PLISSN 0081-3834

SPRAWOZDANIA ARCHEOLOGICZNE

INSTYTUT ARCHEOLOGII I ETNOLOGII POLSKIEJ AKADEMII NAUK

Archaeological Reports
Archäologische Berichte

72/2

KRAKÓW 2020

SPRAWOZDANIA ARCHEOLOGICZNE

INSTYTUT ARCHEOLOGII I ETNOLOGII
POLSKIEJ AKADEMII NAUK

SPRAWOZDANIA ARCHEOLOGICZNE

Archäologische Berichte · Archaeological Reports

72
2

KRAKÓW 2020

Editor
PIOTR WŁODARCZAK, wlodarczak.piotr@gmail.com

Editorial Secretary
ANNA RAUBA-BUKOWSKA, sprawozdania.archeologiczne@gmail.com

English proofreading
MARK TOUSSAINT

Technical Editor and Layout
JOANNA KULCZYŃSKA-KRUK
Centre for Mountains and Uplands Archaeology, Institute of Archaeology and Ethnology, Polish Academy of Sciences

Cover
So-called Światowit from Wolin. Photo by PAWEŁ SZCZEPANIK

Professor Jan Machnik. Photo by KRZYSZTOF TUNIA

Editor's Address
CENTRE FOR MOUNTAINS AND UPLANDS ARCHAEOLOGY, INSTITUTE OF ARCHAEOLOGY AND ETHNOLOGY, POLISH ACADEMY OF SCIENCES, 31-016 KRAKÓW, UL. SŁAWKOWSKA 17

Ministry of Science and Higher Education
Republic of Poland

Volume financed by the Ministry of Science and Higher Education from the founds for science popularization activities, Contract Nr 651/P-DUN/2019

PL ISSN 0081-3834
DOI: 10.23858/SA/72.2020.2

Printed by
PARTNER POLIGRAFIA Andrzej Kardasz, Grabówka, ul. Szosa Baranowicka 77, 15-523 Białystok

Edition: 300 pcs.

Sprawozdania Archeologiczne is regulary listed in the: SCOPUS, CEJSH, ERIH Plus

CONTENTS

Sprawozdania Archeologiczne is regulary listed in the International Current Awareness Service: Anthropology. Selected material is indexed in the International Bibliography of social and Cultural Anthropology.
Indexed in:
IBZ – International Bibliography of Periodical Literature
IBZ – CD-ROM

Dedicated to Professor Jan Machnik for His 90th Birthday

SPRAWOZDANIA ARCHEOLOGICZNE 72/2, 2020
PL ISSN 0081-3834
DOI: 10.23858/SA/72.2020.2.2260

ARTICLES

Kathryn M. Hudson[1], Janusz Kruk[2], Sarunas Milisauskas[3]

JOURNEYS OF THE MIND: COGNITIVE LANDSCAPES, SYMBOLIC DIALECTS, AND NETWORKED IDENTITIES IN THE EUROPEAN NEOLITHIC

ABSTRACT

Hudson K. M., Kruk J., Milisauskas S. 2020. Journeys of the Mind: Cognitive Landscapes, Symbolic Dialects, and Networked Identities in the European Neolithic. *Sprawozdania Archeologiczne* 72/2, 11-40.

Although the notion that the past was populated by cultural spheres containing relatively homogenous populations is pervasive, nuanced considerations of intra-culture variability allow for the recognition of local or regional identities that were simultaneously connected to but distinct from an overarching cultural sphere. This requires the identification of multiple interrelated cultural constituents and the recognition of a kind of cultural layering in which the identity or identities salient for members of a particular group are conceptualized as consisting of variably articulating categories that interact with and depend upon each other. Our approach to cultural variability and identity construction is based on this view and posits that cultural spheres studied in archaeological contexts can be divided into distinct but related cultural subgroups or dialects based on variations in material cultural data and studied independently or comparatively.

Keywords: cognitive landscapes, symbolic dialects, Cucuteni culture, painted pottery, wave medallions, cultural dialects

Received: 30.06.2020; Revised: 07.09.2020; Accepted: 27.10.2020

1 Department of Anthropology, Department of Linguistics, State University of New York at Buffalo, Ellicott Complex, Buffalo, NY 14261-0026, USA; khudson@buffalo.edu; https://orcid.org/0000-0002-5313-1544
2 Institute of Archaeology and Ethnology, Polish Academy of Sciences, Sławkowska 17, 31-016 Kraków, Poland; janusz.z.kruk@gmail.com; https://orcid.org/0000-0002-5014-9327
3 Department of Anthropology, State University of New York at Buffalo, Ellicott Complex, Buffalo, NY 14261-0026, USA; smilis@buffalo.edu; https://orcid.org/0000-0002-0225-3832

INTRODUCTION

There is a pervasive notion that the past can be characterized in terms of cultural spheres containing relatively homogenous populations. Although local and regional variations within these spheres always exist, they are often described as either (1) geographically or temporally constrained singularities marking distinct subcategories within a broader cultural landscape or (2) subsumed within the range of variations allowable for a particular cultural theme. Discussions of these variations are thus routinely positioned within a broader – and ostensibly dominant – cultural tradition in a manner that maintains perceptions of cultural singularity and obscures the kinds of variability used to create and affirm more localized identities. Through the analysis of a sample data set containing nine medallion motifs drawn from the summary discussion in Ciuk (2008) – an admittedly small sample but one that is nonetheless representative of the diversity in the Cucuteni cultural sphere and conducive to the spatial constraints of an introductory analysis based on ongoing work – a more refined view based on the concept of cultural dialectology can be developed. Such approaches to culture are inherently pluralistic and require data-driven frameworks in which variations significant to past individuals are prioritized. Cognitive landscapes provide a new and nonphysical supplement to orthodox frameworks, and the use of a syntactic textuality for their analysis facilitates consideration of how the identities associated with them were networked.

A nuanced approach to the issue of intra-culture variability requires awareness of local or regional identities that were simultaneously connected to but distinct from the overarching cultural sphere. This entails the recognition of a kind of cultural layering in which the identity salient for the members of a particular group can be conceptualized as composed of multiple juxtaposed identities that interact with and depend upon each other. Similar kinds of cultural pluralism have been described ethnographically (see *e.g.* Leach 1959) and, more recently, archaeologically (see Hudson 2015; 2016; Hudson and Henderson 2014). The key observation of these and related studies is that identity is not a singular concept tied to a clearly demarcated – and often imposed – grouping but rather is based on the negotiation of broader cultural norms and localized variations. This negotiation, and the interpretations of culture and cultural identities associated with it, is reflected in the cognitive landscape and its markers.

MAPPING IDENTITIES: COGNITIVE LANDSCAPES AND SYMBOLIC DIALECTS

Landscapes are traditionally defined on the basis of their connection(s) to a marker or set of markers within the physical world. These can be naturally occurring or culturally constructed; both types are tied to human conceptualizations of their environment, and both reflect culturally specified processes of meaning attribution that are tangible to individuals unaware of these cultural semantics. In archaeological contexts, landscape studies frequently emphasize "spatial, [but] not necessarily ecological or economic, relationships… [they] model places and spaces as dynamic participants in past behavior, not merely setting (affecting human action), or artifact (affected by human action)" (Branton 2009, 51). This approach maintains an emphasis on the physicality of landscape markers but productively treats them as contextualized instantiations of the dynamic and interactive connections between landscapes and space rather than as independent singularities. These relationships are rooted in cultural associations that can be conscious or unconscious and may be situated within the cultural, social, and/or natural world. The danger, however, is that the relationships brought to bear on such analyses are etic – those of the contemporary researcher – rather than ones extant in the ancient cultural context under review.

An alternative less prone to distortion comes from cognitive landscape theory, which de-emphasizes non-cultural, topographic elements of landscapes and instead focuses analytically on emic dimensions of their markers. This framework develops the notion of cognitive landscapes – defined as culturally specific landscapes that are physically indicated by material culture markers recognizable to members of the relevant culture but separable from the natural and physical worlds – to cultivate a new dimension of landscape studies (see Hudson and Henderson in press; Hudson and Milisauskas 2015; 2018). It focuses on two interrelated processes: (i) the sociocultural mappings salient in the lives of individuals and (ii) the cognitive understandings that govern interpretation in ways that demarcate and reify identity (*ibid.*). These landscapes are "culturally learned, socially sanctioned and physically indicated but extant only in the minds of their experiencers" (Hudson and Milisauskas 2018, 214); they are accessible only through culturally-specified processes of cognitive mapping that use a particular cultural grammar – defined, briefly, as the principles and patterns that structure and underlie a system of cultural knowledge and norms – to link physical markers to significances within the internal (cognitive) world. Cognitive landscapes are thus rooted in physical (*i.e.* tangible, visible) markers – like all landscape varieties – but bound only to those markers rather than to a particular place or space. They thus differ from notions of cognitive space (Delle 1998) and ideational space (Knapp and Ashmore 1999), which function as "culturally transmitted mechanism[s] used for decoding landscape markers and navigating human-landscape interactions" (Delle 1998) but remain physically bound.

A full summary of this framework is not possible here (but see Hudson and Henderson in press; Hudson and Milisauskas 2015, 2018 for expanded discussions). However, it is necessary to consider the general features and functions of cognitive landscape markers before examining how Cucuteni iconographic elements mark cultural and semantic categories. These aspects of imagery, like most cognitive landscape markers, were intentionally produced by human activity. They are physical creations but are not physically bound to a geographic place or space; they are components of a particular *cultural* environment accessible anywhere an individual with the necessary cultural competency/competencies encounters such a marker. This does not mean that cognitive landscape markers are idiosyncratic, however, since their existence depends on their relationship to culturally prescribed analytical frameworks (Hudson and Milisauskas 2018, 214). This is true even when the culture-specific significances that underlie them are attached to immutable natural features rather than constructed materials.

Unlike the markers of traditional (*i.e.* physical) landscapes, cognitive landscape markers are not always recognizable to those outside of the relevant sociocultural system(s). Their physical existence is perceptible to anyone, but their identity as markers of a cognitive landscape is only perceptible to individuals with knowledge of the particular cultural grammar that assigns them this role. It is, of course, possible for multiple cultural systems to assign significance to a single marker, though the semantics assigned to these markers in these cases – and the features that indicate it – are culturally variable. Individuals with knowledge of different cultural grammars recognize and respond to different things (even in cases of closely related cultural dialects, albeit potentially less so) and accordingly have different interpretations. In these and all other cases, the demarcative functions of cognitive landscape markers are rooted in a culturally defined semantics embodied in one or more of their features. The features that identify them are recognizable only to members of the cultural group or groups that imbue them with semantic significance; the identification of these markers as semantically salient is thus as important than the particularities of their physical form. This reflects the interaction between intangible cultural constructs and tangible manifestations of sociocultural ideas that characterizes cognitive landscapes (Hudson and Milisauskas 2018, 215).

These features of cognitive landscape markers suggest they function as "culturally situated enactive interfaces through which sociocultural knowledge and norms of behavior are organized, reified and transmitted" (Hudson and Milisauskas 2018, 215). The implications of this functionality are significant, since

> "[e]ngagement with these markers entails a social institution…that is itself a product of collective cognitive effort, inherited by successive generations of cultural adherents as a product "constituted in mental processes already accomplished by others" and perpetuated through the ongoing engagement of individuals with this system to accomplish further cognitive work (Gallagher 2013, 7). Such institutions define the relevant semantic parameters; these definitional processes generate cognitive landscapes by conceptually animating their markers through the assignment of culturally rooted significances." (Hudson and Milisauskas 2018, 215).

Cognitive landscapes are produced whenever and wherever their markers are encountered; they are activated through engagement with these markers in a way that extends cultural cognitive processes to variable external spaces. They are mental institutions dependent on the collective recognition of their significance(s) by a group of individuals who agree on the relevant semantic parameters and collectively perpetuate or modify the associated cultural paradigm(s) (for an expanded discussion, see Gallagher 2013; Gallagher and Crisafi 2009; Hudson and Milisauskas 2018). They also form one part of a transient coupled system that reflects a culturally specified cognition and the kind of enactive process described by Gallagher (2013, 5); the other part is instantiated by the cognitive landscape markers connected to them. The successful interpretation of their semantics within this system requires cognitive processes that are "continuously available but selectively engaged based on available material evidence" such that "coupling occurs reliably whenever the specified external cues are encountered" (Hudson and Milisauskas 2018, 215). These cues come from aspects of material culture – the cognitive landscape markers – that function as correlated enactive interfaces that trigger culturally specific responses (interpretations, interactions, and/or behaviors) when they are encountered by individuals with the cultural knowledge necessary to recognize them. This suggests that "cultural knowledge and norms develop and are learned in combination with external indicators that couple with their cognitive counterparts" (Hudson and Milisauskas 2018, 215-216).

The cognitive processes underlying these transient couplings are embedded in a sociocultural system that structures an individual's environment, positions them within a culturally defined conceptual space, and constrains their engagement with – and interpretation of – cognitive landscape markers. They reflect a collective (or collectively rooted) sociocultural mind that couples external and internal dimensions of thought and conditions the resulting actions and/or interpretations (Hudson and Milisauskas 2018; see also Tollefsen 2006) and reflect Menary's (2007; 2013) view of enculturated cognition. Their use of imagery and other physical markers constitutes a public representation system in which "the knowledge required to interpret their markers and recognize their semantic loci, like the skills required to reproduce them in interpretable ways, are transmitted by …enculturation" (Hudson and Milisauskas 2018, 216; see also Menary 2013 and Sterelny 2012).

The textuality that structures these markers guides this interpretive process and reflects the general cultural grammar that licenses them, particularly when imagery functions as a cognitive landscape marker (for expanded discussions of textuality and its applications, see *e.g.* Bakhtin 1981; Boyarin 1993; Derrida 1977; Hanks 1989; Lavin 1990; Preucel 2006; Quilter 1997; Riles 2006; Street 1984; Whorf 1956; Winter 1981). Variations of a particular textual theme reflect symbolic dialects associated with more specific identities in the relevant cultural category and can function as markers in a cognitive landscape construction. Considerations of the morphosyntax that underlies these variations – the compositional rules and parameters that license particular textual and constituent forms – yields a syntactically or morphosyntactically rooted textuality that permits evaluation of the potentially pluralistic ways textual units are formed (see Hudson 2013a; 2013b; 2014). It also recasts textuality as a dynamic and motivated process intimately related to the sociocultural identities that create it. This reflection of socially and/or culturally defined values causes syntactically textual units to simultaneously function as general indicators within the cognitive landscape – since the recognition and production of particular textual structures is contingent upon the existence of a shared cultural grammar that licenses them and recognizes their semantic potential – and as representations of more precise identities – marked by variations on this shared textual theme – within the broader cultural sphere responsible for a particular cognitive landscape construction.

The cognitive landscape theory therefore proposes a new approach to landscape studies that is based on the sociocultural mappings salient in the lives of individuals and reflective of the cognitive understandings that govern interaction and interpretation. Unlike the cognitive space described by Delle, which is an interpretive framework used to access the significances of landscapes in the physical plane, cognitive landscapes – like their physical counterparts – are distinct entities that require their own interpretive frame. This need for an interpretation that can ascertain the significances of the relevant markers is a feature of all landscape varieties; in the case of cognitive landscapes, the cultural grammar and its associated identities fulfills this function. More crucially, cognitive landscapes allow consideration of identities and sociocultural relationships that were salient to members of a particular population. This allows more etic access to the emic world in which ancient individuals lived and, by extension, creates the possibility for more nuanced archaeological interpretations.

This theoretical and methodological perspective facilitates consideration of how symbolic systems can be more emically approached and facilitates recognition of dialectal subsets that can be used to populate a cognitive landscape. The identification of these symbolic dialects must begin with the definition of the particular kind of textual unit to be considered, and syntactic textuality provides an ideal methodology for identifying the kinds of textual units that exist within a particular corpus. Spatially demarcated symbolic units – which can often be identified based on the presence or absence of lines that divide the constituent elements of the text and demarcate subgroups within a broader textual unit – provide one such data set. Such compositions reflect a degree of intentionality and cohesiveness different from the isolated or more random uses of the signs, and it suggests that the elements contained within such sets are intended to be interpreted as a single semantic unit. We will focus here on the medallions that occur among the imagery found on Cucuteni ceramics and on the ways in which these structures relate to and reflect the cognitive landscape(s) salient in the lives of their creators.

CUCUTENI: A CASE STUDY

The Cucuteni culture belongs to the Ariuşd-Cucuteni-Tripilia Cultural Complex of the Copper Age or the Eneolithic period (Ellis 1984; Lazarovici *et al.* 2009). It is found in Romania, Moldova and the western parts of Ukraine, and its three major phases – A, A-B and

B – are dated roughly from 4600 to 3500 BC (Mantu 1998). The Pre-Cucuteni period is dated from 5050 BC (Lazarovici 2010). It should be noted that the Ukrainian periodization is somewhat different and can be divided into Tripilia A (Pre-Cucuteni), BI (Cucuteni A), BII (Cucuteni A-B), CI-γI (Cucuteni B) and CII- γII (Horodiştea-Erbiceni). The Transylvanian variant of this Complex is called Ariuşd.

Since we concentrate here on the symbolism of artifacts, we will only discuss briefly other aspects of this Copper Age culture such as the impressive settlements. There is now quite an extensive English literature about the Cucuteni or Cucuteni-Tripilia (Ellis 1984; Lazarovici 2009; Lazarovici *et al.* 2009; Lillie 2008; Marinescu-Bîlcu and Bolomey 2000; Burdo *et al.* 2013; Ciuk 2008; Diachenko and Menotti 2012; Zbenovich 1996; Harper 2013; Menotti and Korvin-Piotrovskiy 2012). Cucuteni settlement organization, and especially the architecture of houses, has been extensively investigated by archaeologists (Lazarovici and Lazarovici 2007a; 2007b). There are more than 1800 Cucuteni sites in Romania and 500 additional sites in Moldova (Monah 1992; Popovici 2000; Lazarovici and Lazarovici 2007b, 439). While some Cucuteni houses were subterranean, surface structures were the most common variety. Some sites had a large number of houses; for example, Petreni in Moldova occupied 30 hectares and had 498 houses arranged in nine circles (Ellis 1984). Houses ranged in size from less than 20 square meters to more than 100 square meters (Lazarovici and Lazarovici 2007). Some sites such as Truşeşti, Hăbăşesti, Traian, and Cucuteni-Baiceni had defensive ditches (Florescu 1966).

The Cucuteni culture produced some of the most beautiful painted pottery and figurines of humans and animals of the European Copper Age (Dumitrescu 1979; Lazarovici *et al.* 2009). These materials have been extensively used to study ancient symbolism and ritual (Gimbutas 1995; Monah 1997; Lazarovici 2005). Marija Gimbutas (1982, 34) clearly expressed this practice when she observed that "characteristic of the Cucuteni peoples are their colourful bichrome and trichrome vases, bowls, ladles, and other pottery forms; equally distinctive are libation jugs, vessels for divination, altars and schematic anthropomorphic and zoomorphic figurines, which reveal an adherence to elaborate ritual practices." Many of the examples used in the analysis developed here are drawn from Cherkasiv Sad, Petreny, Bernashivka, and Konivka, which can be assigned to the Western Tripilia grouping in the larger Cucuteni-Tripilia cultural sphere and which were occupied in sequence: Konivka – Cherkasiv Sad – Bernashivka II – Petreni (Ryzhov 2007). Additional samples came from sites in Moldova.

Medallions Defined

Medallions can be concisely defined as textual units in which a central symbolic element or set of elements is demarcated by framing that separates the internal components from other iconographic elements. They represent a particular form of ceramic decoration and have the potential to encode information about symbolic dialects and how they relate to cognitive landscapes. The frame(s) are most often circular in form, though they may also be rectangular or figural, and concentric framing is common. The internal components are variable and single elements occur as often as multi-element compositions. The most important feature of these internal elements is not their particular form, however, but rather the fact that they are demarcated by framing elements; this is the syntactic characteristic that marks them as distinct units with their own internal textuality.

Determining the boundary between the framing and central elements of medallions can be challenging. Although many medallions have clear distinctions between their internal motifs and the framing elements that surround them, some have elaborate frames surrounding relatively small internal motifs that can, at times, seem to blend into the frames that encase them. Such blurred boundaries are most common in medallions with complex frames because the embellishment or composition of the framing elements can easily seem linked with the internal motif in such compositions; this is especially true when the internal motif is partially mirrored in the embellishment of the frames.

The key to identifying where an internal element ends and the frame begins lies in the characteristics of the framing itself. Although it is possible for framing elements to be embellished with decorative motifs or composed of multiple distinct features, these are distinct from the central element. This distinction exists even when the central motif incorporates some or all of the same features that constitute or embellish the frame; the difference is that framing elements are clearly demarcated and structured – most often into circular or ovoid forms – while central elements exhibit more freedom of form and do not surround any other element (though circular components may be part of a medallion-internal composition). If elements or sets of elements are arranged sequentially in a banded form that is circular or geometric and situated around an internal area, they belong to a frame. If elements or sets of elements exhibit a more clustered arrangement and are surrounded by sets of other elements that are sequentially arranged, they belong to a central motif.

It is worth noting that the use of medallions for analyses rooted in syntactic textuality represents the establishment of an etic grid as defined by Bohnemeyer (2006). In this model, an etic grid can be viewed as "a categorization…[that is] independent and supposed to hold as a classification matrix for the domain of study" (Bohnemeyer 2006, 17). Although originally intended to describe methodologies specific to the elicitation and study of data based on natural languages, *i.e.* "language-independent conceptual classifications of stimuli in a given domain" (Bohnemeyer 2006, 32), the concept is easily appropriated for the archaeological analysis of imagery. In these contexts, the use of an etic grid as an independent classificatory frame for the analysis of a particular domain is useful for the study of complex systems in which a single target variable must be isolated in order for consideration. Although the potential for bias and circular reasoning has been leveled as a criticism of such methods, cognizance of these potential pitfalls – as pointed out by Bohnemeyer (2006) – allows them to be avoided.

Cucuteni Medallions as Cognitive Landscape Markers

Cucuteni medallions most commonly have a circular or oval shape in which the central element(s) are surrounded by frames that themselves constitute a significant component of the vessel's imagery. The internal space of these medallions is clearly demarcated and structured by its framing, though frame(s) and the component(s) within them can intersect in a manner suggestive of a more dynamic interpretive process in which frame meanings are intimately and necessarily associated with the reading of the internal elements. Many medallions occur in linear groups that form part of the imagery of wide bands that encircle the exterior surfaces of ceramic vessels, though it is also possible for these groups to occur in nonlinear positions and be scattered throughout decorated areas. Medallions may also occur individually as stand-alone motifs and in groups whose constituents are related through their occurrence on a particular vessel and/or similarities in their form and composition rather than through intervening pieces of imagery.

Cucuteni medallions occur in a variety of forms that can be differentiated based on the structural features of the frames and the relationships that exist between the framing and internal elements. One of the most common of these, identified here as the wave medallion, contains an internal element or set of elements surrounded by a frame that appears to swirl around it in a relatively fluid manner (Fig. 1). The upper part of the frame rises from the lower left-hand side of the medallion and often appears to develop from imagery that occurs to the left of the medallion itself. The lower portion of the frame mirrors this arrangement and appears to move upwards and to the right in a manner that encloses the lower portion of the medallion before moving towards imagery occurring to the right.

Wave medallions offer an interesting point of analysis. The frequency and broad distribution of these motifs suggests that, within the Cucuteni cultural sphere, the wave medallion was recognized as a valid structure capable of licensing semantically significant interpretations. Such recognition had as a prerequisite the existence of a shared cultural grammar that united the dialects networked within the Cucuteni cultural sphere through a common adherence to a shared set of ideas about the kinds of forms and structures that were meaningful or not meaningful. It is safe to assume that motifs deemed incapable of

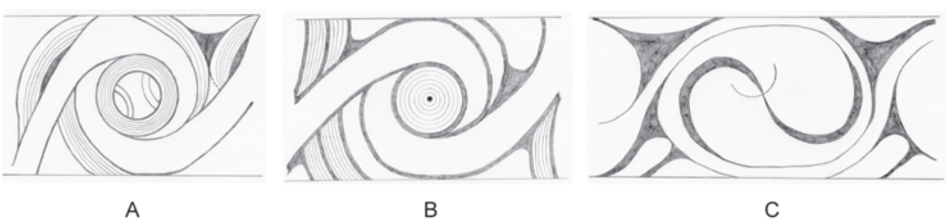


Fig. 1. Examples of Cucuteni wave medallions on ceramics from (A) Cherkasiv Sad II, (B) Petreny, and (C) Bernashivka (all illustrations by K. Hudson)

meaning generation would have occurred rarely – if at all – on the material culture that was produced, particularly since individuals other than their creator(s) would not have recognized such anomalies as semantically significant.

The cultural grammar that licensed meaningful forms and form combinations was also responsible for the existence of the cultural sphere itself, since it provided the necessary common substrate that allowed local variations (*i.e.* dialects) to interact and affiliate with each other despite their differences. Culture can thus be viewed as a set of networked cultural dialects unified by their use of a shared cultural grammar. This approach creates a situation in which shared underlying structures unify related cultural dialects and exist simultaneously with distinct local manifestations of these structures that create and reaffirm localized identities. The result of this dual-level process of identity formation is that that ancient individuals could have recognized non-local groups and materials as belonging to their culture even when the particularities of cultural expression were unfamiliar.

The occurrence of medallions in multiple distinct contexts indicates that this structure was a product of the cultural grammar salient in the overarching cultural sphere of Cucuteni; by extension, therefore, the geographic distribution of this medallion form provides one criterion for determining the distribution of the Cucuteni cultural sphere. The common structure of wave medallions reflects the existence of a common underlying structural core and thus, by extension, a common cultural grammar. The boundaries of this grammar – and its associated culture – would have demarcated the cognitive landscape into which the inhabitants of the Cucuteni culture, their dialects and their associated material creations were placed. This placement, in turn, allowed individuals to determine relationships at a more refined level than that of the cultural sphere, and it is likely that interpersonal and inter-group relationships were affected in some way by these determinations.

It is important to note that a common underlying structure such as the one that unifies the wave medallion motifs does not necessitate identical or even overtly similar surface manifestations. Although it is tempting to assume that all variations on a particular compositional theme will share some degree of representational commonality – and such commonality is attested in many corpora – it is the structural substrate that indicates shared cultural affiliations rather than the particular forms superimposed onto it in particular contexts. This structure is the level at which culturally-licensed combinations are constructed, and certain kinds of pairings and associations will be allowed within the relevant cultural grammar while others will be deemed nonsensical and thus avoided. Although the particularities of localized instantiations of a culturally shared structure – *i.e.* dialectal variations in its manifestation – can differentiate cultural subgroups and indicate local identities, the shared structural core creates and reaffirms affiliation with a common cultural sphere.

Although a common structural foundation such as that found among Cucuteni wave medallions indicates affiliation with a common cultural sphere, the particularities of local manifestations indicate cultural dialects that existed within this sphere and can shed light on how culturally related individuals and groups identified and related to each other. In this way such variations represent markers on the cognitive landscape. These and other cognitive landscape markers are rooted in and defined by the cultural grammar associated with the relevant cultural sphere, and the ability to recognize and interpret this dimension of their significance requires access to this grammatical system. Recognition of the underlying structural substrate is generated by such culturally-specific grammatical knowledge; consequently, variations in the surface manifestation of a structural norm can be simultaneously identified as culturally similar but dialectally distinct. These distinctions, which differentiate related but separate entities, mark distinct categories on the cognitive landscape and allow for consideration of the identities and sociocultural relationships that were salient.

Variations in the framing elements of wave medallions offer an obvious starting point for considering this kind of variation. Among the eight wave medallions that constitute the sample data set used here, eight distinct frames occur. These can be grouped into three categories based on the particularities of their form: simple wave frames, compound wave frames, and complex wave frames. Examples of simple wave frames are presented in Figure 2. In these frames, the underlying structure is apparent and the swirling of the wave structure appears to move in one direction from the lower left to the upper right. Although these frames may occur in banded or clustered groups, each individual frame is clearly separated from other motifs. This appears to be the most common form of framing for wave medallions, though additional data may, of course, indicate that other varieties are equally prevalent.

Within the category of simple wave frames, as in all such groupings, subdivisions are readily apparent. Although a detailed analysis of these differences is beyond the scope of

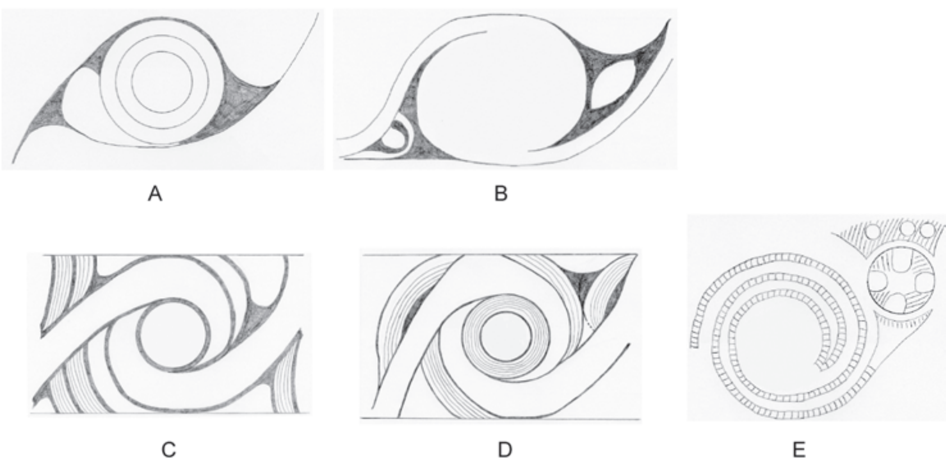


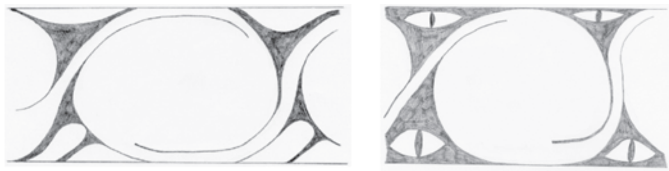
Fig. 2. Examples of simple wave frames from (A) Konivka, (B) Moldova, (C) Cherkasiv Sad II, (D) Petreny, and (E) Oleksandrivka (all illustrations by K. Hudson)

the present discussion, a brief consideration is both interesting and illustrative of the complexity found in Cucuteni imagery. In the case of the samples used here, three subcategories can be identified. The first, dubbed streamlined simple wave frames and represented by Figures 2: A and 2: B, appear to be entirely self contained and have clearly demarcated exterior edges. A second subcategory, identified as embellished simple wave frames and represented by Figures 2: C and 2: D contains frames that are busier than their streamlined counterparts and have more details in and on the framing elements. Although the detail found on some of these, such as Figure 2: D, causes them to resemble compound wave frames (see below), the dominance and features of the broad outermost framing element suggests that they represent embellished simple frames instead. The third subcategory is represented by 2: E and can be described as a split simple frame in which the framing element splits into two components, one of which moves to the lower left and one of which moves towards the upper right.

Examples of compound wave frames are presented in Figure 3. In these frames, the underlying structure is apparent but tightly intertwined with other elements and individual frames are therefore not clearly differentiated. In particular, these frames are joined with other compound wave frames and any associated imagery to produce bands or clusters of wave medallions on the surface of a vessel. Although the visibly swirling nature of the frame means that each framing unit moves from the lower left corner to the upper right, the intertwining of the frames create the sense that each interior element is in fact surrounded by elements in all four corners since the corner elements of adjacent frames are so closely positioned. This form of framing is less common than simple wave frames, though additional data may, of course, require a modification of this assessment.

A complex wave frame is presented in Figure 4. These frames are perhaps the most enigmatic variety, and their forms blur the lines between medallion and non-medallion imagery. In complex wave frame forms, the swirling nature of the frame is present but more difficult to discern, in part because its manifestation is not always as clearly presented as it is in the simple and compound varieties. These frames are commonly intertwined with other non-medallion imagery and may form part of a larger composition. In the example presented in Figure 4, the medallion itself forms the head of a humanoid figure. The swirling dimension of the medallion frame clearly moves up from the lower left hand corner; a small portion of the frame also seems to move towards the upper right hand corner, though the breakage patterns make it difficult to determine the degree of this extension.

The elements positioned below the medallion and the band that moves in from the lower left to form the outermost upper portion of the frame combine with the medallion itself to form the humanoid figure, though they are not themselves part of the primary medallion structure. The curved form of the band to the left of the figure is evocative of a medallion frame, but the curvature pattern of the band that forms the outermost upper portion of the wave medallion suggests that it is separate from the medallion that consti-



A B

Fig. 3. Examples of compound wave frames from (A) Bernashivka II and (B) Moldova (all illustrations by K. Hudson)

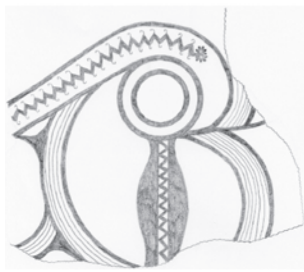


Fig. 4. A complex wave frame from Konivka (illustration by K. Hudson)

tutes the figure's head. This curvature partially encircles the wave medallion and combines with the two concentric circles that constitute the rest of the frame; the curving element below them is compositionally distinct, though the proximity of these elements may suggest that the wave medallion is itself part of a larger textual unit with an internal textuality.

Although variations in the form of the frame used to construct Cucuteni wave medallions likely encoded semantic information necessary for the interpretation of the medallion as a whole, framing elements are – by definition – supplemental to the internal element(s) that form a medallion's core. Although frames form an important part of the textual whole of any medallion and are interpreted through a consideration of the textually contained within this unit, they do not by themselves appear to represent the kinds of elements likely to serve as markers on the cognitive landscape. Instead, they contribute to the interpretation of the medallion motif that is demarcated by them and also contribute to the meaning of any broader textual unit of which they are a part. This role does relate them to dialectally-specific cultural varieties and thus to the cognitive landscape in which these dialects are positions, but their position is secondary and they do not on their own serve as landscape markers.

The internal elements of Cucuteni wave medallions appear to be more significant for the cognitive landscape than the frames that encircle them. This is due, in large part, to their position at the semantic and physical core of the medallion structure; the inside-out or narrow-to-broad focus of textuality-based medallion readings reinforces this interpretation.

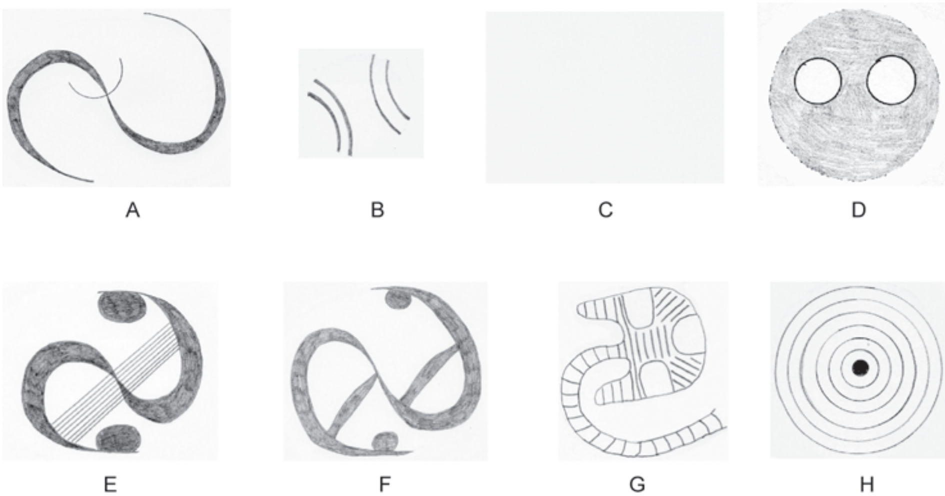


Fig. 5. The internal elements found in the eight wave medallions of the current data set. These motifs occur on vessels from (A) Bernashivka II, (B) Cherkasiv Sad II, (C) Konivka, (D) Konivka, (E) Moldova, (F) Moldova, (G) Oleksandrivka, and (H) Petreny (all illustrations by K. Hudson)

The interpretation or reading of a medallion motif would therefore be based primarily on the culturally specified significances of these internal elements; the information contributed by the frames and other associated elements is supplemental and serves to refine the meaning of the internal component. Additionally, the greater degree of commonality and uniformity among frames suggests a reduced semantic role while the greater variability found among internal elements – even in very small data sets – indicates a more specified significance that, in turn, indicates a closer association with local processes of identity formation.

The internal elements that occur in the eight wave medallions in the current data set are presented in Figure 5. These show a striking range of variability in form as well as in their degree of attachment to or independence from the frame(s) that surround them. Some, such as the s-shaped motifs from Bernashivka II (Fig. 5: A) and Moldova (Figs 5: E, 5: F) and the head motif from Oleksandrivka (Fig. 5: G), connect directly to their frames and appear to develop out them. Others, such as the pairs of arched lines from Cherkasiv Sad II (Fig. 5: B) and the facial image from Konivka (Fig. 5: D), physically articulate with their frames but do not appear to be part of them; the concentric circles from Petreny (Fig. 5: H) do not intersect with their frame in any way. Geometric forms are common (*e.g.* Figs 5: A, 5: B, 5: E, 5: F, 5: H), though anthropomorphic motifs (*e.g.* Figs 5: D, 5: G) and abstract elements such as the empty interior from Konivka (Fig. 5: C) – which suggests that lack of embellishment can be as significant as its pre-sence – also occur.

Further support for the semantic primacy of internal medallion elements and their role as markers on the cognitive landscape comes from the regional patterns suggested by their distributions. An excellent example occurs in two of the interior elements from Moldova, which are reproduced in Figures 6 and 7. Both of these elements have a general s-shape that connects directly to the end of the framing lines. Both are modified by pairs of solid dots positioned at the ends of the element, and both contain lines that cut across their interior spaces. The visual similarities are striking.

The common geographic origins of these motifs, when viewed in combination with their structural commonalities, suggests they were licensed by the same variety of the Cucuteni cultural grammar (*i.e.* they were the products of the same symbolic dialect). This observation requires recognition that the layered nature of culture that defines a cultural sphere as a network of related but distinct cultural dialects also generates a complex dialectal reality in which multiple instantiations of a particular dialect can coexist. In this model, each dialect can be viewed as a kind of miniature sphere in which related variations are connected; the entirety is analogous to the broader cultural sphere that encompasses it.

When viewed in relation to the cognitive landscape, which reflects the sociocultural relationships and distinctions salient within the relevant cultural sphere, this layering implies the existence of multiple categories of landscape markers that correspond to the varying

A B

Fig. 6. One of the internal elements found in a wave medallion from Moldova, shown (A) in isolation and (B) in association with its frame (illustrations by K. Hudson)

A B

Fig. 7. Another internal element found in a wave medallion from Moldova, shown (A) in isolation and (B) in association with its frame (illustrations by K. Hudson)

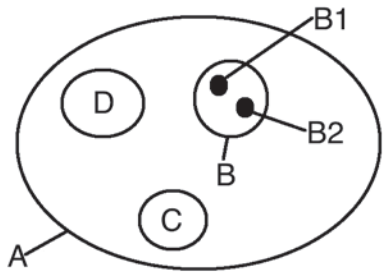


Fig. 8. A schematic representation of the varying levels of markers possible within a cognitive landscape (illustration by K. Hudson)

levels of detail. The relevance of these levels to the cognitive landscape varies based on the needs of the individual; broader markers are assumed to be more relevant for those viewing a particular dialect or set of dialects from an etic perspective, while those with a more emic knowledge of one or more dialectal varieties are likely to have focused on more specific and refined markers. Both levels of analysis represent cognitive landscape markers; the difference is in the degree of specificity.

An illustration of this concept is provided in Figure 8. In this image, the large circle marked A represents the cognitive landscape as it is defined by a particular cultural sphere. This is the space into which the networked dialects that comprise the cultural sphere are placed, and markers within it convey information about relationships and affiliations. These markers are tangible items such as imagery whose similarities relate them to a common cultural sphere and grammar; their differences indicate distinctions salient in the social and cultural lives of individuals and groups. The circles labeled B, C, and D represent markers on this cognitive landscape that correspond to symbolic dialects. These symbolic variations reflect cultural dialects (*i.e.* localized instantiations of the overarching cultural grammar); the markers therefore indicate the position of the relevant materials and their creations within the landscape defined by the cultural sphere. More refined markers indicating variations within these dialects are also possible, as indicated by the dots marked B1 and B2; these convey more nuanced information about identity.

In terms of the motifs presented in Figures 6 and 7, the basic structure – an s-shaped line modified by two dots and bisecting lines – represents a cognitive landscape marker identifying a particular symbolic dialect that is associated with Moldova and which, in turn, reflects a particular identity or position within the broader grammatical tradition of the relevant cultural sphere. More specific instantiations or variations within this cultural dialect – which may themselves be labeled as dialects or sub-dialects, though it is possible for terminological issues to obscure the overall analysis – are indicated by the particularities of individual manifestations of this more general marker. These represent more refined markers on the cognitive landscape and are capable of provided specified information.

The need for this increased level of detail is contextually conditioned; some interpretations would have focused only on general kinds of markers in order to assign individuals and items to relatively broader classifications, while others required more specific information concerning particular kinds of relationships and thus focused on different kinds of markers. A diagrammatic representation is presented in Figure 9.

Although it is tempting to classify the interior element in the medallion from Bernashivka II with the Moldovan motifs, the structural underpinnings of these elements suggest that a more refined and layered approach is once again necessary. The presence of an s-shaped line as the primary element unifies the three motifs, but these lines are modified differently in the Moldovan examples and in Bernashivka II. This suggests that use of an s-shaped line as the primary element may represent a particular symbolic/cultural dialect while the different styles of modification may indicate sub-dialects or variations; particular instantiations of these modification schemes may, in turn, represent even more localized traditions. Each of these levels contains cognitive landscape markers of varying degrees of specificity, and the markers relevant to an individual in a particular circumstance are contextual. The key observation is that the motifs that occur inside wave medallions indicate positions within the cultural sphere and thus serve as markers on the cognitive landscape. A refined diagrammatic representation is presented in Figure 10, and the potentially multi-tiered nature of these markers is once again illustrated.

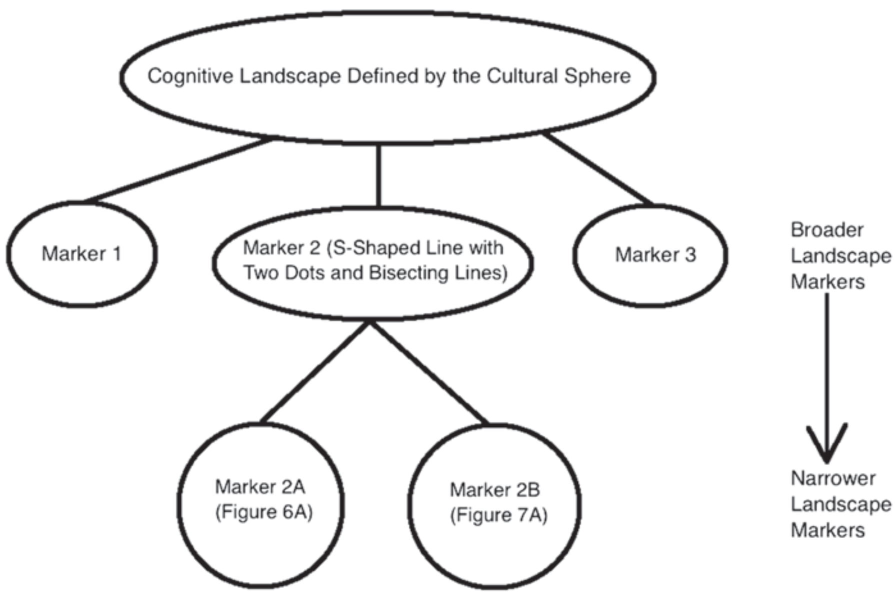


Fig. 9. A diagrammatic representation of how the Moldovan motifs relate to a multi-tiered system of cognitive landscape markers (illustration by K. Hudson)

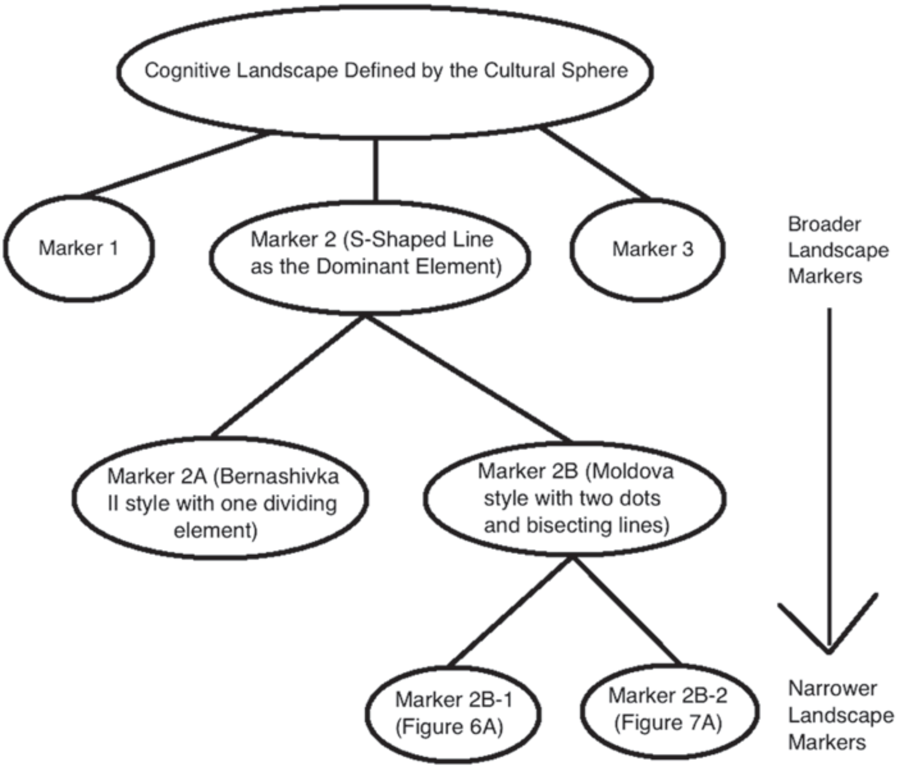


Fig. 10. A refined diagrammatic representation demonstrating how the Moldovan and Bernashivka II motifs relate to a multi-tiered system of cognitive landscape markers (illustration by K. Hudson)

An even more suggestive example comes from the wave medallion found at Cherkasiv Sad II (reproduced in Figure 11). The internal element of this medallion is distinctive and consists of two sets of mirrored parallel arcs that attach directly to the interior edges of the frame itself. A variation of this element occurs in another medallion from Cherkasiv Sad II, though this example is not another wave medallion but rather represents a more standard medallion form (Fig. 12). Its primary frame is composed of a series of concentric circles – the outer- and innermost of which are darker and thicker than those between them – that are situated within a broader composition that provides a kind of secondary frame. The interior element itself represents a variation of the form found in the wave medallion. It contains the same sets of parallel arcs that attach directing to the interior edges of the frame, but it also contains two vertical lines that demarcate an interior space that is filled with a column of dots.

The underlying structure that unifies these motifs – two sets of mirrored parallel arcs that attach to the interior edges of the frame – serves as a cognitive landscape marker

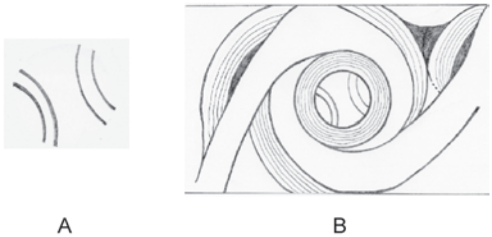


Fig. 11. The internal element found in the wave medallion from Cherkasiv Sad II, shown (A) in isolation and (B) in association with its frame (illustrations by K. Hudson)

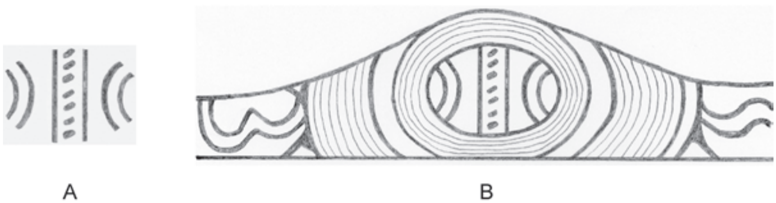


Fig. 12. The internal element found in the standard medallion from Cherkasiv Sad II, shown (A) in isolation and (B) in association with its frame (illustrations by K. Hudson)

identifying a symbolic dialect associated with Cherkasiv Sad II. The use of this dialect reflects a particular identity or position within the broader grammatical tradition of the Cucuteni cultural sphere and thus indicates a corresponding cultural dialectal tradition. Observers with access to the Cucuteni cultural grammar would have recognized this motif as valid and been able to associate it with a particular group of individuals or communities. This association formed the basis of the use of this structure as a marker on the cognitive landscape; its appearance in multiple iconographic contexts from the same site reinforces the interpretation of medallion-internal elements as related to identity and pertinent to cognitive landscape orientation.

Modifications of this structure represent dialectal variations indicating specific groups or identities within the broader cultural dialect indicated by use of the two sets of parallel arcs. These manifest on the cognitive landscape as more refined markers capable of providing specified information that assigns the associated individuals and items to more nuanced classifications; the relative importance of this kind of specificity is contextually conditioned and may only be relevant in some situations. As with the Moldovan and Bernashivka II examples, the structural underpinnings of these elements suggest that a more refined and layered approach is necessary. Cognitive landscapes are culturally conditioned and fluid entities closely connected to the situation of their users, and different kinds of markers will be assigned primacy in different situations. A diagrammatic representation involving the Cherkasiv Sad II examples is presented in Figure 13.

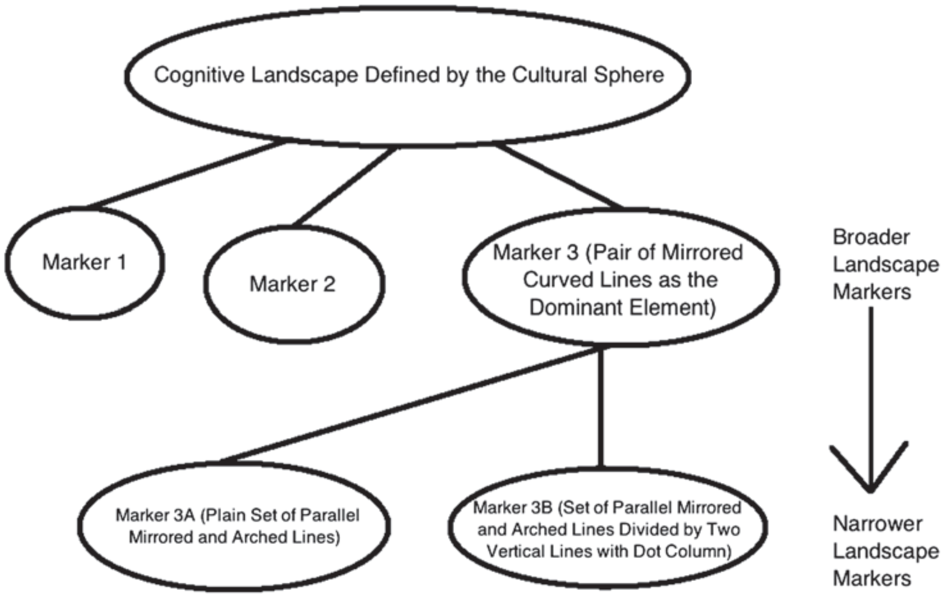


Fig. 13. A diagrammatic representation demonstrating how the Cherkasiv Sad II motifs relate to a multi-tiered system of cognitive landscape markers (illustration by K. Hudson)

DISCUSSION

Cognitive landscapes are tangibly signified by material markers but intangibly realized in the minds of their experiencers and accessible only through processes of cognitive mapping. The validity of a cognitive landscape is dependent upon its relationship to the frameworks recognized by a particular cultural group, which provide the general semantic foundation that allows the cognitive landscape to have meaning(s) shared by all members of the relevant sociocultural group. Crucial to this analysis is the view that culture is a composite entity made up of constituent elements that are combined and recombined in different ways to form variations on a common cultural theme. The scope of these variable combinations constitutes a cultural sphere which can be defined as the range over which combinations of a defined set of cultural elements occur in distinct but mutually-intelligible and interacting patters; the particular variations within this sphere represent cultural dialects capable of developing distinct symbolic and cultural subsystems.

Cultural Dialects and Networked Identities

An emphasis on the negotiated nature of culture and cultural identity requires the development of a new analytical frame in which the multiple constituents of a culture can be recognized and their relationships considered. We posit that such a methodology can be productively described as a kind of cultural dialectology in which individuals in different parts of a cultural sphere can be viewed as 'speaking' different cultural dialects. In the field of linguistics, dialects – along with the associated concepts of ethnolects, sociolects, and other group-based varieties – are defined as distinct but mutually intelligible language varieties spoken by particular subgroups within a broader population of speakers. Speakers are able to understand dialects other than their own, but they often view speakers of these non-native dialects as somehow different from themselves. Cultural dialectology adopts the general premises underlying its linguistic counterpart and posits that the members of a culture can be divided into dialectal subgroups whose members are more similar to each other than they are to the inhabitants of other subgroups within the broader cultural sphere. Each of these can be studied as a distinct and independent entity; alternatively, they can be comparatively approached through a framework that incorporates one or more additional varieties. As with dialects based on language, cultural dialects are generally recognizable and interpretable cross-dialectally by non-native users. However, each dialect represents a distinct approach to or variation of a broader cultural tradition. This overarching category is not a normalized or dominant standard: such hierarchical structuring is inappropriate and rooted in subjective assessments of validity and importance. Instead it is the collective set of elements, features, and patterns that define a particular cultural category and establish the parameters within which it's variations (*i.e.* dialects) function.

Culture must therefore be reanalyzed as a composite entity made up of constituent elements (*i.e.* the elements that comprise religious practice, kinship, material production, *etc.*) that are combined and recombined in multiple ways to form variations on a common cultural theme. The geographic or temporal scope of these related combinations constitute a cultural sphere, which can be defined as the range over which combinations of a defined set of cultural elements occur in distinct but mutually-intelligible and interacting patters. This intelligibility and interactivity within past cultures must be inferred from a combined consideration of material gradients of similarity and distributions, but the agency and value-systems imbued in material remains and the places they were used allows for such analyses if they are suitably rooted in the empirical data. In both past and present situations, a cultural sphere most commonly contains multiple varieties; culture is therefore a multi-layered entity in which a broader cultural level is juxtaposed onto a second level comprised of variations on the more general cultural theme.

These levels combine in the experiences of individuals to create a complex cultural identity that is both locally rooted and more broadly constrained. This layered approach to culture and localized cultural variation does not, however, mean that cultural dialects exist primarily in isolation. Cultural spheres are defined as the range over which combinations of a defined set of cultural elements (*i.e.* cultural dialects) occur in distinct but mutually-intelligible and interacting patterns; the inclusion of *interacting* as a descriptor in this definition is crucial. Cultural dialects are networked within the scope of their associated cultural sphere, and it is this networking that produces the culture to which these dialects belong. In other words, a cultural sphere represents the interconnected dialects of a particular culture. These dialectal networks reflect interactive realities and perceived relationships and consequently shape the experiential landscape of the individuals who inhabit them.

Towards a Pluralistic Past

This definition of culture is inherently pluralistic. The existence of cultural dialects requires that each culture be reconceptualized as a network of distinct but related dialectal groups that are networked within the associated cultural sphere; the extrapolation of this observation so that it encompasses an entire region (*e.g*. eastern Europe) reveals a complex and multilayered reality in which the imposed categories of archaeology are woefully insufficient. It is necessary to move beyond the typological frameworks that have dominated the field and transition to a more nuanced analytical frame in which variations of different forms can be used in tandem to create a picture of the past that more accurately captures the cultural realities of the individuals who inhabited it.

Archaeological attempts to develop a more emic view of the past are hindered by the lack of cultural interpreters who can explain the significances of material and spatial variations to the contemporary researcher. Humans as a species are prone to categorizing their world in an attempt to make it make sense; culture and language are both elaborate semiotic systems that use categorization to structure the world according to local convention and organize symbolic relationships through the association of various significances with particular categories and the manipulation of their constituents. The ability to 'read' the resulting constructions requires access to the relevant cultural grammar; without it, many significant emic patterns will be overlooked.

Unlike ethnographic analyses, which have access to consultants native to the culture in question, archaeological interpretations must be based on the pattern-recognition abilities of the investigator(s). These abilities are governed in large part by the cultural inheritance of the scholar, and the kinds of patterning and variations which are identified as significant will be influenced by the patterning and variations that are recognized and valued within the investigator's own cultural tradition. Archaeological frameworks are thus a reflection of the culture of the scholar as frequently as they are a reflection of the culture under study. The difficulty of accessing an extinct cultural grammar leads to the substitution of a modern one; such replacements often go unrecognized and unchallenged due to the lack of informants and the power of orthodox disciplinary assumptions about what kinds of variability are worthy of note.

A related issue comes from the nature of archaeological materials. Archaeologists are required by necessity to base their investigations solely on an incomplete set of materials that provides only a partial representation of the culture under study; issues of differential preservation and selective sampling are additional complicating factors. This reality combines with the etic tendencies of archaeologists and the human desire to classify in a way that has produced a disciplinary emphasis on typological methodologies and a corresponding tacit acceptance of the assumptions inherent within them. Although typologies are undeniably beneficial, particularly in combination with other analytical frames, they are prone to obscuring or minimizing variations in a material dataset and creating a false sense of linear and sequential development through the suggestion of developmentally linked cultural singularities.

These issues have the potential to obscure ancient cultural plurality. Although typologies reflect differences within a particular site or region, these variations are cast as subunits of a broader sequence – thus maintaining the sense of a single cultural tradition – and approached as isolated rather than interactive entities. The criteria used to establish typological categories are themselves based on the imposed values of the researcher(s), and the entire typological endeavor is prone to etic bias. Many cultural categories are thus imposed by the archaeologists who study them and are only partially reflective of the kinds of cultural identities that would have been salient to the individuals who lived them. The past is often constructed around the assumed accuracy of these imposed categorizations; data follow the prescribed categories when accuracy required a reversed analytical order.

Since cultural identity is bound to localized dialects that are themselves linked to a broader cultural frame and negotiated through dynamic interactions within the cultural sphere, it is necessary to move away from static typological frames and develop methodologies capable of more accurately capturing the plurality of cultures and cultural identities that existed in the past. This requires a more emically motivated framework in which variations significant to past individuals are sought and prioritized; a data-driven approach is thus necessary. Although it is not possible to access the minds of ancient individuals, it is possible to identify patterns and distributions reflective of past conceptualizations of identity. Individuals and groups produce patterns in accordance with the cultural grammar salient within their cultural dialect, and the specifics of these configurations – in combination with their distributions on the physical landscape – can provide information about how ancient populations viewed themselves *vis-à-vis* the broader culture to which they belonged. They can also shed light on how the relevant groups positioned themselves within the cultural sphere. A cognitive landscape rooted in the recognition and negotiation of identities and relationships is thus juxtaposed onto the physical world.

The Materialization of Cultural Plurality

The cultural grammar, which represents the principles and patterns that structure and underlie cultural knowledge and norms, facilitates the recognition of semantically significant constructions capable of serving as markers with the cognitive landscape. These markers are components of the cultural environment that can be disassociated from parallel aspects of the natural and built environments, which are universally recognizable but not necessarily imbued with significance by all cultural groups. Their distinguishing features are thus salient and perceptible only for the cultural groups that recognize them, and access to the cultural grammar is prerequisite for this recognition.

The collective assignment of cultural interpretations and significances to markers used to delimit a cognitive landscape means that the intangible nature of cognitive landscapes coexists with tangible manifestations of social and cultural ideas. The failure to recognize a particular symbolic or material construction as semantically significant is as important as the recognition and interpretation of a construct licensed by the cultural grammar of the observer, and 'unintelligible' markers can help to further define group membership and position a particular cultural sphere within its broader context. No cultural sphere exists in a vacuum, and the ability to recognize foreign constructs and place them within the cognitive landscape according to cultural knowledge and belief allows for the reification and perpetuation of a mutually agreed upon world order. This, in turn, creates a kind of cultural stability and further suggests the close relationships that exist between cognitive landscapes, their markers, and the social and cultural norms that imbue these markers with recognizable meaning.

The examples presented above indicate that the internal elements of wave medallions in particular, and arguably medallions in general, served as markers on the Cucuteni cognitive landscape. These motifs could be used to position people, groups, and material items within this landscape and determine their relationships. The restricted variability attested for the framing elements supports the view that they belonged to broader textual units and thus contributed to the meaning of a medallion's core but were nonetheless semantically secondary and served a function whose purpose was to refine rather than generate meaning. The broad range of variability found among the internal elements, in combination with the distributive patterns described above, indicates that these elements were the semantic core of their textual units and formed the starting point for the interpretive process. They were also closely associated with particular kinds of interpretations and identities and thus served as cognitive landscape markers.

It is important to consider the roles of context and perspective, since individuals belonging to a particular cultural dialect are more likely attuned to variations within it than are those viewing a dialect and its symbolic indications from the outside. This creates a situation in which cognitive landscape markers of multiple levels of specificity in may exist simultaneously, though the privileging of one level over another should not be viewed as evidence that one level of specificity is dominant. As illustrated by Figure 8, multiple levels of markers exist simultaneously on the cognitive landscape. This creates a complex reality in which different degrees of specificity occur in different contexts based on the position of the interpreter within the cultural sphere and the particularities of their situation. A relatively simple graphic illustration of this potential complexity based on the examples used here is provided in Figure 14.

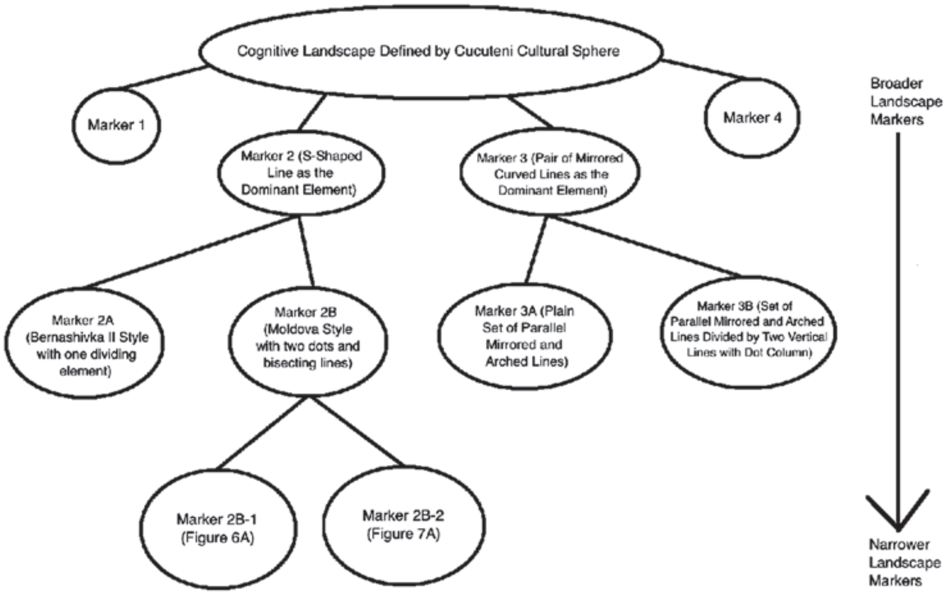


Fig. 14. An illustration of the complexity of cognitive landscape markers based on the data set used in the current discussion. Note that different degrees of specificity can be used in different contexts based on the position of the interpreter within the cultural sphere and the particularities of their situation (illustration by K. Hudson)

The variety of potential assessment processes attests to the complexity of the cultural sphere and suggests a resultant cultural plurality. A cultural sphere most commonly encompasses multiple manifestations of its cultural grammar, and culture itself can therefore be viewed as a multi-layered entity in which the broader cultural level is superimposed onto a second level comprised of variations on the broader cultural theme. These variations represent cultural dialects networked within the scope of their cultural sphere, and this networking produces the culture to which these dialects belong. In other words, a cultural sphere represents the networked dialects of a particular culture.

It is important to note that there is not a necessary correlation between geography and cultural dialect or identity, as evidenced by the examples presented above. It is possible for geographically disparate locations to share a particular instantiation of the cultural grammar due, perhaps, to histories of interaction, trade, or other commonalities. Similarly, geographically close locations should not be assumed to adhere to the same cultural dialect or symbolic repertoire; variations in the materials produced by closely situated communities should not, as a matter of default, be viewed as representative of foreign or trade goods unless significant numbers of local goods warrant such an explanation. Furthermore, cognitive landscapes can exist on broader or narrower scales than the cultural sphere-based model that is presented here and may contain markers representing different kinds of entities (*e.g.* multiple cultural spheres, lineage groups, professions, *etc.*). Although these cognitive landscapes can be difficult to identify archaeologically, particularly at narrower scales, it is worth acknowledging their existence in studies related to potentially relevant categories.

CONCLUDING REMARKS

Individuals and groups produce patterns in accordance with the cultural grammar salient within their cultural dialect, and the specifics of these configurations – in combination with their distributions on the physical landscape – can provide information about how ancient populations viewed themselves *vis-à-vis* the broader culture to which they belonged. They can also shed light on how the relevant groups positioned themselves within the cultural sphere. A cognitive landscape rooted in the recognition and negotiation of identities and relationships therefore allows for the classification and categorization of individuals and their material culture in a manner that reifies the sociocultural order and affirms multiple levels of group identity.

Although the data set analyzed here is small and further research is required before the Cucuteni dialects can be more completely understood, these examples demonstrate the pluralistic reality of cultural spheres as they are made manifest in the symbolic systems they produce. The internal elements of wave medallions in particular, and arguably medallions in general, served as markers on the Cucuteni cognitive landscape that could be used to position people, groups, and items within this landscape and determine their relationships. The restricted variability attested for the framing elements supports the view that they were belonged to broader textual units and thus contributed to the meaning of a medallion's core but were nonetheless semantically secondary and served a function whose purpose was to refine rather than generate meaning. Future studies focused on these and other structurally grouped textual units will further illuminate Cucuteni cognitive landscapes and provide additional information on the cultural realities salient within the Cucuteni cultural sphere.

References

Bailey D. W. 2005. *Prehistoric Figurines: Representation and Corporeality in the Neolithic*. New York: Routledge.

Bailey D. W., Alasdair W. R. and Cummings V. 2005. *(Un)Settling the Neolithic*. Oxford: Oxbow.

Bakhtin M. M. 1981. *The Dialogic Imagination*. Austin: University of Texas Press.

Bohnemeyer J. 2006. Semantic typology: the crosslinguistic study of semantic categorization. Proceedings of CIFCL 10 Lectures, Beihang University.

Boyarin J. 1993. *The Ethnography of Reading*. Berkeley: University of California Press.

Branton N. 2009. Landscape approaches in historical archaeology: The archaeology of places. In T. Majewski and D. Gaimster (eds), *International Handbook of Historic Archaeology*. New York: Springer.

Burdo N., Videiko M., Chapman J. and Gaydarska B. 2013. Houses in the archaeology of the Trypillia-Cucuteni groups. In D. Hofmann and J. Smyth (eds), *Tracking the Neolithic house in Europe*. New York: Springer, 95-115.

Chapman J. 2000. *Fragmentation in archaeology: people, places, and broken objects in the prehistory of South Eastern Europe*. London: Routledge.

Chomsky N. 1957. *Syntactic structures*. The Hague: Mouton & Co.

Ciuk K. ed. 2008. *Mysteries of ancient Ukraine: The remarkable Trypilian Culture 5400-2700 BC*. Toronto: Royal Ontario Museum.

Constantinescu B., Bugoi R., Pantos E. and Popovici D. 2007. Phase and chemical composition analysis of pigments used in Cucuteni Neolithic painted ceramics. *Documenta Praehistorica* 34, 281-288.

Delle J. A. 1998. *An Archaeology of social space: Analyzing coffee plantations in Jamaica's Blue Mountains*. New York: Plenum Press.

Derrida J. 1977. *Of grammatology*. Baltimore: The Johns Hopkins University Press.

Diachenko A. 2019. Does the social field cause or accelerate cultural changes? In S. Kadrow and J. Müller (eds), *Habitus? The social dimension of technology and transformation*. Leiden: Sidestone Press, 71-86.

Diachenko A. and Menotti F. 2012. The gravity model: monitoring the formation and development of the Tripolye culture giant-settlements in Ukraine. *Journal of Archaeological Science* 39(4), 2810-2817.

Dumitrescu V. 1979. *Arta Culturii Cucuteni*. Bucureşti: Editura Meridiane.

Ellis L. 1984. *The Cucuteni-Tripolye Culture: A study in technology and the origins of complex society* (= *BAR International Series* 217). Oxford: BAR Publishing.

Florescu A. 1966. Sistemul de Fortificare al Aşezărilor Cucuteniene din Moldova. *Archeologia Moldovei* 4:23-37.

Gallagher S. 2013. The socially extended mind. *Cognitive Systems Research* 25-26, 4-12.

Gallagher S. and Crisafi A. 2009. Mental institutions. *Topoi* 28(1), 45-51.

Gimbutas M. 1970. Proto-Indo-European Culture: The Kurgan Culture during the fifth, fourth, and third millennia B.C. In G. Cardona, H. M. Hoenigswald and A. Senns (eds), *Indo-European and Indo-Europeans: Papers*. Philadelphia: University of Pennsylvania Press, 155-197.

Gimbutas M. 1972. The Neolithic cultures of the Balkan Peninsula. In H. Birnbaum and S. Vryonis (eds), *Aspects of the Balkans: Continuity and change*. Paris: The Hague.

Gimbutas M. 1973. Old Europe c. 7000-3500 B.C.: The Earliest European civilization before the infiltration of the Indo-European peoples. *Journal of Indo-European Studies* 1, 11-20.

Gimbutas M. 1982. *The gods and godesses of Old Europe: 7000-3500 BC*. Berkeley and Los Angeles: University of California Press.

Hanks W. F. 1989. Text and textuality. *Annual Review of Anthropology* 18, 95-127.

Harper T. K. 2013. The effect of climatic variability on population dynamics of the Cucuteni-Tripolye cultural complex and the rise of the Western Tripolye giant-settlements. *Chronika* 3, 8-46.

Hudson K. M. 2013a. Text and textuality in Ulúa iconography. *Anthropology: Bachelors to Doctorates* 1, 2-20.

Hudson K. M. 2013b. Reading writing and the arithmetic of meaning: syntax and reading as social process. *SUNY Buffalo Graduate Romance Studies Journal Special Issue: Plasticity 3D*, 67-91.

Hudson K. M. 2014. Sherd stories: ceramic collections as archives for archaeological analysis. *Archaeological Review from Cambridge: The Archive Issue* 29(2), 164-178.

Hudson K. M. 2015. Edmund Leach and the rise of Cultural Polyvocality: A case study from the Ulúa Valley, Honduras. In R. Darnell and F. W. Gleach (eds), *Corridor talk to culture history: public anthropology and its consequences*. Lincoln: Board of Regents of the University of Nebraska, 131-154.

Hudson K. M. 2016 Localized stories and regional tales: imagery, identity, and cultural negotiation in Ulúa visual narratives. *Visual Past*, 1-36.

Hudson K. M. and Henderson J. S. 2014. Life on the edge – identity and interaction in the Land of Ulúa and the Maya World. In J. Ikäheimo, A-K. Salmi and T. Äikäs (eds), *Sounds like theory* (= *Monographs of the Archaeological Society of Finland* 2). Helsinki: Suomen arkeologinen seura, 157-171.

Hudson K. M. and Henderson J. S. In Press. Points of Contact: Landscape marking in the Ulúa iconographic tradition. In M. Kempf and M. Depaermentier (eds), *The Production of space and landscapes*. *Journal of Archaeological Science: Reports*, *Special Issue*.

Hudson K. M. and Milisauskas S. 2015. Interacting forms and visualized identities: The implications of graphic and syntactic variability in the symbolic repertoires of Trypillian Culture groups. In S. Ryzhov, M. Videiko and A. Diachenko (eds), *Kruts Memorial Volume*. Kiev: Institute of Archaeology of the National Academy of Sciences of Ukraine, 53-90.

Hudson K. M. and Milisauskas S. 2018. Cognitive landscapes and the archaeology of the extended mind. *Societá Editrice il Mulino* 6(12), 213-230.

Kessler H. L. and Shreve Simpson M. (eds) 1985. *Pictorial narrative in Antiquity and the Middle Ages*. Washington: National Gallery of Art.

Knapp B. A., and Ashmore W. 1999. Archaeological landscapes: constructed, conceptualized, ideational. In W. Ashmore and A. B. Knapp (eds), *Archaeologies of Landscape*. Malden: Blackwell Publishers Inc.

Lavin M. 1990. *The place of narrative: Mural decoration in Italian churches, 431-1600*. Chicago: The University of Chicago Press.

Lazarovici C.-M. 2005. Anthropomorphic statuetes from Cucuteni-Tripolye: some signs and symbols. *Documenta Praehistorica* 32, 1-10.

Lazarovici C.-M. 2009. Cucuteni ceramics: technology, typology, evolution, and aesthetics. In D. W. Anthony and J. Y. Chi (eds), *The lost world of Old Europe: The Danube Valley, 5000-3500 BC*. Princeton: Princeton University Press, 128-161.

Lazarovici C.-M. and Lazarovici G. 2007. *Arhitectura Neoliticului şi Epocii Cuprului din România I, Epoca Cuprului*. Iaşi: Trinitas.

Lazarovici C.-M. and Lazarovici G. 2007. *Arhitectura Neoliticului şi Epocii Cuprului din România II, Epoca Cuprului*. Iaşi: Trinitas.

Lazarovici C.-M., Lazarovici G.-C. and Turcanu S. 2009. *Cucuteni: A great civilization of the prehistoric world*. Iaşi: Editura Palatul Culturii.

Lazarovici G. 2003. New archeological research about Cucuteni-Ariuşd Culture, Transylvania. In A. G. Korvin-Piotrovskiy (ed.), *Tripolye settlements-giants: The international symposium materials*. Kyiv: Korvin Press, 217-231.

Leach E. 1959. *Political systems of highland Burma: A study of Kachin social structure* (= *London School of Economics Monographs on Social Anthropology* 44). New York: Berg.

Lillie M. 2008. *The Trypilian Culture in Context*. In K. Ciuk (ed.), *Mysteries of ancient Ukraine: The remarkable Trypilian Culture 5400-2700 BC*. Toronto: Royal Ontario Museum, 11-16.

Mantu C.-M. 1998. *Culturea Cucuteni: evolutie, cronologie, legături*. Piatra Neamt: Muzeul de Istorie Piatra Neamt.

Mantu C.-M., Dumitroaia Gh. and Tsaravopoulos A. 1997. *Cucuteni, the last great Chalcolithic civilization of Europe*. Catalog of an exhibit at the Archaeological Museum of Thessaloniki. Bucharest: Athena Printing House.

Marinescu-Bîlcu S. and Bolomey A. 2000. *Drăguşeni, a Cucutenian community*. Bucureşti: Editura Enciclopedică.

Menary R. 2007. *Cognitive integration: Mind and cognition unbounded*. Basingstoke: Palgrave Macmillan.

Menary R. 2013. Cognitive integration, enculturated cognition and the socially extended mind. *Cognitive Systems Research* 25-26, 26-34.

Menotti F. and Korvin-Piotrovskiy A. G. (eds). 2012. *The Tripolye culture giant-settlements in Ukraine: formation, development and decline*. Oxford: Oxbow Books.

Monah D. 1992. *Les villages de la civilisation de Cucuteni-Tripolie en Roumanie*. *Typologie et organisation interne*. In Congrès L'habitat et l'occupation du sol à l'âge du Bronze en Europe. Colloque international (16/05/1990) no. 4 (2/3 p.). Paris: C.T.H.S., 391-406.

Monah D. 1997. *Plastica antropomorfă a culturii Cucuteni-Tripolie*. Piatra Neamţ: Editura Constantin Matasă.

Monah D. 2003. A Ghost is haunting Europe: The Neolithic proto-cities. In A. G. Korvin-Piotrovskiy (ed.), *Tripolian Settlements-Giants*. Kiev: Korvin Press, 239-243.

Monah D. 2005. Religie si arta in cultura Cucuteni. In G. Dumitroaia (ed.), *Primul muzeu Cucuteni din Romania* (= *Bibliotheca memoriae antiquitatis* 15). Piatra-Neamţ: Editura Foton, 162-173.

Popovici D. N. 2000. *Cultura Cucuteni. Faza A. Repertoriul a Şezărilor (1)* (= *Biblioteca Memoriae Antiquitatis* 8). Piatra Neamţ: Editura „Constantin Matasă".

Preucel R. W. 2006. *Archaeological Semiotics*. Malden: Blackwell Publishing.

Quilter J. 1997. The Narrative approach to Moche iconography. *Latin American Antiquity* 8(2), 113-133.

Riles A. 2006. *Documents: artifacts of modern knowledge*. Ann Arbor: University of Michigan Press.

Ryzhov S. M. 2007. Suchasnyi stan vyvchennia kulturno-istorychnoy spilnosti Kukuten-Trypillia. In S. Ryzhov and Yu. Rassamakin (eds), *Oleh Olzhych: Arkheologiya*. Kyiv: Vydavnytstvo im. Oleny Teligy, 437-477.

Schmidt H. 1932. *Cucuteni in der oberen Moldau, Rumänien: die befestigte Siedlung mit bemalter Keramik von der Steinkupferzeit bis in die vollentwickelte Bronzezeit*. Berlin-Leipzig: W. de Gruyter.

Sherratt A. 1997. *Economy and society in prehistoric Europe: changing perspectives*. Princeton: Princeton University Press.

Silverstein M. and Urban G. 1996. *Natural histories of discourse*. Chicago: University of Chicago Press.

Sterelny K. 2012. *The evolved apprentice: How evolution made humans unique*. Cambridge: The MIT Press.

Stratulat L. 2008. *Cucuteni-Trypilla: a great civilization of old Europe; Palazzo della Cancelleria, Rome-Vatican, 16 September-31 October 2008*. Catalog for an exhibit held at the Palazzo della Cancelleria museum in Vatican City from 16 September-31 October 2008. Palazzo della Cancelleria: Rome-Vatican.

Street B.1984. *Literacy in Theory and Practice*. Cambridge: Cambridge University Press.

Taylor T. 1987. Aspects of settlement diversity and its classification in southeast Europe before the Roman period. *World Archaeology* 19(1), 1-22.

Tollefsen D. P. 2006. “From extended mind to collective mind”. *Cognitive Systems Research* 7, 140-150.

Videiko M. 2010. *Ukraine: from Trypillia to Rus*. Kyiv: Krion.

Volosinov V. N. 1986. *Marxism and the Philosophy of Language*. Trans. L. Matejka and I. R. Titunik. Cambridge: Harvard University Press.

Waddell L. A. 1929. *The makers of civilization in race and history*. London: Legion for the Survival of Freedom, Incorporated.

Weitzman K. 1947. *Illustrations in roll and codex: A study of the origin and methods of text illustrations*. Princeton: Princeton University Press.

Whittle A. W. R. 1996. *Europe in the Neolithic: the creation of new worlds*. Cambridge: Cambridge University Press.

Whorf B. L. 1956. *Language, Thought, and reality: selected writings of Benjamin Lee Whorf*. New York: The Technology Press of Massachusetts Institute of Technology and John Wiley & Sons, Inc.

Winn Shan M. M. 1981. *Pre-Writing in Southeastern Europe: The sign system of the Vinca Culture, ca. 4000 B.C.* Calgary: Western Publishers.

Winter I. 1981. Royal rhetoric and the development of historical narrative in Neo-Assyrian relief. In I. Winter (ed.) *On art in the ancient Near East: of the first millennium B.C.E.*, Leiden: Koninklijke Brill NV, 3-70.

Zbenovich V. G. 1996. The Tripolye culture: centenary of research. *Journal of World Prehistory* 10(2), 199-241.

SPRAWOZDANIA ARCHEOLOGICZNE 72/2, 2020
PL ISSN 0081-3834
DOI: 10.23858/SA/72.2020.2.1713

Aldona Kurzawska[1], Iwona Sobkowiak-Tabaka[2]

SPONDYLUS SHELLS AT PREHISTORIC SITES IN POLAND

ABSTRACT

Kurzawska A., Sobkowiak-Tabaka I. 2020. *Spondylus* shells at prehistoric sites in Poland. *Sprawozdania Archeologiczne* 72/2, 41-66.

This article presents the results of research concerning shell ornaments discovered in Poland and described in the literature as made of *Spondylus* shells. Our study focuses on the identification and revision of these artefacts in terms of species, ornament types, and locations of discovery. Additionally, we address the issue of the role of *Spondylus* shell ornaments and their meaning to the Neolithic communities inhabiting the area of present-day Poland. Our research involved specialist analyses, which allowed us to identify seven *Spondylus* shell artefacts discovered at five archaeological sites. The strontium isotope analysis ^{87}Sr / ^{86}Sr indicated the Quaternary age of the shells, confirming that they were contemporaneous with prehistoric communities and originated from areas located around the Mediterranean Sea. Presenting the results of our study, we would like to join a wider discussion on the importance of *Spondylus* shell ornaments in Central Europe in the Neolithic period.

Keywords: *Spondylus,* shell, Neolithic, ornaments
Received: 20.02.2020; Revised: 11.04.2020; Accepted: 28.06.2020

1 Institute of Archaeology and Ethnology, Polish Academy of Sciences, Al. Solidarności 105, 00-140 Warszawa, Poland; aldona.kurzawska@wp.pl; https://orcid.org/0000-0003-0215-046X
2 Faculty of Archaeology, Adam Mickiewicz University, Uniwersytetu Poznańskiego st. 7, 61-614 Poznań, Poland; iwosob@amu.edu.pl; https://orcid.org/0000-0001-5913-1177

INTRODUCTION

I asked why a shell that is, in simple terms, just an oyster would have been traded from the Mediterranean almost to the British Channel, but I was dissatisfied with the answer repeatedly offered, that it was for 'prestige' (Séfèriadès 2010).

Spondylus is undoubtedly the best-known shell recorded among ornaments dating to the Neolithic period. Nearly 140 years have passed since the first mention of artefacts made of this shell species appeared in the European literature (Virchow 1884). During this time, numerous studies have been published presenting the artefacts themselves, their distribution, and interpretations related to their meaning in prehistoric culture (*e.g.* Willms 1985; Müller 1997; Ifantidis and Nikolaidou 2011; Champan and Gaydarska 2015; Windler 2018).

The appearance and spread of *Spondylus* ornaments in Central Europe through exchange and trade was associated with the introduction of agriculture and the emergence of a new social order (Séfèriadès 2010). Shells of this species were valued by Neolithic communities not only because of their aesthetic qualities, lustre, or white colour but also due to their cultural meaning.

In Poland, ornaments made of mollusc shells are recorded relatively frequently in funeral contexts at archaeological sites associated with the Neolithic and the Early Bronze Age. So far, such shells have been described mainly in terms of ornament types (necklaces, hip belts, bracelets), burial types (male/female), and, finally, as indicators of the high social status of the deceased (*e.g.* Czerniak and Pyzel 2013). Many of these valuable ornaments were misidentified with regard to the species (*e.g.* Jażdżewski 1938; Maciejewski *et al.* 1954; Czerniak 1980), which had a direct influence on archaeological interpretation. To this day, such examples of incorrect identification have been repeatedly quoted in Polish and international literature (*e.g.* Müller 1997; Séfèriadès 2010; Kowalski 2013). Shell artefacts recorded in the area of Poland have not received much attention so far, which stands in contrast to similar studies carried out all over the world (*e.g.* Vanhaeren *et al.* 2004; Bonnardin 2009; Álvarez-Fernández and Carvajal-Contreras 2010; Bar-Yosef Mayer *et al.* 2010; Stiner *et al.* 2013; Rigaud *et al.* 2015).

In the article, we present the results of research concerning ornaments discovered in Poland and already identified as made of *Spondylus* shells. Showing the results of our study, we would like to join the wider discussion on the importance of these ornaments in Central Europe in the Neolithic period. Our research focuses on identifying which of the ornaments recorded at archaeological sites in Poland and described in the literature are in fact *Spondylus* shells, which types of ornaments they represent, and where they were found. Additionally, we address the issue of the role of the ornaments discussed and their meaning to the Neolithic communities inhabiting the area of present-day Poland.

MALACOLOGICAL INFORMATION

Spondylus gaederopus (Linnaeus, 1758), a thorny oyster, is a sea mollusc species from the Spondylidae family (Fig. 1). It lives in warm seas at a depth of 6-30 m. It leads a sedentary lifestyle, attaching itself with its left valve to hard substrates – rocks and reefs. Currently, it lives mainly in the western part of the Mediterranean, in the Aegean Sea, the Adriatic, and the Pacific Ocean. The size of adult specimens varies from 6 to 12 cm. The valves of this mussel differ considerably. The lower, left valve of the shell is white, usually oval in shape, and thick-walled. The upper, right valve is violet/purple, oval in shape, and thinner; its outer surface is covered with spikes (Poppe and Goto 2000). It is worth mentioning that currently the specimens of *Spondylus gaederopus* reach smaller shell sizes than specimens known from archaeological sites (Siklósi 2013).

MATERIAL AND METHODS

Our research on *Spondylus* shell ornaments discovered in the area of present-day Poland is based primarily on shell finds published so far. Therefore, the article presents the history of research and discovery of individual artefacts (see Annex). On the basis of the relevant literature, the following archaeological sites have been selected for analysis (Fig. 2): Karsko, Inowrocław-Mątwy, Brześć Kujawski 4, Biskupin 15, Szczotkowice 1, Krusza Zamkowa 3, Gocanowo, Inowrocław (surroundings). In addition, the analysis was performed on two unpublished artefacts from the sites of Racibórz-Studzienna and Werbkowice-Kotorów (displayed in museum exhibitions). In total, the study material came from ten archaeological sites (Table 1). The artefacts were examined using standard methods of archaeomalacological analysis (Claassen 1998). The poor state of preservation of some of the investigated shells made it impossible to identify their exact species and places of origin. In those cases, the strontium isotope analysis ^{87}Sr / ^{86}Sr was applied (Table 2). The selected shell samples (*ca*. 24-40 mg), prepared for the analysis, were examined in the Isotope Laboratory of Adam Mickiewicz University in Poznań.

RESULTS

The analyses have allowed us to identify seven artefacts made of *Spondylus* shells, discovered at five archaeological sites located in the area of present-day Poland. A detailed description of these shells is presented in the annex to the article. The summary of information about the examined artefacts is included in Table 1. The artifacts identified as ornaments made of *Spondylus* shells were recorded in funerary contexts. They include (Fig. 3):

Fig. 1. *Spondylus gaederopus*, a modern shell from the collection of the National Museum in Belgrade, photo by Biljana Mitrović

– three medallions made of shell valves, discovered at Karsko, Inowrocław-Mątwy, and Brześć Kujawski 4 (Fig. 3: A, B, C);

– three large beads – two irregular/barrel-shaped and one cylindrical, discovered in Szczotkowice (Fig. 4: A);

– a pendant, which was originally a bead of an irregular/barrel shape, discovered at Werbkowice-Kotorów (Fig. 4: B);

All the above-mentioned ornaments bear traces of long use indicated by microwear visible on their surfaces:

– traces of repairs (broken holes in the medallion from Karsko – replaced by new perforations; Fig. 3: A),

– use-wear traces made by a string, visible on the edges of shells in medallions from Brześć Kujawski and Inowrocław-Mątwy (Fig. 3: B),

– a pendant made of a damaged bead – the find from Werbkowice-Kotorów (Fig. 4: B).

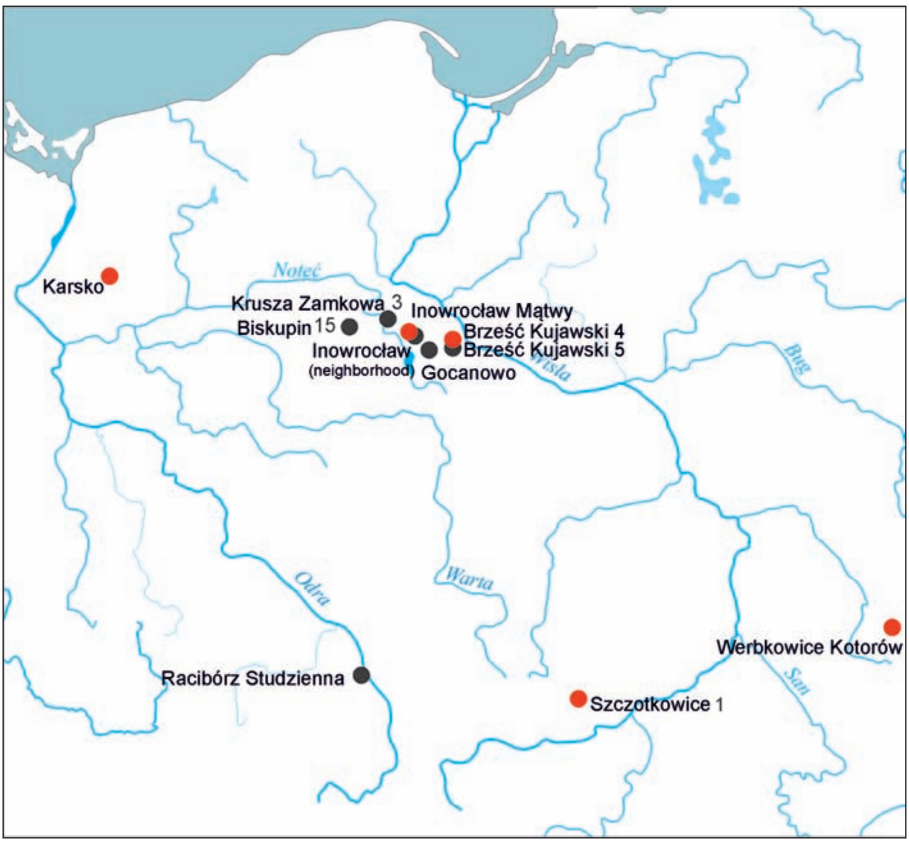


Fig. 2. Map with archaeological sites mentioned in the article
(red dots mark the locations where confirmed *Spondylus* artefacts were recorded)

Table 1. Shell artefacts mentioned in the article. LBK – Linear Band Pottery culture; SBK – Stroke Band Pottery culture; BKC – Brześć Kujawski culture

Site	Feature	Artefact	No of artefacts	Species	Chronology/ archeological classification	References	Location of artefacts
Biskupin, site 15	burial II	disc beads	365	*Unio* spp.	BKC	Smoczyńska, 1952, 3, tab. I, 7; Maciejewski *et al.* 1954; Czerniak, 1980, 102	Archaeological Museum in Biskupin
Brześć Kujawski, site 4	burial IV	disc beads (necklace)	?	*Unio* spp.	BKC	Jażdżewski, 1938, Tabl. III2	Museum of Archaeology and Ethnography in Łódź, no. IN 2617
	burial VII	disc beads	8?	*Unio* spp.		Jażdżewski, 1938, Tabl. VI 2b, h	
	burial XXIV	disc beads	?	*Unio* spp.		Jażdżewski, 1938, Tabl. XIX 8	
	burial XXIX	medallion (perforated shell valve)		*Spondylus gaederopus*		Jażdżewski, 1938, Tabl. XXII 3	
	XXXIV	disc beads	2	*Unio* spp.		Jażdżewski, 1938, Tabl. XXV3b	
	XXXVIII	disc beads	?	*Unio* spp.		Jażdżewski, 1938, Tabl. XIV3	
Brześć Kujawski, site 5	XXXIX	disc bead	1	*Unio* spp.		Jażdżewski, 1938, Tabl. XXVII 5	
Gocanowo	burial? found in 1883	disc beads (necklace)	c. 100	*Unio* spp.	BKC	Smoczyńska, 1952, 13, tab. III; Czerniak, 1980, 102	Leon Wyczółkowski District Museum in Bydgoszcz nr 2075

Inowrocław (neighborhood)	skeletal burial	disc beads	7	*Unio* spp.		Waga 1931, 11, 32, fig. 4; Smoczyńska, 1952, 19, fig. 74	Archaeological Museum in Poznań, no. MAP 1897: 388
Inowrocław-Mątwy	burial remains	medallion (perforated shell valve)	1	*Spondylus gaederopus*	LBK or BKC	*Jahrbuch*…1894; Smoczyńska, 1952, 19; Szałkowska-Łoś, Łoś 2014, 34-35	Leon Wyczółkowski District Museum in Bydgoszcz, no. 1233 / no. A621
Karsko	burial remains	medallion (perforated shell valve)	1	*Spondylus gaederopus*	SBK	Walter 1898; Kunkel, 1927; Siuchniński 1972; Kulczycka-Leciejewiczowa 1979, 164, fig. 87; Galiński *et al.* 2012, 94-95	National Museum in Szczecin, no. MNS/A/22065
Krusza Zamkowa, site 3	burial 392	disc beads (bracelet)	89	*Unio* spp.	BKC	Bednarczyk *et al.* 1980, 60-63, fig. 8, 9, 10, 17; Czerniak 1980, 102, 103, fig. 40, 44, 45	Deposit of the Adam Mickiewicz University in Poznań Faculty of Archaeology in Archaeological Museum in Poznań, no. 1296B XXXVIII
		disc beads (hip belt)	2293	*Unio* spp.			
	burial 412	disc beads (hip belt)	1575?	*Unio* spp.			
Racibórz Studzienna	?	?	1	*Ostrea edulis*	?		Racibórz Museum
Szczotkowice, site 1	burial	beads (1 cylindrical and 2 irregular)	3	*Spondylus gaederopus*	LBK	Krauss 1964	Archaeological Museum in Kraków, no. MAK/KA/272
Werbkowice-Kotorów	burial	pendant	1	*Spondylus gaederopus*	LBK	Liana and Piętka-Dąbrowska 1962	Lublin Museum

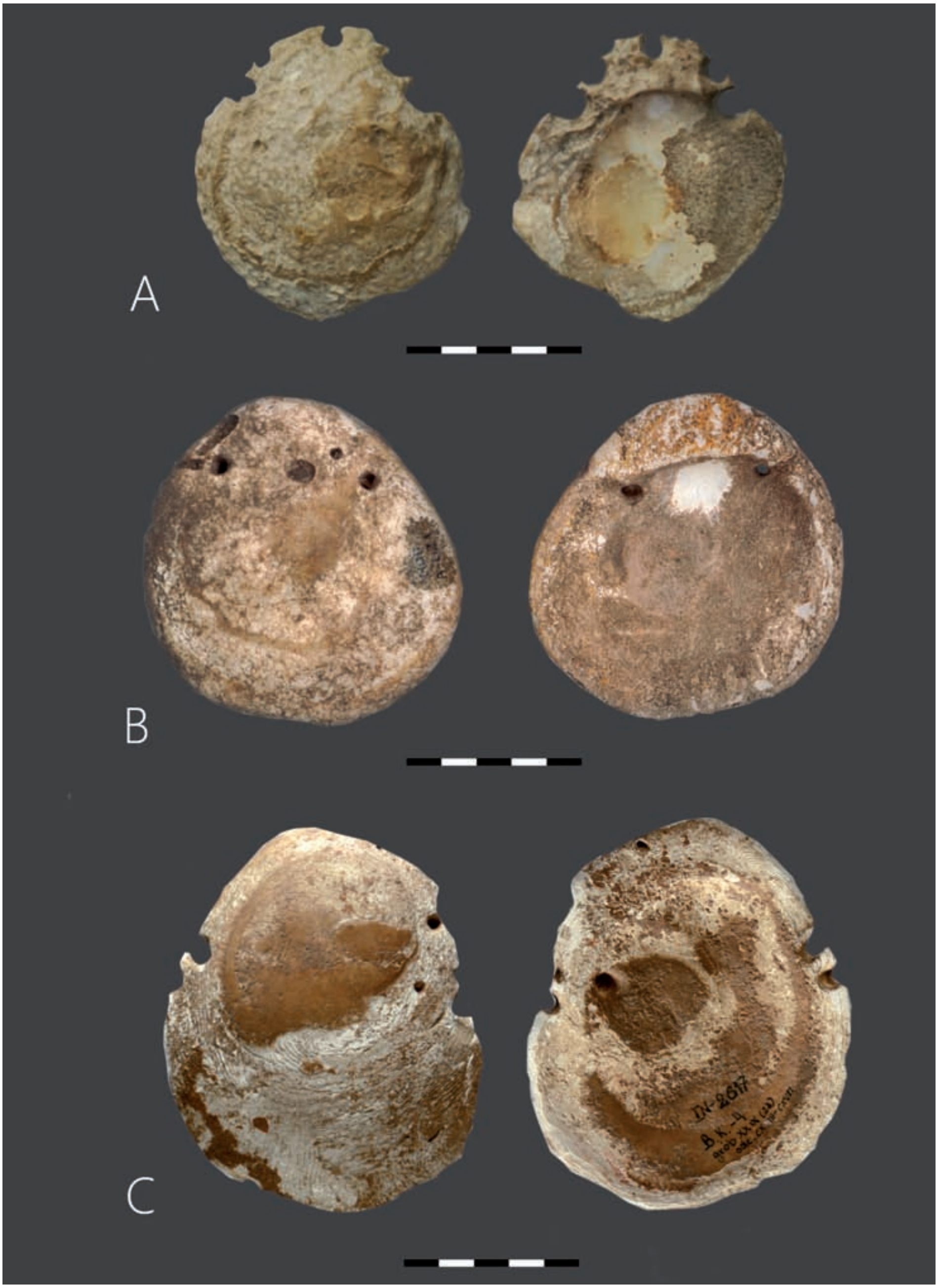


Fig. 3. *Spondylus* shell artefacts recorded in Poland: A – Karsko (National Museum in Szczecin, photo by Anna Ryś), B – Inowrocław-Mątwy (Museum in Bydgoszcz, photo by Wojciech Woźniak), C – Brześć-Kujawski (Museum of Archaeology and Ethnography in Łódź, photo by Władysław Podhorecki)

Fig. 4. *Spondylus* shell artefacts recorded in Poland: A – Szczotkowice (Archaeological Museum in Kraków, photo by Agnieszka Susuł), B – Werbkowice-Kotorów (Lublin Museum, photo by A. Kurzawska)

Other shell ornaments known from the literature as *Spondylus* items were also subject to analysis, which allowed for their identification as disc beads made of the shells of freshwater mussels from the Unionidae family. They were recorded at the following sites: Krusza Zamkowa 3 (Czerniak 1980; Bednarczyk *et al.* 1980), Brześć Kujawski 4 and 5 (ornaments from the remaining graves), Biskupin 15, Gocanowo, Inowrocław. One of the artefacts, recovered at Racibórz-Studzienna (currently on display at the Museum in Racibórz), was identified as the European flat oyster *Ostrea edulis*.

The proper identification of shell species provides certainty as to their origin. However, it is not always possible due to, *e.g.* taphonomic alterations of the material. The method used successfully for the identification of shell sources in such cases is strontium isotope dating (*e.g.* Shackleton and Elderfield 1990; Vanhaeren *et al.* 2004; Bentley 2006; Bajnóczi *et al.* 2013; Kurzawska *et al.* in prep.). In our research, due to the poor state of preservation of *Spondylus* shell artefacts and the uncertainty with regard to their origin, it was decided to perform the strontium isotope analysis $^{87}Sr/^{86}Sr$. The goal was to identify fossil shells derived from local deposits and/or Quaternary (subfossil) shells originating probably from the Mediterranean (Shackleton and Renfrew 1970). Three samples were selected for the analysis: a cylindrical bead from Szczotkowice (previously damaged by cutting off a thin

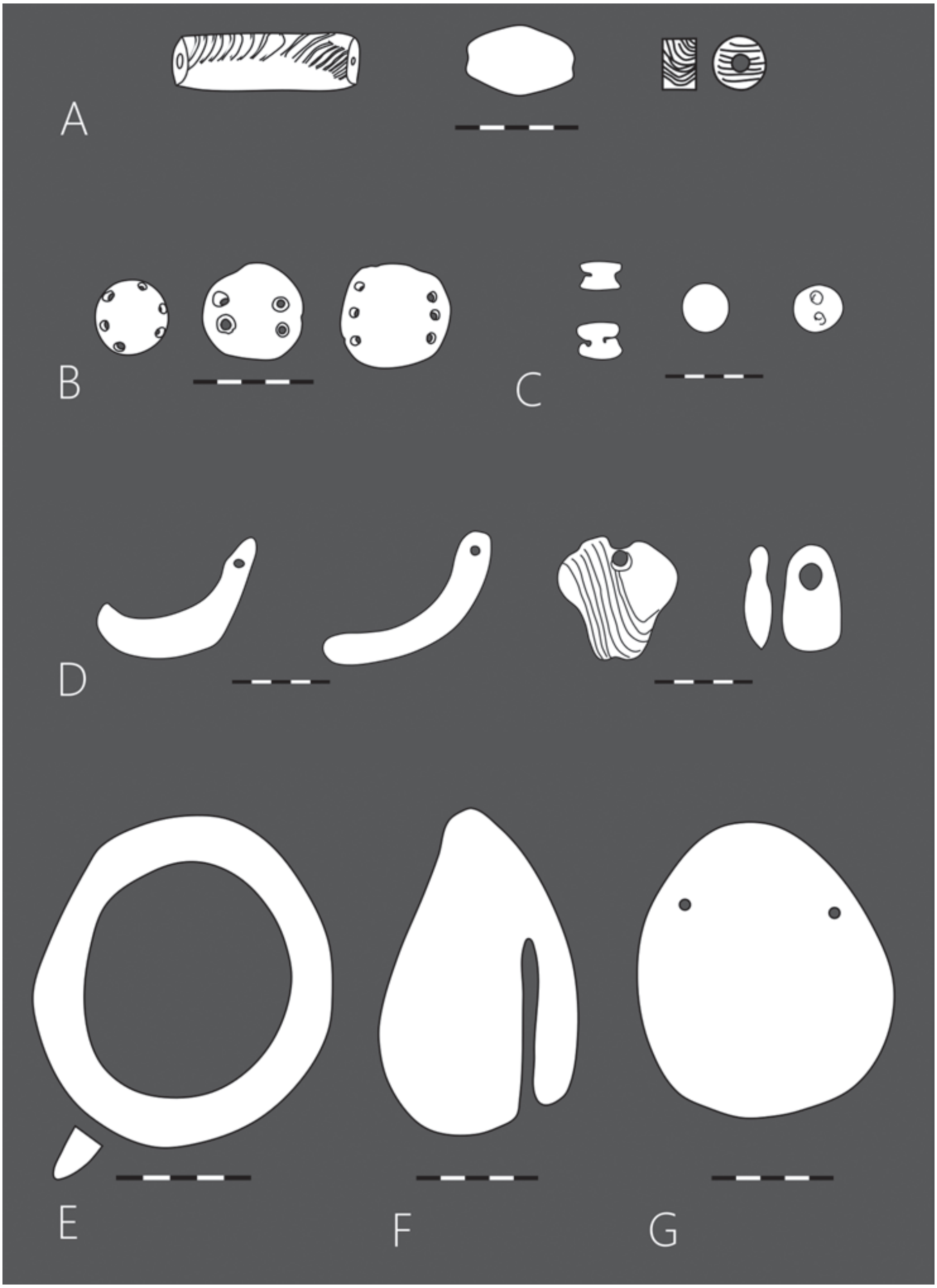


Fig. 5. Types of *Spondylus* shell ornaments: A – beads, B – small plates with perforation, C – buttons, D – pendants, E – bangle, F – buckle, G – medallion (based on: Bonnardin 2009; Siklósi 2004; Ifantidis and Nikolaidou 2011), prepared by P. Rutkowska

Table 2. Results of the strontium isotope analysis $^{87}Sr/^{86}Sr$

Sample	Species	$^{87}Sr/^{86}Sr$	Chronology
Szczotkowice	*Spondylus* sp.	0,709183 ± 9	Quaternary
Karsko	*Spondylus* sp.	0,709259 ± 15	Quaternary
Inowrocław-Mątwy	*Spondylus* sp.	0,709426 ± 12	Quaternary

section, see Krauss 1964), and two medallions – from Karsko and from Inowrocław-Mątwy, which resemble 'fossilised' shells (Table 2).

Fossil shells, morphologically similar to subfossils, occur locally in the area of Poland in Miocene or Oligocene deposits (G. Jakubowski pers. com.; Kurzawska *et al.* in prep.). A fossil origin was particularly suspected in the case of the find from Karsko, which was very similar to fossil shells of the Oligocene species of *Spondylus tenuispina* (Sandberger 1863; G. Jakubowski, pers. com.). The analysis clearly indicated that the shells date to the Quaternary. The obtained results and the dating have been assessed with the standard curve of $^{87}Sr/^{86}Sr$ ratios (McArthur *et al.* 2001). The strontium signatures are close to those received from previous research by Shackleton and Elderfield (1990), and they fit well into Quaternary. Thus, it can be concluded with certainty that the shells under study were contemporaneous with people living in prehistory, and they originated from areas located around the Mediterranean Sea.

DISCUSSION

Spondylus shell artefacts recorded at archaeological sites in Central Europe are mainly ready-made ornaments discovered in grave contexts. They were manufactured from whole shell valves or shell fragments. It should be remembered that both the size and the shape of the valves determined the appearance and type of the ornament (Siklósi 2013). The types of *Spondylus* shell artefacts are presented in Fig. 4 (based on Siklósi 2004; Bonnardin 2009; Ifantidis and Nikolaidou, 2011). They include:

– thick and high bangles – made of right shell valves,

– thin bangles – made of left shell valves,

– V-shaped belt buckles (made of right shell valves),

– pendants:

– so-called medallions – made of complete *Spondylus* shell valves, with 2-4 suspension holes; optionally, 1 large perforation in the centre; recorded in burials in the chest and waist areas,

– pendants made of shell fragments: arched – from fragments of bracelets (?), animal tooth-shaped, arched pendants with a perforation in the upper part,

– irregularly shaped pendants made of damaged ornaments, *e.g.* from larger beads,

– beads: cylindrical, barrel-shaped, oval, disc-shaped, biconical irregular; in all different sizes (large, medium and small),

– V-perforated buttons,

– small plates with perforations.

The repertoire of ornaments made of *Spondylus* shells is repeatable, and their presence is additionally linked with specific regions of Europe, and also, closely, with chronology; even their size points to a certain timeframe (Siklósi and Csengeri 2011).

The artefacts in question were used mainly by the communities inhabiting the areas located along the Aegean Sea and in south-eastern Europe between 6,500 and 5,500 BC. In the next stage, *ca*. 5,500-5,000 BC, the spread of these artefacts can be observed; they were used by peoples living in the areas of Central Europe up to the Paris Basin, and slightly later, in the fifth millennium, also in the Carpathian Basin and along the Black Sea. From the fourth millennium onwards, this mussel species was used sporadically by people inhabiting present-day Romania and Greece for consumption only (Windler 2018).

The importance of items made of *Spondylus* shells varied in time. Initially, in the early stage of their use by the communities of the Linear Band Pottery culture (LBK), they rarely served as grave goods. Probably, they were valuable items worn by living people who handed them down from generation to generation (Windler 2018). Over time, however, their status evolved, and with the advent of the Copper Age (*e.g*. Kalicz and Szénászky 2001) they began to appear in larger quantities. They likely lost their importance, becoming 'common goods' and being gradually replaced by other resources and items, mainly copper ones (Nieszery 1995; Siklósi and Csengeri 2011).

Shell ornaments discovered at archaeological sites in Poland have been poorly recognized so far in comparison with the artefacts of this kind known from other regions of Europe (Müller 1997; Bonnardin 2009; d'Errico *et al*. 2009; Perlès and Vanhaeren 2010; Séfèriadès 2010; Borello and Micheli, 2011; Ifantidis and Nikolaidou, 2011; John 2011; Cristiani *et al*. 2014; Dimitrijević 2014; Sakalauskaite *et al*. 2019). Although mentioned in numerous archaeological reports, they have rarely been precisely analysed or properly identified.

The first records concerning *Spondylus* shell ornaments found in the area of Poland appear in the literature relatively early. The oldest mentions come from the end of the nineteenth century and relate to finds from Inowrocław-Mątwy (Jahrbuch… 1894, 88; Smoczyńska 1953) and Karsko (Walter 1898). Tracing back the history of later discoveries of shell ornaments in Polish archaeology, it is worth mentioning a medallion found in Brześć Kujawski. The publication of this finding by K. Jażdżewski (1938), which included descriptions of other shell ornaments recorded in graves at the same site, long remained the only reference for scholars searching for analogies to their subsequent discoveries. Probably for this reason each shell ornament found at Neolithic sites was automatically identified as a *Spondylus* specimen (Smoczyńska 1953; Maciejewski *et al*. 1954). The lack of interdisciplinary studies (in this case malacological) contributed to the repetition of incorrect information. An exception to this rule was the analysis carried out in 1964 by W. Krach from the Museum of Geology, Polish Academy of Sciences in Kraków, who, on the basis of a thin-section, correctly identified beads discovered in a grave at Szczotkowice, site 1, as made of *Spondylus* shells. A later work by L. Czerniak (1980) presenting the summary of research carried out at Krusza Zamkowa, site 3, comprises the most complete description of ornaments found in graves thus far. Referring to previous publications, the author repeats the incorrect information about ornaments made supposedly of *Spondylus* shells. However, this is the first publication in Poland that includes the typology of shell artefacts and draws attention to analogous finds from the Carpathian Basin. In fact, the disc shell beads from Krusza Zamkowa 3 were identified by A. Dzięczkowski as being made of freshwater bivalve shells (Bednarczyk *et al.* 1980). He noticed that the shells discussed were thicker than those known from Poland and suggested that they may have been imports, though still thinking of freshwater bivalves. Due to a misunderstanding, these local freshwater shells were repeatedly quoted in the literature as *Spondylus gaederopus* shells – at the time the only shell known to archaeologists as an imported shell item. It is important to mention that the disc beads made of shells are not similar to other *Spondylus* ornaments found in Poland. They more closely resemble disc beads made of white stones known from the Tiszapolgár burials in Hungary (Bognàr-Kutzian 1963). This hypothesis may be confirmed by a find from Krusza Zamkowa, where in one of the graves (no. 412) a single bead made of white stone was found among shell disc beads in a hip belt.

The research on shell artefacts from the area of Poland has allowed us to confirm the identification of ornaments from only four of the examined sites. In addition, one artefact made of a *Spondylus* shell, previously misidentified as stone, was noticed by the authors at the exhibition in the Lublin Museum (a pendant from Werbkowice Kotorów).

In total, the archaeological literature mentions eight archaeological sites in Poland where *Spondylus* shells were recorded. The study by L. Czerniak, particularly the part concerning ornaments made of imported shells discovered in the graves of 'princesses', has often been cited by researchers. It has become the source for subsequent interpretations, mostly concerning issues of trade, imports, connections with neighboring and distant populations, and the meaning of shells and shell ornaments in magic-related practices (Cofta-Broniewska and Kośko 1982; Müller 1997; Kadrow 2008; Siklósi 2013; Kowalski 2013, 2014). Recently, shell ornaments have also been recognized as one of the aspects of cultural syncretism, changes in the social structure, and even cultural redefinition of the role of men and women in the Brześć Kujawski Culture (BKC; Czerniak and Pyzel 2019).

The artefacts known from the literature and misidentified as *Spondylus* shells included mostly disc beads made from shells of freshwater mussels from the Unionidae family. Their freshwater origin has been additionally confirmed by isotope analysis (Apolinarska and Kurzawska 2020). In the light of the results of our research, ornaments made of *Spondylus* shells are considerably less numerous than previously thought, and they include the most common types: pendants – medallions (3 items), beads (3 items), and a pendant made of a large, damaged bead (1 item). They were recorded in graves as single finds (except for the beads from Szczotkowice), and, as already mentioned, they bore traces of long use.

Chronologically, two *Spondylus* shell ornaments are certainly associated with the communities of the LBK. The cultural attribution of the find from Inowrocław-Mątwy is problematic (it could be related to either LBK or BKC). Only one find comes from a site of the Stroke Band Pottery Culture (SBK), and one from the cemetery of the Brześć Kujawski culture (BKC). More accurate dating, although only relative, is known for Szczotkowice – the music-note phase of the LBK development, about 5,300-5,000 BC (Czekaj-Zastawny 2009), and for Brześć Kujawski (the classic phase the BKC; *ca*. 4,500-4,300 BC – Grygiel 2008). The first of the aforementioned chronological horizons in Europe was characterised by the presence of *Spondylus* shell artefacts in the form of pendants, beads, and bracelets (see Nieszery 1995; Siklósi 2004; Table 1). The closest analogies to the beads from Szczotkowice can be found, for example, at the cemetery of Vedrovice in Moravia, *e.g*. in graves H19/75, H9/88, H39/76, H 65, H62, H46, H36, H78/79 (Podborský 2002); at Garadna-Elkerülő út, site No. 2, grave No. S191 (Bükk Culture; Siklósi and Csengeri 2011), and at Mlynárca in Slovakia (Nitra period; Novotny 1958: Tab. XXIX: 7-14). Our observations have shown that this type of bead was common at cemeteries rich in ornaments made of *Spondylus* shells. Medallions similar to those found at Karsko, Inowrocław-Mątwy, and Brześć Kujawski were also relatively popular throughout the whole period in which decorations made of this shell species were 'in fashion'. Analogous medallions have been discovered at numerous cemeteries of the LBK in France (*e.g*. Aisne, tombe 1; Bas-Rhin, tombe 2; Bonnradin 2009), Germany (Nieszery 1995), Hungary (Siklósi 2013), the Czech Republic (Vedrovice, *e.g*. in graves H9/88, H70/79, H19/75, H86/80), and Ukraine (Rovancě in Volhynia; Bardeckyi *et al*. 2016).

In the fifth millennium BC, a substantial increase in the number of *Spondylus* shell ornaments can be observed in the area of Europe. As mentioned earlier, they became common and more diverse. Various types of pendants, bracelets and beads are known from that time (Siklósi 2004; Table 2). In Poland, only one such artefact dating to that period has been recorded so far, i.e. the medallion from grave XXIX at Brześć Kujawski, site 4.

The number of shell ornaments found in Poland is low in comparison with the rest of Europe – there are only seven artefacts of this kind (from five archaeological sites). They are distributed over a wide area, without any specific concentration in a particular location (see Fig. 2). Their interpretation poses many problems due to the scarcity of contextual data. Out of five burials containing *Spondylus* shell ornaments, the identification of the age and sex of the deceased was possible in only two cases. The two people buried were adult men equipped with grave goods including, *i.a*. shell medallions. In the absence of additional evidence, it would be difficult to undertake any in-depth analysis of the finds.

THE MEANING OF SHELL ORNAMENTS IN THE LIGHT OF NEW ANALYSES (SUMMARY)

Ornaments are mainly personal objects that play a significant role in human non-verbal communication. They can signify or symbolise belonging to a given social group, sex, age, social status or position; they can also convey certain ideas or reflect a way of life. Importantly, the meaning of the message they carry is only understood by certain communities. Wearing ornaments and decorating the body serve to satisfy the needs of both the individual and the community. The possession of an appealing decoration can bring admiration not only to the object itself but also to the person wearing it (Sommer 2003, 67-68; Séfèriadès 2010; Vanhaeren 2005).

In a difficult attempt to interpret the meaning of ornaments made of *Spondylus* shells discovered in Poland, several factors must be taken into account. First, it should be stressed that the majority of *Spondylus* shell ornaments known from this region were recorded at the end of the nineteenth century (Karsko, Inowrocław-Mątwy) and in the 1930s and early 1960s (Brześć Kujawski, Werbkowice Kotorów, Szczotkowice). Interestingly, wide-range rescue excavations carried out in recent years ahead of the construction of roads and motorways have not yielded new finds of shell ornaments. Such a small number of these artefacts prompts us to perceive them as unique items and assume that they had some special meaning for the Neolithic communities inhabiting the area of present-day Poland.

The shell ornaments discussed were high-quality items made of 'exotic' raw material. They functioned in specific social groups for a long time (handed down from generation to generation?), as indicated by previously mentioned traces of use and repair. The ornaments reached the Polish lands in a ready-made form through trade(?), as gifts(?), or together with people from the south who settled in the area under study.

In the opinion of some researchers (Séfèriadès 2010), the best explanation why objects made of *Spondylus* shells were handed down from generation to generation is the phenomenon of shamanism. Also, the ornaments may have been used for a long time in the areas where access to precious/prestigious items was difficult or limited. Clay imitations of shell ornaments recorded at archaeological sites (Siklósi 2004) – one of them discovered in the area of Poland (Czarniak 2007) – confirm the significance of these objects in Neolithic communities. Interestingly, the majority of ornaments recorded in the area of present-day Poland are associated with burials of the LBK or SBK communities. Only one of them – the medallion from Brześć Kujawski – is chronologically linked with the later period.

Although a single find, it may be considered additional proof of the connection between the BKC communities and earlier groups of the LBK. So far, evidence of the use of LBK sites or structures in a special way by BKC communities has been found primarily in the location of burials (around the LBK houses), the construction of houses on the plans of LBK houses, or the use of LBK objects. These traces have been interpreted as the remnants of rituals of BKC communities, who possibly worshiped – or otherwise considered significant – the remains of LBK settlements, believing that they were the homes of their mythical ancestors (Czerniak and Pyzel 2013; 2019). Thus it can be assumed that the use of shell ornaments (or their imitations), which were typical and characteristic for the LBK communities in almost all Europe, may additionally confirm, even in this individual case, some relationship of the BKK with the LBK communities in the sphere of beliefs and rituals.

According to R. Grygiel (1966, 2008a), the Brześć Kujawski Culture was shaped by societies of the Stroke Band Pottery Culture and migrants from Silesia, and particularly communities of the Jordanów-Silesia group. These contacts between the BKC and communities from Silesia were visible throughout its entire duration. We should also bear in mind strong links with LBK cultures from western Europe – Hinkelstein and Rössen – and with the Lengyel Culture from the areas located to the south of Poland (Grygiel 1983, 2008a). Taking into account the presence of hip belts and other shell ornaments in BKC and contemporaneous cultures, *i.e.* the aforementioned Hinkelstein and Rössen (Nieszery 1995), Tiszapolgár (Bognàr-Kutzián 1963) and Lengyel (Pavúk and Bátora 1995) cultures, we cannot exclude that the medallion made of *Spondylus* might have been an object of exchange or trade between the BKC and societies related to the listed cultures.

Typologically, the medallion does not indicate any specific period of time. This type of ornament was used throughout the Neolithic and Eneolithic periods, when items made of *Spondylus* were common. Only traces of wear, such as smoothed edges, damage or repairs (making subsequent suspension holes) indicate that the artefact was in use for a long time, but it is not known when or for how long. Therefore, both hypotheses explaining the origin of the find from Brześć Kujawski are possible.

The wide distribution of *Spondylus* shells in Europe in the Neolithic period suggests that they were associated mostly with agricultural communities, and that they symbolised a new social order (Séfèriadès 2010). However, the meaning of shell ornaments changed through time and was certainly determined by the distance between the places where the shells naturally occurred, the places where the ornaments were produced, and the locations where ready-made objects were deposited (Windler 2018). 'Traditionally' *Spondylus* shell ornaments are considered symbols of social status and prestige (see wider discussion, *e.g.* Müller *et al.* 1996; Kalicz and Szénászky 2001; Siklósi and Csengeri 2011; Gaydarska and Chapman 2015). However, is this a sufficient answer to the question raised about the meaning of these artefacts (Séfèriadès 2010)?

In light of the new analyses presented in this article, it appears necessary to revise previous interpretations concerning *Spondylus* shell ornaments recorded in Poland (see *e.g.* Cofta-Broniewska and Kośko 1982; Kadrow 2008; Kowalski 2013, 2014; Czerniak and Pyzel 2019).

Although the hypotheses linking these artefacts with long-distance exchange and trade or with social status and prestige cannot be excluded, the confirmed scarcity of evidence significantly limits the possibilities of interpretation. Therefore, in our opinion, considerations concerning these finds should focus on the meaning of the object itself, which reflected a certain idea associated with the Neolithic period, brought to the area of Poland by the first farmers. Thus, maybe we should perceive *Spondylus* shell ornaments as items which identified certain communities or individuals as members of agricultural society, with its specific social structure, and the owners of the ornaments as unique and representative for that society?

Acknowledgements

Thanks are expressed to Ryszard Grygiel (Museum of Archaeology and Ethnography in Łódź), Krzysztof Kowalski (National Museum in Szczecin), Józef Łoś (Museum in Bydgoszcz), Marta Cyran (Lublin Museum), Jacek Górski and Albert Zastawny (Archaeological Museum in Kraków), who provided us with materials from archaeological sites and enabled our studies. We are grateful to Patrycja Rutkowska for preparing figures for the article. Special thanks to Stanisław Wilk (Karkonoskie Museum in Jelenia Góra) for consultation concerning the chronology of the grave from Werbkowice-Kotorów. This work was supported by the National Science Centre, Poland, under Grant No. 2015/19/D/HS3/01594, awarded to Aldona Kurzawska.

References

Álvarez-Fernandez E. and Carvajal-Contreras D. (eds) 2010. *Not only food. Marine, terrestrial and freshwater molluscs in archaeological sites. Proceedings of the 2nd Meeting of the ICAZ Archaeomalacology Working Group (Santander, February 19th-22nd 2008)* (= *munibe. Suplemento – Gehigarria* 31). Donostia: Sociedad de Ciencias Aranzadi Zientzia Elkartea.

Apolinarska K. and Kurzawska A. 2020. Can stable isotopes of carbon and oxygen be used to determine the origin of freshwater shells used in Neolithic ornaments from Central Europe? *Archaeological and Anthropological Sciences* 12(1), 1-16. https://doi.org/10.1007/s12520-019-00978-2.

Bajnóczi B., Schöll-Barna G., Kalicz N., Siklósi Zs., Hourmouziadis G.H., Ifantidis F., Kyparissi-Apostolika A., Pappa M., Veropoulidou R. and Ziota Ch. 2013. Tracing the source of Late Neolithic Spondylus shell ornaments by stable isotope geochemistry and cathodoluminescence microscopy. *Journal of Archaeological Science* 40(2), 874-882. https://doi.org/10.1016/j.jas.2012.09.022.

Bardec'kyj A., Dębiec M. and Saile T. 2016. Zwei runde Spondylusklappen aus der bandkeramischen Siedlung von Rovancě in Wolhynien. Ein Beitrag zu Tausch und Statusim frühen Neolithikum. *Sprawozdania Archeologiczne* 68, 183-192. https://doi:10.1007/s12520-019-00978-2.

Bar-Yosef Mayer D. E., Gümüs B.A. and Islamoglu Y. 2010. Fossil hunting in the Neolithic: Shells from the Taurus Mountains at Çatalhöyük, Turkey. *Geoarchaeology* 25, 375-392. https://doi:10.1002/gea.20311.

Bednarczyk J., Kośko A. and Czerniak L. 1980. Z badań nad zespołem osadniczym ludności z kręgu kultur ceramiki wstęgowej w Kruszy Zamkowej, stan. 3, woj. Bydgoszcz (część sepulkralna). *Sprawozdania Archeologiczne* 32, 55-83.

Bentley R.A. 2006. Strontium Isotopes from the Earth to the Archaeological Skeleton: A Review. *Journal of Archaeological Method and Theory* 13, 135-187. https://doi:10.1007/s10816-006-9009-x.

Bognàr-Kutzián I. 1963. *The Copper Age Cemetery of Tiszapolgár-Basatanya*. Budapest: Institute of Archaeological Sciences.

Bonnardin S. 2009. *La parure funéraire au Néolithique ancient dans les Bassins parisien et rhénan. Rubané, Hinkelstein et Villeneuve Saint Germain* (= *Société Préhistorique Française, Mémoire* 49). Paris: Société Préhistorique Française.

Chapman J. and Gaydarska B. 2015. Spondylus Gaederopus/Glycymeris exchange network in Neolithic and Chalcolithic. In Ch. Flower, J. Harding and D. Hofmann (eds), *The Oxford Handbook of Neolithic Europe*. Oxford: Oxford University Press, 639-656. https://doi:10.1093/oxfordhb/9780199545841.013.014.

Claassen C. 1998. *Shells. Cambridge Manuals in Archaeology*. Cambridge: Cambridge University Press.

Cofta-Broniewska A. and Kośko A. 1982. *Historia pierwotna społeczeństw Kujaw*. Warszawa, Poznań: PWN.

Cristiani E., Farbstein R. and Miracle P. 2014. Ornamental traditions in the eastern Adriatic: The Upper Palaeolithic and Mesolithic personal adornments from Vela Spila (Croatia). *Journal of Anthropological Archaeology* 36(1), 21-31. https://doi:10.1016/j.jaa.2014.06.009.

Czarniak K. 2007. Gliniany amulet z osady starszej fazy kultury lendzielskiej w Zarzycy na Dolnym Śląsku. *Sprawozdania Archeologiczne* 59, 115-121.

Czekaj-Zastawny A. 2009. Obrządek pogrzebowy kultury ceramiki wstęgowej rytej [Funerary rite of the Linear Pottery culture]. In A. Czekaj-Zastawny (ed.), *Obrządek pogrzebowy kultur pochodzenia naddunajskiego w neolicie Polski południowo-wschodniej (5600/5500-2900 BC)* [*Funerary rite of the Danubian cultures in the Neolithic of southeastern Poland (5600/5500-2900 BC)*]. Kraków: Instytut Archeologii i Etnologii PAN, 25-51.

Czerniak L. 1980. *Rozwój społeczeństw kultury późnej ceramiki wstęgowej na Kujawach*. Poznań: Wydawnictwo Naukowe UAM.

Czerniak L. and Pyzel J. 2013. Unusual Funerary Practices in the Brześć Kujawski Culture in the Polish Lowland. In N. Müller-Scheeßel (ed.), *"Irreguläre" Bestattungen in der Urgeschichte: Norm, Ritual, Strafe…? Akten der Internationalen Tagung in Frankfurt a. M. vom 3. bis 5. Februar 2012* (= *Römisch-Germanische Kommission des Deutschen Archäologischen Instituts. Kolloquien zur Vor- und Frühgeschichte* 19). Bonn: Dr. Rudolf Habelt GmbH, 139-150.

Czerniak L. and Pyzel J. 2019. The Brześć Kujawski culture. The north-easternmost Early Chalcolithic communities in Europe. In R. Gleser and D. Hofmann (eds), *Contacts, boundaries & innovation in the fifth millennium: exploring developed Neolithic societies in central Europe and beyond*. Leiden: Sidestone Press, 59-90.

D'Errico F., Vanhaeren M., Barton N., Bouzouggar A., Mienis H. and Richter D. 2009. Additional evidence on the use of personal ornaments in the Middle Paleolithic of North Africa. *Proceedings of the National Academy of Sciences of the United States of America* 106(38), 16051-16056. https://doi:10.1073/pnas.0903532106.

Dimitrijević V. 2014. The provenance and use of fossil scaphopod shells at the Late Neolithic/Eneolithic site Vinča-Belo Brdo, Serbia. In K. Szabó, C. Dupont, V. Dimitrijević, L.G. Gastelum and N. Serrand (eds), *Archaeomalacology: shells in the archaeological record* (= *BAR International Series* 2666). Oxford: Archaeopress, 33-41.

Galiński T., Dziewanowski M. and Kowalski K. 2012. Epoka kamienia – katalog zabytków. In K. Kowalski and A. Marciniak (eds), *Zaginione – Ocalone. Szczecińska kolekcja starożytności pomorskich*. Szczecin: Muzeum Narodowe, 81-100.

Chapman J. and Gaydarska B. 2015. Spondylus Gaederopus/Glycymeris exchange network in Neolithic and Chalcolitic. In Ch. Flower J. Harding and D. Hofmann (eds), *The Oxford Handbook of Neolithic Europe*. Oxford: Oxford University Press, 639-656.

Grygiel R. 2008. *Neolit i początki epoki brązu w rejonie Brześcia Kujawskiego i Osłonek* 2: 1. *Środkowy neolit. Grupa brzesko-kujawska kultury lendzielskiej*. Łódź: Fundacja Badań Archeologicznych K. Jażdżewskiego.

Grygiel R. 2008a. *Neolit i początki epoki brązu w rejonie Brześcia Kujawskiego i Osłonek* 2: 3. *Środkowy neolit. Grupa brzesko-kujawska kultury lendzielskiej*. Łódź: Fundacja Badań Archeologicznych K. Jażdżewskiego.

Ifantidis F. and Nikolaidou M. 2011. (eds), *Spondylus in Prehistory. New data and approaches. Contributions to the archaeology of shell technologies* (= *BAR International Series* 2216). Oxford: Oxford University Press.

Jahrbuch... 1894. Jahrbuch der Historischen Gesellschaft für Netzedistrikt zu Bromberg.

Jażdżewski K. 1938. Cmentarzyska kultury ceramiki wstęgowej i związane z nimi ślady osadnictwa w Brześciu Kujawskim. *Wiadomości Archeologiczne* 15, 1-105.

John J. 2011. Status of Spondylus artifacts within the LBK grave goods. In F. Ifantidis and M. Nikolaidou (eds), *Spondylus in prehistory. New data and approaches. Contributions to the archaeology of shell technologies* (= *BAR International Series* 2216). Oxford: Oxford University Press, 39-45.

Kadrow S. 2008. Gender-differentiated burial rites in Europe of the 5th and 4th millennia BC: attempts at traditional archaeological interpretation. *Analecta Archaeologica Ressoviensia* 3, 49-95.

Kalicz N. and Szénászky J.G. 2001. Spondulus-Schmuck im Neolithikum des Komitats Békés. *Praehistorische Zeitschrift* 76, 24-54. https://doi.org/10.1515/prhz.2001.76.1.24.

Krauss A. 1964. *Grób kultury starszej ceramiki wstęgowej ze Szczotkowic, pow. Kazimierza Wielka*. In S. Nosek (ed.), *Studia i Materiały do badań nad neolitem Małopolski*. Wrocław, Warszawa, Kraków: Zakład Narodowy im. Ossolińskich, 69-76.

Kowalski A. P. 2013. *Mit a piękno. Z badań nad pochodzeniem sztuki*. Bydgoszcz: Oficyna Wydawnicza Epigram.

Kowalski A. P. 2014. *Archeologia zamierzchłych znaczeń*. Toruń: Polskie Towarzystwo Historyczne.

Kurzawska A., Sobkowiak-Tabaka I. and Jakubowski G. (in prep.). Miocene shells in the Late Neolithic and Early Bronze Age burials in Poland. *Geoarchaeology*.

Liana T. and Piętka-Dąbrowska T. 1962. Sprawozdanie z badań ratowniczych przeprowadzonych w 1959 r. na stanowisku I w Werbkowicach-Kotorowie, pow. Hrubieszów. *Wiadomości Archeologiczne* 28(2), 152-173.

Maciejewski F., Rajewski Z. and Wykrój Z. 1954. Ślady osadnictwa kultury t. zw. brzesko-kujawskiej w Biskupinie, pow. Żnin. *Wiadomości Archeologiczne* 20(1), 67-79.

McArthur J. M., Howarth R. J. and Bailey T. R. 2001. Strontium isotope stratigraphy: LOWESS Version 3: Best Fit to the marine Sr-isotope curve for 0-509 Ma and accompanying look-up Table for Deriving Numerical Age. *The Journal of Geology* 109, 155-170.

Micheli R. 2012. Personal ornaments, Neolithic groups and social identities. Some insights into Northern Italy. *Documenta Praehistorica* 39, 227-255 https://doi.org/10.4312/dp.39.16.

Müller J. 1997. Neolithische und chalkolithische Spondylus-Artefakte. Anmerkungen zu Verbreitung, Tauschgebiet und sozialer Funktion. In C. Becker, M. L. Dunkelmann, C. Metzner-Nebelsick, H. Peter-Röcher and M. Roeder and B. Teržan (eds), *Chronos. Beiträge zur prähistorischen Archäologie zwischen Nord- und Südosteuropa. Festschrift für Bernhard Hänsel. Internationale Archäologie* (= *Studia honoraria* 1). Espelkamp: Leidorf, 91-106.

Müller J., Herrera A. and Knossalla N. 1996. Spondylus und Dechsel – zwei gegensätzliche Hinweise auf Prestige in der mitteleuropäischen Linearbandkeramik? In J. Müller and R. Bernbeck (eds), *Prestige – Prestigegüter - Sozialstrukturen. Beispiele aus dem europäischen und vorderasiatischem Neolithikum* (= *Archäologische Berichte* 6). Bonn: Holos, Deutsche Gesellschaft für Ur- und Frühgeschichte e.V., 81-96.

Nieszery N. 1995. *Linearbandkeramische Gräberfelder in Bayern* (= *Internationale Archäologie* 16). Espelkamp: Marie Leidorf.

Novotný B. 1958. *Slovensko v mladšej dobe kamennej*. Bratislava: SAV.

Pavúk J. and Bátora J. 1995. *Siedlung und Gräber der Ludanice-Gruppe in Jelšovce*. Nitra: Archeologický ústav SAV.

Perlès C. and Vanhaeren M. 2010. Black Cyclope neritea marine shell ornaments in the Upper Palaeolithic and Mesolithic of Franchthi Cave, Greece: arguments for intentional heat treatment. *Journal of Field Archaeology* 35(3), 298-309. https://doi:10.1179/009346910X12707321358874.

Podborský V. 2002. *Dvě pohřebiště neolitického lidu s lineární keramikou ve Vedrovicích na Moravě*. Brno: Ústav archeologie a muzeologie, Filozofická fakulta Masarykovy University.

Poppe G. T. and Goto Y. 2000. *European Seashells. Vol 2. Scaphopoda, Bivalvia, Cephalopoda)*. Hackenheim: ConchBooks.

Raczky P. and Anders A. 2017. The chosen ones: unconventional burials at Polgár-Csöszhalom (north-east Hungary) from the fifth millennium cal BC. In P. Bickle, V. Cummings, D. Hofmann, J. Pollard and A. Whittle (eds), *The Neolithic of Europe: Papers in honour of Alasdair Whittle*. Oxford: Oxbow Books, 63-81.

Rigaud S., d'Errico F. and Vanhaeren M. 2015. Ornaments reveal resistance of North European Cultures to the spread of farming. *PLoS One*, e0121166. https://doi.org/10.1371/journal.pone.0121166.

Sakalauskaite J., Andersen S. H., Biagi P., Borrello M. A., Cocquerez T., Colonese A. C., Bello F. D., Girod A., Heumüller M., Koon H., Mandili G., Medana C., Penkman K. E. H., Plasseraud L., Schlichtherle H., Taylor S., Tokarski C., Thomas J., Wilson I. J., Marin F. and Demarchi B. 2019. 'Palaeoshellomics' reveals the use of freshwater mother-of-pearl in prehistory. *eLife* 2019; 8: e45644. https://doi:10.7554/eLife.45644.

Séfèriadès M. L. 2010. Spondylus and long-distance trade in prehistoric Europe. In D. W. Anthony and J. Chi (eds*), The lost world of old Europe. The Danube valley, 5000-3500 BC*. New York, Princeton, Oxford: Institute for the Study of the Ancient World at New York University, Princeton University Press, 179-186.

Shackleton J. and Elderfield H. 1990. Strontium isotope dating of the source of Neolithic European Spondylus shell artefacts. *Antiquity* 64, 312-315.

Shackleton N. and Renfrew C. 1970. Neolithic trade routes re-aligned by oxygen isotope analyses. *Nature* 228, 1062-1064.

Siklósi Zs. 2004. Prestige goods in the Neolithic of the Carpathian Basin. *Acta Archaeologica Academiae Scientarum Hungaricae* 55, 1-62.

Siklósi Zs. 2013. *Traces of Social Inequality during the Late Neolithic in the Eastern Carpathian Basin* (= *Dissertationes Pannonicae ex Instituto Archaeologico Universitatisde Rolando Eötvös nominatae Budapestinensis provenientes*. *Ser. IV. Vol.* 3). Budapest: Eötvös Loránd University, Institute of Archaeological Sciences.

Siklósi Zs. and Csengeri P. 2011. Reconsideration of Spondylus Usage in the Middle and Late Neolithic of the Carpathian basin. In F. Ifantidis and M. Nikolaidou (eds), *Spondylus in Prehistory: New data and approaches. Contribution to the archaeology of shell technologies* (= *BAR, International Series 2216*). Oxford: Archaeopress, 47-62.

Siuchniński K. 1972. *Klasyfikacja czasowo-przestrzenna kultur neolitycznych na Pomorzu Zachodnim*. 2. *Opracowanie analityczne*. Szczecin: Muzeum Pomorza Zachodniego.

Smoczyńska Ł. 1953. Kultura ceramiki wstęgowej w Wielkopolsce. *Fontes Archaeologici Posnanienses* 3, 1-84.

Szałkowska-Łoś J. and Łoś J. 2014. Odkrywanie przeszłości – zarys historii badań archeologicznych w regionie. In *Na pograniczu Wielkopolski i Pomorza. Bydgoszcz i regionu zarania dziejów*. Bydgoszcz: Muzeum Okręgowe w Bydgoszczy, 9-101.

Sommer M. 2003. *Zbieranie. Próba filozoficznego ujęcia*. Warszawa: Oficyna Naukowa.

Stiner M. C., Kuhn S. L. and Güleçb E. 2013. Early Upper Paleolithic shell beads at Üçağızlı Cave I (Turkey): Technology and the socioeconomic context of ornament life-histories. *Journal of Human Evolution* 64(5), 380-398. https://doi.org/10.1016/j.jhevol.2013.01.008.

Todorova H. 2002. Die Mollusken in den Gräberfeldern von Durankulak. In H. Todorova (ed.), *Durankulak, Band II. Die prähistorischen Gräberfeldern von Durankulak*. 1. Sofia: Deutsches Archäologisches Institut in Berlin, 177-190.

Vanhaeren M. 2005. The Evolutionary significance of beadmaking and use. In F. d'Errico and L. Backwell (eds), *From tools to symbols, from early hominids to modern humans*. Johannesburg: Wits University Press, 525-553.

Vanhaeren M., d'Errico F., Billy I. and Grousset F. 2004. Tracing the source of Upper Palaeolithic shell beads by strontium isotope dating. *Journal of Archaeological Science* 31, 1481-1488. https://doi.org/10.1016/j.jas.2004.03.011.

Virchov R. 1884. Excursion nach Bernburg (Anhalt). *Zeitschrift für Ethnologie* 16, 398-420.

Willms C. 1985. Neolithischer Spondylus Schmuck: Hundert Jahre Forschung. *Germania* 63, 321-344.

Windler A. 2018. *Der Astausch von Spondylus gaederopus in Europa zwischen 5500 und 5000 v. Chr.: eine ökonomische Analyse* (= *Der Anschnitt Beiheft* 40). Bochum: Verlag Marie Leidorf.

Annex

KARSKO

History of the discovery

Undoubtedly, the first documented find of a *Spondylus* shell found in the area of present-day Poland comes from a grave discovered accidentally on the northern shore of Lake Płoń in Karsko in 1884. This artefact was described in 1898 by E. Walter in *Die steinzeitlichen Gefäße des Stettiner Museums*. It was again defined as a *Spondylus* shell in 1927 by O. Kunkel in *Reallexikon der Vorgeschichte*. The find was also published in 2012 in an exhibition catalogue, where R. Borówka described it as 'a bowl made of an oyster shell with traces of 5 holes (...) the shell was largely silicified, which suggests that the bowl was made of a Cretaceous oyster' (Galiński *et al*. 2012, 94-95).

Description of the find

The medallion (Fig. 3: A), 80 mm long and 73 mm wide, was made of the left valve of a *Spondylus* shell. In the upper part (umbo) of the shell valve, from the hinge side, partly preserved human-made suspension holes (5) are visible.

Context

The site is located on the northern shore of Lake Płoń. The skeletal grave with the body of an adult man was furnished with a pedestal bowl, a three-part vessel with a biconical body, a vessel with spherical body and base, a fragment of a vessel's body, 2 lower tusks of a boar, 5 flint blades, and a shell (Galiński *et al.* 2012, 94-95). The grave is attributed to the Stroke Band Pottery culture.

INOWROCŁAW-MĄTWY

History of the discovery

The artefact was discovered at the end of the 19th century. In 1893, a teacher from Bydgoszcz named Hellmann discovered the remains of a grave in a gravel pit in Inowrocław-Mątwy. The grave contained two large valves of a *Spondylus* shell. The find was described in *Jahrbuch der Historischen Gesellschaft für Netzedistrikt zu Bromberg* in 1894 (Jahrbuch… 1894, 88; Smoczyńska 1953).

Description of the find

The medallion (Fig. 3: B), 104 mm long and 102 mm wide, was made of the left valve of a *Spondylus* shell. In the upper part of the shell, on both sides of the umbo, two suspension holes are present. Between the holes and the edge, on both sides of the shell, use-wear traces made by a string are visible, indicating the way the ornament was suspended.

Context

Originally, the Museum in Bydgoszcz was in possession of 2 valves of a *Spondylus* shell (inv. no. 1233), which may have come from the same damaged skeletal grave. Currently, there is only one medallion (inv. no. A621; Szałkowska-Łoś, Łoś 2014, 34-35) displayed at the permanent exhibition. The cultural attribution of the grave is problematic, as the two shell valves are the only known elements of grave equipment. Based on analogies to a very similar medallion found at Brześć Kujawski (BCK) and other finds from European LBK sites (*e.g.* Vedrovice in Czech Republic or at French sites), we can consider the burial to be chronologically related to LBK or BCK.

BRZEŚĆ KUJAWSKI, SITE 4

History of the discovery

In his publication on the results of the research carried out at Brześć Kujawski (1938), K. Jażdżewski described in detail the *Spondylus* shell ornaments recorded in graves. The shells were identified by S. Feliksiak from the State Museum of Zoology in Warsaw. In total, nine graves were described containing artefacts identified as *Spondylus* shells (Jażdżewski 1938, 56 Table).

Description of the find

The medallion inv. no. IN 2617 (Fig. 3: C), 110 mm long and 93 mm wide, was made of the left valve of a *Spondylus* shell. Suspension holes (4-5) are placed near the shell's outer edge, on both sides of the umbo.

Context

"Grave XXIX. In a very even, rectangular grave pit, at a depth of 35-35 cm, on the left side, lay a skeleton of an adult human in a strongly contracted position, with the head oriented to south-east and the face looking north-east. The deceased's right arm was bent at the elbow at a right angle, with the palm turned down towards the knees. The left hand, also bent at the elbow, was stretched forward. By the forehead of the deceased, a dozen or so copper beads were placed, probably as a decoration of the forehead. On the chest, below the lower jaw, rested a medallion made of a large Spondylus shell. In front of the chest, lay an antler battle axe. Near the knees, several flint objects were scattered. The height of the deceased was about 1.5 m. The grave pit, filled with grey hummus, was 49 cm deep, and it contained potsherds of the Brześć Kujawski culture" (Jażdżewski 1938).
Grave equipment: an antler battle axe, a shell ornament, copper beads. Chronologically, the find is associated with the Brześć Kujawski culture.

Other finds

Other artefacts recorded in graves include disc beads made of shells of mussels from the Unionidae family (see Table 1). We suppose that the reason behind the misidentification of the shells was their poor state of preservation – disc beads, unintentionally stuck together in rows, looked like cylindrical beads; in addition, they were covered with sediment and taphonomically altered, which probably made the identification more difficult.

SZCZOTKOWICE, SITE 1, PINCZÓW DISTRICT

History of the discovery

In 1961, during the construction of a road in the area of Szczotkowice, a burial attributed to the Linear Band Pottery culture was discovered. Grave goods included, *i.a.* three ornaments made of *Spondylus* shells (Krauss 1964; Czekaj-Zastawny 2009) identified by W. Krach (Geological Museum, Polish Academy of Sciences, Kraków) on the basis of a thin section cut from a cylindrical bead (Krauss 1964, 72, fig. 4).

Description of the find

The first bead (Fig. 4: A), measuring 32.65 mm × 30.89 mm, was made of the upper (umbo) part of a *Spondylus* shell. It has an irregular shape. A biconical hole running through the bead's center, with an outer diameter of 5.89-5.95 mm, was made by drilling the bead from both sides. The second bead (Fig. 3: D.2), measuring 42.63 mm × 34.17 mm, is of a similar shape. It also has a biconical hole running through the center, with an external diameter of 6.12-6.32 mm, made by drilling from both sides. The third artefact (Fig. 4: A) is a large cylindrical bead measuring 24.08 mm × 11.92 mm, partly damaged. The damage on one side was made in prehistory as the result of friction from the string. Its other end was cut off for a thin-section analysis by W. Krach in 1964. Roughly rectangular holes visible on the bead's surface, previously described as decorations, are of natural origin; they were present in the shell already at the time the bead was manufactured. Microwear traces on all the beads testify to their long use.

Context

"In the spring of 1961, during the construction of a country road in Szczotkowice, Kazimierza Wielka district, a skeletal grave with a stone frame was unearthed. It was equipped with vessels and beads. It was located on the northern part of the road, about 100m north of the Nidzica River (...). According to the information obtained, the deceased was buried in a contracted position, in a west-east direction, with the head turned westwards. Its equipment consisted of beads found by the head, and three vessels together with a stone enclosure at the side of the skeleton. The entire grave was covered with ochre, which was visible on the bones and artefacts" (Krauss 1964).

During the field investigation carried out in 1961, only fragments of skull bones were collected. The deceased's equipment consisted of 3 vessels (2 small bowls and an amphora) deposited by his side as well as 36 biconical beads made of white marble and 3 *Spondylus* beads placed by the head (Krauss 1964). The shell beads were probably elements of a necklace. Chronologically, the burial is associated with the Linear Band Pottery culture (LBK).

WERBKOWICE-KOTORÓW

History of the discovery

The artefact was discovered in a grave published in 1962; it was described as an amulet made of limestone (white chalk; Liana and Piętka-Dąbrowska 1962). Currently, it is on display at the archaeological exhibition in the Lublin Museum. In 2016, when visiting the exhibition, the authors of the article noticed this artefact described as a stone (limestone) object. After initial examination, they identified it as made of a *Spondylus* shell.

Description of the find

The artefact (Fig. 4: B) is now an irregularly shaped pendant measuring 43 mm × 46 mm. In its central part, it has a suspension hole with a diameter of 7 mm. Originally the artefact was probably a large, irregularly shaped bead with a hole running through the centre. Due to its high value, after the damage, the broken bead was 'repaired' by drilling a hole in the middle so that the ornament could be used further.

Context

"The grave was heavily damaged by a bulldozer. The skeleton lay just below the surface; some of the bones were protruding from the surface. The skull was completely crushed. The grave pit was characterised by a slightly grayish colour. The grave was damaged in the eastern part by pit 45, as a result of which the bones of the left foot and partially the right one were not preserved. The skeleton was oriented north-east, with the head turned westwards. The legs were contracted, and the hands placed under the chin. Next to the bones of the right arms an amulet was deposited (Fig. 12). Inventory: a limestone (white chalk) amulet with a drilled hole (Tabl. XXXIII: 9). Sex of the deceased: female; unspecified age; height 153 cm; chronology: the Neolithic period, the Stroke Band Pottery Culture" (Liana, Piętka-Dąbrowska 1962).

Based on analogies to the orientation of the skeleton and the shape of the pendant, the artefact should be linked with the Linear Band Pottery culture (LBK).

SPRAWOZDANIA ARCHEOLOGICZNE 72/2, 2020
PL ISSN 0081-3834
DOI: 10.23858/SA/72.2020.2.2275

Aleksandra Gawron-Szymczyk[1], Dagmara Łaciak[2], Justyna Baron[3]

TO SMOOTH OR NOT TO SMOOTH? A TRACEOLOGICAL AND EXPERIMENTAL APPROACH TO SURFACE PROCESSING OF BRONZE AND IRON AGE CERAMICS

ABSTRACT

Gawron-Szymczyk A., Łaciak D., Baron J. 2020. To smooth or not to smooth? A traceological and experimental approach to surface processing of Bronze and Iron Age ceramics. *Sprawozdania Archeologiczne* 72/2, 67-86.

The biographic approach – that is, tracing artefacts' 'lives' from production, through their use, and finally to their deposition – is commonly applied in the analysis of lithic, flint, and metal artefacts. Objects made of clay, although the most common artifacts at many prehistoric sites, are rarely subject to such studies. In this paper, we focused on the short span of time during the "life" of a ceramic object when its surfaces were smoothed or/and burnished. Both are typical properties of Bronze/early Iron Age pottery found in today's Poland. We studied two factors that influenced the desired final effect: the vessel drying time and the applied tool(s). To accomplish this study, we combined the results of observations of 46 samples from three settlements and two cemeteries in southwestern Poland, as well as the analysis of experimental reference samples. We demonstrated that the drying time was crucial, while the tool kit was composed of rather simple, mostly unprepared, objects such as pebbles or pieces of antler. In the smoothing process, we also observed a connection between surface selection (internal/external) and the purpose to which the vessel was put (settlement/funerary).

Keywords: Bronze Age, early Iron Age, ceramics, experiment, surface treatment, pottery tool kit
Received: 17.07.2020; Revised: 03.08.2020; Accepted: 31.08.2020

1 Institute of Archaeology, University of Wrocław, Szewska 48, 50-139 Wrocław, Poland; aleksandra.anna.gawron@gmail.com; https://orcid.org/0000-0002-0364-6064
2 Institute of Archaeology, University of Wrocław, Szewska 48, 50-139 Wrocław, Poland; dagmara.laciak@uwr.edu.pl; https://orcid.org/0000-0003-2472-8226
3 Institute of Archaeology, University of Wrocław, Szewska 48, 50-139 Wrocław, Poland; justyna.baron@uwr.edu.pl; https://orcid.org/0000-0001-6429-2872

1. INTRODUCTION

That pottery production was one of the basic human activities in the past is reflected in the abundant archaeological evidence dated to the Neolithic onwards. Ceramics have been the subject of studies from the very beginning of professional archaeology, which have analysed them from the angles of typology, technology, contexts, *etc*. However, in the case of clay surfaces, traces and micro traces of their production and use have rarely been studied. This is particularly striking when we compare this paucity of interest with the dynamically developing studies on flint, bone, antler, and recently on metal objects (*e.g.*, Legrand and Sidéra 2007; van Gijn 2010; Dolfini and Crellin 2016). However, since recently, this area of study seems to be receiving increasing attention (*e.g.*, Lepère 2014; Ionescu *et al.* 2015; Skibo 2015; Calvo *et al.* 2018; Forte *et al.* 2018).

An important contribution to the subject in Polish archaeology is the book by M. Mogielnicka-Urban (1984) in which she discusses working on both wet and dried ceramic surfaces. Basing on the ethnographical data, she argues that the vessels were first smoothed by hand and then polished with a hard tool (Mogielnicka-Urban 1984, 104).

Our main objective was, therefore, to identify the tools used in the finishing techniques commonly employed during the Bronze and Iron Age, *i.e.*, smoothing, polishing and burnishing.

Smoothing is a technique for obtaining a finer and more regular surface than the one that results from forming only (Rice 1987, 138) and is applied immediately after forming (Ionescu and Hoeck 2020, 204). Burnishing and polishing techniques result in surface lustre; however, in case of burnishing, linear facets are observed (Rice 1987, 138).

The main questions that arose from the above discussion were:

- can we identify the tools used in surface processing right after the vessels were formed?
- were they *ad hoc* tools (pebbles, ribs of animals), or were the tools worked before use?
- can we observe different patterns in the finishing of vessels used in settlement versus funerary contexts?

2. THE SITES AND MATERIALS

This study is based on a collection of 46 pottery samples from three settlements – namely, Radłowice, Ruszowice, and Wrocław Niemczańska street (10 samples per site) – and two cremation cemeteries: Szprotawa and Miłosławice (6 and 10 samples, respectively). All of them are located in today's SW Poland (Fig. 1) and belong to the periods from the early Bronze Age to the early Iron Age, *i.e.*, *ca*. 1800-550 BC (Table 1).

The settlement at Radłowice is located on the loess-based fertile soils in the NE part of the Wrocław Plain. The excavations were carried out in 1968 by S. Pazda (1968), and between 1984 and 1989 by I. Lasak (1993), with a total area of 2,600 m^2 unearthed. The site

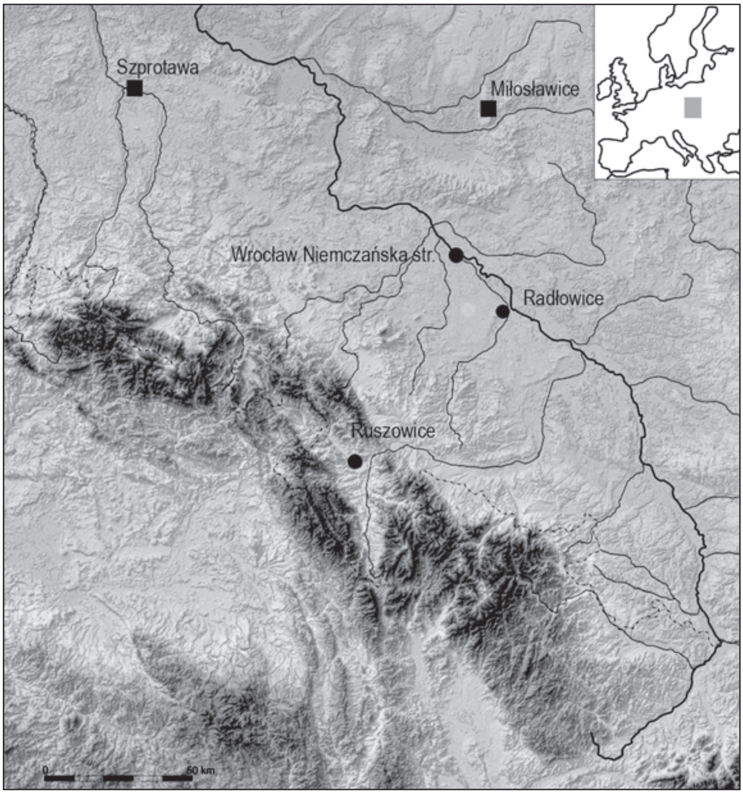


Fig. 1. The studied sites in SW Poland. Squares – cemeteries, circles – settlements (illustrated by A. Gawron-Szymczyk)

was a typical settlement with numerous pits, post-holes, pit houses, and many artefacts made of ceramics, bone, flint, and only few metal objects (Lasak 1993). The pottery is typical for late stages of the early Bronze Age (Lasak 1993, 76-82) and its paste was tempered with fine and medium-grained crushed granite. Ten analysed pieces came from feature no. 1 – a one-metre-deep trench whose interpretation is still ambiguous (Lasak 1990, 117-136; 1991, 87-96).

Another settlement is the site of Ruszowice in the Kłodzko Basin. According to the surface survey, the site covers an area of about 20,000 m^2, of which 940 m^2 were excavated in 2014-2018 (Baron *et al*. 2018). The properties of the ceramics indicate two settlement stages: an early urnfield period (*ca*. 1300-1100 BC) and the early Iron Age (750-550 BC). The analysed samples (6 pieces) come from the occupational layer – two pieces from pit no. 36, located within the outline of a house, one piece from pit no. 45, interpreted as the foundation trench of a building, and one piece from pit no. 51. Due to the high fragmentation of the pottery, we were not able to date the particular samples.

Table 1. Results of macro- and microscopic observation of traces on archaeological samples. Key: sample ID: E – external surface; I – internal surface; site type: se – settlement, cem – cemetery; grave/pit no: layer – occupational layer, st – stray; chronology: EBA – early Bronze Age, MBA – middle Bronze Age, LBA – late Bronze Age, EIA – early Iron Age; surface treatment: sm – smoothed, pol – polished, ro – rough, mt – matte, dmg – damaged; band direction: par – parallel, md – multidirectional

No	Sample ID	Site	Site type	Grave or pit no.	Chronology	Macroscopic features			Microscopic features				Figure
						surface treatment	band	lines inside band	bands		lines inside band		
									width [mm]	direction	occurrence	distance [mm]	
1	Ra-01-E	Radłowice 22	se	1	EBA	sm	+	-	0.5	par	+	0.02	
2	Ra-01-I	Radłowice 22	se	1	EBA	sm	+	-	0.3-0.1	md	-	-	6: c
3	Ra-02-E	Radłowice 22	se	1	EBA	sm	+	+	2	md	+	0.003	
4	Ra-02-I	Radłowice 22	se	1	EBA	sm	+	-	-	-	-	-	
5	Ra-03-E	Radłowice 22	se	1	EBA	pol	-	-	-	-	-	-	
6	Ra-03-I	Radłowice 22	se	1	EBA	pol	-	-	-	-	-	-	
7	Ra-04-E	Radłowice 22	se	1	EBA	sm, film	-	-	0.4	par	-	-	
8	Ra-04-I	Radłowice 22	se	1	EBA	dmg	-	-	-	-	-	-	
9	Ra-05-E	Radłowice 22	se	1	EBA	pol	+	-	0.6	par	-	-	
10	Ra-05-I	Radłowice 22	se	1	EBA	pol	+	-	0.6	md	-	-	
11	Ra-06-E	Radłowice 22	se	1	EBA	sm	+	+	1	md	+	0.03-0.06	6: b
12	Ra-06-I	Radłowice 22	se	1	EBA	sm	+	-	0.5	par	+	0.03	
13	Ra-07-E	Radłowice 22	se	1	EBA	film	-	-	-	-	-	-	
14	Ra-07-I	Radłowice 22	se	1	EBA	film	-	-	-	-	-	-	
15	Ra-08-E	Radłowice 22	se	1	EBA	pol	-	-	-	-	-	-	6: a
16	Ra-08-I	Radłowice 22	se	1	EBA	dmg	-	-	-	-	-	-	
17	Ra-09-E	Radłowice 22	se	1	EBA	pol	-	-	-	-	-	-	

18	Ra-09-I	Radłowice 22	se	1	EBA	dmg	-	-	-	-	-	-	
19	Ra-10-E	Radłowice 22	se	1	EBA	sm	-	-	0.7	md	-	-	
20	Ra-10-I	Radłowice 22	se	1	EBA	film	-	-	-	-	-	-	
21	S-11-E	Szprotawa Niepodległości av.	cem	1	MBA	film	-	-	0.3	par	-	-	
22	S-11-I	Szprotawa Niepodległości av.	cem	1	MBA	dmg	-	-	-	-	-	-	
23	S-12-E	Szprotawa Niepodległości av.	cem	5	MBA	ro	-	-	-	-	-	-	
24	S-12-I	Szprotawa Niepodległości av.	cem	5	MBA	sm	+	+	1.1	par	+	0.03-0.07	7: a
25	S-13-E	Szprotawa Niepodległości av.	cem	st	MBA	film	-	-	0.7	par	+	0.7	7: c
26	S-13-I	Szprotawa Niepodległości av.	cem	st	MBA	film	-	-	-	-	-	-	
27	S-14-E	Szprotawa Niepodległości av.	cem	1	MBA	pol, film	-	-	-	-	-	-	
28	S-14-I	Szprotawa Niepodległości av.	cem	1	MBA	pol, film	-	-	-	-	-	-	
29	S-15-E	Szprotawa Niepodległości av.	cem	1	MBA	pol	+	+	0.9	par	-	-	
30	S-15-I	Szprotawa Niepodległości av.	cem	1	MBA	pol	+	+	0.9	md	+	0.1-0.2	7: b
31	S-16-E	Szprotawa Niepodległości av.	cem	1	MBA	sm, film	+	-	0.9	par	-	-	
32	S-16-I	Szprotawa Niepodległości av.	cem	1	MBA	sm, dmg	+	-	0.4-0.6	par	-	-	
33	Ru-17-E	Ruszowice 5	se	layer	MBA-EIA	sm, mt	-	-	-	-	-	-	
34	Ru-17-I	Ruszowice 5	se	layer	MBA-EIA	pol	+	-	1.75	par	-	-	
35	Ru-18-E	Ruszowice 5	se	36	MBA-EIA	sm, mt	-	-	-	-	-	-	
36	Ru-18-I	Ruszowice 5	se	36	MBA-EIA	sm	+	-	1.75	par	-	-	

Table 1.

No	Sample ID	Site	Site type	Grave or pit no.	Chronology	Macroscopic features			Microscopic features				Figure
						surface treatment	band	lines inside band	bands		lines inside band		
									width [mm]	direction	occurrence	distance [mm]	
37	Ru-19-E	Ruszowice 5	se	36	MBA-EIA	sm, mt	-	-	-	-	-	-	
38	Ru-19-I	Ruszowice 5	se	36	MBA-EIA	film	+	-	0.8	par	-	-	
39	Ru-20-E	Ruszowice 5	se	45	MBA-EIA	sm, mt	-	-	-	-	-	-	
40	Ru-20-I	Ruszowice 5	se	45	MBA-EIA	film	-	-	-	-	-	-	
41	Ru-21-E	Ruszowice 5	se	layer	MBA-EIA	sm, mt	-	-	-	-	-	-	
42	Ru-21-I	Ruszowice 5	se	layer	MBA-EIA	film	-	-	-	-	-	-	
43	Ru-22-E	Ruszowice 5	se	51	MBA-EIA	sm, mt	-	-	-	-	-	-	
44	Ru-22-I	Ruszowice 5	se	51	MBA-EIA	sm	+	-	1.7	md	-	-	6: f
45	Ru-23-E	Ruszowice 5	se	layer	MBA-EIA	sm, mt	-	-	-	-	-	-	
46	Ru-23-I	Ruszowice 5	se	layer	MBA-EIA	sm, mt	-	-	-	-	-	-	
47	Ru-24-E	Ruszowice 5	se	layer	MBA-EIA	mt	-	-	-	-	-	-	6: e
48	Ru-24-I	Ruszowice 5	se	layer	MBA-EIA	film	-	-	0.9	par	+	0.1	6: d
49	Ru-25-E	Ruszowice 5	se	layer	MBA-EIA	sm, film	+	-	0.6	par	-	-	
50	Ru-25-I	Ruszowice 5	se	layer	MBA-EIA	sm	+	-	0.6	par	+	0.03-0.06	
51	Ru-26-E	Ruszowice 5	se	layer	MBA-EIA	sm	+	+	1.9	par	-	-	
52	Ru-26-I	Ruszowice 5	se	layer	MBA-EIA	sm, mt	-	-	-	-	-	-	
53	N-27-E	Wrocław, Niemczańska st.	se	111	LBA	sm	+	-	1.3	par	-	-	6: g
54	N-27-I	Wrocław, Niemczańska st.	se	111	LBA	film	+	-	1.3	par	-	-	6: h
55	N-28-E	Wrocław, Niemczańska st.	se	150	LBA	dmg	-	-	-	-	-	-	

56	N-28-I	Wrocław, Niemczańska st.	se	150	LBA	film	+	-	1.3	par	-	-	
57	N-29-E	Wrocław, Niemczańska st.	se	157	LBA	film	-	-	-	-	-	-	
58	N-29-I	Wrocław, Niemczańska st.	se	157	LBA	film	-	-	-	-	-	-	
59	N-30-E	Wrocław, Niemczańska st.	se	180	LBA	pol	+	-	2.3	par	+	0.5	
60	N-30-I	Wrocław, Niemczańska st.	se	180	LBA	film	-	-	-	-	-	-	
61	N-31-E	Wrocław, Niemczańska st.	se	177	LBA	pol	+	-	1	md	+	0.1-0.03	
62	N-31-I	Wrocław, Niemczańska st.	se	177	LBA	pol	+	-	1	par	-	-	6: i
63	N-32-E	Wrocław, Niemczańska st.	se	104	LBA	dmg	-	-	-	-	-	-	
64	N-32-I	Wrocław, Niemczańska st.	se	104	LBA	pol	+	-	1.1	md	-	-	
65	N-33-E	Wrocław, Niemczańska st.	se	197	LBA	pol, dmg	+	+	1.3	par	-	-	
66	N-33-I	Wrocław, Niemczańska st.	se	197	LBA	film	-	-	-	-	-	-	
67	N-34-E	Wrocław, Niemczańska st.	se	103	LBA	sm, mt	-	-	-	-	-	-	
68	N-34-I	Wrocław, Niemczańska st.	se	103	LBA	sm, mt	-	-	-	-	-	-	
69	N-35-E	Wrocław, Niemczańska st.	se	111	LBA	film	-	-	-	-	-	-	
70	N-35-I	Wrocław, Niemczańska st.	se	111	LBA	film	-	-	-	-	-	-	
71	N-36-E	Wrocław, Niemczańska st.	se	111	LBA	film	-	-	-	-	-	-	
72	N-36-I	Wrocław, Niemczańska st.	se	111	LBA	sm	-	-	0.03	md	-	-	
73	M-37-E	Miłosławice 6	cem	374	EIA	sm	+	-	0.4	par	-	-	

Table 1.

No	Sample ID	Site	Site type	Grave or pit no.	Chronology	Macroscopic features			Microscopic features				Figure
						surface treatment	band	lines inside band	bands		lines inside band		
									width [mm]	direction	occurrence	distance [mm]	
74	M-37-I	Miłosławice 6	cem	374	EIA	film	-	-	-	-	-	-	
75	M-38-E	Miłosławice 6	cem	52	EIA	film	-	-	-	-	-	-	
76	M-38-I	Miłosławice 6	cem	52	EIA	sm	-	-	-	-	-	-	
77	M-39-E	Miłosławice 6	cem	51	EIA	film	-	-	-	-	-	-	7: f
78	M-39-I	Miłosławice 6	cem	51	EIA	sm	-	-	-	-	-	-	7: e
79	M-40-E	Miłosławice 6	cem	434	EIA	sm	-	-	-	-	-	-	
80	M-40-I	Miłosławice 6	cem	434	EIA	film	-	-	-	-	-	-	
81	M-41-E	Miłosławice 6	cem	489	EIA	film	+	-	1	par	+	0.03-0.06	7: d
82	M-41-I	Miłosławice 6	cem	489	EIA	dmg	-	-	-	-	-	-	
83	M-42-E	Miłosławice 6	cem	61	LBA	film	-	-	-	-	-	-	
84	M-42-I	Miłosławice 6	cem	61	LBA	sm	-	-	-	-	-	-	
85	M-43-E	Miłosławice 6	cem	196a	EIA	ro	-	-	-	-	-	-	
86	M-43-I	Miłosławice 6	cem	196a	EIA	film	-	-	-	-	-	-	
87	M-44-E	Miłosławice 6	cem	37	LBA	film	+	-	-	-	-	-	
88	M-44-I	Miłosławice 6	cem	37	LBA	film	-	-	-	-	-	-	
89	M-45-E	Miłosławice 6	cem	65	LBA	pol	+	-	2	-	-	-	
90	M-45-I	Miłosławice 6	cem	65	LBA	film	-	-	-	-	-	-	
91	M-46-E	Miłosławice 6	cem	199	LBA	film	+	-	-	-	-	-	
92	M-46-I	Miłosławice 6	cem	199	LBA	sm	+	-	0.6	md	+	0.03-0.06	

In Wrocław Niemczańska street, a site attributed to late stages of the Bronze Age (*ca*. 1100-750 BC) was excavated before construction works. From 205 pits of various functions, numerous pottery sherds, daub lumps, and slags were excavated (Panek 2012; Kądziołka 2016). Three pieces came from pit 111, and one piece each from pits 103, 104, 150, 157, 177, 180, and 197.

The urnfield at Szprotawa was located in the town centre at Niepodległości avenue and was excavated before a road was constructed over it (Panek 2012). The site consisted of five partly destroyed graves furnished with a typical urnfield set of grave goods, *i.e*., pottery and a few metal objects. We sampled four vessels from grave no. 1, vessel no. 2 from grave 5 (one piece), and one stray piece – six samples in total. The bones from grave 5 were dated to 1372-1128 BC (with 95.4% probability interval) with a carbon-14 test, which corresponds well with the artefact-based chronological period – Montelius III (1300-1100 BC).

The last site is a large urnfield at Miłosławice, excavated in the 1960s and then in 1995-2004. The total number of graves excavated in the 1995-2004 campaigns is 501. In general, the chronology covers late stages of the Bronze Age up to the early Iron Age (*i.e*., 1100-550 BC; Lasak 1996). The samples come from late Bronze Age graves dated roughly to 900-750 BC (one sample each from graves 37, 61, 65 and 199), and early Iron Age graves, *i.e*., *ca*. 750-550 BC (one sample each from graves 51, 52, 196a, 374, 434 and 489).

3. METHODS

The sample selection was based on the variability of traces observed with the naked eye. We selected sherds – both those with clearly visible traces of tools, and other heavily polished, smooth, lustrous pieces – to test whether the traces can be observed in further research. Then, the macroscopic documentation was done with the use of a Canon camera (EOS550D, lens EFS 18-55 mm). The micro traces were analysed at the Laboratory of Archaeometry and Artefact Conservation at the Institute of Archaeology, Wrocław University with the use of a stereoscopic microscope Olympus SZX9 (magnification 6,4-10×). In the observation and documentation process, the Lucia Measurement software and Nikon DS-5-U1 camera were used.

To verify and interpret the observations, an experiment was designed to produce reference samples. We applied the experimental protocol introduced by P. Richter (1991). The reference samples were 15 bowls of about 5 cm in diameter and about 3 cm high. The paste was red clay tempered with fine (<2 mm) sand in a 4:1 ratio. Each bowl weighed 50 g and had nine-milimetre-thick walls. They were made from a single lump of clay and dried in a dark, windless room at a temperature of about 20°C. They were then divided into three groups (I-III) according to their drying time, which was 2, 24, and 72 hours, respectively. The tools used to smooth the unworked surfaces were a pig rib, a piece of fired pottery made of plastic clay tempered with granite, a quartzite pebble, a smooth piece of pinewood,

Fig. 2. Smoothing tools used in the experiment: a – rib; b – sherd of pottery; c – pebble; d – wooden stick; e – antler (photo by A. Gawron-Szymczyk)

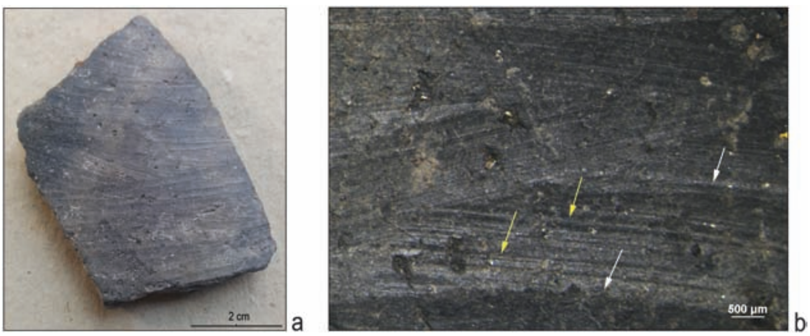


Fig. 3. Macroscopic (a) and microscopic (b) images of a worked surface of early Bronze Age pottery from Radłowice (sample Ra-06-E). White arrows indicate band edges (protrusions), yellow arrows denote lines inside band (photo by A. Gawron-Szymczyk)

and a smooth piece of red deer antler (Fig. 2). During the smoothing process, a uniform pressure was applied on the surfaces. Each bowl was smoothed for 5 minutes with regular, circular movements.

The firing was then done in an electric kiln, in an oxidizing atmosphere with hourly temperature increases of 50°C to reach a maximum of 600°C. The firing lasted 14 hours and 30 minutes, including 30 minutes at the maximum temperature. After the firing, the traces were observed under a microscope. The observations focused on all the traces created while smoothing the surfaces. Most of the traces were in the form of bands of various shapes and running in various directions. Small portions of clay were seen accumulated along the edges of the bands, forming protrusions, while inside the bands, parallel lines made by the tools were observed. They corresponded well with the traces observed on prehistoric pieces (Fig. 3).

4. RESULTS

Experimental Pottery

The experiment proved that the main factor influencing the surface smoothness was the drying time of the vessel before the smoothing started (Table 2). The humidity of the

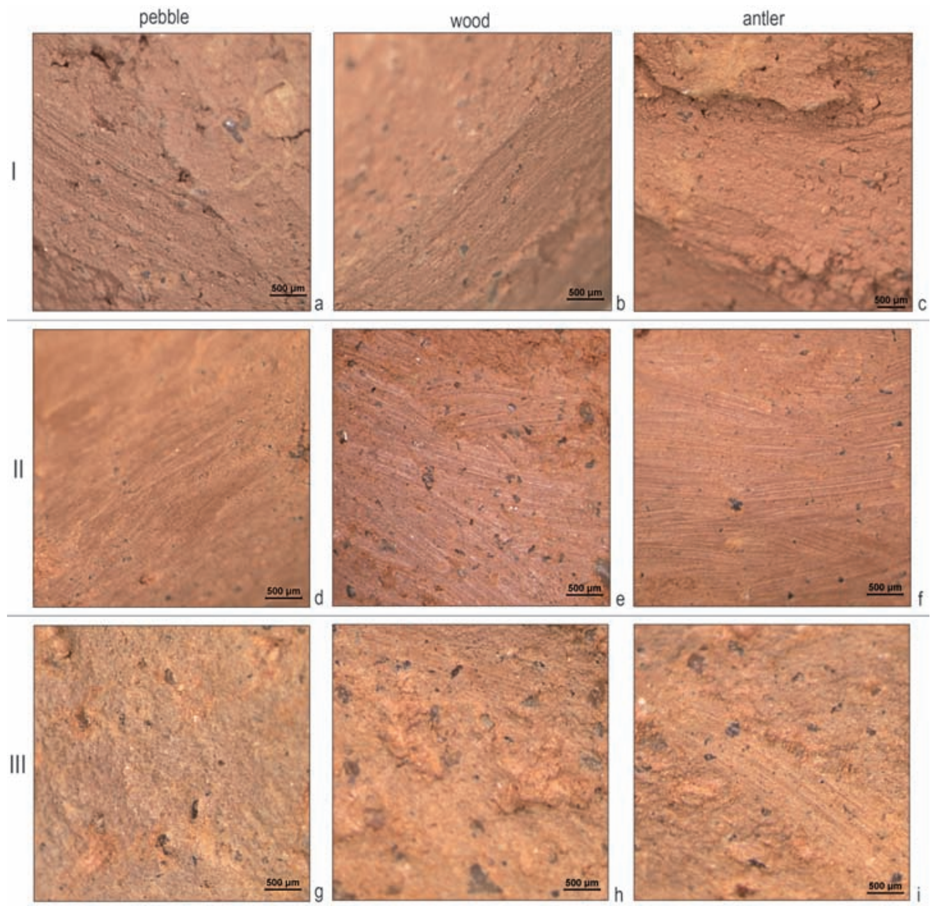


Fig. 4. Traces of tools on the experimental pottery. Labels I-III denote groups according to the drying time (photo by A. Gawron-Szymczyk)

Table 2. Results of microscopic observation of traces obtained on reference pottery. Key: group I-III: drying time (2, 24, 72 hours respectively); effect on the surface (macroscopic): ro – rough, sm – smooth, pol – polished; band direction: fr – frayed, par – parallel, w – wavy

No	Group	Tool	Effect on the surface (macroscopic)	Microscopic observations				Comments	Figure
				band		lines inside band			
				occurence	direction	occurence	width [mm]		
1	I	rib	ro	+	fr	+	0.08-0.1		
2		shard	ro	-	-	-	-		
3		pebble	ro	+	par, fr	+	0.05		4: a
4		wood	sm	+	par, fr	+	0.03-0.1		4: b
5		antler	ro	+	par, w	+	0.4		4: c
6	II	rib	sm	+	par	+	0.2	mildirectional lines in the bands	
7		shard	no traces	-	-	-	-	traces on the worked surface occured only in contact spot of the mineral temper of the tool	
8		pebble	sm	+	par	+	0.04		4: d
9		wood	pol	+	par	+	0.06-0.09		4: e
10		antler	pol	+	par	+	0.01		4: f
11	II	rib	sm	+	fr	+	0.2		
12		shard	ro	+	par, fr	+	0.03		
13		pebble	film	-	-	-	-		4: g
14		wood	no traces	-	-	+	0.1	no band edges observed	4: h
15		antler	no traces	-	-	+	0.1		4: i

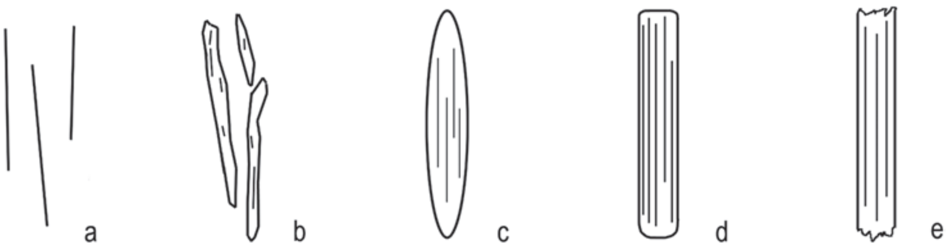


Fig. 5. Schematic traces of tools observed on bowls from group II: a – rib; b – sherd of pottery; c – pebble; d – wooden stick; e – antler (illustrated by A. Gawron-Szymczyk)

paste, the temperature, and possible air movements during the drying process were, therefore, crucial for the effectiveness of surface working, but relatively difficult to control in the course of the experiment.

The bowls that were dried for 2 hours (group I) were too wet to be smoothed – all the tools went too deep into the surfaces and left rough traces (Fig. 4: a-c).

Smooth surfaces with clearly visible, shining bands were noticed only in group II, which had been left to dry for 24 h. This group seems to have optimally hard walls for the use of the smoothing tools, which neither damaged the surface with deep bands nor caused abrasion (Fig. 4: d-f).

Also, the bowls from group III, which were left to dry for 72 hours, were too dry, and working their surfaces resulted in micro chippings or even abrasion on the vessels' walls (Fig. 4: g-i). The tools left only poorly visible traces, mostly concentrated in zones in which the paste was probably more moist.

The characteristics of traces on the bowls left to dry for 24 hours are presented in the following paragraphs.

The pig's rib left deep, poorly visible, matte grooves (Fig. 5: a). The piece of pottery seemed to be the least effective due to temper grains, which left irregular bands and grooves on the smoothed surface (Fig. 5: b). The traces of smoothing with pebbles were clearly visible as lenticular, matte bands of similar sizes and with straight edges. The lines inside the bands were shallow, dense, and parallel (Fig. 4: a, d, g; 5: c). The bands made by the piece of wood were more rectangular, deeper, and lustrous inside. The lines inside the bands were parallel, but denser and deeper compared to those made by pebbles (Fig. 4: b, e, h; 5: d). The piece of antler left the bands with irregular, notched ends, and the lines within the bands were deep, but not dense (Fig. 4: c, f, i; 5: e).

Among the tools used in the experiment, the pebble and the piece of pine wood seemed to be the most effective. Even in group I, their impact on the surface was lower compared to other tools (Fig. 4: a, b).

Prehistoric Pottery

The traces observed under the microscope on the archaeological samples were most similar to those observed on the experimental bowls from group II, *i.e.*, the group that was left to dry for 24 hours. Based on the results of the experiments, we identified such tools as pebbles, wood, antler, and rib.

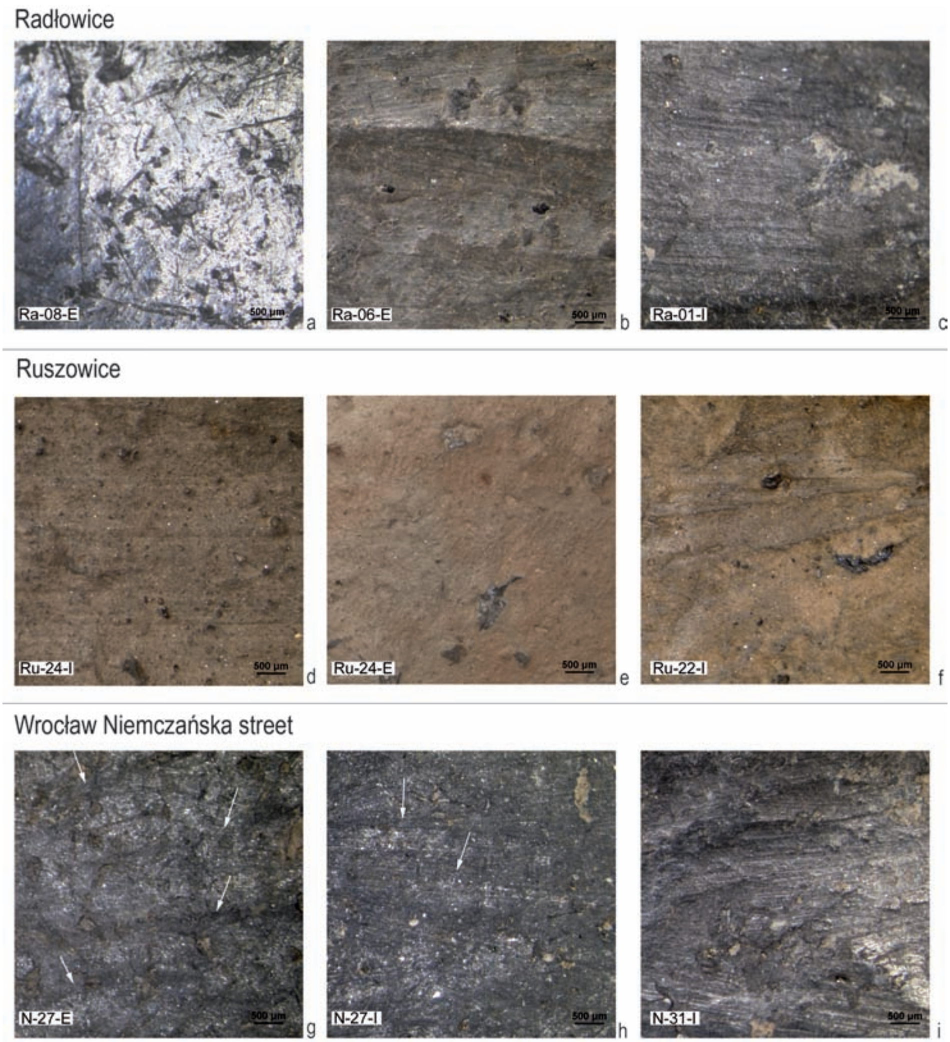


Fig. 6. Traces of tools on the ceramics from the settlements: a – polishing (no traces observed), b, d, e, g, h – pebble, c, i – wood, f – antler. White arrows denote traces of similar pebble use. The sample IDs are given in the lower left corner of each image (photo by A. Gawron-Szymczyk)

Table 3. Traces of tools on the archaeological samples

Tool	Settlement			Cemetery		
	Radłowice	Ruszowice	Wrocław Niemczańska	Szprotawa	Miłosławice	
pebble	2	7	5	5	8	= 27
wood	3	-	2	-	-	= 5
antler	1	2	-	-	-	= 3
rib	-	-	-	1	-	= 1
shard	-	-	-		-	= 0
Total	**6**	**9**	**7**	**6**	**8**	**= 36**

Of the 46 sherds in the sample, traces of tools were observed on 36 pieces (Table 3). On ten of the sample sherds, the tools remained unidentified, mostly due to intense polishing.

The most common traces were made by pebbles (27 pieces), wooden tools (5 pieces), antler (3 pieces), and a rib tool (1 piece). None bore traces of working with a piece of pottery. Therefore, the most common tools were simple, unprepared objects – smooth quartzite pebbles and pieces of antler in this case. Wood could easily have been used as well.

Interestingly, each piece (internal and external surface) was worked with one tool only, *i.e.*, the potters were able to smooth all the curved surfaces with one small object.

At the early Bronze Age settlement at Radłowice, 4 fragments were smoothed with unidentified tools, and the surfaces were heavily polished (Fig. 6: a). It seems that soft smoothers such as fur, leather, or textile might have been used. However, confirmation of that will require further experiments. This is also the only site where traces of pebbles (observed on two pieces – Fig. 6: b) did not prevail over the use of a wooden tool (3 pieces – Fig. 6: c). On one piece, traces of the use of an antler were observed.

Very interesting traces were observed on the collection from the settlement at Ruszowice. The pottery was smoothed with pebbles (7 pieces), but it seems that this work was done on dryer surfaces than in other cases. The smoothing was observed mostly on the inner surfaces of six pieces (Fig. 6: d), while the external surface of one was matte (Fig. 6: e), probably worked by hand only. Therefore, we may conclude that the smoothing was done to improve the vessel's watertightness; however, its original form, *i.e.*, its probable function, cannot be reconstructed due to the high fragmentation. Antler was used on two other pieces – again on their inner surfaces only (Fig. 6: f). The tool used for one fragment could not be recognised.

At the settlement from Wrocław Niemczańska street, the pottery was worked with pebbles five pieces), and similar bands were observed on the outer and inner surfaces (Fig. 6: g, h). Two pieces were worked with a wooden tool (Fig. 6: i). Another three pieces were covered with a thin film, but this technique remains unrecognized.

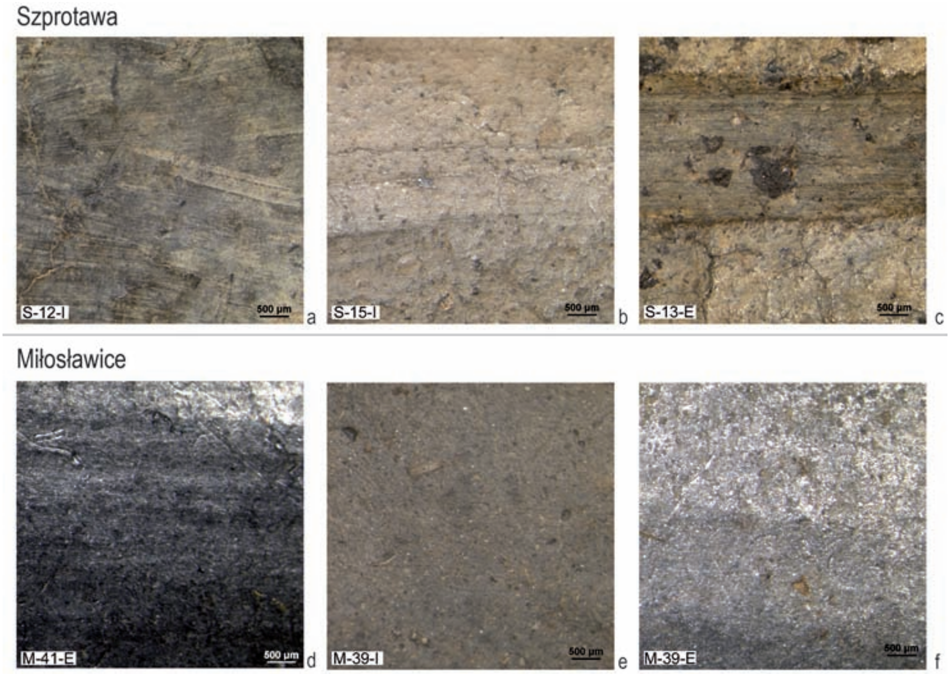


Fig. 7. Traces of tools on the ceramics from the cemeteries: a – rib tool, b-d, f – pebble, e – no traces. The sample IDs are given in the lower left corner of each image (photo by A. Gawron-Szymczyk)

The pottery from the cemetery at Szprotawa was worked with a rib (Fig. 7: a) and with pebbles (5 pieces – Fig. 7: b). In the case of a decorated sherd, the pattern of parallel bands was likely made with a thin pebble (Fig. 7: c).

Among the samples from the cemetery at Miłosławice, eight fragments were smoothed with pebbles, while unidentified tools were used on two others. In the case of this site, smoothing was done very carefully, and so the traces (in the form of parallel lines) were rather minimal (Fig. 7: d). Interestingly, seven pieces did not show any traces of smoothing inside the vessel, though these were evident on its outer surface (Fig. 7: e, f). It seems that in this case, improving the vessel's impermeability was not the objective. The vessel's inner surface was porous, and thus its absorptivity must have been significantly higher.

5. DISCUSSION

The modes of surface treatment of ceramic artifacts from Polish archaeological sites, and the tools used for the treatment, have not previously been subjects of research. Experimental observations in various scales in the current study have led to the identification of the tools used in treatments and the characteristic traces they leave on the surfaces of partly dried vessels.

There are some opinions in the literature about ceramic processing on materials of varying stages of dryness, and about surface burnishing performed on dry vessels (Mogielnicka-Urban 1984, 104; Orton *et al.* 1993, 126). Our experiments showed that better results can be achieved on slightly moist surfaces, on which micro chippings rarely occur, and a smooth texture and lustrous burnish are achieved more quickly.

Similar research, including micro observations and experiments, have been done on Neolithic pottery (4000-3800 cal. BC) from the Gava cave in SE Spain (Calvo *et al.* 2018, 251-256). Replicas of the pottery were made from the local clay, and the final surface treatment was done with small rocks on vessels at various levels of dryness. The results were similar to ours, but were not used to interpret traces of tools on the prehistoric pottery from this site.

In our research, we managed to prove that the most common tools used in the smoothing process were pebbles of various sizes. An interesting question that remains is how a perfectly smooth and shiny surface (as in the examples from Radłowice) was obtained, as the experiment proved that smoothing with the use of various tools was not enough for such a result. Ethnographic data from Central America showed a two-stage process of surface treatment – first, the use of pebbles and hands, followed by wet textiles (Shepard 1956, 65-69). In archaeological literature, it is also noted that pottery might have been polished with pieces of leather (Gądzikiewicz 1954), but M. Mogielnicka-Urban argues that the use of leather leaves the surface smooth, but matte (1984, 104). Therefore, further use of hard tools (pebbles of various sizes) cannot be ruled out. Interestingly, the possible two-stage smoothing process seems to be typical only for early Bronze Age material, and is observed on both settlement pieces and funerary pieces.

There is a widely held opinion that many objects used in pottery production might have had other functions previously, *i.e.*, they were not originally designed as specialist tools for potters. A good example is that of small ceramic discs (usual diameters 5-10 cm) with smooth rounded edges (*e.g.*, at Wrocław Niemczańska Street – Fig. 8: a, b). They are considered to be potsherds transformed for secondary use as smoothers (Venclová *et al.* 2019). Our experiment, however, demonstrated that potsherds are not suitable for smoothing, as they contain temper which leaves deep linear traces on the worked surfaces (Fig. 8: c, d). Therefore, we argue the ceramic discs were not used as smoothers but might have had other functions like toys, pieces in games, *etc.* (Żychlińska 2015, with further references therein).

Why were the surfaces smoothed? To improve quality or aesthetics? In our collection, the settlement vessels were more often smoothed and burnished inside, while the outer surfaces were rather matte. That may, therefore, suggest contact with liquids or semi-liquid content, requiring higher ware watertightness, which was achieved by intense smoothing. On the other hand, the grave vessels were not smoothed inside, and therefore,

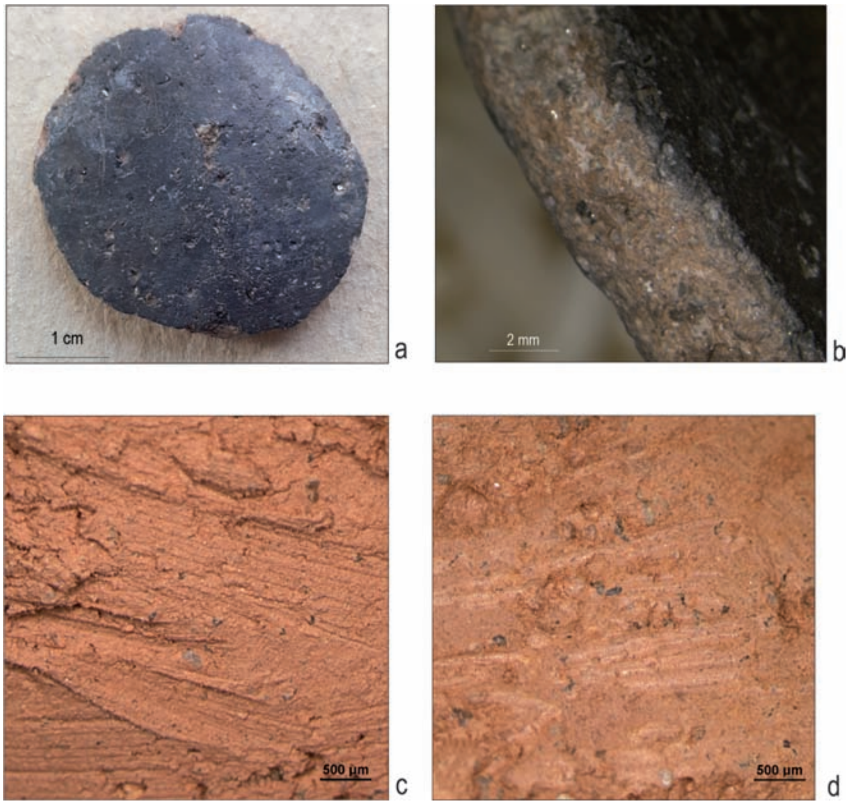


Fig. 8. Ceramic smoothers? a – ceramic disc from the settlement at Wrocław Niemczańska street and b – its rounded edge under the microscope, c – traces of use of ceramic smoother on experimental vessels from group I, d – traces of use of ceramic smoother on experimental vessels from group II (photo by A. Gawron-Szymczyk)

their walls remained relatively porous and absorptive. That may exclude them from many everyday uses, such as for storing, processing and serving food. Their carefully worked outer surfaces suggest rather a desire for obtaining a smooth and shiny or lustrous effect. Our results cannot be compared with data from other sites, as the smoothers have never been studied and published.

6. CONCLUSIONS

Our research enabled the identification of tools used in processing surfaces of ceramic vessels of various types (settlements, cemeteries) from archaeological and chronological contexts (from the early Bronze Age to the early Iron Age). Based on observations of archaeological samples and experimental reference materials, the main conclusions are:

1. The efficiency of surface treatment depended mostly on the degree of ceramic moisture, and the traces observed on archaeological samples corresponded the most with experimental smoothing performed at about 24 hours after the vessels were made.

2. The most common tools used in this process were simple, small pebbles. Evidence of the use of pottery sherds was not found.

3. Some of the vessels' surfaces, mostly in the early Bronze Age, were heavily polished, which suggests two stages in surface processing, *i.e.*, smoothing with unidentified tools and then further smoothing using some soft material.

4. The settlement vessels were smoothed mostly on the inside, which may confirm that the smoothing was applied to improve the impermeability of the container.

5. Unlike the settlement pottery, the funerary vessels were usually smoothed on the outside only, which did not influence their porosity and absorptivity. That may suggest they were not made for everyday use.

Acknowledgements

We would like to thank the two anonymous reviewers for their comments, which improved the final version of the manuscript.

This research did not receive any specific grants from funding agencies in the public, commercial, or not-for-profit sectors.

References

Baron J., Nowak K. and Bohr M. 2018. Kotlina Kłodzka w czasach pól popielnicowych. Główne zagadnienia i potrzeby badawcze. *Śląskie Sprawozdania Archeologiczne* 60 (2), 91-103.

Calvo S., Bosch J., Molist M. and Gómez-Bach A. 2018. Aproximación a los tratamientos de superficie en los recipientes cerámicos de las minas prehistóricas de Gava (Barcelona). *Butlletí Arqueólogic* V, 40, 251-256.

Dolfini A. and Crellin R.J. 2016. Metalwork wear analysis: The loss of innocence. *Journal of Archaeological Science* 66, 78-87.

Forte V., Cesar S.N. and Medeghini L. 2018. Cooking traces on Copper Age pottery from central Italy: An integrated approach comprising use wear analysis, spectroscopic analysis and experimental archaeology. *Journal of Archaeological Science: Reports* 18, 121-138.

Gądzikiewicz M. 1954. Wybrane zagadnienia z badań nad kulturą grobów kloszowych. *Wiadomości Archeologiczne* 20(2), 134-173.

Ionescu C., Hoeck V., Crandell O.N. and Sarić K. 2015. Burnishing versus smoothing in ceramic surface finishing: a SEM study. *Archaeometry* 57(1), 18-26.

Ionescu C. and Hoeck V. 2020. Ceramic technology. How to investigate surface finishing. *Archaeological and Anthropological Sciences* 12(204), https://doi.org/10.1007/s12520-020-01144-9.

Kądziołka K. 2016. Technologia wytwarzania naczyń ceramicznych na stanowisku kultury łużyckiej przy ul. Niemczańskiej we Wrocławiu na podstawie badań makro- i mikroskopowych. Unpublished MA thesis, Institute of Archaeology, University of Wrocław.

Lasak I. 1990. Z badań wczesnobrązowej osady w Radłowicach (sezon 1988). *Śląskie Sprawozdania Archeologiczne* 31, 117-136.

Lasak I. 1991. Badania poszukiwawcze rowu w strefie brzeżnej niszy źródliskowej na osadzie w Radłowicach. *Śląskie Sprawozdania Archeologiczne* 32, 87-96.

Lasak I. 1993. Osada kultury unietyckiej w Radłowicach (stan. 22). *Studia Archeologiczne* 24, 67-84.

Lasak I. 1996. Ratownicze badania wykopaliskowe na cmentarzysku kultury łużyckiej w Miłosławicach, gm. Milicz (stan. 6). *Śląskie Sprawozdania Archeologiczne* 38, 143-157.

Legrand A. and Sidéra I. 2007. Methods, means, and results when studying European bone industry. In C. Gates St-Pierre and R. Walker (eds), *Bones as tools: current methods and interpretations in Worked Bone Studies* (= *British Archaeological Reports, International Series* 1622). Oxford: Oxbow Books, 67-79.

Lepère C. 2014 Experimental and traceological approach for a technical interpretation of ceramic polished surfaces. *Journal of Archaeological Science* 46, 144-155.

Mogielnicka-Urban M. 1984. Warsztat ceramiczny w kulturze łużyckiej. Wrocław, Warszawa, Kraków, Gdańsk, Łódź: Ossolineum.

Orton C., Tyers P. and Vince A. 1993. *Pottery in archaeology*. Cambridge: Cambridge University Press.

Panek P. 2012. *Badania archeologiczne przy Al. Niepodległości w Szprotawie*. Unpublished excavation report, Wrocław.

Pazda S. 1968. Sprawozdanie z badań archeologicznych przeprowadzonych w rejonie Radłowic i Gostkowic powiat Oława w 1968 r. *Śląskie Sprawozdania Archeologiczne* 11, 25-30.

Rice P. M. 1987. Pottery Analysis: a Sourcebook. Chicago and London: The University of Chicago Press.

Richter P. B. 1991. Experimentelle Archäologie: Ziele, Methoden und Aussage-Möglichkeiten. *Experimentelle Archäologie in Deutschland, Bilanz* 6, 19-49.

Shepard A. 1956. *Ceramics for the archaeologist*. Washington: Carnegie Institution of Washington.

Skibo J. M. 2015. Pottery Use-Alteration Analysis. In J. M. Marreiros, J. F. Gibaja Bao and N. F. Bicho (eds), *Use-Wear and Residue in Archaeology. Manuals in Archaeological Method, Theory and Technique*. Cham: Springer, 189-198.

Van Gijn A. L. 2010. *Flint in Focus. Lithic Biographies in the Neolithic and Bronze Age*. Leiden: Sidestone Press.

Venclová N., Thér R. and Mangel T. 2019. Obroušené grafitové keramické fragmenty v době železné: možnosti interpretace. *Studia Historica Nitriensia* 23, 187-205.

Żychlińska J. 2015. Funkcja krążków glinianych ludności kultury łużyckiej w świetle nowych znalezisk z Wielkopolski. *Folia Praehistorica Posnaniensia* 20, 545-556.

SPRAWOZDANIA ARCHEOLOGICZNE 72/2, 2020
PL ISSN 0081-3834
DOI: 10.23858/SA/72.2020.2.1865

Katarzyna Trybała-Zawiślak[1]

THE CHOTYNIEC AGGLOMERATION AND ITS IMPORTANCE FOR INTERPRETATION OF THE SO-CALLED SCYTHIAN FINDS FROM SOUTH-EASTERN POLAND

ABSTRACT

Trybała-Zawiślak K. 2020. The Chotyniec agglomeration and its importance for interpretation of the so-called Scythian finds from south-eastern Poland. *Sprawozdania Archeologiczne* 72/2, 87-116.

Artefacts of eastern provenance, so-called Scythian ones, have been registered in Polish areas for a long time. In the western part of Polish lands, they were most often linked with Scythian invasions, and this explanation of finds was emphasized by destroyed settlements. In eastern Poland, the presence of similar artefacts, was interpreted rather in the context of contacts with the forest-steppe zone, and their almost neighbourly character was confirmed by characteristic decorations and parts of clothing. Discoveries related to the fortified settlement in Chotyniec (south-eastern Poland), together with accompanying settlements from the same time, allow for a slightly different view on the so-called Scythian finds recorded within the eastern groups of the Lusatian circle. The agglomeration should be treated as the farthest northwest enclave of the forest-steppe variant of the Scythian culture and as transmitter of certain cultural patterns. It is also a cultural phenomenon that plays a key role in the reception of the so-called eastern cultural elements.

Keywords: fortified settlement in Chotyniec, Chotyniec agglomeration, forest-steppe circle of Scythian cultures, Scythian artefacts
Received: 29.04.2020; Revised: 22.07.2020; Accepted: 11.10.2020

1 Institute of Archaeology Rzeszów University, Moniuszki st. 10, 35-015 Rzeszów, Poland; katarzyna.trybala@archeologia.rzeszow.pl; https://orcid.org/0000-0002-1482-0072

1. INTRODUCTION

The discovery of a fortified settlement in Chotyniec, Jarosław district, was associated with the implementation of a research project aimed at characterizing and analyzing cultural and settlement changes in the Wisznia River basin in the Bronze Age and the Early Iron Age. These studies, carried out on a large scale (both on the Polish and Ukrainian side of the border) have resulted in a number of extremely interesting observations. The choice of the territory covered by the research was also strictly justified, because an area between the San and Dniester basins is a territory connecting two large cultural provinces – Central and Eastern European regions. This fact results in an extremely important observation – the area we are interested in (the so-called Przemyśl Gate) can certainly be treated as a kind of contact zone and a route of movement of population groups. The strategic importance of this territory is clearly confirmed by the discovery of the fortified settlement (a ring fort), which should be linked with the cultural patterns implemented in the forest-steppe zone. No less important is the identification of a settlement enclave connected exactly with the Scythian cultural circle. It concerns a number of sites – both very large and smaller settlements, which, together with the fortified settlement, were called „the Chotyniec agglomeration". The use of such a name seems to be fully justified – we are dealing here with the central location of the fortified settlement and the sites located around it, which were a kind of support area for this fortification. The research on the entire settlement complex is still in progress, therefore the current state of knowledge will be reported in this paper, as well as up-to-date discoveries and their impact on the interpretation of the so-called Scythian finds in south-eastern Poland. Implementation of this term (with reference to mentioned finds) is combined with two units of the Lusatian circle, for which various terms are currently encountered. These include the Tarnobrzeg Lusatian culture and the Lusatian culture in the Lublin region, also called the Lublin variant of the Lusatian culture (Kłosińska 2009). However, other entities may provide a broader background for the discussed issues from the east part of the Lusatian circle – the areas of Mazowsze and Podlasie and Chełm-no Land, *i.e.* in the traditional nomenclature – the Mazowsze-Podlasie group and Chełmno group of the Lusatian culture (see Dąbrowski 2009). Several naming systems are clearly visible in this division. They result partly from the state of research (a change of the out-of-date name "the Ulwówek group" for the Lublin variant of the Lusatian culture), partly from the highlighted combination of common elements of the Lusatian circle and clear regional distinctions (the best example would be the term "Tarnobrzeg Lusatian culture" – see Dąbrowski 1980). They are also partly derived from the use of traditional taxonomic divisions (the Mazowsze-Podlasie group or Chełmno group), which still exist in the literature on the subject. Terminological issues undoubtedly have an ordering character, but in the context of the raised problem they are not of primary importance. That is why with the reference to the names of individual taxonomic units quoted below, although they reflect several different variants of archaeological systematics, they do not affect the general understanding of the south-eastern zone of the Lusatian circle and the territorial context of the so-called Scythian finds in eastern Poland.

2. CHARACTERISTICS OF THE CHOTYNIEC AGGLOMERATION

As already mentioned, the concept of the Chotyniec agglomeration is connected not only with the fortified settlement, but also with the accompanying settlement sites, in which assemblages of sources were analogous to those discovered in Chotyniec. However, it should be remembered that this is basically just one of the simpler approaches to the topic of our interest. Therefore, it is worth reviewing this issue in greater detail.

Data on the settlements located closest to the fortification were already published (Czopek *et al.* 2018; Czopek 2019), but it is worth relating some of the most important information. The three largest sites – Hruszowice, sites 2 and 16, Przemyśl district, and Chotyniec, site 7, Jarosław district, were investigated on a large scale, as part of the motorway research program. Although they are multicultural settlements, we can certainly distinguish a very substantial set of sources related to the Early Iron Age. Such a chronology – despite some doubts related to, for example the flattening of the calibration curve – can also be attributed to radiocarbon dates originating from the settlement at site 2 in Hruszowice (see Czopek 2018c, 197). Unfortunately, their interpretation is not straightforward, due to the fact that one of the dates may also correspond to the pre-Scythian horizon, which (even though is possible) has not yet been confirmed by archaeological sources, even those recorded within the fortified settlement. A little further (about 6 km) southwest of Chotyniec, a vast settlement at site. 24 in Nienowice, Jarosław district, was recorded, where the discovered sources (ceramic and metal) fit typologically very well into the set of materials characteristic for the agglomeration. Furthermore, additional points located in the immediate vicinity of the fortified settlement are still being recognized – at least a dozen sites with ceramic materials of the type known from Chotyniec are known from surface surveys. It is very challenging to determine the eastern extent of the agglomeration. Although analogous sources are known from settlements located in Korczowa, a much broader surface survey of the entire Polish-Ukrainian border area is definitely needed (Trybała-Zawiślak 2019, 278). Therefore, it is necessary to return to the issue previously described, *i.e.* the extent of the Chotyniec agglomeration. So far, the clearly separated boundary between eastern groups, such as the Leznica or Cherepin-Lagodiv groups, and the western zone assigned to the Tarnobrzeg Lusatian culture seems to be increasingly problematic in light of recent discoveries related to the agglomeration. The similarity of ceramic materials is so great that it cannot be said without doubt whether they should be linked with the aforementioned eastern groups or with the Chotyniec agglomeration (see Czopek 2019, 135). In this context, defining the agglomeration as a fortified settlement and the closest few neighbouring settlements is only one possible option. A wider territorial and cultural context is most likely, although at the current stage of research (especially when we take into account the disproportion in the field research of sites on the Ukrainian side of the border) it is still quite difficult to prove.

Although the research on the Chotyniec microregion is still ongoing, undoubtedly it should be connected with the Scythian cultural circle. Its cultural "identity" becomes even more visible in the face of neighbouring, typical "Tarnobrzeg" sites. It must be remembered that the identification of the agglomeration opens a new chapter in studies of the Early Iron Age; it is the first in the territory of south-eastern Poland, and in a much wider area as well, where sources of the so-called eastern type have been identified. The declining phase of the Tarnobrzeg Lusatian culture is characterized by these elements in a special way; its specificity and difference to earlier stages is characterized mainly in context of sources of the eastern type. Such an approach is not surprising, owning to the fact that many years ago, when this taxonomic unit was just being recognized by researchers, it was believed that these eastern type elements provided its characteristic form (see Moskwa 1982; Gediga 1989; Gedl 1989), along with distinguishing a new phase in its development, so-called Phase III (Czopek 1989). Therefore, the mutual relations between the agglomeration and the Tarnobrzeg Lusatian culture can be quite difficult to define precisely, especially since the unification of material culture in the Early Iron Age applies to the very extensive territory of Central and Eastern Europe. There is no doubt that the Tarnobrzeg settlement is still a very important component of the cultural diversity of the Early Iron Age (Trybała-Zawiślak 2019, 363), although the differences between phases II and III of this cultural unit are so clear (Czopek 2007c) that the argument regarding the uninterrupted use of large cemeteries becomes essential in the context of the cultural continuity of this area. However, another important issue is the previously unrecorded identification of settlement processes, which are confirmed, on the one hand, by a newly-established necropolis with graves organized in clusters, and on the other hand, by the presence of very extensive settlements with separable functional structures indicating the chronological and spatial development of settlements (see Czopek 2014a, 2014b). The affiliation of these sites (despite the sources recorded there, especially pottery sherds in the forest-steppe type) with the Tarnobrzeg Lusatian culture is unquestionable. In this context, another interesting settlement (also extensive) at site 1 in Grabowiec, Jarosław district, is a very good example of the complicated "Chotyniec-Tarnobrzeg relationship". Eastern-type materials identified there are not very numerous, although the distance from the fortified settlement in Chotyniec is quite small. In this case, the cultural identification of the settlement should be unambiguously linked to the Tarnobrzeg Lusatian culture (Czopek 2018b; Trybała-Zawiślak 2019). Therefore, the Chotyniec agglomeration – understood as an enclave of the forest-steppe settlement variant of the Scythian culture – is now a very expressive and permanent element of the cultural image of Polish lands, and the adaptation of eastern stimuli in many cases leads not only to the unification, but also to a somewhat Scythization of material culture.

3. THE SO-CALLED SCYTHIAN FINDS – SOURCE CHARACTERISTICS

The concept of Eastern or Scythian elements in the literature on the subject has been known for a long time, thus these are obviously not new concepts. The interpretation usually tended to view such elements as the manifestation of references, influences, impulses, infiltration, or more widely understood relationships, though sometimes difficult to define. This mainly applied to finds from the eastern part of Poland, unlike western Lusatian groups, where the finds were primarily treated as evidence of military expansion and

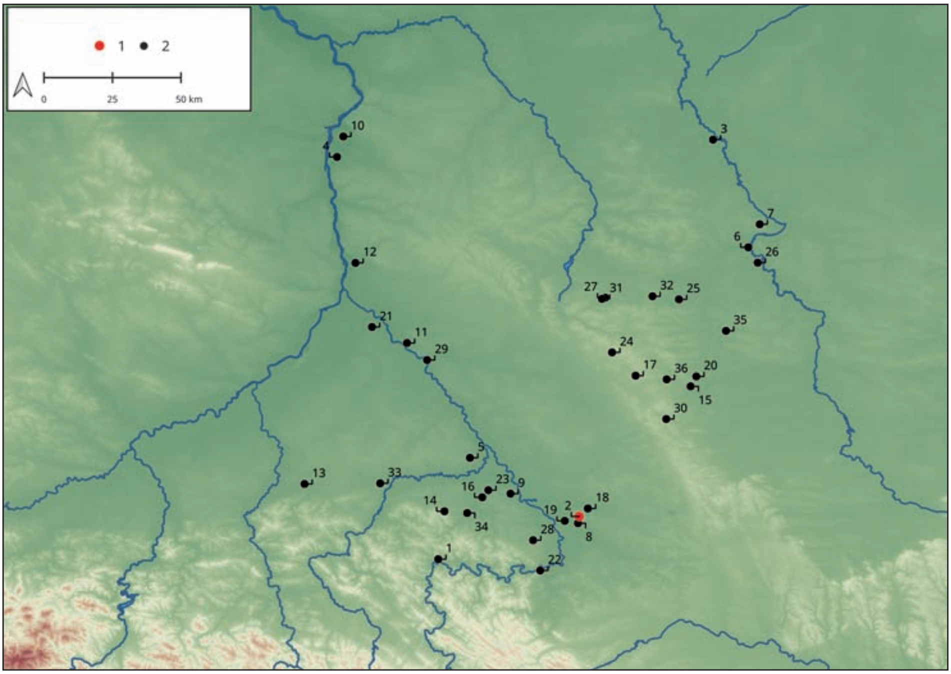


Fig. 1. Military items – finds from south-eastern Poland: 1 – Bachórz, Rzeszów district; 2 – Chotyniec, Jarosław district; 3 – Dorohusk, Chełm district; 4 – Głodno, Opole Lubelskie district; 5 – Grodzisko Dolne, Leżajsk district; 6 – Gródek, Hrubieszów district; 7 – Hrebenne, Hrubieszów district; 8 – Hruszowice, Przemyśl district; 9 – Jarosław, district Loco; 10 – Kłodnica, Opole Lubelskie district; 11 – Kłyżów, Stalowa Wola district; 12 – Kosin, Kraśnik district; 13 – Kozodrza, Ropczyce district; 14 – Lipnik, Przeworsk district; 15 – Machnów Stary, Tomaszów Lubelski district; 16 – Maćkówka, Przeworsk district; 17 – Maziły, Tomaszów Lubelski district; 18 – Młyny, Jarosław district; 19 – Nienowice, Jarosław district; 20 – Nowosiółki Kardynalskie, Tomaszów Lubelski district; 21 – Obojna, Stalowa Wola district; 22 – Przemyśl, district Loco; 23 – Rozbórz, Przeworsk district; 24 – Róża, Tomaszów Lubelski district; 25 – Swaryczów, Zamość district; 26 – Ślipcze, Hrubieszów district; 27 – Topornica; Zamość district; 28 – Trójczyce, Przemyśl district; 29 – Ulanów, Nisko district; 30 – Werchrata, Lubaczów district; 31 – Wieprzec, Zamość district; 32 – Wolica Śniatycka, Zamość district; 33 – Zaczernie, Rzeszów district; 34 – Żuklin, Przeworsk district; 35 – Żulice, Tomaszów Lubelski district; 36 – Żyłka, Tomaszów Lubelski district

Scythian invasions. In addition, the researchers noted differences in the proportions of certain categories of artefacts – in the eastern part of the Polish lands they were mainly decorations or parts of clothing, whereas in the west, the vast majority were military items (Bukowski 1977). Today this view may still be supported, though not entirely. While Scythian invasions and their traces discovered in destroyed Lusatian settlements are beyond dispute (Chochorowski 2014, 37, 41), the proportions of individual types of artefacts (especially in terms of two basic groups, *i.e.* militaria and decorations) have changed slightly. Before we get into more detailed information, it is important to note what sources we consider to be "Eastern" or "Scythian" finds. In the group of military items (Fig. 1), arrowheads of several types are still the largest and most common group of artefacts. The category of materials related to armaments can also be supplemented with individual items of iron battle-axes or acinaces. The second group is quite diverse – these are objects related to, for example, horse harness and riding ware, as well as other artefacts such as whetstones or iron knives, although they are not represented by many examples. At the same time, these items are often treated as attributes and permanent equipment for Scythian warriors, so they could basically be included in a set that contains military items. Finally, the third, quite substantial group are ornaments and clothing items, primarily represented by nail-shaped earrings and small hoop ornaments, as well as pins and glass beads.

Let us look in detail at the individual groups of artefacts listed above. The set of arrowheads mainly consists of trilobate and trilateral solid items, but singularly bilobate points with fairly chronologically early metrics and those made of iron are also found. So far, the largest series of arrowheads comes from the fortified settlement in Chotyniec (see Burghardt 2020), where they were registered mainly within the so called *zolnik* (a ritual object with a rather complicated stratigraphy, with layers in which there are animal bones, fragments of ceramics and charcoal, which is also known by the name "ash-hill"). In the immediate vicinity of the settlement there are two other settlements with arrowheads – Nienowice, site 24, and Hruszowice, site 2. In total, we know 14 sites from south-eastern Poland, where the aforementioned objects were registered (see Trybała-Zawiślak 2019, Fig. 7.21). Recently, there has also been a significant increase in sources from the Lublin region (see Kłosińska 2013), which shows that Scythian arrowheads can now be considered in the category of mass artefacts, and at the same time they allow the possibility of dating. Their collation, covering not only the eastern part of Polish lands, but also the areas of western Ukraine, has already been published (Czopek *et al.* 2015, Table 1), so here let us focus on an attempt to systematize the current state of knowledge. In the first place, this concerns typological and chronological issues. Arrowheads from Chotyniec primarily represent the first chronological group, linked with the early Scythian period, *i.e.* the second half of the 7th century and the first half of the 6th century BC. It seems that they form a fairly coherent and homogeneous collection, and the items discovered in the vicinity of Chotyniec also fit well in the above-mentioned time range, which can be assigned to types 1, 2, and 2-3 according to Melyukova (1964), III according to Petrenko (1967), or 36 according to Chochorowski (1985). Thus it is possible to date the discussed artefacts to the 7th -6th century BC and a little later, *i.e.* from the turn of the 6th/ 5th to the 3rd century BC. Bilobate points are unique because of their relatively early chronological position, including items of the Kelermes type, known not only from the fortified settlement in Chotyniec, but also from the Lublin region (Kłosińska 2007b, 2007c), for example from Kłodnica, Lublin district, or Wieprzec, Zamość district (Kłosińska 2007a). Other arrowheads, dated to the second half of the 6th and the first half of the 5th century BC and later prove the permanent links of this territory with the forest-steppe zone, which remains under the dominance of Scythian culture (Kłosińska 2007c). Iron socketed points with a laurel leaf design are worth mentioning, though they do not fit into the group of small trilateral arrowheads, known from three sites from Mazowsze. Importantly early Scythian analogies are also indicated for them (Andrzejowska 2016, 301), which fits well with the dating of another artefact of this category – a small trilateral arrowhead from Czekanów, Sokołów district, with a rather archaic feature, *i.e.* the presence of a barb on the socket (Łoźny 1981; Gawlik 2009). Within the Chełmno group, the most famous site is still the defensive settlement in Kamieniec (Chudziakowa 1974), currently classified as Czarnowo, Toruń district (Gackowski 2012), where characteristic trilateral arrowheads with a socket are registered, dated between the mid-6th and mid-5th centuries BC (Bukowski 1977, 63-64).

The category of artefacts related to armaments is complemented by acinaces, of which one example is known from Rozborz, Przeworsk district, dated to the 5th century BC (Czopek 1995, 109), and another one from the vicinity of Przemyśl (Czopek 2005), along with a dagger blade from Ślipcze, Hrubieszów district (Kłosińska 2007a, 239). This last artefact is preserved in a poor condition, but there are some similarities to items of the so-called short weapons, which are characteristic for nomadic people of the pre-Scythian and Scythian periods (Kłosińska 2009, 254). We should also mention the iron battle-axes from Żuklin, Przeworsk district (Chochorowski and Gawlik 1997), and Werchrata, Lubaczów district (Kłosińska 2001). Both items (classified as the so-called Eger type) have close analogies in the Great Hungarian Plain, in collections of the Vekerzug culture, and their dating is linked with the period of the 6th-5th centuries BC (Chochorowski 1985). Transcarpathian analogies of narrow-bladed iron battle-axes from Mazowsze are also known, with a similar chronology connected with times no later than the third decade of the 6th century BC (Andrzejowska 2016, 298). However, another battle-axe, coming from the region of south-eastern Lublin region (more precisely from the area of Eastern Roztocze or Grzęda Sokalska), was connected with a slightly different direction of ingress (the exact location is not known). This item does not have any equivalent in the south, but rather in the forest-steppe zone, in the upper Dniester River basin (Sadowski 2012, 389). As already mentioned, iron knives could also be included in the military group. They are known from two cemeteries of the Lusatian Tarnobrzeg culture – Kłyżów, Stalowa Wola district (Trybała-Zawiślak 2012), and Ulanów (Czopek 1992, Poradyło 1995) – and from Czerwonka, Sokołów district, in Mazowsze (Andrzejowska 2016, 301). These are quite slender, long and arched items, which, similar to

Fig. 2. Whetstone from Chotyniec (photo by T. Tokarczyk)

the aforementioned battle-axes, may have close equivalents in the materials of the Vekerzug culture, in which they are dated to the 5^{th}-4^{th} centuries BC (Chochorowski 1985, 80-81). Furthermore, the finds of whetstones are also interesting. Three examples are known from the Lublin region – Sobibór, Włodawa district, Koczów, Chełm district and Hrebenne, Tomaszów district (Kłosińska 2007a, 239). One whetstone was registered at the fortified settlement in Chotyniec (Fig. 2), among the layers of *zolnik*, and another item is known from the settlement in Gorzyce, Tarnów district (Szpunar *et al.* 2009), which indicates the significant spread of eastern impacts, reaching the areas of Lesser Poland. The presence of these artefacts in the Central European zone is considered a sign of adaptation of nomadic elements and extensive contact with the steppe population. They also have a specific place in funeral rites, becoming one of the basic elements of personal warrior equipment (Burghardt 2012, 133-134). Undoubtedly, the same social group should also be linked with the harness of a horseman. Apart from small items, such as the item from Lipnik, Przeworsk district (Blajer 2001), or the harness separator from Maćkówka, Przeworsk district (Czopek 2007c), it is also necessary to mention a large series of disks (phalerae) and knob-shaped snaffle bits from the Lublin region, namely from Puławy, from Gródek and Hrubieszów, Hrubieszów district, Swaryczów, Zamość district or Przewodów, Hrubieszów district (Kłosińska

2001; 2007a), and Głodno, Opole Lubelskie district (Kłosińska 2013, 11). The last three items are considered unique because of their ornitomorphic shape, which is also mentioned in the case of the item from Maćkówka (Kłosińska 2007a, 239; 2013, 11). Territorially, the closest analogies to these interesting artefacts relate to the West-Podolian group, and chronologically they merge with the early Scythian period, falling between the 7^{th} and the first half of the 6^{th} century BC. The location of these items is interesting because they do not cross the line of the Vistula River (Kłosińska 2013, 11). It is worth mentioning that Maćkówka would be the southernmost site, and at the same time it is a place situated only about 40 km away from Chotyniec. Therefore, we will return to this aspect later in the discussion.

Relatively rare finds include iron bits. Most of the items known from Eastern Poland can be undoubtedly regarded as imports from the Hallstatt circle (Niemiec 2007; 2009), except for items from the settlement in Hruszowice, site 2 (Fig. 3). These are the bits that have the closest connections with the eastern territories. The formation of cheek-rings suggests that we are probably dealing here with the so-called "stirrup-shaped" examples (Bandrivski 2014, 370), which are often found in the inventories of the West-Podolian group. The chronology of this type of artefact mainly falls into the early Scythian periods 2 and 3, *i.e.* within the 7^{th} -6^{th} centuries BC (Medvedskaya 1992). Sometimes it is established only into the early Scythian period 3, ranging from 650-600 BC (Mogilov 2003). Additionally, there

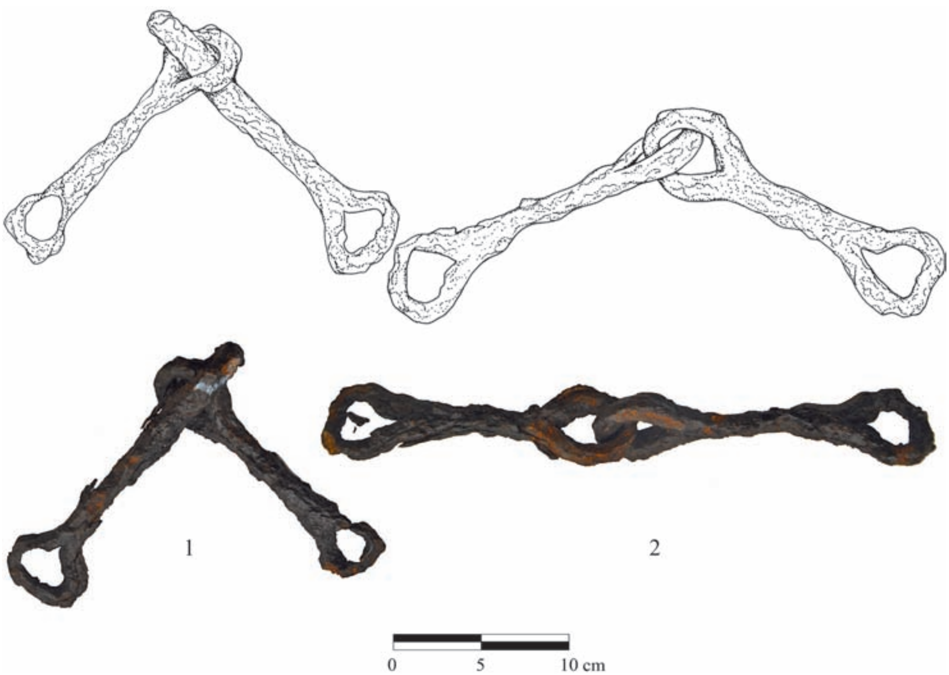


Fig. 3. Iron bits from Hruszowice (illustrated by K. Trybała-Zawiślak, photo by S. Czopek)

is an interesting issue related to the bits, which are to some extent intermediary, perhaps indicating the evolution of cheek-rings from stirrup-shaped to ring-shaped, and in this sense they can be considered even unique (Kowalski-Birokrylyy 2012). Such a find is known from the barrow in Ivahnivci (Bandrivski 2010). There is a certain probability that the bits from Hruszowice could also correspond to this type, but the condition of their preservation does not allow for such unambiguous determination. Despite this, it is important to be able to date these artefacts quite precisely (Kowalski-Birokrylyy 2012). The chronology of undisturbed deposits was determined on the basis of an analyses of the inventories of the West-Podolian barrows, in which the bits of our interest are determined to be from the middle of the 7th to the third quarter of the 6th century BC (Kowalski-Birokrylyy 2012). Unfortunately, such precise dating of the bits from Hruszowice is not possible, but in the context of all sources related to the Chotyniec agglomeration, it is important to note that they date to the mid-7th-6th century BC. Thus, they significantly broaden the group of sources with dating determinations, and they are also clear evidence of the links between the Chotyniec agglomeration and the eastern forest-steppe cultural environment. These cross-regional contacts have a much broader extent, which is evidenced by the bits from Mazowsze with early Scythian and West Podolian analogies. Therefore, it obviously implies their early dating in the range of the 7th to the beginning of the 6th century BC (Andrzejowska 2016, 298-300).

It is also important to bear in mind another, quite large group of artefacts, which can be described as decorations and parts of clothing (Fig. 4). Even when one of the first synthetic studies regarding Scythian monuments in Poland was being made, it was noted that this category of sources was mainly concentrated in the fork of the rivers Vistula and San. In addition, not all items were treated as imports, because a significant number of them were considered to be local imitations or local varieties (see Bukowski 1977). Today, we can only confirm the previously noted mass occurrence in the eastern zone of the Lusatian culture. There are already nearly 70 earrings from south-eastern Poland that fit well within a consistent time horizon covering the mid-7th/6th centuries BC (Trybała-Zawiślak 2019, 299, table 7), and in the Lublin region their number exceeded 30 copies (Kłosińska 2013, 6). In the literature on the subject we have noticed quite different views on the spread of earrings in Polish areas. The suggestion regarding the local production of these ornaments (understood primarily as the environment of the Tarnobrzeg Lusatian culture) seems to be correct, especially with regard to some copies that have no counterparts in the Scythian world (Gawlik 2007, 231-232). In this regard, there is still the important and long-known discovery of casting moulds from the settlement in Zawada (Michalski 1982). The area of the Sandomierz Basin was also indicated as the starting point for the spread of the nail-shaped earrings further north, including those cases in which their non-local origin was pointed out (Andrzejowska 2016, 297-298). It has sometimes been suggested that even quite distant connections with the areas of central Transdnistria may come into play, as visible in some examples of earrings from south-eastern Poland as well as western Mazowsze

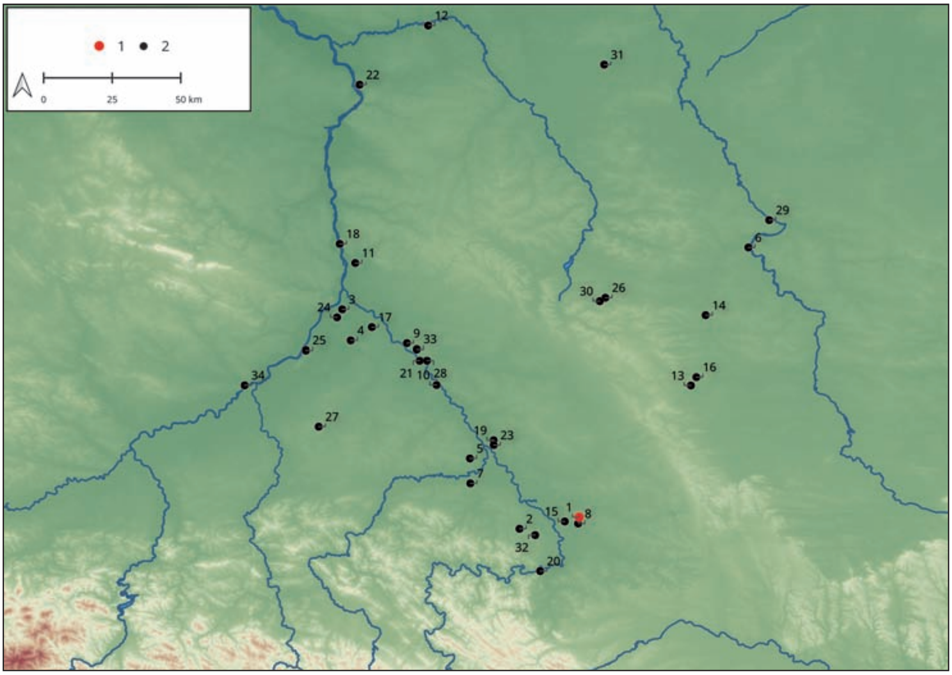


Fig. 4. Decorations and parts of clothing – finds from south-eastern Poland: 1 – Chotyniec, Jarosław district; 2 – Dobkowice, Jarosław district; 3 – Gorzyce, Tarnobrzeg district; 4 – Grębów, Tarnobrzeg district; 5 – Grodzisko Dolne, Leżajsk district; 6 – Gródek, Hrubieszów district; 7 – Gręska, Przeworsk district; 8 – Hruszowice, Przemyśl district; 9 – Kłyżów, Stalowa Wola district; 10 – Kopki, Nisko district; 11 – Kosin, Kraśnik district; 12 – Krupy, Lubartów district; 13 – Machnów Stary, Tomaszów Lubelski district; 14 – Mikulin, Tomaszów Lubelski district; 15 – Nienowice, Jarosław district; 16 – Nowosiółki Kardynalskie, Tomaszów Lubelski district; 17 – Obojna, Stalowa Wola district; 18 – Opoczka Mała, Kraśnik district; 19 – Paluchy, Przeworsk district; 20 – Przemyśl, district Loco; 21 – Przędzel, Nisko district; 22 – Puławy-Włostowice, Puławy district; 23 – Sieniawa-Pigany, Przeworsk district; 24 – Sokolniki, Tarnobrzeg district; 25 – Tarnobrzeg-Machów, Tarnobrzeg district; 26 – Topornica, Zamość district; 27 – Trzęsówka, Kolbuszowa district; 28 – Ulanów, Nisko district; 29 – Wieniawka, Hrubieszów district; 30 – Wieprzec, Zamość district; 31 – Wytyczno, Włodawa district; 32 – Zabłotce, Jarosław district; 33 – Zarzecze, Nisko district; 34 – Zawada, Staszów district

(Gawlik 2009). The leading role of the environment of the Tarnobrzeg Lusatian culture in transmitting certain patterns was also emphasized in the case of some Kuyavian finds, especially when nail-shaped earrings in one of the grave inventories were found next to an ornament similar to a coiled wire of the Trzęsówka type (Andrzejowska 2016. 298), typical for the Tarnobrzeg materials of the declining period. Nevertheless, for some finds, these impacts are suggested not directly from the Tarnobrzeg environment, but through contacts with the Lublin region. For example, this applies to an interesting complex from the cemetery in Kolonia Bąkowiec, Kozienice district (Miraś and Twardowski 2009). The discussed inventory included two nail-shaped earrings, an iron pin (with the head curled up into a loop, and therefore with small distinctive features), three Trzęsówka-type coiled wires and very distinctive ceramics – vessels with holes under the edge and incompletely pierced holes under the edge of the rim (*ibidem*, Table I). The authors of the study suggest that even though the elements of the grave inventory have the closest and most clear references to the materials of the Tarnobrzeg Lusatian culture, we should not assume direct influences but rather evidence of transmission by means of contact with the Lublin region, from where they penetrated the areas located in the lower estuary of the Wieprz river, and beyond – on the left bank of the Vistula (*ibidem*, 454). One argument for this would be, inter alia, the lack of vessels decorated with incompletely perforated holes, sometimes called "an ornament of knobs-pearls" or zhemczuzhin (see Kłosińska 2007a, 235), in ceramics of the Tarnobrzeg Lusatian culture, as well as the presence coiled wires of the Trzęsówka type at the cemetery in Jakubowice Murowane, Lublin district (Miraś and Twardowski 2009, 453-454). This concept, in light of recent discoveries related to the Chotyniec agglomeration, obviously requires verification.

As already mentioned, the set of ornaments and parts of the clothing, which can represent an "eastern" origin, does not include only the nail earring. This group also includes other items known due to the latest discoveries. With regard to the artefacts from south-eastern Poland, it includes primarily the pins with nail-shaped heads recorded at the settlement in Hruszowice and Chotyniec, as well as the pins with spiral-shaped heads, known both from the aforementioned sites and from another settlement – site No. 24 in Nienowice (Trybała-Zawiślak 2019, 283). All these finds have good references in the Scythian world, where we find close analogies (Fig. 5). Pins with nail heads represent type III according to Petrenko, and they are dated from the end of the 7th to the beginning of the 6th century BC or the end of 7th through the 6th century BC, while those with spiral heads were determined as type 22, and their chronology falls within the beginning of 7th-6th century BC (Petrenko 1978, 8, 18-19). Further items with nail heads, for which exemplars from the West-Podolian group are mentioned as prototypes, are known from the Lublin region, specifically Stary Machnów, Tomaszów district (Kłosińska 2008; 2013, 357). Speaking of the Transcarpathian zone, it is worth mentioning a find of a bronze pendant with a small head from the same place. In the materials of the Vekerzug culture, such artefacts are treated as among the more common or even flagship ones (Kłosińska 2007b, 277). One of the interesting examples of pins with clearly eastern connections was registered in Czerwonka, Sokołów district, which was already mentioned in the context of the iron knife (Andrzejowska 2016, Fig. 8, d). Further north, there is a site located on the Chełmno Land, where at the cemetery in Mała Kępa, Bydgoszcz district, nail earrings were discovered (Chudziakowa 1974), which have the closest analogies to the examples from the cemeteries in Drohiczyn and Trzęsówka (Bukowski 1977, 93).

It is impossible not to mention another category of sources, which seems to be gaining in importance in the context of the so-called "eastern" finds, namely ceramics, which until now have been rarely considered in this context. It is not a matter of pointing out specific

Fig. 5. Bronze pins from Chotyniec and Hruszowice
(photo by T. Tokarczyk)

and faithful analogies associated with particular cultural entities, due to the fact that (in the traditional sense) there could be at least a few eastern groups developing under the influence of Scythian culture. On the other hand, the legitimacy of their separation or the arbitrary division of the territory they occupied is a separate issue, which in light of recent discoveries related to the Chotyniec agglomeration seems to be increasingly questionable. Therefore, it seems more proper (in the context of sources) to identify several distinctive features that would indicate unification of material culture in a fairly large territory. For our considerations, three elements that are most useful are a combination of specific ceramic forms and specific types of decoration (Fig. 6). First of all, it is necessary to mention pots with a highly placed plastic strip, which can be additionally decorated with holes just under the edge. The second form is represented by bowls with incompletely perforated holes forming the ornament of characteristic small knobs. Actually, these are two basic

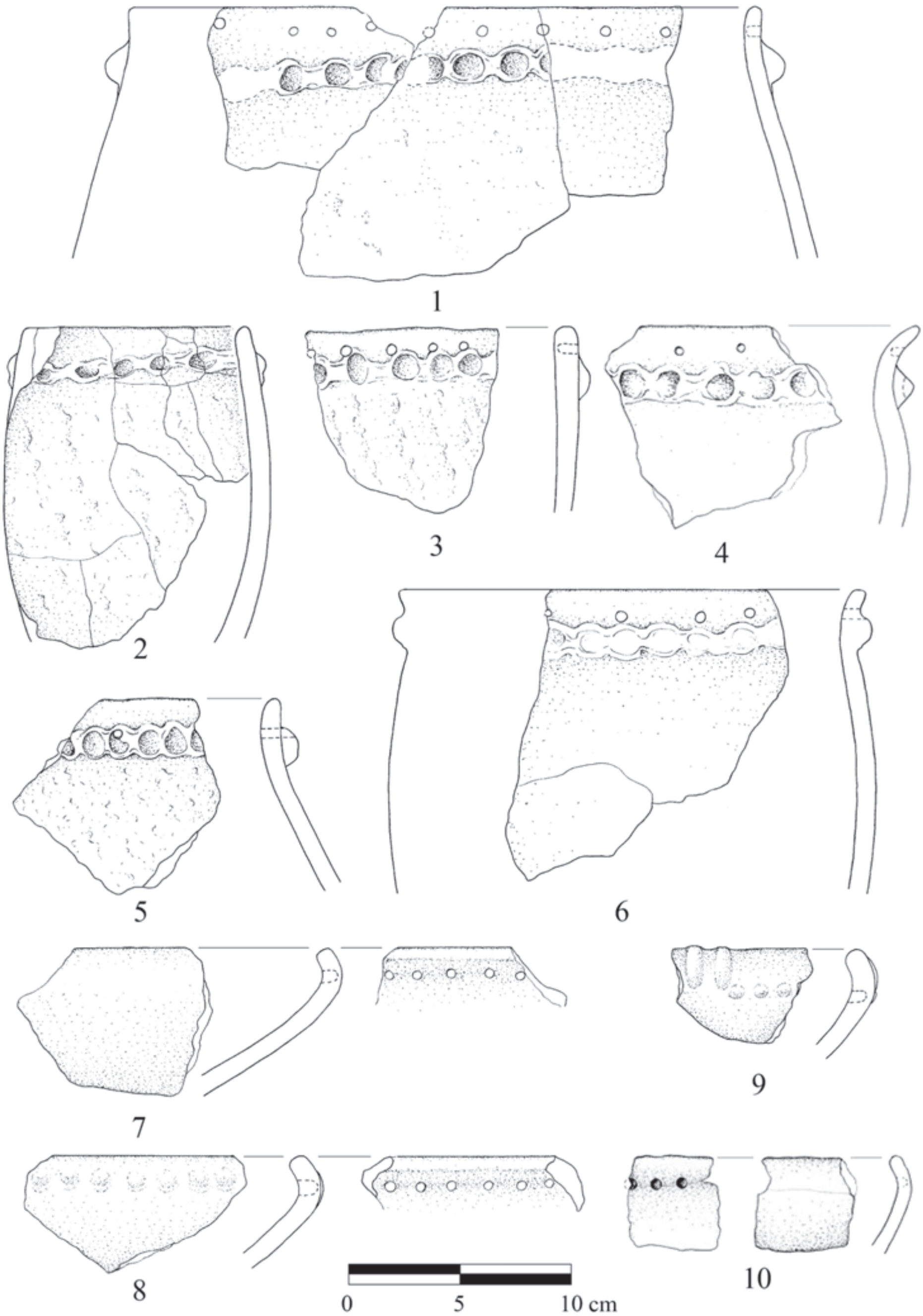


Fig. 6. Ceramics with an eastern context from the fortified settlement in Chotyniec (acc. to Czopek *et al.* 2018)

types forming an almost universal set in the world of forest-steppe Scythian groups (Geyko 2011, 135-139), but they can be supplemented by a third element – cups with high handles, which are relatively rarely seen in Polish lands, but quite unique. These ceramic elements together with the aforementioned metal artefacts, especially arrowheads and earrings, create a set of sources that seems to have the most features characteristic of indicating the Scythian culture. Of course, all these elements can be recorded at individual sites to varying degrees and they are not always included in the set. Therefore, it is necessary to return to the discussion regarding ceramics. The presence of the abovementioned materials is evident both at the fortified settlement and neighbouring sites, and hence – decisive in terms of belonging to the agglomeration itself. The detailed characteristics of these materials (see Trybała-Zawiślak 2019, 292-295) allow us to draw some synthetic conclusions. First, the extent of the agglomeration to the east and north-west of this fortified settlement cannot be determined more precisely at present. There are materials of our interest in that area, but they are known as sites only from surface surveys, so better recognition of them would be necessary. There is no doubt that such broader excavation studies should also be performed at sites that are located outside the administrative borders of our country. Regarding the area of the middle Wisznia River, *i.e.* relatively close, we have recorded the presence of the site Berehowe 2, which indicates many source relationships with the materials traditionally linked with the Cherepin-Lagodiv group (Czopek 2018a, 185), although in light of discoveries related to the Chotyniec agglomeration, it is probably necessary to consider the legitimacy of such a clear identification of its territorial borders, as well as the distinctive features of the inventory, which (according to the latest analyses) are simply very convergent in a vast area of Central and Eastern Europe (Czopek 2018c, 204-205). The situation is slightly different in the case of the Tarnobrzeg Lusatian culture. The eastern nature of its declining phase is unquestioned, but at the same time this unit is still present in the cultural image of south-eastern Poland. Furthermore, a completely new problem appears with regard to (sometimes complex) Tarnobrzeg-Chotyniec relations, which was already mentioned in the example of the settlement in Grabowiec. We can also mention here other quite extensive sites, of which hundreds ares have been excavated, such as two settlements in Rozborz, Przeworsk district. A very clear horizon of sources connected with the Tarnobrzeg Lusatian culture was identified there (Mazurek and Okoński 2013a, 2013b), but materials that could be associated with the Chotyniec agglomeration have only been found in trace amounts. On the other hand, there is a settlement at site No. 22 in Grodzisko Dolne, Leżajsk district, located almost in the centre of the Tarnobrzeg ecumene, where a whole set of artefacts that interest us was registered, *i.e.* ceramics and metal finds, including trilobate arrowheads and nail-shaped earrings. In the case of the latter, their spread is worth mentioning – in most cases they are present at cemeteries. At the same time, there is reason to believe that at least some of these graves (especially when other distinctive features are involved) should be treated as evidence of some kind of marital exchange, assuming the inclusion of a group from outside. The analyses of cemeteries show that this is not a completely groundless concept (see Trybała-Zawiślak 2015), and if we take into account the "neighbourly" nature of contacts with eastern groups (see Czopek 2008, 165) and we also include the Chotyniec agglomeration, these relations certainly gain a stronger base. Mutual contacts and greater flow of people are also noted in the case of materials registered in the Lublin region. This applies to both metal and ceramic materials. With reference to the Early Iron Age, characteristic vessels appear here in great numbers, replacing the existing Lusatian style of manufacture. The greatest frequency of characteristic pots or bowls with rounded rims and the so-called "zhemchuzhin" ornament is observed in the eastern and south-eastern Lublin region as well as in the area of Powiśle Lubelskie and the upper Wieprz River (Kłosińska 2007a, 235). Eastern references in ceramics are also revealed in materials from Mazowsze and Podlasie. Until recently, it seemed that ceramics with forest-steppe features did not actually cross the Wieprz River line, and crossed the Vistula line only in the case of the aforementioned burial from Kolonia Bąkowiec. The northernmost sites with the ceramics of our interest were isolated single points such as a cemetery in Płosków, Łosice district, a site at Drohiczyn "Kozarówka", Siemiatycze district, and a settlement in Jartypory, Węgrów district (Andrzejowska 2016, 292). Moreover, it is necessary to include quite numerous eastern references which should be linked with the pre-Scythian horizon. They relate to ceramics showing references to the stamp-circle cultures or the late-Chernoles environment, and their appearance is associated with influences flowing by means of the Tarnobrzeg Lusatian culture (see Dąbrowski and Mogielnicka-Urban 2014; Andrzejowska 2016). Furthermore, the effect of cultural changes is visible not only in relation to the eastern settlement zone of the Lusatian circle, but also in a much wider territory. It is worth mentioning analogous processes observed in the Polish Lowlands. The suggested definition of Pontic-East European cultural patterns covers an entire package of characteristics with specific distinguishing features, established chronology and a defined style of ceramics (Ignaczak 2008, 2016). Therefore, several possible ways of reception of eastern patterns are indicated in the case of the Upper Silesian-Lesser Poland Lusatian culture zone, in which the Tarnobrzeg Lusatian community would be one of the potential transmitters (Dzięgielewski and Godlewski 2009).

It is also worth noting other manifestations of eastern influences that link with symbolic culture. In the first place, there are sites from the Lublin region – Bliskowice, Kraśnik district, Jakubowice Murowane, Lublin district, and Krupy, Lubartów district. The identification of inventories is unequivocal here, *i.e.* pots with holes under the edge and plastic strips, hemispherical bowls on feet, nail-shaped earrings and coiled wires of the Trzęsówka type. On the other hand, definitive argument is made by burials with traces of burning in situ, and with large burial pits or large wooden cists (Czopek 2007c; Kłosińska 2007a). It should be noted that the "eastern" nature of such burials is beyond doubt and is definitely different from the local funerary tradition, even if it is difficult to clearly indicate the "origin" or "starting" area for this type of ritual behaviour. Further north, we are dealing with a cemetery in Płosków, Łosice district with unusual burial features, and with a specific arrangement of cremation and with vessels decorated with the "pearl" (zhemczuzhin) ornament (Dąbrowski 1961). Interestingly, we do not record such graves in the Tarnobrzeg Lusatian culture, although the frequency of eastern sources in this environment is very high. Perhaps a kind of response to changes in spiritual culture would be cemeteries with an orderly structure, in which clusters of graves become the almost universally binding rule for the organization of funeral space in the Early Iron Age (see Trybała-Zawiślak 2015). Moreover, inventories of some graves are also interesting, including those discovered in the immediate vicinity or even some within settlement areas, for example at Dobkowice, site 35, Jarosław district, Białobrzegi, site 2, Łańcut district or Łąka, site 11-16, Rzeszów district (Czopek 2011b; Florkiewicz and Strzyżowski 2012; Mazurek 2013). It is necessary to pay attention to their inventories and some features of the funeral rites. However, this is a complex issue that goes beyond the scope of this study, and at the same time, it may also be associated with the horizon of earlier, pre-Scythian interactions (Trybała-Zawiślak 2019, 210).

With reference to the space of spiritual culture, there are other aspects that manifest symbolic behaviour. Their representations are objects, such as a *zolnik*. Currently, we can describe two examples of such structures, among which the *zolnik* from the fortified settlement in Chotyniec is almost standard. The second one is a similar type from the settlement in Białobrzegi (Czopek 1989). The first one has already been the subject of studies and preliminary analyses (Czopek *et al.* 2017; Czopek 2019), so we will mention only the most important information. It is a large object, with a diameter of about 21 meters, and a preserved height reaching 40 cm. The different stages during the functioning of the *zolnik* are very clearly identifiable on the basis of the stratigraphy of individual layers, in which subsequent levels of use are visible. The most interesting here are the dark layers, rich in source materials – animal bones and ceramics, among which there are fragments of Greek amphoras, as well as metal artefacts (Trybała-Zawiślak 2019, 268). A *zolnik* from Białobrzegi was preserved only fragmentarily, but with legible layers of ash, in which characteristic artefacts were recorded, for example charcoal, ornithomorphic figures, animal bones and ceramics (Czopek 1989, 242, 245). This object, in the context of recent discoveries from Chotyniec, is perhaps an interesting example of the adaptation of some eastern features in the local Tarnobrzeg environment.

Currently, it seems that the situation is much more complex than was previously thought. We are certainly talking about an increasingly wider territory covered by eastern influences, for which the more or less emphasized echoes of the activity of the nomadic and steppe peoples (sometimes simply called "Scythians") are important contexts. Therefore, in such a situation, it is impossible not to ask questions about the place of the Chotyniec agglomeration in these important processes, filling a clearly culture-creating role. Chronology is another important aspect, and the phenomenon known as the Chotyniec agglomeration can be dated in two ways. The first alternative is a chronology determined by means of well-dated metal artefacts, while the second option is connected with the radiocarbon dates obtained so far. Among the artefacts, arrowheads and earrings and possibly some types of pins are most useful for dating. In the case of materials from south-eastern Poland, we already have a large collection of these artefacts, hence some generalizations are possible. Most of the nail-shaped earrings are linked with the 6^{th}-5^{th} century BC, but there are also items dated from the second half or the end of the 7^{th} century BC. A relatively small portion is dated between the 6^{th} and 4^{th} centuries BC. With regard to arrowheads, three major chronological groups can be identified. The first group is connected with the 7^{th} to the beginning of the 6^{th} century BC, the second one with the 5^{th}-4^{th} century BC, and the third is dated to the middle of the 4^{th} to the 3^{rd} century BC. Interestingly, the oldest items are generally recorded only on the fortified settlement in Chotyniec (Trybała-Zawiślak 2019, 162). Similarly, a growing series of similar artefacts from the Lublin region is dated in the same way (Kłosińska 2007a, 2013), and in the case of materials from the Tarnobrzeg Lusatian culture, two waves of influence were pointed out – the first group is related to the area of the Ukrainian forest-steppe, dated between the 7^{th} and 5^{th} centuries BC, and the younger one from the 5^{th}-4^{th}, and perhaps also the 3^{rd} century BC, flowing from the south, *i.e.*, from the Carpathian Basin and its outskirts (Czopek 2008, 162-163). All of this creates a coherent horizon of the so-called eastern impacts, and the discoveries related to the Chotyniec agglomeration perfectly fit in with the discussed time range. Additionally, radiocarbon dates can confirmation this determination. So far, the most numerous series of dates comes from the fortification in Chotyniec, and additional single data points come from settlements belonging to the agglomeration. These dates come from the base of the settlement rampart and from the layers of *zolnik*, and they are connected with the stage before this object was created.

The collation of dates leads us to the conclusion that they fall within a wide range of probabilities between the 9^{th} and the 3^{rd} or even the 2^{nd} century BC (Fig. 7). However, we can also try to clarify the chronology based on the sources discussed above. One of the oldest dates is connected with the stage before the construction of the *zolnik* and indicates 2750±90 BP, which at the calibration level of 1 σ gives a result between the 10^{th} and 9^{th} centuries BC. The date obtained from the base of the settlement rampart (2679±30 BP) fits in a somewhat similar range, along with one date coming from the settlement in Hruszowice, which, at the same calibration level, sets the time frame between the 9^{th} and 8^{th} centuries BC as well as the 8^{th} and 6^{th} centuries BC. This may be associated with the presence of some pre-Scythian stage, which has already been mentioned, although it is quite difficult to establish its connection with the agglomeration via archaeological sources for now. However, another issue is related to the numerous series of sources (primarily ceramic material) connected with this horizon, which is present in increasing numbers in the vast territory of the eastern groups of the Lusatian circle (see Kłosińska 2007a; Andrzejowska 2016; Trybała-Zawiślak 2019). Probably it should be considered as an “introduction” to the changes observed in the younger part of the Early Iron Age. Nonetheless, this issue is so extensive that it would require a separate analytical study. Returning to the issue of dates related to the agglomeration, it should also be noted that the sample determining the

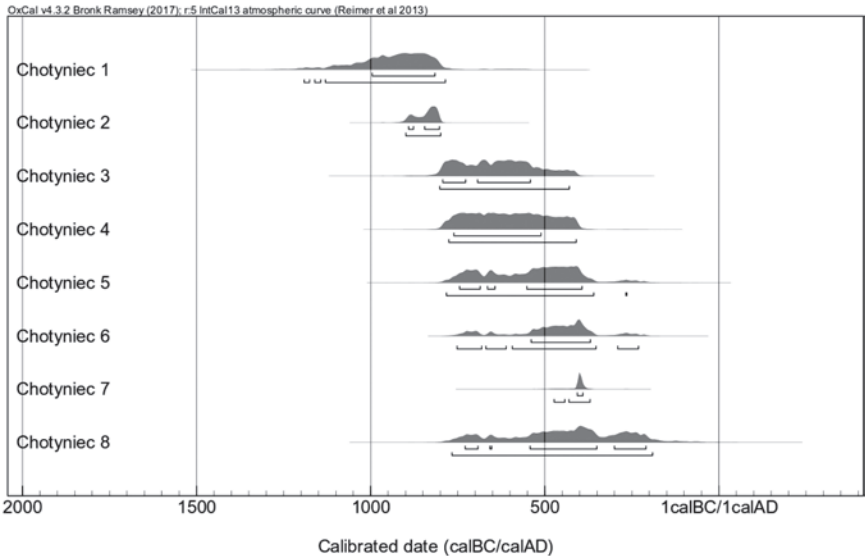


Fig. 7. Radiocarbon dates from the layers of *zolnik* from the fortified settlement in Chotyniec

chronology of the rampart was taken from the outer part of its base, and very fine charcoal was used in the analyses (Czopek *et al*. 2017, 299). The remaining dates from the fortified settlement in Chotyniec are generally established to be in the range of the 7th-5th centuries BC and are associated with individual phases of the *zolnik*, which in turn includes very good sources. Most of the discovered artefacts connected with the forest-steppe cultural environment, as already mentioned, should be dated just to this period. The problem of interpreting dates related to the Chotyniec agglomeration not only concerns the issue of its beginning, but also the decline of this cluster of sites, or more precisely – the fortification in Chotyniec. In light of the radiocarbon data, this stage would be associated with the 4th-3rd and even 2nd centuries BC. While the first scope could be considered possible, taking into account the cultural situation in Central and Eastern Europe, the longer functioning of these sites at the moment is rather difficult to imagine. With reference to the current state of research, questions about the decline of the agglomeration must therefore remain open, because we do not have a large enough pool of source data yet to be able to solve this problem. However, it seems that the discussed set of sites certainly functioned at the turn of the 7th and 6th centuries or even from the second half of the 7th century BC. This conclusion is confirmed, for example, by the chronology of Greek amphoras from the Chotyniec settlement, which can be quite precisely established to the 7th/6th or the beginning of the 6th century BC, as well as the dating established for bronze arrowheads, pins, earrings and bits.

4. FINAL CONCLUSIONS

The aforementioned connections with the eastern Scythian cultural circle concern several Lusatian groupings. Various concepts have existed until now in the literature regarding possible transmitted sources, and at the same time they have assumed the supra-regional dimension of these contacts. As for the potential cultural units, the West-Podolian group was mentioned (for example in the case of arrowheads of the older chronological group), as well as the issue of contacts with the Transcarpathian zone and the Vekerzug culture communities. The latter were associated not only with the finds of younger arrowheads, but also to other military items, even the narrow-bladed battle axes discussed earlier. Finally, in many cases, especially when we talk about the units of the eastern part of the Lusatian circle, the leading role of the Tarnobrzeg communities as a kind of transmitter of certain patterns was pointed out. It seems that in light of the latest research and discoveries, perhaps a change the direction of these interactions should be considered, or at least some of them, connecting them directly with the Chotyniec agglomeration. Acknowledgment of its significant stylistic influence on particular types of material culture does not preclude the flow of ideas and influence from other routes and directions. So far, two possibilities have been highlighted in previous analyses. The first concerns the Boh-Bug-Vistula route and emphasizes the secondary nature of the eastern elements present in Central Poland and Kujawy (Ignaczak 2011, 393; 2016, 180), as well as in the Lublin region (Kłosińska 2007a, 241), from where the already "filtered" patterns would go to Mazowsze (Andrzejowska 2016, 307). The second possibility concerns the Dniestr-San route, taking into account the broader cultural processes, in which we are dealing not with intra-Lusatian interactions with the 'starting' area of the Tarnobrzeg Lusatian culture as an intermediary in the transmission of specific patterns, but rather with (possibly multiple) extensive population shifts as their primary mode of transmission (Czopek 2011a, 460). This concept has another dimension, connected with the existence of a Neurian community that would explain such a wide spread of eastern elements from Lesser Poland, through the Lublin region, Central Poland, Kujawy and Greater Poland (Czopek 2011a, 460). This is how the assimilation of new elements of culture in the Lublin region was often explained, and the mixing of the population, for example in the form of exogamous marriages, could be of significant importance in this process (see Kłosińska 2007a, 240). In light of the research and archaeological sources discovered so far, speaking of the agglomeration in terms of structures of the Scythian environment seems to be fully justified. The migration of the Neurians from east to west not only explains the extensive evidence of links between the Vistula river basin and the Ukrainian forest-steppe zone, but it would also be consistent with the thesis about population transitions (Czopek 2007a, 120), which are more and more confirmed by archaeological sources. The area of Volhynia and Podolia is a wide contact zone in the Early Iron Age, whose characteristic feature is a specific "mixture" of various elements, both western, *i.e.* connected with the eastern part of the Lusatian cultural circle, as well as those form the eastern forest-steppe zone. According to some researchers, the connections of this territory with the forest-steppe zone, considered in the context of trade and exchange contacts, mean that at least at some stage of development, these communities could fall within the scope of interests of the so-called Great Scythia (Kozak 2012, 35), especially since, according to Herodotus's records, the Neurians were located on the borders of this extremely dynamic political organism. Great Neurida, so called by some researchers, is placed on the right-bank side of the forest-steppe zone, and at the same time is considered a unique phenomenon (Bandrivski 2014). Analyses of Herodotus's text of *The Histories* (see Czopek 2007b), as well as the thesis of Kazimierz Moszyński (1954) regarding the migration of Neurians from west to east, are very inspiring – therefore, it is difficult to resist the notion that, in light of these interpretations, the location of the fortification in Chotyniec is extremely meaningful.

There is no doubt either way that, regardless of the flow routes – each of which could play an individual role – the original area for the discussed elements is that of the forest-steppe. It seems, however, that in the context of the Chotyniec agglomeration, the aforementioned Dniestr-San route, which appears to be the most natural and convenient route, is gaining special significance. The vast area located in the Dniester basin presents a kind of cultural syncretism at the time of our interests; this is where the forest-steppe influences of Eastern Europe and the Carpathian Basin intersect with the entire Danube area. In a global sense, therefore, it is a "passageway" between the Black Sea and Danube zones, as well as the route of relocation of various population groups (Czopek 2010, 364-365). Therefore, if we are to look for the directions of flow of these cultural elements and sources that we register on the San River, they should be located in the area of the Przemyśl Gate, and the Chotyniec agglomeration is the regional centre of their reception, and probably also their further transmission. To some extent, the concept of "centre-periphery", which has been successfully used by many researches for different periods, eras and areas, could be an illustration of this state of affairs (see for example Kristiansen 1998; Kadrow 2001; Valde-Nowak 2004; Pelisiak 2018). Analyzing all the relationships related to contacts, interactions, and socio-political transformations, as well as the spatial range of contacts between the Chotyniec agglomeration (understood as "the centre") and other areas (understood as "the periphery") is rather not possible at this stage of research. We are dealing here not only with neighbouring areas, *i.e.* those directly adjacent to the agglomeration, but also with those located further away. In both cases, the likelihood that they were within the range of its impacts (though not fully defined yet at this stage) is very high. At this point, it is worth relating an extremely interesting concept that concerns the destruction of settlements and fortified settlements (ring forts) in Central Europe from the turn of the 7^{th} /6^{th} to the end of the 6^{th} century BC (Chochorowski 2014, 32, 41). This horizon includes the fall of the fortified settlement in Wicina, which has been viewed as the effect of a Scythian invasion due to characteristic finds of military items of eastern origin (Michalak and Jaszewska 2011). The latest chronological findings, obtained using dendrochronology, indicate the possibility of placing these events after 571 BC (Krąpiec and Szychowska-Krąpiec 2013, 373-374). Most important for us is the possibility of identifying in these expeditions "contingents of warriors recruited from the environment of the West-Podolian group" (Chochorowski 2014, 41, 43), which raises the question about the possible presence of warriors from Chotyniec in these raids (Czopek *et al.* in print). At the same time, the issue of the previously discussed arrowheads, registered at the fortified settlement in Chotyniec, is extremely interesting. Of particular interest are the iron-socketed items with four-sided (square) heads, which are known (so far) only from the fortified settlement in Chotyniec and from the destructive layers of the fortified settlement in Wicina (Burghardt 2020). The convergence of these forms does not have to be treated as a key argument, but it can certainly be a premise indicating the possibility of the participation of Chotyniec warriors in the invasions of Central Europe.

In discussing the crucial importance of forest-steppe groups in the creation of the cultural situation in the vast areas of Central and Eastern Europe, it is necessary to ask the question about the cultural affiliation of the fortified settlement in Chotyniec, as well as that of the entire Chotyniec agglomeration. Unfortunately, this question must remain without unambiguous answer at this stage of research. It is difficult to assume that the appearance of the agglomeration is associated with the transformations of the local (Tarnobrzeg) cultural environment, which is still a separate entity, although it certainly remains with the agglomeration in certain relations. One interesting hypothesis refers to the possibility of linking the agglomeration with the Western-Podolian group of the Scythian cultural circle. On one hand, this thesis can be supported by a similar chronology, spanning the end (fourth quarter) of the 8th century to the beginning (first quarter) of the 6th century BC (Bandrivski 2010; Kowalski-Bilokrylyy 2012), which additionally can be quite accurately confirmed by metal artefacts (arrowheads, bits). On the other hand, the distance separating the fortified settlement in Chotyniec from the integrated range of the Western-Podolian group is quite significant, and radiocarbon dates indicate the much greater duration (beyond the limits established for the decline of the Western-Podolian group) of the fortified settlement in Chotyniec. Therefore, field research of the wide Polish-Ukrainian border area is certainly necessary, although new sources have appeared recently, which shed light on the issue we are interested in, for example a very large collection of Scythian arrowheads of various types from the area of Mościska and Arłamowska Wola and Berehowe. These finds could provide evidence of the local activity, including potential population movements. Their chronology falls within the 7th to 5th-4th centuries BC (Czopek 2018c, 203-204). However, other materials, known only from surface research, indicate the continuity of settlement in the Wisznia River basin, where ceramic materials with eastern features are recorded. With reference to sources, many analogies between the Chotyniec agglomeration zone and sites located east of the current national border could be provided, but perhaps it is not justified to search for arguments confirming the continuity of settlement in the entire forest-steppe zone (Czopek 2019, 140). In this sense, there could be another possibility, according to which we assume the separateness of the agglomeration as an "independent" regional structure within the broadly understood forest-steppe variant of Scythian culture, and thus its northwest enclave. Another important question concerns north-south connections, in which the location of the settlement in Chotyniec may also play a significant role. Considering artefacts of a nomadic type, known from the southern part of the Carpathians, we can say that specific mixed components concern many regions of central and eastern Europe. This interesting issue is certainly worth a broader analyses that could be the subject of separate studies.

Regardless of these concepts and their future confirmation or refutation based on new sources, we are certainly able to speak about the entry of the south-eastern part of Poland into the orbit of broad cultural changes in the Early Iron Age. These processes are an integral part of the changes so clearly visible in the entire border region of Central and Eastern Europe, the fact of which allows us to treat the fortified settlement in Chotyniec as an unquestionable transmitter of certain patterns. Therefore, the functioning of the Scythian enclave in Polish territories can be seen as a cultural phenomenon that plays a fundamental role in the reception of the so-called eastern cultural elements.

Acknowledgments

This text is based on the results of research obtained during the implementation of the grant of the National Science Centre (2017/27/B/HS3/01460) entitled "On the border of two worlds. The Chotyniec agglomeration of the Scythian cultural circle – stage I: fieldwork".

References

Andrzejowska M. 2016. Niektóre elementy obrazu kulturowego Mazowsza i Podlasia we wczesnej epoce żelaza w świetle oddziaływań „wschodnich". In B. Gediga, A. Grossman and W. Piotrowski (eds), *Europa w okresie od VIII wieku przed narodzeniem Chrystusa do I wieku naszej ery* (= *Biskupińskie Prace Archeologiczne* 11). Biskupin-Wrocław: Muzeum Archeologiczne w Biskupinie, Polska Akademia Nauk-Oddział we Wrocławiu, Instytut Archeologii i Etnologii Polskiej Akademii Nauk, 279-322.

Bandrivski M. 2010. Pamyatki serednodnistrovskoy (zahidnopodilskoy) grupi rannozaliznogo viku v centralnoevropeyskiy khronologichniy shkali ta problemi periodizacii. *Materyiali i Doslidzhennya z Arheologii Prikarpttya i Wolini* 14, 76-113.

Bandrivski M. 2014. *Kulturno-istorychni procesi na Prikarpatti i Zakhidnomu Podili v pizniy period epokhi bronzi – na pochatku dobi rannogo zaliza*. Lviv: Prostir-M.

Blajer W. 2001. Trzeci sezon ratowniczych badań wykopaliskowych na stanowisku 5 w Lipniku, pow. Przeworsk. *Rocznik Przemyski* 27/1, 17-25.

Bukowski Z. 1977. The Scythian influence in the area of Lusatian Culture. Wrocław, Warszawa, Kraków, Gdańsk: Wydawnictwo Polskiej Akademii Nauk.

Burghardt M. 2012. *Osełki z otworem do podwieszania w kulturach stepowych późnej epoki brązu i wczesnej epoki żelaza* (= *Collectio Archaeologica Ressoviensis* 16). Rzeszów: Instytut Archeologii Uniwersytetu Rzeszowskiego.

Burghardt M. 2020. Classification and chronology of the collection of arrowheads from ash-hill found in hillfort of the Scythian Cultural Circle in Chotyniec, site 1, Jarosław district. *Sprawozdania Archeologiczne* 72/2, 327-355.

Chochorowski J. 1985. *Die Vekerzug-Kultur. Charakteristik der Funde*. Kraków: Uniwersytet Jagielloński.

Chochorowski J. 2014. Scytowie a Europa Środkowa – historyczna interpretacja archeologicznej rzeczywistości. *Materiały i Sprawozdania Rzeszowskiego Ośrodka Archeologicznego* 34, 9-58.

Chochorowski J. and Gawlik A. 1997. Żelazny czekan kultury Vekerzug z Żuklina, gm. Kańczuga. *Materiały i Sprawozdania Rzeszowskiego Ośrodka Archeologicznego* 18, 173-179.

Chudziakowa J. 1974. *Kultura łużycka na terenie międzyrzecza Wisły, Drwęcy i Osy*. Warszawa, Poznań: Towarzystwo Naukowe w Toruniu.

Czopek S. 1989. Z badań nad schyłkową fazą grupy tarnobrzeskiej. In A. Barłowska and E. Szałapata (eds), *Grupa tarnobrzeska kultury łużyckiej. Materiały z konferencji 12-14 listopada 1986 w Rzeszowie*. Rzeszów: Muzeum Okręgowe w Rzeszowie, 241-261.

Czopek S. 1992. Zabytki żelazne w materiałach grupy tarnobrzeskiej. In S. Czopek (ed.), *Ziemie polskie we wczesnej epoce żelaza i ich powiązania z innymi terenami. Materiały z konferencji – Rzeszów, 17-20.09.1991*. Rzeszów: Muzeum Okręgowe w Rzeszowie, 111-126.

Czopek S. 1995. Żelazny akinakes z Rozborza, woj. przemyskie, w kontekście innych znalezisk tzw. scytyjskich z południowo-wschodniej Polski. *Archeologia Polski* 40/1-2, 107-123.

Czopek S. 2005. Zur kulturgeschichtilichen Sonderstellung der polnischen Karpatenzone in der Bronze- und frühen Eisenzeit. *Acta Archaeologica Carpathica* 40, 39-61.

Czopek S. 2007a. Środkowoeuropejska rubież kulturowa – między wschodem a zachodem w epoce brązu i wczesnej epoce żelaza. In M. Dębiec and M. Wołoszyn (eds), *U źródeł Europy Środkowo-Wschodniej: pogranicze polsko-ukraińskie w perspektywie badań archeologicznych* (= *Collectio Archaeologica Ressoviensis* 5). Rzeszów: Instytut Archeologii Uniwersytetu Rzeszowskiego, 109-125.

Czopek S. 2007b. Uwagi o możliwościach archeologicznej identyfikacji Neurów. In P. Berdowski and B. Blahaczek (eds), *Haec mihi in animis vestris templa. Studia Classica in Memory of Professor Lesław Morawiecki*. Rzeszów: Instytut Historii UR, 407-422.

Czopek S. 2007c. Związki dorzecza Wisły z terenami lasostepu ukraińskiego w epoce brązu i wczesnej epoce żelaza. In L. Bakalarska (ed.), *Wspólnota dziedzictwa archeologicznego ziem Ukrainy i Polski. Materiały z konferencji zorganizowanej przez Ośrodek Ochrony Dziedzictwa Archeologicznego, Łańcut (26-28 X 2005 r.)*. Warszawa: Krajowy Ośrodek Badań i Dokumentacji Zabytków, 213-225.

Czopek S. 2008. Uwagi o sytuacji kulturowej we wczesnej epoce żelaza na terenie południowo-wschodniej Polski. In M. Mogielnicka-Urban (ed.), *Opera ex aere. Studia z epoki brązu i wczesnej epoki żelaza dedykowane profesorowi Janowi Dąbrowskiemu przez przyjaciół, uczniów* *i kolegów z okazji siedemdziesięciolecia urodzin*. Warszawa: Instytut Archeologii i Etnologii Polskiej Akademii Nauk, 159-167.

Czopek S. 2010. Naddniestrzańskie rubieże kulturowe w epoce brązu i wczesnej epoce żelaza. In S. Czopek and S. Kadrow (eds), *Mente et rutro. Studia archaeologica Johanni Machnik viro doctissimo octogesimo vitae anno ab Amicis, collegis et discipulis oblata*. Rzeszów: Instytut Archeologii Uniwersytetu Rzeszowskiego, 357-368.

Czopek S. 2011a. Rola szlaku Dniestr-San w epoce brązu i we wczesnej epoce żelaza. In M. Ignaczak, A. Kośko and M. Szmyt (eds), *Między Bałtykiem a Morzem Czarnym. Szlaki międzymorza IV-I tys. przed Chr*. Poznań: Wydawnictwo Poznańskie, 453-463.

Czopek S. 2011b. Zwischen der Chronologie und Funktion. Horizont (?) der Gräber mit Glasperlen auf den Gräberfeldern der späten Phase der Tarnobrzeg-Lausitzer Kultur. *Sprawozdania Archeologiczne* 63, 115-134.

Czopek S. 2014a. Osada tarnobrzeskiej kultury łużyckiej. In S. Czopek, D. Niemasik, W. Pasterkiewicz and A. Pelisiak, *Rzeszów, stanowisko 117 – osada wielokulturowa*. Rzeszów: Muzeum Okręgowe w Rzeszowie, 79-201.

Czopek S. 2014b. *Stanowisko 158 w Jarosławiu, woj. podkarpackie. Część II. Osadnictwo od starszej epoki brązu do okresu rzymskiego*. Rzeszów: Fundacja Rzeszowskiego Ośrodka Archeologicznego.

Czopek S. 2018a. Podsumowanie. In S. Czopek, K. Trybała-Zawiślak, N. Wojceszczuk, O. Osaulczuk, D. Bobak, P. Gębica, A. Jacyszyn, W. Pasterkiewicz, D. Pawliw, W. Petehyrycz, M. Połtowicz-Bobak and A. Wacnik, *Przemiany kulturowo-osadnicze w dorzeczu rzeki Wiszni w epoce brązu i we wczesnej epoce żelaza w kontekście zmian prahistorycznej i wczesnośredniowiecznej ekumeny*. Rzeszów: Wydawnictwo Uniwersytetu Rzeszowskiego, 185-191.

Czopek S. 2018b. Środkowa, młodsza i późna epoka brązu. In S. Czopek, K. Trybała-Zawiślak, N. Wojceszczuk, O. Osaulczuk, D. Bobak, P. Gębica, A. Jacyszyn, W. Pasterkiewicz, D. Pawliw, W. Petehyrycz, M. Połtowicz-Bobak and A. Wacnik, *Przemiany kulturowo-osadnicze w dorzeczu rzeki Wiszni w epoce brązu i we wczesnej epoce żelaza w kontekście zmian prahistorycznej i wczesnośredniowiecznej ekumeny*. Rzeszów: Wydawnictwo Uniwersytetu Rzeszowskiego, 156-185.

Czopek S. 2018c. Zmienność kulturowa w epoce brązu i we wczesnej epoce żelaza w dorzeczu Wiszni na tle przemian kulturowych w Europie Środkowo-Wschodniej. In S. Czopek, K. Trybała-Zawiślak, N. Wojceszczuk, O. Osaulczuk, D. Bobak, P. Gębica, A. Jacyszyn, W. Pasterkiewicz, D. Pawliw, W. Petehyrycz, M. Połtowicz-Bobak and A. Wacnik, *Przemiany kulturowo-osadnicze w dorzeczu rzeki Wiszni w epoce brązu i we wczesnej epoce żelaza w kontekście zmian prahistorycznej i wczesnośredniowiecznej ekumeny*. Rzeszów: Wydawnictwo Uniwersytetu Rzeszowskiego, 193-210.

Czopek S. 2019. Enklawa scytyjskiego kręgu kulturowego w południowo-wschodniej Polsce. *Przegląd Archeologiczny* 67, 119-148.

Czopek S., Pawliw D., Trybała-Zawiślak K. and Wojcieszczuk N. 2015. New discoveries of arrowheads of Scythian type from Polish-Ukrainian borderland (San, Bug and upper Dniester grainage basin). *Acta Archaeologica Carpathica* 50, 191-216.

Czopek S., Trybała-Zawiślak K., Tokarczyk T., Ocadryga-Tokarczyk E., Burghardt M., Adamik-Proksa J. and Rajpold W. 2017. Pierwsze sprawozdanie z weryfikacyjnych badań na grodzisku z wczesnej epoki żelaza w Chotyńcu. *Materiały i Sprawozdania Rzeszowskiego Ośrodka Archeologicznego* 38, 291-306.

Czopek S., Trybała-Zawiślak K., Bobak D., Wojceszczuk N., Osaulczuk O. 2018. Katalog stanowisk. In S. Czopek, Katarzyna Trybała-Zawiślak, Natalia Wojceszczuk, Oleg Osaulczuk, Dariusz Bobak, Piotr Gębica, Andrij Jacyszyn, Wojciech Pasterkiewicz, Dmytro Pawliw, Wołodymyr Petehyrycz, Marta Połtowicz-Bobak and Agnieszka Wacnik, *Przemiany kulturowo-osadnicze w dorzeczu rzeki Wiszni w epoce brązu i we wczesnej epoce żelaza w kontekście zmian prahistorycznej i wczesnośredniowiecznej ekumeny*. Rzeszów: Wydawnictwo Uniwersytetu Rzeszowskiego, 245-677.

Czopek S., Trybała-Zawiślak K. and Tokarczyk T. Hotyneckaya aglomeracya skifskogo kulturnogo kruga i yee znachenye dlya interpretacyi kulturnyh svyazey ranney epohi zheleza na pogranicheSredney i Vostochnoy Evropi. *Stratum plus* 3/2020, 233-250.

Dąbrowski J. 1961. Materiały kultury łużyckiej z Podlasia. *Materiały Starożytne* 7, 23-46.

Dąbrowski J. 1980. Przydatność ceramiki łużyckiej dla podziałów kulturowych. In M. Gedl (ed.), *Zróżnicowanie wewnętrzne kultury łużyckiej*. Kraków: Instytut Archeologii Uniwersytetu Jagiellońskiego, 33-55.

Dąbrowski J. 2009. *Polska przed trzema tysiącami lat. Czasy kultury łużyckiej*. Warszawa: TRIO.

Dąbrowski J. and Mogielnicka-Urban M. 2014. *Zespół osadniczy kultury łużyckiej w Maciejowicach, pow. garwoliński, woj. mazowieckie* (= *Archeologia Mazowsza i Podlasia. Studia i Materiały* 5). Warszawa: Instytut Archeologii i Etnologii Polskiej Akademii Nauk.

Dzięgielewski P. and Godlewski K. 2009. Wschodnie oddziaływania kulturowe na terytorium zachodniej Małopolski we wczesnej epoce żelaza – źródła i interpretacje. In S. Czopek and K. Trybała-Zawiślak (eds), *Tarnobrzeska kultura łużycka – źródła i interpretacje* (= *Collectio Archaeologica Ressoviensis* 11). Rzeszów: Instytut Archeologii Uniwersytetu Rzeszowskiego, 191-225.

Florkiewicz I. and Strzyżowski L. 2012. Materiały tarnobrzeskiej kultury łużyckiej. In I. Florkiewicz (ed.), *Opracowanie ratowniczych badań archeologicznych na stanowisku nr 2 w Białobrzegach (nr autostradowy: 85)* I, II. Rzeszów, 381-415. Unpublished materials. Archive of the Rzeszów Foundation of Archaeological Centre. Rzeszów.

Gackowski J. 2012. *Przestrzeń osadnicza Pojezierza Chełmińskiego i przyległych dolin Wisły, Drwęcy i Osy w młodszej epoce brązu i na początku epoki żelaza*. Toruń: Wydawnictwo Naukowe Uniwersytetu Mikołaja Kopernika.

Gawlik A. 2007. Geneza zausznic gwoździowatych. In J. Chochorowski (ed.), *Studia nad epoką brązu i wczesną epoką żelaza. Księga poświęcona Profesorowi Markowi Gedlowi na pięćdziesięciolecie pracy w Uniwersytecie Jagiellońskim*. Kraków: Wydawnictwo Uniwersytetu Jagiellońskiego, 219-240.

Gawlik A. 2009. Elementy miłogradzkie w środowisku kultury łużyckiej Polski południowo-wschodniej. In S. Czopek and K. Trybała-Zawiślak (eds), *Tarnobrzeska kultura łużycka – źródła i in-*

terpretacje (= *Collectio Archaeologica Ressoviensis* 11). Rzeszów: Instytut Archeologii Uniwersytetu Rzeszowskiego, 177-190.

Gediga B. 1989. Podstawy wyróżniania grupy tarnobrzeskiej. In A. Barłowska and E. Szałapata (eds), *Grupa tarnobrzeska kultury łużyckiej. Materiały z konferencji 12-14 listopada 1986 w Rzeszowie*. Rzeszów: Muzeum Okręgowe w Rzeszowie, 15-26.

Gedl M. 1989. Problemy grupy tarnobrzeskiej. In A. Barłowska and E. Szałapata (eds), *Grupa tarnobrzeska kultury łużyckiej. Materiały z konferencji 12-14 listopada 1986 w Rzeszowie*. Rzeszów: Muzeum Okręgowe w Rzeszowie, 27-42.

Geyko A. 2011. *Goncharstvo naselennya skifskogo chasu Dniprovskogo Lisostepnovogo Livoberezhzhya*. Poltava: ASMI.

Ignaczak M. 2008. Wzorce kulturowe lasu/lasostepu strefy pontyjskiej w niżowych zespołach kręgu łużyckiego. In J. Bednarczyk, J. Czebreszuk, P. Makarowicz and M. Szmyt (eds), *Na pograniczu światów. Studia z pradziejów międzymorza bałtycko-pontyjskiego ofiarowane Profesorowi Aleksandrowi Kośko w 60. rocznicę urodzin*. Poznań: Wydawnictwo Poznańskie, 141-165.

Ignaczak M. 2011. Rola szlaków międzymorza w rozwoju społeczeństw kultury łużyckiej u schyłku epoki brązu i w początkach wczesnej epoki żelaza. In M. Ignaczak, A. Kośko and M. Szmyt (eds), *Między Bałtykiem a Morzem Czarnym. Szlaki międzymorza IV-I tys. przed Chr*. Poznań: Wydawnictwo Poznańskie, 387-396.

Ignaczak M. 2016. *Elementy kulturowe lasostepu pontyjskiego we wczesnej epoce żelaza na Niżu Polskim w świetle materiałów ceramicznych (650-520/470 BC)*. Poznań: Wydawnictwo Naukowe UAM.

Kadrow S. 2001. *U progu nowej epoki. Gospodarka i społeczeństwo wczesnego okresu epoki brązu w Europie środkowej*. Kraków: Instytut Archeologii i Etnologii Polskiej Akademii Nauk.

Kłosińska E. M. 2001. Czekan żelazny z miejscowości Werchrata, pow. Lubaczów. *Archeologia Polski Środkowowschodniej* 6, 219-221.

Kłosińska E. M. 2007a. Issues of the East- and Central-European contacts of the Lublin Region in the younger Bronze Age and the early Iron Age in the light of existing research and sources. In J. Baron and I. Lasak (eds), L*ong distance trade in the Bronze Age and Early Iron Age. Materiały z Konferencji we Wrocławiu 19-20 kwietnia 2005* (= *Studia Archeologiczne* 40). Wrocław: Wydawnictwo Uniwersytetu Wrocławskiego, 269-290.

Kłosińska E. M. 2007b. Lubelszczyzna i Ukraina w młodszych odcinkach epoki brązu i we wczesnej epoce żelaza – pytania o losy wspólne i niewspólne. In L. Bakalarska (ed.), *Wspólnota dziedzictwa archeologicznego ziem Ukrainy i Polski. Materiały z konferencji zorganizowanej przez Ośrodek Ochrony Dziedzictwa Archeologicznego, Łańcut (26-28 X 2005 r.)*. Warszawa: Krajowy Ośrodek Badań i Dokumentacji Zabytków, 226-249.

Kłosińska E. M. 2007c. Nowe zabytki brązowe wschodniej proweniencji z Lubelszczyzny. *Archeologia Polski Środkowowschodniej* 9, 273-278.

Kłosińska E. M. 2007d. Unknown artefacts from Topornica and Wieprzec, Zamość commune, obtained from private collections and from archaeological institutions in the Lublin region. *Sprawozdania Archeologiczne* 59, 345-391.

Kłosińska E. M. 2008. Nowe znaleziska brązowe ze Starego Machnowa, pow. tomaszowski. *Archeologia Polski Środkowowschodniej* 10, 237-248.

Kłosińska E. M. 2009. Kilka uwag na temat militariów ludności kultury łużyckiej na Lubelszczyźnie. In H. Taras and A. Zakościelna (eds), *Hereditas praeteriti. Additamenta archaeologica et historica dedicata Ioanni Gurba Octogesimo Anno Nascendi*. Lublin: Instytut Archeologii Uniwersytetu Marii Curie Skłodowskiej w Lublinie, 245-258.

Kłosińska E. M. 2013. Research problems of the Lusatian culture in the Early Iron Age in the Lublin region in the light of new archaeological findings. In J. Kolendo, A. Mierzwiński, S. Moździoch and L. Żygadło (eds), *Z badań nad kulturą społeczeństw pradziejowych i wczesnośredniowiecznych. Księga Jubileuszowa dedykowana Profesorowi Bogusławowi Gedidze w osiemdziesiątą rocznicę urodzin przez przyjaciół, kolegów i uczniów*. Wrocław: Instytut Archeologii i Etnologii Polskiej Akademii Nauk, 349-364.

Kowalski-Bilokrylyy J. 2012. Chronologia grupy zachodniopodolskiej scytyjskiego kręgu kulturowego. *Materyiali i Doslidzhennya z Arheologii Arkheologii i Volini* 16, 160-189.

Kozak D. 2012. *Poselennya Nevriv, Slovyan ta Germantsiv na Stiri*. Kiiv: Natsionalna Akademiya Nauk Ukraini, Instytut Arkheologii.

Krąpiec M. and Szychowska-Krąpiec E. 2013. Analiza dendrochronologiczna drewna z badań grodziska w Wicinie w latach 2008-2012. In A. Jaszewska and S. Kałagate (eds), *Wicina. Badania archeologiczne w latach 2008-2012 oraz skarb przedmiotów pochodzących z Wiciny* (= *Biblioteka Archeologii Środkowego Nadodrza* 5). Zielona Góra: Wydawnictwo Fundacji Archeologicznej, 371-417.

Kristiansen K. 1998. *Europe before history*. Cambridge: Cambridge University Press.

Łoźny L. 1981. Grocik scytyjski z Czekanowa, woj. Siedlce. *Wiadomości Archeologiczne* 46(2), 241-242.

Mazurek M. 2013. Tarnobrzeska kultura łużycka. In J. Okoński and M. Mazurek (eds), *Opracowanie ratowniczych badań wykopaliskowych na stanowisku 11-16 (A4/68-73) w Łące, gm. Trzebownisko. 2: Analiza. Wybór fotografii*. Unpublished materials. Archive of the Rzeszów Foundation of Archaeological Centre. Rzeszów, 42-57, 87-89.

Mazurek M. and Okoński J. 2013a. Wstęp. In M. Mazurek and J. Okoński (eds), *Opracowanie ratowniczych badań wykopaliskowych na stanowisku 28 (A4/9) w Rozborzu, gm. Przeworsk* I(1). Unpublished materials. Archive of the Rzeszów Foundation of Archaeological Centre. Rzeszów, 4-7.

Mazurek M., Okoński J. 2013b. Wstęp. In M. Mazurek and J. Okoński (eds), *Opracowanie ratowniczych badań wykopaliskowych na stanowisku 42 (A4/8) w Rozborzu, gm. Przeworsk* I(1). Unpublished materials. Archive of the Rzeszów Foundation of Archaeological Centre. Rzeszów, 3-5.

Medvedskaya I. N. 1992. Periodizaciya skifskoy arhaiki i Drevniy Vostok. *Sovetskaya Arheologiya* 3(1992), 86-107.

Melyukova A. I. 1964. *Vooruzhenie Skifov. Arheologiya SSSR* (= *Svod Arheologicheskih Istochnikov,* v. D 1-4). Moskva: Nauka.

Michalak A. and Jaszewska A. 2011. Katalog zabytków metalowych. In A. Jaszewska (ed.), *Wicina. Katalog zabytków metalowych*. Zielona Góra: Stowarzyszenie Naukowe Archeologów Polskich, Oddział Lubuski, 55-291.

Michalski J. 1982. Pracownia odlewnictwa brązu w Zawadzie, woj. tarnobrzeskie. In Z. Bukowski (ed.), *Pamiętnik Muzeum Miedzi 1*. Legnica: Wydawnictwa Przyjaciół Nauk w Legnicy, 199-207.

Miraś I. and Twardowski W. 2009. Pochówek z zausznicami gwoździowatymi z Kolonii Bąkowca, pow. Kozienice, stan. 1. In S. Czopek and K. Trybała-Zawiślak (eds), *Tarnobrzeska kultura łużycka – źródła i interpretacje* (= *Collectio Archaeologica Ressoviensis* 11). Rzeszów: Instytut Archeologii Uniwersytetu Rzeszowskiego, 449-458.

Mogilov O. 2003. Detali kinskogo sporyadzhennya u pamiatkakh Zakhidnopodilskoy grupi Skifskogo chasu. *Arkheologiya* 2, 74-83.

Moskwa K. 1982. Tendencje rozwoju grupy tarnobrzeskiej kultury łużyckiej. In M. Gedl (ed.), *Południowa strefa kultury łużyckiej i powiązania tej kultury z południem*. Kraków, Przemyśl: Instytut Archeologii Uniwersytetu Jagiellońskiego, 301-315.

Moszyński K. 1954. O Neurach Herodota. *Lud* 41, 134-152.

Niemiec Ł. 2007. Żelazne kiełzno z cmentarzyska w Wierzawicach, pow. Leżajsk, stan. 18 na tle podobnych metalowych zabytków z terenu Polski we wczesnej epoce żelaza. *Materiały i Sprawozdania Rzeszowskiego Ośrodka Archeologicznego* 28, 45-58.

Niemiec Ł. 2009. Niektóre elementy rzędu końskiego w materiałach tarnobrzeskiej kultury łużyckiej. In S. Czopek and K. Trybała-Zawiślak (eds), *Tarnobrzeska kultura łużycka – źródła i interpretacje* (= *Collectio Archaeologica Ressoviensis* 11). Rzeszów: Instytut Archeologii Uniwersytetu Rzeszowskiego, 407-413.

Pelisiak A. 2018. *Centrum i peryferia osadnictwa w neolicie i wczesnej epoce brązu na wschodnim Podkarpaciu i we wschodniej części polskich Karpat* (= *Collectio Archaeologica Ressoviensis* 38). Rzeszów: Instytut Archeologii Uniwersytetu Rzeszowskiego.

Petrenko W. G. 1967. *Pravoberezhe Srednego Pridneproviya v V-III vv. do n.e.* (= *Arkheologiya SSSR* D. 1-4). Moskva: Nauka.

Petrenko W. G. 1978. *Ukraschenya Skifii VII-III vv. do n. e.* (= *Arkheologiya SSSR* D. 1-4). Moskva: Nauka.

Poradyło W. 1995. Materiały z dawnych badań na cmentarzyskach grupy tarnobrzeskiej, przechowywane w muzeach w Przemyślu i Krakowie. *Materiały i Sprawozdania Rzeszowskiego Ośrodka Archeologicznego* 16, 23-118.

Szpunar A., Szpunar B. and Kuś M. 2009. Osada z wczesnej epoki żelaza w Gorzycach, pow. Tarnów, stan. 3, w świetle dotychczasowych badań. In S. Czopek and K. Trybała-Zawiślak (eds), *Tarnobrzeska kultura łużycka – źródła i interpretacje* (= *Collectio Archaeologica Ressoviensis* 11). Rzeszów: Instytut Archeologii Uniwersytetu Rzeszowskiego, 415-440.

Sadowski S. 2012. Nowe znalezisko czekana typu scytyjskiego z południowo-wschodniej Polski. In W. Blajer (ed.), *Peregrinationes archaeologicae in Asia et Europa Joanni Chochorowski dedicatae*. Kraków: Instytut Archeologii Uniwersytetu Jagiellońskiego, 385-390.

Trybała-Zawiślak K. 2012. *Kłyżów, stan. 2 i Mokrzyszów, stan. 2 – cmentarzyska ciałopalne z wczesnej epoki żelaza* (= *Collectio Archaeologica Ressoviensis* 21). Rzeszów: Instytut Archeologii Uniwersytetu Rzeszowskiego.

Trybała-Zawiślak K. 2015. *Przestrzeń i czas – cmentarzyska tarnobrzeskiej kultury łużyckiej w kontekście rozplanowania grobów* (= *Collectio Archaeologica Ressoviensis* 35). Rzeszów: Instytut Archeologii Uniwersytetu Rzeszowskiego.

Trybała-Zawiślak K. 2019. *Wczesna epoka żelaza na terenie Polski południowo-wschodniej – dynamika zmian i relacje kulturowe*. Rzeszów: Wydawnictwo Uniwersytetu Rzeszowskiego.

Valde-Nowak P. 2004. Neolit. Lessowe centra i górskie peryferia. In D. Abłamowicz and Z. Śnieszko (eds), *Zmiany środowiska geograficznego w dobie gospodarki rolniczo-hodowlanej. Studia z obszaru Polski*. Katowice: Muzeum Śląskie w Katowicach, 383-394.

SPRAWOZDANIA ARCHEOLOGICZNE 72/2, 2020
PL ISSN 0081-3834
DOI: 10.23858/SA/72.2020.2.1712

Bartłomiej Szymon Szmoniewski[1]

ROMAN AND EARLY BYZANTINE FINDS FROM THE JAPANESE ARCHIPELAGO – A CRITICAL SURVEY

ABSTRACT

Szmoniewski B. S. 2020. Roman and Early Byzantine finds from the Japanese Archipelago – a critical survey. *Sprawozdania Archeologiczne* 72/2, 117-141.

Artifacts discovered on the Japanese archipelago, which are interpreted as being of Roman and Byzantine provenance, are critically discussed in the following article. In light of chemical analyses, some of the glass artifacts found, including beads and vessels, are related to the glass typical of Mediterranean workshops. They were imported in the times of their production. New numismatic discoveries from Okinawa, dated to the fourth century, were found in layers associated with the sixteenth and seventeenth centuries, and cannot be contemporaneous with the glass imports. The silk textile from Shōsō-in, despite its superficial similarity to Early Byzantine art products, seems to be a Central Asian/Chinese imitation, probably woven in the workshops of Chang'an. Thus, finds of Mediterranean origin, produced in the Roman and Early Byzantine epochs, are insignificant in their number and their imports were isolated cases. However, their presence supports the thesis that the Japanese archipelago should be included as part of the ancient network of the Silk Road.

Keywords: Japan, Silk Road, Trade, Exchange, Roman Byzantine period
Received: 09.04.2020; Revised: 07.05.2020; Accepted: 13.05.2020

1 Institute of Archaeology and Ethnology, Polish Academy of Sciences, Sławkowska st. 17, 31-016 Kraków, Poland; bartheque@yahoo.fr; https://orcid.org/0000-0003-0737-434X

1. INTRODUCTION

The Japanese archipelago is poor in finds of Mediterranean provenance due to its significant distance from the main trade routes of Eurasia. This fact is contrasted with the relatively large number of finds of Central Asian and Sasanian origin (Mierse 2017). Each discovery of artifacts from the Roman or Byzantine provenance in Asia continuously enjoys much attention of scientists. Among such finds, coins from the Roman and Byzantine Empires are most numerously represented, along with their imitations and copies; apart from them, there are also glass products (*cf*. Borell 2008a; 2008b; Borell *et al*. 2014; Szmonievskiy 2016; Żuchowska 2015; 2016; Żuchowska and Szmoniewski 2018). Unfortunately, this results in much misinformation in the literature, because many reports of such finds are uncritically associated with these two Empires (*cf*. Markovic *et al*. 2017). Artifacts that could be related with the Mediterranean basin include glass (beads and vessels), coins, and textiles – all of them found in four regions in Japan: the Honshu, Kyushu, Shikoku and Okinawa Islands. These discoveries have not yet been the subject of one synthetic, critical discussion. This article, I hope, will be able to fill this gap.

2. THE DESCRIPTION OF ARTIFACTS ASSOCIATED WITH THE MEDITERRANEAN CULTURE CIRCLE

2.1. Glassware

This group of finds includes two kinds of glass products: 1) beads; 2) vessels.

2.1.1. Glass beads

Glass beads are the most abundant of glass artifacts found on the Japanese archipelago (Fig. 1). Over 600,000 (as of 2013) of them have been found at sites dated to the Yayoi and Kofun periods (Oga and Tamura 2013, 36). Of these, 4,323 specimens, discovered at 63 sites, have been analysed by means of X-ray fluorescence. The results obtained from these analyses have shown their three compositional classes: lead glass, potash glass group and soda glass group. Here, most interesting is the large group of soda glass. This group has been further subdivided into five sub-groups, in which a single class has been defined, *i.e*. the SI group „typical natron glass” with two sub-divisions: SIA and SIB (a-c), which use antimony oxide as their compound (Oga and Tamura 2013, 46-47). In a new study by Tomomi Tamura and Katsuhiko Oga (2016), the SI group was reanalyzed and divided into one type with antimony – type A, with five compositional subtypes (A1-A4 and A-Other: tabular beads), and one type without antimony: Type B. Beads among subtypes A1 to A3 represent cobalt blue beads, manufactured by various techniques (mainly the folding tech-

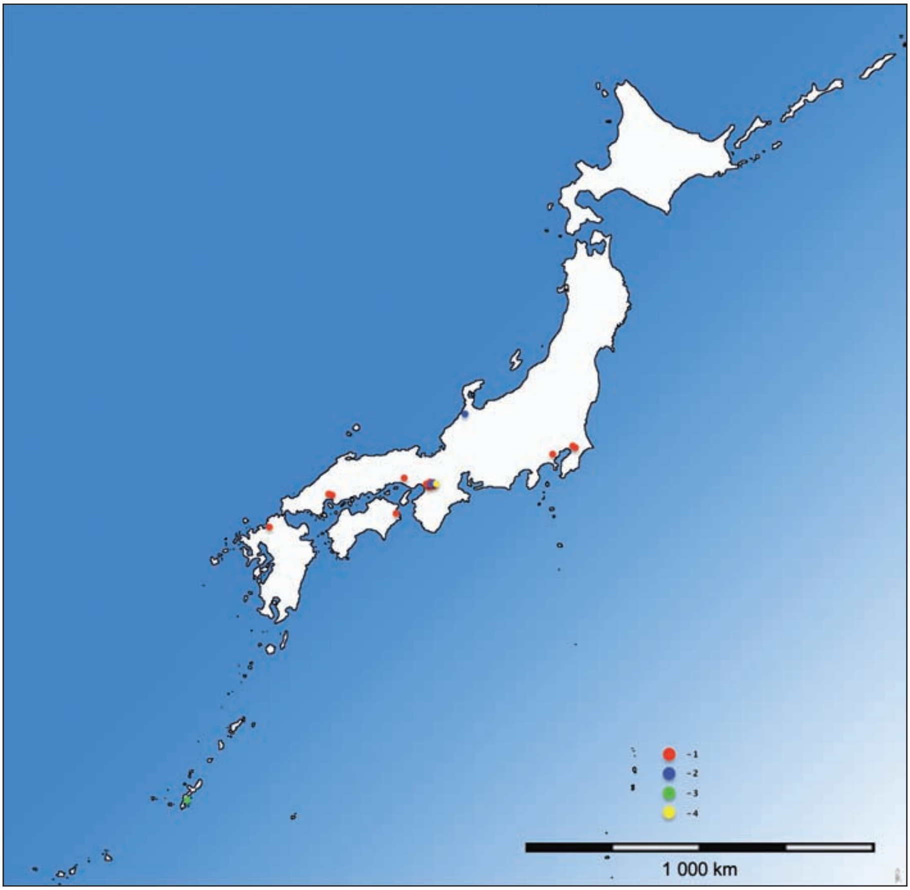


Fig. 1. Distribution of finds examined in text; 1 – glass beads; 2 – glass vessels; 3 – coins; 4 – textile

nique). Thus, subtype A-Other: tabular beads is represented by only a single, light blue, opaque bead. Subtype A4 represents multi-layered beads with traces of gold in the inner layer. Subtypes of type B differ in their various levels of MnO, TiO_2, Fe_2O_3 and represent different types of beads *vis-à-vis* their manufacturing methods: segmented, folded, attached and ring-shaped beads.

In sub-type A1, cobalt blue beads, made by the segmenting or folding method, are the most numerous. They have been discovered at sites dated from the second half of the late Yayoi period to the end of the Yayoi period (early 2nd century BC – second century A.D. – Osandai, tomb 5, Chiba pref., Ochayadori, tomb 1, Kanagawa pref., Yadani D site, Hiroshima pref.) and to the early Kofun period (from the early 3rd century to the early 4th century A.D. – Odappe Kofun, Chiba pref., Mengahira Kofun, Oita pref.) in the amount of 3 to 9 specimens per site (Yayoi – 10 pieces, total; Early Kofun – 17 pieces, total). The group of beads from the period of the Middle Kofun (later 4^{th} century A.D.) including beads of sub-type A1 in the number of 60 pieces (Namitsuki Kofun, Nara pref.). Three beads of sub-type A2 were found in a tomb of the Middle Kofun (Kazakufiyama kofun, Osaka pref.), in which other beads belonging to sub-types A3 (4 pcs), B1 (253 pcs), B2 (38 pcs), B3 (126 pcs) and B-Other: segmented (2 pcs). From the same period, beads of sub-types A4 (3 pcs) and B3 (3 pcs) were discovered in one tomb (Utsukushi No 1 Kofun, Kyoto pref.), and beads of sub-type B1 were also discovered at two sites (8 pcs – Kuninari Kofun, Hiroshima pref., and 1 pc. – Meikegaya no 25 Kofun, Osaka pref.). One bead belonging to Sub-type A4 was dated to the Late Kofun (Taku-Urigasaka, Fukoka pref. – 6^{th} century A.D.; Tamura and Oga 2016, 9-13, Table 3). Sub-type A1 co-occurred with group PI in the Yayoi period and P2 in the Early Kofun, while in the Middle Kofun Period, sub-types A2, A4, B1-3 and B-Other co-occurred mainly with PI and less frequently PII (Oga and Tamura 2013, Table 1; Tamura and Oga 2016, Table 3).

The most interesting examples are golden-foil beads with traces of gold from Utsukushi No. 1 kofun – later 5^{th} century A.D. (3 pcs; Figs 2: 2, 4: 3) and Taku-Urigasaka, Fukoka pref. – 6^{th} century (1 pc.; Tamura and Oga 2016, 9-13, Table 3). It should also be mentioned that one gold-foil bead was found in mound 126 in Niizawa Senzuka 126 (Fig. 2: 1; Niizawa 1977, 62, Fig. 44, Pl. 40: 2).

The Authors compared the results of the analyses of glass beads from Japan with specimens found in the Mediterranean area. Sub-type B2 corresponds with the Levantine I type, and sub-type A1 is close to glass containing antimony (animony-only), but does not strictly match distinguished groups of such glass from the Mediterranean. It is interesting that nearly all beads of such origin, except 4 pieces of subtype A4 (gold in leaf), are blue cobalt. The kind of bead mentioned here can be included in the class of gold-in-glass beads, which probably constitutes a portion of of both the segmented and single-bead groups. The origin of this type of bead is associated with Egyptian workshops, where they had probably been manufactured since the Ptolemaic times (Ptolemaeus II Philadelphus; see Spaer 1993, 10). Multiple gold/glass beads and fragments of gold/glass vessels dated to the late 3^{rd} century BC were excavated on the Isle of Rhodes. It is therefore assumed that the oldest specimens are dated *prior to the 3rd century BC* (Spaer 1993, 10). The workshops manufacturing them (the production being evidenced, *i.a.*, by finds of grooved stone molds) were documented on two Egyptian sites: on Elephantine Island, in a house *FB* dated between the 2^{nd} and 3^{rd} centuries A.D. (Kucharczyk 2011, 64, 65, fig. 8), and in Kom-el-Dikka in Alexandria, dated to the late Roman Period (Rodziewicz 1984, 146-159, 241-243, figs. 265-266, Pl. 72). Alexandria is generally considered a production hub of beads, and it is thought that it was from there that specialized glassmakers came to Elephantine Island in the Early Roman Period (Rodziewicz 2005, 25, 27, 35). However, some regions in Southern Egypt, like Nubia, are also assumed to be such centres, along with the northern shores of the Black Sea – especially when we take into account the sheer quantity of such finds (Spaer 1993, 18). Gold beads and silver beads enjoyed great popularity on vast areas from

Europe to Roman Britannia during the whole period of Roman rule (Bonn 1977, 197-199, pl. XV), including the Central European Barbaricum (Mączyńska-Tempelmann 1985, 22, 64-65, 188, Taf. 14: 387) and reaching the northern Pontic area (Alekseyeva 1978, 27-33, Tabl. 26; Stawiarska 1985, 103). It is assumed that the beads were cheaper substitutes of those made of precious metals: gold or silver. The most fascinating group of gold/glass beads were found in India and Korea. Within the latter region, some 200 gold/glass and silver/glass artefacts have been excavated, prevailingly in royal burials of Baekje and Silla; they are mostly multiple tubes as well as single beads (Francis 1985, 14). Chemical analyses of several specimens from the site in Korea have shown that their chemical composition is based on soda glass with a low content of MgO and K_2O – natron was a raw material – and that the purity of gold foil used was between 19.9 – 22.6K (Kim and Kim 2012, 213-214, fig. 7, Tables 2 and 3).

The group of cobalt beads raises some interesting questions (Fig. 2: 3 and 4). Cobalt as a pigment is very special due to its colouring properties (Gratuze *et al.* 2018). It is the prevailing kind of pigment used in the production of natron glass beads from Japan (Tamura and Oga, 2016, 11). It would be an extremely difficult task to identify and locate the mines sourcing the material used in this kind of glass production, despite the fact that two main locations with such resorces are known to researchers as having been explored in Antiquity: Egypt and Iran (Kaczmarczyk 1986, 373-374; Matin and Pollard 2015, 2017; Gratuze *et al.* 2018; Mierse 2017). Some other possible locations are deposits in the eastern part of Turkey and in the Caucasus (Tite and

Fig. 2. Gold-in-glass beads (1, 2) and cobalt beads (3, 4) discovered in Japan; 1 – Niizawa Senzuka, burial mound, No 126, Nara Prefecture (courtesy of Tokyo National Museum); 2 – Utsukushi, burial mound, No 1 (after Nagaokakyo-shi 2012); 3, 4 – Kazafukiyama burial mound (after Oga and Tamura 2013)

Shortland 2008, 75). The chemical composition of the analysed beads is aproximately the same as in a certain part of the Egyptian finds, belonging to type N, and including both subgroups – N1 (low-MnO) as well as N2 (high MnO), and dated from about 550 BC to the 4th century A.D. (Late-Ptolemaic-Roman Period; Abe *et al.* 2012, 1979; Tamura and Oga 2016, 15). In the case of this Egyptian evidence, as well, it is assumed that the raw material used was imported from Iran (Kaczmarczyk 1986, 373-374). The higher content of MnO in types B2 and B3 does not necessarily involve the use of cobalt as the pigment, because the ratios of other components – for example, PbO and CuO – are reminiscent of types A1 and B1 with low quantities of MnO (Tamura and Oga 2016, 15). Such low-manganese cobalt ores have indeed been located in Qamsar in Central Iran (Matin and Pollard 2015, 171, 2017). Iran as the land of origin of the cobalt used as a pigment in the production of natron glass is additionally indicated by some analyses of lead isotope ratios of natron glass (Tamura and Oga 2016, 16).

2.2.2. Glass vessels

Vessels make up the second category of glass associated with the Mediterranean culture circle. Two artifacts of this group have been found in Japan: a plate from a burial in Niizawa Senzuka in Asuka (near Nara), and the lower part of a bottle from the site Jike in Ishikawa. Some researchers also include one vessel from Shōsō-in, a treasure house of the Tōdai-ji Buddhist temple, in the same group, because its chemical composition belongs to the alkali-lime glass category (Hayashi 1975, 88, fig. 16; Mierse 2017, 8, Fig. 1; Żuchowska and Szmoniewski 2017, 182).

2.2.2.a. Niizawa Senzuka, barrow 126 (Figs 3-5)

The cluster in Niizawa Senzuka contains about 600 graves with tombs, and out of this number, 125 burials have been archeologically explored and documented (Fig. 3). The cluster is situated in the valley of Ochioka, south of the city of Kashihara, in the southern part of the Nara basin. The whole site consists of different types of graves with different tombs, ranging from small-scale, keyhole-shaped and square ones, to round tombs. The cluster is dated between the second half of the 4th century and the 6th century A.D. One of the richest and the most interesting burials with regard to grave goods, is grave No. 126, dated to the Middle Kofun period in the second half of the 5th century A.D.). This burial belongs to a small group of mounded tombs of a rectangular shape, which are oriented along an East-West axis. The length of the mound is 22 meters, its width is 16 meters, and its height is 1.5 m. Inside, in its southern part, there was a rectangular burial pit with a wooden split-log coffin. Grave goods were found inside the coffin, as well as outside it. These included, *i.a.*, a sword, a hinoshi (a traditional Japanese iron) and lacquered platters outside the coffin; inside it, there were personal jewels such as gold earrings with

Fig. 3. General view of the burial mound cluster in Niizawa Senzuka, Nara Prefecture (after Niizawa 1977); 1 – location of burial mound, No 126; 2 – photo of burial mound No 126 (photo by Author)

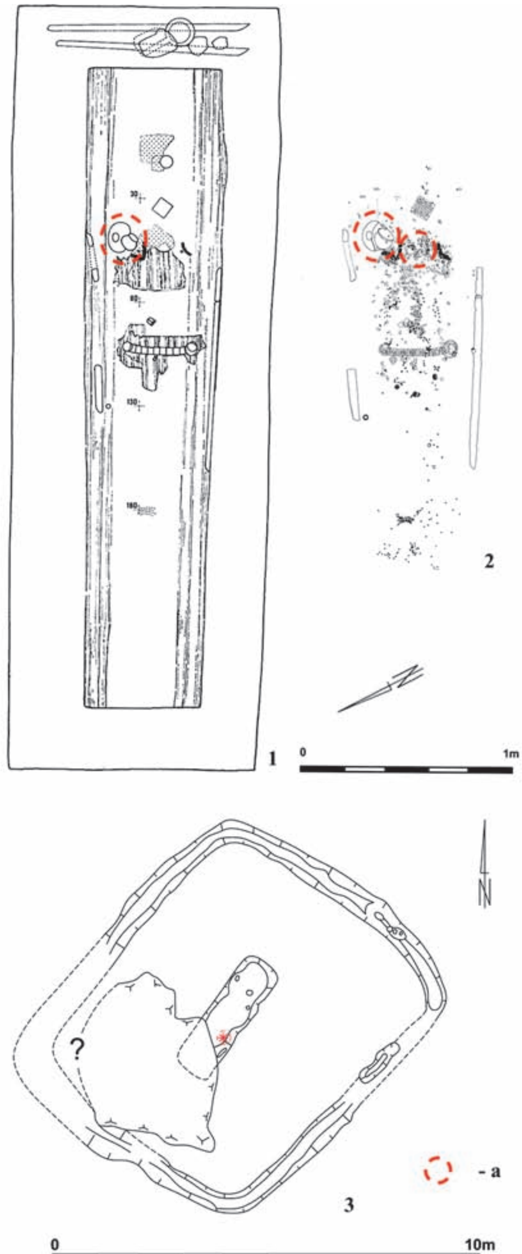


Fig. 4. Horizontal layout of the graves with a gold-in-glass bead and glass vessels (1, 2) and a gold-in-glass bead (3); 1, 2 – Niizawa Senzuka, burial mound, No 126, Nara Prefecture (after Niizawa 1977); 3 – Utsukushi, burial mound, No 1 (after Nagaokakyo-shi 2012); a – deposition area

decorative chain pendants, gold, spiral-shaped pendant decorations, gold hair decorations, gold and silver rings and bracelets, a gilt bronze belt buckle, a rectangular gold plate with a dragon motif in openwork carving, a bronze mirror, and a glass bowl and dish (Dictionnaire 1989, 146; Niizawa 1977). Close to the head of the buried body, there were two glass vessels, put one into the other (Fig. 4: 1, 2). The first vessel, a bowl, has a circular form with a short neck and a folded rim. On its surface, there are rounded facets. At its widest, the rim is 7.8 cm, its main body is 8.7 cm, the height is 6.7 cm, and the walls are 1.5 mm thick (Fig. 5: 2, 6: 2). The second vessel is a plate of a dark-blue color (of cobalt shade), with a diameter between 14.1 and 14.5 cm, and a height of 3 cm (Fig. 5: 1, 6: 1). On the bottom, as seen from the outside, there is a pontil mark. The surface of the vessel was decorated with golden paint at a later time. The painted figure of a bird was depicted in the centre, and in the circular band around it, there was a human figure holding a ring in one hand and leading a horse by a bridle with the other. The horse has an oval head decoration. Behind the horse, a symmetrical, geometricized tree was painted, and another, more realistic tree was painted next to it. Moreover, painted flower petals were scattered in several spots. On the other side of the human figure with the ring,

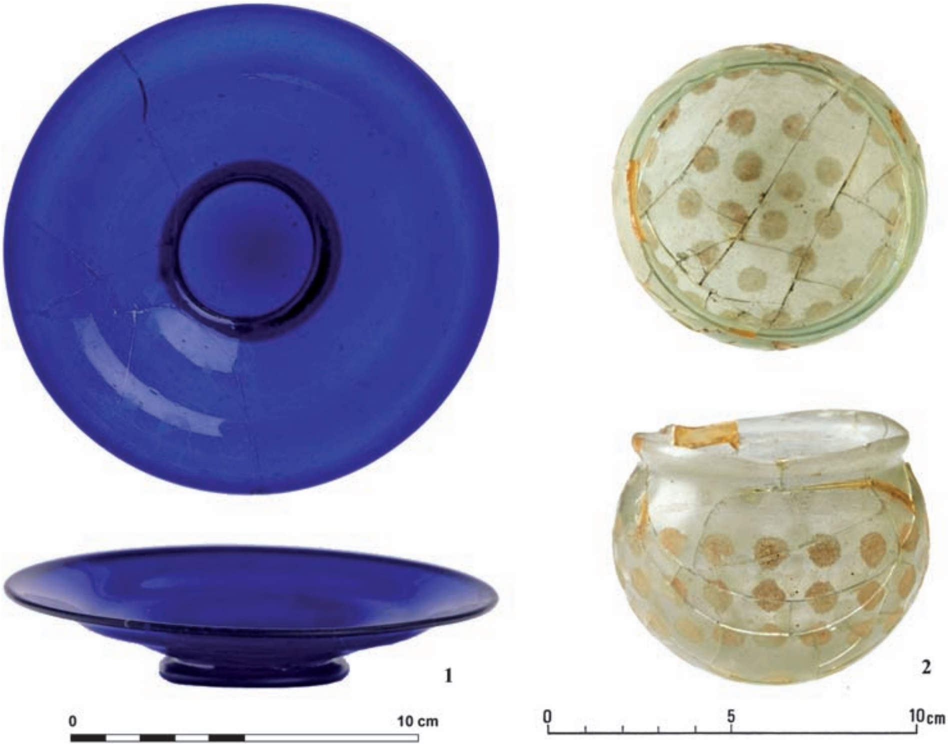


Fig. 5. Glass vessels from Niizawa Senzuka; 1, 2 – Burial mound, No 126, Nara Prefecture (courtesy of Tokyo National Museum)

another human depiction was found, surrounded with foliage motifs (?); but, due to the poor state of preservation, it is difficult to identify (Fig. 6: 1). Sei-ichi Masuda associates the style of these depictions with the West-Asian tradition. Based on his analysis of the details, he assumed that the decorative motifs on this vessel were the work of a Persian craftsman form the Sasanian period, produced during his stay in China, or applied *during its eastward transportation* (Masuda 1972, 355-356, Fig. 3; Abe *et al.* 2018, 218). Some traces of the golden paint have been preserved and are visible also on the foot of the vessel. Both vessels have been chemically and stylistically analyzed; the analyses have supported the thesis about the first of them being a Sasanian product, whilst the other (blue) is natron glass (Abe *et al.* 2018). It is also interesting what a Roman vessel was used by a Sasanian craftsman, which, in light of some new interpretations of finds from the territories of the Sasanian Empire, points to the possibility that other Roman vessels were also used by Sasanian glassmakers (Simpson 2015, 95, fig. 17: 1). It is quite likely that gold paint is an imitation of Roman gold/glass vessels of the 3rd and 4th centuries A.D. (Whitehouse 2001, 239). The wide range of subjects used for decorating the surface refer to diverse symbolic

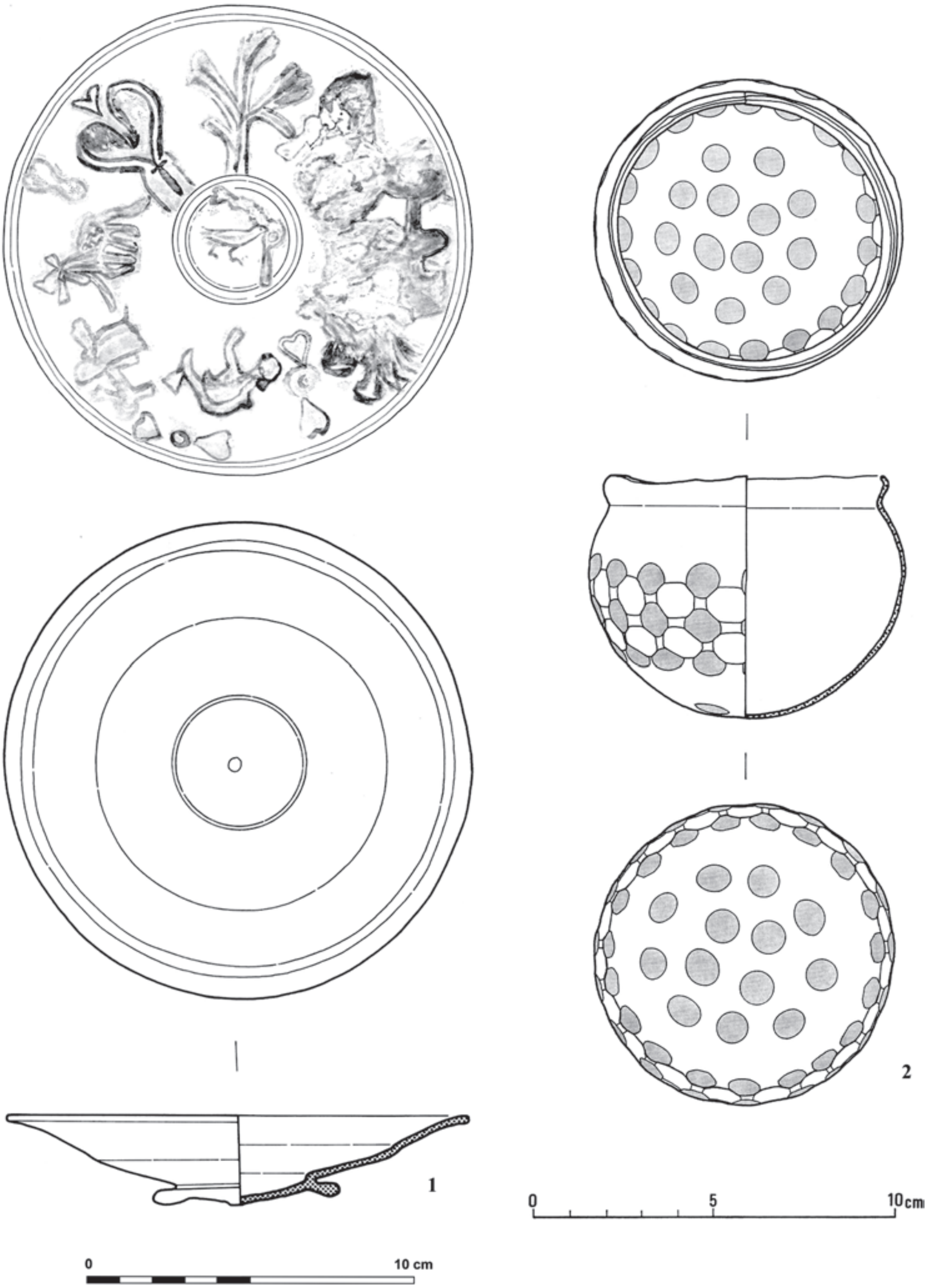


Fig. 6. Glass vessels from Niizawa Senzuka; 1, 2 – Burial mound, No. 126, Nara Prefecture (after Niizawa 1977)

meanings from pagan and mythological themes, as well as Christian and Jewish themes, and also, depictions of married couples, animals and plants. It should also be noted that such gold/glass items were often used as grave goods (Stern 2001, 139-140; Whitehouse 2001, 239-252). In the available archeological evidence, no analogies could be found to the vessels from Niizawa Senzuka. The resemblance can be traced among glassware from Northern Egypt, and especially, in some finds of plates (class 1 A) from Karanis (Harden 1936, 46-67). Some similarity can be found in a dish and plates on foot-ring from there; however, dishes from Karanis mostly have their rims involuted and are oval shaped (Harden 1936, Pl. I, XI: 1-17, 60, Fig. 1: b, d, e). Among this group, there were vessels of purple and brown shades. The first occurrence of this type of vessel is dated by Harden to the end of the 3rd century A.D., and the peak of their production was in the 4th and early 5th centuries A.D. (Harden 1936, 47). Hayes (1975, 2-3) suggested they they date to the 5th and 6th centuries. Recently, Harden's chronology of this type is considered preferable (Whitehouse 2001, 239). This dating corresponds with the chronology of the burial in Niizawa Senzuka, which took place in the mid-5th century. The latest chemical analysis of this plate has shown that it was produced in the eastern Mediteranean basin (Abe *et al.* 2018).

In this place, a historic discovery should be mentioned, which included *a jar in bright blue color, and a plate in a water-white color*. This find was made in 1872, on the southern slope of the Emperor Nintoku kofun – Daisen-ryo, in Otori, Osaka prefec. They had been discovered in a stone coffin, but were later reburied. Because of their reburial, their details remained unknown (Sugiyama 2011, 550). The rest of the objects found there are now on display in the Boston Museum (Masashi 2010). It should be taken into consideration that other imperial burials could also contain glass vessels among the other grave goods deposited there, which most probably was a common practice in that time in Japan, and also in Korea. The prohibition of further archeological research of the imperial burials makes the verification of this suggestion impossible to conduct. In the tombs designated as imperial (containing remains of emperors or their family members) since 1871, all forms of archaeological research have been forbidden. This is because, officially, the tombs contain the remains of imperial ancestors and their spirits. However there are other reasons, such as the linking of the Yamato imperial rulers with Korea's dynasties and the low probability of identification of tombs with mythological emperors whose line is said to have begun in 660 B.C. (*cf.* Immamura 1996, 194; Edwards 2000).

A fragment of a glass vessel linked with Roman production has been unearthed in the Jike site in Ishikawa prefecture. This site is situated in a sand dune on the coast of the Sea of Japan, about 1 km southeast of the Keta Shrine. In pit SBT04, positioned in the southern part of the site and dated to the second quarter of the 8th century, a triangle glass vessel was discovered, measuring 1.4 × 1.4 × 1.6 cm, with walls that are 1.2 mm thick. The color of this fragment is yellowish, of an ash gray hue. A chemical analysis showed that the fragment mentioned above was produced out of soda glass, and it is interpreted as a fragment from the bottom of a small Roman bottle. This find is associated with rituals that could have

Fig. 7. Shōsō-in; 1 – Shōsō-in (The treasure house), Nara Prefecture (photo by Author); 2, 3 – Glass vessel from Shōsō-in, Nara Prefecture. Treasure number: Middle section 70 (1 – after Glass objects 1965; 2 – Courtesy of the Imperial Household Agency)

been performed by Shinto priests from the nearby temple Keta. It is also assumed that this fragment could have been used in the temple Yanagida-shadoke, the ruins of which are situated about 800 meters east-southeast of the Keta Shrine, and are dated to the end of the 7th or beginning of the 8th century (Sugiyama 2011, 544-545).

In Shōsō-in (Fig. 7: 1), in a treasure house of the Tōda-ji temple, six glass vessels are preserved (only three, including the presented cobalt glass, were from the initial deposit) (Figs 7: 2 and 3; Mierse 2017, 8). This is a truly unique set, as is the entire collection of luxury objects of foreign provenance, which were gifts of the Empress Kōmyō, widow of the Emperor Shōmu. The latter received numerous luxury artifacts during his rule in the middle of the 8th century. Shortly after his death in 756 A.D., they were passed on by the widowed Empress to the Tōdai-j temple. One of these vessels has been associated with Mediterranean workshops. It is a blue cup, produced out of alkali-lime glass. Its surface is decorated with 22 circular coils ordered in three rows: two of them contain eight elements each, and the lower one has six. According to Hayashi, it was a product of the Eastern Roman Workshops (Hayashi 1975, foldout 1). The base of the cup is made of silver and most probably was added later (Laing 1991, 115; Żuchowska and Szmoniewski 2017, 182; different view *i.* Mierse 2017, 10). The decoration of rings and trails on the surface of the vessel was almost unknown within the circle of the Roman glassmaking tradition. Thus far, I am aware of one example of a transparent, pale blue-greenish glass cup with similar decorations of chunks (parison rolled in chunks of glass) and a ring from the Corning Museum of Glass, dated to the 1st century A.D. (Whitehouse 1997, 208, no. 358). Some analogies to cups or bowls with blue prints (Mierse 2017, 11-15) are suggested in the literature, but they seem dissimilar. In these cases, the decoration is based not on rings, but on blue dots encompassed by trails of glass (Szmoniewski 2018, 161, 162-163, fig. 5: 1-3, fig. 8: 4-9). There is also a proposal that this cup originated as *a late Sasanian or early Islamic period product from an Iranian glass workshop* (Mierse 2017, 10). A nearly identical vessel, but of a green color, is known from the Songrim-sa pagoda, Chilgok county, North Gyeongsang province, Korea (dated around 935 – the end of the later Silla/early Goryeo period), and was probably produced in the second half of the 7th century or in the 8th century (Hong 2010, 193, fig. 13; Żuchowska and Szmoniewski 2017, 182). A similar type of decoration is documented on the surface of a translucent white glass cup from the hoard of Hejia, Xi'an in China, which is dated to the mid-8th century – not long after 731 A.D. (Hansen 2012, 152; Hua wu da Tang chun 2003, 101, no. 12), and from a fragment discovered in Togujai, near Moji in Xinjiang autonomous region, China (Lu *et al.* 2017, 116-117). As chemical analyses show, the chemical formula of these vessels is based on a component related to Central Asian glassware (Lu *et al.* 2017, 116-117; see also Brill 2009, 146, Tabl. 3.2. and 3.3.6). According to a new proposal, the vessel from Hejia is thought to be among the gifts that were offered at the Imperial Court of Tang by the envoy from Kapiśa (which was situated in Afghanistan and centred on what is now Kabul) in 619 A.D. (Lin 2017; Aihaiti *et al.* 2017). Thus, glass vessels of this type might have been produced in Central Asia, where different branches of crafts could also evolve – among them, glassmaking related to Mediterranean traditions, but with a stamp of local provenance (see Szmoniewski 2018 and 2019).

2.2.3. Coins

In the year 2016, during the excavations carried out within the Katsuren castle in Uruna, Okinawa prefecture, a few coins of foreign origin were found (Fig. 8). This building, which consists of five enclosures, is situated on a limestone ridge around 90 m above sea

Fig. 8. Katsuren Castle; 1 – Katsuren Castle, Okinawa (photo by Author); 2 – Early Byzantine coins (Courtesy of Uruma City Education Board); 3 – Plan of Katsuren Castle (after Pearson 1999), a – location of coins

level, with a strategic view of the entire southwestern part of the island. There coins were found in four of the enclosures, which covered a total acreage of 7600 m^2. Four specimens dated to the 3rd and 4th centuries have been identified, and one dated to the Ottoman epoch (17th century). The Roman coins are made of copper, with diameters between 1.6 and 2 cm; their surfaces are very damaged and worn off, with the barely-visible motif of a ruler. This makes their identification and typological classification very difficult. In the case of the most well-preserved coin, it has been ascribed to Constantius the Second and his administration in the time between 337-361 A.D. With regard to the other coins, they all are related to the edition from the time between 320-370 A.D. (Fig. 8: 2; personal communication of Makiko Tsumura). It is hardly possible, however, to connect the time of their arrival in Japan with the time of the imports of glassware from the Mediterranean workshops, because the castle of Katsuren is from a much later period. Its history can be divided into five periods. Up to the 12th century (period I), the castle walls had not yet been constructed. Its fortification walls are probably from the second phase, i.e., from the 13th century. According to a local tradition, the first Lord of Katsuren Castle, the Katsuren Aji, was the fifth son of Tatsei (1300-1308). The most intensive period of construction fell in the time of Amawari (early to mid-15th century). On the site where enclosure 2 stood, which contained the palace, four layers were distinguished, and it was there that multiple artifacts were found: jade beads, Ming glaze pottery, coins, earthenware (probably local products) and other types of pottery. Coins, mainly Chinese and of diverse chronology, were discovered in various locations in the Ancient Ryukyu, and also in other castles within this territory (Pearson 1999, 289-293, fig. 4 a and b; Ladefoged and Pearson 2000, fig. 1). From some earlier periods, a few coins from the Han epoch were also documented (Pearson 2013, 11); moreover, 36 finds of Chinese coins of Kaiyuan Tongbao were made at 8 sites in the Okinawa Islands, and 28 finds came from two sites on Yeayama Island, with the earliest from the site of Sakieda Akasaki, Ishigakijima; they were mainly minted in the 7th and 8th centuries (Pearson 2013, 74, 80, 133-134, 278, fig. 6.3.3.4). Yet, the most numerous group is dated to the Song epoch – mostly Northern Song (Pearson *et al.* 2000, 226; Pearson 2013, 206). To this must be added that Byzantine coins, and their imitations or bracteates from the Far East, are gold items. The only deposit of Roman bronze coins (1st-3rd c.) from Lingshi, Shansi province, seems to be a collection, as evidenced by the eighteenth coin of Henry III – King of Poland and France, issued in 1589 (Thierry 2012, 30-32). However, more single finds of Roman coins are known from Southern and South-Eastern Asia (Hoppá *et al.* 2018).

2.2.4. Textiles

Jōdai-gire (the Japanese term for ancient fabric) from Shōsō-in includes over 170,000 textiles and their fragments (each fragment was counted separately). Their exact number is difficult to estimate due to *a mishap in the past*, namely that they had been mixed and

Fig. 9. Textile with lions from Shōsō-in, Nara Prefecture (Courtesy of the Imperial Household Agency)

confused with the textiles from the Hōryū-ji i and Tōdai-ji temples. They are still being classified into categories and types. The debate concerning their provenance is still fierce, and according to Atsuhiko Ogata (2012, 6) *none of the textiles of Shoso-in was manufactured in Europe, such as Persia, Central Asia, or the west of China*. It is probable that most, if not all of them were produced in China and Japan. In the literature, one of the textiles is described as the most exotic of the entire collection; it is a *joku* with lions and human figures, under a flowering tree on light-brown ground, thought to be of Byzantine origin and a product of Syrian workshops (Figs 9 and 10: 1, 2). The artifact described here, dated to last half of the 8th century and preserved only fragmentarily in two (?) parts, was a kind of a mat, hung vertically in halls of Buddhist temples. The preserved fragment is a weft-faced, twill damask weave, 99 cm long and 52.2 cm wide. Three units of the same pattern are repeated (Matsumoto 1984, 229-230, no. 49). At first glance, the pattern of the textile seems to be the product of Mediterranean workshops (see discussion in Mierse 2017, 35). Kazuko Yokohari, on the other hand, underlined a Chinese technique of weaving (Yokohari 2006, 171). A closer analysis of the designs suggests some analogies to the sphere of Chinese art influence, especially to the workshops of the Tang epoch. Without going deeper into the details of the depictions, I would like to focus on some select details. First, the motif of a lion, which at first sight seems to be related to early Byzantine depictions,

Fig.10. Textile with lions and analogies of its representations; 1, 2 – Textile with lions from Shōsō-in – details; 3 – Stone element of Sarcophagus of Li Shou grave (d. 631 or 632), Jiaocun, Shaanxi Province, China; 4 and 5 – Clay figurines of Kunrung (Kunlun) from Tang era (618-907) graves; 6 – Stone element of Sarcophagus of Empress Zhenshun (d. 737), Xi'an, Shaanxi Province, China; 1, 2 – Courtesy of the Imperial Household Agency; 3 and 4 – after Chinas 1993; 5 – The Art Institute of Chicago – Open Acces Image, 6 – after Wang 2014

suggests rather to reflect the Chinese style. The lion in China was a little-known animal, and in most cases, depictions of it were imitations of foreign motifs, mainly Sasanian and maybe also Roman ones (Szmonievskiy 2013). Particularly, the end of its tail, as seen in this fragment, and the arrangement of the muzzle, have their equivalents in depictions of lions and other *phantastic* animals in Chinese art. Good examples of such depictions are stone elements of the funeral sarcophagus of Empress Zhenshun (Consort Wu, died 737), discovered in Xi'an, Shaanxi province (Wang 2014, 3: 4) as well as a stone pillar also discovered in Xi'an (Fig. 10: 6; Haussig, 1992, 152-153). Half-naked keepers of animals also find their equivalents in the art of the Tang period – above all, in figural depictions in sculpture. They depict foreigners, mostly half-naked, with curly hair and knee-length trousers (pantalons), which can be identified with Black Africans or Southeastern Asians, for whom the ancient Chinese used the expression "Kurung" (Kunlun) (for origin and meaning see: Zhu, Hu 2019, 124). However, in the Tang era, the name "Zangi" or "Zānji" was used for Black slaves from Africa, (Zhu, Hu 2019, 124; Wyatt 2010, 313) who were kidnapped and sold in slave markets or presented as gifts for Chinese envoys (Wyatt 2010, 313). Besides historical information about Black Africans in China during the Tang era (Xiong 1990; Wilensky 2002), the pottery figurines also confirmed their presence (Chinas 1993, 70, 71). Thus, the models for these depictions in the presented textile from Shōsō-in might be people from South Eastern Asia or from Africa, who are mostly presented as half naked with knee-length trousers and curly hair (Fig. 10: 4-5).

The last element I would like to discuss is a stylized depiction of a bird resembling a peacock. Similar motifs of birds with the characteristic feather on their heads also occur – one can easily find equivalents in Chinese art; a good example here may be the decoration on the door of Li Shou's sarcophagus (died 631 or 632) from Jiaocun, near Sanyuanxian, Shaanxi province (Fig. 10: 3; Chinas 1993, 183). This depiction seems to represent the Feng Huang bird. It is worth pointing out that this motif, taken from the Chinese art tradition, appears in the Byzantine circle in the Middle Byzantine period. According to K. Yokohari (2006, 171)*, it is possible that the Chinese wove it after seeing a Western image*, which was not an exception in China. Moreover, the Japanese researcher allows for the possibility that the *Horyu-ji samit initiated the production of hunting-motif samit silks in the West, in particular in the area of Byzantine influence during and after the eighth century*. Therefore, we could be dealing with a renewed adaptation of this modified motif with lions – motif, which this time, came from the East to the West.

3. SUMMARY AND CONCLUSIONS

My purpose was to show that in spite of many reports about alleged finds of products of Roman and Byzantine workshops in the Japanese archipelago, their number is actually small and limited to the glassware artifacts imported there in the times directly succeeding their production. In the case of numismatic finds, coins were imported long after their minting. Other products associated with the Byzantine Empire, *e.g.*, textiles, were Asiatic (from Central Asia or China), with the exception of their stylistic linkage to their western equivalents in some cases. Three routes of their influx are possible.

As far as beads are concerned, their co-occurence with group PI and PII, produced in South India (PI) and Central Vietnam and coastal regions of South China (PII), suggests a sea route; the beads included in these two groups, along with other Indo-Pacific beads found their way to Japan and were later deposited in burials. A special role in the production of beads was undeniably played by India, where several sites containing finds with gold-in-glass beads were documented, with the artifacts most probably manufactured *in situ* (contra this view, Francis 2002, 92). The analyses conducted thus far of gold foil and silver beads from Bara, near Peshawar in Pakistan (the site dated from the 2nd c. BC to the 2nd c. A.D.), have supported the thesis of their local provenance;the same is true in the case of a find from Harinajanpur (India). The analyses of 3 beads from Arikamedu (India), however, as well as those excavated in Koktepe (Uzbekistan) and Khuan Lukpad (Thailand), have proven that all of these artefacts came from the Mediterranean Basin (Dussubieux and Gratuze 2003, 319). Some analyses conducted on a portion of the vessels excavated from double burial 98 in Hwangnamdaechong have shown their closer similarity to glass beads and bead making debris from the aforementioned Bara site (Lankton *et al.* 2010, 223). In light of these analyses, it seems that we cannot exclude the existence of a continental route, apart from the maritime one, as a route for the influx of this type of glass products to East Asia. The offshore imports of gold/glass beads, *i.e.*, finds of them, are mapped with various frequency along the South-Asian trade route (Francis 2002, 91-93).

This is an astonishing perspective that opens to researchers who focus on the fact that the greatest concentration of such finds in this part of Asia, as well as the greatest diversity of variants of gold in glass beads (ranging from simple to segmented, and in the production of which natron prevailed as a raw material), can be found in many burials of the Three Kingdoms of Korea (Kim and Kim 2012, 213-215, Table 1, Fig. 7: 1); thus, we cannot exclude that it is from these hubs that they were imported to Japan. Intensive trade and exchange obviously took place between Gaya, Silla, Peakche (Korea) and Wa in Japan, a thesis supported by the finds of various artifacts of Korean origin made of iron and noble metals; or, as an alternative interpretation, the artifacts could be a result of the adaptation of the house heating system typical for southwestern Korea, such as that known from the Peakche site (Park 2018; Woo 2018).

Blue beads frequently discovered in Korea could well be manufactured by some local craftsmen with the use of imported raw materials (Lee 2013, 119, Pl. 64), as was the case in South East Asia, where *the methods or workers, perhaps both, had been transferred from another, more established site* (Lankton and Dussubieux 2006, 121-122). In the area just mentioned, a significantly broad range of chemical compositions of glass products is apparent, which indicates a high probability of three distinct origins and archaeological traditions (Lankton and Dussubieux 2006, 121-122). From the same perspective, beads could be manufactured in various regions and with the use of different types of minerals and raw materials, using melted as well as remelted glass, which would have resulted in the differentiation of chemical components and their various concentrations in slightly different types of glass production (Lankton and Dussubieux 2006, 121-122). In the case of cobalt aluminate, in its natural, primordial form, it is not of blue colour at all, but rather pinkish; therefore, in order to achieve this special blue hue, it had to be dissolved in water with the addition of sodium bicarbonate, ammonia or plant ash. Such a mixture, after being heated to a temperature between 800-1000°C to obtain the amalgamation of the components, and after the precipitation process, would render the desired pigment (Nicholson and Henderson 2006,198). The resulting form of the material could easily be transported and traded over longer distances or used locally, misleading our analyses and causing us to search for a possible Mediterranean provenience of the artifacts. However, according to some researchers, *only Near Eastern cobalt blue glass and gold-foiled glass beads were imported from Mediterranean regions* (Dussubieux cited in Gratuze 2013, 328).

The grave goods found in mound 126 at Niizawa Senzuka, apart from a square openwork plaque from a diadem with leaf pendants as its decorative pattern, include, among others, two glass vessels (Roman and Sasanian), and other objects that suggest cultural bonds with the Korean Peninsula, both stylistically as well as by the repeated number of two glass vessels, which corresponds with such finds in the several graves of Gyeongju. The gold, openwork plaque belongs to a kind of adornment that most probably came from the West. The most characteristic specimen found in this cemetery/necropolis is a golden crown from Tomb VI in Tillya Tepe (Afghanistan), dated to the second quarter of the 1st century A.D. Other finds of this kind are mostly from burials in Mongolia, Jilin and Liaoning provinces in north-eastern China, where this fashion disappeared by the mid-5th century. However, this style was continued later on in the East – in Baekje and Gaya on the Korean Peninsula, and most intensely, in the Kingdom of Silla (Szmoniewski, 2019, 214-215). It is only through systematic research of imperial burials that we could answer the question of whether rulers' graves in Japan contain glassware as is the case in Korea; this issue however, cannot be solved as yet due to the prohibition of archeological research in such burials.

In the case of the coins from Katsuren Castle on Okinawa Island, they should also be associated with a sea route as far as their import is concerned. Katsuren was an important trade hub on the eastern coast of Okinawa, and as such, a dangerous rival of Shuri, capital of Ryukyu Kingdom. Rich and diverse discoveries from the enclosures of Katsuren support its far-reaching trade contacts. At the foot of the castle, Yambaru Sen – Okinawan trading ships – were berthing until as late as the 20th century.

Thus, the finds of products of Mediterranean origin from the Roman and the Early Byzantine Periods are scarce, which points to the unique character of their import. This all supports the view that the Japanese archipelago should indeed be included into the network of the Silk Road routes, but its role was only passive.

Acknowledgements

This paper could not be written without the help of many people. Foremost, I would like to express my special gratitude to Professor Toshio Hayashi from Soka University (Tokyo) for his help in my research during the JSPS Fellowship for Overseas researchers (2016-2018), sharing his knowledge and support. Special thanks are due to Dr. Makiko Tsumura (Tokyo), Dr. Chizuko Kotera (Tokyo), Dr. Ryuji Shikaku (Okayama) and Dr. Marta Żuchowska (Warsaw) for interesting and inspiring discussions. Special thanks goes to Professor Koichi Yukishima for all his helping in collecting illustrations. I would also like to thank the Tokyo National Museum, Imperial Household Agency and Uruma City Education Board for permission to use materials for illustrations. The paper was written during the tenure of a Fellowship for Overseas Researchers from the Japan Society for the Promotion of Science (JSPS).

References

Abe Y., Harimoto R., Kikugawa T., Yazawa K., Nishisaka A., Kawai N., Yoshimura S. and Nakai I. 2012. Transition in the use of cobalt-blue colorant in the new kingdom of Egypt. *Journal of Archaeological Science* 39, 1793-1808.

Abe Y., Shikaku R. and Nakai I. 2018. Ancient glassware travelled the Silk Road: Nondestructive X-ray fluorescence analysis of tiny glass fragments believed to be sampled from glassware excavated from Niizawa Senzuka Tumulus No. 126, Japan. *Journal of Archaeological Science: Reports* 17, 212-219.

Alekseyeva Ye. M. 1978. *Antichnyye busy Severnogo Prichernomoria* (= *Svod arkheologicheskikh istochnikov* G1-12/2). Moskva: Nauka.

Aihaiti M., Kim S. and Hao C. 2017. Sichou zhi lushang de zhong ya boli qi jian lun zhong ya boli qi xiang zhongguo, chaoxian bandao he riben zhi chuanbo. *Kaogu yu wenwu* 6, 104-110.

Boon G. C. 1977. Gold-in-glass beads from the Ancient World. *Britannia* 8, 193-207.

Borell B. 2008a. Some western imports assigned to the Oc Eo period reconsidered. In J.-P. Pautreau, A.-S. Coupey, V. Zeitoun and E. Rambault (eds), *From Homo Erectus to the living traditions. Choice of papers from the 11th International Conference of the European Association of Southeast Asian Archaeologists, Bougon, 25th-29th September 2006*. Chiang Mai: Siam Ratana, 167-174.

Borell B. 2008b. The Early Byzantine lamp from Pong Tuk. *The Journal of the Siam Society* 96, 1-26.

Borell B. 2010. Trade and glass vessels along the maritime Silk Road. In B. Zorn, and A. Hilgner (eds), *Glass along the Silk Road, from 200 BC to AD 1000*. Mainz: Römisch-Germanisches Zentralmuseum Mainz, 127-142.

Borell B., Beìreìnice B. and Boonyarit Chaisuwan. 2014. Contacts between the Upper Thai-Malay Peninsula and the Mediterranean World. In N. Revire and S. Murphy (eds), *Before Siam: Essays in Art and Archaeology*. Bangkok: River Books, 98-117.

Brill R. H. 2009. Opening remarks and setting the stage. Lecture at the 2005 Shanghai International Workshop on the Archaeology of Glass along the Silk Road. In: G. Fuxi, R. H. Brill and T. Shouyun (eds), *Ancient glass research along the Silk Road*. Singapore: World Scientific Pusblishing, 109–148.

Chinas 1999. Chinas Goldenes Zeitalter. Die Tang-Dynastie (618-907 n. Chr.) und das kulturelle Erbe der Siedenstrasse. Dieter Kuhn (ed.). Dortmund: Edition Braus.

Dussubieux L. and Gratuze B. 2003. Nature et origine des objets en verre retrouveìs aÌ Begram (Afghanistan) et aÌ Bara (Pakistan). In O. Bopearachchi, C. Landes, and C. Sachs (eds), *De l'Indus aÌ l'Oxus: archeìologie de l'Asie centrale*. Lattes: Association imago-museìe de Lattes, 315-323.

Edwards W. 2000. Contested access: The Imperial tombs in the postwar period. *Journal of Japanese Studies* 26(2), 371-392.

Francis P. 1985. *A survey of beads in Korea* (= *Occasional papers of the Center for Bead Research* 1). New York: Lapis Route Books.

Francis P. 2002. *Asia's maritime bead trade: 300 B.C. to the present*. Honolulu : University of Hawai'i Press.

Glass 1965. *Glass objects in the Shosoin*. Shosoin Office (ed.). Tokyo: Nihon Keizai Shimbun Sha.

Gratuze B. 2013. Provenance analysis of glass artefacts. In. K. Janssens (ed.), *Modern methods for analysing archaeological and historical glass* 1. Chichester: Wiley, 311-343.

Gratuze B., Pactat I. and Schibille N. 2018. Changes in the signature of cobalt colorants in late antique and early Islamic glass production. *Minerals* 8(6), https://www.mdpi.com/2075-163X/8/6/225 (acces 7.01.2020).

Hansen V. 2012. *The Silk Road. A new history*. Oxford: Oxford University Press.

Harden D. B. 1936. *Roman glass from Karanis found by the University of Michigan Archaeological Expedition in Egypt 1924–1929*. Ann Arbor: University of Michigan Press.

Hausig H. W. 1992. *Archäologie und Kunst der Seidenstrasse*. Darmstadt: Wissenschaftliche Buchgesellschaft.

Hayashi R. 1975. *The Silk Road and the Shōsō-in The Heibonsha survey of Japanese art*. New York: Weatherhill.

Hayes J. 1975. *Roman and Pre-Roman glass in the Royal Ontario Museum: a catalogue*. Toronto: Royal Ontario Museum.

Hong Y. 2010. Ancient Buddhist Reliquaries in China and Korea. *Chinese Archaeology* 10(1), 184-195.

Hoppál K., Adhityatama S., Vida I. and Lu Y. 2018. All that glitters is not Roman' Roman coins discovered in East Java, Indonesia: A study on new data with an overview on other coins discovered beyond India. *Dissertationes Archaeologicae* 3(6), 461-492.

Hua wu da Tang chun 2003. *Hua wu da Tang Chun : Hejia cun yi bao jing cui*. Beijing: Wen wu chu ban she.

Imamura K. 1996. *Prehistoric Japan: New perspectives on insular East Asia*. Honolulu: University of Hawaii Press.

Kaczmarczyk A. 1986. The source of cobalt in ancient Egyptian pigments. In J. S. Olin and M. J. James (eds), *Proceedings of the 24th International Archaeometry Symposium*. Washington, D.C.: Smithsonian Institution Press, 369-376.

Yokohari K. 2006. The Hōryű-ji Lion-hunting silk and related silks. In R. Schorta (ed.), *Central Asian textiles and their contexts in the Early Middle Ages* (= *Riggisberger Berichte* 9). Riggisberg: Abegg-Stiftung, 155-173.

Kim N. Y. and Kim G. H. 2012. Asan myeong-amli Bakkjimeule yujeog chulto yuliguseul-ui hwahag-jeog teugseong. *Journal of Conservation Science* 28(3), 205-216.

Kucharczyk R. 2011. Glass from area F on Kom el-Dikka (Alexandria). Excavations 2008. *Polish Archaeology in the Mediterranean* 20 (Research 2008), 56-69.

Ladefoged T. N. and Pearson R. 2000. Fortified castles on Okinawa Island during the Gusuku Period, AD 1200-1600. *Antiquity* 74, 404-12.

Laing F. J. 1991. A report on Western Asian glassware in the Far East. *Bulletin of the Asia Institute. New Series* 5, 109-121.

Lankton J.W. and Dussubieux L. 2006. Early glass in Asian maritime trade: a review and an interpretation of compositional analyses. *Journal of Glass Studies* 48, 121-144.

Lankton J. W., Gratuze B., Kim G. H., Dussubieux L. and Lee I. 2010. Silk Road glass in ancient Korea: The contribution of chemical compositional analysis. In B. Zorn and A. Hilgner (eds), *Glass along the Silk Road from 200 BC to AD 1000*. Mainz: Römisch-Germanisches Zentralmuseum Mainz, 221-237.

Lee I. 2013. Of glass and gold. Silla tombs, the Silk Road and the steppe. In: S. Lee and D. P. Leidy (eds), *Silla Korea's Golden Kingdom*. New York: Metropolitan Art Museum, 115-131.

Lin M. 2017. Tangwude er nian ji bin guo gongpin kao – jian lun xian hejiacun tang jiao zang yuan wei daming gong qiong link u huangjia baozang. *Kaogu yi wenwu* 6, 94-103.

Lu X., Liu Z., He D., Liu X. 2017. Hejiacun tang dai jiaocang baoshi ji boli wan jiance baogao. *Kaogu yu wenwu* 6, 114-120.

Markovic L., Vranes A. and Jelic Mariokov M. 2017. The story of the Silk Road and Nara's Shosoin treasure repository of the Emperor. Conference: The Asian Conference on Arts and Humanities 2017. https://papers.iafor.org/submission35719/.

Masashi T. 2010. Beikoku Bosuton Bijutsukan shozō iwayuru 'den Nintokuryō shutsudohin' no chōsa. *Shoryōbu kiyō [Ryōbo hen]* 62, 1-17.

Masuda S. 1972. On the painted Sassanian glass receptacle found in Japan. In *The memorial Volume of the Vth International Congress of Iranian Art and Archaeology (Tehran, Isfahan, Shiraz, 11th-18th April 1968)*. Tehran: Ministry of Culture and Arts, 353-356.

Matin M. and Pollard A. M. 2015. Historical accounts of cobalt ore processing from the Kāshān Mine, Iran. *IRAN (Journal of the British Institute of Persian Studies)* 53, 171-183.

Matin M. and Pollard A. M. 2017. From ore to pigment: a description of the minerals and an experimental study of Cobalt ore processing from the Kāshān mine, Iran. *Archaeometry* 59(4), 731-746.

Matsumoto K. 1984. *Jōdai-gire: 7th AND 8th Century Textiles in Japan from the Shōsō-in and Hōryuji*. Kyoto: Shikosha.

Mierse W. E.2017. The significance of the Central Asian objects in the Shōsō-in for understanding the international art trade in the seventh and eighth centuries. *Sino-Platonoc Papers* 267, 1-52.

Nagaokakyo-shi 2012. Nagaokakyō-shi maizō bunkazai sentā. Utsu Hisashi 1 gōfun ni tsuite hakkutsu chōsa seika kara ~ kōeki zaidanhōjin, 1-10. http://nagaokakyo-maibun.or.jp/asset/00032/download/utsukushi1goufun_tama.pdf.

Niizawa 1977. *Nīzawa sendzuka 126 gōfun' Nara ken kyōiku iinkai*. Nara: Institute of Archaeology.

Nicholson P. T. and Henderson J. 2006. Glass. In P. T. Henderson and I. Shaw (eds), *Ancient Egyptian materials and technology*. Cambridge: Cambridge University Press, 195-227.

Oga K. and Tamura T. 2013. Ancient Japan and the Indian Ocean interaction sphere: chemical compositions, chronologies, provenances and trade routes of imported glass beads in Yayoi-Kofun Period (3rd Century BCE-7th Century CE. *Journal of Indian Ocean Archaeology* 9, 35-65.

Ogata A. 2012. The Shoso-in textiles of the era of Emperor Shomu. *Textile Society of America Symposium Proceedings* 720 http://digitalcommons.unl.edu/tsaconf/720.

Park C. S. 2018. Kaya, Silla, and Wa: changing relationships and their historical backgrounds. In M. E. Byington, K. Sasaki and T. Bale (eds), *Early Korea-Japan interactions*. Seoul: Korea Institute, Harvard University 2018, 133-181.

Pearson P. 1999. Regional settlement in Okinawa: The Yokatsu Peninsula and its offliers. *Journal of East Asian Archaeology* 1, 277-323.

Pearson R., Li M., and Li G. (2000). Port, city, and hinterlands: archaeological perspectives on Quanzhou and its overseas trade. In A. Schottenhammer (ed.), *Quanzhou and its overseas trade in the Song and Yuan dynasties*: Leiden: Brill.

Pearson R. 2013 *Ancient Ryukyu. An archaeological study of island communities*. Honolulu: Hawaii University Press.

Rodziewicz M. 1984. *Les habitations romaines tardives d'Alexandrie à la lumière des fouilles polonaises à Kom el-Dikka* (= *Alexandrie* 3). Warsaw: PWN – Èditions Scientifiques de Pologne.

Rodziewicz M. 2005. *Elephantine XXVII: Early Roman Industries on Elephantine* (= *Archäologische Veröffentlichungen* 107). Mainz: Zabern.

Simpson S. J. 2015. Sasanian glassware from Mesopotamia Gilan, and the Caucasus. *Journal of Glass Studies* 57, 77-96.

Spaer M. 1993. Gold-Glass beads: a review of the evidence. *Beads: Journal of the Society of Beads Researchers* 5, 9-25.

Stawiarska T. 1985. Paciorki szklane z obszaru Polski północnej w okresie wpływów rzymskich (= *Biblioteka archeologiczna* 28). Wrocław: Zakład Narodowy im. Ossolińskich.

Sugiyama S. 2011. Glass bowl unearthed from Okinoshima island and related sites in the Munakata region. *Study Report* 1, 541-554.

Dictionaire 1989. *Dictionnaire historique du Japon*, volume 15, 1989. Lettres M (2) et N (1), 146.

Stern E. M. 2001. *Roman, Byzantine, and Early Medieval Glass: Ernesto Wolf Collection*, Ostfildern: Hatje Cantz.

Szmonievskiy B. S. (= Szmoniewski B. S.) 2013. Obraz lva v izobrazitelnom iskusstve Kitaya: svyazuyushcheye zveno mezhdu Vostokom i Zapadom (ot Han' do Tsin). *Uchenyye zapiski Otdela Kitaya Instituta Vostokovedeniya RAN* 11, 456-468.

Szmoniewskiy B. S. 2016. Bizantiyskaya moneta i yeye podrazhaniya (moneta mertvykh) na primere nakhodok iz pogrebeniy avarskogo kaganata, na Shelkovom puti i prilegayushchikh territoriy (VI-VIII vv.). *Kratkie Soobshcheniia Instituta Arkheologii* 44, 254-274.

Szmoniewski B. S. 2018. Roman glassware from Korean Peninsula: Silla, Gaya, Baekje from fourth to sixth century A.D. Myth or reality (I). *Pontica* 51, 151-191.

Szmoniewski B. S. 2019. Roman glassware from Korean Peninsula: Silla, Gaya, Baekje from fourth to sixth century A.D. Myth or reality (II). *Pontica* 52, 213-236.

Tamura T. and Oga K. 2016. Archaeometrical investigation of natron glass excavated in Japan. *Microchemical Journal* 126, 7-17.

Tempelmann-Mączyńska 1985. *Die Perlen der römischen Kaiserzeit und der frühen Phase der Völkerwanderungszeit im mitteleuropäischen Barbaricum* (= *Römisch-germanische Forschungen* 43). Mainz: Zabern.

Thierry F. 2012 Rome et la Chine, trois notes de numismatique. *Archéothéma* 19, 27-33.

Tite M. S. and Schortland A. J. 2008. *Production technology of faience and related early vitreous materials* (= *Oxford University School of Archaeology Monographs* 72). Oxford: Oxford University.

Wang Q. 2014. Muzang zhong de su du bo: Zai lun wuhuifei shi guo yongshi shenshou tu Wangqingwei. *Dunhuang xue ji kan* 83(1), 145-158.

Whitehouse D. 1997. *Roman glass in the Corning Museum of Glass*, 1. New York: Corning Museum of Glass.

Whitehouse D. 2001. *Roman glass in the Corning Museum of Glass*, 2. New York: Corning Museum of Glass.

Wilensky J. 2002. The magical Kunlun and “devil slaves”: Chinese perceptions of dark-skinned people and Africa before 1500. *Sino-Platonic Papers* 122, 1-51.

Woo J. -P. 2018. Interactions Between Paekche and Wa in the third to sixth centuries A.D. based on patterns of trade and exchange. In M. E. Byington, K. Sasaki and T. Bale (eds), *Early Korea-Japan interactions*. Seoul: Korea Institute, Harvard University, 183-230.

Wyatt D. J. 2010. *The Blacks of Premodern China*. Philadelphia: The University of Pennsylvania Press.

Xiong V. C. 1990. The Story of a Kunlun Slave in Tang Chang’an. *Chinese Historians* 4, 77-81.

Zhu Y. and Hu R. 2020. A brief analysis of semantic interactions between loanwords and native Words in the Tang Dynasty. In J.-F. Hong, Y. Zhang and P. Liu (eds), *Chinese Lexical Semantics. 20th Workshop, CLSW 2019, Beijing, China, June 28–30, 2019, Revised Selected Papers*. Cham: Springer International Publishing, 123-129.

Żuchowska M. 2015. “Roman Textiles” in the Hou Han Shu. A 5th century Chinese vision versus Roman reality. *ANABASIS. Studia Classica et Orientalia* 6, 216-242.

Żuchowska M. 2016. Importowane naczynia szklane w Chinach w I tysiącleciu n.e. *Archeologia Polski* 61, 77-112.

Żuchowska M. and Szmoniewski B. S. 2017. Glass along the Silk Road in the first millennium AD. *Archaeologia Polo*na 55, 161-188.

SPRAWOZDANIA ARCHEOLOGICZNE 72/2, 2020
PL ISSN 0081-3834
DOI: 10.23858/SA/72.2020.2.1725

Paweł Szczepanik[1]

COMPARATIVE ANALYSIS OF EARLY MEDIEVAL ANTHROPOMORPHIC WOODEN FIGURINES FROM POLAND. REPRESENTATIONS OF GODS, THE DECEASED OR RITUAL OBJECTS?

ABSTRACT

Szczepanik P. 2020. Comparative analysis of early medieval anthropomorphic wooden figurines from Poland. Representations of gods, the deceased or ritual objects? *Sprawozdania Archeologiczne* 72/2, 143-167.

Miniature anthropomorphic images, due to their unique character, have attracted the attention of archaeologists for a very long time. This text analyses the forms, significance and functions of items coming from the early Middle Ages, which were discovered in the area of Poland. The set of wooden objects is diverse in terms of form and probably also in terms of meaning. The biggest number of artefacts come from Pomerania, but some of them were found in other places. The Baltic Sea basin will be used as a broad comparative background during this analysis. Information from written sources and from broad anthropological reflection will also be used in an attempt to determine the functions and meanings of these miniature figurines. Thanks to this analysis, it will be possible to show the importance of anthropomorphic figures in the context of early medieval religion and beliefs.

Keywords: anthropomorphic figurines; miniaturisation; Slavic religion; Baltic Sea region; early medieval archaeology; pre-Christian beliefs

Received: 09.04.2020; Revised: 06.05.2020; Accepted: 31.08.2020

INTRODUCTION

The set of early-medieval miniature anthropomorphic figurines is not a very numerous collection, but it is highly diversified in terms of morphology, form and meaning. Although some of them were noted in the monograph of Torsten Capelle's wooden idols (1995, 54),

1 Institute of Archaeology, Nicolaus Copernicus University, Szosa Bydgoska 44/48, 87-100 Toruń, Poland; pawelszczepanik@umk.pl; https://orcid.org/0000-0002-0259-0169

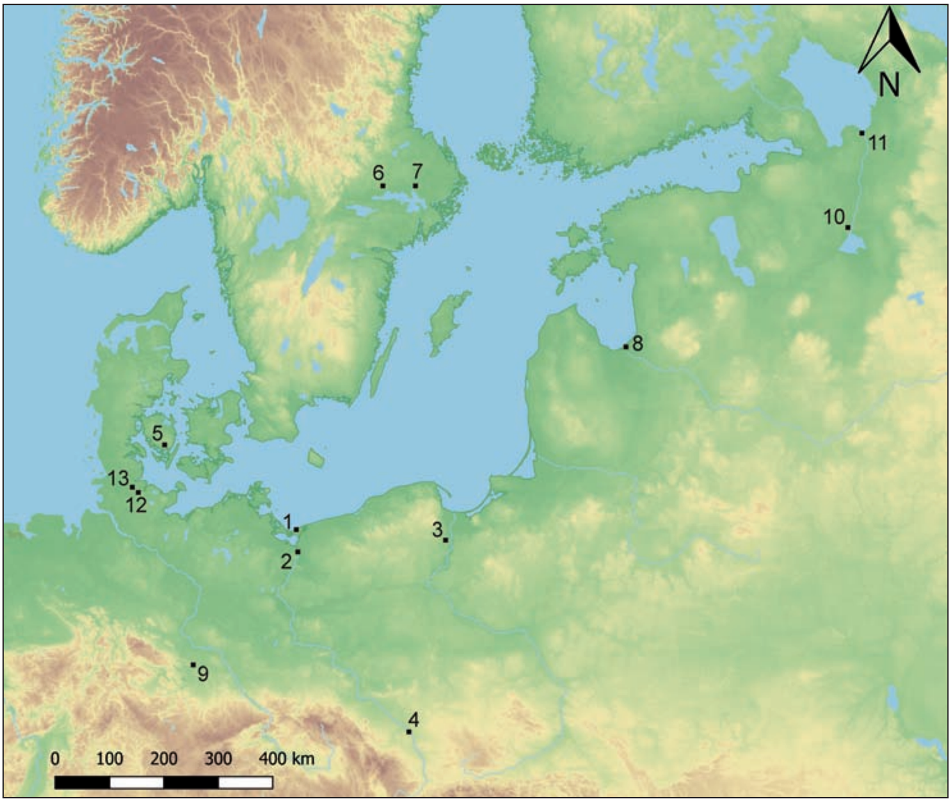


Fig. 1. Map with locations of archeological sites with figurines mentioned in this article:
1 – Wolin, 2 – Szczecin, 3 – Gniew, 4 – Opole, 5 – Svendborg, 6 – Tunby, 7 – Väsby, 8 – Riga, 9 – Merseburg, 10 – Novgorod, 11 – Old Ladoga, 12 – Hedeby, 13 – Schleswig (map by K. Niedziółka and author)

they did not receive extensive study. For starters, the analysis presented in the text deals with a theoretical reflection on miniaturisation and anthropomorphisation. In the following pages, I will present the materials, their previous interpretations and finally the new interpretative possibilities. I will try to show that these items were related to the sphere of pre-Christian beliefs; in this particular context, they probably had different meanings and functions. In the interpretations and descriptions which are available in other literature sources, these objects are interpreted as: images of deities, images of ancestors, and ritual and ceremonial props. Objects from today's Poland will be compared with findings from the Baltic Sea basin (Fig. 1). Among the latter, special attention should be paid to multi-headed artefacts and a set of wooden figurines of the Rus' area, with particular emphasis on Novgorod and Old Ladoga. Initial research on these objects has already been conducted (Szczepanik 2013; 2018a; Kajkowski and Szczepanik 2013; 2013a). However, this represents the first attempt at such a broad comparative approach.

THE PROBLEM OF MINIATURISATION AND ANTHROPOMORPHISATION

There are quite a lot of theoretical considerations that attempt to describe the phenomenon of miniature anthropomorphic images. However, they focus mainly on prehistoric cultures (Aldhouse-Green 2005; Bailey 2005; Foxall 2015; Hansen 2007; Renfrew and Morley 2007). On the other hand, all of them point to the need for reflection on the idea of miniaturisation. It is a phenomenon observed since the dawn of human culture, associated with "many aspects of life, death, the supernatural and divine, in some cases weaving them together. They serve worship, play, ornamentation, learning, socialization and social engagement and thought experiments. Undoubtedly, they were entangled in many ways that are now lost to us. But, the widespread urge to remake the world in miniature suggests that changing the scale of things opens up pathways for people to reimagine the world" (Foxall 2015, 4). Therefore, in the context of traditional cultures, miniature figurines should be seen as the results of human contact with the supernatural world, and the miniature object itself can be interpreted as a link with this world (Foxall 2015, 3). These objects should be treated as spontaneous products of culture, not just reduced copies of full-sized elements. When miniature-scale products try to imitate full-size objects as closely as possible, they should be called toys. If we want to discuss size, it seems that the only valid reference point is the human body. According to Douglass Bailey, there can only be three types of size: 'life-size, smaller than life-size, and larger than life-size' (Baile 2005, 28-29). We must also agree that the miniatures are something other than models: "Miniatures are small things that do not seek accuracy in representation, that are not precise or exact. Furthermore, miniatures result from human experimentation with the physical world; they are cultural creations" (Baile 2005, 29).

Miniature objects understood in this way refer to the ideological sphere – they create a fetish, rather than simply visualizing specific symbolic content. This implies the need to consider each group of objects, or even every single object in a highly individual way. On the one hand, they will be objects related to the sphere of the *sacrum*. On the other hand, they will be models of objects or creatures known from the surrounding world. The latter may also include full-sized images that have a sacred significance – may be statues of deities of some kind. The inclusion of a specific artefact in a set of miniature items is subjective and diversified because the size that we consider to be normal – whether miniature or full-size – is subjective (Mack 2007, 49). Therefore, in the case of anthropomorphic figures, the reference to the scale of the human body seems to be extremely accurate. So, the uniqueness of the described figurines is associated with their small sizes and anthropomorphic form. For this reason, figures should be considered as a manifestation of miniaturisation and anthropomorphisation. The second matter may be understood as giving the object not only a form referring to the human body, but also invisible features which are characteristic for humans (Kowalski 2010, 35). Such a definition of anthropomorphisation becomes a broader interpretation of the act of giving a humanoid shape to something. It focuses only on the form of a particular material product, not on its active features.

MATERIALS

One unique figurine (Fig. 2) is a four-face so-called Światowit, discovered in Wolin (trench 6; Filipowiak Wł. And Wojtasik 1975). Its discovery caused many emotions related to the possibilities of using archaeology in the context of learning about the pre-Christian religion of the Slavs. The figurine was made of yew wood (height 9.3 cm) and was discovered in a layer of discarded wood and other household waste dated to the second half of

Fig. 2. So-called Światowit from Wolin (trench 6/1660, layer XIV) (Photo P. Szczepanik)

the ninth century. The upper part of the object is decorated with four faces directed to the four directions of the world. These faces are presented very schematically and have a shape similar to a triangle. The faces are not the same; they differ a bit in height and shape (Filipowiak Wł. and Wojtasik 1975, 85-86). The flat-formed shaft or handle has a semicircular ending at the bottom. In addition, the surface of the handle is covered with partially faded kerfs in the form of diagonal lines and ovals(unknown significance) and traces of tar or another unspecified substance. The figurine was discovered near the building interpreted in older literature sources as the "older temple" (Filipowiak Wł. 1993, 24-25; Filipowiak W. 2019, 124). However, the latest interpretations call into question such a role of this building (Stanisławski 2011, 238-239; Polak and Rębkowski 2019, 125-127). A supposed analogy was discovered nearby, but was not related to the remains of the "temple" (Fig. 3: a). It is

Fig. 3. Figurines from Wolin Old Town (a – trench 6/1660, layer XII; b, c, e – trench 6/1709, layer XII; d – trench 6/1709, layer XI) (Photo P. Szczepanik)

also made of yew wood and the lower part of the handle was shaped in a similar manner (Filipowiak Wł. 1993, 29). The upper part, however, ends with a flat disc, not facial images. This item does not bear any traces of an attempt to decorate it with images of faces, but it does seem to be a finished item. Therefore, this analogy should be considered as unjustified (Szczepanik 2018a, 45-46).

Other wooden figurines discovered in Wolin were single-face images. The first of them (height 9.5 cm) is dated to the first half of the eleventh century and was found in an empty area near the hearth (Filipowiak W. 2019, 127). Similarly to the four-face figurine, it was

Fig. 4. Figurines from: a-c – Wolin (a – Old Town, trench 6/1709, layer IX; b – Market place; c – Ogrody, trench 2, layer IV); d – Szczecin (Podzamcze, trench VI, layer XXXVIII); e – Gniew (Market place); f – Opole-Ostrówek(ar 342, layer D) (Photo P. Szczepanik)

made of yew wood (Fig. 4: a). The bottom of the handle presents a well-preserved head of a bearded man with a strongly emphasized nose and a triangular head covering. Some researchers interpret it as a representation of a nasal helmet (Stanisławski 2013a, 27). More importantly, the item has visible traces of fire on it. Two other figurines are quite similar in terms of the formation of their heads and head coverings. However, they were made more schematically. The first of them (height 5.5 cm) was found inside the remains of a house and is dated to the end of the tenth century or the beginning of the eleventh century (Filipowiak W. 2019, 125). It presents a man who wears a cone-shaped head covering with a truncated top. It also carries visible signs of destruction – its lower ending is broken (Fig. 3: d). The rim around the forehead and the line marking the face contour with a beard are quite well preserved. The details of the face are almost invisible, only the straight nose is faintly apparent (Szczepanik 2018a, 48). The next figurine is much better preserved (height 4.2 cm) and was found in the remains of the so-called "younger temple", dated from the last three-quarters of the tenth century (Filipowiak W. 2019, 124). A head with a visible beard, a straight nose and a cone-shaped head covering was placed on an oval handle (Fig. 3: c). Similar to the previous example, intentional destruction is visible in the form of a diagonally cut off lower part (Filipowiak Wł. 1993, 28). Another object (Fig. 3: b) from this context is an oval head (height 4.3 cm). Its eyes are schematically rendered in the form of dots, and its lips are represented by two lines parallel to each other (Filipowiak 1993, 29). The next figurine, omitted by older literature sources, comes from the same stratigraphic context (Fig. 3: e). This object (height 6.8 cm) depicts an oval head placed on an oval handle, which was created with great care. The profile has a flat face with a clearly-defined chin. Once again, the bottom of the figurine is fractured.

The next artefact (height 11cm) from Wolin (Market place, trench 0) was discovered in the 1930s (The number of trench 0 was given by post-war archaeologists. About pre-war excavations: see Biermann 2013), and represents a figure with a head covering in the form of a cone with a truncated vertex (Fig. 4: b; Stanisławski 2013a, 22). The head, with a straight nose,is separated from the torso with a strong indentation. On the handle, under the face, there is an additional horizontal incision schematically showing the chin. The form of the bottom of the figure is different from the previously described items. The figurine was equipped with two short legs (Kowalski and Kozłowska-Skoczka 2012, 367).

The last figurine from Wolin (Ogrody) was discovered in the remains of a woodworking workshop, and we can date it to the turn of the tenth and eleventh centuries or to the first half of the eleventh century (Fig. 4: c; Filipowiak Wł. and Stanisławski 2013, 104-115). The figurine (height 7 cm) shows a male figure wearing a cone-shaped head covering. The figurine has a straight nose, a broad chin lying on the chest and straight arms along the body. In the lower part of the item there is a lateral hole. According to the excavators, it allowed the figurine to be hung upside-down (Filipowiak Wł. and Stanisławski 2003, 29).

Another figurine was discovered in Szczecin, which was another very important craft and trade centre (Kowalska and Dworaczyk 2011). A wooden, anthropomorphic figurine originating from early urban layers was excavated in the area next to one of the buildings. The context of the discovery allows for the object to be dated to the eleventh century (Fig. 4: d). The figurine (height 17cm) presents a figure with a clearly separated head and legs (Wilgocki 1995, 187–190; Kowalska 2013, 627). The left side of the body was covered with an ornament in the form of diagonal crosses. Perhaps it should be interpreted as an image of a coat or other form of a decorated cloak (Wilgocki 1995, 189).

The last miniature presentation from Pomerania is an object from Gniew, on the Vistula river (Fig. 4: e). The figurine was found at the Market place and it dates to the thirteenth century. The object (height 9.5 cm) was carved very roughly and schematically (Ratajczyk 2013, 627-628). Once again, the plain handle is topped with a head wearing a conical head covering. The face has a straight nose, almond eyes and narrow lips.

A figurine from Ostrówek in Opole has a slightly different form from the objects found in the area of Pomerania. It was found between wooden houses and is dated from the third quarter of the eleventh century (Bukowska-Gedigowa and Gediga 1986, 123). The figurine (height 5.8 cm) has the form of a solid, wooden handle which has a straight cut at the bottom (Fig. 4: f). The upper part is decorated with a face, with a marked eyebrow line, straight nose and mouth. The triangular beard once again falls on his chest (Hołubowicz 1959, 125).

Wooden figurines from Poland should be dated quite broadly to almost the entire period of the early Middle Ages, from the second half of the ninth century to the beginning of the thirteenth century. They come from important craft centres and may be associated with trade routes connected with the Baltic Sea.The analogical artefacts discussed below are examples of figurines made of wood and antler. The organic material from which they were made has importance in the context of the interpretation of the functions of these objects.

ANALOGIES

Let us start with the so-called Światowit. The closest analogy is the figurine from Svendborg (Fig. 5: c). It is made of juniper wood, and it has the form of a slender handle. It is finished with four faces, shown in such a way that each of the oval eyes simultaneously belongs to two adjacent faces. All faces have triangularly shaped beards, long, straight noses and delicately defined lips. The figurine is crowned with a joint, flat-cut head, covered with a separate rim. This item was discovered in the centre of the city of Svendborg in the interwar period. However, more detailed information about it came out not so long ago, due to an inventory carried out in the museum. The figurine comes from the twelfth century and, according to Danish researchers, is proof of a Slavic presence in this place (Jansen 1998, 565).

Another two objects have been discovered in Sweden. The first figurine comes from Tunby (St. Ilian's parish, Västmanland – Fig. 5: b). It was discovered in the 1930s, and it comes from one of the cremation graves dated to the tenth century (Översiktskatalog 1931,

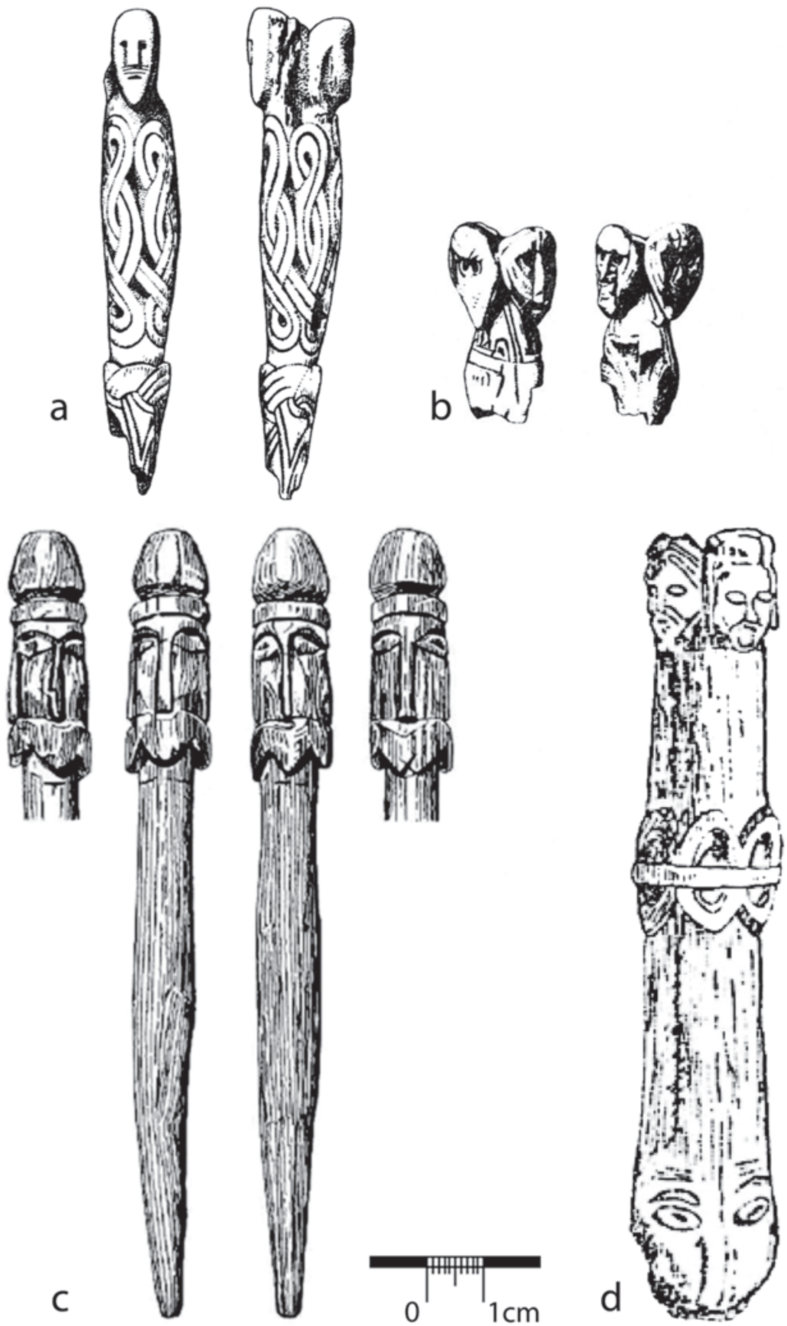


Fig. 5. Four-headed figurines from the Baltic Sea region: a – Väsby, b – Tunby (Östmark 1980, fig. 6); c – Svendborg (Jansen 1998, 565); d – Riga (Kotlarczyk 1987, fig. 15.3) (Preparation of image by author)

Fig. 6. Single-faced figurines from: a, c-j, l-n – Novgorod (Kolchin1989b, fig. 202-206; Musin 2019, fig. 6); b – Merseburg (Muhl 2013, fig. 523); k – Schleswig (Radtke 2010, fig. 1) (Preparation of image by author)

CXX). The figurine was made of bone and its lower part was destroyed. The upper part is crowned with four faces with triangularly-shaped, slender beards. The faces have long, straight noses, lips and eyes in the form of holes. A vertical hole goes through the figurine. According to Jan P. Lamm, this object could serve as the handle of a stitching awl (Lamm 1987, 228). The second Swedish item comes from Väsby (Vallentuna parish, Uppland – Fig. 5: a). It was discovered in a cremation grave dated to the ninth or early tenth century (Östmark 1980, 11). The figurine is crowned with two oval-shaped faces, with schematically-marked straight noses, eyes and moustaches. The figurine originally had four faces, but, unfortunately, they were broken and two of them were not preserved. The sculpture's main body was covered with a complicated ornament in the form of an interlace and a string braid with sharp triangles placed at the bottom (Duczko 2000, 39). This type of ornament may refer to the 'Pomeranian school of Scandinavian-insular ornamentation' and perhaps confirms that this item is a Pomeranian product (Chudziak and Kaźmierczak 2013). According to J. P. Lamm, a bone handle from one of the graves from Birka could be an analogy for the object from Väsby (Lamm 1987, 228). In terms of the form of the object, its function and decoration, this statement seems to be a misinterpretation. But we must underline that some other typical objects from the Viking ages were found in the above graves – namely, richly decorated oval brooches in the Tunby grave (Översiktskatalog 1931, CXX) and an iron neck-ring with Thor's hammers in the Väsby grave (Östmark 1980, 28).

Another analogy to the so-called Światowit figure is a wooden figurine from Riga. It was discovered in the context of a wooden road and is dated to the thirteenth century (Caune 1995, 26-27). The figurine depicts two (originally four) bearded, male faces (Fig. 5: d). The faces have strongly marked eyes and noses, highlighted moustaches and long hair. Once again, we may also see a schematic head covering. The central part of the sculpture is divided by a linear ornament, consisting of two parallel, wavy lines, separated by a horizontal line. At the lower edge we may notice the image of an animal head. It has large eyes, and the upper part of its muzzle and nose is very distinctive (Caune 1995, 28-29).

The single-face representations which correspond to Polish artefacts are more numerous. The first of these is a bone figurine from Merseburg dated from the 10th-11th centuries (Fig. 6: b). It was discovered at the beginning of the 20th century, and it is difficult to say anything more about the context of its discovery. The head has a strongly marked triangular beard and a head covering in the form of a cap (Muhl 2013, 523). The figurine is hollowed out inside, which suggests that it could be the end of a ritual stick (Gabriel 2001). Another figurine was discovered in Schleswig in the context of a harbour and is dated from the 11th-12th centuries (Fig. 6: k; Wegner 2012, 51). The image is made very carefully. Of particular note are the thick eyebrows and a moustache raised towards the ears (Radtke 2010, 92-93).

Following the trail of this figure, a group of anthropomorphic figures from Novgorod are noteworthy, where eleven objects were discovered (Kolchin 1989, 201). The first from this group is a direct analogy to the item from Schleswig (Fig. 6: a). The figurine is pre-

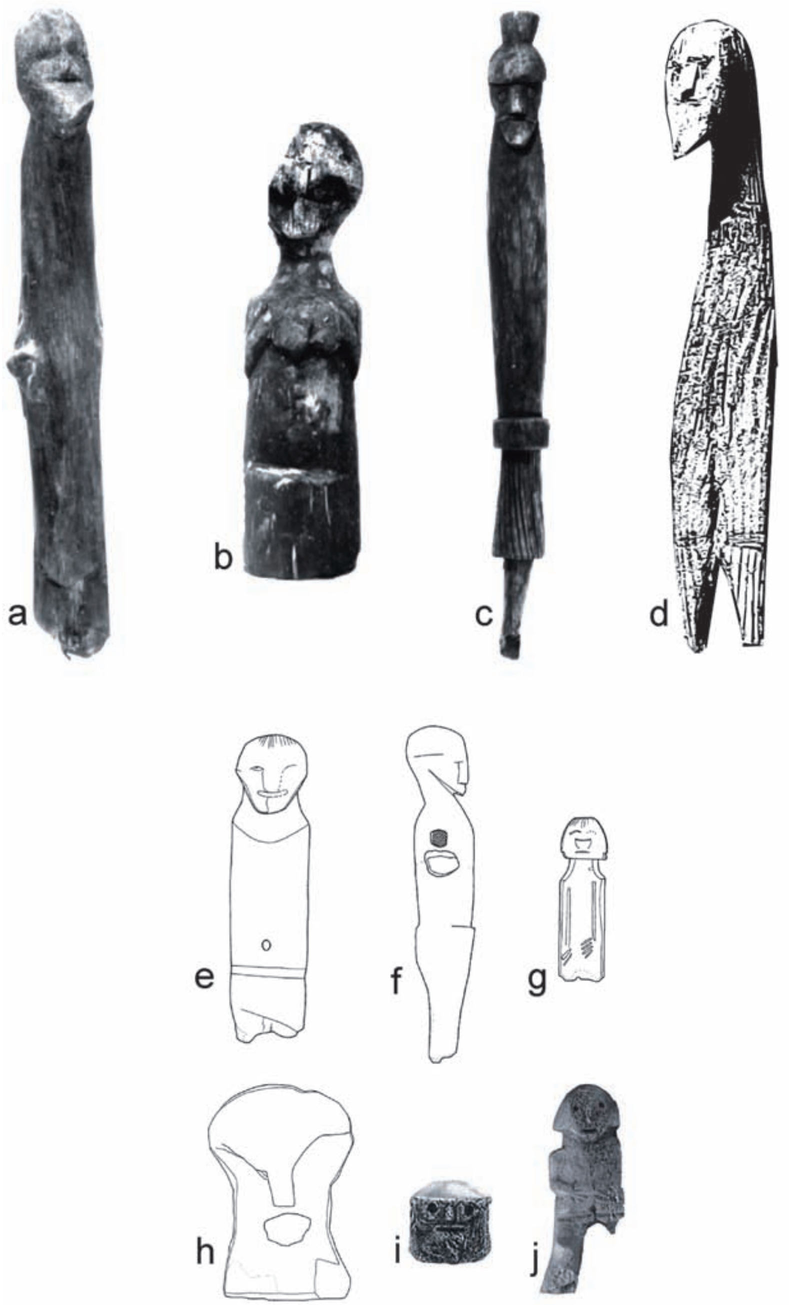


Fig. 7. Single-faced figurines from: a-d – Old Ladoga (Kirpichnikov and Sarabyanov 1996, 74-75; Roesdahl 1992, fig. 277; Duczko 2006, fig. 12b); e-j – Hedeby (Westphal 2006, fig. 63; Kalmring 2010, fig. 292) (Preparation of image by author)

cisely dated to 930-950 (Musin 2018, 178) and is partially destroyed (Pokrovskaya 2007, 411-412). Another interesting example is a wooden stick topped with a head wearing a conical hat, which has a strongly raised moustache and is dated to the twelfth century (Fig. 6: d; Andersen and Birkebæk 1993, fig. 68). The next figurine is a simple handle with a schematic head covered with a conical cap or a nasal helmet (Fig. 6: e). We may also observe schematic hands lying on the chest (Kolchin 1989a, 452). A similar gesture is visible on another, partly destroyed figurine (Fig. 6: c). In this case, the head is covered with a conical, wide-brimmed cap (Musin 2018, 179). A similar copy is a small figure with a schematic face, covered with a low, wide hat (Fig. 6: f; Kolchin 1989, 451). A figure with a large oval head placed on a disproportionately small body has a different form (Fig. 6: j). It has a straight nose and small lips marked on the face. Its high forehead and wide chin are highlighted (Pokrovskaya 2007, 411). Another figurine (Fig. 6: i), dated to the middle of the tenth century (Kolchin 1989, 193) is a direct analogy to the item from Opole. A head with a low conical cap was placed on the short handle. The details of the face show a triangular nose, straight mouth, and a chin lying on the chest (Kolchin 1989a, 451). The next examples from Novgorod, dated from the 10^{th}-13^{th} centuries, have a slightly different form (Fig. 6: g, m, n). Their size is approximately several centimetres. They each have a simple and straight wooden body with an oval or round head (Kolchin 1985, 108-111). A common feature of all these images is the schematic manner of their representation and visible damage in the lower part. It is especially worth noting figurines with schematic faces depicting vertical noses.

Further artefacts come from Old Ladoga. This set dates from the 9^{th}-10^{th} centuries. It contains a few figurines of various forms (Fig. 7). The first of them has the form of a rough piece of wood. On its top there is an oval head with a triangular nose and a beard (Fig. 7: a). The next figurine presents an individual with his hands lying on his chest. Oval eyes are marked on the round head, but part of it is cut off (Fig. 7: b; Kirpichnikov and Sarabyanov 1996, 74-75). The next item is a sculpture in the form of a handle. It has a head covered with a hat with an unusual ending on the top (Fig. 7: c). Its face is well developed. Round eyes, a straight nose, and an arched moustache are visible (Roesdahl 1992, 301). The lower part of the item may suggest that it was originally part of a more complex wooden composition. The last object from this group refers to items from Novgorod. It has a protruding face with a strongly defined chin, straight nose and delicately marked eyes and lips (Fig. 7: d). It differs from other samples because the shape of its lower part is different. In this case, it took the form of two short legs (Duczko 2006, fig. 12: b), similarly to Pomeranian items.

The next figurines were discovered in Hedeby (Schietzel 2018, 463). They may be treated as analogies to the discoveries from Wolin to a large extent. These objects should be dated quite widely between the 9^{th} and 11^{th} centuries century and were found in the context of a settlement and harbour. The first figurine is an oval handle with a schematically illustrated head with a wide, flat nose and two short, damaged legs (Fig. 7: e). An analogous, smaller item has a similarly shaped head with visible hair (Fig. 7: g). Additionally, hands were shown on the body (Westphal 2006, 204). The next figurine has the form of a flat wooden board (Fig. 7: f). Only a straight, wide nose and a half-round hat are marked on the round head. A very interesting fact is that it is equipped with a hole on the shoulder line that was used to attach movable hands. Such hands were also discovered in this place. However, they were not the part of discussed object. Another figurine was made of antler (Fig. 7: j). It depicts the figure of a man standing with widely spread legs. One leg is broken off, and his arms are on his stomach. The head has a conical shape. On the face are small eyes, shown as points, and a short nose and mouth (Kalmring 2010, 399). A head with a similarly depicted face and a low, conical hat is also made of antler (Fig. 7: i). The last anthropomorphic image from Hedeby is the flat image of a head (Fig. 7: h). The representation is very schematic, but elements such as triangles, an asymmetrical nose and an open mouth are visible (Westphal 2006, 204). The above list of miniature anthropomorphic figurines made of wood and bone seems to close the list of anthropomorphic discoveries connected with the Baltic Sea basin.

REVIEW OF PREVIOUS INTERPRETATIONS

The literature contains copious information and presents various ways of interpreting these items. Let us try to systematise them. In order, we will start with the so-called Światowit and four-faced figurines. The name of the item from Wolin may already be seen as its own interpretation. It refers to a four-headed idol of Sventovit, worshiped in Arkona, and described by Saxo Grammaticus (XIV, 39, 565). According to Władysław Filipowiak, the figurine is a miniature image of this deity used for personal worship (Filipowiak Wł. 1993, 33). He describes it as a 'travel figurine' (germ. *Taschengott*) (Filipowiak Wł. 2001, 100-101; 2013). This object, as well as other figurines of Światowit, worked as equivalents to Christian personal emblems in the form of crosses (Jansen 1998, 567; Filipowiak 2001). According to Janusz Kotlarczyk, Światowit is a simplified version of the statue of the Zbruch Idol (1993, 56-57). This monument is an example of a stone sculpture and can be dated to the early Middle Ages (see Tyniec 2016 – review of the research). It is combined with an extensive cosmological vision of the Slavs (Szczepanik 2018b, 48-53 – review of the research). Other researchers declare that Światowit and other figurines should be interpreted as the images of ancestors (Bylina 1992, 24; Wawrzeniuk 2004). Further interpretations suggest that it is a wooden model of a whetstone (Urbańczyk 2014, 146). Whetstones played a significant role in Scandinavian and Anglo-Saxon beliefs (Lamm 1987, 223-224; Mortimer and Pollington 2013, 129-164). This is supposedly proof of the Scandinavian provenance of the artefact. Nowadays, archaeologists debate the relationship between Światowit and whetstones. Objects from Wolin resembling the shape of the figurine handle were called 'Sventovit-like' (Filipowiak W. and Szydłowski 2019, 222-223). Metal whetstone holders decorated with facial images that were discovered in Wolin may be further proof of the Scandinavian provenance of the finds. According to Władysław Duczko, they are a testament to Scandinavian religious concepts present in Pomerania (Duczko 2000, 26). However, only the casting mould from Szczecin has images of four faces (Filipowiak Wł. 1993, 30). Whetstones from Wolin were decorated with images of two faces, and they do not have any analogies in the Scandinavian world (Janowski 2014, 29-30). Another fitting of a whetstone was decorated with three schematic faces and the image of an animal (Janowski 2019, 61-62). It seems that these objects should be considered as a phenomenon peculiar to Wolin and a local product (Janowski 2019, 63). However, it should be emphasized that these cannot be called figurines.

Therefore, the problems of interpreting figurines are related to their cultural provenance and the question of whether they are Slavic or Scandinavian objects. According to Błażej Stanisławski (Stanisławski 2013, 133-134; 204-207), these objects should be associated with the circle of Scandinavian culture. This is primarily indicated by the fact that similar items are known from excavation locations related to Scandinavian settlement and/or influence. According to Leszek Gardeła, their discovery in such contexts should not suggest their Scandinavian origin. Their relationship with the beliefs of the peoples of the North should be rejected (Gardeła 2014, 96-98).

Archaeologists have a similar attitude towards the interpretation of single-face images, which are often associated with the Scandinavian cultural circle. The main argument for such interpretations (Duczko 2006, 77-78; Pokrovskaya 2007, 402), apart from the locations of the discoveries, is the report of Ibn Fadlan describing the sacrifices made by Rus merchants: “when the ships come to this mooring place, everybody goes ashore with bread, meat, onions, milk and *nabid* and betakes himself to a long upright piece of wood that has a face like a man’s and is surrounded by little figures, behind which are long stakes in the ground” (Smyser 1965, 97). However, in the description of this ritual, there is no information that the wooden figures are miniature; there is only information about a large statue surrounded by smaller ones.

If we go further, we may find one more, extremely interesting interpretation in the literature. It defines these objects as the images of the deceased. The veneration of the dead could be one of the basic elements of the pre-Christian beliefs of the Slavs (Bylina 1992, 24; Wawrzeniuk 2004). According to this proposal, miniature figurines should be interpreted as images of house spirits (Kolchin 1989, 192-193; Pokrovskaya 2007, 402) or as representations of ancestors and the deceased (Wawrzeniuk 2016, 100).

NEW WAYS OF INTERPRETATION AND CONCLUSIONS

Before we proceeding to the analysis of the significance of the artefacts discussed above, let us look at the archaeological contexts of their discovery. They come from cultural layers of typical character, associated with wooden residential buildings, roads, squares and harbors. Such contexts may suggest that after fulfilling their roles they were simply thrown away. As we remember, the figurines have traces of numerous irreversible damage, and after the ritual animation – activity was over, the objects could lose their status and value. It is also very interesting that only Swedish examples come from funerary contexts. Unfortunately, we do not have more detailed information about that. However, the context of cremation graves may indicate a direct reference to the religious and mythical sphere of the objects in question. Let us move on to the discussion of these meanings.

We will begin again with the four-face figurines. These objects should certainly be considered in a broad socio-cultural perspective, but their original meaning was directly related to the sphere of Slavic beliefs (Szczepanik 2013; 2018a; Kajkowski and Szczepanik 2013a). This thesis can be confirmed by several arguments. The first is connected with religious studies. It concerns the functioning of characters with many faces or heads in Slavic, Germanic and Baltic mythologies. The existence of multi-headed deities in Slavic mythology has been discussed many times and seems not to raise doubts today (Pettazzoni 1946; Gieysztor 2006; Słupecki 1994). Written sources inform us about the deities endowed with three, four, five and even seven heads/faces functioning in the religion of the Slavs. For us, the most important is the four-headed Sventovit. Interestingly, such characters appear neither in Baltic mythology (Suchocki 1991; Greimas 2007) nor in Germanic mythology. In Norse mythology there are figures of giants with several heads, but they are always characters with three heads, or with a number of heads that is a multiple of three (Słupecki 2003, 294; Gardeła 2014, 96-97). Therefore, if we consider multi-face figurines as an element of Scandinavian culture, we have to reject their interpretation as objects that are images of mythological characters known from written sources. This is because four-face figures in this mythology simply do not exist. Of course, we cannot assume that they do not depict other nameless characters with unknown characteristics and meaning. However, we have a source that informs us about the functioning of the cult of miniature figurines in Scandinavia. This cult concerns sculptures depicting deities in anthropomorphic form (Lamm 1987, 222). We also have some written sources about Slavic culture that describe miniature figurines (Szczepanik 2018a, 55). These are the descriptions of a miniature, golden statuette of Triglav from Szczecin (Ebo II, 13), a bronze Saturn from Starogard Wagryjski/Oldenburg in Holstein (Widukind III, 68) and statues from Wolin of an unspecified form (Ebo III, 1). The latter were probably taken by the inhabitants from the temple during the mission of St. Otto of Bamberg. Then, they were used in pagan rites related to the apostasy of newly baptized Pomeranians (Kajkowski and Szczepanik 2013, 59).

The next source has a quite different character and does not mention any miniature figurines, but does mention the remains of Slavic settlements from the early thirteenth century. In his chronicle, Henry of Latvia (X, 13-14) described "the strange and tragic history of one small tribe which settled on the Lithuanian-Latvian border. The tribe called *Vindi* in 1206 was (at the time) insignificant and poor. Expelled from the River Winda, they settled on the site where Riga was later built. But even here they did not feel peace, because they were attacked by Kurs (one of the Baltic tribes) who chased away and killed many of them" (Ochmański 1982, 27). It seems that the *Vindi* tribe should be recognised as Slavs who lived on the eastern shore of the Baltic Sea (Murray 2013). Perhaps in that case, the described figurine should be recognized as evidence of that settlement? It presents one of the most complex mythical narratives in the religion of the pagan Slavs. The upper part of the idol crowned with four faces depicts a deity – Sventovit. The lower part takes the form of a creature with a dragon or snake head, which we can interpreted as the image of a chthonic-aquatic dragon known from cosmological myths. Both figures represent the sovereigns of two spheres of the cosmos. They are separated from each other by a water zone, shown as a wavy ornament. Similarities are also visible in other categories of artefacts, *i.e.*, bronze fittings of knife sheaths (Szczepanik 2017).

Assuming that the figurines are related to Slavic beliefs, we must ask another question: are they images of a deity (or deities) or not? If they are images of deities, were they given reverence similar to that of full-size statues known from written sources? Maybe they were rather specific religious fetishes? It is a difficult question. Were they worshipped equally to statue of Sventovit from Arkona, in front of which the priest could not even breathe (Saxo XIV, 39). On the other hand, we remember that miniature statues of Triglav or anonymous figurines from Wolin were bestowed with *agency*. While comparing Slavic artefacts, we are obliged to make a distinction between figurines made of organic materials discovered during archaeological excavations and figures made of precious metals, known from written sources (Szczepanik 2018a). We may conclude that the precious ores were part of the equipment of people or institutions whose task was to administrate such images. Of course, they were also able to posses them. Both conditions were fulfilled by pagan temples. They were not only theplaces of *theophany*, but they were also treated as the depositories of treasure (Słupecki 2013). Recalling Arkona, it is worth mentioning that the Danish king Sven sent gifts to this pagan temple (Sundqvist 2016, 196). It could be proof of the existence of Slavic religious ideas in the Scandinavian environment. Perhaps the figurines from these areas should be examined and recognised as traces of such contacts. Maybe these relations occurred not at the level of monarchy, but of ordinary people?

Once again, we may put forth the thesis that the material from which the figurines were made was important. Images made of wood and bone could be relatively easily made. On the other hand, they could also be easily transformed and destroyed. Thanks to this, they were ideally suited for ritual and magical activities. Special significance was attached to these images due to the fact that they were made of 'living' elements of nature. The possibility of transforming products made from natural materials was directly related to the changes of seasons and the cyclicality of life and death (Aldhouse-Green 2005, 96). If we assume that these objects were ritually animated, then perhaps they should be considered in the category of religious fetishes. Thus, these objects referred to the spheres of competence of a deity but they were not synonymous with that deity. A religious fetish understood in this way may be an object that determines and enables ritual activities that are not directed at it (Leeuw 1997, 33). From this point of view, figurines could not be treated as objects of worship. For this reason, these figurines could be combined with ritual activities. They should not be interpreted as images of deities with *theophanic* properties. It is worth noting that the figurines could not be stood upright at a particular place because of the form of their bottoms. Until now, it was assumed that the 'handles' were used to hold figurines by hand. Perhaps the way in which this part was shaped (phallic?) was associated with their function in vegetative and love magic, extremely important for all traditional communities (Čausidis 1999, 291). It is worth recalling here that one of the most important competences of Sventovit was the sphere of vegetation and fertility (Kajkowski and Szczepanik 2013, p. 212-213).

To sum up this section, in my opinion the miniature four-face figurines discovered in the Baltic Sea basin could be the traces of Slavic religiosity, related to the sphere of competence of Sventovit. However, these objects were not strictly defined idols. They were rather ritual props and/or religious fetishes referring to a specific sacred force and the spheres of competence of a particular deity. The range of their occurrence and the local, individual character of each of the objects is also worth consideration. This may be evidence that the elements of Slavic beliefs were transferred throughout the entire Baltic Sea basin. Therefore, the phenomenon of these figurines is associated with complex contacts, which cannot be reduced to the simple circulation of objects in isolation from cultural and religious contexts (Duczko 2000, 39).

The meaning of the single-face figurines found in many places may be close to the meaning of the above-discussed images (although it certainly does not have to be). When analysing this group of artefacts, we should point out several common features. The first of these are the conical head coverings, sometimes considered to be images of helmets (Stanisławski 2013a, 26). Such head coverings are known from many other anthropomorphic discoveries. This may indicate the form of a characteristic male head covering from that period. The simple form of the nose is probably associated with the schematism and simplicity of representing this detail of facial physiognomy and not with the nasal component of the helmet. However, we cannot discount the theory that this manner of forming the head is supposed to refer to brave ancestors or mythical heroes, who were remembered and imagined in such a way. On the one hand, we can consider the conical shape of the heads with the sphere of fertility and vegetative magic. On the other hand, they could illustrate the relationship of these images with the sphere of military competence.

We must also keep in mind the extremely important traces of damage visible on the surface of the figurines – traces of fire or various cut marks. They should be interpreted as the remains of ritual animation aimed at annihilating the force inside the image. Going further, this may suggest that these artefacts could have served as a votive offering. This thesis is confirmed in Slavic ethnographic material (Moszyński 1967, 248-249; Kunczyńska-Iracka 1987, 67-71). Interestingly, during the Prussian mission of St. Bruno, miniature wooden idols were supposed to be destroyed by throwing them into a fire (Tyszkiewicz 2009, 130). These objects should be interpreted as performative images, understood as "material images of humans, animals, or spirits that are created, displayed, or manipulated in narrative or dramatic performance" (Proschan 1983, 4).

In this context, the interpretive possibilities associated with 'multi-part' figurines are extremely interesting. One of the figures from Wolin (Fig. 4: c) can be considered as an example of this. It is difficult to clearly determine what was the form of the lower part or the movable legsthat were attached in this place – similar to the moving hands from Hedeby or Birka (Price 2006, 181). The next question is whether the figurine was placed on a pole or pillar, *etc*. Adopting the second possibility, this image could refer to a representation visible on a bronze fitting from Starogard Wagryjski/Oldenburg in Holstein, showing an extensive cosmological vision with a male deity at the top (Szczepanik 2017, 174-175). At the same time, it is difficult to decide whether these items were elements of temple equipment or whether they were only used for home worship.

Thus, figurines could perform many extremely different functions. Certainly, these images should not be interpreted as images of gods in a literal sense. It seems that they could represent the images of ancestors or other mythical characters, and performed primarily ritual-ceremonial functions they – were specific ritual props. Undoubtedly, an attempt to assign a specific artefact to a specific mythical figure is still quite difficult and remains an open matter. We agree with Neil Price that it is impossible to draw definitive conclusions in this field (Price 2006, 182). However, we can assume that the four-face figurines are clearly associated with the cult of Sventovit. These objects could be evidence of the spread and importance of his worship in the Baltic Sea basin. The words of Saxo Grammaticus (XIV, 39) – "This deity had other temples in many places which were looked after by priests with almost equal worship, but less power" – may become the confirmation of this thesis.

Acknowledgements

The text was created during a research internship at Stockholm University, implemented as part of the project "Religions and their Things. Comparative Analysis of Early Medieval Objects Connected to Religiosity Discovered in Poland" (DEC-2017/24/C/HS3/00116), financed by the National Science Centre of Poland. The author would like to thank: Anna B. Kowalska, Aleksandra Wilgocka (Muzeum Narodowe, Szczecin), Andrzej Janowski, Wojciech Filipowiak (Ośrodek Archeologii Średniowiecza Krajów Nadbałtyckich, Instytut Archeologii i Etnologii PAN, Szczecin), Bogdan Kościński (Muzeum Archeologiczne, Gdańsk), Ewa Matuszczyk (Muzeum Śląska Opolskiego, Opole), Andres Andrén, Lena Holmquist, Torun Zachrisson, Anna Jelicic (Departament of Archaeology and Classical Studies, Stockholm University), and Sven Kalmring (Centre for Baltic and Scandinavian Archaeology, Schleswig) for all help given during the work on this text.

References

Aldhouse-Green M. 2005. *An archaeology of images. Iconology and cosmology in Iron Age and Roman Europe*. London: Routledge.

Andersen M. and Birkebæk F. 1993. *Vikingernes Rusland: fortidens Staraja Ladoga og Novgorod***.** Roskilde: Roskilde Museum.

Bailey D. W. 2005. *Prehistoric figurines representations and corporeality in the Neolithic*. London: Routledge.

Biermann F. 2013. A Slavic or a Viking town? The excavations at Wolin 1934/41 and their contemporary interpretation. In S. Moździch, B. Stanisławski and P. Wiszewski (eds), *Scandinavian culture in medieval Poland*. Wrocław: Institute of Archaeology and Ethnology of the Polish Academy of Sciences, 179-191.

Bukowska-Gedigowa J. and Gediga B. 1986. *Wczesnośredniowieczny gród na Ostrówku w Opolu*. Wrocław: Zakład Narodowy im. Ossolińskich.

Bylina S. 1992. *Człowiek i zaświaty. Wizje kar pośmiertnych w Polsce średniowiecznej*. Warszawa: Polska Akademia Nauk.

Capelle T. 1995. *Anthropomorphe Holzidole in Mittel- und Nordeuropa*. Stockholm: Almqvist & Wiksell International.

Caune A. 1995. Archäologische Zeugnisse von den heidnischen Volksglauben in Riga während des 12-13 Jahrhunderts. *Światowit* 40, 26-42.

Chudziak W. and Kaźmierczak R. 2013. Zdobnictwo przedmiotów drewnianych z Żółtego na Pomorzu Zachodnim jako przykład tzw. pomorskiej szkoły ornamentyki skandynawsko-insularnej. *Archaeologia Historica Polona* 21, 7-30.

Čausidis N. 1999. Mythical pictures of the South Slavs. *Studia Mythologica Slavica* 2, 275-296.

Duczko W. 2000. Obecność skandynawska na Pomorzu i słowiańska w Skandynawii we wczesnym średniowieczu. In L. Leciejewicz and M. Rębkowski (eds), *Salsa Cholbergiensis. Kołobrzeg we wczesnym średniowieczu*. Kołobrzeg: Wydawnictwo Le Petit Cafe, 23-44.

Duczko W. 2006. *Ruś Wikingów. Historia obecności we wczesnośredniowiecznej Europie Wschodniej*. Warszawa: Trio.

Ebo 1969. *Żywot św. Ottona biskupa bamberskiego*. J. Wikarjak (ed.) (= *Monumenta Poloniae Historica Series* 2. 7, 2). Warszawa: Państwowe Wydawnictwo Naukowe.

Filipowiak Wł. 1993. Słowiańskie wierzenia pogańskie u ujścia Odry. In M. Kwapiński and H. Paner (eds), *Wierzenia przedchrześcijańskie na ziemiach polskich*. Gdańsk: Muzeum Archeologiczne, 19-46.

Filipowiak Wł. 2001. Taschen-Svantevit. In M. Puhle (ed.), *Otto der Grosse. Magdeburg und Europa, 2: Katalog*. Mainz: Philipp von Zabern, 100-101.

Filipowiak Wł. and Stanisławski B. 2003. Dendrochronologia w badaniach archeologicznych wczesnośredniowiecznego Wolina. *Polska Akademia Nauk – Działalność Naukowa – Wybrane Zagadnienia* 16, 28-30.

Filipowiak Wł. and Stanisławski B. 2013. Przez most do przeszłości – badania wykopaliskowe w dzielnicy Ogrody. In B. Stanisławski and W. Filipowiak (eds), *Wolin wczesnośredniowieczny*. 1. Warszawa: Fundacja na Rzecz Nauki Polskiej, 65-190.

Filipowiak Wł. and Wojtasik J. 1975. Światowit z Wolina. *Z Otchłani Wieków* 41(2), 82-89.

Filipowiak W. 2019. Wooden Artefacts. In M. Rębkowski (ed.), *Wolin – the Old Town, Vol. II. Studies of Finds*. Szczecin: Institute of Archaeology and Ethnology of the Polish Academy of Sciences, 89-135.

Filipowiak W. and Szydłowski M. 2019. Stone Artefacts. In M. Rębkowski (ed.), *Wolin – the Old Town* 2. *Studies of Finds*. Szczecin: Institute of Archaeology and Ethnology of the Polish Academy of Sciences, 221-244.

Foxall L. 2015. Introduction: miniaturization. *World Archaeology* 47(1), 1-5.

Gabriel I. 2001. Männerkopf als Knauf eines Amtsstabes. In M. Puhle (ed.), *Otto der Große. Magdeburg und Europa. Katalog-Handbuch in zwei Bänden* 2. Mainz: Philipp von Zabern Verlag, 96-97.

Gardeła L. 2014. *Scandinavian amulets in Viking Age Poland* (= *Collection Archaelogica Ressoviensis* 33). Rzeszów: Fundacja Rzeszowskiego Ośrodka Archeologicznego, Oficyna Wydawnicza "Zimowit".

Gieysztor A. 2006. *Mitologia Słowian*. Third Edition, A. Pieniądz (ed.). Warszawa: Wydawnictwo Uniwersytetu Warszawskiego.

Greimas A. J. 2007. *O bogach i ludziach. Studia o mitologii litewskiej*. Kęty: Wydawnictwo Marek Derewiecki.

Hansen S. 2007. *Bilder vom Menschen der Steinzeit. Untersuchungen zur antropomorphen Plastik der Jungsteinzeit und Kupferzeit in Südosteuropa*. Mainz: Philipp von Zabern.

Henricus L. 1955. *Henrici Chronicon Livoniae*. In L. Arbusow and A. Bauer (eds) (= *Scriptores rerum Germanicarum in usum scholarum separatim editi* 3). Hannover: Hahnsche Buchhandlung.

Hołubowicz W. 1959. Z prac wykopaliskowych na Ostrówku w Opolu w r. 1956. *Sprawozdania Archeologiczne* 6, 115-131.

Janowski A. 2014. *W wolińskim porcie.../In Wolin's port...*. Wolin: Muzeum Regionalne im. Andrzeja Kaubego.

Janowski A. 2019. Metal Finds. In M. Rębkowski (ed.), *Wolin – the Old Town. Vol. II. Studies of Finds*. Szczecin: Institute of Archaeology and Ethnology of the Polish Academy of Sciences, 47-88.

Jansen H. M. 1998. Die Svantevit-Figur aus Svendborg. In A. Wesse (ed.), *Studien zur Archäologie des Ostseeraumes. Von der Eisenzeit zum Mittelalter. Festschrift für Michael Müller-Wille*. Neumünster: Wacholtz, 565-569.

Kajkowski K. and Szczepanik P. 2013. Drobna plastyka figuralna wczesnośredniowiecznych Pomorzan *Materiały Zachodniopomorskie. Nowa Seria* 9, 207-247.

Kajkowski K. and Szczepanik P. 2013a. The multi-faced so-called miniature idols from the Baltic Sea area. *Studia Mythologica Slavica* 16, 55-68.

Kalmring S. 2010. *Der Hafen von Haithabu* (= *Die Ausgrabungen in Haithabu* 14). Neumünster: Wachholtz Verlag.

Kirpichnikov A. and Sarabyanov V. 1996. *Staraya Ladoga: Ancient capital of Rus*. Sankt Petersburg: Slavija.

Kolchin B. A. (ed.) 1985. *Drevnij Novgorod: prikladnoye iskusstvo i arkheologiya. Raskopy, gramoty, pismennost, muzykalnyie instrumenty, maski, shakhmaty, vislyie pechati, cvetnoy metall, kost, derevo, steklo, yantar, kamen, glina, kozha, zhelezo*. Moskva: Iskusstvo.

Kolchin B. A. 1989. *Wooden artefacts from medieval Novgorod, Part I. Text* (= *BAR International series* 495). Oxford: BAR.

Kolchin B. A. 1989a. *Wooden artefacts from medieval Novgorod, Part II. Illustrations* (= *BAR International series* 495). Oxford: BAR.

Kotlarczyk J. 1987. Słonecznego boga miejsca kultu. *Z otchłani wieków* 53(2-4), 153-168.

Kotlarczyk J. 1993. W poszukiwaniu genezy wielotwarzowych wyobrażeń Światowita, Świętowita, Rujewita i innych. In M. Kwapiński and H. Paner (eds), *Wierzenia przedchrześcijańskie na ziemiach polskich*. Gdańsk: Muzeum Archeologiczne, 56-63.

Kowalska A. B. 2013. Kleine Holzfigur mit einem Gesicht. In C. Stiegemann, M. Kroker and W. Walter (eds), *Credo. Christianisierung Europas im Mittelalter. Bd. 2, Katalog*. Petersberg: Michael Imhof Verlag, 627.

Kowalska A. B. and Dworaczyk M. 2013. *Szczecin wczesnośredniowieczny. Nadodrzańskie centrum* (= *Origines Polonorum* 5). Warszawa: Fundacja na Rzecz Nauki Polskiej.

Kowalski A. P. 2010. Kulturoznawczo-estetyczna interpretacja antropomorfizacji w sztuce prehistorycznej. In E. Bugaj and A. P. Kowalski (eds), *Estetyka w archeologii. Antropomorfizacje w pradziejach i starożytności*. Poznań: Wydawnictwo Poznańskie, 35-43.

Kowalski K. and Kozłowska-Skoczka D. 2012. *Zaginione – Ocalone. Szczecińska kolekcja starożytności pomorskich*. Szczecin: Muzeum Narodowe.

Kunczyńska-Iracka A. 1987. Woskowe wota z Krypina. *Polska Sztuka Ludowa* 41, 65-73.

Lamm J. P. 1987. On the cult of multiple-headed gods in England and in the Baltic area. *Przegląd Archeologiczny* 34, 219-231.

Leeuw van der G. 1997. *Fenomenologia religii*. Warszawa: Książka i Wiedza.

Mack J. 2007. *The art of small things*. Cambridge: Harvard University Press.

Moszyński K. 1967. *Kultura ludowa Słowian. Tom 2, część 1: Kultura duchowa*. Warszawa: Książka i Wiedza.

Mortimer P. and Pollington S. 2013. *Remaking the Sutton Hoo stone. The Ansell-Roper replica and its context*. Little Downham: Anglo-Saxon Books.

Muhl A. 2013. Knaufkopf eines Kultgerätes. In C. Stiegemann, M. Kroker and W. Walter (eds), *Credo. Christianisierung Europas im Mittelalter, Bd. 2, Katalog*. Petersberg: Michael Imhof Verlag, 582-583.

Murray A. V. 2013. Henry of Livonia and the Wends of Eastern Baltic: Ethnography and biography in the thirteenth-century Livonian mission. *Studi Medievalii. Serie Terza* 54(2), 807-833.

Musin A. 2018. The rise of Novgorod revisited. *Slavia Antiqua* 59, 165-94.

Ochmański J. 1982. *Historia Litwy*. Wrocław: Zakład Narodowy im. Ossolińskich.

Östmark K. 1980. *Delar av grafälf, yngre järnålder, och boplastsrester fornlämning 21, Väsby, Vallentuna sn, Uppland, 1973-74. Riksantikvarieämbetet Raport*. Stockholm: Statens Historiska Museum.

Översiktskatalog 1931. *Tillväxten under Ír 1931*. Stockholm: Statens Historiska Museum.

Pettazzoni R. 1946. The Pagan origins of the three-headed representation of the Christian trinity. *Journal of the Warburg and Courtauld Institutes* 9, 135-151.

Pokrovskaya L. V. 2007. Ritual objects from Novgorod: Thef from Troitsky excavations 1973-1999. In M. Brisbane and J. Hather (eds), *Wood Use in Medieval Novgorod* (= *The Archaeology of Medieval Novgorod* 2). Oxford: Oxbow Books, 399-417.

Polak Z. and Rębkowski M. 2019. Building structures and spatial organization. In M. Rębkowski (ed.), *Wolin – the Old Town. Vol. I, Settlement structure, stratigraphy & chronology*. Szczecin: Institute of Archaeology and Ethnology of the Polish Academy of Sciences, 115-132.

Price N. 2006. What's in a name? An archaeological identity crisis for the Norse gods (and some of their friends). In A. Andrén, K. Jennbert and C. Raudvere (eds), *Old Norse religion in long-term perspectives. Origins, changes, and interactions*. Lund: Nordic academic Press, 179-183.

Proschan F. 1983. The semiotic study of puppets, masks and performing objects. *Semiotica* 47 (1/4), 3-44.

Radtke C. 2010. Der Schleswig-Mann – ein „Hausgeist" aus Novgorod? *Archäologische Nachrichten aus Schleswig-Holstein* 16, 92-95.

Ratajczyk Z. 2013. Klein Hausgottheit. In C. Stiegemann, M. Kroker and W. Walter (eds), *Credo. Christianisierung Europas im Mittelalter, Bd. 2, Katalog*. Petersberg: Michael Imhof Verlag, 627-628.

Renfrew C. and Morley I. (eds) 2007. *Image and Imagination. A global prehistory of figurative representation*. Cambridge: McDonald Institute for Archaeological Research.

Roesdahl E. 1992. *Viking og Hviderkrist. Norden og Europa 800-1200*. København: Nordisk Ministerråd.

Saxo 1931. *Saxonis Gesta danorum*. J. Orlik and H. Raeder (eds). Hauniae: Apud Librarios Levin & Munksgaard.

Schietzel K. 2018. *Spurensuche Haithabu. Archäologische Spurensuche in der frühmittelalterlichen Ansiedlung Haithabu. Dokumentation und Chronik 1963-2013*. Neumünster: Wachholtz Verlag.

Smyser H. M. 1965. Ibn Faldan's account of the Rus. In J. B. Bessinger Jr. and R. P. Creed (eds), *Franciplegius. Medieval and linguistic studies in honour of Francis Peabody Magoun, Jr*. New York: New York University Press, 92-119

Słupecki L. P. 1994. *Slavonic pagan sanctuaries*. Warsaw: Institute of Archaeology and Ethnology Polish Academy of Sciences.

Słupecki L. P. 2003. *Mitologia skandynawska w epoce wikingów*. Kraków: Zakład Wydawniczy Nomos.

Słupecki L. P. 2013. Temple fiscality of pagan Slavs and Scandinavians. In M. Bogucki and M. Rębkowski (eds), *Wolińskie Spotkania Mediewistyczne II. Economies, monetisation and society in the West Slavic lands 800-1200 AD*. Szczecin: Wydawnictwo Instytutu Archeologii i Etnologii Polskiej Akademii Nauk, 109-114.

Stanisławski B. 2011. Budownictwo wczesnośredniowiecznego Wolina – próba reinterpretacji. *Materiały Zachodniopomorskie. Nowa seria* 6/7, 223-268.

Stanisławski B. 2013. *Jómswikingowie z Wolina-Jómsborga. Studium archeologiczne przenikania kultury skandynawskiej na ziemie polskie*. Wrocław: Instytut Archeologii i Etnologii PAN.

Stanisławski B. 2013a. Wstęp do archeologii wczesnośredniowiecznego Wolina. In B. Stanisławski and W. Filipowiak (eds), *Wolin wczesnośredniowieczny*. 1. Warszawa: Fundacja na Rzecz Nauki Polskiej, 13-42.

Suchocki J. 1991. *Mitologia bałtyjska*. Warszawa: Wydawnictwa Artystyczne i Filmowe.

Sundqvist O. 2016. *An arena for high powers. Ceremonial buildings and religious strategies for rulership in Late Iron Age Scandinavia*. Leiden: Brill.

Szczepanik P. 2013. Wczesnośredniowieczne figurki wielotwarzowe z terenów basenu Morza Bałtyckiego – dowód kontaktów międzykulturowych czy uniwersalny fenomen? *Archaeologia Historica Polona* 21, 49-60.

Szczepanik P. 2017. Early Medieval bronze sheaths with zoo- and anthropomorphic ornamental fittings from Poland: mythical pictures and their content. In F. Biermann, T. Kersting and A. Klammt (eds), *Religion und Gesellschaft im nördlichen westslawischen Raum* (= *Beiträge zur Ur- und Frühgeschichte Mitteleuropas* 82). Langenweissbach: Beier & Beran Archäologische Fachliteratur, 169-178.

Szczepanik P. 2018a. Wczesnośredniowieczne figurki miniaturowe z terenów Słowiańszczyzny Północno-Zachodniej. Próba interpretacji. In S. Rosik, S. Jędrzejewska and K. Kollinger (eds), *Hierofanie, wierzenia, obrzędy… Kultura symboliczna w średniowieczu między pogaństwem a chrześcijaństwem* (= *Materiał V Kongresu Mediewistów Polskich* 2). Rzeszów: Wydawnictwo Uniwersytetu Rzeszowskiego, 43-67.

Szczepanik P. 2018b. *Słowiańskie zaświaty, wierzenia, wizje i mity*. Szczecin: Wydawnictwo „Triglav".

Tyniec A. 2016 Zbruczański posąg – więcej pytań niż odpowiedzi? In B. Chudzińska, M. Wojenka and M. Wołoszyn (eds), *Od Bachórza do Światowida ze Zbrucza. Tworzenie się słowiańskiej Europy w ujęciu źródłoznawczym. Księga jubileuszowa Profesora Michała Parczewskiego*. Kraków, Rzeszów: Wydawnictwo Uniwersytetu Rzeszowskiego, 373-380.

Tyszkiewicz J. 2009. *Brunon z Querfurtu w Polsce i krajach sąsiednich. W tysiąclecie śmierci 1009-2009*. Pułtusk: Akademia Humanistyczna im. Aleksandra Gieysztora.

Urbańczyk P. 2014. *Bliskie spotkania wikingów*. Wodzisław Śląski: Wydawnictwo Templum.

Wawrzeniuk J. 2004. Słowiański domowy kult przodków na tle porównawczym. In S. Moździoch (ed.), *Wędrówki rzeczy i idei w średniowieczu* (= *Spotkania Bytomskie* 5). Wrocław: Instytut Archeologii i Etnologii PAN, 115-133.

Wawrzeniuk J. 2016. *Magia ochronna Słowian we wczesnym średniowieczu na ziemiach polskich*. Warszawa: Wydawnictwo Uniwersytetu Kardynała Stefana Wyszyńskiego.

Wegner J. 2012. Anthropomorphe figure. In A. Lewykin and M. Wemhoff (eds), *Russen und Deutsche. 1000 Jahre Kunst, Geschichte und Kultur*. Petersberg: Michael Imhof Verlag, 51.

Westphal F. 2006. *Die Holzfunde von Haithabu* (= *Ausgrabungen in Haithabu* 11). Neumünster: Wachholtz Verlag.

Widukind 1971. *Widukindi res gestae Saxonicae* (= *Ausgewählte Quellen zur Deutschen Geschichte des Mittelalters* 8). R. Buchner (ed.). Darmstadt: Wissenschaftliche Buchgesellschaft.

Wilgocki E. 1995. Drewniany posążek ze szczecińskiego Podzamcza. *Przegląd Archeologiczny* 43, 187-190.

SPRAWOZDANIA ARCHEOLOGICZNE 72/2, 2020
PL ISSN 0081-3834
DOI: 10.23858/SA/72.2020.2.1728

FIELD SURVEY AND MATERIALS

Marcin Wąs[1], Lucyna Domańska[2], Seweryn Rzepecki[3]

MIDDLE PALAEOLITHIC FLINT ARTEFACTS FROM CENTRAL POLAND. CASE STUDY OF THE SITE OF POLESIE 1, ŁOWICZ DISTRICT, ŁÓDŹ VOIVODSHIP

ABSTRACT

Wąs M., Domańska L., Rzepecki S. 2020. Middle Palaeolithic flint artefacts from Central Poland. Case study of the site of Polesie 1, Łowicz district, Łódź voivodship. *Sprawozdania Archeologiczne* 72/2, 169-199.

This paper deals with the presentation of flint artefacts of Middle Palaeolithic provenience discovered during the excavations at the site of Polesie 1 in the central part of Central Poland. An in-depth analysis of its morphology, taphonomy and readable technological features helped uncover some elements of the products of the Micoquian tradition. This article discusses these extraordinary findings in the context of their importance as the northernmost such finds on the map of Middle Palaeolithic sites in Poland. Selected elements of research on paleoenvironmental conditions of the studied area are also presented as key points in the discussion on the possibilities of researching the Neanderthal settlement ecumene within the Polish Lowland.

Keywords: Middle Palaeolithic, lithic analysis, Neanderthal settlement, Micoquian, Pleistocene in Central Poland

Received: 09.04.2020; Revised: 07.05.2020; Accepted: 02.08.2020

1 Institute of Archaeology and Ethnology, University of Gdańsk, Bielańska 5, 80-851 Gdańsk, Poland; marcin.was@ug.edu.pl; https://orcid.org/0000-0001-9140-2694
2 Institute of Archaeology, University of Lodz, G. Narutowicza 65, 90-131 Łódź, Poland; lucyna.domanska@uni.lodz.pl; https://orcid.org/0000-0002-9978-8306
3 University of Lodz Branch in Tomaszów Mazowiecki, Konstytucji 3 Maja 65/67, 97-200 Tomaszów Mazowiecki, Poland; seweryn.rzepecki@uni.lodz.pl; https://orcid.org/0000-0002-8101-0686

INTRODUCTION

Rescue excavations carried out at the site of Polesie 1 (Łódź voivodship, Łowicz district, Łyszkowice commune) yielded numerous and diverse relics of prehistoric settlements, prominent among which was a settlement and a sepulchral complex of the Trzciniec culture (Górski *et al*. 2011; Domańska *et al*. 2012; 2013). Among the collected artefacts representing various categories, an assemblage of flint artefacts composed of 449 specimens was distinguished by its abundance. On this basis, Early Bronze Age assemblages as well as older ones (*i.e.*, Neolithic, Mesolithic and Late Palaeolithic) were delimited (Domańska and Wąs 2011).

In the process of fieldwork, a large number of erratic flints (about 200 pieces) were recorded in addition to some flint products from hunter-gatherer and early-agrarian societies. In the phase of desk research, the preliminary classification of the entire flint collection revealed several specimens with distinct industrial surfaces. However, considering their state of preservation, they varied from the predominating flint artefacts dated to periods from the late Palaeolithic, Mesolithic and Neolithic to the Early Bronze Age. A brief analysis of the technological features and general morphology of the several, aforementioned artefacts helped uncover some elements among them which are characteristic of flint products of Middle Palaeolithic provenance. The present study aims primarily to provide the reader with the knowledge of these particular artefacts. They are not only quite an intriguing collection – they also give rise to considerations about the presence of settlement traces linked with an occurrence of Neanderthals in Central Poland.

It should also be also pointed out that the presence of materials of Middle Palaeolithic provenance at Polesie 1 was earlier only signalled by the authors (Wąs 2009; Domańska *et al*. 2012; 2013). Recently, this site was also mentioned in some wider studies dealing with the Middle Palaeolithic in Poland (*e.g*. Sudoł 2013; Wiśniewski *et al*. 2019).

THE SITE

Research

The site of Polesie 1 was discovered during surface surveys and test excavations conducted by the Professor Konrad Jażdżewski Foundation for Archaeological Research in Łódź (Domańska *et al*. 2012). The excavations, which preceded the construction of the A2 motorway, were of rescue character and were carried out by a team representing the University of Łódź Foundation led by Lucyna Domańska and Seweryn Rzepecki. During four excavation seasons carried out in the years 2005-2008, an area of 17 ha was explored, and the relics of settlement – constituting almost a complete cross-section from the pre-modern periods up to the modern times – were recorded.

The method used to obtain the historical materials was extremely important for the issue of the presence of traces from the Middle Palaeolithic. The exploration of the site was fully subordinated to the methodology of excavations on the large-area archaeological sites located in the zone of their overlap on the linear construction project (in this case: the construction of the motorway). The humus layer, with a thickness of up to 30 cm, was removed using mechanical equipment, and its base was cleaned thoroughly with shovels. The further earthworks predominantly included the recording of cultural features and their thorough exploration. The sources were recorded in quarters of ares within the arbitrary layers.

It should be emphasized that at the beginning of the excavation, a significant part of the site was heavily damaged. The historical materials were located throughout a large area in sub-surface levels.

The state of preservation of the features, their distribution and the large fragmentation index of the material recorded in the near-surface layers of the site confirmed a significant degree of destruction of the site. This was caused not only by cultural factors occurring in prehistory (*i.e.* intensive settlement in different periods, economic activity and accompanying deforestation), but also by natural ones (*i.e.* aeolian processes and water erosion), as well as by some modern factors such as agrotechnical operations and illegal storage of garbage, for example. Agricultural works – notably deep ploughing, were invasive and destructive to the historical material (Twardy 2008). Those factors significantly disturbed the original context and the cultural layers, and transformed the subsurface stratigraphic profiles containing relics of settlement from distant periods of Prehistory. Consequently, the relationship between the distinguished features and the materials within arbitrary levels was the source of many baffling issues.

Location of the site

The site of Polesie 1 (AZP 61-57/42) is located in the Łowicz-Błonie Plain, constituting the south-western part of the Central Masovian Lowland (Fig. 1; Solon *et al.* 2018). This mezoregion lies to the south and south-west of the Warsaw Basin, southeast of the Kutno Plain and east of the Koło Basin and the Łask Heights. From the south, it borders the Łódź Hills and the Rawa Heights, and from the east it meets the Warsaw Plain (Kondracki 1994, 132; Solon *et al.* 2018). In terms of topography, this region is a flat denudation plain with differences in elevation ranging from 84 to 110 m.a.s.l.

The excavated area of the site extends over the northern edge of the plateau. It stretches between two watercourses with a meridional course – the Zwierzynka in the east and the Ruczaj in the west (Fig. 3). Running from south to north, their waters feed the River Bzura, whose valley is located about 9 km from the site. To the north of the site, there is an extensive flood plain, separated from the aforementioned fluvioglacial plain by a long smooth, gentle slope, which occupies a larger part of the study area (Fig. 4). The land of the site

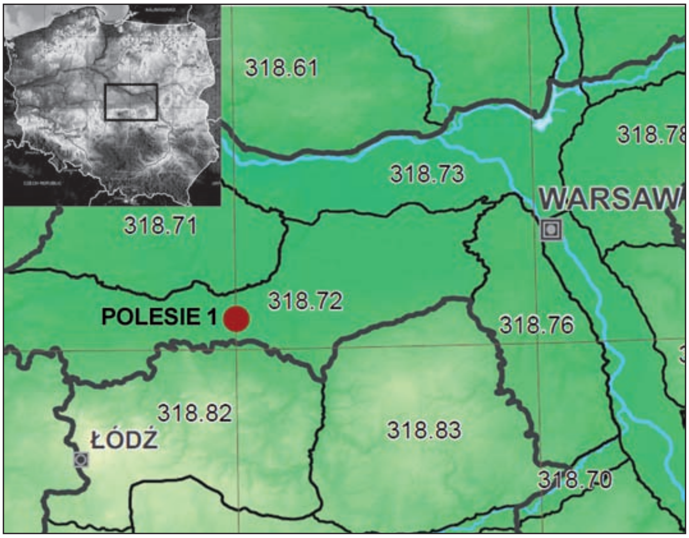


Fig. 1. Location of Polesie 1 in the context of physical-geographical regionalization (acc. Solon *et al.* 2018). Key: 318.61 – Płońsk Heights, 318.70 – Lower Pilica River Valley, 318.71 – Kutno Plain, 318.72 – Łowicz-Błonie Plain, 318.73 – Warsaw Basin, 318.76 – Warsaw Plain, 318.78 – Wołomin Plain, 318.82 – Łódź Hills, 318.83 – Rawa Heights (after: Solon *et al.* 2018 – altered)

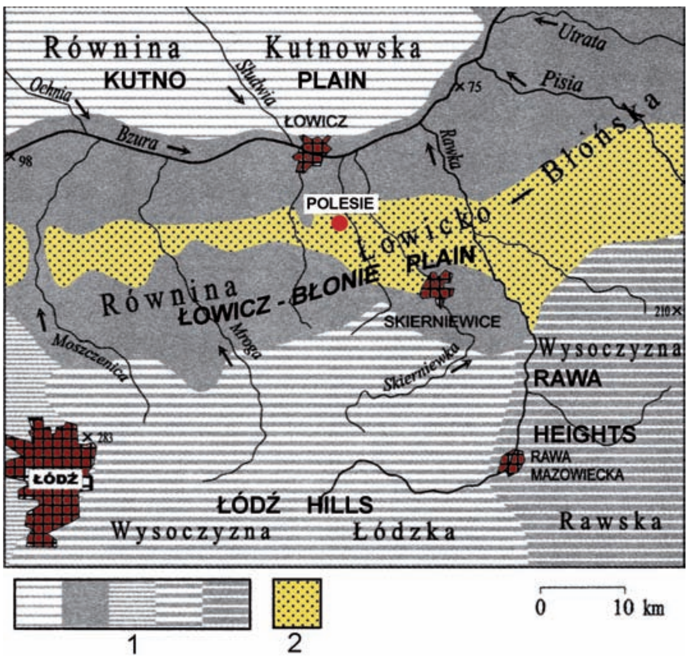


Fig. 2. Location of Polesie 1. Key: 1 – boundaries of physical-geographical units; 2 – area of the "*huge alluvial fans*" (after: Twardy and Forysiak 2011, 228 – altered)

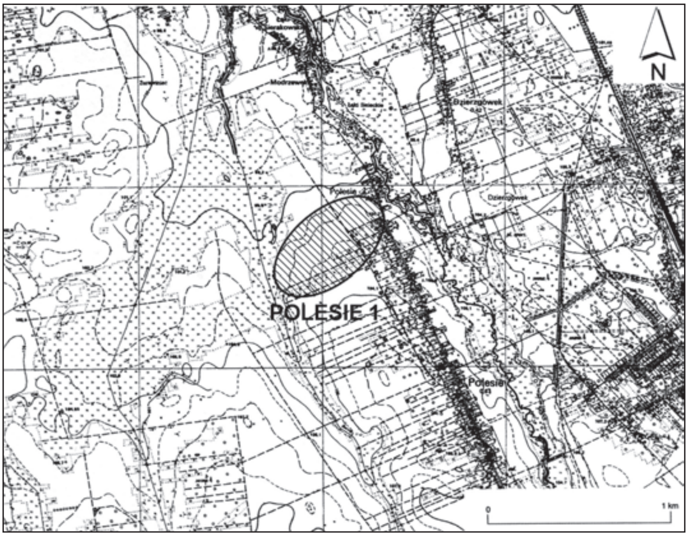


Fig. 3. The site of Polesie 1 on a topographic map (after: Górski *et al.* 2011, 15 – altered)

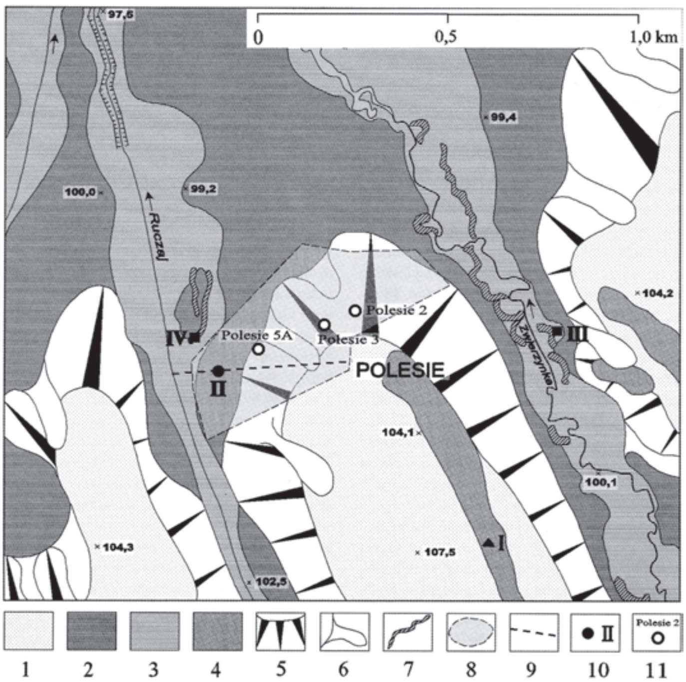


Fig. 4. Geomorphological sketch of the area of Polesie 1: Key: 1 – fluvioglacial plain; 2 – flood terrace; 3 – bottom of the valley; 4 – aeolian layers; 5 – more important slopes; 6 – denudation hollows; 7 – traces of paleovalleys; 8 – archaeological site; 9 – geological cross-section line; 10 – lithological profile with slope sediments; 11 – lithological profiles with source sediments (after: Twardy and Forysiak 2011, 230 – altered)

slopes to the north and also, in its peripheral parts, to the east and then to the west – towards the river valleys that constitute its boundary. The land slopes do not exceed 1-2°; they increase to several degrees only in the valley zones. The differences in the elevation of the terrain within the area of the site range at about 3-4 m (from 99 m. a.s.l. in the Ruczaj floodplain to 104 m. a.s.l. in the central part of the site), which, considering the spatial extent of the site, gives grounds for assessing it as relatively flat, with low differentiation of relief.

Land relief and geological structure

The area of Polesie 1 was shaped during the Riss and the Vistulian glaciations by the waters of the melting ice sheet (Twardy and Forysiak 2011). The water network of the site area is formed by the River Bzura along with the right-bank southern tributaries flowing from the Southern Masovian Hills, among which the most important are: the Skierniewka, the Moszczenica, the Mroga, the Pisia, the Rawka and the Utrata. They form a network of parallel, small river valleys, oriented SSE-NNW, which cut the extensive sand-gravel, fluvioglacial plain, extending eastwards and westwards, into a series of smaller and quite similar patches (Twardy 2008, 48). The extent of the plain on the S-N axis is accompanied by an increase in altitudes from c. 100 m. a.s.l. in the north, up to about 110 m. a.s.l. in the south. This is also where the fluvioglacial sands of the Warta glaciation meet the northern slopes of the Łódź Hills. They constitute a several-kilometre-wide zone of the late Warta fluvioglacial accumulation in the form of "huge alluvial fans" filling a broad part of the Warsaw-Berlin Urstromtal near Skierniewice. The site of Polesie 1 is located in the central part of this zone range (Twardy 2008, 48, and further literature within). The cutting of the aforementioned fans by rivers flowing from the south had already taken place at the end of the Warta glaciation. Here, a lack of Eemian Interglacial deposits in the valleys should be emphasized, and this might confirm the age of their cutting. The fans are mainly composed of sand and gravel fractions which have a thickness of several meters. The sediments form a latitudinally extended zone between the northern slopes of the Rawa, Skierniewice and Siedlce Uplands, and the axis of the Warsaw-Berlin Urstromtal. Although their genesis and age still remain a subject of debate, two main groups of views on their origin can be distinguished. One of them underlines the fluvial genesis associated with an accumulative activity in the lower sections of the rivers draining the aforementioned uplands northward. From a chronological point of view, this process took place both in the Eemian and the Vistulian cycles, or only in the Vistulian. Another suggestion accentuates the glacial origin of sediments building the fans. Its supporters treat this zone as the fluvioglacial level formed between the northern slopes of the Łódź Heights, the Rawa and Skierniewice Uplands, and the Warta glacier. The proponents of this genesis accept the chronologically older, late Wartanian origin of the fringes of the sand series (Twardy 2008, 38-39 – and further literature within). Therefore, the sand series that is part of the "huge alluvial fans" has a polygenic character, because it could be formed by the waters released from melting blocks of dead-ice deposited in the Urstromtal, as well as by the waters from small, extra-glacial rivers flowing north from the southern uplands (*e.g.*, the Łódź Heights). At the end of the Vistulian, the primary alluvial fan series was covered by blow sands. The lithological studies carried out in the zone of huge alluvial fans, supported by OSL dating, prove the aeolian provenance of the series of cover sands, whose accumulation took place alternatively with the slope processes in the variable climatic conditions of the Vistulian. This process can be divided into four aeolian phases dated from the Grudziądz interstadial to the late Vistulian.

In addition to the aforementioned interpretative concepts for the genesis of the area on which Polesie 1 is located, a view linking the genesis of a series of sediments with a shorter slope transport was also put forward. Additionally, a suggestion was made that the sandy plain of the site should be considered part of the Radzymin-Błonie level distinguished within the Warsaw Basin. Unfortunately, its western range does not include the region of Polesie 1 and, moreover, it is formed of clay sediments, which means different sediments from the ones present at the site of our interest (Twardy and Forysiak 2011, 228 – and further literature within; Balwierz *et al.* 2009).

The fluvioglacial plain, with a thickness of several meters, is built from poorly diversified sands, slightly muddy sands and, sporadically, gravels (Fig. 5), deposited in the form of repetitive, horizontal layers. The material is purely mineral, non-carbonate and, in some parts, quite strongly enriched with oxidized iron compounds. At a depth of 0.5 to 1.5 m, there is a record of the periglacial environment (in the form of layers with involutions and small fissure structures), most probably of late Wartanian and Vistulian origin (Twardy and Forysiak 2011). The top, a several-dozen-centimetre-thick layer of fluvioglacial sands, has a blurred structure and, in some parts, a slightly larger admixture of silt. Also, a slightly higher level of aeolisation of quartz grains is observed here. It is worth noting that the presence of ferruginous compounds, as well as the degree of aeolian quartz rounding, are the features observed on the surfaces of the flint artefacts that are the subject of this publication.

The area of the site extending over the valleys of the rivers Zwierzynka and Ruczaj is part of the wide zone of "plains of the alluvial fans," probably of a fluvial origin and from the Vistulian age (Fig. 5). The formation of overflow terraces, which form part of the site in the vicinity of the Zwierzynka and the Ruczaj valleys, presumably took place in the Plenivistulian and the late Vistulian. They gained their morphological shape as a result of intense erosion at the turn of the Plenivistulian and late Vistulian (high meadow terrace) and the late Vistulian and the Holocene (low meadow terrace). The formation of this terrace was still ongoing in the Upper Plenivistulian (after a short warming during the Konin-Maliniec II interstadial), as indicated by the radiocarbon determinations for the Polesie II lithological profile (LOD 1380: 21,990±350 years BP), obtained from a thin, radiocarbon-dated peat insert. Analyses of the geological cross-sections recorded in the western and eastern parts

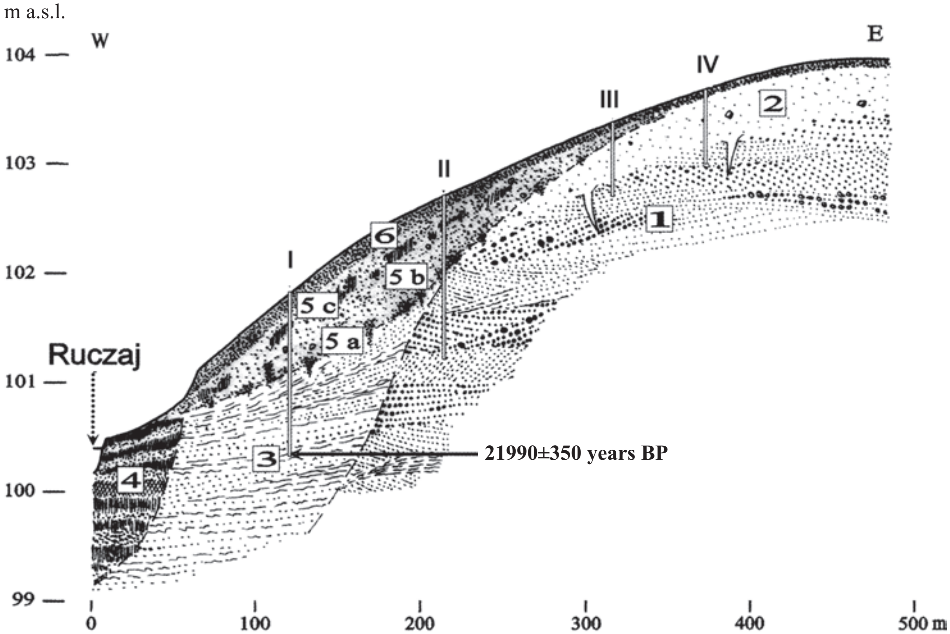


Fig. 5. Geological cross-section through the right part of the Ruczaj River bank and the adjecent fluvioglacial plain at the Polesie 1 site. Warta glaciation: 1 – layered sands and glacial gravels with pseudomorphoses after the ice wedges in the ceiling; 2 – unstructured silty sands; Vistulian: 3 – sands and layered muds with detritic intrusions; river; Holocene: 4 – organic muds and layered sands; with peat spacers; fluvial (riverine); Neoholocene: 5a – accumulation level of fossil soil with roots; faded; 5b – humic sands; unstructured; sloped; 5c – level of hardpan in sediments as above; interrupted by roots and plowing; 6 – contemporary soil with archaeological materials; I – IV – lithological profiles (after: Twardy and Forysiak 2011, 234 – altered)

of the site prove that the Wartanian fluvioglacial plain is built of sands and gravels covered with a surface layer of Neoholocene formations. The latter are particularly well-detectable in the slope parts where, in the Ruczaj valley, they lie not only in the Wartanian fluvioglacial deposits but also in the Vistulian alluvial deposits (Fig. 5).

In the near-surface part, the terrace is built of sand material with silty intersections, forming thin laminae. A quartzite-grain abrasion analysis indicates a clear increase in the aeolisation of the material by about 50-55%. Along with the other parameters, this indicates conversion of the fluvioglacial material in the fluvial and aeolian environment, with an indication of aeolisation of quartz grains typical of the Upper Plenivistulian formations. These alterations can also be treated as a reference point and a genetic background for the taphonomy and tribological changes visible on the flint artefacts dated to the Middle Palaeolithic.

It should be noted that the land relief, formed essentially in the Vistulian, did not undergo any significant changes in its later periods. The changes that occurred in the Holocene, as a result of the impact of a number of climatic and environmental factors, as well as by anthropogenic mechanisms confirmed by the intensive settlement of this area in prehistory, were only a "retouch" of the original relief formed in the earlier, cold cycles: the Wartanian – glacial and the Vistulian – periglacial (Twardy and Forysiak 2011, 235). In addition, the area of the Łowicz-Błonie Plain, where Polesie 1 is located, is classified as a morphogenetic area with a balance of degradation and aggradation, and a very low intensity of geomorphological processes (slope, fluvial and aeolian types). The flat lay of the land present in the territory of the site significantly limited the development of the slope processes to a low scale. The proximity of the small rivers Ruczaj and Zwierzynka, which drained the poorly outlined river valleys, reduced the intensity of the geomorphological processes connected with erosion, transport and fluvial accumulation. The intensity of the aeolian processes generated by westerly wind was, on the other hand, inhibited by the valley zones, meridionally cutting the fluvioglacial plain. As a result of the existing conditions and the limiting factors, the thickness and distribution of the sediments accumulated thanks to the slope, aeolian and fluvial processes are insignificant in the area of Polesie 1.

Overview of the occupational history of site

The site of Polesie 1, viewed through the prism of archaeology, has a multicultural character. The excavations revealed traces of the presence of Stone Age societies, cultures of the Bronze Age and the Early Iron Age, as well as features and artifacts from the modern period. The oldest recorded sequence of relics from the site are small flint inventories linked with the hunter-gatherer societies representing the Late Palaeolithic Swiderian culture, and also to the younger (by at least 2000 years), Late Mesolithic Janislavice culture. The remains of the culture of the Eneolithic, agrarian communities are far better represented. Among them, the most archaeologically discernible materials are pottery and flint materials of the Funnel Beaker culture as well as some younger and less numerous artefacts associated with the late phase of the Corded Ware culture (Domańska *et al.* 2012). Among all the historical materials and the identified artefacts obtained through the excavations, the remains of settlements from the Early Bronze Age associated with the Trzciniec culture have the most numerous representation (Górski *et al.* 2011). Over the duration of the occupation of the site by the "Trzciniec" communities, for more than 700 years, there were at least five settlements and two cemeteries built within its area (in addition, two single tombs were identified there). Around the sepulchral zones, residential and economic zones evolved over the centuries: from a dispersed settlement pattern towards a larger settlement centre. Certainly, the intensity of the settlement here, in the aforementioned period, most notably affected the state of preservation of some older settlement relics, which is particularly significant in the context of the issues undertaken by the authors. A multitude of the features, such as economic pits, sepulchral structures and the remains of pole frame houses, contributed to the destruction of the earlier stratigraphic arrangement and the anthropogenic arrangement. Relics of the settlement of the Lusatian culture is a far more poorly represented category in the prehistoric material from Polesie 1. On the other hand, two settlement phases are clearly recognizable here: the early ("Trzciniec-Lusatian") and the full development phases. The data concerning spatial exploitation by communities representing the Pomeranian culture, living there in the Early Iron Age, and the later Przeworsk culture seem even less discernible. In the modern period, the site of Polesie 1 arguably served as an agricultural hinterland for the potential settlement growing nearby.

The outline (supra) of the settlement changes at Polesie 1 makes us aware of the scale of the transformations that it has undergone over the millennia. Those alterations significantly disturbed the old systems and relics of the presence of human communities (destruction of the earlier anthropogenic layers, the artefacts and the original arrangements of the artefacts), and they also led to the successive remodelling of the primeval topography of the site. In the quite monotonous, flat landscape of the site, the processes initiated by human activity launched a series of changes to the original relief and the layers that built it (Twardy and Forysiak 2001, 227). Geological and geomorphological traces of activities of various geodynamic processes were recorded in the slope, fluvial, aeolian and biogenic formations within the territory of the site and its immediate vicinity (Twardy and Forysiak 2011; Balwierz 2011).

Certainly, such factors figure prominently, while traversing the character of the post-depositional processes and the taphonomy – in a broad sense, that have left their mark on the condition (quantity and quality) of a small collection of flint artefacts dated to the Middle Palaeolithic.

MATERIALS

Spatial distribution of the Middle Palaeolithic artefacts

An attempt to analyse the dispersion of flint products at Polesie 1 presents a true challenge due to a serious disturbance of the original stratigraphic sequences in the subsequent phases of occupation of the study area. Although the artefacts of Middle Palaeolithic provenance constitute a rather stray-find collection, devoid of archaeological context or even more specific stratigraphic context, on the scale of the whole explored area – they tend to accumulate in one part of the site (Figs 6 and 7). The artefacts representing this period (*i.e.* 1 core and 5 tools) make a vast, stray-find collection that extends over a distance of about 100 metres from NW-SE. Flakes show a far greater dispersion – they can be cautiously treated as Middle Palaeolithic in chronology. Their horizontal distribution is significantly broader than in the case of the aforementioned tools and the core, although 4 of them are located in the same zone of the site, in close proximity to the tools and the core. Two other specimens were located in the central part of the study area, as a result of which the separation between the most distant flakes is about 300 meters.

Fig. 6. View of Polesie 1 from the west, with marked zone of occurrence of Middle Palaeolithic artefacts

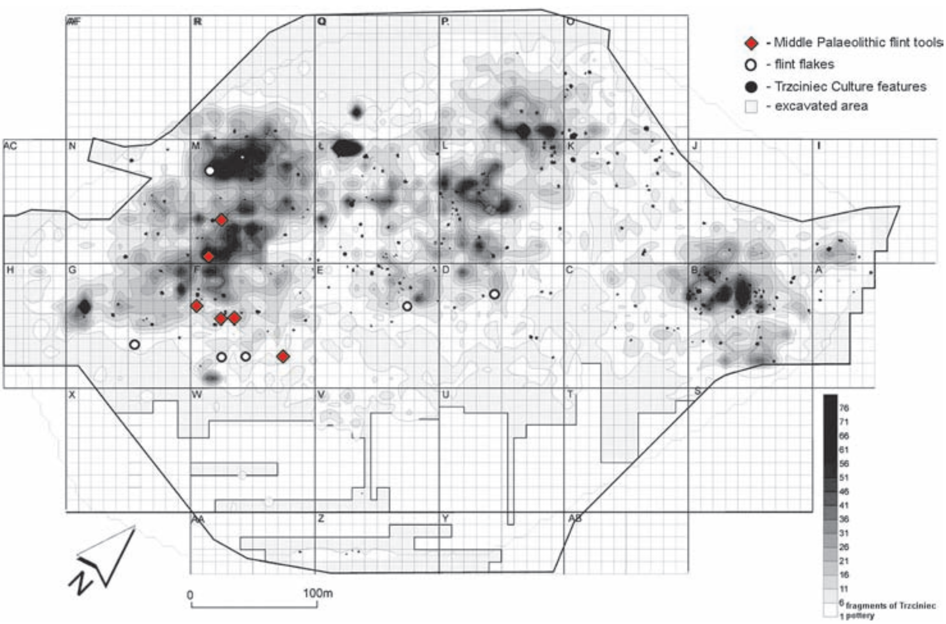


Fig. 7. Planigraphy of Middle Palaeolithic flint artefacts at Polesie 1 against the background of relics of the Trzciniec culture settlement from the Early Bronze Age (acc. Domańska *et al*. 2013 – altered)

Analysing the horizontal distribution pattern of the artefacts from the study period in the context of the multicultural character of the site, it should be noted that the study material is located on the margin of the primary zones of particularly abundant materials from the younger periods of prehistory. Especially notable is the almost fringe location of the prevailing relics, representing a settlement of the Trzciniec culture from the Early Bronze Age. Despite the fact that the deposition of Middle Palaeolithic artefacts outside the primary stratigraphic context is, undoubtedly, of secondary character, an additional post-depositional factor, blurring their distribution pattern, should be noted here. This factor was the intense process of anthropogenic transformations of the site during the intensively developing occupations in the Neolithic, the Early Bronze Age and the later periods as well.

Currently, the zone of dispersion of the Middle Palaeolithic artefacts is located within the area of the lanes of the A2 motorway.

Description of the Middle Palaeolithic artefacts

1. Inv. F37, excavation unit F31b, layer n 1

Simple, oval side-scraper, preserved nearly in its entirety, with broken tip. Dimensions: length 77 mm, width 46 mm, thickness 20 mm (Fig. 8: 1; 10: 1). This tool was made of a massive, partly cortical flake. The whole tool is moderately rounded and smoothed, which is clearly visible on the arrises. The lower portion of the tool is the ventral surface of the blank with a reduced proximal end. The bulb was removed by recurrent, centripetal blows, which gave the lower part of the side-scraper a rather uniform, flattish form. Its surface also reveals some natural post-depositional changes in the form of "linear" frost fissures with a rusty discolouration. In addition, mottled discolourations, similar to a rusty ferruginous patina, occur, which corresponds to the changes captured during the analysis of the sand and gravel deposits on which the site is built The distal portion of the tool shows only one part of the impact scar from the previous stage of knapping the blank. The rest of the surface is taken up by the impact scar resulting from the retouch that shaped the tool, with traces of outwashed cortical (original) surface. The studied surface of the tool is covered with a delicate, pale blue, oxidation patina. The side-scraper was formed by retouching one edge, which extends nearly over the full length of the specimen – from its base in the proximal part of the blank to the apex of the distal end. In this case, the retouching process is quite heterogeneous, *i.e.* less invasive and semi-abrupt in the lower part, but more extensive and more invasive in the distal part, where it locally takes the form of stepped-retouch. The edge opposite to the retouched one has the form of a blunted half-back obtained by chipping, which divided the blank transversely and slightly diagonally to the axis of the blank. Also, two smaller impact scars are clearly evident, confirming the chipping actions (which shaped the tool) from the same direction as those that formed its flat back. It was also affected by several, lighter, centripetal blows, which finely thinned

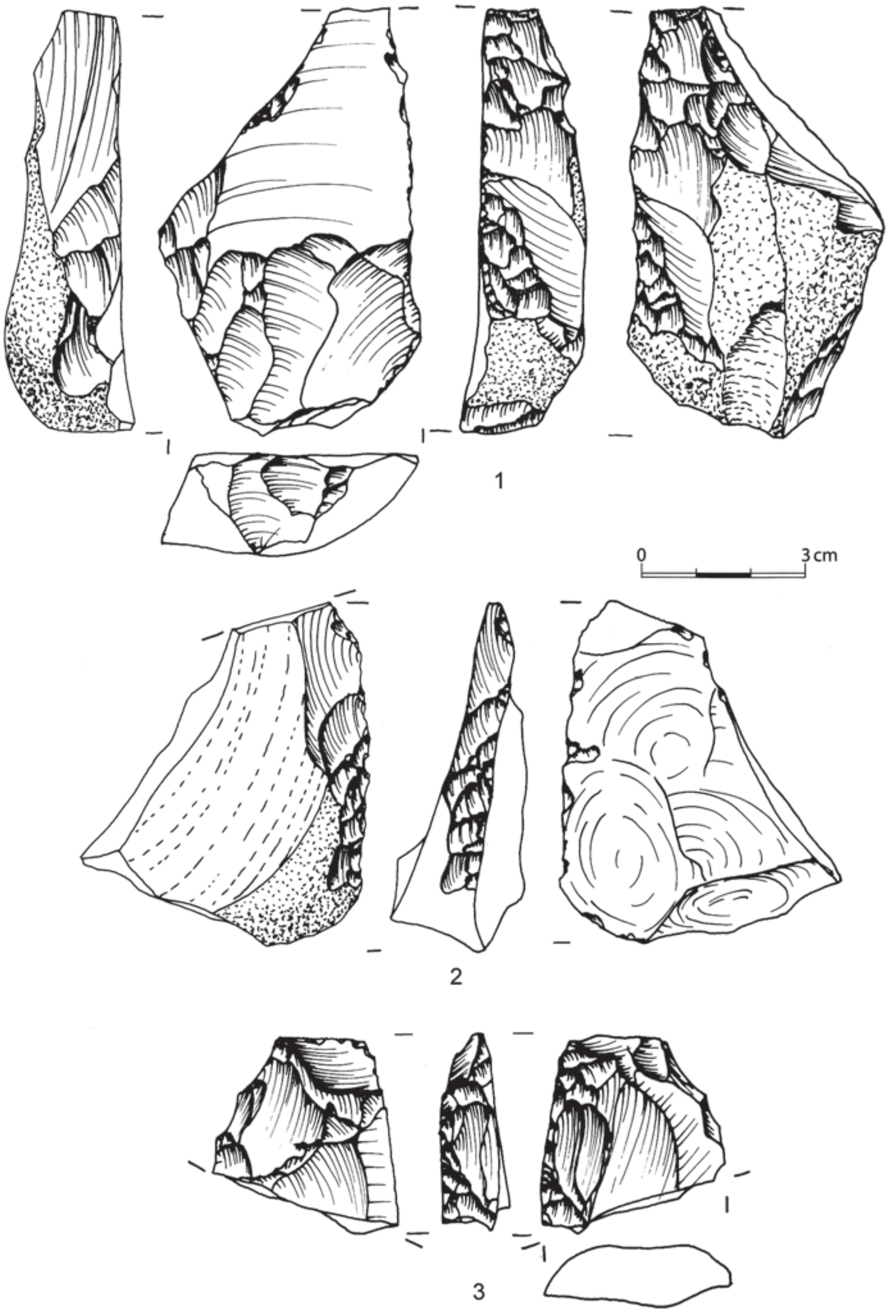


Fig. 8. Polesie 1 site. Middle Palaeolithic flint artefacts
(illustrated by M. Wąs)

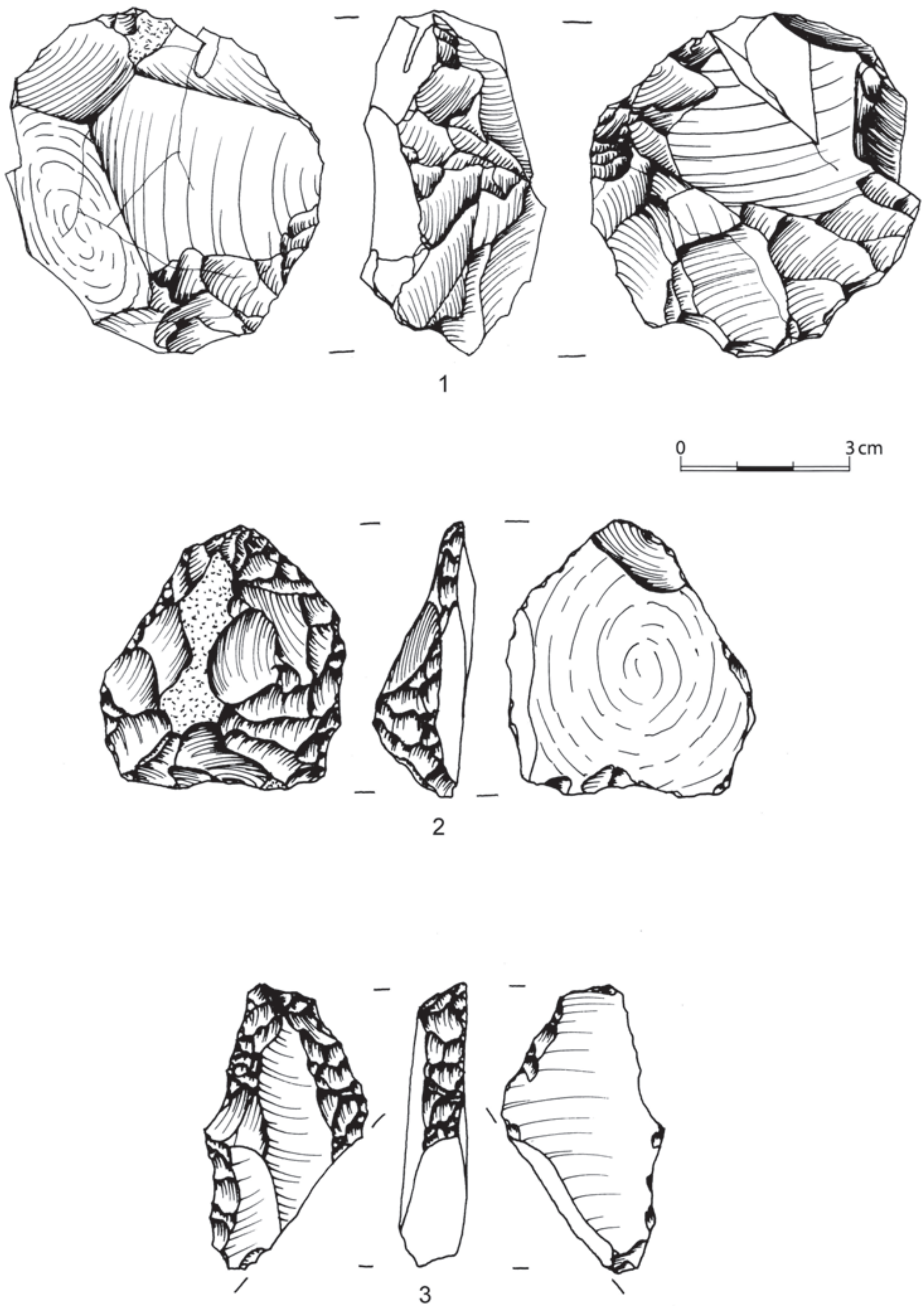


Fig. 9. Polesie 1 site. Middle Palaeolithic flint artefacts
(illustrated by M. Wąs)

the whole tool in the distal part of the upper surface. In this way, the removal of the cortex was performed in part of the upper surface. This specimen has its tip broken off, and no traces of the corrective actions were recorded here. Morphologically, this tool refers to the Klausennische knives with thinned, proximal ends (Weiss *et al.* 2018).

2. Inv. F402, excavation unit F44a, layer m 4

Simple, straight side-scraper, preserved nearly in its entirety (Fig. 8: 2; 10: 2). Dimensions: length 62 mm, width 52 mm, thickness 20 mm. The specimen is made of a flattish chunk of Baltic flint. The upper surface of the scraper is a natural concretion, which shows a fragment with the outwashed core and a larger fragment with natural fissures, covered with a pale-rusty patina. The lower surface is uniform, slightly patinated with frost fissures. The tool shaping treatments were applied to one edge of the chunk, which was then modified with the use of continuous retouch. The course of retouch is a bit convex, and it starts just above the thicker, proximal end as semi-abrupt retouch, changing – in the apical part – to semi-flat retouch. This is the thinnest part of the tool and has a transverse break. The surface opposite to the retouched one is a natural, flattish back. The analyzed side-scraper is characterized by a natural form of concretion, without any "industrial" traces of its processing. It can be assumed that the parameters and general morphology of the chunk led to its selection for adaptation as a tool, which was was accomplished via shaping measures that were limited to retouch of one edge only.

3. Inv. F627, excavation unit F78a, layer m 1

Convergent side-scraper, preserved in its entirety (Fig. 9: 2; 11: 2). Dimensions: length 48 mm, width 43 mm, thickness 15 mm. The specimen is made of a natural chunk of Baltic flint. The lower part of the tool is the area with natural frost or mechanical fissures, covered with a pale-rusty patina. The upper surface is almost completely transformed by retouch; only in the central part was a fragment of the external surface of the concretion with the outwashed cortex preserved. This surface of the tool is also covered with a pale-blue patina. The tool forming operations covered its three edges, giving the side-scraper a form similar to a triangle. For this reason, the specimen can be formally classified as a convergent side-scraper with retouch on the proximal end. In the lower part, the specimen reaches its maximum thickness, while it is clearly thinned near the apex, located on the longitudinal axis of the tool. Despite the circumferential character of the retouch, the differences between individual edges are clearly visible. The base of the tool is a semi-abrupt, retouched edge. It passes smoothly and articulately onto one of the sides (left), which is a bit angular above the proximal end. This edge is also shaped by semi-abrupt retouch, which appears less invasive in the apical part. The opposite edge (right) has an arcuate shape, and the retouch is diversified in terms of its range. At least two areas of retouch can be distinguished here. One of them covers the surface of the side-scraper from the edge to its central part, and the second one is edge retouch. The morphology of the tool indicates that it is a residual specimen whose apical part was probably larger in its original form. It seems likely that the reduced tool was reworked in its apical part, possibly because it was worn out and used. An indirect indication in this respect is the scar visible in the apical part in the lower portion of the side-scraper.

4. Inv. M132, excavation unit M92a, layer n 1

Convergent side-scraper, fragmentarily preserved, and with a broken proximal end (Fig. 9: 3; 11: 3). Dimensions: length 49 mm, width 32 mm, thickness 11 mm. This specimen was made of a flake of unidentified flint, with negative flake scars on its dorsal surface. It might be Baltic or Jurassic flint, as indicated by its colouration and punctiform, white-gray discolourations (which are probably specific of both kinds of flint with fossil inclusions). This tool does not have any post-depositional changes in the form of a patina, but some moderate smoothing and aeolian-derived polishing are detectable. The scale of these changes is varied throughout the whole specimen. The lower surface of the tool is the ventral surface of the blank, showing the features of a massive flake. In spite of the post-depositional changes, clear cracking ripples are seen on it, which suggests that the proximal end was broken off of the preserved tool. The upper surface shows three, clear negative scars having an opposite direction to the direction in which the blank was flaked. Typologically, the specimen is closer to convergent side-scrapers, although it also possesses features making it similar to denticulate tools. It was shaped by retouching the two edges that contact the distal part of the blank to form a short, transverse tip. The retouch on both edges is semi-abrupt, but each differs in its form. The longer, preserved edge was retouched to form two shallow notches, which, contacting each other, give it a somewhat denticulate form. The opposite edge is much more homogeneous in terms of the process and form of retouch. The prior apex of the scraper was subjected to secondary retouch, which gave it a slightly transverse and oblique form in relation to the axis of the tool; above all, it clearly distinguishes itself from its two lateral edges. Additionally, a small point was recorded on one of the edges, either from breakage or at a point of impact. This piece (next to the largest side-scraper in the assemblage – Fig. 8: 1; Fig. 10: 1) is the only analyzed tool in the assemblage that was not made from a natural blank, but rather from a modified flake blank.

5. Inv. M458, excavation unit M63b, layer m 2

Prądnik knife (Ciemna-type knife), preserved in its upper portion (Fig. 8: 3; 10: 3). Dimensions: length 35 mm, width 33 mm, thickness 12 mm. This tool was made of Baltic flint. Apart from delicate smoothing of the arrises, there are no traces of more significant post-depositional transformations. The preserved specimen has a number of diagnostic features that can be used to provide its precise, typological classification. Certainly, it is a bifacial tool, representing the type of planoconvex knives, *i.e.*, with morphological diversification on both faces of the tool. The arrangement of the negative scars and the manner in which the surface and edges were shaped indicate the presence of morphological elements typical of "Prądnik-type" tools, such as: a back, a half-back, an apex, a short point, the tip of the point and, above all, a burin-like spin off scar (Krukowski 1939-1948; Sobczyk 1975). A more detailed analysis of the pattern and chronology of negative scars allows us to conclude that the described specimen is a fragment of a modified or repaired tool, whose

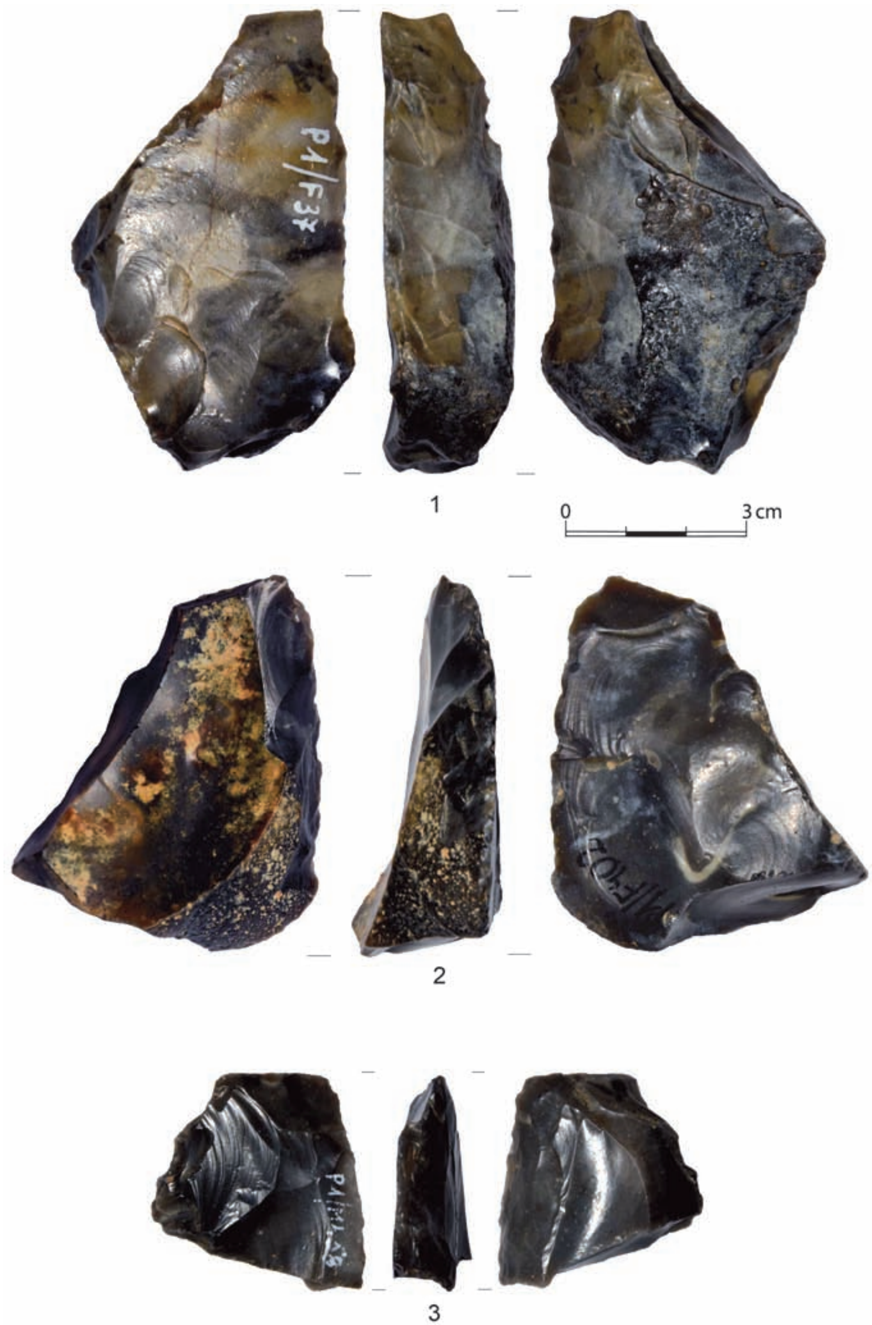


Fig. 10. Polesie 1 site. Middle Palaeolithic flint artefacts
(photo by M. Wąs)

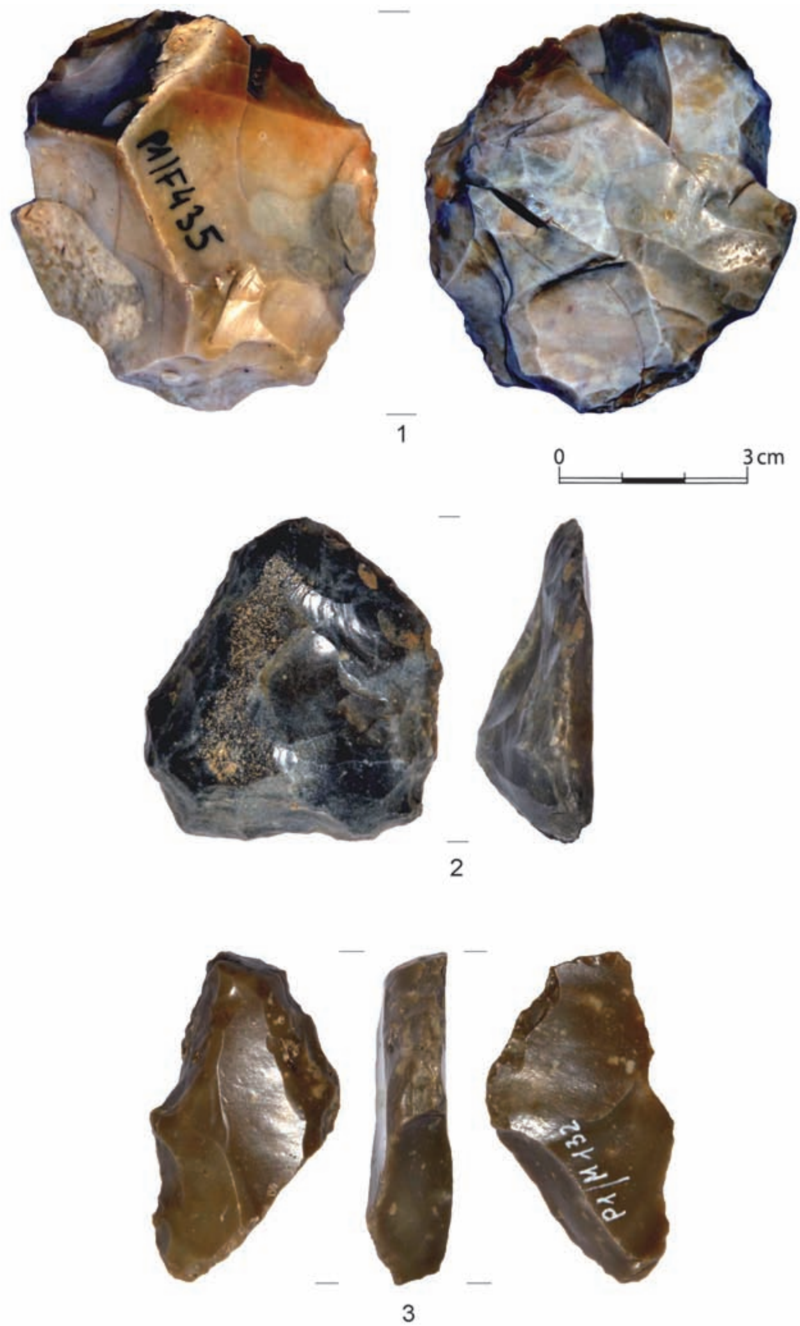


Fig. 11. Polesie 1 site. Middle Palaeolithic flint artefacts (photo by M. Wąs)

traces are particularly well visible on the relatively flat, ventral face with the burin-like spin off scar. One of the elongate negatives located parallel to the blade is probably a relic of the earlier phase of shaping the tool – a relic of the "dominant blow" (Jöris 1992; 2001; Urbanowski 2003; Migal and Urbanowski 2006; Frick *et al*. 2017; Frick 2020). The pattern of negatives on the more convexly formed, dorsal surface, is far less disturbed by subsequent repairs, which are particularly well detectable in the area of the transverse break of the tool. Also, noteworthy is the character of the break – its surface has traces that suggest the break occurred as a result of the lateral force affecting the surface of the side-scraper. The detachment of the last burin-like flake, which was performed in order to sharpen the cutting edge, was probably unsuccessful, as the edge was hinged, precluding the possibility of the further resharpening of this part of the tool.

6. Inv. F435, excavation unit F45d, layer m 2

Discoidal (or sub-discoidal) core (Fig. 9: 1; 11: 1). Dimensions: length 64 mm, width 58 mm, thickness 30 mm. This artefact is made of Baltic or Jurassic flint. Post-depositional transformations (especially a whitish patina on the surface) preclude a precise classification of the raw material used to make the tool. In addition, the specimen has frost fissures which resulted in the chipping off of two fragments – a small one near the flaking edge, and a larger fragment of one of the working surfaces. The smoothing of the arrises is also a result of post-depositional changes, but its scale is diverse within the body of the core. A great majority of the negative scars are quite clear, allowing for the identification of the sequence of core reduction. In only in one fragment are the processed surfaces more heavily obliterated. This core can probably be classified as the changed orientation type. A clear sequence of centripetal, circumferential blows is visible on the primary exploitation surface; thus, it would seem that it served as the flaking face. After obtaining a large enough flake, an attempt was made to remove flakes from the opposite direction, which resulted in the acquisition of short, hinged flakes, rendering the further reduction of this core plane impossible. A consequence of this action was the reorientation of the fragment, using the previous platform as a flaking face. In this way, a single, flattish, broad flake was obtained; this activity was preceded by the preparation of the zone for flaking on the circumferential striking platform. An analysis of this part of the core allows us to conclude that the obtained flake was a *chapeau de gendarme* type, typical of Levallois debitage (*e.g.*, Van Peer 1992). The next sequence of blows was directed at the area located next to the negative scar of the aforementioned detachment. Unfortunately, this attempt was unsuccessful, as the obtained flakes were too short, and also hinged, which eventually put an end to the possibility of further exploitation of the core.

The foregoing description indicates that the assemblage obtained from Polesie 1 contains the forms typologically distinguishable within the classification framework of the Middle Palaeolithic products present in the literature (*e.g.*, Ginter and Kozłowski 1975). Some of them possess the features which allow for their classification as "knife-like" tools (especially Figs. 8: 1 and 8: 2). They have a retouched, distally-thinned working edge and

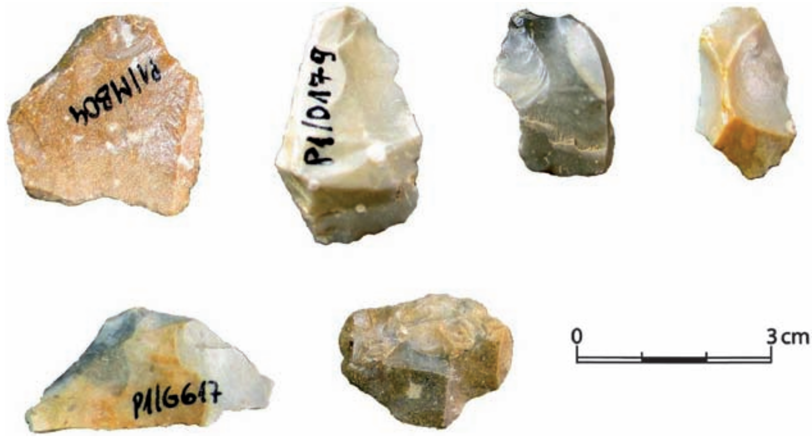


Fig. 12. Polesie 1 site. Flint flakes distinguished as Middle Palaeolithic (photo by M. Wąs)

an opposing blunt surface, which is a natural break that was adapted as the back of the tool (also referred to as "*couteau à dos naturèlle*"; *cf.* Sudoł and Cyrek 2013). These specimens either possess partial surface retouch or they are completely devoid of it (Fig. 8: 2).

In addition to the aforementioned six types of specimens, six flakes having features of Middle Palaeolithic debitage were identified (Fig. 12). Only the complete specimens with prepared butts, which refer in their form to the faceted butts from Levallois debitage, were classified here (some indirect hints resulting from the analysis of the discoidal core were taken into account). The most vital datum was the state of preservation of the surface of the flakes, which was analogous to the retouched pieces and the core described before. It is worth noting here that their spatial pattern is, in large part, quite similar to the scatter pattern of the side-scrapers and the core.

TAPHONOMY AND STATE OF PRESERVATION OF THE ARTEFACTS

The study artefacts show a number of features that are the result of secondary changes of natural origin (*cf.* Stapert 1976). These changes include post-depositional transformations, and can be the subject of taphonomic and petroarchaeological analyses (Fernandes and Raynal 2006). In the case of the stone artefacts dated to the Middle Palaeolithic, all kinds of modification to the surface (patination) or edges (breakages and "pseudo-retouch"), as well as the readability of the arrises are analysed following the tribological concepts (Burroni *et al.* 2002). These transformations can be of tectonic, chemical, cryogenic or other provenance. Post-depositional changes recorded on the surfaces of the Middle

Palaeolithic artefacts are, however, relatively frequent effects of the modifications which the flint products undergo during water transport (*cf.* Hosfield and Chambers 2003). The diagnostic features for long-lasting and intensive water transport are, predominantly, *arętes* and breakages occurring on edges (Chu and Hosfield 2020). These characteristics are macroscopic, and therefore no use of optical instruments is required for their identification. The presence of clear, bifacial traces of abrasion is explained as a result of the purely physical impact of the aquatic environment and its components on the transported flint artefact (Chambers 2003). This phenomenon is typical, especially of materials with Lower and Middle Palaeolithic provenance, found in gravelly fluvial deposits (Shackley 1974; 1978; Hosfield 2011). On the other hand, numerous faces with the traits of aeolisation and a pale blue patina suggest the exposure of flint artefacts to the conditions of intense or long-lasting aeolian processes and post-depositional processes on the surface (Glauberman and Thorson 2012).

Note that these remarks are of particular importance in the case of the artefacts analysed here, and notably the geological context of finding them. Clear instances of "smoothing" (visible on their surfaces), the abrasion of arrises, fine – though not too numerous – notches on the edges of the blades, and probably also the pale-rusty and pale-blue discolourations of the surfaces may suggest that the artefacts were subjected to a range of factors related to both water transport and the dynamics of aeolian processes (see also: Caux *et al.* 2018; Fernandes *et al.* 2007; Thiry *et al.* 2014). Undoubtedly, a number of post-depositional transformations confirm the redeposited character of the Middle Palaeolithic artefacts from Polesie 1. Unfortunately, both the scale of this phenomenon as well as the location of the original stratigraphic context of the artefacts, from which they were certainly moved, are now intractable problems.

CHRONOLOGICAL AND TAXONOMICAL NOTES

The geomorphological context and the circumstances in which the artefacts presented in this article were obtained preclude the possibility of treating them as relics of the Middle Palaeolithic site *in situ*. Even if we assume that it was originally located in the place covered by the excavations, it would have been seriously disturbed due to natural and anthropogenic factors in the younger periods. Alternatively, they may be relicts of a site that was originally located in the vicinity of the excavated area. Here, the suggestive "linear" scatter pattern of the artefacts is consistent with the slope angle of the landform on which the site is located. Particularly suggestive is their location in the slope zone of the northern part of the post-glacial plain bordering the extensive, fluvial terrace, within the Warsaw-Berlin ice-marginal valley. However, the scale of disturbance of the original spatial pattern of the artefacts is impossible to determine. Even if we accept the interpretation of the context of the features in question being in fact of a secondary (midden) character, nothing

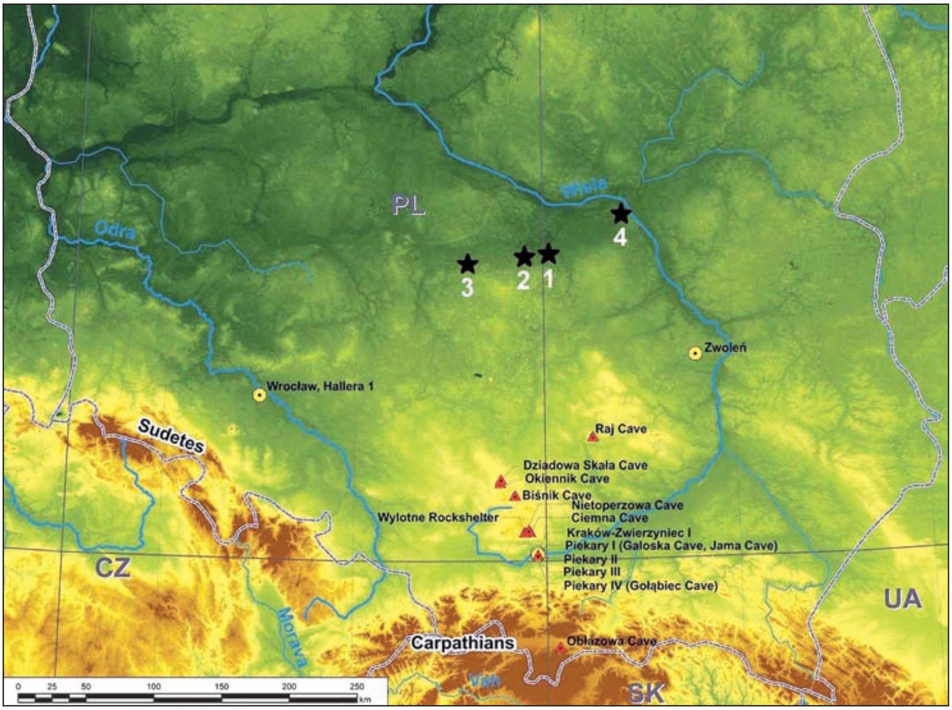


Fig. 13. Location of Polesie 1 and other sites from Central Poland with potential finds dated to the Middle Palaeolithic, against the background of major sites from the Eemian and Vistulian periods in Poland (MIS4 – MIS5d). Key: black stars – sites from Central Poland (1 – Polesie; 2 – Skaratki; 3 – Mount St. Margaret; 4 – Łomianki); yellow circles – other open-air sites; red triangles – cave sites (after: Wiśniewski 2016, 57 – altered)

can diminish the fact that they are the oldest traces of human presence in this part of Mazovia. Despite the fact that the assemblage from Polesie 1, of such an early age, is a single find in the scale of the Polish Lowlands, it significantly enriches the source base for the Middle Palaeolithic in Poland. Additionally, it proves that the artefacts related to Neanderthal settlement patterns may be found far to the north of the zone of the Southern Polish Uplands (*cf*. Sudoł 2013; Wiśniewski *et al*. 2019).

In this context, it is worth turning to the older references suggesting the presence of Middle Palaeolithic sites in the Polish Lowlands (especially in Central Poland). Two sites from the study period are known from the Central Masovian Lowland area: Skaratki and Mount St. Margaret (Fig. 13; Polish: Góra Św. Małgorzaty; Chmielewski and Kubiak 1962; Chmielewski 1975).

Skaratki, situated about 14 km to the west, is the site with the closest geographical proximity to Polesie (Chmielewski and Kubiak 1962; Chmielewski 1964; 1975). Skaratki has already been firmly established in the literature, and it was particularly frequently mentioned in the syntheses of the prehistory of Polish lands as the northernmost Polish Middle Palaeolithic site. According to the source publications, one of the horizons of the fossil bog located in the vicinity of Skaratki yielded some mammoth remains that possessed traces of cuts and intentional breakage, which were believed to be the results of human activity (Chmielewski and Kubiak 1962). In addition, single pieces of charcoal and a stone chunk were found on the level of their deposition. That level was dated to the turn of the Eemian interglacial and the Early Vistulian glaciation (Chmielewski and Kubiak 1962; Chmielewski 1975). Apart from the aforementioned finds, there are not enough convincing premises confirming the anthropogenic character of the site. The recent archaeozoological analyses significantly question the earlier findings, especially the functional interpretation, according to which it was a hunting camp (Wojtal 2007, 117). According to Piotr Wojtal, the interpretation of this find as a relic of a kill-site, where the partial butchering of a dead (?) mammoth carcass took place, is acceptable. The lack of any essential and diagnostic elements of the mammoth skeleton that could have supported the thesis suggesting the hunting character of the site can be explained by the activity of scavenger animals, which probably dragged the carcass away from the site, as well as by a number of other, natural processes. Nevertheless, the most important problem that appears in the context of the study area is the lack of flint artefacts throughout the site in Skaratki.

Another spot in which a potential find dating back to the Middle Palaeolithic is located lies 44 km west of Polesie 1, at a site in the village of Mount St. Margaret near Łęczyca. Unfortunately, not more than a single flint side-scraper found on the southern slope of a small hill towering over the valley has been mentioned so far – and only a few times. Its morphology has not been fully defined yet – the publications mentioning the site do not contain any characteristics or illustrations of this artefact; however, its Early-Vistulian provenance was suggested (Chmielewski 1964; 1970; 1975; Chmielewska and Chmielewski 1975).

A separate example that fits in the group of potential traces of the Middle Palaeolithic in Central Poland is the recently published stray find of a bifacial piece of the blade type, found in the Vistula alluvium in the vicinity of Łomianki, near Warsaw (Wąs and Migal 2017).

The lack of any analogous finds in the close vicinity of Polesie forces us to search for similar specimens in the inventories obtained from sites located further to the south.

While looking for the data facilitating the cultural attribution of the flint products that we have already described, it should be first of all stressed that tool types such as side-scrapers and knifes with natural half-backs are known specifically from sites representing the Micoquian tradition. This is exemplified by a re-utilized and transformed biface from the Wylotne rock-shelter, as well as by some pieces from Pietraszyn 49 and Samborowice (Mańka *et al.* 2004; 2006; Targosz 2006; Wiśniewski *et al.* 2019; Fajer *et al.* 2008). Similar features are also observed in the case of some Prądnik knives from Ciemna Cave (Krukowski 1939-1948; Kowalski 1967; Urbanowski 2003; Valde-Nowak *et al.* 2014; 2016). Zwoleń, located within the Southern Mazovian Upland, is the closest geographically researched site that yielded some products similar to the specimens obtained from Polesie 1 in terms of stylistics and technology (Schild 2005). The abundant inventory, occupying several stratigraphic levels, included similar tools made of chocolate flint (Tomaszewski 2005).

Due to the geographically isolated character of the find, devoid of a clear archaeological and geological context, there is not enough data to provide even an approximate chronological framework of the site under consideration within the Middle Palaeolithic periodization in Central Europe. Only the morpho-technical characteristics of the features can be perceived as relics of "techno-cultural" phenomena that occurred in particular phases of the Middle Palaeolithic. Looking at the study artefacts from a chronological perspective, they can be hypothetically associated with the characteristics of flint technology operating in the wide spectrum identified with the isotopic MIS5 stage, including the MIS5e substage, basically corresponding to the Eemian interglacial (*cf.* Wiśniewski 2012; 2016). Even the dates obtained for the aforementioned sites from which the well-researched Micoquian inventories originate do not permit a more precise dating of the products from Polesie 1. It is worth mentioning that the vast majority of the researched and dated Micoquian sites are linked with the Early Vistulian period (MIS 5d – 4). Those are the cave sites (Biśnik Cave – complex E, Deszczowa Cave – layers IV-VI, Ciemna Cave and Wylotne rock-shelter) as well the open-air sites (Maków and Zwoleń – the upper cultural level) (Sudoł 2013). Assemblages A2 and A3 from the Biśnik Cave and Piekary III are dated to the Eem Interglacial (MIS 5e). Apart from the already existing data, which prove that the oldest inventories are linked with the Micoquian tradition that occurred in the Polish lands (mainly in the south) as early as during the MIS 8-6 periods (however, the chronological spectrum of the Micoquian could be even wider, *i.e.*, from MIS8 – early assemblages from the Biśnik Cave, to MIS3 – Stajnia Cave), there is not sufficient evidence or such early dates for the finds from Polesie 1 (*cf.* Cyrek 2002; 2010; Żarski *et al.* 2017). On the other hand, some of the well-dated Micoquian sites with knives represent younger periods – MIS 4 or MIS 3 (*i.e.* Ciemna Cave, Pietraszyn 49a, Stajnia Cave) (Valde-Nowak *et al.* 2016; Wiśniewski *et al.* 2019; Żarski *et al.* 2017).

If we accept the assumption that the obtained collection of artefacts is a relic of the presence of Neanderthals in the study region, a cautious attempt can be made to indicate the period in which that could have potentially taken place. It is most likely that humans inhabited the areas of the Wartanian alluvial fans in the Eemian cycle (MIS 5e). Considering the possibility that those areas were explored in the Early Vistulian (as, for example, W. Chmielewski suggested) because of hunting expeditions that were led northward, it seems that, alternatively, inhabitation could have taken place during some relatively warmer periods, such as the Brörup and Odderade Interstadials (MIS 5c, MIS 5a), for example, or in the colder periods, when the head of the ice-sheet was farther north, *e.g.*, in the Świecie stadium (MIS 4) (see: Behre *et al.* 2005). It should be emphasized, however, that these considerations are entirely hypothetical.

CONCLUSIONS

The Middle Palaeolithic products discovered at Polesie 1 are not merely traces of the origins of settlement in the vicinity. Their importance goes far beyond their contribution to the reconstruction of the history of the site itself; rather, they also enrich the image of the Middle Palaeolithic in Poland (*cf.* Kozłowski J.K. and Kozłowski S.K. 1977; Kozłowski 2004; Schild 2005; Wiśniewski 2006). The archaeological sites at which the finds dating to the Middle Palaeolithic were recorded are very rare in the zone located north of the Uplands and the Southern Polish high plains. As is known, Zwoleń represents the most prominent site in the zone of the Southern Mazovian Upland (Schild 2005). Against this background, Polesie 1, located in the Central-Mazovian Lowland area, is currently the northernmost site from the Middle Palaeolithic period in Poland; however, its special location should be accentuated here, along with two other sites: Skaratki and Mount St. Margaret. All of them are located at similar latitudes, creating a kind of sequence of potential points containing relics from the Middle Palaeolithic. Here, the convergence of their locations compared to the regional differentiation of Central Poland is striking: all of them are located just at the southern edge of the Warsaw-Berlin ice-marginal valley, and at the northernmost periphery of the Central Polish Uplands.

The location of such old relics of settlements in the sediment zone that built both huge alluvial fans and sanders in the glacial forefield has already been suggested in the literature (Waga *et al.* 2009). Obviously, further research is required to determine the original stratigraphic position of the material, as well as the scale of its displacement and the degree of natural transformation of the terrain forms and layers potentially containing artefacts. Assuming the late genesis of the glacial plain within which the site is located, it can be assumed that those areas (or parts of them) constituted rather stable, dry and – at the same time – flat concentrations of inselbergs, elevated above the lower levels, or the levels adjacent to the hydrographic network of the glacial forefield (*e.g.*, in the Eemian interglacial or the Early Vistulian glaciation; *cf.* Waga *et al.* 2009, 35).

It is also worth emphasizing that the presence of a Middle Palaeolithic site in the lowland zone should not come as a surprise, especially as compared to the settlement range from that period recognized hitherto (*cf.* Skrzypek *et al.* 2011; White and Pettitt 2011; Wiśniewski *et al.* 2013). There are known individual sites that define the northern periphery of the Neanderthal ecumene, most notably in other regions of Central, Eastern and Western Europe (*e.g.*, sites Lichtenberg and Königsaue in Germany, or Khotylevo in Russia; *cf.* Conrad and Prindiville 2000; Bosinski 2006; Kozłowski J.K. 2004; 2006; Howard *et al.* 2007; Rolland 2010; Hartz *et al.* 2012; Ocherednoi *et al.* 2014; 2014a; Picin 2016; Richter 2016). In the light of the cited data on the chronology of the selected Middle Palaeolithic sites in Poland, the question of dating the artefacts presented in this article must be limited only to the sphere of theoretical digressions.

To conclude, the example of the site of Polesie 1 (even if it does not constitute a homogeneous collection of an undisturbed primary system) clearly indicates the possibility that more sites linked to that period may be discovered in that part of the Lowlands in the near or distant future.

References

Balwierz Z. 2011. Wyniki analizy pyłkowej osadu za stanowiska Polesie-Zwierzynka i Polesie-Ruczaj. In J. Górski, P. Makarowicz and A. Wawrusiewicz (eds), *Osady i cmentarzyska społeczności trzcinieckiego kręgu kulturowego w Polesiu stanowisko 1, woj. łódzkie*. 1 (= *Spatium Archaeologicum* 2). Łódź: Instytut Archeologii Uniwersytetu Łódzkiego, 251-267.

Balwierz Z., Domańska L., Forysiak J., Rzepecki S. and Twardy J. 2009. Archeologiczne i paleośrodowiskowe badania wielokulturowego stanowiska Polesie 1, gmina Łyszkowice (centralna Polska). In L. Domańska, P. Kittel and J. Forysiak (eds), *Środowiskowe uwarunkowania lokalizacji osadnictwa*. Poznań: Bogucki Wydawnictwo Naukowe, 281-300.

Behre K. E., Hölzer A. and Lefdahl G. 2005. Botanical macro-remains and insects from the Eemian and Weichselian site of Oerel (northwest Germany) and their evidence for the history of climate. *Vegetation History and Archaeobotany* 14, 31-53.

Bosinski G. 2006. The Keilmesser Groups (Micoquian) in Germany. In S. K. Kozłowski (ed.), *Wylotne and Zwierzyniec: paleolithic sites in Southern Poland*. Warszawa, Kraków: Instytut Archeologii i Etnologii PAN, 383-400.

Burroni D., Donahue R., Pollard A. M. and Mussi M. 2002.The Surface Alteration Features of Flint Artefacts as a Record of Environmental Processes. *Journal of Archaeological Science* 29, 1277-1287.

Caux S., Galland A., Queffelec A. and Bordes J. G. 2018. Aspects and characterization of chert alteration in an archaeological context: A qualitative to quantitative pilot study. *Journal of Archaeological Science: Reports* 20, 210-219.

Chambers J.C. 2003. Like a rolling stone? The identification of fluvial transportation damage signatures on secondary context bifaces. *Lithics* 24, 66-77.

Chmielewska M. and Chmielewski W. 1975. Paleolit w Polsce Środkowej. *Prace i Materiały Muzeum Archeologicznego i Etnograficznego w Łodzi. Seria Archeologiczna* 22, 9-25.

Chmielewski W. 1964. Dzieje grup ludzkich zamieszkujących ziemie Polski w plejstocenie. In W. Hensel (ed.), *Materiały do prahistorii ziem polskich*. 1. *Paleolit i mezolit*. Warszawa: Instytut Historii Kultury Materialnej Polskiej Akademii Nauk, 1-128.

Chmielewski W. 1970. Wpływ środowiska peryglacjalnego na osadnictwo ludzkie w górnym plejstocenie Polski. *Światowit* 31, 5-18.

Chmielewski W. 1975. Paleolit środkowy i górny. In W. Hensel and W. Chmielewski (eds), *Prahistoria Ziem Polskich*. Wrocław, Warszawa, Kraków, Gdańsk: Ossolineum, 9-158.

Chmielewski W. and Kubiak H. 1962. The find mammoth bonnes at Skaratki in the Łowicz District. *Folia Quaternaria* 9, 1-9.

Chu W. and Hosfield R. 2020. Lithic artifact assemblage transport and micro-wear modification in a fluvial setting: a radio frequency identification tag experiment. *Geoarchaeology* 35(4), 591-608.

Conard N. J. and Prindiville T. J. 2000. Middle Palaeolithic hunting economies in the Rhineland. *International Journal of Osteoarchaeology* 10, 286-309.

Cyrek K. (ed.) 2002. *Jaskinia Biśnik. Rekonstrukcja zasiedlenia jaskini na tle zmian środowiska przyrodniczego*. Toruń: Wydawnictwo Naukowe Uniwersytetu Mikołaja Kopernika.

Cyrek K. 2010. The Biśnik Cave in Southern Poland: reconstruction of the Palaeolithic cave habitation in relation to the environmental changes. In M. Burdukiewicz and A. Wiśniewski (eds), *Middle Palaeolithic Human Activity and Palaeoecology: New Discoveries and Ideas* (= *Studia Archeologiczne* 41). Wrocław: Wydawnictwo Uniwersytetu Wrocławskiego, 69-94.

Domańska L. and Wąs M. 2011. Materiały krzemienne trzcinieckiego kręgu kulturowego ze stanowiska Polesie 1, gm. Łyszkowice, woj. łódzkie. In J. Górski, P. Makarowicz and A. Wawrusiewicz (eds), *Osady i cmentarzyska społeczności trzcinieckiego kręgu kulturowego w Polesiu stanowisko 1, woj. łódzkie*. 1 (= *Spatium Archaeologicum* 2). Łódź: Instytut Archeologii Uniwersytetu Łódzkiego, 276-283.

Domańska L., Rzepecki S., Makarowicz P., Górski J., Wawrusiewicz A., Solecki Ł., Kot K., Piotrowska M., Ficyk M. and Wąs M. 2012. Wyniki ratowniczych badań wykopaliskowych przeprowadzonych w latach 2005-2008 na stanowisku Polesie 1, gm. Łyszkowice, woj. Łódzkie. In S. Kadrow (ed.), *Raport 2007-2008*. Warszawa: Narodowy Instytut Dziedzictwa, 183-216.

Domańska L., Rzepecki S. and Wąs M. 2013. The Polesie site: from Neanderthal Man to the Motorway Builders. In Yung-jo Lee, Gao Xing and Xie Fei (eds), *Suyanggae and her neighbours: 16th International Symposium in Nihewan (China)*. Beijing: Oceanpress, 123-130.

Fajer M., Foltyn E. M., Foltyn E., Pawełczyk W. and Waga J. M. 2008. Site of older phase of the Middle Paleolithic at Samborowice (Upper Silesia). *Analecta Archaeologica Ressoviensia* 3, 9-47.

Fernandes P. and Raynal J. P. 2006. Pétroarchéologie du silex: un retour aux sources. *Comptes Rendus Palevol* 5, 829-837.

Fernandes P., Le Bourdonnec F. X., Raynal J. P., Poupeau G., Piboule M. and Moncel M. H. 2007. Origins of prehistoric flints: The neocortex memory revealed by scanning electron microscopy. *Comptes Rendus Palevol* 6, 557-568.

Frick J. A. 2020. Reflections on the term Micoquian in Western and Central Europe. Change in criteria, changed deductions, change in meaning, and its significance for current research. *Archaeological and Anthropological Sciences* 12(2), 1-39. DOI: 10.1007/s12520-019-00967-5.

Frick J. A., Herkert K., Hoyer C. T. and Floss H. 2017. The performance of tranchet blows at the Late Middle Paleolithic site of Grotte de la Verpillière I (Saône-et-Loire, France). *PLoS ONE* 12 (11), 1-44. e0188990 https://doi.org/10.1371/journal.pone.0188990.

Ginter B. and Kozłowski J. K. 1975 (1990). *Technika obróbki i typologia wyrobów kamiennych paleolitu i mezolitu*. Warszawa: PWN.

Glauberman P. J. and Thorson R. M. 2012. Flint Patina as an Aspect of "Flaked Stone Taphonomy": A Case Study from the Loess Terrain of the Netherlands and Belgium. *Journal of Taphonomy* 10(1), 21-43.

Górski J., Makarowicz P. and Wawrusiewicz A. (eds) 2011. *Osady i cmentarzyska społeczności trzcinieckiego kręgu kulturowego w Polesiu stanowisko 1, woj. łódzkie*. 1 (= *Spatium Archaeologicum* 2). Łódź: Instytut Archeologii Uniwersytetu Łódzkiego.

Hartz S., Beuker J. R. and Niekus M. J. L. Th. 2012. Neanderthal finds in Schleswig Holstein? – Middle Palaeolithic flint scatters in Northern Germany. In M. J. L. Th. Niekus, R. N. E. Barton, M. Street and Th. Terberger (eds), *A mind set on flint. Studies in honour of Dick Stapert*. Groningen: Barkhuis, Groningen University Library, 93-105.

Hosfield R. T. 2011. Rolling stones: understanding river-rolled Paleolithic artifact assemblages. In A. G. Brown, L. S. Basell and K. W. Butzer (eds), *Geoarchaeology, Climate Change, and Sustainability* (= *GSA Special Paper* 476). Boulder, Colorado: Geological Society of America, 37-52.

Hosfield R. T. and Chambers J. C. 2003. Flake Modifications during Fluvial Transportation: Three Cautionary Tales. *Lithics* 24, 57-65.

Howard A. J., Bridgland D., Knight D., McNabb J., Rose J., Schreve D., Westaway R., White M. J. and White T. S. 2007. The British Pleistocene fluvial archive: East Midlands drainage evolution and human occupation in the context of the British and NW European record. *Quaternary Science Reviews* 26, 2724-2737.

Jöris O. 1992. Pradniktechnik im Micoquien der Balver Höhle. *Archäologisches Korrespondenzblatt* 22, 1-12.

Jöris O. 2001. *Der spätmittelpaläolithische Fundplatz Buhlen (Grabungen 1966-69): Stratigraphie, Steinartefakte und Fauna des oberen Fundplatzes* (= *Universitätsforschungen zur prähistorischen Archäologie* 73). Bonn: Verlag Dr. Rudolf Habelt GmbH.

Kondracki J. 1994. *Geografia fizyczna Polski. Mezoregiony fizyczno-geograficzne*. Warszawa: PWN.

Kowalski S. 1967. Ciekawsze zabytki paleolityczne z najnowszych badań archeologicznych (1963-1965) w Jaskini Ciemnej w Ojcowie, pow. Olkusz. *Materiały Archeologiczne* 8, 39-46.

Kozłowski J. K. 2004. *Świat przed „rewolucją" neolityczną* (= *Wielka Historia Świata* 1). Kraków: Wydawnictwo Świat Książki.

Kozłowski J. K. 2006. The Moustero-Levalloisian and/or the Levallois-Mousterian: their place in the evolution and differentiation of the Mousterian techokomplex. In S. K. Kozłowski (ed.), *Wylotne and Zwierzyniec: paleolithic sites in Southern Poland*. Warszawa, Kraków: Instytut Archeologii i Etnologii PAN, 401-416.

Kozłowski J. K. and Kozłowski S. K. 1977. *Epoka kamienia na ziemiach polskich*. Warszawa: PWN.

Krukowski S. 1939-1948. Paleolit. In *Prehistoria ziem polskich*, z. 1 (= *Encyklopedia Polska P.A.U. 4/1*). Kraków: Polska Akademia Umiejętności.

Mańka D., Milewski M. and Targosz M. 2004. Neanderthal economy: recycling stone tools at Poland's Wylotne Shelter. *Antiquity* 78 (301), http://antiquity.ac.uk/projGall/manka/index.html.

Mańka D., Milewski M. and Targosz M. 2006. Homo neanderthalensis economicus – an example of reusing of the raw material in Middle Palaeolithic site Wylotne, Poland. In A. Wiśniewski, T. Płonka and J. M. Burdukiewicz (eds), *The stone: technique and technology*. Wrocław: Uniwersytet Wrocławski, Instytut Archeologii, SKAM Stowarzyszenie Krzemieniarskie, 91-96.

Migal W. and Urbanowski M. 2006. Pradnik knives reused. Experimental approach. In A. Wiśniewski, T. Płonka and J. M. Burdukiewicz (eds), *The stone: technique and technology*. Wrocław: Uniwersytet Wrocławski, Instytut Archeologii, SKAM Stowarzyszenie Krzemieniarskie, 73-89.

Ocherednoi A. K., Vishnyatsky L. B., Voskresenskaya E. V. and Nehoroshev P. 2014. News from the north-east fringe of Neanderthal Europe: recent work at Khotylevo 1 (Bryansk Oblast, Russia). *Antiquity Project Gallery* 88 (341), http://journal.antiquity.ac.uk/projgall/ocherednoi341.

Ocherednoi A. K., Salnaya N. V., Voskresenskaya E. V. and Vishnyatsky L. B. 2014a. New geoarcheological studies at the Middle Palaeolithic sites of Khotylevo 1 and Betovo (Bryansk Oblast, Russia): some preliminary results. *Quaternary International* 326-327, 250-260.

Picin A. 2016. Short-term occupations at the lakeshore: a technological reassessment of the open-air site Königsaue (Germany). *Quartär* 63, 7-32.

Richter J. 2016. Leave at the height of the party: A critical review of the Middle Palaeolithic in Western Central Europe from its beginnings to its rapid decline. *Quaternary International* 411, 107-128.

Rolland N. 2010. The early human occupation of high latitudes, boreal, continental and periglacial habitats: Middle Palaeolithic milestones in Northern Eurasia. In J. M. Burdukiewicz and A. Wiśniewski (eds), *Middle Palaeolithic Human Activity and Palaeoecology: New Discoveries and Ideas* (= *Studia Archeologiczne* 41). Wrocław: Wydawnictwo Uniwersytetu Wrocławskiego, 15-46.

Schild R. (ed.) 2005. *The Killing Fields of Zwoleń. A Middle Paleolithic Kill-Butchering-Site in Central Poland*. Warszawa: Instytut Archeologii i Etnologii PAN.

Shackley M. 1974. Stream abrasion of flint implements. *Nature* 248, 501-502.

Shackley M. 1978. The behaviour of artefacts as sedimentary particles in a fluviatile environment. *Archaeometry* 20, 55-61.

Skrzypek G., Wiśniewski A. and Grierson P. 2011. How cold was it for Neanderthals moving to Central Europe during warm phases of the last glaciation? *Quaternary Science Reviews* 30, 481-487.

Sobczyk K. 1975. Problem prądnika w świetle taksonomii numerycznej. *Sprawozdania Archeologiczne* 27, 255-268.

Solon J., Borzyszkowski J., Bidłasik M., Richling A., Badora K., Balon J., Brzezińska-Wójcik T., Chabudziński Ł., Dobrowolski R., Grzegorczyk I., Jodłowski M., Kistowski M., Kot R., Krąż P., Lechnio J., Macias A., Majchrowska A., Malinowska E., Migoń P., Myga-Piątek U., Nita J., Papińska E., Rodzik J., Strzyż M., Terpiłowski S. and Ziaja W. 2018. Physicogeographical mesoregions of Poland: verification and adjustment of boundaries on the basis of contemporary spatial data. *Geographia Polonica* 91(2), 143-170. DOI 10.7163/GPol.0115.

Stapert D. 1976. Some natural surface modifications on flint in the Netherlands. *Paleohistoria* 18, 7-41.

Sudoł M. 2013. *Kultura mikocka na ziemiach polskich*. Manuscript of PhD thesis, Toruń: Instytut Archeologii UMK.

Sudoł M. and Cyrek K. 2013. Modyfikacje środkowopaleolitycznych wyrobów kamiennych na wybranych przykładach. In M. Nowak, D. Stefański, and M. Zając (eds), *Retusz – jak i dlaczego? „Wieloperspektywiczność elementu twardzowego”* (= *Prace Archeologiczne* 66). Kraków: Instytut Archeologii Uniwersytetu Jagiellońskiego, 29-46.

Targosz M. 2006. Analysis of the flint material of Micoquian-Pradnikian culture from layer 6 at Wylotne Rockshelter in Ojców. In S. K. Kozłowski (ed.), *Wylotne and Zwierzyniec: paleolithic sites in Southern Poland*. Warszawa, Kraków: Instytut Archeologii i Etnologii PAN, 161-177.

Thiry M., Fernandes P., Milnes A. and Raynal J. P. 2014. Driving forces for the weathering and alteration of silica in the regolith: Implications for studies of prehistoric flint tools. *Earth-Science Reviews* 136: 141-154.

Tomaszewski A. J. 2005. Lithic Artifacts. In R. Schild (ed.), *The Killing Fields of Zwoleń. A Middle Paleolithic Kill-Butchery-Site in Central Poland*. Warszawa: Instytut Archeologii i Etnologii PAN, 139-190.

Twardy J. 2008. *Transformacja rzeźby centralnej części Polski Środkowej w warunkach antropopresji*. Łódź: Wydawnictwo Uniwersytetu Łódzkiego.

Twardy J. and Forysiak J. 2011. Charakterystyka środowiska geograficznego okolic stanowiska archeologicznego Polesie 1 oraz neoholoceńskie zmiany jego budowy geologicznej i rzeźby. In J. Górski, P. Makarowicz and A. Wawrusiewicz (eds), *Osady i cmentarzyska społeczności trzcinieckiego kręgu kulturowego w Polesiu stanowisko 1, woj. łódzkie* 1 (= *Spatium Archaeologicum* 2). Łódź: Instytut Archeologii Uniwersytetu Łódzkiego, 227-250.

Urbanowski M. 2003. *Noże prądnickie jako element specyfiki techno-stylistycznej zespołów mikockich*. Manuscript of PhD thesis. Warszawa: Instytut Archeologii UW.

Valde-Nowak P., Alex B., Ginter B., Krajcarz M., Madeyska T., Miękina B., Sobczyk K., Stefański D., Wojtal P., Zając M. and Zarzecka-Szubińska K. 2014. Middle Paleolithic sequences of the Ciemna Cave (Prądnik valley, Poland): The problem of synchronization. *Quaternary International* 326-327, 125-145.

Valde-Nowak P., Alex B., Ginter B., Krajcarz M., Madeyska T., Miękina B., Sobczyk K., Stefański D., Wojtal P., Zając M. and Zarzecka-Szubińska K. 2016. Late Middle Palaeolithic occupations in Ciemna Cave, southern Poland. *Journal of Field Archaeology* 41(2), 1-18. DOI: 10.1080/00934690.2015.1101942

Van Peer P. 1992. *The Levallois Reduction Strategy* (= *Monographs in World Archaeology* 13). Madison: Prehistory Press.

Waga J. M., Foltyn E. and Sady A. 2009. Stanowisko w Gardawicach na Górnym Śląsku – potwierdzenie modelu migracji ludzi na przedpolu lądolodu odrzańskiego. In L. Domańska, P. Kittel and J. Forysiak (eds), *Środowiskowe uwarunkowania lokalizacji osadnictwa*. Poznań: Bogucki Wydawnictwo Naukowe, 29-38.

Wąs M. 2009. Problemy badawcze środkowopaleolitycznych materiałów krzemiennych z Mazowsza. Przypadek Polesia 1, pow. Łowicz. *Abstract book 6th SKAM Flint Technology Workshop, Małkocin 27-30.X.2009*. Szczecin, Małkocin, 14.

Wąs M. and Migal W. 2017. Środkowopaleolityczne ostrze znalezione nad Wisłą w okolicach Warszawy. In A. Marciniak-Kajzer, A. Andrzejewski, A.Golański, S. Rzepecki and M. Wąs (eds), *Nie tylko krzemienie – not only flints. Studia ofiarowane prof. Lucynie Domańskiej w 45-lecie pracy naukowo-dydaktycznej i w 70. rocznicę urodzin*. Łódź: Instytut Archeologii Uniwersytetu

Łódzkiego, Łódzka Fundacja Badań Naukowych, Stowarzyszenie Naukowe Archeologów Polskich, Oddział w Łodzi, 21-32.

Weiss M., Lauer T., Wimmer R. and Pop C. M. 2018. The Variability of the Keilmesser-Concept: a Case Study from Central Germany. *Journal of Paleolithic Archaeology* 1, 202–246.

White M. J. and Pettitt P. B. 2011. The British Late Middle Palaeolithic : an interpretative synthesis of Neanderthal occupation at the northwestern edge of the pleistocene world. *Journal of World Prehistory* 24(1), 25-97.

Wiśniewski A. 2006. *Środkowy paleolit w dolinie Odry*. Wrocław: Wydawnictwo Uniwersytetu Wrocławskiego.

Wiśniewski A. 2012. *Przejawy zachowań technologicznych ludzi u schyłku plejstocenu środkowego. Przykłady z Europy Środkowej* (= *Studia Archeologiczne* 44). Wrocław: Wydawnictwo Uniwersytetu Wrocławskiego.

Wiśniewski A. 2016. The First humans. Societies of the Lower and Middle Palaeolithic. In J. Kabaciński (ed.), *The Past Societies. Polish Lands from the First Evidence of Human Presence to the Early Middle Ages, vol. 1: 500,000 – 5,500 BC*. Warszawa: Instytut Archeologii i Etnologii Polskiej Akademii Nauk, 46-96.

Wiśniewski A., Adamiec G., Badura J., Bluszcz A., Kowalska A., Kufel-Diakowska B., Mikołajczyk A., Murczkiewicz M., Musil R., Przybylski B., Skrzypek G., Stefaniak K. and Zych J. 2013. Occupation dynamics north of the Carpathians and Sudetes during the Weichselian (MIS5d-3): The Lower Silesia (SW Poland) case study. *Quaternary International* 294, 20-40.

Wiśniewski A., Lauerb T., Chłoń M., Pyżewicz K., Weiss M., Badura J., Kalicki T. and Zarzecka-Szubińska K. 2019. Looking for provisioning places of shaped tools of the late Neanderthals: a study of a Micoquian open-air site Pietraszyn 49a (southwestern Poland). *Palevol* 18(3), 367-389.

Wojtal P. 2007. *Zooarchaeological studies of the Late Pleistocene sites in Poland*. Kraków: Institute of Systematics and Evolution of Animals Polish Academy of Sciences.

Żarski M., Winter H., Nadachowski A., Urbanowski M., Socha P., Kenig K., Marcinkowski B., Krzemińska E., Stefaniak K., Nowaczewska W. and Marciszak A. 2017. Stratigraphy and palaeoenvironment of Stajna Cave (southern Poland) with regard to habitation of the site by Neanderthals. *Geological Quarterly*, 61(2), 350–369. DOI: 10.7306/gq.1355.

SPRAWOZDANIA ARCHEOLOGICZNE 72/2, 2020
PL ISSN 0081-3834
DOI: 10.23858/SA/72.2020.2.1844

Janine Mazanec[1], Susanne Hummel[2], Thomas Saile[3]

"RAPTUS SABINAE?" COMPLEMENTED: MOLECULAR GENETIC STUDIES ON A FEMALE *CALVARIUM* OF THE *BANDKERAMIK* SETTLEMENT OF ROVANTSI IN VOLHYNIA (UA)

ABSTRACT

Mazanec J., Hummel S., Saile T. 2020. "Raptus Sabinae?" complemented: molecular genetic studies on a female *calvarium* of the *Bandkeramik* settlement of Rovantsi in Volhynia (UA). *Sprawozdania Archeologiczne* 72/2, 201-211.

A fragmented human cranial calotte was discovered in a Bandkeramik (LBK) settlement context at Rovantsi in Volhynia (UA). The female *calvarium* of a mature woman with an age of about 45-50 years was uncovered in the deepest part of a settlement pit. It can be dated to round about 5,250 BC. PCR-based molecular genetic analyses were successfully performed on these extremely rare skeletal remains from the Early Neolithic of Ukraine. The female family line can be assigned to haplogroup T2, in which it represents the lineage T2c1d+152. The woman was lactose intolerant, like most LBK individuals. Her hair colour was brown, and her eye colour was found to be hazel.

Keywords: ancient DNA (aDNA), human mitochondrial DNA haplogroup, DNA profiling, polymerase chain reaction (PCR), Early Neolithic, Bandkeramik (LBK), Ukraine

Received: 12.04.2020; Revised: 22.05.2020; Accepted: 28.06.2020

1 Department of Historic Anthropology and Human Ecology, Johann-Friedrich-Blumenbach Institute for Zoology and Anthropology, University of Göttingen, Bürgerstraße 50, 37073 Göttingen, Germany; jmazane@gwdg.de; https://orcid.org/0000-0002-8437-2084

2 Department of Historic Anthropology and Human Ecology, Johann-Friedrich-Blumenbach Institute for Zoology and Anthropology, University of Göttingen, Bürgerstraße 50, 37073 Göttingen, Germany; shummel1@gwdg.de; https://orcid.org/0000-0002-3647-8968

3 Chair of Prehistory and Early History, Institute of History, University of Regensburg, Universitätsstraße 31, 93053 Regensburg, Germany; thomas.saile@ur.de; https://orcid.org/0000-0003-0834-5567

INTRODUCTION

In a previous volume of this journal, the female *calvarium* of Rovantsi was presented (Bardetskiy *et al*. 2017). It belongs to a mature woman with an age range of *ca*. 45-50 years. The missing jawbone and face of the *calvarium*, as well as some cut-marks, indicate that it had already undergone several post-mortem processes before it found its way into a settlement pit (Fig. 1). The fragmented skull was located about 2.6 m below ground level, in the deepest part of pit 19 north of house I, which had been dug almost 3 m into the loess (Bardetskiy *et al*. 2017, 239, fig. 4). Due to the calcareous soil conditions, the preservation of the bone can be characterized as very good.

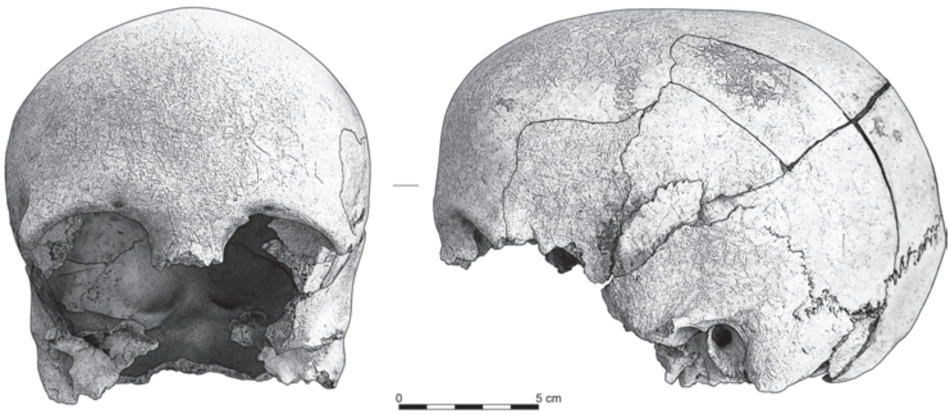


Fig. 1. Rovantsi (UA). Female *calvarium* from pit 19

The site, which lies on a flat loess terrace upon the right bank of the Styr River, is rich in remarkable finds and can be dated to a later stage of the Želiezovce phase, *i.e*. to the 52nd-51st century BC. The skull fragment was found in pit 19 together with Šarka type pottery (Bardetskiy *et al*. 2017, 237, fig. 5; Saile *et al*. 2018, 30-31, fig. 4-5). Two radiocarbon dates obtained from samples of the *calvarium* placed its origin in the 53rd century BC (KIA-53054: 6287±29 BP; MAMS-35954: 6263±29 BP). At first sight, the dates seem to be too old. However, the discrepancy between the death of the woman and the time of the pit's formation may be explained by a long-term ritual use of the body after the death of the person. About five generations later, the human remains were finally deposited in the settlement pit mentioned above. Taphonomic processes explain the difference between the archaeological ceramic dating and the dating of the bone determined by natural science.

Until today the skull fragment is the easternmost preserved human skeletal remain with a *Bandkeramik* cultural affiliation (Dębiec and Saile 2015).The dimensions of the robust skull differ from the expected values of the more gracile LBK average (Bardetskiy *et al*. 2017, 246-250). May this be understood as a reference to a Mesolithic background of the person? Since immigrant LBK settlers introduced agriculture, cattle breeding and a sedentary way of life not only in Central Europe but also in the landscapes northeast of the Carpathians, the question of their relationship to the Mesolithic population may claim special interest.

So far, analyses of ancient DNA from numerous human skeletal finds of the LBK have resulted in the identification of genetic features of the Early Neolithic. These characteristics range from phenotypic to metabolic traits as well as maternal and paternal haplotype distributions, which among other things confirms the hypothesis of immigration from the Near East to Central Europe (Haak *et al*. 2010; Brandt *et al*. 2013; Mathieson *et al*. 2015). The very good bone preservation of the Rovantsi find made successful DNA analyses appear possible. Therefore, genetic analyses based on polymerase chain reaction (PCR) and a genome-wide assessment of single nucleotide polymorphisms (SNPs) were performed. We believe that the results obtained should be of interest to those studying the Early Neolithic of East Central Europe.

SAMPLE PREPARATION, DNA EXTRACTION AND ANALYSES

The genetic analyses were performed on the left petrous bone of the *calvarium*. For this purpose, a small piece weighing less than one gram was cut out from the cranial rim of the *pars petrosa ossis temporalis*.

To remove any possibly adhering modern DNA, the sample was immersed in a 6% NaClO solution (sodium hypochlorite) for 5 min., then rinsed in bi-distilled water for 15 min. and dried overnight at room temperature. The sample was then ground to a fine powder for 20 s at 24 Hz. in a ball triturator (MM200, Retsch®). The following preparation and all steps of the analysis were carried out repeatedly to ensure the reproducibility of the results.

Four aliquots of 0.25 g each of the powder were incubated in 3900 µl EDTA (0.5 M, pH 8.3) including 100 µl of Proteinase K for 18 h in order to chemically disolve the inorganic apatite component of the bone powder and to break down the protein backbone of the bone cells and their nuclei. The subsequent steps of DNA isolation and purification were conducted following a standard protocol (Frischalowski *et al*. 2015; Flux *et al*. 2017). This protocol starts with an organic extraction using phenol and chloroform and is continued in the QIAvac extraction system (Qiagen®) using MinElute® columns in order to separate the DNA molecules and to reduce the finale volume of the extract to 50 µl.

A PCR approach was chosen for the analysis of the regional origin of the maternal lineage, the investigation of the lactase persistence, and the proof of authenticity of the ancient DNA through short tandem repeat (STR) typing (Hummel 2003; Butler 2015). All PCRs were done from two to four DNA extracts. The reagent mixtures and amplification procedures followed the standard protocols for the amplification of ancient DNA, i.e. the primers were designed with particular respect to enhanced sensitivity and specificity and up to 40 amplification cycles were performed (Hummel 2003).The analyses included the processing of an extraction blank (EB), no template controls (NTC), and positive controls (PC).

A genome-wide single nucleotide polymorphism (SNP) typing was used to detect the pigmentation of hair and eyes. For this, a set of 24 SNPs (*e.g.* Kayser 2015; Söchtig *et al.* 2015) located on different human chromosomes was analysed using Fluidigm® technology (Schmidt *et al.*2020).

ANCIENT DNA AUTHENTICATION

The STR typing, also known as genetic fingerprinting, was performed using a mini STR heptaplex kit (Seidenberg *et al.* 2012), including six highly polymorphic markers and the amelogenin gene indicating biological sex (Table 1). Due to the unique combination of alleles in the bi-allelic markers, proof of authenticity of the ancient DNA was also achieved.

Moreover, the results of STR typing already indicated that the DNA showed the characteristic signs of degradation. In the agarose gel electrophoresis of the STR amplification products (Fig. 2), this can be deduced from the comparatively weak signal strengths, although the allele determination of all four analytic approaches led to a complete STR typing (= "consensus" conf. Table 1). However, a closer look at the individual results also reveals typical signs of DNA degradation. While some of the single STRs (*e.g.* D21S11 and D5S818) occasionally show allelic dropouts, in FGA (2nd PCR conf. Table 1) even an allelic drop-in can be observed (Butler 2015). Both types of events were attributed to the presence of only small amounts of intact indigenous DNA, which is a function of the age of the skull.

Table 1. Heptaplex typing for authentication

Amplification of Amelogenin and STRs	Extract no.	Sex determination	STR markers					
		Amelogenin	D13S317	D21S11	D18S51	TH01	D5S818	FGA
1.PCR (a)	1	X/-	11/-	31.2/32.2	12/-	6/9	11/-	19/-
1.PCR (b)	1	X/-	11/-	31.2/-	12/-	6/9	11/12	19/-
2.PCR	2	X/-	11/-	32.2/-	12/-	6/9	11/-	21/-
3.PCR	3	X/-	11/-	31.2/32.2	12/-	6/9	11/12	19/23
4.PCR	4	X/-	11/-	31.2/-	12/-	6/9	11/12	19/23
Consensus		X/X	11/11	31.2/32.2	12/12	6/9	11/12	19/23

Key: in some of the genetic markers (Amelogenin, D13S317, D18S51) only one allele occurred in the multiple amplifications, hence, the marker was considered to reveal a homozygous genotype; in other markers (D21S11, D5S818), which were considered to reveal a heterozygous genotype, occasionally allelic dropouts of one of the alleles occurred in single amplifications due to DNA degradation

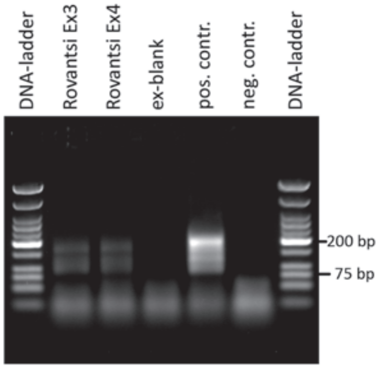


Fig. 2. Electrophoresis of the Heptaplex amplification products of PCRs 3 and 4. After 35 amplification cycles, comparatively faint bands are visible for the Rovantsi sample on the gel. Additionally, control samples were carried along in the analysis

MATERNAL FAMILY LINEAGE

Two fragments of mitochondrial hypervariable regions (HVRs) were analysed to determine the maternal lineage. HVR I was studied by amplification and sequencing of a 435-base-pair (bp) fragment from extracts 1 and 2, while HVR II is represented by a 379 bp fragment amplified from all four extracts. For the Taq cycle sequencing, readily prepared kits (Big Dye® Terminator kit v1.1, Applied Biosystems®) and standard procedures were used. For both fragments, the respective amplification primers served as forward and reverse sequencing primers (*e.g.* Fehren-Schmitz *et al.* 2010; Seidenberg 2016).

The amplification and sequencing analyses were fully reproducible and enabled clear basecalls, although signs for DNA degradation (Hofreiter *et al.* 2001) are visible in the sequences of the HVRs (Fig. 3). Characteristic is the so-called deamination, whereby cyto-

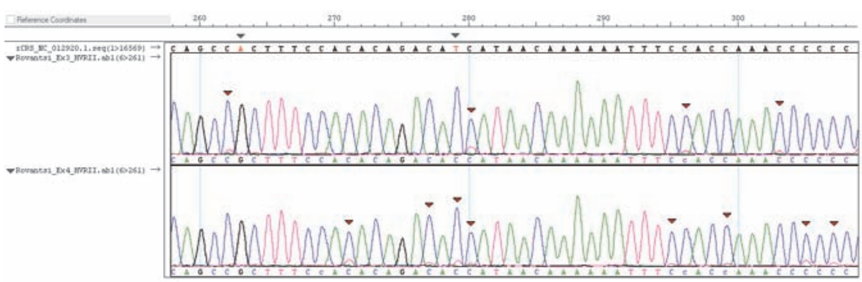


Fig. 3. Part of the HVR II sequence. Nucleotide positions with signs of weak deamination are marked by red arrows. Characteristic are small red peaks (Thymine), which can be recognized underneath some of the large blue peaks (Cytosine). Further, two deviations from the reference sequence (rCRS) are marked with grey arrows. The deviations in the Rovantsi sample sequence belong to the polymorphisms characteristic for the Haplogroup T2c1d+152

Table 2. Mitochondrial sequence and haplotyping

Amplifications of HVRs I and II	Extract no.	Nucleotide positions in HVRs I and II											Haplotype
		T 16126	C 16292	C 16294	A 73	G 143	T 146	T 152	A 263	T 279	del 309.1	del 315.1	
1.PCR HVR I	1	C	T	T									
2.PCR HVR I	2	C	T	T									
1.PCR HVR II	1				G	A	C	C	G	C	C	C	
2.PCR HVR II	2				G	A	C	C	G	C	C	C	
3.PCR HVR II	3				G	A	C	C	G	C	C	C	
4.PCR HVR II	4				G	A	C	C	G	C	C	C	
Consensus		C	T	T	G	A	C	C	G	C	C	C	T2c1d+152

Key: Nucleotide positions are given with the bases realized in the human mitochondrial reference sequence (rCRS); del = deletion; the haplotype was determined using the database EMPOP (Parson and Dür 2007)

Table 3. Genotypes and phenotypes for hair and eye colour

SNP Accession No.	rs1129038	rs11538871	rs12203592	rs12821256	rs12896399	rs12913832	rs12931267	rs1393350	rs1545397	rs16891982	rs1800407	rs1805005	rs1805006	rs1805009	rs2228479	rs2378249	rs2402130	rs28777	rs35264875	rs4778138	rs4959270	rs6119471	rs7495174	hair colour	eye colour
Rovantsi	AG	G	C	T	T	GA	C	G	A	GC	G	G	C	G	G	A	A	A	TA	GA	AC	C	A	brown	hazel-brown

Key: SNP Accession No. = SNPs are identified through their accession numbers in the NCBI database GeneBank; hair colour = was identified through the software "Snipper" (Philipps et al. 2007); eye colour = was identified through the use of the softwares "Snipper" (Philipps *et al.* 2007) and "HIrisplex" (Chaitanya *et al.* 2018); hazel = intermediate eye colour ranging from green-brown sine nucleotides in some of the target sequences of the DNA extract are damaged and therefore misread during amplification, which in turn leads to their replacement by thymine nucleotides.

The results of the sequencing (Table 2) allow us to assign the maternal lineage to the haplogroup T2, and within this group they represent the lineage T2c1d+152.

DIGESTION OF UNFERMENTED MILK

The study of so-called lactase persistence, which genetically determines the ability to digest milk in adults, was carried out by amplifying a 146 bp fragment on chromosome 2, which frames the LCT-13910 locus associated with lactase persistence (Enattah *et al.* 2002). The respective amplification primers are designed for being introduced to an STR multiplex amplification kit, i.e. they reveal a dye labelling in one primer for fragment length analysis (Fulge 2005; Seebode 2010). The co-amplification of STRs along with the Lac-primers also ensure the proof of authenticity for the amplification of this single bi-allelic marker. The Lac-primers replace the amelogenin primers and are designed to detect a mismatch in the 3' region of the upper primer and introduce a cleavage site for enzymatic analysis. The genotyping of the C/T-polymorphism at the LCT-13910 locus was done through an enzymatic digestion and possible cleavage by the endonuclease Hinf I. The function of the cleavage reaction is controlled through the co-digestion of one of the STRs, which is independent from the LCT-13910 locus.

The results of the analysis show that the female individual has a homozygous expression of the C allele (Fig. 4). This indicates that she was lactose intolerant, meaning that she could not digest unfermented milk or milk products.

EYE AND HAIR COLOUR

The SNP typing for determining hair and eye colour was carried out in a so-called high-throughput approach targeting the relevant 24 SNPs. Basically, the standard procedures as provided by the manufacturer Fluidigm® were used. This comprises a multi-step analysis, including a software-based evaluation of the SNP typing. However, the initial enrichment step had been modified by increasing the number of amplification cycles from 14 to 20 to enable the investigation of minute amounts of ancient DNA (Schmidt *et al.* 2020).

The analyses showed that the colour of the woman's eyes was hazel, with the hazel usually shifting from light brown to green. In addition, the analysis of the SNPs that determine hair colour revealed a brown appearance (Table 3). Both phenotypic characteristics are consistent with each other (Söchtig *et al.* 2015).

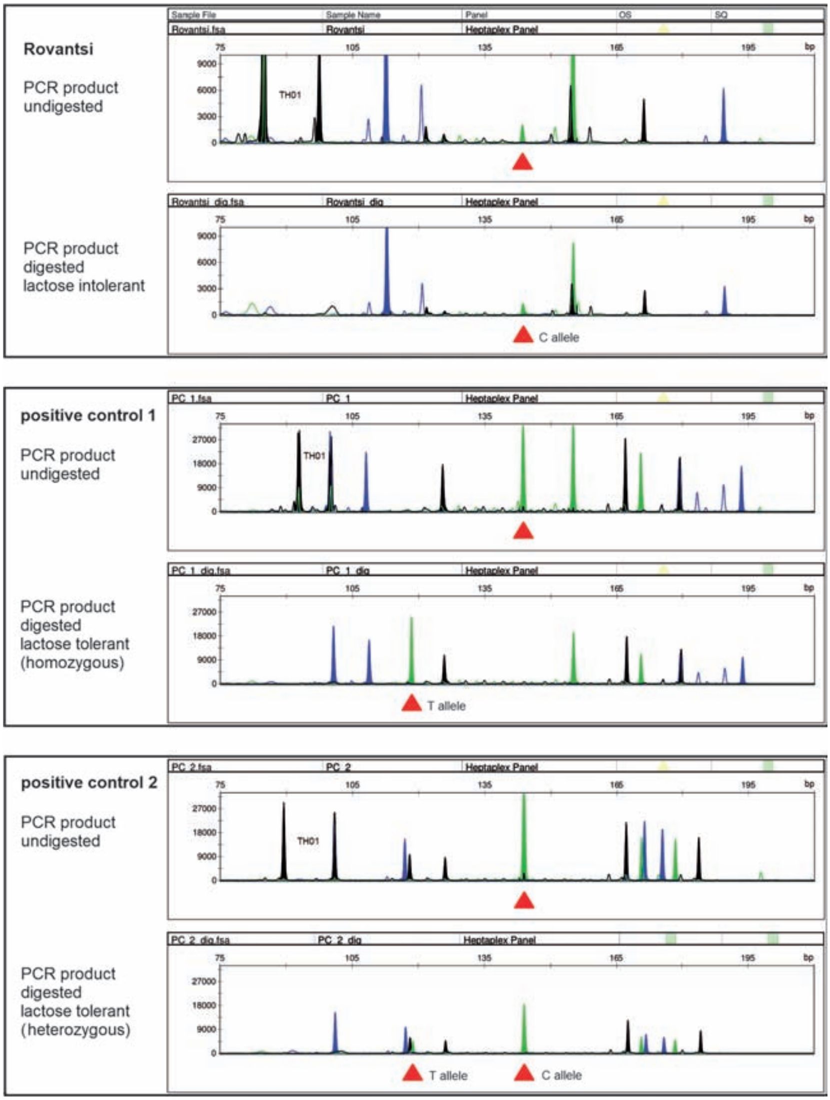


Fig. 4. Electropherograms of the Rovantsi sample and two positive controls showing the results of the lactose persistence investigation. The relevant peaks are marked by red arrows (121 and 146 bp); all other peaks represent co-amplified STRs, including the TH01 locus. Lactose intolerance is indicated by the unaffected peak at 146 bp after enzymatic digestion, representing the C allele. Lactose persistence is indicated by either a fully digested PCR product (PC1, homozygous, T allele) or a partially digested PCR product (PC2, heterozygous, C and T alleles). The homozygous state of lactose persistence can be recognized through the complete disappearance of the peak from its original position at 146 bp and the appearance of a peak at 121 bp. In the heterozygous case only part of the PCR product is digested, leading to a diminished peak height at the 146 bp position (C allele) and the additional occurrence of a peak at the 121 bp position (T allele). The success of the enzymatic digestion is monitored by TH01, which is co-digested in the process and thus disappears from the electropherogram

RESULTS AND DISCUSSION

Mitochondrial DNA haplotyping revealed the identification of lineage T2c1d+152, a subgroup of the haplogroup T2. This has a Near Eastern origin and is thought to have spread to Europe about 10,000 years ago (Pala *et al*. 2012; Strien 2018, 18). It is one of the most frequent haplogroups found in LBK contexts (Haak *et al*. 2005; Haak *et al*. 2010; Brandt *et al*. 2013). The investigations also showed that the individual was lactose intolerant, which, in contrast to today, was the common genetic disposition of European sat the time (Mathieson *et al*. 2015). The analysis of 24 SNPs made it possible to determine the hair colour of the woman as brown and her eye colour as hazel. Both phenotypic characteristics are mutually consistent (Söchtig *et al*. 2015). They are in accordance with a Near Eastern origin. These results are similar to those obtained from the majority of the aDNA data analysed so far from this time (*e.g*. Cerqueira *et al*. 2012; Deng and Xu 2018), although the phenotypic characteristics in Early Neolithic Europe appear to have shown considerable variability (Olalde *et al*. 2014). The findings support an assignment of the mature woman to the *Bandkeramik*. The robustness of the skull thus reflects the considerable morphological variability of the individuals of this culture.

References

Bardetskiy A. B., Dębiec M., Potekhina I. D. and Saile T. 2017. *Raptus Sabinae?* Of a female *calvarium* from the *Bandkeramik* settlement of Rovantsi in Volhynia. *Sprawozdania Archeologiczne* 69, 235-251.

Brandt G., Haak W., Adler C. J., Roth C., Szécsényi-Nagy A., Karimnia S., Möller-Rieker S., Meller H., Ganslmeier R., Friederich S., Dresely V., Nicklisch N., Pickrell J. K., Sirocko F., Reich D., Cooper A., Alt K. W. and Genographic Consortium. 2013. Ancient DNA reveals key stages in the formation of central European mitochondrial genetic diversity. *Science*. 2013 Oct 11; 342(6155), 257-261.

Butler J. M. (ed.) 2015.*Advanced Topics in Forensic DNA Typing: Interpretation*. San Diego, CA, USA: Academic Press.

Cerqueira C. C. S., Paixão Côrtes V. R., Zambra F. M. B., Salzano F. M., Hünemeier T. and Bortolini M.C. 2012. Predicting homo pigmentation phenotype through genomic data: From neanderthal to James Watson. *American Journal of Human Biology* 24(5), 705-709.

Chaitanya L., Breslin K., Zuńiga S., Wirken L., Pospiech E., Kukla-Bartoszek M., Sijen T., de Knijff P., Liu F., Branicki W., Kayser M. and Walsh S. 2018. The HIrisPlex-S system for eye, hair and skin colour prediction from DNA: Introduction and forensic developmental validation. *Forensic Science International Genetics* 35, 123-135.

Dębiec M. and Saile T. 2015. Zu den östlichsten Siedlungen der frühen Bandkeramik. *Praehistorische Zeitschrift* 90, 1-19.

Deng L. and Xu S. 2018. Adaptation of human skin color in various populations. *Hereditas* (2018) 155:1.

Enattah N. S., Sahi T., Savilahti E., Terwilliger J. D., Peltonene L. and Järvelä I. 2002. Identification of a variant associated with adult-type hypolactasia. *Nature Genetics* 30, 233-237.

Fehren-Schmitz L., Reindel M., Cagigao E. T., Hummel S. and Herrmann B. 2010. Pre-Columbian population dynamics in coastal southern Peru. A diachronic investigation of mtDNA pattern in the Palpa region by ancient DNA analysis. *American Journal of Physical Anthropology* 141(2), 208-221.

Flux A. L., Mazanec J., Strommenger B. and Hummel S. 2017. Staphylococcus aureus Sequences from Osteomyelitic Specimens of a Pathological Bone Collection from Pre-Antibiotic Times. *Diversity* 9, 43.

Frischalowski M., Seidenberg V., Grosskopf B., Wulf F. W. and Hummel S. 2015. Molekulargenetische Untersuchung des Verwandtschaftsverhältnisses von möglichen Mutter-Kind-Bestattungen aus dem frühneuzeitlichen Eldagsen. *Nachrichten aus Niedersachsens Urgeschichte* 84, 193-206.

Fulge M. 2005. *Laktosetoleranz in der bronzezeitlichen Lichtensteinhöhle – Molekulargenetischer Nachweis des Polymorphismus C/T 13910 an prähistorischer DNA*. Göttingen 2005 [unpublished state examination thesis].

Haak W., Forster P., Bramanti B., Matsumura S., Brandt G., Tänzer M., Villems R., Renfrew C., Gronenborn D., Alt K. W. and Burger J. 2005. Ancient DNA from the first European farmers in 7500-year-old Neolithic sites. *Science* 310(5750), 1016-1018.

Haak W., Balanovsky O., Sanchez J. J., Koshel S., Zaporozhchenko V., Adler C. J., Der Sarkissian C. S. I., Brandt G., Schwarz C., Nicklisch N., Dresel V., Fritsch B., Balanovska E., Villems R., Meller H., Alt K. W., Cooper A. and the Genographic Consortium. 2010. Ancient DNA from European Early Neolithic Farmers Reveals Their Near Eastern Affinities. *PLoS Biol*. 2010 Nov 9;8(11): e1000536.

Hofreiter M., Jaenicke V., Serre D., von Haeseler A. and Pääbo S. 2001. DNA sequences from multiple amplifications reveal artifacts induced by cytosine deamination in ancient DNA. *Nucleic Acids Res*. 29(23), 4793-4799.

Hummel S. 2003. *Ancient DNA Typing. Methods, Strategies, and Applications*. Berlin, Heidelberg: Springer.

Kayser M. 2015. Forensic DNA Phenotyping: Predicting human appearance from crime scene material for investigative purposes. *Forensic Science International: Genetics* 18, 33-48.

Mathieson I., Lazaridis I., Rohland N., Mallick S., Patterson N., Roodenberg S., Harney E., Stewardson K., Fernandes D., Novak M., Sirak K., Gamba C., Jones E., Llamas B., Dryomov S., Pickrell J., Arsuaga J., Bermúdez de Castro J.-M., Carbonell E., Gerritsen F., Khokhlov A., Kuznetsov P., Lozano M., Meller H., Mochalov O., Moiseyev V., Guerra M. A. R., Roodenberg J., Vergčs J. M., Krause J., Cooper A., Alt K.W., Brown D., Anthony D., Lalueza-Fox C., Haak W., Pinhasi R. and Reich D. 2015. Genome-wide patterns of selection in 230 ancient Eurasians. *Nature* 528(7583), 499-503.

Olalde I., Allentoft M. E., Sánchez-Quinto F., Santpere G., Chiang C. W. K., DeGiorgio M., Prado-Martínez J., Rodríguez J. A., Rasmussen S., Quilez J., Ramírez O., Marigorta U. M., Fernández-Callejo M., Prada M. E., Encinas J. M. V., Nielsen R., Netea M. G., Novembre J., Sturm R. A., Sabeti P., Marqučs-Bonet T., Navarro A., Willerslev E. and Lalueza-Fox C. 2014. Derived Immune and Ancestral Pigmentation Alleles in a 7,000-Year-old Mesolithic European. *Nature* 2014 March 13; 507(7491).

Pala M., Olivieri A., Achilli A., Accetturo M., Metspalu E., Reidla M., Tamm E., Karmin M., Reisberg T., Hooshiar Kashani B., Perego U. A., Carossa V., Gandini F., Pereira J. B., Soares P., Angerhofer N., Rychkov S., Al-Zahery N., Carelli V., Sanati M. H., Houshmand M., Hatina J., Macaulay V., Pereira L., Woodward S. R., Davies W., Gamble C., Baird D., Semino O., Villems R., Torroni A. and Richards M. B. 2012. Mitochondrial DNA signals of late glacial recolonization of Europe from near eastern refugia. *American Journal of Human Genetics* 90(5), 915-924.

Parson W. and Dür A. 2007. EMPOP – A forensic mtDNA database. *Forensic Science International: Genetics* 1(2), 88-92. https://empop.online/.

Phillips C., Salas A., Sánchez J. J., Fondevila M., Gómez-Tato A., Álvarez-Dios J., Calaza M., Casares de Cal M., Ballard D., Lareu M. V., Carracedo Á. and The SNPforID Consortium. 2007. Inferring ancestral origin using a single multiplex assay of ancestry-informative marker SNPs. *Forensic Science International: Genetics* 1(3-4), 273-280. www.http://mathgene.usc.es/snipper/.

Saile Th., Sedlmaier H. and Dębiec M. 2018. Šárka in Wolhynien und in Bayern. Ein Beitrag zu spätbandkeramischen Dreiecksintarsien. *Archäologisches Korrespondenzblatt* 48, 27-38.

Schmidt N., Schücker K., Krause I., Dörk T., Klintschar M. and Hummel S. 2020. Genome-wide SNP typing of ancient DNA – Determination of hair and eye colour of Bronze Age humans from their skeletal remains. *American Journal of Physical Anthropology* 2020, 1-11.

Seebode C. 2010. *Das Skelettkollektiv der Lichtensteinhöhle als genetisches Archiv – Untersuchungen des Laktosetoleranzmarkers C/T13910 an den bronzezeitlichen Individuen*. Göttingen 2010 [unpublished diploma thesis].

Seidenberg V. 2016. *Ein bronzezeitlicher Familienclan als genetisches Archiv – Morphologisch-paläogenetische Bearbeitung des Skelettkollektivs aus der Lichtensteinhöhle*. Göttingen 2016 [unpublished PhD thesis].

Seidenberg V., Schilz F., Pfister D., Georges L., Fehren-Schmitz L. and Hummel S. 2012. A new mini-STR heptaplex system for genetic fingerprinting of ancient DNA from archaeological human bone. *Journal of Archaeological Science* 39, 2012, 3224-3229.

Söchtig J., Phillips C., Marońas O., Gómez-Tato A., Cruz R., Alvarez-Dios J., Casares de Cal M.-Á., Ruiz Y., Reich K., Fondevila M., Carracedo Á. and Lareu M. V. 2015. Exploration of SNP variants affecting hair colour prediction in Europeans. *International Journal of Legal Medicine* 129(5), 963-975.

Strien H.-C. 2018.*Westexpansion und Regionalisierung der Ältesten Bandkeramik* (= *Kommunikation und Wandel. Monographien zu Entwicklungen in der Urgeschichte* 1). Kerpen-Loogh: Welt und Erde Verlag.

SPRAWOZDANIA ARCHEOLOGICZNE 72/2, 2020
PL ISSN 0081-3834
DOI: 10.23858/SA/72.2020.2.2261

Guram Chkhatarashvili[1], Valery Manko[2], Amiran Kakhidze[3], Ketevan Esakiya[4], Maia Chichinadze[5], Marianna Kulkova[6], Mikhail Streltcov[7]

THE SOUTH-EAST BLACK SEA COAST IN THE EARLY HOLOCENE PERIOD (ACCORDING TO INTERDISCIPLINARY ARCHAEOLOGICAL INVESTIGATIONS AT THE KOBULETI SITE)

ABSTRACT

Chkhatarashvili G., Manko V., Kakhidze A., Esakiya K., Chichinadze M., Kulkova M., Streltcov M. 2020. The South-East Black Sea coast in the Early Holocene period (according to interdisciplinary archaeological investigations at the Kobuleti site), *Sprawozdania Archeologiczne* 72/2, 213-230.

The paper presents the results of interdisciplinary research carried out at the Kobuleti Early Holocene site. Typological and use-wear analyses of stone artifacts helped to define the main branch of the economy of humans at the site. Palynological studies were conducted to reconstruct the paleoenvironment. The investigated plant spores proved that the climate in the Early Holocene was warm. Definition of an absolute date by means of the radiocarbon method (^{14}C) represents an innovation conducted in the study of the Stone Age in Ajara.

Keywords: Kobuleti, Artifacts, Interdisciplinary investigations, Early Holocene
Received: 02.07.2020; Revised: 06.08.2020; Accepted: 27.10.2020

1 Batumi Archaeological Museum, Chavchavadze str., 77, 6010, Batumi, Georgia; gurami.chxa87@yahoo.com; https://orcid.org/0000-0002-0568-9797
2 Institute of Archaeology, National Academy of Science of Ukraine, Heroyiv Stalinhradu 12, 04210, Kiev, Ukraine; valery_manko@yahoo.com; https://orcid.org/0000-0002-2990-7234
3 Batumi Shota Rustaveli State University, Ninoshvili 32/35, 6010, Batumi, Georgia; amirankakhidze35@gmail.com; https://orcid.org/0000-0003-2319-0436
4 Archaeological Research Institute, Georgian National Museum, Rustaveli ave. 3, 0105, Tbilisi, Georgia, k.esakia@gmail.com; https://orcid.org/0000-0001-7727-8949
5 Paleoantropology and Paleobiology Research Institute, Georgian National Museum, Rustaveli ave. 3, 0105, Tbilisi, Georgia; maizdr001@gmail.com; https://orcid.org/0000-0003-3209-3654
6 Herzen State Pedagogical University of St. Peterbourg, nab. Moyki, 48/12, 191186, St. Peterbourg, Russian; kulkova@mail.ru; https://orcid.org/0000-0001-9946-8751
7 Herzen State pedagogical University of St. Peterbourg, nab. Moyki, 48/12, 191186, St. Peterbourg, Russian, michail1996@mail.ru; https://orcid.org/0000-0003-1838-3356

INTRODUCTION

Archaeological research has proven that the territory of Georgia has been populated since the Lower Paleolithic period (Vekua *et al.* 2002; Vekua *et al.* 2006; Lordkipanidze 2001). Archaeological sites of various periods have been discovered in Western Georgia during archaeological research (Nioradze 1933; 1953; Tushabramishvili 1960; Nebieridze 1972; Meshveliani *et al.* 1999; Tushabramishvili *et al.* 1999; Adler *et al.* 2006; Adler *et al.* 2008; Bar-Yosef *et al.* 2011; Pinhasi *et al.* 2014). The territory of Ajara has been exploited since ancient times, as evidenced by the numerous sites of the Stone Age (Grigolia 2002; Berdzenishvili and Nebieridze 1964; Gogitidze 1978; 2008). One of the most prominent sites in this regard is the Early Holocene site at Kobuleti village, where interdisciplinary studies were conducted in 2019, the results of which are presented in our publication. The main goal of this work is to show the life of Early Holocene hunters in the 8th millennia BC. Our research is based on techno-typological and use-wear analyses of the flint and obsidian artefacts found during excavations, as well as the latest palynological and radiocarbon data.

ARCHAEOLOGICAL BACKGROUND

The Kobuleti open-air site is situated on a high hill (Figs 1 and 2) to the right of the Kintrishi River (GPS: N 41 48.178 E 041 53.066) and 10 km to the east of the Kobuleti resort. The hill is 50 m high. The first archaeological study of this area is associated with the famous Georgian archaeologists Nino Berdzenishvili and Lamara Nebieridze (Berdzenishvili and Nebieridze 1964). The in-depth scientific analysis of the site was performed by the archaeologist Sergo Gogitidze (Gogitidze 1978; 2008), who supervised a number of field seasons in Kobuleti village in 1973-1986. They discovered a large amount of material by collecting a total number of thirty thousand samples. More than two-thousands of them were tools.

We had an opportunity to resume the archaeological fieldwork (head of excavations Prof. A. Kakhidze) at the Kobuleti site in 2019. It is noteworthy that it was the first time in the history of Stone Age archaeology in the Ajara region when an interdisciplinary group was involved in the work.

The excavations were carried out in the central part of the hill, where we confirmed the following stratigraphic picture:

Layer I – humus – 0.2 m.

Layer II – brown 0.45 m, containing three deposits:

1. Blackish-brownish – 0.10 m.
2. Brown – 0.15 m.
3. Light brownish with small pebbles 0.20 m.

Layer III – yellow (sterile) – from 0.65 m.

Fig. 1. Location of the Kobuleti archaeological site (illustrated by G. Chkhatarashvili)

Fig. 2. Kobuleti site. View from the south (photo by G. Chkhatarashvili)

A cultural layer was attested in the brownish layer, where we identified 3 deposits. It is clear that despite different colors, all three deposits belonged to the same period, namely to the Early Holocene period. In addition, during excavations we discovered 12 pits of various functions, in which we found numerous flint and obsidian artifacts. Bone and wood materials were not found because the soil is moist at the Kobuleti site.

METHODOLOGY

The study of the site was carried out using fairly standard methods. After dividing the trench, a grid of 1:1 m squares was marked, and each square was given an alphanumeric arrangement. The upper turf layer was removed by shovels. A patch of loam containing a cultural layer was excavated using trowels. Each lithological layer in a patch of loam was studied separately; as a result, layers 0, 1, and 2 were distinguished. These layers varied in color, but had very fuzzy boundaries. In this regard, much attention was paid to basalt blocks, the bases of which perfectly marked the boundaries between the lithological layers. For a clear distinction between cultural and lithological layers, we also used observations on the intake level of embedded objects. It should be noted that in most cases, the levels of the bases of the basalt blocks and the inlet of the embedded objects were correlated, which made it possible to reliably connect the fillings of the pits with a certain cultural layer. All finds and in-depth objects were noted in the plan with a designation of their depth from the benchmark. Profiles were drawn for embedded objects, which allowed us to reconstruct them with three-dimensional models. All loam containing a cultural layer was sifted on a sieve with 3 × 3 mm cells, and also washed. This procedure ensured one-hundred-percent detection of artifacts, including small-scale artifacts and fragments. Most microliths were also detected as a result of washing.

The use-wear analyses of flint and obsidian artifacts were carried out in the Laboratory of the Traceological Department of the Archaeological Research Institute at the Georgian National Museum. The stone artefacts were studied in two stages. The first phase included the microscopic study of the sample surfaces. Different types of completely natural traces are left on the surfaces (lines, scratches, polishes, blunts, *etc.*) of the tools after use (Semenov 1957; Semenov and Korobkova 1983). Binocular (MBS-9) and metallographic (Olympus) microscopes were used for the study of these traces. The second stage of the research concerned the functional analysis of artifacts, which resulted in the classification (Korobkova 1987; Esakiya 2005) of tools, on the basis of which the economy, its leading and secondary industries, site functions, economic characteristics and so forth were revealed.

The radiocarbon studies were conducted in the laboratory of the Geological and Geo-Ecological Department of the Herzen State Pedagogical University of Saint-Petersburg. For ^{14}C dating the LSC conventional method was used. First, the charcoal samples were processed using HCl acid (1.2N). After they were washed by distilled water, NaOH (0.1N) solution was used. At end of pretreatment, the diluted hydrochloric acid was used again. This pretreatment enabled the removal of contaminants like carbonates and organics from soils. For benzene synthesis, a steel reactor was used. The reaction of lithium carbide done under a pressure of 0,1-0,2 atmosphere and at temperature about 750°C. The lithium carbide was decomposed by distilled water to obtain acetylene. Benzene was synthesized from acetylene using a vanadium catalyst (Skripkin and Kovalukh 1998; Kovalukh and Skripkin 2007). The benzene cocktails were measured on the the Ultra Low Level Liquid Scintillation Spectrometer Quantulus 1220. The results were calibrated into calendar years according to the Intcal13 curve (Reimer *et al.* 2013) with the Oxcal 4.2 software (Bronk Ramsey 2009).

Laboratory processing of archaeological material samples obtained at the Palynological Laboratory of the Georgian National Museum were carried out in accordance with the standard method used for research of palynological and non-pollen palynomorphs (NPP), performed in four stages (Grichuk and Zaklinskaya 1948; Erdtman 1952; Moore *et al.* 1991). **During the first stage**, 100-150 g of soil (or other kinds of organic residues) was placed into a 1000-gram porcelain container. It was boiled in a 10% solution of potassium (or sodium) hydroxide (KOH or NaOH). **During the second stage**, organic remains were extracted from the soil sample by means of its centrifugation together with a solution of Cadmium iodide (CdI_2). **During the third stage**, acetolysis occurred, *i.e.* the material was dyed. During the last, **fourth stage**, the organic remains were dried and placed into glycerin.

After the laboratory processing, the material was studied and photographed, using an OMAX light microscope, scaled up to 200x-400x. Statistical processing and diagram building was conducted by means of the program 'Tilia' (Grimm 2004), while plates illustrating the photographed material were created using the program 'Corel draw'.

Identification of the pollen grains was performed on the basis of the palynological atlases and the palynotheka of present-day plants, belonging to the Research Institute of Paleoanthropology and Paleobiology of the GNM (van Hoeve and Hendrikse 1998; Reille 1992; 1995; 1998; Richter *et al.* 2004; Beug 2004; Piperno 2006; Torrence and Barton 2006).

RESULTS

Flint and obsidian complex. The lithic assemblage consists of 1533 units (Table 1-2) of flint and obsidian, of which 262 are tools (Fig. 3). The technique of removing blanks is focused on obtaining blades and microblades by manually pressing from conic and pencil-like cores. There are only 3 specimens of cores in the finds. We also have core tablets (2 specimens), which have traces of negatives clearly visible on them.

Table 1. Flint and obsidian artifacts from Kobuleti

Type	Flint	Obsidian	Total
Cores	2	1	3
Tablettes	3	1	4
Blades	17	8	25
Bladelets	110	84	194
Microblades	83	76	159
Flakes	185	93	278
Chunks	156	65	221
Chips	271	107	378
Burin spalls	6	3	9
Total	**833**	**438**	**1271**

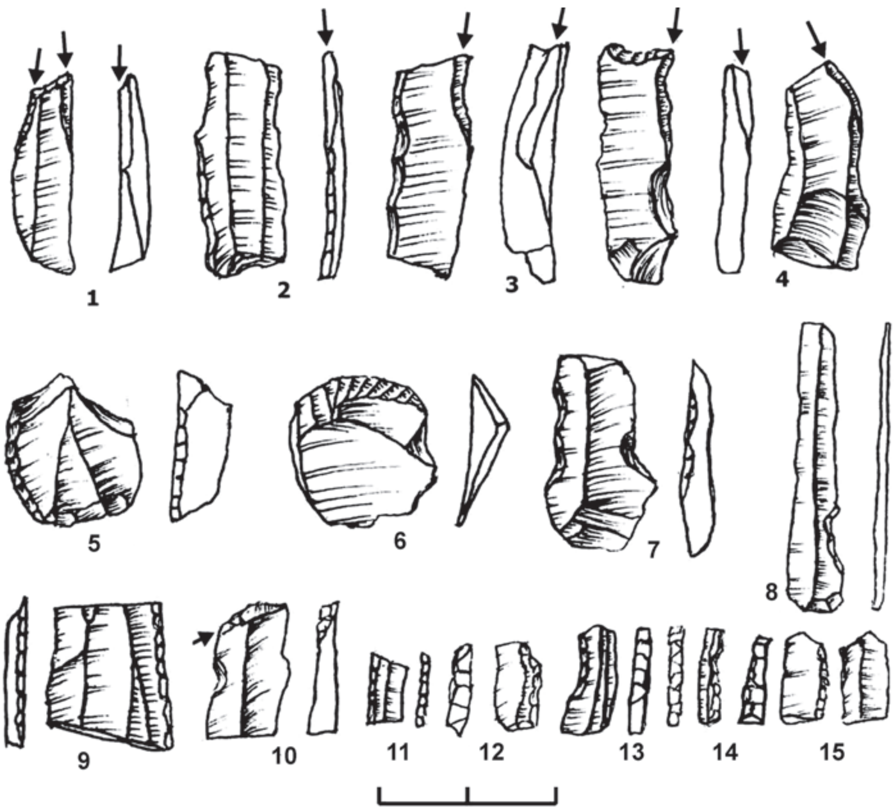


Fig. 3. Kobuleti site. Flint and Obsidian tools: 1-4 – burins; 5-6 – scrapers; 7-8 – notched blade and bladelet; 9 – retouched blade; 10 – truncated bladelet with microburin spall; 11-15 – bladelets and microblades with abrupt retouch (illustrated by V. Manko)

Table 2. Flint and obsidian tools from Kobuleti

Tools	Flint	Obsidian	Total
Burins	32	30	62
Scrapers	6	9	15
Burin-Endscraper	1	0	1
Chisels	9	6	15
Retouched flakes	5	4	9
Retouched blades/ bladelets/ microblades	30	59	89
Notched blades/bladelets/ microblades	10	17	27
Truncated blade/ bladelets/microblades	7	12	19
Microblades with abrupt retouch	5	20	25
Total	**105**	**157**	**262**

As is clear from the typological analysis of the material, flint and obsidian were not knapped on the spot. This conclusion follows from a comparison of the quantities of blades and flakes/chunks. There are three times more blades than flakes. Apparently, a large portion of the artefacts were brought to the site in the form of ready products.

The majority of the tools are retouched bladelets and microblades. Some of the bladelets are notched. Burins represent the second most numerous group of tools. They are rather diverse. We can distinguish side and angle burins. There are also many double-faceted burins. The majority of the burins are made on blades, but some of them are made on flakes. The same category of tools also contains the only combined tool – a burin-endscraper.

There are few scrapers among the finds, only 15 samples. The majority of them are made on flakes. Almost the same quantity of chisels is made on blades. Apparently, the functions of the endscrapers and chisels were performed by the retouched flakes presented in the collection.

Truncated blades are also found. Some of them are truncated facetted blades, which still contain the negatives of microburin spalls. A separate group of tools is composed of those produced specifically for hunting. This is a series (25 samples) of bladelets and microblades with abrupt retouch.

Use-Wear analysis. Blades, flakes and chunks made in flint and obsidian were selected for use-wear analysis (Inventory Number: Kob./2019/4-197; Kob./2019/403-491). In total, 288 artifacts have been studied with this method. The use-wear analysis has revealed several types of tools, the majority of which have displayed no visual signs of secondary knapping or wearing out. Several among them are multifunctional tools. We have distinguished the following functional groups of tools, among others: knives, scrapers, endscrapers, burins, combined tools, and carving tools. The analysis shows that knives, scrapers and endscrapers dominante among the tools. The blades and bladelets were used for making various other tools.

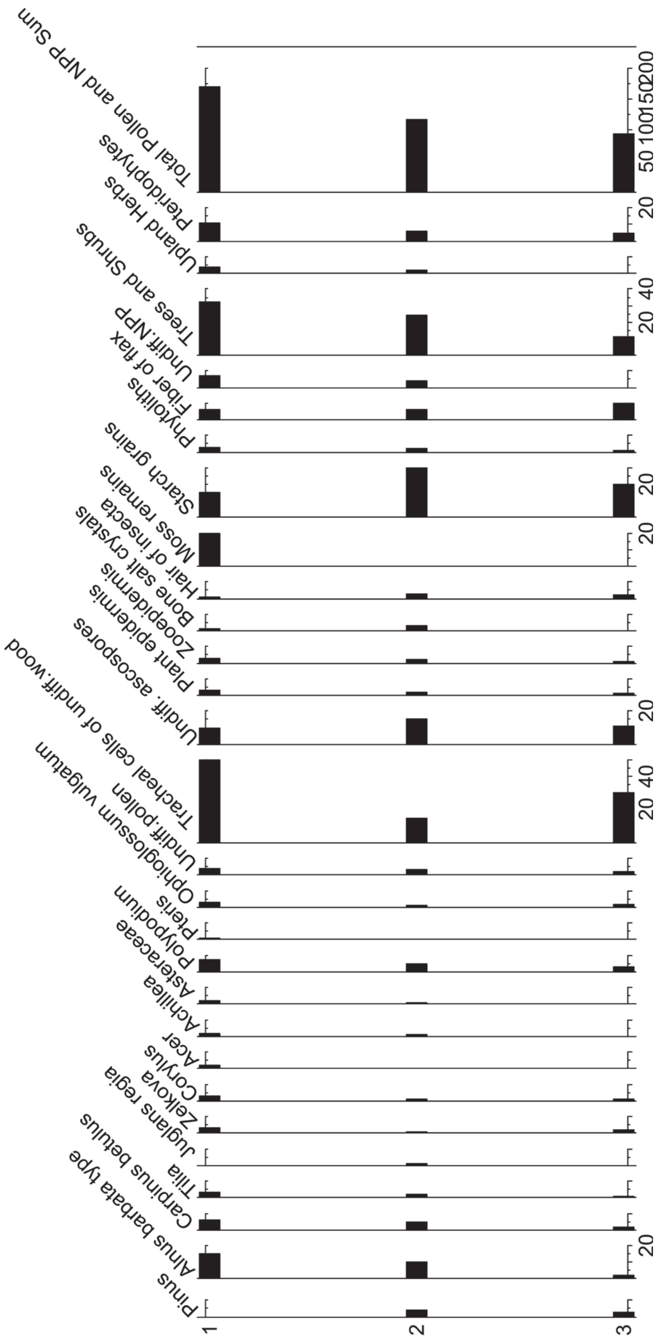


Fig. 4. Diagram of the pollen grains and non-pollen palynomorphs of the organic residues collected from the habitation layers

Table 3. Radiocarbon date of Kobuleti site

Location	Sample	Lab. Cod	Dates ^{14}C BP	Dates cal. BC (68.2%)	Dates cal. BC (95.4%)	Reference
Pit 7, Level 2	Charcoal	Spb-3084	8670±100	7908-7584	8180-7534	Chkhatarashvili and Glascock, 2020

The function of almost half of the tools was associated with the processing of products acquired while hunting (Fig. 3: 12-16). We have discovered that another large number of tools were associated with working wood/bone. Tools for working leather make up the third largest group.

The knives constitute the largest group of tools (84 samples), 81 of which were used for cutting meat, while the other 3 were used on animal skins. The tools of this type have sharp cutting edges and get blunt quickly. The traces of work (the thin crumbling of cutting edges, scratches and polished edges) are expressed weakly on these knives. Each of them was created on a bladelet and has one cutting edge. The opposite sides are knapped with blunting retouch. Three samples have 2 cutting edges and are made on middle-size blades.

The next functional group of tools is composed of scrapers (37 samples). The retouch on their working edges is the result of utilization. The cutting edge is a little bit notched (the edges blunted and rounded). The scrapers were used for processing wood.

A smaller quantity of endscrapers was also found (27 samples). The majority of them were used for processing leather; however, some of them bear traces of working on wood. During microanalysis of the edges, we revealed micro traces characteristic of processing leather (including removing the fat) and wood. The majority of endscrapers were made on blades, though 5 samples were made on flakes. We also identified two endscrapers with retouched heads.

We have also identified some burins (13 samples) in the collection, made both on blades and flakes. There are 3 burins among them that were intended for extremely delicate work (on wood or bone). They are considered to be jeweler tools. The majority of the polyfunctional tools are a combination of end scrapers and scrapers on the cutting edges of knives (7 samples).

Radiocarbon (C14) Analysis. There had been no series of absolute dates for the Kobuleti site so far. The date had only been determined approximately and according to contemporaneous sites. To acquire it, we sent the charcoals discovered in the undisturbed cultural layers to be studied in the laboratory. The laboratory research has established the site's date (Table 3).

Palynological analysis. The samples were collected from the habitation layer, dated from the 8th millennium BC, of which the three were studied by means of palynological methods. Their spectra are illustrated on the diagram (Fig. 4). The composition of the palynological spectra are not rich in pollen grains or spores, which is characteristic of ar-

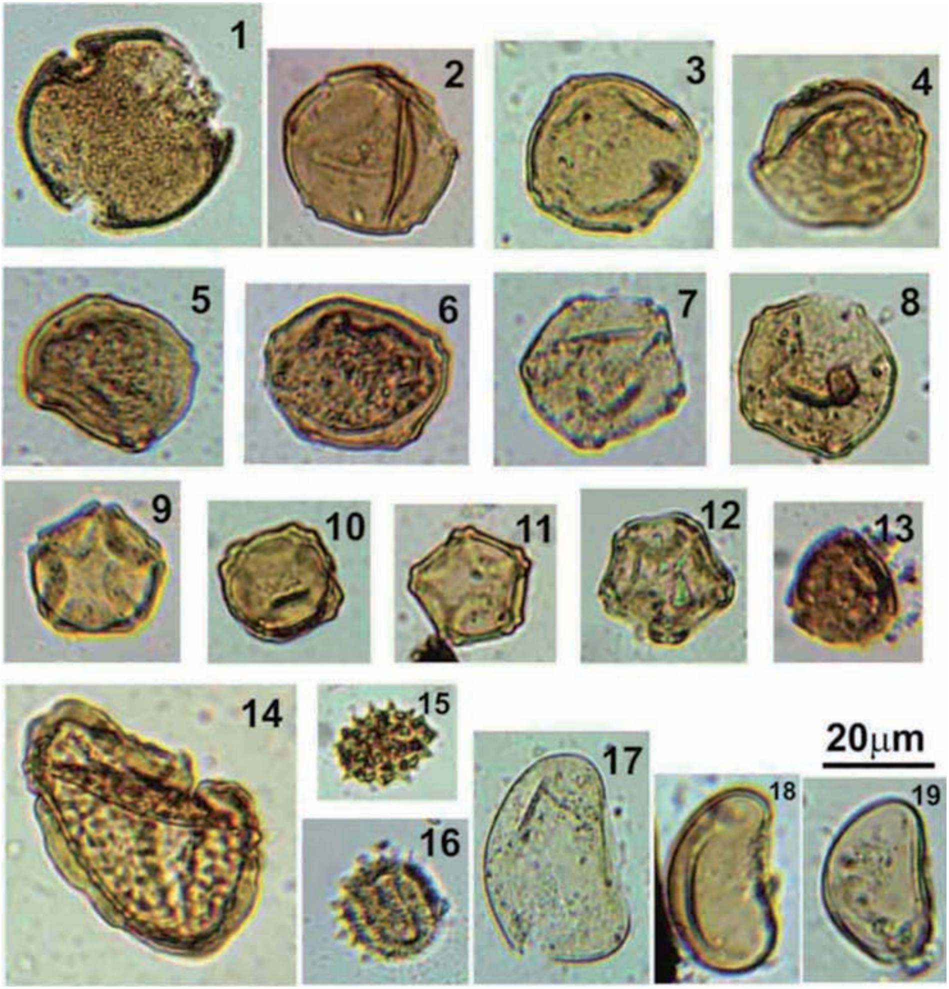


Fig. 5. Pollen grains of the plants and spores of ferns identified in the first sample: 1 – *Tilia* (Lime), 2-6 – *Carpinus* (Hornbeam), 7-8 – *Zelkova* (Zelkova), 9-12 *Alnus* – (Alder-tree), 13 – *Corylus* (Hazel), 14 – *Pteris* (Pteris), 15 – *Aster* (Aster), 16 – *Achillea* (Yarrow), 17-19 – *Polypodiaceae* (photo by M. Chichinadze)

chaeological materials. As for non-pollen palynomorphs, they are rather well represented (Fig. 4).

The arboreal group is represented by pollen grains of eight taxa (Figs 5 and 6). Nearly all of them are thrive in warm climate and moist soil. Among them are: hornbeam (*Carpinus betulus*), lime (*Tilia*), maple (*Acer)*, walnut (*Juglans regia*), hazel (*Corylus*), and zelkova tree (*Zelkova*). As for the zelkova tree, it represents a Tertiary relict. In the present-day Georgia it grows only in warm locations at low altitudes, being preserved in the Alazani

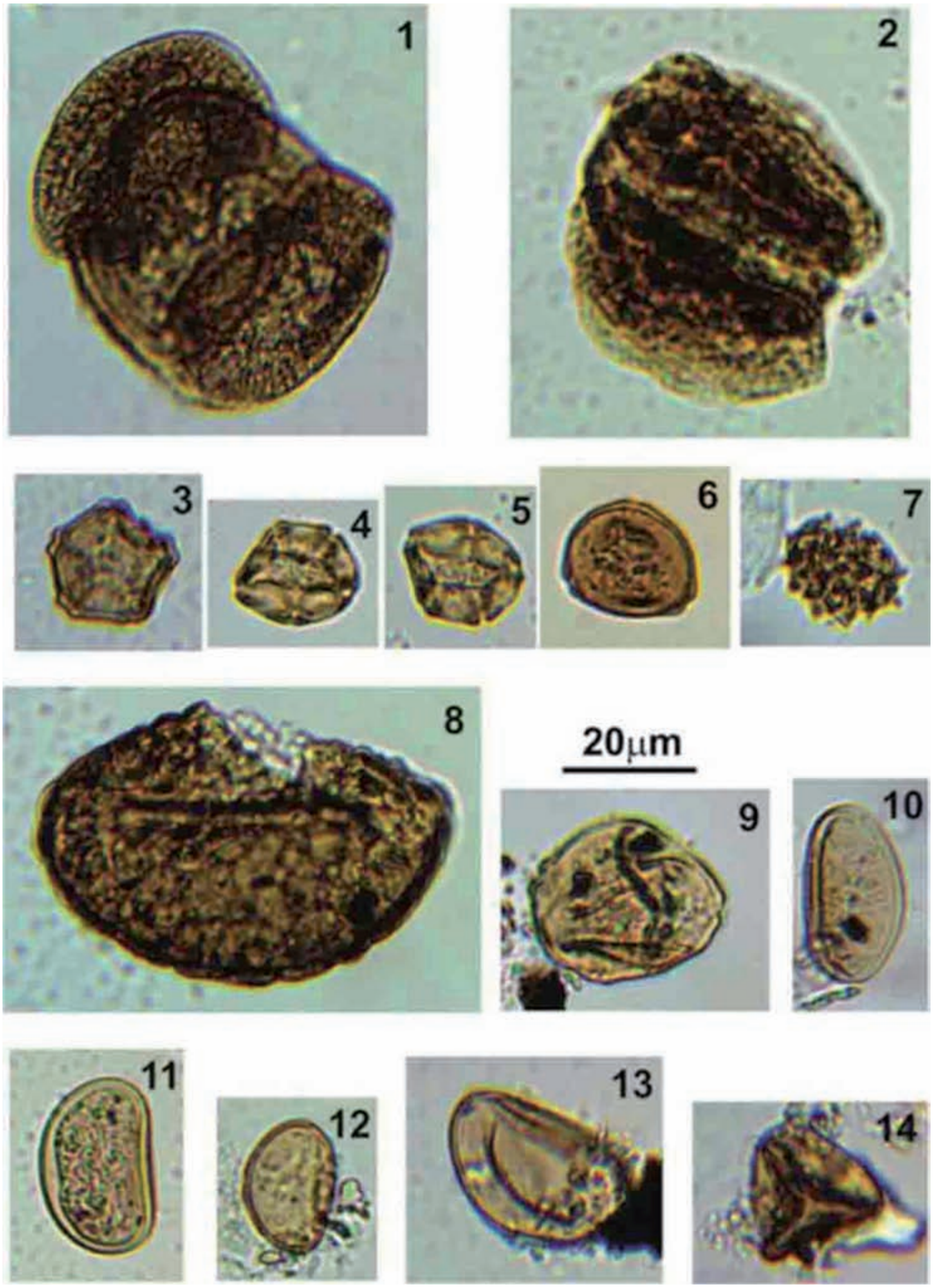


Fig. 6. Pollen grains of the plants and spores of ferns identified in the second sample: 1-2 – *Pinus* (Pine), 3-5 – *Alnus* (Alder-tree), 6 – *Corylus* (Hazel), 7 – *Aster* (Aster), 8, 10-14 – *Polypodiaceae*, 9 – *Carpinus* (Hornbeam) (photo by M. Chichinadze)

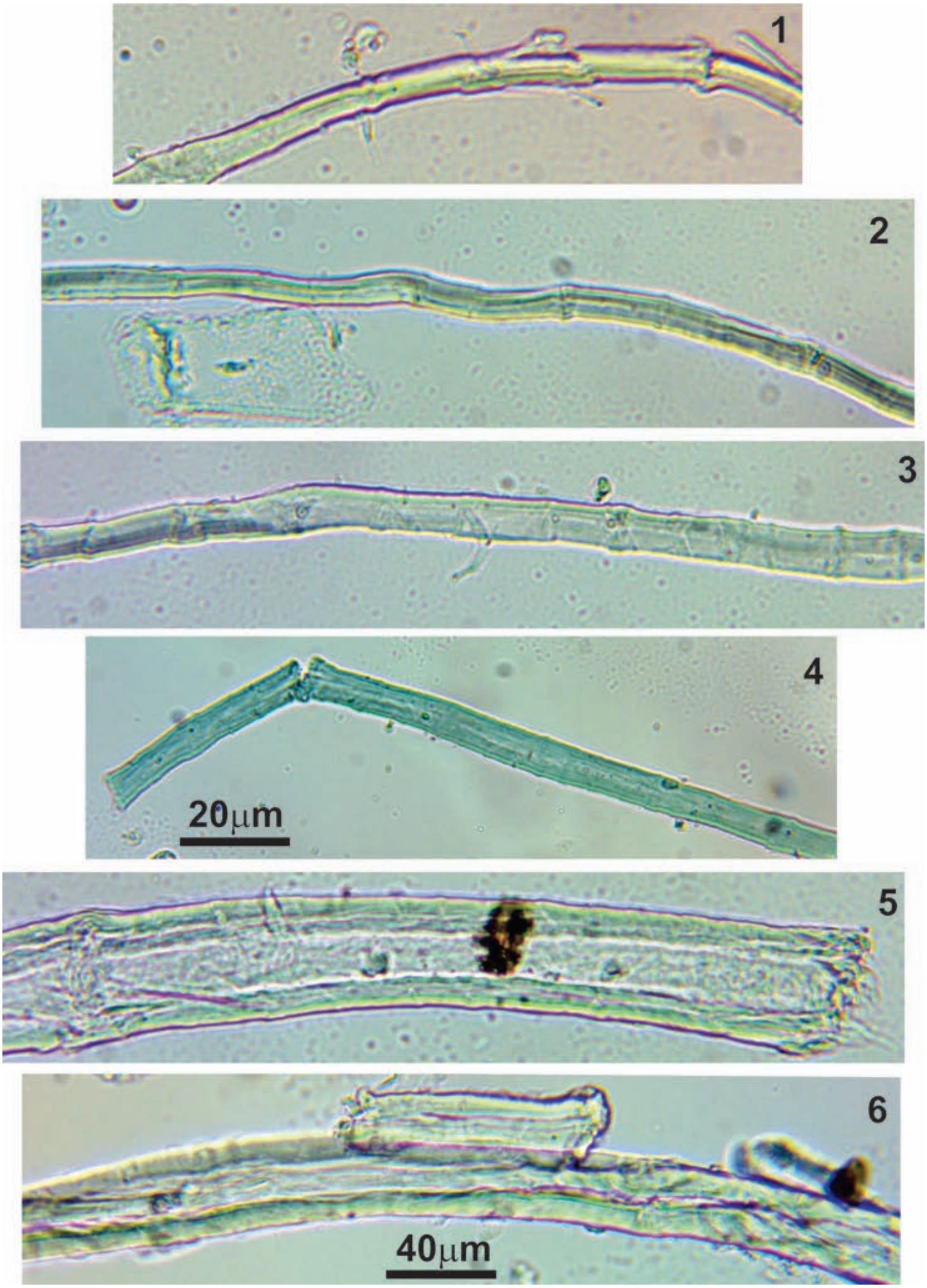


Fig. 7. Flax (Linen) fabric fibers discovered in all three samples.
1-3, 5-6 – flax fibers, 4 – dyed linen fiber (photo by M. Chichinadze)

Valley and the Colchian coast (Kvavadze, Connor, 2005). Common alder (*Alnus barbata*) and adder's tongue (Ophioglossum vulgatum) are also indicators of a warm climate.

Among herbaceous plants, yarrow (*Achillea*) and other Asteraceae, often used as medicinal plants (Martkoplishvili and Kvavadze 2015; Martkoplishvili 2017; Martkoplishvili and Kvavadze 2017), were distinguishable (Figs 5 and 6). Spores of the Pteridophyta, growing only in wooded areas, were also found. Charred parenchymal cells of timber prevail in the group of non-pollen palynomorphs, presumably representing traces of hearth fire.

Linen cloth fibers (Kvavadze *et al.* 2010a; 2010b; Chichinadze and Kvavadze 2013; Kvavadze and Chichinadze 2020), including dyed fibers, were found in all three samples (Fig. 7). They represent microscopic fabric residues of clothing belonging to ancient humans. Small quantities of cereal phytoliths, moss remains, salt crystals of animal bones, hairs, and the epidermises of insects were found.

Thus, the discussed palynological spectra indicate that a wooded landscape surrounded the archaeological site. Presumably, deciduous species like lime, hornbeam, walnut, and zelkova trees were growing there in warm and moist soil, while hazel and common alder were part of the brushwood. Plenty of ferns also grew in these woods, facilitated by the wet climate. Great numbers of starch and cereal phytoliths demonstrate that edible plants occupied a great portion of the diet of ancient humans. Linen fibers, and especially those dyed in various colors, prove the existence of clothes made of linen fabric.

As for the climatic conditions of the period in question, it was rather warm. This was due to the global warming that took place after the last Würm glaciations, at the beginning of the Holocene, i.e. 10 000 years ago (Roberts 2014; Shatilova *et al.* 2011).

CONCLUSION

According to our interdisciplinary archaeological research, we can make several conclusions. The typological analysis of the tools showed the important role of hunting. It is worth noting that the stone industry evidenced at Kobuleti has analogies at archaeological sites of the Mle'faat (Near East) culture (Hole 1977; Dittermore 1983; Howe 1983; Chkhatarashvili and Manko 2020), dated to the Late Pleistocene-Early Holocene periods. The main feature of this industry is the use of the pressure flaking technique to obtain bladelets and microblades from conic and pencil-like cores, as well as the use of microblades with abrupt retouched and truncated bladelets. This circumstances enable us to consider a unified culture, which was created as a result of a migration from the Near East; The described complex of stone artifacts is also known at other sites in Western Georgia: Bavra, Bavra I, Bavra II (Gabunia 2001; Gabunia and Tsereteli 2003), Bavra-Ablari (Varoutsikos *et al.* 2017), and Anaseuli I, II (Nebieridze 1972). The indicated complexes have been dated by the radiocarbon method. The dates show that the Kobuleti industry existed in the Preboreal and at the beginning of the Atlanticum. It is interesting that the early stage of the

Kobuleti flint industry developed synchronously with the Trialetian sites, dated from the Preboreal to the beginning of the Boreal (Meshveliani *et al*. 2007). The Trialetian industry was characterized by the absence of the pressure technique and the development of a geometric complex with asymmetric triangles. The coexistence of two archaeological cultures in Western Georgia at the beginning of the Holocene sheds light on the difficult demographic situation in the region.

Based on the use-wear analyses, we can state that, functionally, the majority of the tools were made for processing meat, wood and leather; The palynological analysis enabled us to reconstruct with relative accuracy the paleoclimatic environment of the Early Holocene. The climatic conditions were warm. Attention should be paid to the discovery of the flax fibers, which provide the oldest evidence at Ajara stone age sites for the use of flax fibers for making cloth. The chronology of the Kobuleti site had previously been vague, but thanks to the use of natural science methods, we were able to determine the exact age of the site.

Acknowledgements

This work was supported by the Batumi Shota Rustaveli State University (grant number 02-12/19).

References

Adler D. S. Bar-Oz G. Belfer-Cohen A. and Bar-Yosef O. 2006. Ahead of the Game, Middle and Upper Paleolithic Hunting Behaviors in the Southern Caucasus. *Current Anthropology* 47(1), 89-118.

Adler D. Bar-Yosef O. Belfer-Cohen A. Tushabramishvili N. Boaretto E. Mercier N. Valladas H. and Rink W. 2008. Dating the demise: Neandertal extinction and establishment of modern humans in the south Caucasus. *Journal of Human Evolution* 55, 817-833.

Bar-Yosef O. Belfer-Cohen A. Mesheviliani T. Jakeli N. Bar-Oz G. Boaretto E. Goldberg P. Kvavadze E. and Matskevich Z. 2011. Dzudzuana: an Upper Palaeolithic cave site in the Caucasus foothills (Georgia). *Antiquity* 85, 331-349.

Berdzenishvili N. and Nebieridze L. 1964. Kvis khanis namosakhlari k'int'rishis kheobashi. In A. Inaishvili (eds), *Samkhret-dasavlet sakartvelos dzeglebi* 1. Tbilisi: Sabchota Sakartvelo, 7-16 (in Georgian).

Beug H.-J. 2004. *Leitfaden Der Pollenbestimmung Für Mitteleuropa und Angrenzende Gebiete*. München: Verlag Dr. Friedrich Pteil.

Bronk-Ramsey C. 2009. Bayesian analysis of radiocarbon dates. *Radiocarbon* 51(1), 337-360.

Chichinadze M. and Kvavadze E. 2013. Pollen and non-pollen palynomorphs in organic residue from the hoard of ancient Vani (Western Georgia). *Journal of Archaeological Science* 40(5), 2237-2253.

Chkhatarashvili G. and Glascock M. 2020. Obsidian at Kobuleti (Western Georgia): Evidence for early human contact in Western Transcaucasia during the Mesolithic period. *Archaeological Research in Asia* (in press).

Chkhatarashvili G. and Manko V. 2020. Kobuleti site. The evidence for Early Holocene occupation in western Georgia. *Documenta Praehistorica* (in press).

Dittermore M. 1983. The Soundings at M'lefaat. In L. S. Braidwood, R. J. Braidwood, B. Howe, C. A. Reed and P. J. Watson (eds), *Prehistoric archaeology along the Zagros flanks* (= *Oriental Institute Publication* 105). Chicago: Oriental Institute of the University of Chicago, 671-692.

Erdtman G. E. 1952. *Morfologija pylcy i sistematika rastenij*. Moskva: Inostrannaya Literatura Press. (in Russian)

Esakia K. 2005. Economic efficiency of Meso-Eneolithic settlements in southern Caucasus: the results of the traceological analysis of stone instruments. In L. Longo and N. Skakun with the assistance of M. Saracino and M. Dalla Riva (eds), *„Prehistoric Technology" 40 years later: Functional studies and the Russian legacy, Proceedings of the International Congress Verona (Italy) 20-23 April* (= *BAR International Series* 1783). Oxford: Archaeopress, 179-182.

Gabunia M. 2001. Javakhetis mezolituri k'ult'ura (samkhret sakartvelos vulk'anuri mtianetis regioni). In M. Beridze (eds), *Javakheti, ist'oria da tanamedroveoba* 1. Akhaltsikhe: Tbilisis sakhelmts'ipo universit'et'is meskhetis pilialis gamomtsemloba, 136-165 (in Georgian).

Gabunia M. and Tsereteli L. 2003. K'avk'asiis mezolituri k'ult'ura. *Arkeologiuri k'vlevis tsent'ri. Dziebani* 12, 5-12 (in Georgian).

van Hoeve M. L. and Hendrikse M. (eds). 1998. *A study of non-pollen objects in pollen slides. The types as described by Dr. Bas van Geel and colleagues*. Utrecht: Laboratory of Palynology and Palaeobotany.

Gogitidze S. 1978. *Samkhret-aghmosavlet shavizghvisp'iretis neolituri k'ult'ura*. Tbilisi: Metsniereba (in Georgian).

Gogitidze S. 2008. *K'int'rishis kheobis arkeologiuri dzeglebi (kobuletis adreneolituri khanis namosakhlari)*. Batumi: Batumis sakhelmts'ipo universit'et'is gamomtsemloba (in Georgian).

Grichuk V. P. and Zaklinskaya E. D. 1948. Analiz iskopaemyh pylcy i spor i ego primenenie v paleogeografii. Moskva: Geografgiz.

Grigolia G. 2002. P'irvelq'opili adamianis nashtebi ach'arashi. In Am. Kakhidze (eds), *Batumis arkeologiuri muzeumis shromebi*, 2. Batumi: Batumis arkeologiuri muzeumi, 5-10 (in Georgian).

Grimm E. C. 2004. *TGView 2.0.2*. Springfield: Illinois State Museum, Research and Collections Centre.

Hole F. 1977. *Studies in the archeological history of the Deh Luran plain. The Excavation of Chagha Sefid* (= *Memories of the Museum of Anthropology. University of Michigan* 9). Ann Arbor: Museum of Anthropology, University of Michigan.

Howe B. 1983. Karim Shahir. In L. S. Braidwood, R. J. Braidwood, B. Howe, C. A. Reed and P. J. Watson (eds), *Prehistoric Archaeology along The Zagros Flanks* (= *Oriental Institute Publication* 105). Chicago: Oriental Institute of the University of Chicago, 23-154.

Korobkova G.F. 1987. *Hoziaystvennyye kompleksy rannikh zemledelchesko-skotovodcheskikh obshchestv yuga SSSR*. Leninrad: Nauka.

Kovalukh N. N. and Skripkin V. V. 2007. Radiouglerodnoye datirovanie arkheologicheskoy glinianoy posudy zhidkostno stsintsillyacionnim metodom. In *Radiouglerod v arkheologichesikh i pa-*

leoekologicheskikh issledowaniyakh. Sankt-Peterburg: Institut istorii materialnoy kultury Rossiyskoy Akademii Nauk, 120-126.

Kvavadze E. V. and Connor S. E. 2005. Zelkova carpinifolia (Pallas) K. Koch in Holocene sediments of Georgia – an indicator of climatic optima. *Review of Palaeobotany and Palynology*, 133, 69-89.

Kvavadze E., Bar-Yosef O., Belfer-Cohen A., Boaretto E., Jakeli N., Matskevich Z. and Meshveliani T. 2010a. 30 000-year-old wild flax fibers. *Science*, 325(5946), 1359.

Kvavadze E., Narimanishvili G. and Bitadze L. 2010b. Fibres of Linum, (flax), Gossypium (cotton) and animal wool as non-pollen palynomorphs in the late Bronze Age burials of Saphar-Kharaba, Southern Georgia. *Vegetation History and Archaeobotany* 19(5-6), 479-494.

Kvavadze E. and Chichinadze M. 2020. Palynological analysis of organic materials from Pichvnari (including the earliest silk in Georgia). In N. Sekunda (ed.), *Wonders lost and found: A celebration of the archaeological work of Professor Michael Vickers*. Oxford: Archaeopress, 102-107.

Lordkipanidze D. 2001. *Evolution of natural environment in South Caucasus and main stages of dispersals of Early Hominids* (Hominidae). Unpublished PhD thesis. Tbilisi: State University.

Martkoplishvili I. and Kvavadze E. 2015. Some popular medicinal plants and diseases of the upper Palaeolithic in Western Georgia. *Journal of Ethnopharmacology* 166, 42-52.

Martkoplishvili I. 2017. *Nutrition ration and medication of a man of Upper Paleolithic, Neolithic and Bronze Age of Georgia according to palynological data*. Unpublished PhD thesis. Tbilisi: Ilia State University.

Martkoplishvili I. and Kvavadze E. 2017. Non-pollen palynomorphs of contents of archaeological vessels and household pits – an important marker of human palaeodiet. In *VII Workshop on Non-Pollen Palynomorphs. University of Liverpool 12-14 June. Liverpool, UK*. www.workshop7nonpollen.uk.

Meshveliani T., Bar-Oz G., Bar-Yosef O., Belfer-Cohen A., Boareto E., Jakeli N., Koridze E. and Matskevich Z. 2007. Mesolithic hunters at Kotias Klde, western Georgia: preliminary results. *Paléorient* 33(2), 47-58.

Meshveliani T., Bar-Yosef O., Belfer-Cohen A., Jakeli N., Kraus A., Lordkipanidze D., Tvalchrelidze M. and Vekua A. 1999. Excavations at Dzudzuana cave, Western Georgia (1996-1998), preliminary results. *Préhistoire Européenne* 15, 76-86

Moore P. D., Webb J. A. and Collinson M. E. 1991. *Pollen Analysis*. Oxford: Blackwell Scientific Publications.

Nioradze G. 1933. *P'aleoliteli adamiani deviskhvrelshi*. Tbilisi: Sakartvelos Muzeumis gamomtsemloba (in Georgian).

Nioradze G. 1953. *Kvis khanis adamiani sak'azhias gamokvabulshi*. Tbilisi: Tekhnika da Shroma (in Georgian).

Nebieridze L. 1972. *Dasavlet amierk'avk'asiis neoliti*. Tbilisi: Metsniereba (in Georgian).

Piperno D. R. 2006. *Phytoliths: A Comprehensive Guide for Archaeologists and Paleoecologists*. New York: Alta Mira Press.

Pinhasi R., Meshveliani T., Matskevich Z., Bar-Oz G., Weissbrod L., Miller Ch., Wilkinson K., Lordkipanidze D., Jakeli N., Kvavadze N., Higham T. and Belfer-Cohen A. 2014. Satsurblia: new insights of human response and survival across the Last Glacial maximum in the Southern Caucasus. *Plos ONE* 9(10), 1-27.

Reille M. 1992. *Pollen et spores d'Europe et d'Afrique du Nord*. Marseille: Laboratoire de Botanique Historique et Palynologie.

Reille M. 1995. *Pollen et spores d'Europe et d'Afrique du Nord. Supplement 1*. Marseille: Laboratoire de Botanique Historique et Palynologie.

Reille M. 1998. *Pollen et spores d'Europe et d'Afrique du Nord. Supplement 2*. Marseille: Laboratoire de Botanique Historique et Palynologie.

Reimer P., Bard E., Bayliss A., Beck J. W., Blackwell P. G., Ramsey C. B., Buck Caitlin E., Cheng Hai, Edwards R. L., Friedrich M., Grootes P. M., Guilderson T. P., Haflidason H., Hajdas I., Hatté C., Heaton T. J., Hoffmann D. L., Hogg A. G., Hughen K. A., Kaiser K. F., Kromer B., Manning S. W., Niu M., Reimer R. W., Richards D. A., Scott M. E., Southon J. R., Staff R. A., Turney C. S. and Plicht J. 2013. IntCal13 and Marine13 Radiocarbon Age Calibration Curves, 0-50,000 Years cal BP. *Radiocarbon* 55, 1869-1887.

Richter H., Grosser D., Heinz I. and Gasson P. 2004. Iawa list of microscopic features for softwood indentification. *Iawa Journal* 25(1), 1-70.

Roberts N. 2014. *The Holocene: an environmental history*. Oxford: Wiley Blackwell.

Semenov S. A. 1957. Pervobytnaya tehnika (opyt izucheniya drevneyshikh orudiy i izdeliy po sledam raboty). *Materialy i Issledovaniya po Arkheologii SSSR*. Moskva-Leningrad: Izdatelstvo Akademii Nauk SSSR.

Semenov S. A. and Korobkova G. F. 1983. *Tekhnologiya drevneyshikh proizvodstv (mezolit–eneolit)*. Leningrad: Nauka.

Shatilova I. Mchedlishvili N. Rukhadze L. and Kvavadze E. 2011. *The history of the flora and vegetation of Georgia (South Caucasus)*. Tbilisi: Georgian National Museum. Institute of Paleobiology.

Skripkin V. V. and Kovalyukh N. N. 1998. Recent developments in the procedures used at the SSCER laboratory for the routine preparation of lithium carbide. *Radiocarbon* 40(1), 211-214.

Torrence R. and Barton H. (eds). 2006. *Ancient Starch Research*. Walnut Creek: Left Coast Press.

Tushabramishvili D. 1960. *Gvarjilas k'ldis p'aleolituri nashtebi*. Tbilisi: Sakartvelos Metsnierebata Akademia (In Georgian).

Tushabramishvili N. Lorkipanidze D. Vekua A. Tvalcherlidze M. Muskhelishvili A. and Adler D. S. 1999. The Palaeolithic rockshelter of Ortvale Klde, Imereti region, the Georgian Republic. *Préhistoire Européenne* 15, 65-77.

Varoutsikos B., Mgeladze A., Chahoud J., Gabunia M., Agapishvili T., Martin L. and Chataigner C. 2017. From the Mesolithic to the Chalcolithic in the South Caucasus: New Data from the Bavra Ablari Rock Shelter. In A. Batmaz, G. Bedianashvili, A. Michalewicz and A. Robinson (eds), *Context and connection: Essays on the archaeology of the ancient Near East in honour of Antonio Sagona*. Leuven: Peeters, 233-255.

Vekua A., Lordkipanidze D., Rightmire G. Ph., Agusti J., Ferring R., Maisuradze G., Mouskhelishvili A., Nioradze M., Ponce de Leon M., Tappen M., Tvalchrelidze M. and Zollikofer Ch. 2002. New skull of early Homo from Dmanisi, Georgia. *Science* 297(5), 85-89.

Vekua A., Lordkipanidze D., Rightmire G. Ph., Agusti J., Ferring R., Maisuradze G., Mouskhelishvili A., Nioradze M., Ponce de Leon M., Tappen M., Tvalchrelidze M. and Zollikofer Ch. 2006. A New Skull of Early Homo from Dmanisi, Georgia. In R. L. Ciochon and J. G. Fleagle (eds), *The Human Evolution Source Book*. Upper Saddle River, New Jersey: Pearson Prentice Hall, 321-327.

SPRAWOZDANIA ARCHEOLOGICZNE 72/2, 2020
PL ISSN 0081-3834
DOI: 10.23858/SA/72.2020.2.1847

Weronika Skrzyniecka[1]

TEXTILE IMPRESSIONS ON THE TRYPILLIA CULTURE POTTERY FROM OGRÓD AND VERTEBA CAVE SITES IN BILCZE ZŁOTE

ABSTRACT

Skrzyniecka W. 2020. Textile impressions on the Trypillia culture pottery from Ogród and Verteba Cave sites in Bilcze Złote. *Sprawozdania Archeologiczne* 72/2, 231-258.

Due to the limited number of materials associated with textile production from the Neolithic and Eneolithic, especially in regard to Eastern Europe, its indirect remains present an important and valuable source of information. One of the materials that testifies to textile production is pottery with textile impressions. The aim of this article is to present and discuss the results of microscopic analyses of textile impressions, identified on selected sherds of ceramic vessels from the Trypillia culture sites in Bilcze Złote, Ukraine. During the research, three basic categories of textile-related products were identified: pottery with intentional cord imprints, impressions of various types of non-woven textiles, as well as woven fabrics of varying thickness and density. This article also highlights the issue of using textiles in the technological process of pottery manufacturing. Microscopic analysis of textile impressions opens up new research possibilities in the recognition and reconstruction of the weaves and twists of particular types of fibres, and provides a solid foundation for comparative studies.

Keywords: textile impressions, Trypillia culture, textile production, weaving
Received: 18.04.2020; Revised: 28.05.2020; Accepted: 28.06.2020

1 Adam Mickiewicz University, Faculty of Archaeology, Uniwersytetu Poznańskiego st. 7, 61-614 Poznań, Poland; wskrzyniecka@gmail.com; https://orcid.org/0000-0002-4296-9034

INTRODUCTION

Textile goods constitute an integral part of the everyday life of human communities. As historical sources indicate, the production, distribution and usage of textiles had not only practical, but also social and even religious significance in ancient civilizations (Pipes *et al.* 2019, 5; Shishlina *et al.* 2000, 109). Textile production, which encompasses, according to the definition given in this article, various types of activities associated with processing and interconnecting plant- and animal-based fibres, resulting in the creation of woven and non-woven products, has been constantly gaining the interest of researchers in the last years (Gleba M. 2017; Gleba and Mannering 2012, 1-24; Good 2001, 209-226; Grömer 2016, 2-32; Chmielewski 2009, 9-13; Cybulska and Maik 2007, 185-198; Sikorski 2003, 123-141; Rast-Eicher and Dietrich 2015). Due to the perishable nature of organic materials, direct traces of textiles, especially those from older periods, are rarely discovered at archaeological sites. Only in specific conditions, *e.g.* anaerobic, alkaline, wet environments, do organic materials have a chance to preserve. Some of the most well-known examples come from circum-Alpine wetland settlements, where numerous Neolithic and Bronze Age textile finds were preserved within waterlogged contexts (Bazanella 2012, 203-214; Feldtkeller and Körber-Grohne 1998, 131-242; Grömer 2016, 2-32; Médard 2000; Rast-Eicher 2005, 117-132; Rast-Eicher and Dietrich 2015). However, in relation to Eastern Europe, interpretations regarding the standards of textile crafting are mainly based on the examination of indirect remains of the discussed type of production. This encompasses primarily analyses of production tools, i.e. spindle whorls and loom weights (Adovasio 1996, 526-534; Andersson 2003, 46-62; Grömer 2016, 32-33; Gleba 2008; Mårtensson *et al.* 2009; Pipes *et al.* 2019). Another, though often overlooked, category of material includes imprints of textiles pressed on clay products and hardened during the firing process. The impressions of simple textile structures made of plant-based materials are considered among the oldest traces of textile production in Europe, as their chronology dates back to the Upper Palaeolithic (Adovasio 1996, 526-534; Drooker 2000, 63; Gleba and Mannering 2012, 1-24; Mazare 2011a, 32; Soffer *et al.* 2000, 812-821). Textile imprints from the Neolithic are documented mainly on ceramics and, to a lesser degree, on clay tools and daub. Their appearance is associated with the use of various kinds of textile goods during the process of pottery production, e.g. pads used for forming or transport, materials for surface polishing or elements used to merge parts of the manufactured container. The other category includes intentional textile imprints, such as the so-called ‘cord’ ornament, as well as various types of activities related to preparation of the vessel’s surface (textile ceramics). Despite limitations, resulting *i.a.* from deformations of the original texture during the pressing and firing process or traces of use-wear, such as surface abrasions, technological analyses of textile impressions represent a valuable source of information about textile production (Drooker 2000, 59-68; Makkay 2001; Mazăre 2011a, 27-48; Podkańska 2012, 207-213; Richter 2010, 211-2016).

Previous examinations of textile imprints documented on clay products of the Trypillia culture communities indicate that different types of textile products were utilized. Among them are fabrics made in tabby (weft/warp-faced, *e.g.* kilim technique) and rep weave (possibly made on vertical looms as evidenced by the discovery of loom weights deposited in a row), cords and non-woven textiles made by looping or netting. Plant fibres (tree bast, flax and hemp) were used most frequently; however, the use of wool is also considered possible. All mentioned finds with textile impressions are dated to the Late period of the Trypillia culture (CI), *i.e.* the beginning of the 4th millennium BC (Burdo 2004, 516; Burdo *et al.* 2010; Chmielewski 2009, Tab. 14; Novitskaya 1960; Kordysh 1951; Kosakivskyi 1998; 2001; Kosakivskyi *et al.* 1998; Prokopowicz 2013, 99-100; Sikorski 2010, 49-56; 2017, 365-289).

The aim of this article is to present and discuss the results of microscopic analyses of textile impressions, identified on selected sherds of ceramic vessels from the Trypillia culture sites in Bilcze Złote. Moreover, it is intended as an introduction to further research on the still only partially recognized textile crafting of the Trypillia communities. The presented work continues previous research on traces of textile production from Bilcze Złote assemblages, the results of which (mostly analyses of single sherds with textile negatives) were published in three papers – *Notes on weaving in the Trypillyan Culture of the Ukraine* (1951), *North European Textiles until AD 1000* (1992) and in the volume from 2013 titled *Bilcze Złote: materials of the Tripolye culture from the Werteba and the Ogród sites* (Kordysh 1951, 98-112; Bender Jørgensen 1992, 84, fig. 110; Prokopowicz 2013, 99-100).

SITE

The Verteba Cave and Ogród sites are located near Bilcze Złote, which lies on the eastern bank of the Seret river, in the Ternopil province of the Volhynian-Podolian Upland in Ukraine (Fig. 1).The Ogród site, discovered in the river valley zone, is interpreted as the remains of a Trypillia culture setllement. Verteba Cave, considered to be a place dedicated to ritual practices, is located in a gypsum cave and constitutes a part of an expansive Miocene gypsum karst (Kadrow *et al.* 2003; Nikitin *et al.* 2010; Kadrow 2013a, 23-28; Karstenet *al.* 2015, 121-144; Kadrow and Pokutta 2016, 3; Madden *et al.* 2018, 44-53; Ledogar *et al.* 2018). Excavations on both sites have been conducted (with breaks) since the end of the nineteenth century, *i.a.* by Gotfryd Ossowski and Włodzimierz Demetrykiewicz. Materials obtained during the fieldwork are part of a collection in the Archaeological Museum in Kraków. After World War II, archaeological excavation in Bilcze Złote was resumed in 1996-1997 (and continues to the present), by a team led by Mykhailo Sokhatskiy of the Regional Museum in Borschiv, Ukraine. The collection of artefacts from the sites is considered one of the largest assemblages of Cucuteni-Trypillia complex materials documented so far (Rook and Trela 2001; Sokhatskiy 2001a; Kadrow *et al.* 2003; Nikitin *et al.* 2010;

Fig. 1. Location of Bilcze Złote. Map by R. Skrzyniecki

Ledogar *et al.* 2018). In addition to a large amount of human skeletal remains in association with faunal bones, it consists of thousands of potsherds, whole vessels, numerous examples of anthropo- and zoomorphic figurines, flint and stone products, and objects made of bone and antler (*i.a.* a flattened plaque in the shape of a bull head), as well as other clay items of various functions, *e.g.* spindle whorls and loom weights (Rook and Trela 2001, 201-202; Nikitin *et al.* 2010, 9-18; Ledogar *et al.* 2018, 1-6).

A thorough chronological analysis of ceramic materials from the Ogród and Verteba sites has been conducted by T. Tkachuk, who divided them into six chronological horizons (Kadrow *et al.* 2003). The first three categories are temporally related to the settlement activity on the Ogród site, associated with three local cultural groups: the oldest, labelled Zalishchyky (BZ OI), is dated to BI-BII stage of the Trypillia culture, the middle is the Mereshivka group (BZ OII, BII stage), and the latest is identified with the communities of the Shipentsy group (BZ OIII, the beginning of the CI stage). The remaining 3 chronological horizons fall into the period of habitation of Verteba Cave, during which the succession of at least three local groups took place. It begins with the Shipentsy group (BZ WI, the end of CI stage), continues with the Koshilivtsy group (BZ WII, dated to the beginning of CII stage) and the Kasperivtsy group (BZ WIII), and ends with the younger phase of the CII stage of the Trypillia culture (Sokhatskiy 2001a, 207-227; 2001b, 115-126; Kadrow *et al.*

2003; Kadrow 2013b).The results of radiocarbon dating of the material from Verteba Cave additionally corroborate this sequence, indicating that this site was inhabited by the Trypillia culture communities from the first centuries of the IV millennium BC to the beginning of the III millennium BC (Kadrow *et al.* 2003, 119-123; Nikitin *et al.* 2010; Ledogar *et al.* 2018, 141-158).

MATERIALS AND METHODS

From the collection of clay artefacts, which were gathered during excavations in Bilcze Złote prior to WWII and are currently located in the Archaeological Museum in Kraków, a sample of ten pottery sherds with visible textile impressions was selected for the purpose of the presented research. Technological traits of these materials were analysed using the KEYENCE VHX-6000 digital microscope. Samples were also imprinted in self-hardening sculpting clay in order to make a positive mould form of the negative impressions of textiles, which are used to facilitate microscopic measurements and identification of textile type (Drooker 2000, 59). Among the ten fragments in question, one bore traces of black and red painted designs (sample 10), and another two were adorned with a corded ornament and a horizontal plastic band located below a thickened rim, cut off obliquely and slanting down toward the inside (samples 1 and 2). The remainder of fragments had no particular traces of ornamentation, and therefore can be included into the "kitchenware" category. Textile impressions in various states of preservation were documented on the bottom parts of the ceramic vessels. Among them, 3 impressions of fabrics and 4 non-woven textiles were identified. Apart from the above-mentioned 'cord' impressions located under the rim, one imprint of fabric inside the vessel wall has been identified (sample 10) (Table 1).

Three basic categories were introduced to classify textile products during the research: intentional 'cord' imprints, impressions of various types of non-woven textiles, as well as woven fabrics, varying in thickness and density.

The so-called 'cord' impressions were created intentionally to obtain a distinctive, decorative pattern on the vessels. According to the diameter of these textile products, three terms are distinguished in literature: thread – up to 2 mm in diameter, cord – between 2 and 8 mm and rope – more than 8 mm (Grömer and Kern 2010, 3136-3138; Rast-Eicher 1997, 305). Technological studies also indicate that different types of textile techniques could have been in use. Apart from the most common plied cord, these also include pressing of simple needlework and sewing stitches. More complex decorative motifs could be obtained by using stamps or textile templates with the previously applied cord pattern (Kaczmarek 2015; Sikorski 2010, 49-56; 2017, 365-380). For the purpose of this article, a microscopic analysis was conducted of the two fragments of ceramic vessels decorated with a 'cord' impression and a plastic band located under the thickened, oblique rim

Table 1. Textile impressed ceramics from Bilcze Złote

Sample no.	Artefact	Sample dimensions (cm)	Comment	Figure
1	Fragment of semispherical bowl	26 x 8 x 12,7	Horizontal rows of 'cord' ornament	2, 3
2	Fragment of a vessel	5,0 x 3,4	Horizontal rows of 'cord' ornament	4, 5
3	Bottom fragment of a vessel with preserved part of a body	27,8 x 15,9 Bottom thickness: 1,6 Bottom diameter: 19,8	Basketry impressions at the bottom of the vessel	6, 7
4	Bottom fragment of a vessel with preserved part of a body	14,7 x 10,5	Basketry impressions at the bottom of the vessel	8
5	Bottom fragment of a vessel with preserved part of a body	8 x 6,3 Bottom thickness: 0,9	Non-woven textile impressions at the bottom of the vessel	9,10
6	Bottom fragment of a vessel with preserved part of a body	14,5 x 6,2	Non-woven textile impressions at the bottom of the vessel	11, 12
7	Bottom fragment of a vessel	13 x 9,1 Bottom thickness: 1,1	Woven textile impression at the bottom of the vessel	13, 14
8	Bottom fragment of a vessel with preserved part of a body	13,8 x 9,0 Bottom thickness: 1,2	Woven textile impressions at the bottom of the vessel and spiral, cordage-like impressions under the fabric negative	15, 16
9	Bottom fragment of a vessel with preserved part of a body	11,7 x 15,3	Woven textile impression at the bottom of the vessel	17, 18
10	Fragment of painted ceramic	10,5 x 5	Woven textile impression and fingerprint inside and on the outer wall of the vessel	19, 20

(samples 1 and 2). This type of decorative pattern is connected with the Bilcze Złote Verteba III assemblage.

Imprints of non-woven textiles, *i.e.* different types of non-loom-based textiles, appear as a result of various vessel-making and decorating procedures. The earliest textile techniques were made by linking, looping or knotting strands or yarns by hand or with the use of simple tools such as sticks or needles. These include mesh-like structures, *e.g.* nets (sprang), mats, and products made by needle looping (nålebinding) or twining. The latter has many variants (*e.g.* closed, open, diagonal twining) and represents the most important textile technique in the Central European Neolithic. Twined textiles were created by the twisting of two or more active threads around passive ones, covering them entirely (Doumani and Frachetti 2012, 375, Gleba and Mannering 2012, 1-24; Grömer 2016, 2-32; Seiler-Baldinger 1994). Negatives of basketry are also included in this category of textile impressions. This refers to various types of three-dimensional containers, baskets or bags made of rigid or semi-rigid, mostly plant-derived raw material (Adovasio 1975, 223; 2016, 15; Marian and Bigbaev 2008, 43-49). There are different archaeological interpretations concerning the occurrence of textile imprints on the bases of vessels. Non-woven products could have been used as a support for shaping (simple rotary tool) or for drying/moistening parts of clay products before firing or transportation (Mazăre 2011b, 33; Kosakivskyi 2004, 93-95; Sikorski 2018, 458-459). From the ceramic assemblage of Bilcze Złote, four fragments of vessel bottoms with this type of textile imprint were selected for microscopic analysis (samples 3,4,5 and 6).

In contrast to non-woven goods made by hand or with the use of simple tools, weaving textiles requires the application of an additional device – the loom. The basic function of looms is to create a shed by tension and to separate passive yarns (warp) to facilitate the insertion of the active system of yarns (weft). The structure of weaving textiles is characterized by interlacing two systems of yarns in specific ways, which defines the weave type (Chmielewski 2009, 159-223; Grömer 2016, 2-32; Mazăre 2011a, 33-35). Negatives of fabrics left on clay products, most often as a result of production processes, allow for the identification of the weaving technique and the technical parameters of used threads. Four fragments of pottery from the Bilcze Złote collection with impressions of woven textiles were selected for microscopic analysis (samples 7, 8, 9 and 10).

On the basis of commonly accepted and used research methods of textile impressions, as well as the previously mentioned limitations regarding this particular category of archaeological data, an analytical approach has been developed (Bender Jørgensen 1992, 13; Drooker 2000, 59-68; Gleba 2017, 1205-1207; Gleba and Mannering 2012, 1-24; Grömer and Kern 2010; 3136-3137; Podkańska 2012, 207-213; Sikorski 2010, 49-56; 2017, 365-380). The description of results obtained during the analysis is divided into four main categories. First, the technique of making a textile product (*e.g.* tabby weave, twining) is identified. Preparation of positive casts of post-textile imprints facilitate such interpretation. The second category covers technological parameters. Apart from the basic measurements of textile impressions, the spinning and twisting direction of yarn or cord is determined, and described as Z-twisted if it is spun to the right (clockwise) or S-twisted if spun to the left (counter-clockwise). When threads are plied of two or more yarns (to increase thickness and strength), twist direction is usually opposite to that of the original spinning. However, unlike draft-spun single yarns, plied yarns are one of the characteristic features of thread production with splicing, commonly used in the circum-Alpine Neolithic and ancient Egypt. In this technique, strips of plant fibre, *e.g.* flax, removed from their stalks, are joined together by overlapping and rolling only part of each fibre bundle, creating continuous thread. In the next step, previously prepared single thread is twisted with another one, forming stabilised plied yarn (Gleba and Harris 2018, 2329-2346; Grömer 2016, 74; Leuzinger and Rast-Eicher 2011; Rast-Eicher 2005, 117-132). It should be noted that the twisting direction observed on the impressions is a reversed image of the twist direction of the actual textile product.

The rest of the parameters include the twist angle (given in degrees °), which indicates the intensity (loose or tight) of the yarn or cord twist; width measurements (mm), including the width of the component threads/fibres in the case of multi-ply yarn or multistrand cord; and the density, measured in number of twists or interlaces per centimeter, indicating the fineness or coarseness of the products.

Next, the possible type of raw material (plant – with sharp edges of fibres in the negative, animal – with soft fibre edges) used to produce a textile is suggested. However, it must be emphasized that such interpretations should be supplemented with comparative and experimental studies in the future (*cf*. Grömer and Kern 2010; 3140-3144; Rast-Eicher 2016). Textile finds from Neolithic wetland settlements indicate that the most important fibres at that time were tree bast and, to a lesser degree, flax. Such materials are elastic and soft, and therefore constitute an easy-to-use material for making threads or cords (by hand or using spinning tools) with different intensities of twist (Grömer and Kern 2010, 3136-3137; Rast-Eicher 2005, 117-132).

The last stage of the description of microscopic observations is aimed at the identification of methods of application or appearance of textile impressions; in the case of cord ornaments: *e.g*. manually, roulette, stamp; in the case of woven and non-woven textile impressions: *e.g*. textile support for drying/moistening or transporting the vessels, cloth for smoothing the surface.

RESULTS OF MICROSCOPIC ANALYSIS

Sample 1

Large fragment of semispherical bowl, reconstructed from 7 smaller parts with thickened, obliquely cut rim (slanting inward), and ornamented with three horizontal rows of 'cord' impressions (inner imprint 26 × 1 cm), divided with two vertical rows of incisions. Under the rim is a plastic, encircling band with nail impressions and three dual, horizontal rows of 'cord' impressions (6 rows in total), located below the band (outer imprint 26,5 × 3,2 cm). Surfaces carefully smoothed. 'Cord' ornament created with precision and distributed evenly with the use of fine, tightly Z-plied thread (S-plied impression), regular in depth (Table 2).Visible and sharp edges of component fibres suggest that the thread was made from raw material of plant origin (Figs 2 and 3). Relatively equal distances between cord impressions (2-3,6 mm) and dual sequences of impressions (5,2-7 mm) on the outer wall of the vessel might indicate that the ornament was prepared with the use of an additional tool, for example thread-wrapped rod, roulette or textile template wound around a cylindrical object (*cf*. Dumpe 2006, 71-84; Soper 1985, 29-51; Końko *et al*. 2010, 13-48; Sikorski 2018, 453-467).

Sample 2

Fragment of a vessel decorated with six horizontal rows of 'cord' impressions (five full imprints and one fragmentarily preserved), in two sequences of 3 impressions each (2,7 × 5 cm), placed under the rim of the vessel. Surface probably smoothed before the impres-

Table 2. Textile impressions: technical data

Sample no.	Textile structure	Twist direction	Width of cord/strand/yarn (mm) active/passive	Number of twists/threads per 1 cm active/passive
1 (outer imprint)	thread	Z (31-37°)	1,1-1,7	6
1 (inner imprint)	thread	Z (26-30°)	1,4-1,7	6
2	thread/cord	Z2s? (36-48°)	1,3-2,2	3,5-4
3	coiling	-	2-5	1,5
4	three-dimensional twining?	-	1,8-2,3	-
5	coiling or twining	-	1,6-2,5	-
6	twining or needle looping	S	2-2,9 (in stretched part)	3-4
7	balanced tabby weave	S2*?	0,9-1,1/0,8-1,0	8/8
8	weft/warp-faced tabby weave	indiscernible	1,3-1,5/1,5-1,9	5/6
9	tabby weave	S2*?	0,8/0,6	7-8/8-9
10	tabby weave, netting?	S2*(z)?	1,3-1,5/1,2-1,5	6/6

* – an asterisk is inserted when annotating a spliced thread structure (see also Gleba and Harris 2018, 2330; Rast-Eicher and Dietrich 2015, 36)

sion was made. ‘Cord’ ornament made with coarse, tightly but irregularly Z-plied thread/cord (probably made by hand), regular in depth (Table 2). There is a possibility that each strand of thread/cord was plied of two components twisted in the opposite direction (Z/2s). Coarse microstructure and visible, irregular edges of component fibres suggest the use of plant-derived raw material, *e.g.* bast (Figure 4, 5). Distances between particular rows of textile impressions are between 2,7 to 3,7 mm (between sequences 8,5 mm), which also indicates the possible use of a certain type of rotary tool.

Sample 3

Bottom fragment of a big vessel (reconstructed from three sherds) with preserved portion of the smoothed surfaces of its outer wall. The base of the vessel was completely covered with shallow basketry impressions in circular arrangements, partially smoothed (with visible traces of smoothing tool), and had a thin layer of clay added in the center. The container was probably made in the spiral-coiling technique, where the single vertical stitches wrap horizontal elements (foundation), holding the working end against the previous row (Adovasio 2016, 99). The width of individual strands ranged from 2 (close to the center) to 5 millimeters at the edge (Table 2). No discernible fibre twist was identified. Visible edges of component fibres suggest that plant-derived raw material, *e.g.* roots, straw

Fig. 2. Fragment of vessel with cord ornament from Bilcze Złote (sample 1). Photo by P. Silska

Fig. 3. Details of cord impressions on the obliquely cut, inwardly slanting rim of the vessel from Bilcze Złote (sample 1)

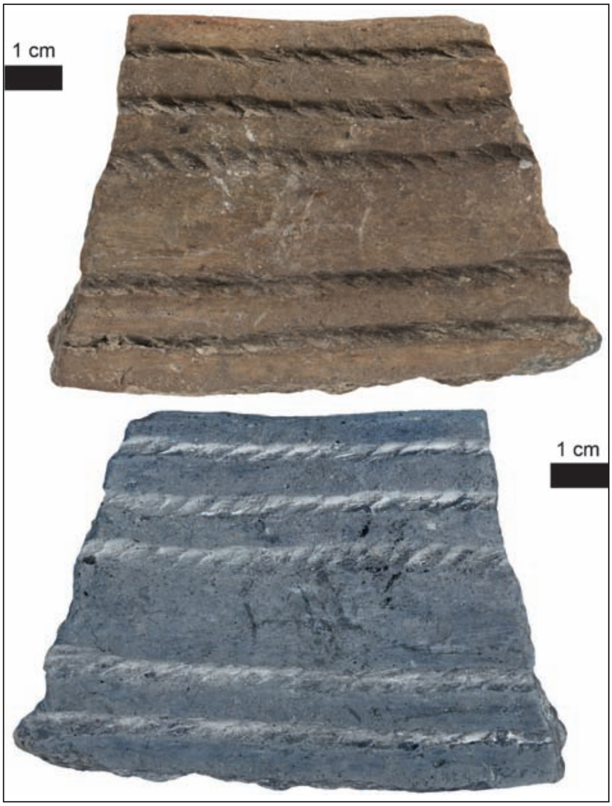


Fig. 4. Fragment of vessel with cord ornament from Bilcze Złote (sample 2). Photo by P. Silska

Fig. 5. Details of cord impressions on vessel fragment from Bilcze Złote (sample 2)

Fig. 6. Bottom fragment of a vessel with basketry impressions from Bilcze Złote (sample 3). Photo by P. Silska

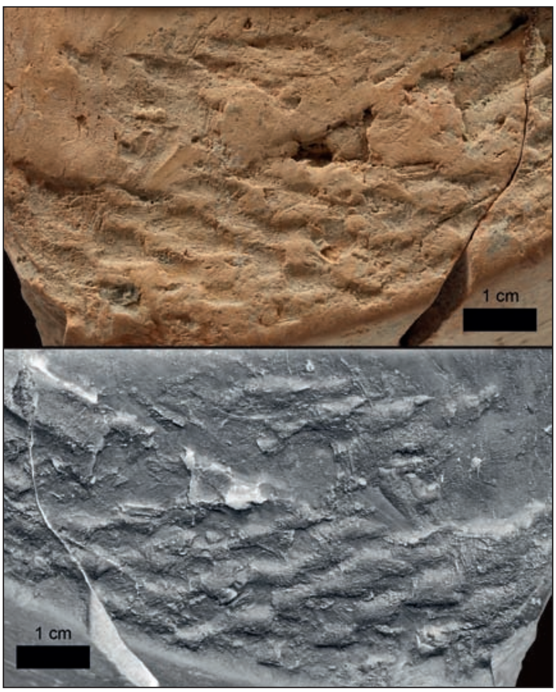


Fig. 7. Details of basketry impressions on bottom fragment of a vessel from Bilcze Złote (sample 3). Photo by P. Silska

or reed, could have been chosen (Figure 6, 7). As indicated above, this type of textile impression occurred as a result of using non-woven products in the pottery manufacturing process.

Sample 4

Bottom fragment of a vessel with a preserved portion of its body. The outer wall was smoothed, the inner bottom part rugged. The surface of the outer bottom was partially damaged and covered with a thin layer of clay (Figure 8). Negatives of spiral basketry visible at the base. The container was probably made in three-dimensional twining; however, due to the state of preservation of the imprint, it is difficult to classify (Rast-Eicher 2005, 118-123). The circular rows of plant strands (1,8-2,3 mm wide, with visible edges of

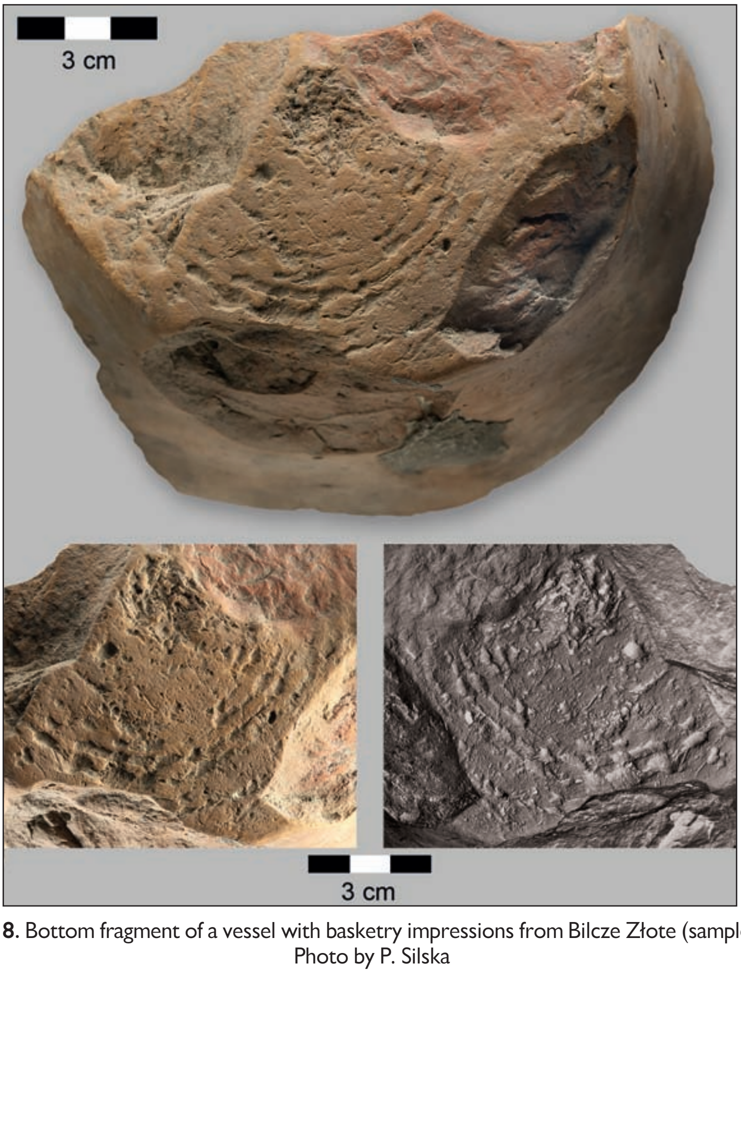


Fig. 8. Bottom fragment of a vessel with basketry impressions from Bilcze Złote (sample 4). Photo by P. Silska

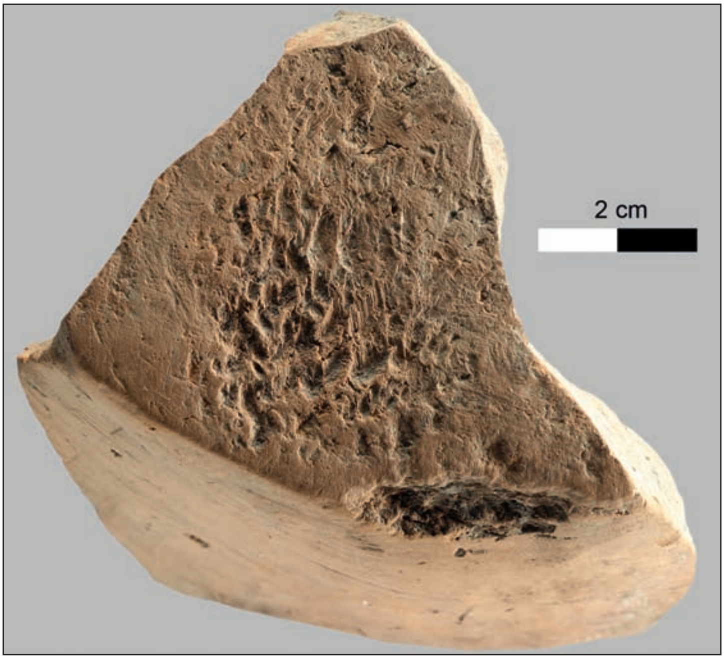


Fig. 9. Bottom fragment of a vessel with plaiting impressions from Bilcze Złote (sample 5). Photo by P. Silska

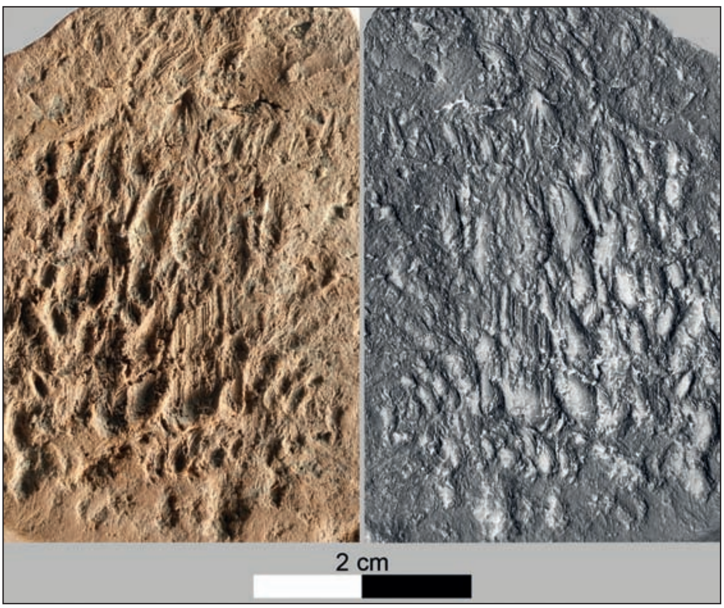


Fig. 10. Details of plaiting impressions on bottom fragment of a vessel from Bilcze Złote (sample 5). Photo by P. Silska

component fibres) were separated from each other by a distance of approx. 2,2 mm (Table 2). No discernible fibre twist was identified.

Sample 5

Fragment of the bottom and part of the body of a vessel with smoothed wall surfaces. An irregular coiling or twining? impression (3,5 × 4 cm) was identified on the vessel base (Figures 9, 10). No discernible twist angle of the strands. Visible negatives of component fibres, approximately 0,06 mm wide, suggest the use of a raw material of plant origin, possibly bast or grass (Table 2).

Sample 6

Bottom fragment of a vessel with a preserved portion of its wall, showing traces of a smoothing tool. Impression of presumably non-woven textiles on the entire bottom, resembling linked, partly stretched, horizontal rows of cord-like impressions with dense structure (Table 2). The textile product was possibly made with a twining or simple needle-looping technique (nålebinding/knotless netting), with the use of S-plied yarn. Nålebinding textiles were produced with one needle, "where the thread of the new stitch is passed arbitrarily through at least two unfinished thread-loops of arbitrary size" (Hansen 1990, 21-27; Mazăre 2011a, 29). This technique preceded knitting and is sometimes difficult to distinguish. It is worth remarking that nålebinding textile impressions were also identified on the bases of Cucuteni pottery, as a result of using "technical" fabrics (Marian 2008, 327-334; 2009). Visible edges of the component fibres of the yarn indicate the use of a raw material of plant origin (Figs 11 and 12).

Sample 7

Bottom fragment and portion of the body of a medium-sized vessel with smoothed outer wall and uneven bottom surface with traces of oval scratches. Small impressions of woven textile (aprox. 1,1 × 1,2 cm) visible on several parts of the base, intentionally covered with an additional layer of clay. The fabric was made of the simplest form of weaving: medium-dense, balanced tabby weave, where the weft threads were interlacing over and under the warp (Table 2). This type of weave can be identified by its checkerboard-like appearance (Gleba and Mannering 2012, 1-24; Mazăre 2011a, 33-36). Yarns were most likely S-plied (visible as Z-plied on the imprint), and no discernible twist of single-thread elements was identified, which suggests thread production with splicing (Gleba and Harris 2018, 2329-2346). Due to the sharp edges of the yarn and the visible negatives of component fibres, it can be assumed that the textile pad was made of plant-derived raw material (Figures 13, 14).

Sample 8

Bottom fragment and portion of the body of a large vessel with smoothed surfaces (clear traces of horizontal smoothing on the outer wall). Visible impression of a partially

Fig. 11. Bottom fragment of a vessel with non-woven textile impressions from Bilcze Złote (sample 6). Photo by P. Silska

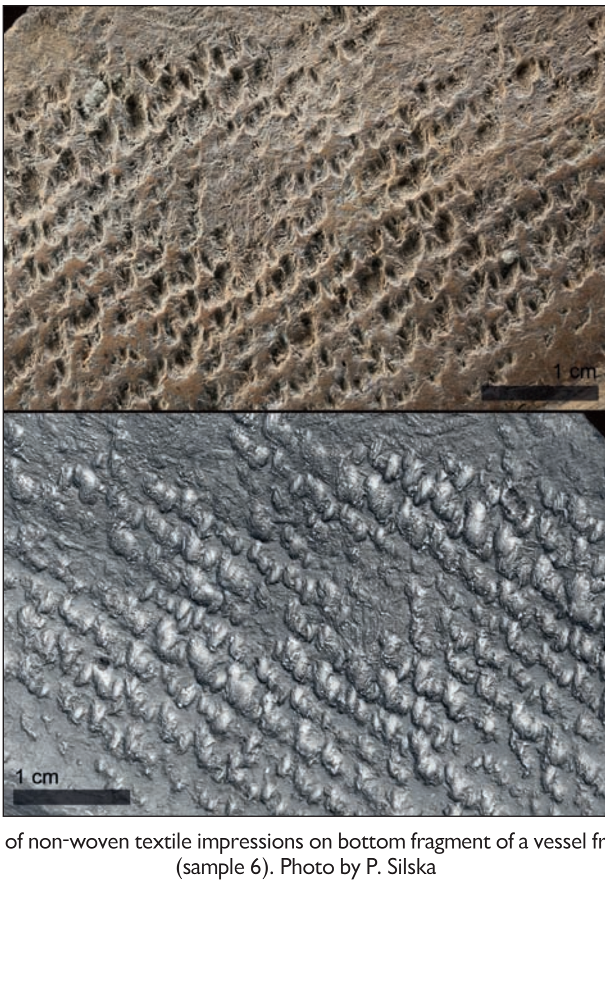


Fig. 12. Details of non-woven textile impressions on bottom fragment of a vessel from Bilcze Złote (sample 6). Photo by P. Silska

Fig. 13. Bottom fragment of a vessel with tabby weave textile impressions from Bilcze Złote (sample 7). Photo by P. Silska

Fig. 14. Details of tabby weave textile impressions on bottom fragment of a vessel from Bilcze Złote (sample 7)

stretched fabric on the entire bottom part (Figures 15, 16). Cloth made of coarse and dense, weft/warp-faced tabby weave (Table 2). Weft/warp weave textiles have one yarn structure covered by the greater density of the opposing one (Doumani and Frachetti 2012, 370; Emery 1966, 76-77). It should be emphasized that in case of textile impressions, usually only a fragment of textile product without selvedges or starting borders is visible, which makes it difficult to distinguish and trace the arrangement of warp and weft threads (Podkańska 2012, 207-2013). The direction of yarn twisting is indiscernible. Under the impression of the textile pad, a deeper, cordage-like negative, arranged in a spiral shape, has been identified (4,5-5 mm wide). Placing the elevating element under the textile pad could have facilitated the lifting and transportation of the formed vessel.

Sample 9

Fragment of a large vessel with preserved bottom and portion of the body. Carefully smoothed outer wall with traces of tool use. The inner surface of the vessel was rugged in the bottom part. Clear impression of a fine and medium-dense tabby weave on the entire base fragment (Figure 17, 18). The fabric was made of fine, most likely spliced and S-plied yarns (Table 2). Missing threads may indicate the use of partially damaged cloths for pottery manufacturing. No traces of covering or smoothing of the imprint were recognized. Individual recesses were identified at the bottom, possibly formed while lifting the vessel. This type of textile impression was created as a result of using a textile "production" pad.

Sample 10

Body fragment of painted pottery. The wall surface was carefully polished, covered with a thin layer of engobe, and painted with black and red horizontal lines. The textile impression (4,5 × 0,8cm) was made of tabby weave with the use of coarse, S-plied (and possibly z-spliced) yarn, of plant origin (Table 2). The location of the imprint is unique in this case. Negatives of fabric were identified inside the wall of the vessel, which indicates a specific function of textiles in the process of pottery manufacture (Figures 19, 20). The analyzed fragment of the vessel was shaped by junctures of clay strips (Starkova and Zakościelna 2018, 67-85). Merging all parts (*e.g.* a moist clay surface with partially dried ones) requires special preparation of the clay to avoid separation of individual elements of the vessel during drying or firing. Uneven and intentionally grooved surfaces, created with the use of textiles, provide better adhesion and bonding of individual parts. There is also a possibility that wet textiles were used to maintain the necessary degree of moisture of the individual parts of the vessel before joining. The appearance of textile impressions inside the walls of ceramic vessels may have been the result of the aforementioned procedures (*cf.* Chmielewski 2009, 229-232; Grygiel 2008, ryc. 1028: 3; Kaczanowska 2006; Mazăre 2011b, 28-33). Apart from fabric negatives, under the separated top layer of engobe covering the wall surface, a possible fingerprint (8,5 × 5,5 mm) was identified. However, the chequered structure in the lower part of the imprint and relatively regular, vertical "lines"

Fig. 15. Bottom fragment of a vessel with tabby weave textile impressions and cordage-like imprint from Bilcze Złote (sample 8). Photo by P. Silska

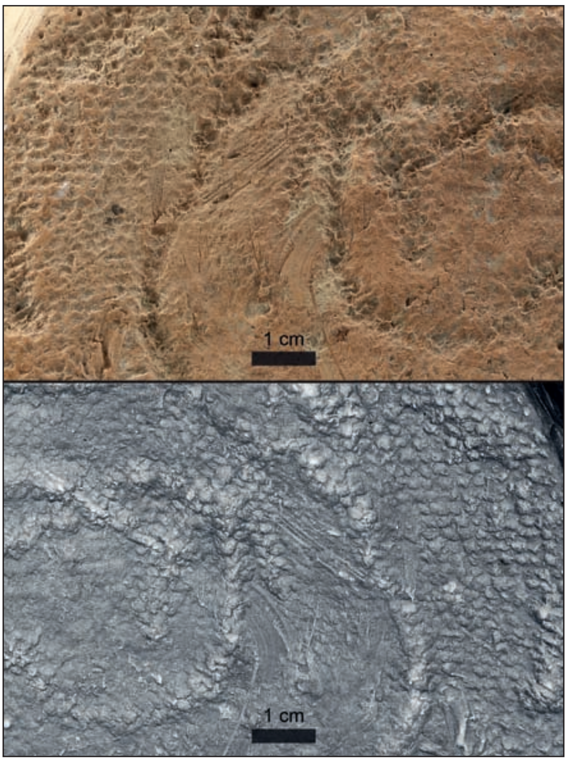


Fig. 16. Details of tabby weave textile impressions on bottom fragment of a vessel from Bilcze Złote (sample 8). Photo by P. Silska

Fig. 17. Bottom fragment of a vessel with tabby weave textile impressions from Bilcze Złote (sample 9). Photo by P. Silska

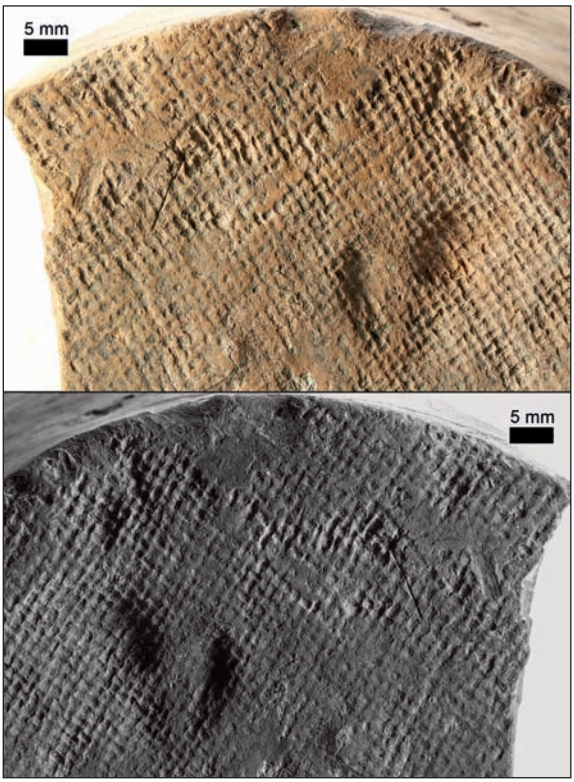


Fig. 18. Details of tabby weave textile impressions on bottom fragment of a vessel from Bilcze Złote (sample 9). Photo by P. Silska

Fig. 19. Tabby weave textile impressions inside the wall of painted ceramic from Bilcze Złote (sample 10). Photo by P. Silska

Fig. 20. Details of tabby weave textile impressions and fingerprint on the vessel from Bilcze Złote (sample 10)

might indicate the occurrence of a very fine textile impression (threads width: 0,3-0,5 mm?) made with the netting technique.

CONCLUSIONS

The presented results of the analysis of textile impressions from the Bilcze Złote pottery assemblages, as well as the current state of research on this issue, indicate that Trypillia communities had the ability to produce textile goods using various techniques. In addition to different types of non-woven products (such as cords, baskets, plaitings and twined textiles), woven fabrics constitute a large group of finds (*cf*. Chmielewski 2009, 233-235; tab. 14, 272-276). Variety in this category occurs both in relation to the density (quality) of the fabric itself and the type of yarn used. Types of fabrics recognized so far were made in tabby (balanced, weft/warp-faced tabby) and rep weave. Number of yarn interlaces per 1 cm in active and passive systems ranges from 3 to 12 threads (Chmielewski 2009, tab. 14, 272-276). On the bottom part of one of the vessels from the Bilcze Złote collection, imprints of fine, balanced tabby weave, with 11 threads per 1 cm were identified (Prokopowicz 2013, 99; Figure 21). The diversity of most likely spliced and plied yarns, with a width between 0,5 and 1,9 mm, indicates that Trypillia communities had knowledge and skills with regard

Fig. 21. Balanced tabby weave textile impression on bottom fragment of the vessel from Bilcze Złote. Photo by P. Silska (see Prokopowicz 2013, 99)

to the selection of technical characteristics of thread for making fabrics of the desired thickness and density. The possible use of splicing supports the hypothesis that the mentioned technique was commonly used for thread production from plant-derived raw material in the European Neolithic and Eneolithic traditions, instead of the previously believed draft-spinning technique (Gleba and Harris 2018, 2329-2346; Leuzinger and Rast-Eicher 2011; Rast-Eicher 2005, 117-132).

The relatively high frequency of textile impressions visible on Trypillia culture pottery indicates that textiles were important elements of the technological process associated with pottery manufacture (Zbenovich 1974, 80-81, Kosakivskyi 2004, 94; Chmielewski 2009, 226-233). The largest number of textile imprints is recorded at the bases of the vessels, which suggests the use of various kinds of textiles as supporting pads prior to firing. A characteristic feature of most impressions of this type is their intentional masking by smoothing and by covering them with an additional layer of clay. Another possibility is that some textile imprints were planned and intentional. The occurrence of textile impressions on the inside of a vessel wall (sample 10, Figure 19, 20), may indicate their application for the better adhesion and merging of individual elements used for pottery-making. Therefore, it can be assumed that textiles, including woven fabrics, were quite commonly used among Trypillia communities, and thus available for pottery manufacture (Mazăre 2011a, 27-48; 2011b, 28-33).

Due to the limited number of sources associated with textile production in Neolithic and Eneolithic communities, especially those from Eastern Europe, examinations of their indirect remains could produce valuable sources of information. Analysis of the technology of textile production opens up new possibilities in the recognition and reconstruction of production processes and the use of particular weaves and twists of fibre. Increasing the database of available clay materials with visible textile imprints offers a more solid foundation for comparative studies focused on the interactions between culturally diversified, periodically co-existing social groups. Furthermore, identification of the degree of technological advancement of textile production provides a basis for new interpretations regarding regional specialization, both in terms of cultivation and craft, which represents an important part of socio-economic organization.

Acknowledgements

Access to materials was kindly provided by The Archaeological Museum of Kraków.

References

Adovasio J. M. 1975. The textile and basketry impressions from Jarmo. *Paléorient* 3, 223-230.

Adovasio J. M. 2016. *Basketry Technology: A guide to identification and analysis*. Updated edition. London, New York: Routledge.

Adovasio J. M., Soffer O. and Klima R. B. 1996. Upper Palaeolithic fibre technology: interlaced woven finds from Pavlov I, Czech Republic, c. 26,000 years ago. *Antiquity* 70, 526-534.

Andersson E. 2003. Textile production in Scandinavia during the Viking Age. In L. Bender Jørgensen, J. Banck-Burgess and A. Rast-Eicher (eds), *Textilienaus Archäologie und Geschichte. Festschrift Klaus Tidow*. Neumünster: Wachholtz Verlag, 46-62.

Bazzanella M. 2012. Italy: Bronze Age. In M. Gleba and U. Mannering (eds), *Textiles and textile production in Europe from prehistory to AD 400* (= *Ancient Textiles Series* 11). Oxford: Oxbow Books, 203-214.

Bender Jørgensen L. 1992. *North European Textile until AD 1000*. Aarhus: Aarhus University Press.

Burdo N. B. 2004. *Tekstylne vyrobnytstvo. Entsyklopedia Trypilskoi Tsyvilizatsii* 2. Kiev: Ukrpolyhrafmedya, Irinovskaya, 516.

Burdo N. B., Kotova N. S. and Videiko M. Y. 2010. Technological study of 'cord' impressions on middle and late Eneolithic pottery in Ukraine. *Baltic-Pontic Studies* 15, 122-134.

Chmielewski T. J. 2009. *Po nitce do kłębka... o przędzalnictwie i tkactwie młodszej epoki kamienia w Europie Środkowej*. Warszawa: Semper.

Cybulska M. and Maik J. 2007. Archaeological textiles – A need for new methods of analysis and reconstruction. *Fibres and Textiles in Eastern Europe* 15(5-6), 64-65.

Doumani P. N. and Frachetti M. D. 2012. Bronze Age textile evidence in ceramic impressions: weaving and pottery technology among mobile pastoralists of central Eurasia. *Antiquity* 86, 368-382.

Drooker P. 2000. Approaching fabrics through impressions on pottery. *Textile Society of America Symposium Proceedings* 773, 59-68.

Dumpe B. 2006. Agrās Tekstilās Keramikas Faktūru Veidošanas Īpatnības. *Arheologija un Etnografija* 23, 71-84.

Emery I. 1966. *The primary structure of fabrics: an illustrated classification*. Washington, D.C.: The Textile Museum.

Feldtkeller A. and Körber-Grohne U. 1998. Pflanzliche Rohmaterialien und Herstellungstechniken der Gewebe, Netze, Geflechte sowie anderer Produkte aus den neolithischen Siedlungen Hornstaad, Wangen, Allensbachund Sipplingen am Bodensee. In A. Feldtkeller, H. Blum and V. von Giertz-Siebenliste (eds), *Siedlungsarchäologie im Alpenvorland V* (= *Forschungen und Berichte zur Vor- und Frühgeschichte in Baden-Württemberg Band* 68). Stuttgart: Landesamt für Denkmalpflege im Regierungspräsidium.

Gleba M. 2008. *Textile production in Pre-Roman Italy* (= *Ancient Textiles Series* 4). Oxford: Oxbow Books.

Gleba M. 2017. Tracing textile cultures of Italy and Greece in the early first millennium BC. *Antiquity* 91(359), 12051-222.

Gleba M. and Harris S. 2018. The first plant bast fibre technology: identifying splicing in archaeological textiles. *Archaeological and Anthropological Sciences* 11(5), 2329-2346.

Gleba M. and Mannering U. 2012. *Textiles and textile production in Europe from prehistory to AD 400* (= *Ancient Textiles Series* 11). Oxford: Oxbow Books.

Good I. 2001. Archaeological Textiles: A review of Current Research. *Annual Review of Anthropology* 30, 209-226.

Grömer K. 2016. *The Art of prehistoric textile making*. Vienna: Natural History Museum.

Grömer K. and Kern D. 2010. Technical data and experiments on corded ware. *Journal of Archaeological Science* 37, 3136-3145.

Grygiel R. 2008. *Neolit i początki epoki brązu w rejonie Brześcia Kujawskiego i Osłonek*. 2. *Środkowy Neolit. Grupa brzesko-kujawska kultury lendzielskiej*. Łódź: Fundacja Badań Archeologicznych Imienia Profesora Konrada Jażdżewskiego, Muzeum Archeologiczne i Etnograficzne w Łodzi.

Hansen E. H. 1990. Nålebinding: definition and description. In P. Walton Rogersnad and J. P. Wild (eds), *Textiles in northern archaeology*. NESAT III, textile symposium in York, 6-9 May 1987 (North European Symposium for Archaeological textiles Mongraph). London: Archetype Publications, 21-27.

Kaczanowska M. (ed.). 2006. *Dziedzictwo cywilizacji naddunajskich małopolska na przełomie epoki kamienia i miedzi*. *The Danubian Heritage: Lesser Poland at the Turn of the Stone and Copper Ages*. Kraków: Muzeum Archeologiczne w Krakowie.

Kaczmarek M. 2015. Sznur czy tekstylia? Analiza tekstylna ornamentu odciskanego na ceramice funeralnej społeczności niżowych III tysiąclecia przed Chr. *Fontes Archaeologici Posnanienses* 51, 263-281.

Kadrow S. 2013a. Natural and cultural background of Neolithic settlement in Bilcze Złote. In S. Kadrow (ed.), *Bilcze Złote. Materials of the Tripolye Culture from the Werteba and the Ogród Sites*. Kraków: Muzeum Archeologiczne w Krakowie, 23-28.

Kadrow S. 2013b. History and the present state of research. In S. Kadrow (ed.), *Bilcze Złote. Materials of the Tripolye Culture from the Werteba and the Ogród Sites*. Kraków: Muzeum Archeologiczne w Krakowie, 9-12.

Kadrow S., Sokhatskiy M., Tkachuk T. and Trela E. 2003. Sprawozdanie ze studiów i wyniki analiz materiałów zabytkowych kultury trypolskiej z Bilcza Złotego znajdujących się w zbiorach Muzeum Archeologicznego w Krakowie. *Materiały Archeologiczne* 34, 53-143.

Kadrow S. and Pokutta D. A. 2016. The Verteba Cave: A subterranean sanctuary of the Cucuteni-Trypillia Culture in western Ukraine. *Journal of Neolithic Archaeology* 18, 1-21.

Karsten J., Sokhatskyi M. P., Heins S. and Madden G. D. 2015. Bioarkheologicheskiy analiz antropologicheskogo materiala iz peshchery Verteba. *Stratum plus 2*, 121-144.

Kordysh N. 1951. Notes on weaving in the Trypilian Culture of the Ukraine. *Annals of the Ukrainian Academy of Arts and Sciences in the U.S.* 1/2, 98-112.

Kosakivskyi V. O. 1998. *Vidbytky tkaniny na keramitsi z piznio trypilskoho poselennya Bershanivka na Podilli. Trypilske poselennya Koshylivtsi-Oboz (do 120-richya vidkryttya)*. Zalishchyky: Naukovi materialy Mizhnarodnoyi arkheolohichnoyi konferentsiyi, 41-43.

Kosakivskyi V. O. 2001. *Trypilski tkaniny*. *Trypilskyi svit i ioho susidy: Tezy do povidey naukovo-praktychnoi konferentsyi*. Zbarazh: Derzhavnyy istoryko-arkhitekturnyy zapovidnyk, 17-19.

Kosakivskyi V. O. 2004. *Vidbytky tekstilu*. *Entsyklopedia Trypilskoi Tsyvilizatsii* 2. Kyiv: Ukrpolyhrafmedya, Irinovskaya, 93-95.

Kosakivskyi V. O., Ocheretnyi V. V. and Prylypko V. P. 1998. Vidbytky tkanyny na keramitsi z piznio trypilskoho poselennya Yaltushkiv na Podilli. *Podilska starovyna,* 29-40.

Kośko A., Sikorski A. and Szmyt M. 2010. „Corded" and „cord-like" ornamentation in the Vistula and Dnieper interfluvial region in the 5th-4th mill. BC. Introduction to interdisciplinary research. *Baltic-Pontic Studies* 15, 13-48.

Ledogar S., Karsten J., Madden G. D., Schmidt R., Sokhatskyi M. P. and Feranec R. S. 2018. New AMS dates for Verteba Cave and stable isotope evidence of human diet in the Holocene forest-steppe Ukraine. *Radiocarbon* 61, 141-158.

Leuzinger U. and Rast-Eicher A. 2011. Flax processing in the Neolithic and Bronze Age pile-dwelling settlements of eastern Switzerland. *Vegetation History and Archaeobotany* 20(6), 535-542.

Madden G. D., Karsten J. K., Ledogar S. H., Schmidt R. and Sokhatsky M. P. 2018. Violence at Verteba Cave, Ukraine: New insights into the Late Neolithic intergroup conflict. *International Journal of Osteoarchaeology* 28(1), 44-53.

Makkay J. 2001. *Textile impressions and related finds of the Early Neolithic Körös culture in Hungary*. Budapest: Published by the Author.

Marian C. 2008. Archaeological arguments concerning the textile techologies of Cucuteni civilisation. Nalbinding technique. In V. Chirica and M. C. Văleanu (eds), *Etablissements et habitations prehistoriques. Structure, organisation, symbole. Actes du colloque de Iaşi, 10-12 Decembre 2007* (= *Bibliotheca Archaeologica Moldaviae* 9). Iaşi: Victor Spinei et Virgil Mihăilescu-Bîrliba, 327-334.

Marian C. 2009. *Meşteşuguri textile în cultura Cucuteni*. Iaşi: Editura Trinitas.

Marian C. and Bigbaev V. 2008. Cercetarea modalităţilor de împletire a unormateriale ale cărorimpresiuni s-au păstrat pe ceramic culturii Cucuteni-Tripolie. In *Cucuteni – 5000 Redivivus. Ştiinţele exacte şi mai puţin exacte. Comunicări prezentate la primul simpozion Internaţional Cucuteni – 5000 Redivisus`, ediţia a III, 11-12 septembrie 2008*. Chişinău: Editura Universitatea Tehnică a Moldovei, 43-49.

Mårtensson L., Nosch M. L. and Andersson Strand E. 2009. Shape of things: understanding a loom weight. *Oxford Journal of Archaeology* 28(4), 373-398.

Mazăre P. 2011a. Textile structures and techniques identified in Neolithic and Copper Age sites from Romania. *Marisia* 31, 27-48.

Mazăre P. 2011b. Textiles and pottery: Insights into Neolithic and Cooper Age pottery manufacturing techniques from Romania. *Archaeological Textile Newsletter* 53, 28-34.

Médard F. 2000. *L'artisanat textile au Néolithique. L'exemple de Delley-Portalban II (Suisse) 3272-2462 avant J.-C.* (= *Collection Préhistoires* 4). Montagnac: Editions Monique Mergoil.

Novitskaya M.A. 1960. Uzornye tkani tripolskoy kultury (za materialamy rozkopok u s. Stina). *Kratkiye soobshcheniya Instituta arkheologii* 10, 33-35.

Nikitin A. G., Sokhatskiy M. P., Kovaliukh M. M. and Videiko M. Yu. 2010. Comprehensive site chronology and ancient mitochondrial DNA analysis from Verteba cave – a Tripillian culture site of Eneolithic Ukraine. *Interdisciplinaria Archaeologica. Natural Sciences in Archaeology* 1(1-2), 9-18.

Pipes M. L., Kruk J. and Milisauskas S. 2019. *Textile production and the social importance of women in the Neolithic*. Kraków: Instytut Archeologii i Etnologii PAN.

Podkańska M. 2012. Odciski tekstylne na ceramice. In P. Silska (ed.), *Wczesnobrązowa osada obronna w Bruszczewie. Badania w latach 1964-1968*. Poznań: Muzeum Archeologiczne w Poznaniu, 207-213.

Prokopowicz A. 2013. Odciski tkanin na ceramice. In S. Kadrow (ed.), *Bilcze Złote. Materials of the Tripolye Culture from the Werteba and the Ogród sites*. Kraków: Muzeum Archeologiczne w Krakowie, 99-100.

Rast-Eicher A. 1997. Die Textilien. In: J. Schibler, H. Hüster-Plogmann, S. Jacomet, C. Brombacher, E. Gross-Klee and A. Rast-Eicher (eds), *Ökonomie und Ökologie neolithischer und bronzezeitlicher Ufersiedlungen am Zürichsee*: *Ergebnisse der Ausgrabungen Mozartstrasse, Kanalisationssanierung Seefeld, AKAD/Pressehaus und Mythenschloss in Zürich* (= *Monographien der Kantonsarchäologie* 20). Zürich und Egg: Fotorotar, 300-328.

Rast-Eicher A. 2005. Bast before wool: the first textiles. In P. Bichler, K. Grömer, R. Hofmann-de Keijzer, A. Kern and H. Reschreiter (eds), *Hallstatt textiles. Technical analysis, scientific investigation and experiment on Iron Age textiles* (= *British Archaeological Report. International Series* 1351). Oxford: BAR Publishing, 117-132.

Rast-Eicher A. 2016. *FIBRES – Microscopy of archaeological textiles and furs*. Budapest: Archaeolingua.

Rast-Eicher A. and Dietrich A. 2015. *Neolitische und bronzezeitliche Gewebe und Geflechte*: Die Funde aus den Seeufersiedlungen im Kanton Zürich (= *Zürcher Archäologie, Monographie*). Zürich: Amt für Raumentwicklung Archaologie und Denkmalpflege.

Richter É. 2010. Our threads to the past: plaited motifs as predecessors of woven binding structures. In E. Andersson Strand, M. Gleba, U. Mannering, C. Munkholt and M. Ringgaard (eds), *North European Symposium for Archaeological Textiles X*. Oxford: Oxbow Books, 211-216.

Rook E. and Trela E. 2001. Stanowiska kultury trypolskiej w Bilczu Złotym w dawnym powiecie Borszczów, w świetle zbiorów krakowskich. In J. Lech and J. Partyka (eds), *Z archeologii Ukrainy i Jury Ojcowskiej*. Ojców: Ojcowski Park Narodowy, 183-206.

Seiler-Baldinger A. 1994. *Textiles: a classification of techniques*. Washington: Smithsonian Institution Press.

Shishlina N. I., Golikov V. P. and Orfinskaya O. V. 2000. Bronze Age textiles of the Caspian Sea maritime steppes. In J. Davis-Kimball, E. M. Murphy, L. Koryakova and L. T. Yablonsky (eds), *Kurgans, ritual sites, and settlements: Eurasian Bronze and Iron Age* (= *British Archaeological. Reports. International Series* 890). Oxford: BAR Publishing, 109-117.

Sikorski A. 2003. Nie tylko o tekstyliach wykopaliskowych z Wielkopolski. *Wielkopolski Biuletyn Konserwatorski* 2, 123-141.

Sikorski A. 2010. More than just „cords" on Neolithic ceramic ware: an outline of microscopic identification for „corded ornamentation". Some thoughts on research methods. *Baltic-Pontic Studies* 15, 49-56.

Sikorski A. 2017. Wytwarzanie i użytkowanie tekstyliów. In M. Szmyt (ed.), *Biały Potok. Materiały z badań Józefa Kostrzewskiego na Podolu* (= *Bibliotheca Fontes Archaeologici Posnanienses* 19). Poznań: Muzeum Archeologiczne w Poznaniu, 365-289.

Sikorski A. 2018. Odciski „tekstylne" na fragmentach ceramiki kultury pucharów lejkowatych. In M. Szmyt (ed.), *Mrowino stan. 3. Późny neolit nad środkową Wartą* (= *Bibliotheca Fontes Archaeologici Posnanienses* 22). Poznań: Muzeum Archeologiczne w Poznaniu, 453-467.

Soffer O., Adovasio J. M., Illingworth J. M., Amirkhanov H. A., Praslo N. D. and Stre V. M. 2000. Palaeolithic perishables made permanent. *Antiquity* 74, 812-821.

Sokhatskiy M. 2001a. Arkheologichni razkopki v pecheri Verteba na Podili. In J. Lech and J. Partyka (eds), *Z archeologii Ukrainy i Jury Ojcowskiej*. Ojców: Ojcowski Park Narodowy, 207-227.

Sokhatskiy M. 2001b. Pechery Podillya. In J. Lech and J. Partyka (eds), *Z Archeologii Ukrainy i Jury Ojcowskiej*. Ojców: Ojcowski Park Narodowy, 115-126.

Soper R. 1985. Roulette decoration on African pottery: technical considerations, dating and distributions. *African Archaeological Review* 3, 29-51.

Starkova E. and Zakościelna A. 2018. Traditions of ceramic production in the Central and Eastern Europe Eneolithic: Tripolye, late Malice and Lublin-Volhynian cultures. *Sprawozdania Archeologiczne* 70, 67-85.

Zbenovich V. G. 1974. *Pozdnetripolskiye Plemena Severnogo Prichernomoria*. Kyiv: Naukova Dumka, 80-81.

SPRAWOZDANIA ARCHEOLOGICZNE 72/2, 2020
PL ISSN 0081-3834
DOI: 10.23858/SA/72.2020.2.2116

Barbara Witkowska[1], Janusz Czebreszuk[2], Barbara Gmińska-Nowak[3], Tomasz Goslar[4], Marzena Szmyt[5], Tomasz Ważny[6]

THE CEMETERY OF THE GLOBULAR AMPHORA CULTURE COMMUNITY AT THE ZŁOTA-GAJOWIZNA SITE IN THE LIGHT OF RADIOCARBON ANALYSIS AND DENDROCHRONOLOGY

ABSTRACT

Witkowska B., Czebreszuk J., Gmińska-Nowak B., Goslar T., Szmyt M., Ważny T. 2020. The cemetery of the Globular Amphora culture community at the Złota-Gajowizna site in the light of radiocarbon analysis and dendrochronology. *Sprawozdania Archeologiczne* 72/2, 259-284.

This paper presents a new series of absolute age determinations from the Złota-Gajowizna site. These are the first chronometric data from the most important necropolis of the central group of the Globular Amphora culture. The obtained dendrochronological data, which are unique for the sites of the Late Neolithic in Poland, made it possible to specify the results of the calibration. A new interpretation of the arrangement of the cemetery has been proposed, which is the starting point for determining the GAC funeral rite in the Sandomierz Upland.

Keywords: Globular Amphora culture, Gajowizna cemetery, funeral rites, radiocarbon chronology, dendrochronology, modelled calibration

Received: 14.06.2020; Revised: 11.09.2020; Accepted: 12.09.2020

1 Institute of Archaeology, Jagiellonian University, Gołębia 11, 31-007 Kraków, Institute of Eastern Studies, Adam Mickiewicz University, Uniwersytetu Poznańskiego 7, 61-614 Poznań, Poland; bejotwu@wp.pl; https://orcid.org/0000-0002-1044-2326
2 Faculty of Archaeology, Adam Mickiewicz University, Uniwersytetu Poznańskiego 7, 61-614 Poznań, Poland; janusz.czebreszuk@amu.edu.pl; https://orcid.org/0000-0001-8487-6031
3 Centre for Research and Conservation of Cultural Heritage, Faculty of Fine Arts, Nicolaus Copernicus University in Toruń, Sienkiewicza 30/32, 87-100 Toruń, Poland; barbara.gminska@gmail.com; https://orcid.org/0000-0001-8447-8033
4 Poznań Radiocarbon Laboratory, Poznań Park of Science and Technology, Rubież 46, 61-612 Poznań, Poland; tomasz.goslar@radiocarbon.pl; https://orcid.org/0000-0002-1346-3122
5 Archaeological Museum in Poznań, Wodna 27 – Pałac Górków, 61-781 Poznań, Poland; marzena@amu.edu.pl; https://orcid.org/0000-0002-5975-4494
6 Centre for Research and Conservation of Cultural Heritage, Faculty of Fine Arts, Nicolaus Copernicus University in Toruń, Sienkiewicza 30/32, 87-100 Toruń, Poland; twazny@umk.pl; https://orcid.org/0000-0001-6641-0131

Despite the fact that the Gajowizna site cemetery was discovered almost 100 years ago, the number of human graves and the abundance of accompanying animal deposits make it a unique find within the Polish (central) group of the Globular Amphora culture (hereinafter GAC). The reduction of analytical value due to loosing part of materials through course of storage has not affected the significance of the necropolis as an important point of reference for the researchers of not only the GAC, but also the Late Neolithic in the Vistula basin. This has made the lack of absolute age determinations for the discovered assemblages even more acute. Under two projects financed by the National Science Centre in recent years (FUGA 2014/12/S/HS3/00355 and BEETHOVEN 2014/15/G/HS3/04720), the first series of chronometric data has been obtained, which forms the basis for establishing the chronology of the GAC in the Sandomierz Upland. The most significant of those data are a number of radiocarbon age determinations. At the same time, the character of the site in question made it possible to carry out dendrochronological analyses, which are unique for the sites of the Late Neolithic in Poland. In order to fully present the context of the obtained results, the arrangement and functions of the features discovered in the cemetery have been reinterpreted, since the increase in knowledge of the GAC funeral rites has falsified the view presented in the original publication on the site (Krzak 1977).

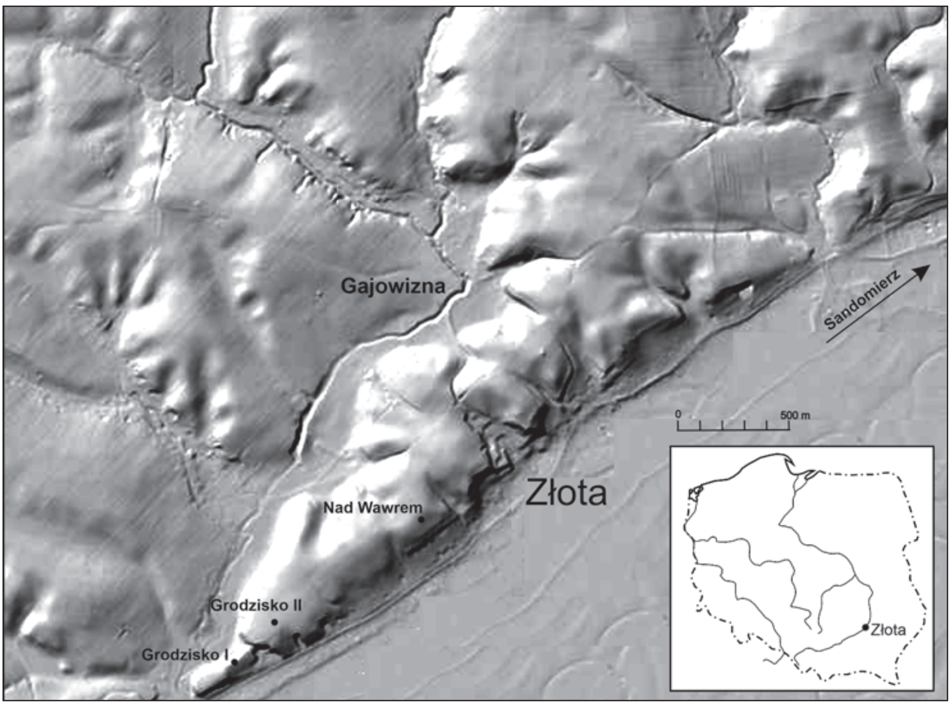


Fig. 1. The Gajowizna site. Location of GAC cemetery within the complex of the sites in Złota, Sandomierz district

The Gajowizna cemetery is usually said to be located in Złota. However, according to the documentation of the Archaeological Survey of Poland, it is situated in the fields outside Polanów Złocki (Fig. 1). It is marked as site 14 on Map Sheet 90-73 (AZP 90-73/14). Like the entire complex of sites in Złota, it was discovered by amateur explorer Zdzisław Lenartowicz, who spent almost 40 years searching for sites of archaeological significance, from 1882 until 1921, when his exploration was eventually discontinued due to a ban from the Office for the Protection of Historical Monuments (Krzak 1976, 8-14, *ibidem* further references; Witkowska 2013, table 2). It is difficult to determine the precise moment in Lenartowicz's activity when the Gajowizna site was dug, but some traces characteristic of his work, such as chaining pin holes, violated arrangements of skeletons or looted inventories, were recorded in 9 features unearthed during the 1926 field research. The complete GAC vessels, which have been included in the collections of several Polish museums since they were donated by Lenartowicz (Gągorowska-Chudobska 2015 and the unpublished collections of the State Archaeological Museum in Warsaw and the Archaeological Museum in Krakow), may be attributed to the necropolis in question, but there is no possibility of linking them with particular grave inventories.

The subsequent field research in Gajowizna was fully professional. It was carried out in 1926 by Zygmunt Szmit and Roman Jakimowicz on behalf of the State Group of Prehistoric Relicts Conservators. During the excavation of the site, a total of 35 archaeological features were discovered. Three years later, Jan Fitzke explored three more pits, including one "animal grave", but their nature and precise locations within the site remain unknown. The authors of the research immediately recognized the value of the discovered materials, which is evidenced by an article on "animal graves" (Jakimowiczowa 1927) published a year after the field works were completed. The Second World War and the difficult times that followed were not favourable for studying the collected material. The findings were not published until 50 years after the archaeological expedition (Kowalczyk ed. 1977). The authors of the publication, notably Zygmunt Krzak, who had undertaken the enormous effort of organizing and publishing the materials from the other Złota sites (*cf.* Krzak 1958; 1961; 1970; 1976; see also Podkowińska 1953; Rauhut 1953; 1962), were aware of the need to present the incomplete sources more exhaustively. Their publication is also the starting point for this article.

In the course of the aforementioned field works of 1926, a total of 32 GAC pits were discovered, out of which 30 were sepulchral features (Table 1). Such an accumulation of ritual structures makes Gajowizna the largest necropolis of the Polish GAC group. However, its analytical value had decreased due to the significant degradation of the site and the disappearance of some of the documentation and artefacts, including osteological materials. This was reflected in the source publication, which contains a number of discrepancies between the field documentation, the descriptions of the objects (Krzak 1977), and specialist zoological (Krysiak and Lasota-Moskalewska 1977; Lasota-Moskalewska 1977) and anthropological (Miszkiewicz 1977) analyses. The above discrepancies influenced the credibility of the archaeological interpretation proposed in the publication in question.

Table 1. The Gajowizna site. Characteristics of sepulchral features of the GAC

No	function	orientation	dimensions (cm)			number of buried person	stones	burnout	vessles	corded ornament	axes	other flints	bone tools	ornaments	shells	animal remains (number indicates individuals buried entirely)			remarks
			length	width	depth											cattle	pigs	goat / sheep	
1	human grave	W-E	460	250	100	3	x	*	4	x	1	-	-	1	x	x	x	x	bones of dog
2	human grave	NW-SE	200	160	25	5	x	-	2	x	1	4	1	1	x				-
3	animal deposit	W-E	230	120	75	-	-	-	-	-	-	-	-	-	-	-	8	-	bone of bear
4	animal deposit	W-E	240	135	80	-	-	*	-	-	-	-	-	-	-	4	-	x	-
6	human grave (?)	W-E	400	200	85	?	x	-	3	x	-	3	1	4		x	x	-	looted by Lenartowicz
8	animal deposit	NW-SE	197	123	45	-	x	-	-	-	-	-	-	-	-	1	-	-	-
9	human grave	NW-SE	240	135	45	2	x	-	4	-	-	3	-	x	x	-	x	-	-
10	human grave	NW-SE	200	90	45	3	x	-	4	-	2	2	-	-	-	-	-	-	-
13	human grave	NW-SE	245	110	50	1	x	*	2	x	-	1	-	-	-	x	x	x	looted by Lenartowicz
14	human grave	NW-SE	240	170	20	2	x	-	?	?	1	1		x	-	-	-	-	looted by Lenartowicz
15	human grave	NW-SE	250	110	-	≥1	x	-	x	x	-	-	-	-	-	x	-	-	lack of drawing documentation, looted by Lenartowicz
16	animal deposit	NW-SE	175	95	20	-	-	-	-	-	-	-	-	-	-	1	-	-	-
17	human grave	NW-SE	230	170	-	≥1	x	-	x	x	-	-	-	-	-	-	-	-	lack of drawing documentation, looted by Lenartowicz

18	human grave	NW-SE	340	130	-	2	?	-	?	?	-	-	-	x	-	-	-	-	lack of drawing documentation
19	animal deposit	NW-SE	180	105	25	-	x	-	-	-	-	-	-	-	-	2	-	-	-
20	human grave	NW-SE	240	130	15	≥1	-	-	2	-	-	-	-	-	-	-	-	-	lack of drawing documentation, looted by Lenartowicz
21	human grave	NW-SE	245	135	85	≥1	x	-	2	x	1	-	-	-	-	-	-	-	lack of drawing documentation, looted by Lenartowicz
22	animal deposit	NW-SE	195	130	95	-	x	-	-	-	-	-	-	-	-	2	-	-	-
23	human grave	NW-SE	220	200	45	≥1	x	*	3	-	1	-	-	-	-	-	-	-	-
24	human grave / animal deposit	NW-SE	480	165	60	2	x	-	4	x	-	-	-	-	-	10	2	3	bone of bear
25	animal deposit (?)	NW-SE	195	145	25	?	x	-	-	-	-	-	-	-	-	-	x	-	-
26	human grave	W-E	220	130	40	≥1	?	-	2	x	-	1?	-	x	-	-	-	-	lack of drawing documentation, looted by Lenartowicz
27	animal deposit (?)	W-E	470	170	35	-	x	-	-	-	-	-	1	-	-	4	2	x	-
28	human grave	N-S	240	180	65	2	x	*	-	-	1	1	-	-	-	x	x	-	bone of horse
29	animal deposit	N-S	385	175	60	-	x	-	-	-	-	-	1	-	-	4	-	-	-
30	human grave	N-S	290	170	65	1	x	*	3	-	1	-	-	x	-	x	x	-	
31	animal deposit	N-S	300	175	80	-	x	-	-	-	-	-	-	-	-	5	-	1	-
32	human grave	N-S	200	130	-	1	-	-	2	x	-	-	-	-	-	x	-	-	lack of drawing documentation, looted by Lenartowicz
33	animal deposit	N-S	150	120	12	-	-	-	-	-	-	-	-	-	-	-	-	-	lack of drawing documentation
34	human grave (?)	W-E	240	150	70	≥1	x	-	x	-	-	x	-	-	-	-	-	-	lack of drawing documentation
					summary	≥ 30	22	6	≥ 40	-	9	≥ 17	4	≥ 12	-	28	12	7	-

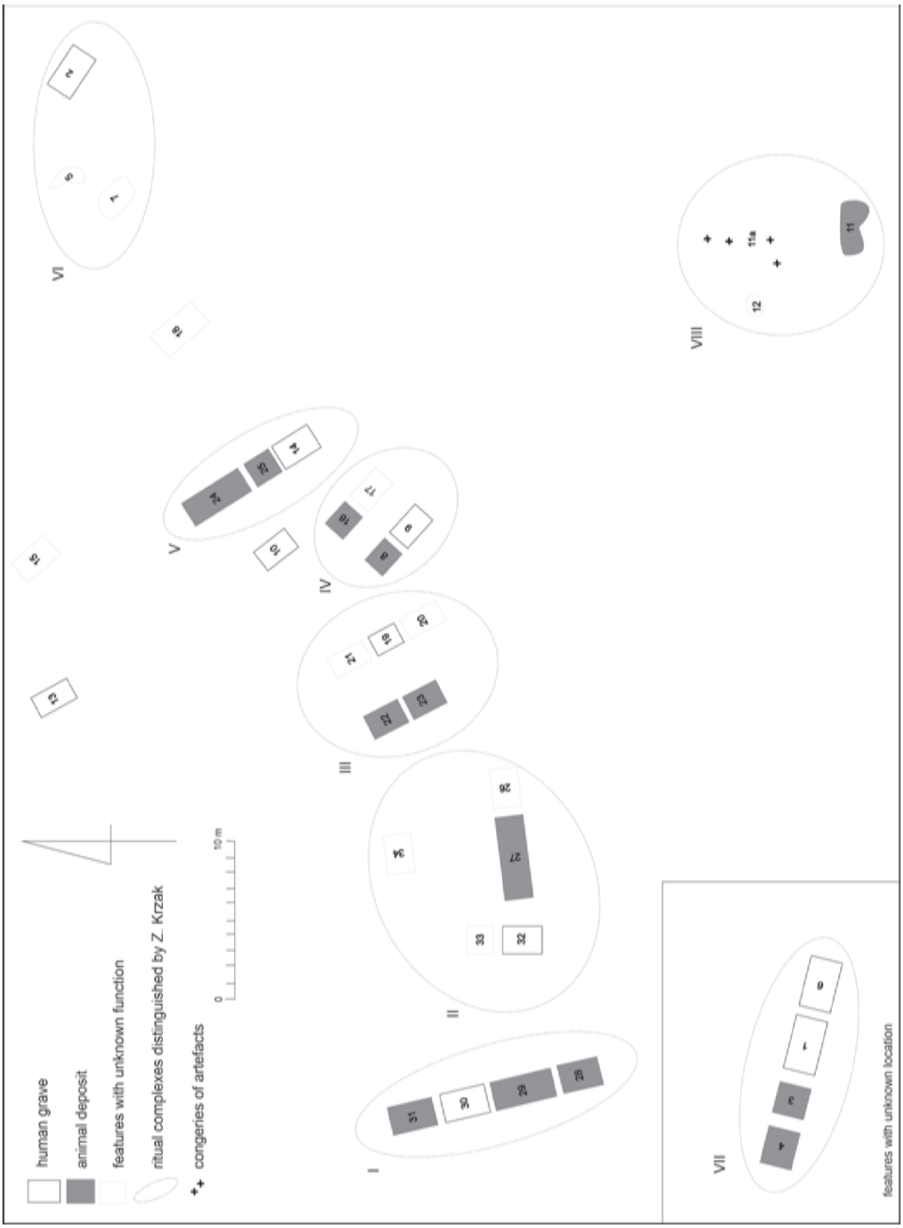


Fig. 2. The Gajowizna site. The arrangement of cemetery according to the interpretation of Zygmunt Krzak (after Krzak 1977, with changes)

Z. Krzak grouped the discovered features into eight complexes, in each of which the so-called sacrificial pits, whose number varied from one to four, were located next to a human burial (Fig. 2; Krzak 1977, 64-67). However, in only three out of the eight clusters he distinguished (marked I, V and VII) was the arrangement of elements regular, which may reflect a repetitive sequence of the funerary rite. The hypothesis proposed by the scholar was based on poor premises, because the nature of almost a third of the discovered pits was not determined (Krzak 1977, 78-79), despite some evidence making it possible to establish their function with considerable likelihood. Only 11 features were classified as human graves. Moreover, two of them (11a and 12) were dated to a younger period, most probably the early Bronze Age. The omission of some data and the incorporation of differently oriented features into individual clusters gave the impression of a chaotic arrangement of the necropolis. It also precluded the recreation of the ritual and the demarcation of the possible phases of the cemetery's use.

A careful study of the site plan and the assumption of some research premises has allowed us to propose an interpretation, different from that of the aforementioned author, of the functions of some of the features and the spatial arrangement of the necropolis. It seems that the number of human graves was significantly underestimated in the original publication, which gave the impression that the people buried in the few sacrificial pits had enjoyed an exceptionally high status. However, some evidence allows for the identification of additional human graves within the structures discovered on the Gajowizna site. The following have been considered identification criteria for such features: the rectangular shape of the pit, notes about the discovery of skeletons or separate human bones included in the field documentation of the looted features, the presence of entire artefacts or pieces of vessels and/or flint items and/or decorations, and the absence of complete animal skeletons. It was important that at least three of the above criteria should be met and that the last of them be mandatory, because none of the characteristics is a good classification tool on its own.

The adoption of the first criterion, which refers to the shape of the feature, eliminated the settlement pits (features 5, 7 and 11, the first two of which might have been settlement pits of the GAC) from further analysis. Human bones were discovered in a total of 19 features, out of which 18 met the additional criteria to be considered as regular burials, including the postulated presence of only incomplete animal remains for symbolic consumption. An exception is Feature 24, which requires a more detailed analysis.

In that rectangular, W-E oriented pit, 4.8 m in length, 1.65 m in width and 0.6 m deep, probably 15 animals were deposited, including 10 cows, at least two pigs and three sheep or goats (Fig. 3). Among the animal carcasses, a child of the age of *Infans II* (Miszkiewicz 1977, 149) and four vessels (Krzak 1977, 40-42 and fig. 57) were deposited. Such a combination of animal deposits, a human burial and a set of vessels is an exception at the Gajowizna site. The following basic questions demand answering: What was the status of the burial of the child in reference to the animal deposits? Was the set of vessels dedicated to

Fig. 3. The Gajowizna site. Feature 24, with radiocarbon date and inventory (after Krzak 1977, with changes; artefacts illustrated by B. Witkowska)

the child or was it connected with the animals? Finally, was this a human grave or a sacrificial pit? It is difficult to answer the above questions without referring to other GAC sites where a similar configuration of deposits was recorded. Therefore, with respect to the presence of the same categories of finds (human remains, whole animal skeletons and ceramic artefacts), the closest analogy is site 4 at Brześć Kujawski in Kuyavia. Following K. Jażdżewski, who was in charge of the excavation, T. Wiślański arbitrarily divided the feature into two "animal graves": no. 1, including the skeletons of a female cow, pigs and a child, as well as vessels, and no. 5, including two bull skeletons, bones of a dog and two bone discs. In fact, it was one approximately rectangular (5.3 m × 1.5-1.6 m), W-E oriented pit, where the three complete cattle (the female in the eastern part and the two males in an antipodal position approximately 3 metres farther west) and parts of the carcasses of the two pigs and the dog were deposited. The remains of the pigs and the body of a 1.5-year-old child (*Infans I*) rested under the pelvis of the cow. Next to the rump of the cow, there was a vessel, and two ornamented bone discs were discovered around the heads of the bulls (Wiślański 1966, 203 and figs 41 and 42). The described feature was classified as an animal grave, and the burial of the child was considered to be of a sacrificial nature (Wiślański 1969, 297). The key marker of the sacrificial role of the child was the location of its remains under the carcass of the cow. A four- or five-year-old child buried between two cows, discovered in Dölkau, Germany, was interpreted in a similar manner. There, the animal and human remains were accompanied by vessels and a spindle-shaped blade made of bone (Behrens 1964). The hypothesis was related to the wider conception by T. Wiślański, who believed that the burials of children were considered less significant, reflecting their position within the community (1969, 309). Adopting this view, Feature 24 in Gajowizna should be classified as a sacrificial pit. However, no other animal deposit in the necropolis included ceramic inventory, even though features containing only animal skeletons deposited along with vessels have been found in all three territorial groups of the GAC. Such deposits have been found, *e.g.*, in Klementowice, site 7, on the Nałęczów Plateau (Uzarowiczowa 1975, 193), Koszyce, site 3, in Lesser Poland (Przybyła *et al.* 2013) and in Adolfin, Opatowice, site 1, Pikutkowo, site 5B and Strzelce, site 2, in Kuyavia (Wiślański 1966; Kośko *et al.* 2007), as well as in Stobra and Zauschwitz, Germany (Behrens 1964), Dolheştii Mari, Romania (Dinu 1960) and Krasnasielski, site 1, Belarus (Charniauski 1996). The last of the above features is particularly similar to Feature 24 in Gajowizna, with one exception, however: no human remains were found among the 13 deposited animals, most of which were cattle, accompanied by four vessels, spindle-shaped bone blades and an amber artefact.

The analogies cited above do not resolve the doubts concerning the function of Feature 24. As compared with the other features unearthed in Gajowizna, the content of the pit is unique, which may suggest that the deposited artefacts were dedicated to the buried child. In this cemetery, the presence of ceramic material is strictly connected with the deposition of human remains. The above argumentation justifies considering Feature 24 a human grave, subject to the aforementioned doubts.

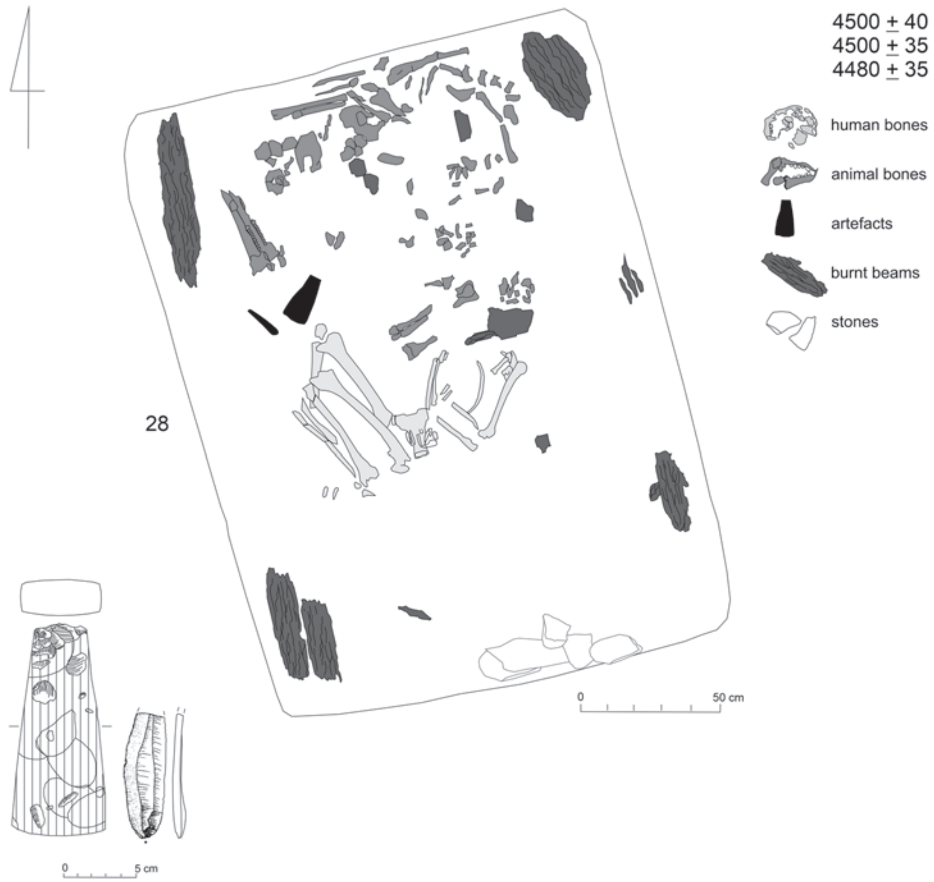


Fig. 4. The Gajowizna site. Feature 28 with radiocarbon date and inventory (after Krzak 1977, with changes, artefacts illustrated by B. Witkowska)

Undoubtedly, a good identifier of a human grave in the discussed cemetery is the presence of a flint axe in the feature. There were a number of such artefacts in Gajowizna. They were found in eight out of nineteen pits containing human remains (Table 1), which all were proper graves that originally included vessels, other flint or bone inventory and incomplete animal skeletons. The specimens of flint axes from Gajowizna, which are curated in museum collections, differ from other GAC tools in that they were relatively small (from 5.6 to 14 cm of length) and utilized massive flakes as blanks. Some of them were cracked due to overheating. Feature 1, in which an artefact of approximately 20 centimetres was discovered (now missing), and Grave 28, which included a 16-centimetre-long axe (Fig. 4; Krzak 1977, 47, fig. 62), are exceptions. Flint blanks and small tools made of them, such as retouched blades and flakes (most of which are missing), were discovered in the

Fig. 5. The Gajowizna site. Feature 6 with radiocarbon date and inventory (after Krzak 1977, with changes)

features that meet the other criteria for human graves. There were only a few bone or amber ornaments and they have been found in the same context.

As a matter of fact, only one type of artefact was found in both the pits containing complete animal skeletons and the hypothetical human graves: GAC-specific spindle-shaped bone blades were found in four features at Gajowizna (Table 1; Figs 5 and 6). Therefore, they were not determinants of any particular type of feature, although the results of functional analyses suggest a clear practical differentiation of tools, depending on the context of the find. The traseology studies of items from six GAC sites, carried out by Małgorzata Winiarska-Kabacińska, PhD, from the Archeological Museum in Poznań, was financed under NSC project no. 2014/12/S/HS3/00355, and its results will be published in a separate article.

Under the above assumptions, 18 human graves (*e.g*. Figs 4 and 5) and 12 accompanying animal deposits (*e.g*. Figs 6-8) can be identified at the Gajowizna site (Table 1; for different estimations, *cf*. Krzak 1977, 78-79; Przybyła and Włodarczak 2013, table 8). Most of the human graves included in Table 1 remained unidentified in the original publication; Krzak considered them pits of an undetermined nature (15, 17, 18, 20-21, 26, 34). Three other features (6, 23 and 28), which in 1977 were described as sacrificial pits (Krzak 1977, 78-79), may be classified as human graves based on the presence of human bones, pieces of vessels,

Fig. 6. The Gajowizna site. Feature 27 with radiocarbon date and inventory (after Krzak 1977, with changes)

Fig. 7. The Gajowizna site. Feature 3 with radiocarbon date (after Krzak 1977, with changes)

flint objects, ornaments and animal half-carcasses. Feature 19, on the other hand, is likely to be an animal deposit and not a hypothetical human grave (Krzak 1977, 78-79) in light of a zoological analysis, whose results suggest that the complete skeletons of two cattle were deposited in the pit (Krysiak and Lasota-Moskalewska 1977, 86). In GAC human graves, the animal skeletons that have been found are primarily incomplete, and were possibly a symbolic meal for the deceased (Szmyt 2006; Kołodziej 2011).

The reinterpretation of the functions of particular features has allowed for the identification of some regularities in the arrangement of the Gajowizna necropolis (Fig. 9). The sacrificial pits containing complete animal specimens were located to the north-west or west of the human graves, and along the same axis. One burial chamber was usually accompanied by one animal deposit, although in complexes 4-3-1-6 and 14-25-24 there were two sacrificial pits, which was probably connected with the larger number of human graves. An important observation is that the double deposits contained different species of animals: the one closer to the burial chamber consisted of pig skeletons, while the one farther away – complete skeletons of cattle.

Thus, the repetitive sequences of actions which were discovered in the Gajowizna cemetery suggest a burial ritual in which human graves were accompanied by animal deposits. This pattern has been discovered in other GAC cemeteries, both in the Sandomierz Upland, *e.g.*, on site 1 in Malice (Witkowska *et al.* in print), and elsewhere, *e.g.*, in Kuyavian cemeteries in Pikutkowo and Zdrojówka (Wiślański 1966). A similar situation was recorded in Zauschwitz, Germany (Bergemann 2018, fig. 179). The above analogies, as well as the observations made so far, support the hypothesis regarding the existence of additional

Fig. 8. The Gajowizna site. Feature 31 with radiocarbon date (after Krzak 1977, with changes)

animal deposits that were not unearthed during the excavation in the Gajowizna cemetery. They should accompany human graves marked 2, 10, 13, 15, 18, 21 and possibly 34 (Fig. 9). This observation is in line with the suggestion by the explorers of the site, who also propounded the possibility of further findings (Jakimowiczowa 1927, 33).

The new view on the spatial arrangement of the Gajowizna cemetery allows for the consideration of the duration of its use and possible division into phases, which would be reflected in two different orientations of sepulchral complexes: along W-E (complexes 4-3-1-6; 26-27 and 34) and NW-SE (complexes 8-9; 16-17; 19-20-21; 22-23; 14-24-25; 28-29-30-31 and 32-33) axes. It should be noted, however, that the artefacts found in those two complexes do not demonstrate taxonomic differentiation. Although the inventories of some features stylistically alluded to an older GAC development phase due to the absence of cord ornamentation, they co-existed within the said complexes with features containing ceramic wares decorated with this technique (*e.g*. complex 20-19-21). Assuming a relatively

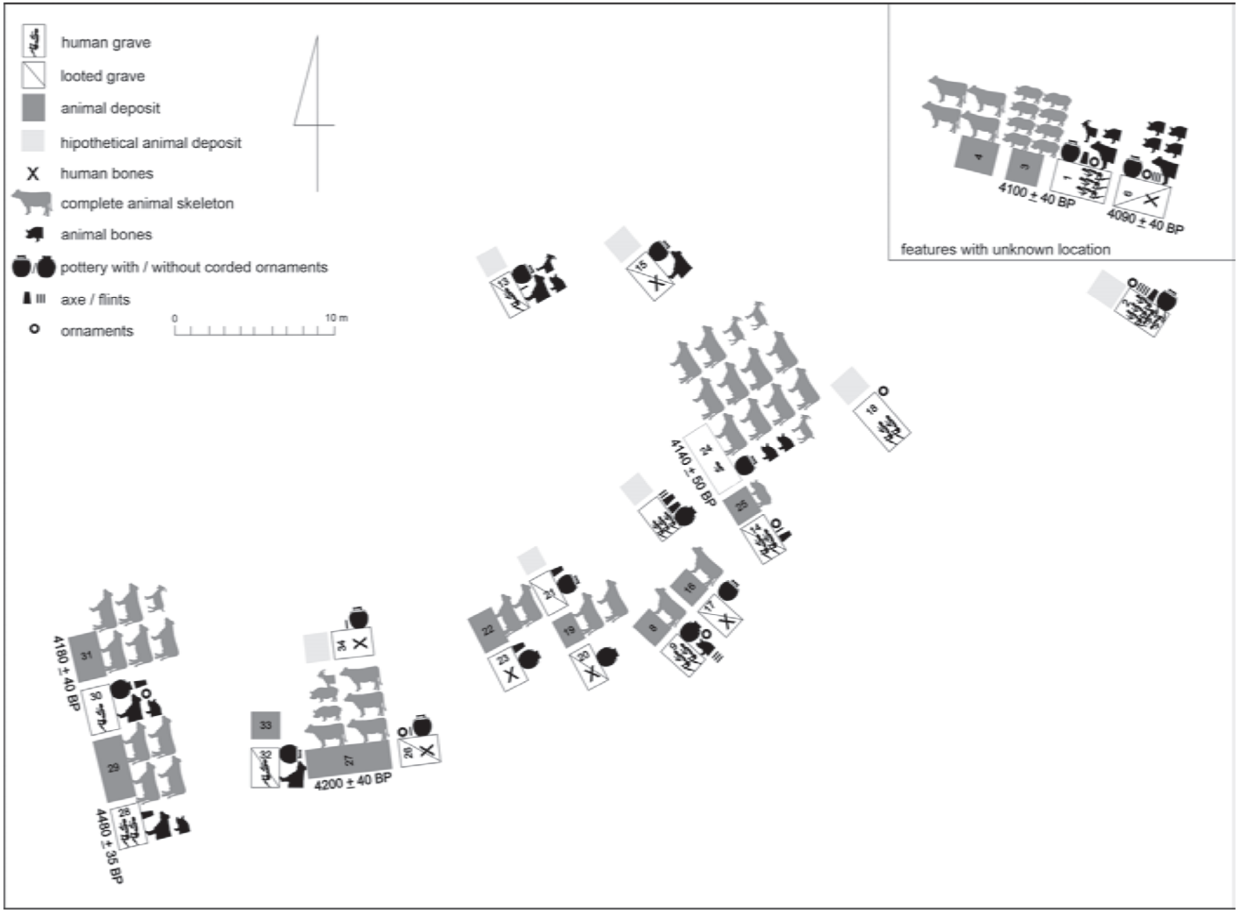


Fig. 9. The Gajowizna site. The reinterpretation of the cemetery arrangement based on the information from the field documentation in the source publication

short period of duration of the cemetery, most objects found therein probably date back to the IIIa phase of the GAC, although some burials may be older. Unfortunately, it is impossible to rule out the possibility that its contemporary presentation is a result of the fact that some artefacts have gone missing. As a result, any typological analyses and their conclusions regarding the Gajowizna necropolis must be treated with (a large dose of) caution and an awareness that the data is incomplete due to the extent of the site's damage and the later history of the sources.

Similar obstacles were faced during the selection of objects for radiocarbon dating. NSC project no. 2014/12/S/HS3/00355 involved running a series of radiocarbon analyses, which, as the first absolute date determinations for the Gajowizna necropolis, provide the possibility of establishing its absolute chronology, and allow us to distinguish a possible chronological sequence for certain sepulchral complexes. It has been assumed that obtaining dates from the pits that contained artefacts without cord ornamentation would be particularly valuable. However, the choice of actual objects for dating has been governed primarily by the availability of material. Most animal bones and charcoal from the discussed site have gone missing, while the human remains, which are now stored in the Department of Anthropology of the Institute of Immunology and Experimental Therapy in the Polish Academy of Sciences in Wroclaw, have been withdrawn from scientific circulation. As a consequence, the absolute chronology of the cemetery has been determined based on samples extracted from separate bones, which were found among the artefacts. Due to the above, it would be impossible to retest the samples should the results of laboratory tests be incongruent with the archaeological classification of the features or should an insufficient amount of collagen be obtained.

Eventually, ten absolute dates were obtained from the Gajowizna site (Table 2, Fig. 10). AMS radiocarbon tests were carried out in the Poznań Radiocarbon Laboratory mainly on osteological material. An exception is Grave 28, from which charcoal samples were sent for dating.

As expected, most of the results indicate the late Neolithic, but two human bones from Features 1 and 9 yielded results incongruent with the classification of the features made by means of taxonomic analyses. Regarding Sample Poz-90799 from grave 1, it is significant that the large amount of collagen (14%) correlates with a later radiocarbon date (1880±40 BP, *i.e.* 53-236 AD), which most probably means that the materials were jumbled in the course of the almost 100-year-long storage of the collection. The dating results from Grave 9 of the same cemetery can be explained in a similar manner. Even though, in the case of Grave 9, the absolute date measurement is not as distant from what was expected (3510±40 BP, 1941-1700 BC), it is difficult to accept it as correct, taking into account the fact that the feature undoubtedly belongs to the GAC. The adoption of such a broad timeframe for the Sandomierz Upland GAC contradicts the current state of knowledge on the demise of this culture, since the latest dates ascribed to it, which come from features of the eastern and central groups, oscillate around 2450-2300 BC (Kadrow and Szmyt 1996; Kośko and Szmyt

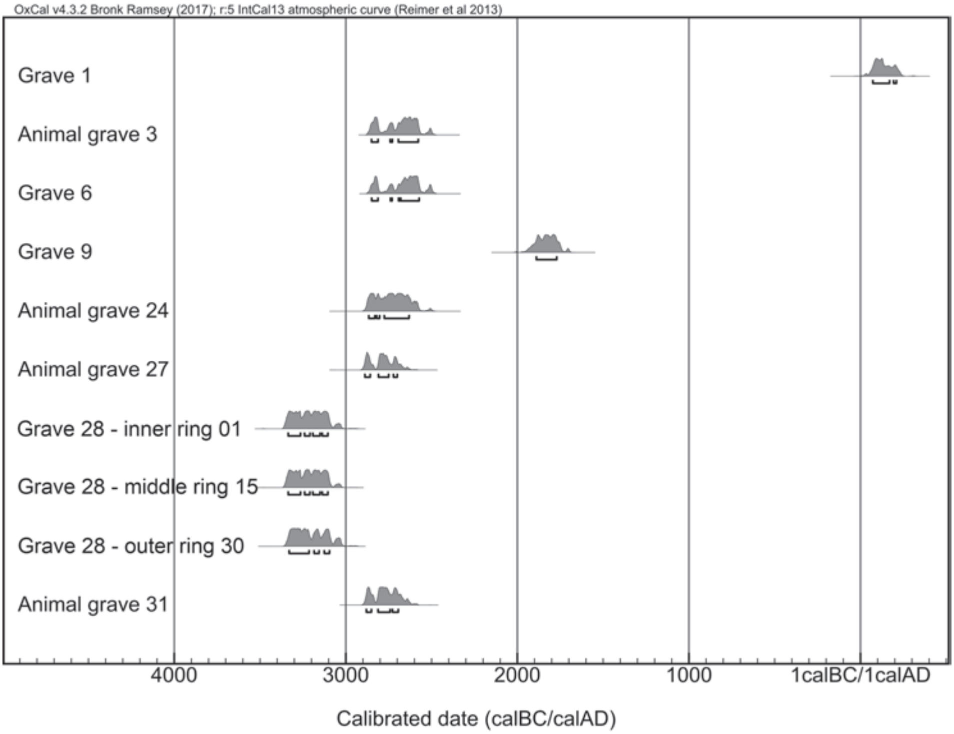


Fig. 10. The Gajowizna site. The calibration of the whole series of radiocarbon dates

2007, table 25.4). The dated bone most probably did not come from Feature 9. In the south-eastern part of the cemetery, there is a cluster of Features 11 and 12, which very likely date back to the early Bronze Age, which is supported by the inventory of Feature 11a (Krzak 1977, fig. 34). The presence of the Mierzanowice culture is further evidenced by an arrowhead found on the surface of the site (Krzak 1977, fig. 83). It is possible that the bone used as sample Poz-90803 actually comes from one of the aforementioned features of that culture.

The other results obtained within the test series are in line with the conclusions drawn based on traditional taxonomy (Table 2). Most absolute date determinations fall into the period from 4200±40 BP to 4090±40 BP, *i.e.*, 2889-2573 BC (1σ) or 2900-2493 BC (2σ). The broad timeframes of the calibrations of those dates are the consequence of an extensive flattening of the calibration curve (IntCal13: Northern Hemisphere, Reimer *et al.* 2013), which spans the first half of the 3rd millennium BC, *i.e.*, the time of the expansion of the GAC in the Sandomierz Upland.

The discussed site remains the largest cemetery of the Polish GAC group discovered so far. Yet, it is impossible to accept the thesis on such a long period of its utilization, spanning

Table 2. The Gajowizna site. Radiocarbon dating of samples from sepulchral features of the GAC

Object	**Sample raw**	**No lab.**	**Age 14C BP**	**Date BC (68,2 %)**	**Date BC (95,4 %)**	**Modelled Date BC (68,2 %)**	**Modelled Date BC (95,4 %)**
ZG-1	human bone	Poz-90799	1880 ± 40	73-210 AD	53-236 AD	-	-
ZG-3	animal bone	Poz-90800	4100 ± 40	2851-2578	2871-2497	-	-
ZG-6	animal bone	Poz-90802	4090 ± 40	2850-2573	2866-2493	-	-
ZG-9	human bone	Poz-90803	3510 ± 40	1890-1771	1941-1700	-	-
ZG-24	animal bone	Poz-90804	4140 ± 50	2867-2632	2878-2581	-	-
ZG-27	animal bone	Poz-90806	4200 ± 40	2889-2701	2900-2693	-	-
ZG-28 p01	charcoal (inner ring)	Poz-117272	4500 ± 40	3336-3105	3356-3033	3347-3122	3350-3119
ZG-28 p15	charcoal (middle ring)	Poz-117273	4500 + 35	3336-3105	3355-3091	3333-3106	3336-3105
ZG-28 p30	charcoal (outer ring)	Poz-117274	4480 ± 35	3331-3096	3342-3029	3318-3093	3321-3090
ZG-31	animal bone	Poz-90807	4180 ± 40	2881 - 2695	2891 - 2631	-	-

300-400 years, due to the relatively low number of funeral complexes found there. They probably evidence a simultaneous deposition or a sequence of interrelated ritual activities (*cf*. Szczodrowski 2012) executed in short intervals, which resulted in the common axis of the graves and the animal deposits dedicated to them. The consistent arrangement of the features and the absence of vertical stratigraphy provide further evidence of the short time spans between separate burials. The period of use of the necropolis was probably approximately 100-200 years in an undetermined part of the time span established by means of the calibrated dates. At the current state of knowledge, it is extremely problematic to give a more precise interpretation of the results due to the limitations of the radiocarbon dating method itself.

One of the available methods that allows us to attempt a more precise dating is wiggle matching. It makes it possible to obtain significantly more precise dates than with individual ^{14}C measurements. This method is used when there are at least two samples of an ascertained age difference (Pearson 1986; Walanus and Goslar 2009). The most reliable material for such analyses are wood fragments or charcoal pieces with visible annual rings found in sealed features on archaeological sites. If it is possible to take samples containing a single tree ring each (or a small, determined number of rings) and to count the number of rings between the samples, the period of time that separates the tested material is known. The objects unearthed in the Gajowizna cemetery make that possible, thanks to the traces of fire within the features: overheated loess and burnt beams (Figs 4 and 11). These were recorded in five funerary chambers (1, 13, 23, 28 and 30) and in the corner of one sacrificial pit (4). Moreover, bark was found in two features (28 and 30). All of the above provided a unique opportunity to carry out dendrochronological analyses of Late Neolithic materials, which resulted in the identification of the tree species and the evaluation of the age of the trees at the time when they were cut down. Such analyses were carried out in the Laboratory of Dendrochronology at the Centre for Research and Conservation of Cultural Heritage of the Nicolaus Copernicus University in Toruń on four samples from two graves located in the western part of the cemetery, which were included in complex 28-29-30-31. The materials from the other features have gone missing or disintegrated in storage.

The identification of the species of the samples is based on the microscopic observation of the anatomy of the wood in three sections: transverse, tangential and radial. The preparation of each sample allowed for the observation of separate sections. In the case of the wood from Feature 30, the radial section is the only one that has not been deformed, and that provided the necessary information to identify the species of the tree. The observation was carried out with a biological microscope in indirect as well as lateral light, at a magnification of between 40x and 400x. The results of the identification were further verified based on reference materials and the atlas of wood anatomy (Schweingruber 1990). All four analysed samples were identified as Scots pine (*Pinus sylvestris* L.). As evidenced by the growth rings, the trees grew in the favourable, stable environment of a low-density forest with plenty of sunlight.

Charcoal for radiocarbon dating was successfully extracted from three selected rings (outer, middle and inner) of the sample from Feature 28, which resulted in three absolute age determinations, separated from one another by an ascertained period of time. For the aforementioned calibration method, the age difference of the samples should be as long as possible. Due to the limitations resulting from the material, 15 years was the assumed minimum time span between the analysed tree rings. Three samples, each of which represented one tree ring, were sent for radiocarbon dating (Fig. 11). The following dates were obtained: 4500±40 BP for the inner ring, 4500±35 BP for the middle ring and 4480±35 BP for the outer ring. The application of unmodelled calibration gives the results of 3356-3033 BC, 3355-3091 BC and 3342-3029 BC, respectively (2σ, Table 2). Those time spans are slightly narrower than the calibration of the dates obtained from the bones, which results from the fact that the absolute age determination of Feature 28 is marked on the calibration curve before the plateau. Still, the obtained calibration range is quite broad, especially in reference to the most interesting outer tree ring. However, the *a priori* knowledge of the stratigraphy of the samples made it possible to apply the wiggle matching method using OxCal, v. 4.3, software (Bronk Ramsey 2001) to estimate the absolute age and narrow down the BC spans, which is particularly clear in the case of two extreme tree rings, for which the difference between the unmodelled and modelled calibrations is almost 100 years, with a probability of 95.4% (Table 2, Fig. 12). This is particularly important, because it has facilitated a more precise determination of the age of the outer ring, which defines the approximate date when the tree was cut down and then deposited in the funeral pit.

It remains problematic, however, that the 3321-3090 BC date is older by almost 200 years than the other results of radiocarbon dating obtained from the bones found in the same cemetery. It is difficult to unambiguously point to the reasons for such a situation. Theoretically, the result should prove the older age of Feature 28 within the necropolis in question. Most likely, however, the older age of the discussed sample results from the specificity of the organic material, *i.e.*, wood. The old wood effect is often addressed in publications (*e.g*. Pazdur and Pazdur 1982, 29; Schiffer 1986; Pospieszny 2009, 79; Biehl and Nieuwenhuyse 2016, 197-200). This thesis is further supported by the date obtained from Feature 31, which is included in the same ritual complex. The result of 4180±40 BP, or 2891-2631 BC, was obtained from a bone of an animal deposited there, which is similar to the other radiocarbon age determinations acquired from the Gajowizna cemetery. Observations from grave VIII at the Sandomierz-Kruków site (Sandomierz, site 78), where the age determinations of human bones are later than those of charcoal that was also found in the feature (Witkowska in print), exemplify the problems resulting from the juxtaposition of age determinations obtained from different materials. With caution arising from the developmental differences in other regions, the observations of earlier dates obtained from charcoal may also be made for series of age determinations from other areas occupied by the GAC (Szmyt 1996, 65; Włodarczak 2016, 540).

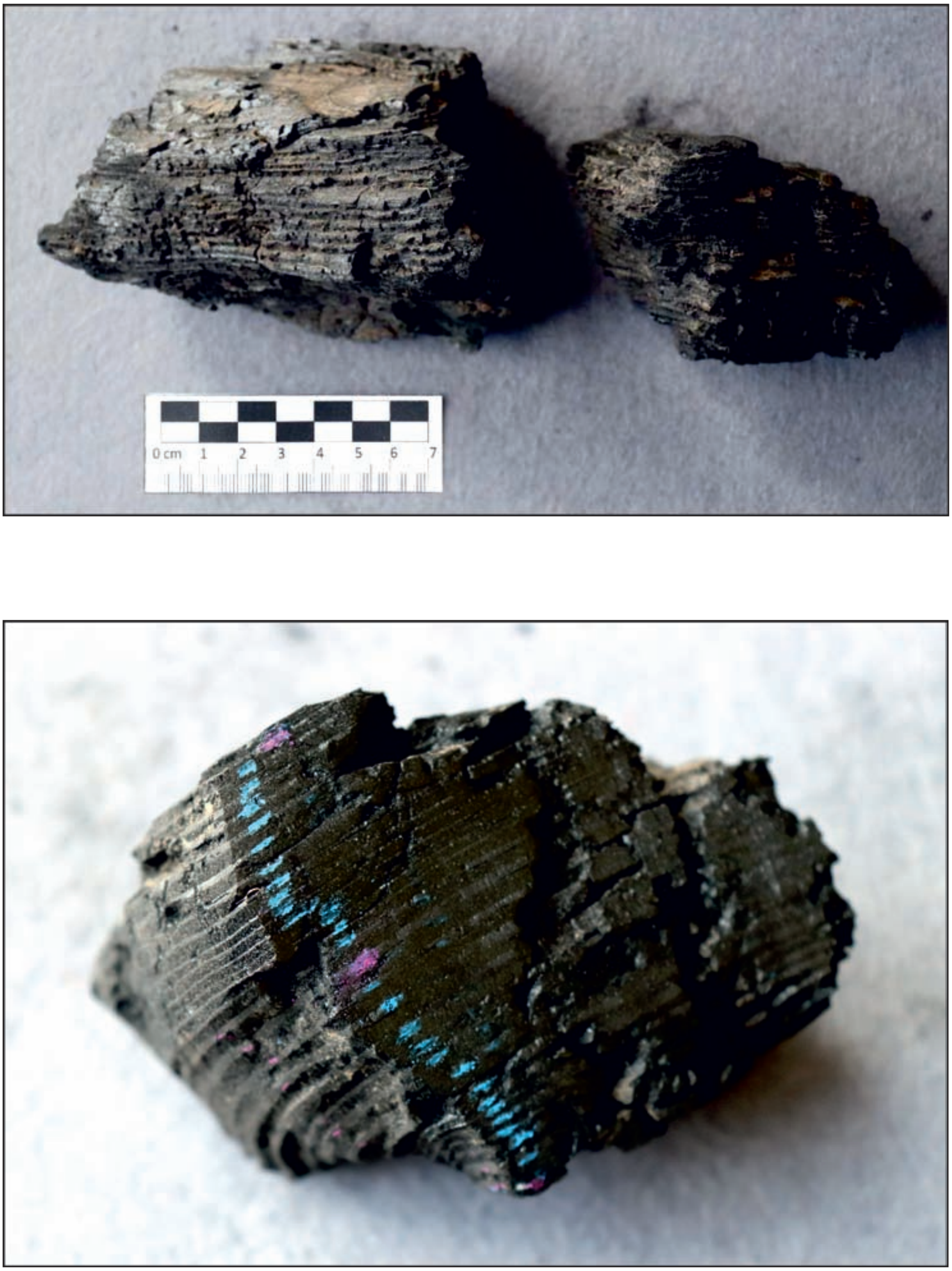


Fig. 11. The Gajowizna site.
Fragments of burned wooden beams found in Feature 28
(photo by B. Gmińska-Nowak)

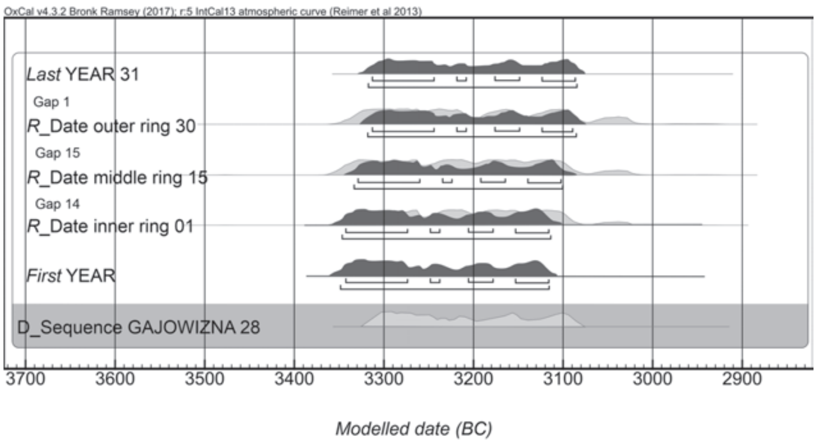


Fig. 12. The Gajowizna site. The calibration with wiggle matching method of three radiocarbon dates from a fragment of beam found in Feature 28

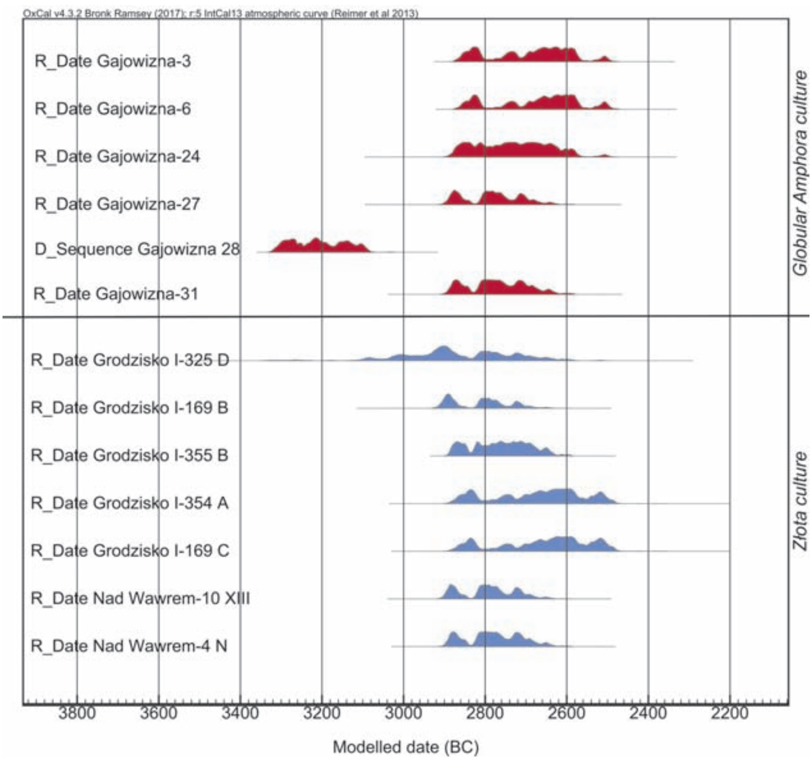


Fig. 13. Comparison of radiocarbon dates of the GAC (red) from the Gajowizna site and absolute age determinations of Złota culture graves (blue) from cemeteries Nad Wawrem and Grodzisko in Złota (Złota culture dates after Krzak 1989)

The first absolute age determinations of the Gajowizna cemetery features allow us to include the necropolis in the chronological pattern of the Late Neolithic in the Sandomierz Upland. As many as 42 absolute age determinations have been obtained so far from GAC features, out of which 18 came from sepulchral sites (Witkowska in print). Almost all of them were obtained from osteological materials and correspond to the calibration span of the series of age determinations from the Gajowizna site, *i.e.*, to the period between 2900 and 2600 BC, which is most likely the time when the necropolis was utilised. This absolute chronology of the GAC ritual site poses an important research problem, since it overlaps with the age determinations of the Złota culture graves (Fig. 13; Krzak 1989; Włodarczak 2019, 193, table 4, fig. 7) discovered in the vast cemeteries located in Złota, less than a kilometre away from the Gajowizna site: Grodzisko I and Nad Wawrem (Fig. 1). The above observation leads to the question regarding the nature of the relations between the groups of people who were using the neighbouring necropolises. Two possible hypotheses should be considered: the coexistence of two populations that followed different funeral scenarios, and the succession of the two cultures. The insufficient precision of the calibration curve makes it impossible to falsify either of the above hypotheses with the radiocarbon age determination method. The question of the possible two phases of use of the GAC cemetery also remains unanswered. Due to the relatively narrow timeframe presumed for the GAC of south-eastern Poland (Włodarczak 2016; Witkowska in print, for different opinion *cf.* Bronicki 2019) and the present inaccuracy of the calibration curve, answering the above and determining the sequence of burials on the Gajowizna site seems rather impossible with the application of radiocarbon chronometry.

References

Behrens H. 1964. *Die neolithisch-frühmetallzeitlichen Tierskelettfunde der Alten Welt*. Berlin: Deutscher Verlag der Wissenschaften.

Bergemann S. 2018. *Zauschwitz (Lendkreis Leipzig): Siedlungen und Gräber eines neolithisches Fundplatzes (= Universitätaforschungen zur prähistorischen Archäologie 314. Human Development in Landscapes* 13*)*. Bonn: Dr. Rudolf Habelt GmbH.

Biehl P.F. and Nieuwenhuyse O.P. 2016. *Climate and Cultural Change in Prehistoric Europe and the Near East* (= *The Institute for European and Mediterranean Archaeology Proceedings* 6). New York: State University of New York Press.

Bronk Ramsey C. 2020. OxCal v. 4.3. Oxford (www. rlaha.ox.ac.uk).

Bronicki A. 2019. Chronologia podgrupy wschodniolubelskiej kultury amfor kulistych w świetle oznaczeń radiowęglowych. In M. Szmyt, P. Chachlikowski, J. Czebreszuk, M. Ignaczak and P. Makarowicz (eds), *Vir Bimaris. From Kujawy Cradle to Black Sea Steppes. Studies on the Prehistory of the Baltic-Pontic Between-the-Seas In Recognition of Professor Aleksander Kośko* (= *Archeologia Bimaris. Disscusion* 5). Poznań: Uniwersytet im. Adama Mickiewicza w Poznaniu, 201-228.

Bronk Ramsey C. 2001. Development of the radiocarbon calibration program. *Radiocarbon* 43(2A), 355-363.

Charniauski M. 1996. Materials of the Globular Amphora Culture in Belarus. *Baltic-Pontic Studies* 4, 87-97.

Dinu M. 1960. K voprosu o kulture sharovidnykh amfor na territorii Moldovii. *Dacia* 6, 89-106.

Gągorowska-Chudobska J. 2015. Późnoneolityczne i wczesnobrązowe materiały z badań Zdzisława Lenartowicza w Złotej, pow. Sandomierz w zbiorach Muzeum Narodowego w Kielcach. *Materiały Archeologiczne* 40, 125-159.

Jakimowiczowa Z. 1927. Groby zwierzęce pod Sandomierzem. *Z otchłani wieków* 2 (3), 33-37.

Kadrow S. and Szmyt M. 1996. Absolute chronology of the Eastern Group of Globular Amphora Culture. *Baltic-Pontic Studies* 4, 103-111.

Krysiak K. and Lasota-Moskalewska A. 1977. Groby zwierzęce na „Gajowiźnie. In J. Kowalczyk (ed.) *Cmentarzysko kultury amfor kulistych w Złotej sandomierskiej*. Wrocław, Warszawa, Kraków: Instytut Historii Kultury Materialnej PAN, 83-96.

Krzak Z. 1958. Cmentarzysko kultury złockiej na stanowisku „Grodzisko II" we wsi Złota, pow. Sandomierz. *Archeologia Polski* 2, 329-388.

Krzak Z. 1961. *Materiały do znajomości kultury złockiej*. Wrocław, Warszawa, Kraków: Instytut Historii Kultury Materialnej PAN.

Krzak Z. 1970. *Cmentarzysko kultury złockiej „Nad Wawrem" w Złotej*. Wrocław, Warszawa, Kraków: Instytut Historii Kultury Materialnej PAN.

Krzak Z. 1976. *The Złota culture*. Wrocław, Warszawa, Kraków: Instytut Historii Kultury Materialnej PAN.

Krzak Z. 1977. Cmentarzysko na „Gajowiźnie" pod względem archeologicznym In J. Kowalczyk (ed.), *Cmentarzysko kultury amfor kulistych w Złotej sandomierskiej*. Wrocław, Warszawa, Kraków: Instytut Historii Kultury Materialnej PAN, 9-82.

Krzak Z. 1989. Złota Culture. Zespoły datowane metodą C^{14}. *Przegląd Archeologiczny* 36, 255-269.

Kołodziej B. 2011. Pochówki zwierzęce w neolicie na terenie ziem Polski. *Materiały i Sprawozdania Rzeszowskiego Ośrodka Archeologicznego* 32, 55-106.

Kośko A., Makowiecki D. and Szmyt M. 2007. Miejsce obrzędowe ludności kultury amfor kulistych. In A. Kośko and M. Szmyt (eds), *Opatowice-Wzgórze Prokopiaka* 2 (= *Studia i Materiały do Badań nad Późnym Neolitem Wysoczyzny Kujawskiej* 2). Poznań: Wydawnictwo Poznańskie, 225-273.

Lasota-Moskalewska A. 1977. Ocena morfologiczna kości bydlęcych z „Gajowizny". In J. Kowalczyk (ed.), *Cmentarzysko kultury amfor kulistych w Złotej sandomierskiej*. Wrocław, Warszawa, Kraków: Instytut Historii Kultury Materialnej PAN, 97-132.

Miszkiewicz B. 1977. Analiza antropologiczna kości z „Gajowizny". In J. Kowalczyk (ed.), *Cmentarzysko kultury amfor kulistych w Złotej sandomierskiej*. Wrocław, Warszawa, Kraków: Instytut Historii Kultury Materialnej PAN, 133-153.

Pazdur A. and Pazdur M. F. 1982. Chronometria radiowęglowa jako metoda badawcza w archeologii. Możliwości, ograniczenia i perspektywy. *Przegląd Archeologiczny* 30, 5-45.

Pearson G. W. 1986. Precise calendrical dating of know growth-period samples using a "curve fitting" technique. *Radiocarbon* 28, 292-299.

Podkowińska Z. 1953. Pierwsza charakterystyka stanowiska eneolitycznego na polu Grodzisko I we wsi Złota, pow. Sandomierz. *Wiadomości Archeologiczne* 19, 1-53.

Pospieszny Ł. 2009. *Zwyczaje pogrzebowe kultury ceramiki sznurowej w Wielkopolsce i na Kujawach*. Poznań: Instytut Prahistorii Uniwersytet im. Adama Mickiewicza w Poznaniu.

Przybyła M. M., Włodarczak P., Podsiadło M. and Tunia K. 2013. Obiekty kultury amfor kulistych. In M. M. Przybyła, A. Szczepanek and P. Włodarczak (eds), *Koszyce, stanowisko 3. Przemoc i rytuał u schyłku neolitu (= Ocalone Dziedzictwo Archeologiczne* 4). Kraków, Pękowice: Stowarzyszenie Archeologów terenowych „Stater", Wydawnictwo i Pracownia Archeologiczna Profil-Archeo, 11-64.

Przybyła M. M. and Włodarczak P. 2013. Groby z Koszyc na tle innych późno- i schyłkowoneolitycznych znalezisk środkowoeuropejskich. In M. M. Przybyła, A. Szczepanek and P. Włodarczak (eds), *Koszyce, stanowisko 3. Przemoc i rytuał u schyłku neolitu (=Ocalone Dziedzictwo Archeologiczne* 4). Kraków-Pękowice: Wydawnictwo i Pracownia Archeologiczna Profil-Archeo, 209-255.

Rauhut D. 1953. Grób kultury ceramiki sznurowej (grupa złocka), znaleziony na stanowisku Pole Grodzisko I we wsi Złota pow. Sandomierz. *Wiadomości Archeologiczne* 19, 54-79.

Rauhut D. 1962. Settlements and Cementeries at Złota, district Sandomierz, Voivodship Kielce. *Archaeologia Polona* 4, 152-164.

Reimer P. J., Bard E., Bayliss A., Beck J. W., Blackwell P. G., Bronk Ramsey C., Buck C. E., Cheng H., Edwards R. L., Friedrich M., Grootes P. M., Guildersoon T. P., Haflidason H., Hajdas I., Hatte C., Heaton T. J., Hoffmann D. L., Hogg A. G., Hughen K. A., Kaiser K. F., Kromer B., Manning S. W., Niu M., Reimer R. W., Richards D. A., Scott E. M.,Southon J. R., Staff R. A., Turney S. M., and van der Plicht J. 2013. IntCal13 and Marine13 Radiocarbon Age Calibration Curves 0-50,000 Years cal BP. *Radiocarbon* 55 (4), 1869-1887.

Schiffer M. B. 1986. Radiocarbon dating and the old wood problem: the case of the Hohokam chronology. *Journal of Archaeological Science* 13, 13-30.

Schweingruber F. H. 1990. *Microscopic Wood Anatomy. Structural variability of stems and twigs in recent and subfossil woods from Central Europe*. 3rd edition. Birmensdorf: Eidgen ssische Forschungsanstalt WSL.

Szczodrowski R. 2012. Spatial Aspects of Globular Amphora Culture Funeral Rites with Animal Deposits in Poland. In A. Pluskowski (ed.), *The Ritual Killing and Burial of Animals. European Perspectives*. Oxford: Oxbow Books, 51-60.

Szmyt M. 1996. *Społeczności kultury amfor kulistych na Kujawach*. Poznań: Uniwersytet im. Adama Mickiewicza.

Szmyt M. 2006. Dead Animals and Living Society, *Journal of Neolithic Archaeology* 8 (www.jungsteinsite.de), 1-10

Uzarowiczowa A. 1975. Wielokulturowe neolityczne stanowisko VII w Klementowicach, pow. Puławy. *Wiadomości Archeologiczne* 40, 179-204.

Walanus A. and Goslar T. 2009. *Datowanie radiowęglowe*. Kraków: Wydawnictwo Akademii Górniczo-Hutniczej.

Wiślański T. 1966. *Kultura amfor kulistych w Polsce północno-zachodniej*. Wrocław: Instytut Historii Kultury Materialnej PAN.

Wiślański T. 1969. *Podstawy gospodarcze plemion neolitycznych w Polsce północno-zachodniej*. Wrocław: Instytut Historii Kultury Materialnej PAN.

Witkowska B. 2013. *Kultura złocka. Taksonomia, osadnictwo i chronologia*. Kraków: unpublished doctoral dissertation at the Institute of Archeology of the Jagiellonian University.

Witkowska B., Podsiadło M., Przybyła M. M. and Włodarczak P. in print. Absolute chronology of the Globular Amphora funeral complex at Malice in Sandomierz Upland. *Baltic-Pontic Studies* 24.

Witkowska B. in print. Radiocarbon dating of the archival funeral complexes of the Globular Amphora Culture in Sandomierz Upland: sites at Mierzanowice, Sandomierz and Złota-Gajowizna. *Baltic-Pontic Studies* 24.

Włodarczak P. 2016. Chronologia absolutna cmentarzysk późno- i schyłkowoneolitycznych na Wyżynie Lubelskiej. In P. Jarosz, J. Libera and P. Włodarczak (eds) *Schyłek neolitu na Wyżynie Lubelskiej*. Kraków: Instytut Archeologii i Etnologii PAN, 537-548.

Włodarczak P. 2019. Grób z Wilczyc na tle środkowoeuropejskich odmienności i reguła w obrzędzie pogrzebowym małopolskiej kultury ceramiki sznurowej. In P. Włodarczak (ed.), *Wilczyce, stanowisko 10. Norma i precedens w rytuale pogrzebowym małopolskiej kultury ceramiki sznurowej (=Ocalone Dziedzictwo Archeologiczne* 9). Kraków, Niepołomice, Pękowice: Wydawnictwo i Pracownia Archeologiczna Profil-Archeo, Stowarzyszenie Archeologów terenowych „Stater”, Instytut Archeologii i Etnologii PAN, 169-209.

SPRAWOZDANIA ARCHEOLOGICZNE 72/2, 2020
PL ISSN 0081-3834
DOI: 10.23858/SA/72.2020.2.1846

Monika Bajka[1], Marek Florek[2]

ZŁOTA CULTURE GRAVE FROM KLECZANÓW, SANDOMIERZ DISTRICT, ŚWIĘTOKRZYSKIE VOIVODESHIP

ABSTRACT

Bajka M., Florek M. 2020. Złota culture grave from Kleczanów, Sandomierz district, Świętokrzyskie Voivodeship. *Sprawozdania Archeologiczne* 72/2, 285-306.

In 2014, a niche grave linked with the Złota culture was accidentally discovered in Kleczanów (Sandomierz district, Świętokrzyskie Voivodeship). An approximately 25-year-old man was inhumed inside. He was crippled: one of his legs was shorter as a result of an improperly healed fracture. His body was subjected to magical rituals. For example, his skull was separated from the rest of the body and placed in a stone-lined cache. The grave inventory was composed of at least three vessels (a mug with a handle and two amphorae), two bone plaques (belt elements), a bone awl, and a flint arrowhead, as well as animal bones (a pig mandible, limb bones of the following animals: roe deer, medium-sized bird, and sheep or goat). A ^{14}C date obtained from a bone fragment allows us to date the grave to the beginning of the 3rd millennium BC.

Key words: Złota culture, grave, Eneolithic, Sandomierz Upland, Lesser Poland
Received: 18.04.2020; Revised: 24.05.2020; Accepted: 31.08.2020

1. INTRODUCTION

In the beginning of January 2014, during earthworks carried out on a plot of land in Kleczanów, a skeletal grave was discovered. The owners of the parcel notified the Sandomierz delegation of the Voivodeship Office for Monument Protection in Kielce. On January 10,

1 “Trzy epoki” Archaeological Services, Olbierzowice 8, 27-640 Klimontów, Poland; bajkamonik@wp.pl; https://orcid.org/0000-0001-5731-3065
2 Institute of Archaeology, Maria Curie-Skłodowska University, Marii Curie-Skłodowskiej sq. 4, 20-031 Lublin, Poland; marek.florek@poczta.umcs.lublin.pl; https://orcid.org/0000-0002-9917-710X

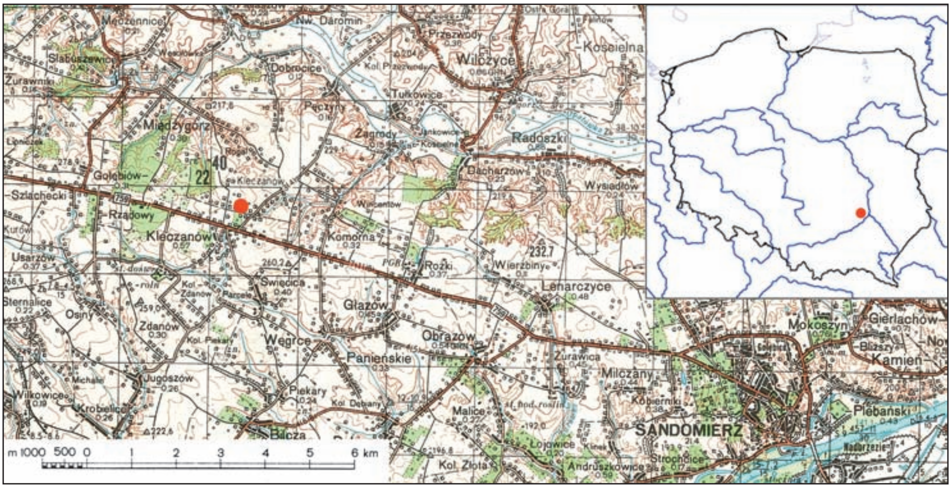


Fig. 1. Kleczanów, site 8, Sandomierz district, Lesser Poland Voivodeship. Location of the site. Modified by M. Bajka

2014, Monika Bajka and Marek Florek conducted emergency research to prepare the documentation of the accidentally discovered feature and to secure the artefacts and bone remains deposited inside.

The discussed grave is located a dozen or so metres from another funerary feature, discovered in 1985 (also accidentally) and linked with the early (Central European) phase of the Corded Ware culture (Buko and Ścibor 1991). The site of the discovery of both graves, referred to as Kleczanów, site 8 (AZP 88-72/1), is a local elevation (approximately 253 m above sea level) in a vast hummock limited by the valley of the Opatówka river from the north and by the valley of the Dębianka stream from the south, located in the central part of the Sandomierz Upland (Fig. 1).

2. GRAVE

The grave was partially damaged during its serendipitous discovery prior to the start of the research, which makes it difficult to precisely determine its original structure. Mainly its north-eastern part (where, as we assume, the shaft leading to the niche containing the burial was located) was damaged. Nevertheless, it is very probable that it was a niche grave, composed of a vertical shaft (which was at least 1.5 m deep) and the burial chamber proper (a niche carved in the loess substratum), which were connected with a short, sloping corridor. The bottom of the niche was approximately 190-200 cm below the present ground level, and its original height probably exceeded 100 cm. On the level of the bottom, the niche (burial chamber) had a nearly rectangular layout, with rounded corners (approximately 230 × 180 cm). The previously mentioned short, 80-cm-wide corridor led from its north-eastern part. At the bottom of the niche, in its central and eastern parts, there were a dozen or so flat plates of different sizes (made of local sandstone), forming an irregular paving. Single stones were located on the circumference of the niche, whereas the corridor leading to the shaft, and probably also the shaft itself, were filled with a greater number of such stones. The fill of the burial chamber was composed of loess from the collapsed ceiling with an admixture of dark-grey soil, probably brought by rains from the side of the corridor and shaft.

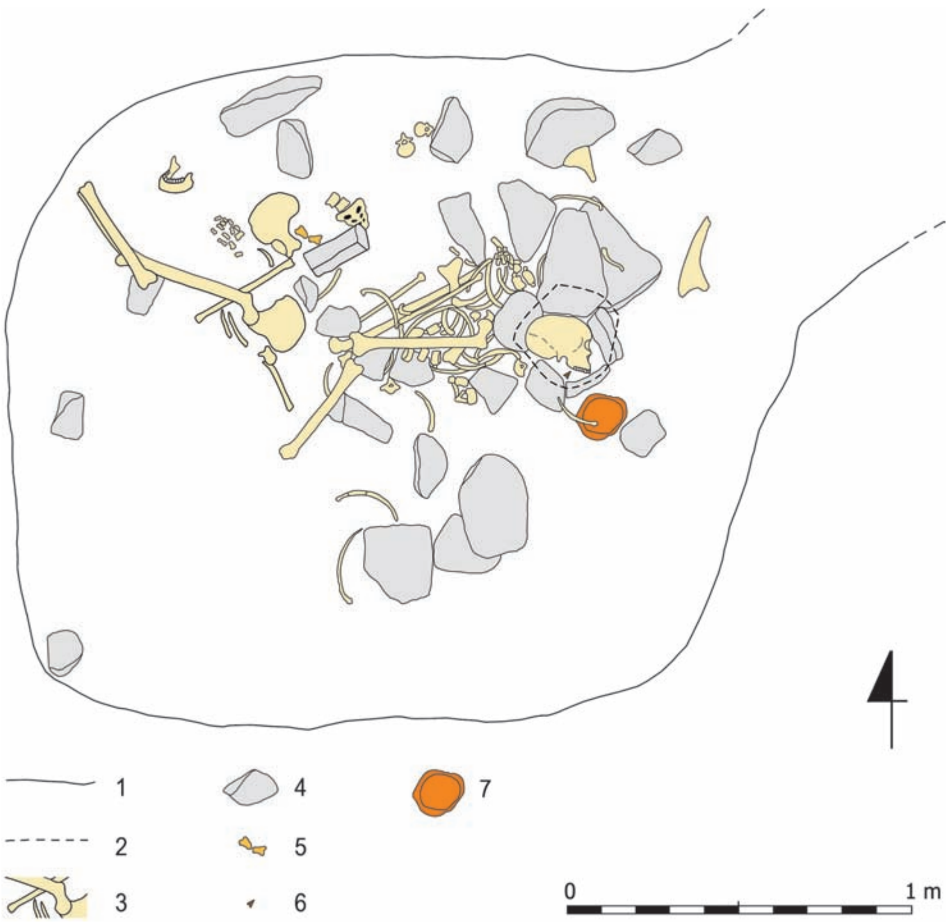


Fig. 2. Kleczanów, site 8, Sandomierz district. Grave of the Złota culture. Layout of the niche bottom (depth *c.* 190-200 cm). Key: 1 – registered outline of the feature at the level of the bottom of the niche, 2 – outline of the sandstone that covered the skull, 3 – bones, 4 – stones, 5 – bone plaques, 6 – flint arrowhead, 7 – clay vessel. Illustrated by M. Bajka, M. Florek

Fig. 3. Kleczanów, site 8, Sandomierz district. Grave of the Złota culture.
View from above of the niche bottom. Photo by M. Florek

Fig. 4. Kleczanów, site 8, Sandomierz district. Grave of the Złota culture.
View of the niche bottom. Close-up of the skull surrounded with stones. Photo by M. Florek

Fig. 5. Kleczanów, site 8, Sandomierz district, Lesser Poland Voivodeship. Grave of the Złota culture. View of the niche bottom. Close-up of the cluster of bones. Photo by M. Florek

At the bottom of the niche, mainly in the part paved with the stone plates, there were scattered bones of an adult man (Figs. 2 and 3). His skull, resting on its side, was surrounded with stones forming a kind of an irregular box (cache) covered with a flat sandstone slab (Fig. 4). The mandible, however, was in the north-western part of the niche, over 100 cm from the skull. One of the femurs was placed on the ribs (Fig. 5), whereas the sternum was located between the pelvic bones. Next to the skull, inside the stone box, a heart-shaped flint arrowhead was discovered. On the outside of the container, to the south-east of it, there was a clay mug with one handle, crushed under the pressure of the earth from the collapsed ceiling. To the west of the skull, in an assemblage of ribs and vertebrae, there was a bone awl. Near the pelvic bones, between them and the sacral bone, which lay separately, two bone plaques with holes in them (probably belt elements) were found. At the entrance from the niche to the corridor, there was a pig mandible. Between the stones filling the corridor, fragments of two ornamented clay amphorae were discovered. Several small fragments of these amphorae, as well as a small piece of a polished tetrahedral axe made of flint, two flint flakes, fine animal bones, and snail shells were discovered in the fill of the niche (burial chamber).

3. ANTHROPOLOGICAL ANALYSIS OF THE HUMAN REMAINS

The analysis of the bone remains was performed by Wanda Kozak-Zychman, PhD, Assistant Professor at the Maria Curie-Skłodowska University in Lublin, and by Anna Szarlip, MA (Institute of Archaeology of the Maria Curie-Skłodowska University in Lublin; Kozak-Zychman and Szarlip 2014).

The skull is rather well preserved (with the mandible) and slightly deformed, especially the bones of the viscerocranium (Figs. 6 and 7). All the main cranial sutures are open.

The mandibular and maxillary (both maxillae) incisors (I_1) and the left mandibular premolar P_2 are missing, but their alveoli are unremodelled, which means that they were probably lost after death. Except the incisors and the maxillary and mandibular M_1, which have moderately worn crowns, all the teeth are only slightly worn. Linear enamel hypoplasia (developmental tooth disorder) was recorded on the maxillary (both maxillae) and mandibular incisors, canines, and first premolars.

The postcranial skeleton is incomplete. The following elements are preserved: the complete set of the cervical vertebrae (C), with bilaterally double foramina transversaria in C5 and C6 (congenital disorder); 11 nearly completely preserved thoracic vertebrae (Th) plus only the arch of Th8; complete set of the lumbar vertebrae (L); the manubrium and

Fig. 6. Kleczanów, site 8, Sandomierz district. Grave of the Złota culture. *En face* view of the skull. Photo by W. Kozak-Zychman

Fig. 7. Kleczanów, site 8, Sandomierz district. Grave of the Złota culture. Profile view of the skull. Photo by W. Kozak-Zychman

Fig. 8. Kleczanów, site 8, Sandomierz district. Grave of the Złota culture. Clearly asymmetrical lengths of the femurs. Photo by W. Kozak-Zychman

the body of sternum (which is damaged in its lower part); 11 right ribs (lack of rib 12); complete set of left ribs; left and right clavicles, on which both acromial ends are slightly damaged, the sternal ends are not fully developed, and the attachments of the costoclavicular ligaments are visibly marked overload lesion); both scapulae; both complete humeri with preserved supratrochlear foramina; complete left radius; right radius with a slightly damaged lateral part of the head; both ulnae (the left one lacks the styloid process, and the diaphysis of the right one is slightly thickened in its inferior part); 4 right wrist bones: scaphoid, pisiform, trapezium, hamate; 4 left wrist bones: scaphoid, pisiform, capitate, hamate; complete sets of the right and left metacarpals; 15 hand phalanges; the sacrum, which is damaged near the apex (fresh, post-mortem fracture) not fully fused between S1 and S2, and has an unfused sacral canal starting with S3 (congenital disorder); both pelvic bones (in the right one, the upper part of the pubic symphysis is damaged, while the left one has a dent in the acetabulum and at the junction of the inferior pubic ramus with the ischial ramus); both femora (there is a clear asymmetry between their lengths, circumferences, and curvatures in the sagittal plane, although the last mentioned feature is not prominent in the left femur, on which a healed fracture is also visible); both patellae; right and left tibia; right and left fibula; 4 right tarsal bones: calcaneus, talus, navicular, cuboid; 5 left tarsal bones: calcaneus, talus, navicular, cuboid, and lateral cuneiform (showing signs of inflammation); complete set of left metatarsals (of which the 3rd metatarsal shows post-inflammatory signs near the proximal epiphysis, and the 1st metatarsal has an enlarged paracentral articular surface of the head on the plantar side, which is probably a degenerative change caused by the trauma of the left femur); 2nd right metatarsal; 4 foot phalanges (3 proximal and a middle one; Table 1).

Table 1. Kleczanów, site 8, Sandomierz district. Grave of the Złota culture.
Measurements of the limb bones. Prepared by W. Kozak-Zychman

Measurements of the limb bones (asymmetry!)								
Humerus	**L**	**R**	***Radius***	**L**	**R**	***Ulna***	**L**	**R**
M-1	330	329	M-1	245	242!	M-1	-	265
M-7	63	65	M-3	41	40	M-3	35!	39
Femur	**L**	**R**	***Tibia***	**L**	**R**	***Fibula***	**L**	**R**
M-1	421!	460	M-1a	377	377	M-1	365?	367
M-2	418!	446	M-1	374	374	M-4a	38	34!
M-8	90!	85	M-10b	74	74			

Table 2. Kleczanów, site 8, Sandomierz district. Grave of the Złota culture.
Reconstruction of the body height. Prepared by W. Kozak-Zychman

Body hight (cm)	Method of reconstruction	Classification of body hight (nos. according to R. Martin)
166,6	K. Pearson	medium height
171,3	M. Trotter i G. C. Gleser	tall

The remains described above belong to one person: an approximately 25-year-old male (*adultus*), who was 166-172 cm tall (Table 2). He had a moderately long, prominently domed skull with a narrow forehead, face and nose, with high orbital cavities. The deformation of the skull (visible asymmetry) might have occurred post-mortem, *e.g*. caused by the pressure of the earth, but the fact that the body was resting between stones and was covered with a sandstone slab contradicts this assumption. It is possible that the asymmetry is a result of undetermined pathological changes._The postcranial skeleton shows pathological changes whose original cause was the fracture of the left femoral diaphysis, which resulted in its considerable shortening (by approximately 5 cm; Fig. 8). The trauma to the femur, which made the man limp, caused secondary degenerative-overload changes in other elements of the skeleton, including the tarsal and metatarsal bones.

4. ANIMAL REMAINS

The animal bones were identified by Zbigniew Boratyński, PhD, Assistant Professor at the Department of Animal Anatomy (Faculty of Veterinary Medicine at the University of Life Sciences in Lublin).

At the bottom of the pit, near the skull of the buried man (to the east of it), there was a pig mandible. The teeth had been intentionally removed, *e.g*. by breaking off whole portions (with tooth sockets) from the inner side (Fig. 9). The fill of the grave pit (its lower part) contained:

– a small fragment of the left tibial diaphysis (with the proximal epiphysis) and a single metatarsal of a roe deer.

– a diaphyseal fragment (probably of a radius), as well as a humeral fragment, a single metatarsal bone, a damaged calcaneus, and a single middle phalanx belonging to a small ruminant: goat or sheep.

– a fragment of a long bone (part of the diaphysis) belonging to an unspecified jackdaw- or crow-sized bird.

Among the postcranial bones of the man, there were at least 42 shells of snails belonging to the species *Capaea vindobonensis* (Fig. 10).

Fig. 9. Kleczanów, site 8, Sandomierz district. Grave of the Złota culture. Pig mandible. Photo by M. Florek

Fig. 10. Kleczanów, site 8, Sandomierz district. Grave of the Złota culture. Shells of snails belonging to the species *Capaea vindobonensis* from the fill of the grave. Photo by M. Florek

5. INVENTORY

5.1. Vessels

1. Mug (Fig. 11). S-shaped and with a band-shaped handle whose upper base is located slightly below the edge of the brim, whereas its lower base is on the level of the broadest part of the belly. The edge of the rim is rounded, with two moulded (flat and vertical) nodules on the level of the upper edge of the handle. The mug is ornamented with cord and stamp impressions. Below the edge of the brim, there is a horizontal band, which is composed of three lines made of cord impressions; between the belly and the neck of the vessel, there is a similar decorative band made of two parallel cord impressions. Between

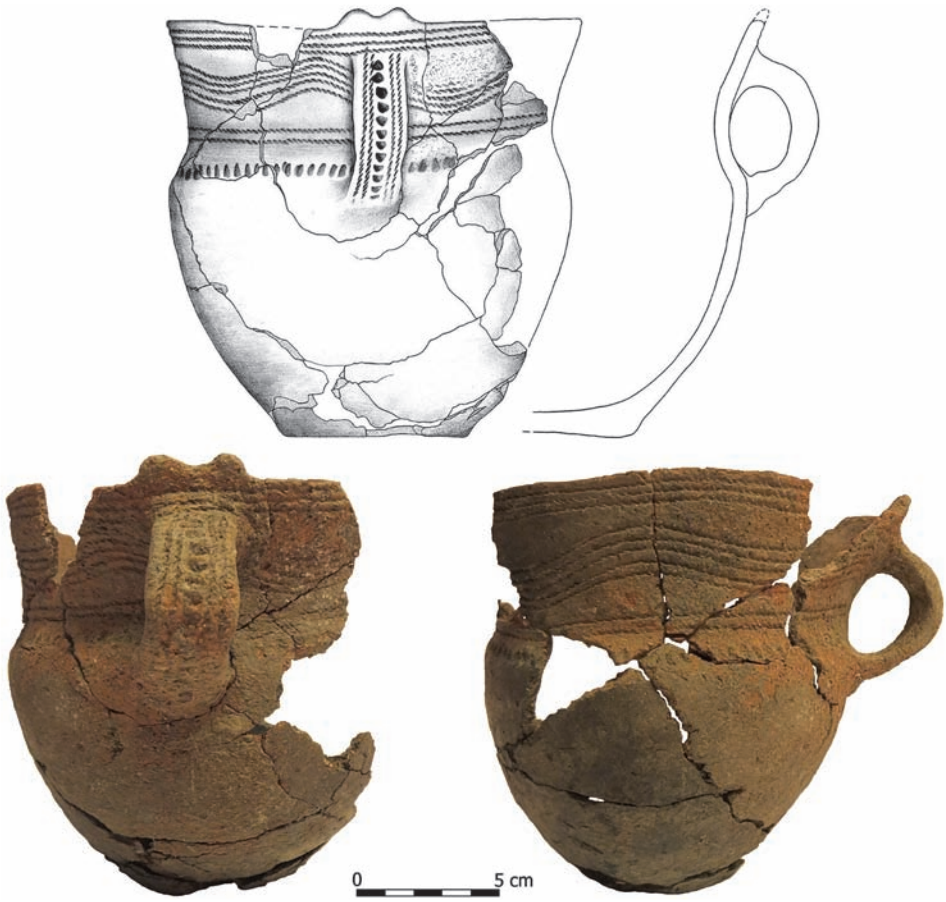


Fig. 11. Kleczanów, site 8, Sandomierz district. Grave of the Złota culture. Vessel: mug. Illustrated by M. Bajka, photos by M. Florek

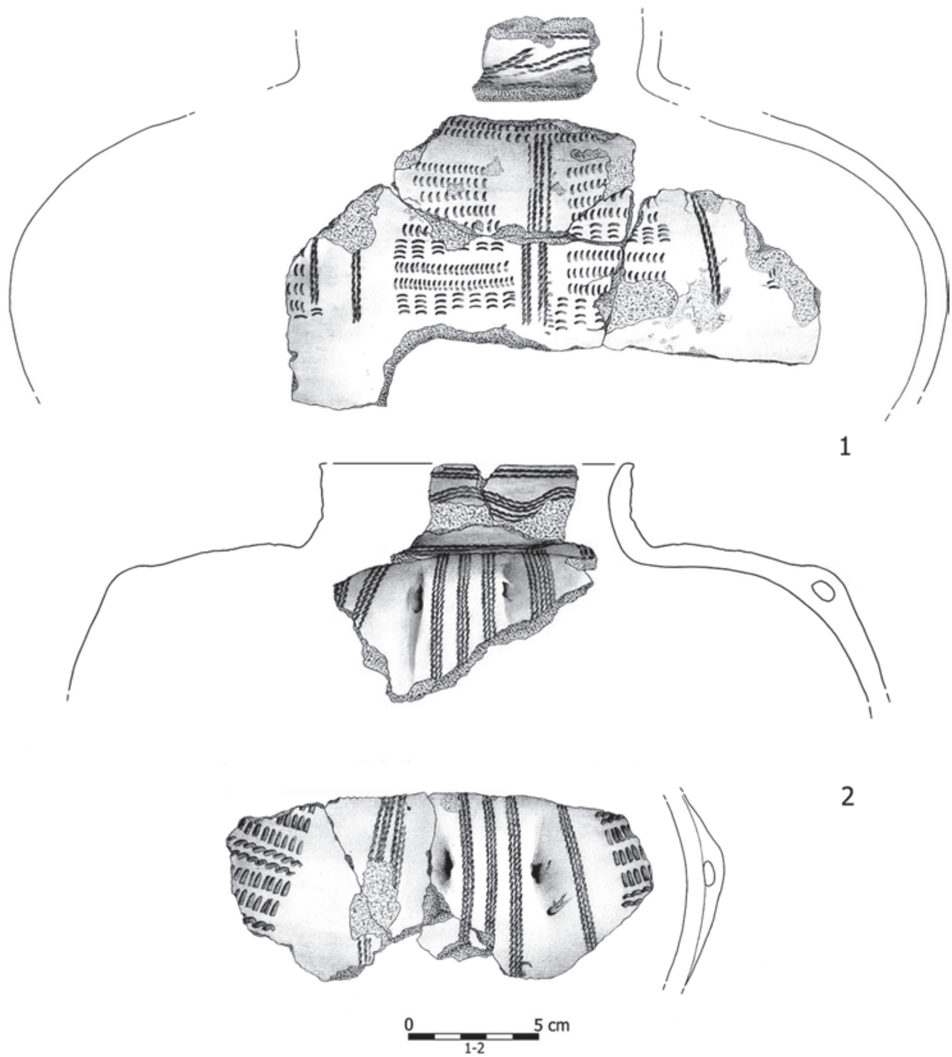


Fig. 12. Kleczanów, site 8, Sandomierz district. Grave of the Złota culture. Fragments of vessels (1 – amphora I, 2 – amphora II). Illustrated by M. Bajka

them, there is a wavy band composed of five linear cord impressions. On the belly, slightly above its broadest part, there is a horizontal row of stamp impressions. The handle is ornamented with two vertical bands of double cord impressions and a row of stamp impressions between them. The surfaces are of various colours (from grey to brown terracotta to almost black); tricoloured fractures. The mug is made of clay with an admixture of finely crushed stone and sand, slightly baked. Dimensions: height – 143 mm; brim diameter – 149 mm; belly diameter – 146 mm; bottom diameter – 62 mm; wall thickness – 5-5.5 mm.

Other vessels are preserved in fragments

2. Amphora I (Fig. 12: 1). Fragment of the belly of a large, bulging amphora, probably having 4 handles (not preserved) on the level of the widest part of the belly (their existence is indicated by the thickened walls of the vessel) and a short, almost vertical neck. The amphora is ornamented with cord and stamp impressions. In the upper part of the belly, there are two horizontal rows of arched stamp impressions, from which depart pairs of vertical lines of cord impressions. Between them, there are wide, vertical bands made of horizontal and vertical rows of arched stamp impressions. On the preserved fragments of the neck, there is an ornament in the form of a double wavy line and a double horizontal line made of cord impressions. The surfaces are brown grey and polished; tricoloured fractures. The amphora is made of clay with an admixture of sand and finely crushed stone, slightly baked. Dimensions: brim diameter – *c.* 150 mm; belly diameter – *c.* 320 mm; wall thickness – 6-8 mm.

3. Amphora II (Fig 12: 2). Fragments of an amphora having a short, vertical neck with a brim and a bulging belly, with 4 broad, flat handles. It is ornamented with cord and stamp impressions. The neck is adorned with a wavy band composed of five linear cord impressions between two horizontal bands (the upper one, made of two or three linear cord impressions, is located just below the brim edge, whereas the lower one, made of two linear cord impressions, is between the neck and the belly of the vessel). The handles are ornamented with three vertical bands composed of three parallel lines that are made with cord impressions. On the belly, there are vertical bands made of three, five, or six linear cord impressions, between which there are wide, vertical bands composed of alternating double horizontal lines of rectangular stamp and cord impressions. The surfaces have various colours (grey and dark-grey tending towards grey-black). The fracture is monochromatic. The vessel is made of clay with an admixture of finely and moderately crushed stone and with a slight addition of sand; quite well baked. Brim diameter – *c.* 120 mm; belly diameter – *c.* 220-230 mm; wall thickness – 6-8 mm.

The vessels discovered in the grave are homogeneous in their styles and the technique used in their production. The mug and the fragmentarily preserved amphorae are made of clay with an admixture of crushed stone and sand. The colours of their external and internal surfaces are similar. Amphora II represents a slightly different production technique (the admixture of sand is relatively small; the vessel was also more thoroughly baked). All the vessels are ornamented with combinations of cord and stamp impressions (the latter are either rectangular or arched) arranged in vertical, horizontal, or wavy bands.

5.2. Flint artefacts

1. A triangular arrowhead with a slightly notched, arched base; edges retouched from both sides; tip broken off; made of chocolate flint (Fig. 13: 4); dimensions: 26 × 14 × 4 mm.

2. Blade from the edge of a polished tetrahedral axe made of Świeciechów flint (Fig. 13: 5); dimensions: 41 × 13.5 × 4.5 mm.

3. Two flint flakes (chips) made of Świeciechów flint (Fig. 13: 6-7).

Only the triangular flint arrowhead, discovered near the skull, in the stone-lined cache covered with the sandstone slab, can be associated without any doubt with the burial. The tetrahedral axe fragment and the two Świeciechów flint chips, found in the fill of the niche, might have gotten there as a result of post-deposition processes.

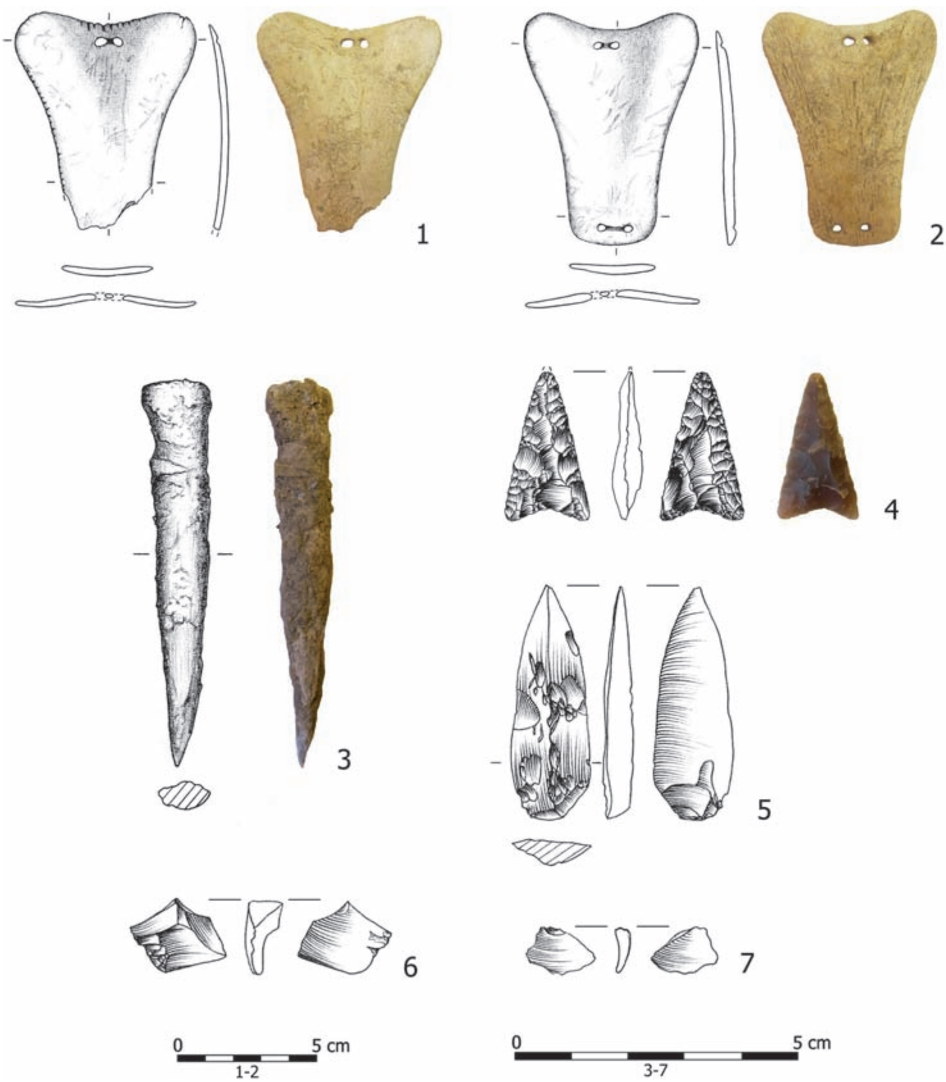


Fig. 13. Kleczanów, site 8, Sandomierz district. Grave of the Złota culture. Bone artefacts (1-2 – flat plaques, 3 – awl) and flint artefacts (4 – arrowhead, 5 – blade from the edge of an axe, 6-7 – flakes). Illustrated by M. Bajka, photos by M. Florek

5.3. Bone artefacts

1. A flat bone plaque (Fig. 13: 2) having an almost trapezoidal shape (with rounded corners; the longer base and the legs are slightly concave; four small apertures: two near each base); dimensions: height – 82 mm; lengths of the bases – 61.5 and 31 mm; thickness – 3.2 mm; diameters of the apertures – 2.3-3 mm.

2. A flat bone plaque (Fig. 13: 1) having an almost trapezoidal shape; nearly identical to the abovedescribed artefact, but the edges of the longer base and one of the legs are ornamented with notches; the part adjacent to the shorter base is damaged; dimensions: (preserved) height – 78 mm; length of the base – 63.8 mm; thickness – 3.1 mm; diameters of the apertures – 3-4 mm.

3. A bone awl (Fig. 13: 3); dimensions: 66.7 × 11 mm.

6. ANALYSIS

The three vessels are stylistically and technologically similar to materials yielded by cemeteries and single graves associated with the Złota culture from across the Sandomierz Upland. Mugs similar (in their forms and ornamentation techniques) to the one discovered in Kleczanów are, *e.g.*, the specimens from the Złota cemetery (Sandomierz district), sites "Grodzisko I" (graves 11 and 55; Krzak 1961, fig. 125: c; 1976, fig. 58: b) and "Nad Wawrem" (graves 83 and 296; Krzak 1970, figs. 82, 171), as well as those found in the so-called Little Market (Mały Rynek, site 1) in Sandomierz (Bajka *et. al.* 2018, fig. 9: a), in a collective grave from Stary Garbów, Sandomierz district, site 3 (Bargieł and Florek 1990, figs. 2: 2, 3: 2), and in an unspecified locality near Sandomierz (Krzak 1976, fig. 58: c). The last specimen listed above, as well as the vessel from the "Nad Wawrem" cemetery (grave 83) and one of the mugs from Stary Garbów, have identical pairs of flat nodules that are stretched upwards, located on the edge of the brim, above the upper base of the handle. Similar nodules (from two to even a dozen or so), also appear on the edges of bowls associated with the Złota culture (Bargieł and Florek 1990, fig. 2: 1; Krzak 1970, fig. 104: a; 1976, figs. 48: e, 49: c-d, 50: a, 50: d). The two amphorae from Kleczanów find even more analogies. These are, *e.g.*, vessels discovered in graves 4, 10, and 37 from the "Nad Wawrem" cemetery (Krzak 1970: figs. 18: b, 36: e, 66: b), in graves 17, 27, 28, 30, 42, 54, and 56 from the "Grodzisko I" site (Krzak 1961, figs. 49: b, 66: c, 67: a, 70: a, 92: b, 120: b, 121: a, 127: c), in Złota, as well as in graves from Święcica, Sandomierz district, site 30 (Bajka and Sieradzka 2019, fig. 11: 6, fig. 12), and in Sandomierz, site 1 (Market and Little Market; Gąssowska 1962, fig. 2: a; Bajka *et al.* 2018, figs. 11, 12). The rich ornamentation of both amphorae from Kleczanów, which is a combination of horizontal, vertical, and wavy motifs (the last mentioned type appears only on the neck) composed of cord and stamp (2 types: rectangular and arched) impressions, deserves special attention.

The triangular arrowhead with a notched base was discovered near the skull of the inhumed man. It was made of chocolate flint. Flint arrowheads (as single or multiple specimens) have been discovered in many graves of the Złota culture (Krzak 1961), but such artefacts made of chocolate flint represent *c.* 2% of the totality (Borkowski 1987, 152). Additionally the shape of the arrowhead from the grave in Kleczanów is slightly different from the forms of typical triangular arrowheads of the Złota culture. Arrows, whose remains are flint arrowheads, are usually considered elements of grave inventories (grave gifts or artefacts used by the inhumed persons during their lives). Nevertheless, the arrowhead from Kleczanów was discovered in the stone-lined cache surrounding the skull of the buried male. Due to the size of this stone chest, it is very unlikely that the arrowhead was deposited there along with the arrow shaft. Thus, either the arrowhead alone was placed inside (which is unlikely), or the shaft was broken. Placing a broken arrow next to the separated skull might have been a certain type of a magical procedure. We cannot rule out the possibility that the arrowhead, perhaps with a fragment of the shaft, was lodged in the soft tissues of the buried man, being the cause of his death.

The two chips and the small fragment of the tetrahedral Świeciechów flint axe (all of them discovered in the fill of the burial chamber) may represent intentionally deposited artefacts, but this is only a conjecture. They also might have gotten there as a result of post-depositional processes.

The two trapezoidal bone plaques, which are nearly identical, were probably belt elements (which is corroborated by their location in the grave, near the pelvic bones). Thus, they should be interpreted as parts of the garment of the buried man, and not as grave goods in the strict sense. Bone plaques whose shapes are identical to those of the plates discovered in the grave from Kleczanów have been also found at two other cemeteries of the Złota culture: in grave 4 from the "Grodzisko I" necropolis in Złota (Krzak 1961, fig. 17: e) and in grave 6, site 23, from Sadowie, Opatów district (Pasterkiewicz 2017, fig. 3). Identical or similar bone plaques, interpreted as belt elements (buckles), have been found at several Eneolithic cemeteries associated with the broadly understood circle of the Corded Ware culture societies inhabiting, *e.g.*, the territories of Czechia, southern Germany, and Sambia (Moucha 1958, 67-73). In the Polish territories, two plaques having a similar shape, but having finely notched edges and interpreted as a pair of shoulder straps, were discovered in grave 427 (site 3), from Krusza Zamkowa, Inowrocław district, which is linked with the early horizon of the Corded Ware culture (Kośko 1992, 88, fig. 2: 2).

The inventory of the grave in Kleczanów also includes the aforementioned bone awl. Similar tools have been discovered, *e.g.*, in many graves of the Złota culture, as well as in funerary features linked with the Globular Amphora and Corded Ware cultures (Wiślański 1966, 42; Krzak 1976, 99-101; Bargieł *et al.* 2001, 251; Buko 1993, 313; Ścibior 1993, 319). Nevertheless, taking into account the fact that it was found among the ribcage bones, as well as the previously discussed assumption that certain magical procedures (broadly understood anti-vampire measures) were performed on the body of the buried male, we cannot rule out the possibility that the discussed tool was used to ritually kill him for the second time.

The animal bones found in the fill of the grave niche should be linked with the burial in question. Animal remains have been recorded many times in Złota culture graves. They are single bones, fragments of carcasses, or even whole animals placed in such funerary features. They are most often interpreted as remains of deposited food products, possibly gifts for the buried persons or nutrition for the afterlife journey (*cf*. Krzak 1961, 141; Machnik 1979, 382; Bajka *et al*. 2018, 162). Although the presence of animal carcasses or their edible parts usually corroborates this assumption, in other cases it is not certain. In the grave from Kleczanów, near the skull, there was a pig mandible. Its teeth were intentionally broken off. Skulls of pigs, or only their jawbones, are among the most frequent types of animal remains discovered in graves associated with the Globular Amphora culture (Nosek 1967, 275). They have also been recorded in the funerary features of the Złota culture, *e.g*., in Święcica, site 30 (Bajka and Sieradzka 2019, 263-264), and in Sandomierz, site 1 (Bajka *et al*. 2019, 140). In the grave from the so-called Little Market (Mały Rynek) in San-domierz, a pig mandible was placed inside a deep bowl, which was one of vessels discove-red in this feature (Bajka *et al*. 2019, 140). Remains of pigs, especially their skulls or mandibles, discovered in Globular Amphora graves are associated with special magical functions linked with funerary rites (Makowiecki and Makowiecka 2008, 378). This is probably how pig jawbones found in the funerary features of the Złota culture should be interpreted.

The rest of the bones discovered in the grave from Kleczanów are solely limb fragments: of a roe deer, a small domesticated ruminant animal (goat or sheep), and a bird (having, similarly to the pig mandible, minimal nutritional value). We can thus assume that they were not deposited in the grave in order to provide the buried male with food, at least not directly. Moreover, the fact that they are exclusively fragments of limbs makes us assume that they were deliberately selected. It is possible that placing them in the grave was linked with unspecified magical measures. Here, it is worth mentioning that in the Złota culture grave from Święcica, bones of bear paws were discovered (*cf*. Bajka and Sieradzka 2019, 260). Nevertheless, we cannot rule out the utilitarian character of the animal bones found in the grave from Kleczanów. They might have been partially processed materials that could be used for the production of tools, just like flint half-products deposited in graves (*cf*. Boroń 2019). It should be noted, however, that wild animal bones are found extremely rarely in graves of the Złota culture. The same applies to funerary features associated with the Globular Amphora culture. Single bones (also exclusively limb fragments) of a wisent and a deer were discovered, *e.g*., in a grave from Malice (near Sandomierz; Nosek 1967, 193). On the other hand, in Strzelce (near Mogilno), in grave I, bones belonging to a roe deer and a deer were found, whereas grave II yielded deer bones (Nosek 1967, 96).

In the burial niche, over 40 shells of snails belonging to the species *Cepaea vindobonensis* were discovered. The shells of this and other gastropod species are more and more frequently discovered in graves dated to the Eneolithic and Early Bronze Age, but it is believed that they got into the grave pits accidentally, in a relatively short time after they had been dug. Thus, the shells do not belong to the grave inventories, but they might be useful in the reconstruction of the ancient natural environment prevailing in the nearest vicinities of such graves or cemeteries (*cf*. Barga-Więcławska and Jedynak 2014, 284-314; Bajka and Sieradzka 2019, 264; Kurzawska 2019, 141-143). Snails, or only their shells, might have accidentally gotten into the burial niche of the grave from Kleczanów, probably before the collapse of the ceiling and before the shaft was filled with soil. Nevertheless, we should bear in mind that there are graves linked with the Złota culture that contained shells of snails and river mussels (swan mussels), or only mussel shells. For example, several dozen snail and mussel shells were discovered in the grave from Stary Garbów (Bargieł and Florek 1990, 78), whereas the grave from Sandomierz (Salve Regina Hill) contained several mussel shells (Buko 1993, 313). Although snail shells might have gotten into the grave fills without human involvement, this cannot be said about mussel shells; thus, they must have been intentionally deposited.

The fact that the discussed funerary feature is a niche grave with an incomplete stone pavement, along with the results of the inventory analysis indicate that it should be linked with the Złota culture. Niche graves, composed of a vertical shaft and a niche coming from it and containing one or more burials (these two elements are often connected with a short corridor) represent a common type of funerary feature discovered across the Sandomierz Upland and the Nida Basin (*cf*. Krzak 1973, 131; Włodarczak 2008, 566; 2014, 21-24; Wilk 2014). One person was buried in it: a man belonging to the *adultus* age group (*c*. 25 years old). The majority of funerary features associated with the Złota culture are collective graves (*cf*. Krzak 1961, 140; Machnik 1979, 380), but individual graves also occur often (*e.g*., Złota – Grodzisko I, graves 4, 54 – *cf*. Krzak 1961, 16-17, 118-119; Mydłów, grave 3 – *cf*. Bargieł 1990, 22; Złota 6 – objects 23, 25 – *cf*. Florek 2012, 68, 69). The anthropological analysis indicates that the man was crippled. His left leg was shorter by at least 5 cm (as a result of improper healing of the fractured bone), thus he must have limped. His skull was probably slightly deformed (asymmetrical), likely as a result of undetermined pathological changes.

The bones of the buried man were chaotically scattered on the bottom of the niche, not preserving their anatomical order. Such arrangements of skeletal remains occur very often in the graves of the Złota and Globular Amphora cultures (*cf*. Nosek 1967, 373). In the discussed grave, the head (skull) was evidently separated from the rest of the body (skeleton) and placed in a kind of irregular stone chest (cache) covered with a flat sandstone slab. An analogical situation occured in grave 2 at the Złota culture site in Książnice, Busko-Zdrój district, where the discovered skull had also been separated from the rest of the skeleton and subjected to special procedures (Wilk 2006). In the grave from Kleczanów, the mandible was found in a different place, which indicates that the skull had been placed in the stone-lined cache after the decomposition of the soft tissues. This can be linked with three different situations: the inhumed remains were previously dismembered; it was a secondary burial (the soft tissues underwent decomposition somewhere else and next the bones were placed in the burial chamber (Krzak 1961, 150-151; Wiślański 1979, 293-294); or, sometime after the inhumation, the grave was reopened in order to scatter the bones and to deposit the skull (without the mandible) in the cache and cover it with stones. The last possibility mentioned above is corroborated by the destruction (intentional or not) of the two amphorae included in the inventory. Their fragments were found in the corridor connecting the shaft with the niche (it is not very possible that they had been originally deposited there). We cannot rule out the possibility that the original arrangement of the remains was disrupted as a result of someone digging into the grave in order to rob valuable artefacts (grave gifts). Traces of the looting of niche graves of the Corded Ware culture by, probably, people of the Mierzanowice culture were discovered, *e.g.*, at the cemetery in Mydłów, Opatów district (Bargieł 1990, 22).

The chaotic arrangement of the bones in the grave, without preserving their anatomical order, might have been the result of various magical procedures to which bodies were subjected directly after death or some time afterwards (*cf*. Krzak 1961, 150-151). They are not always understood by us, but could possibly be alled anti-vampire measures undertaken in order to prevent the return of the buried person to the world of the living (to read

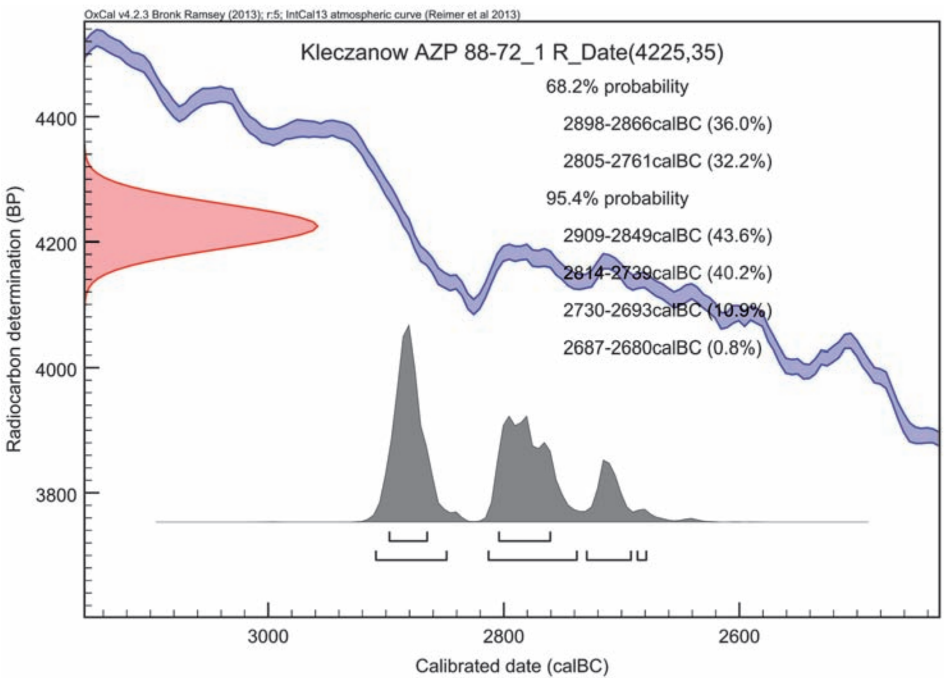


Fig. 14. Kleczanów, site 8, Sandomierz district. Grave of the Złota culture. Calibration of the radiocarbon dates

more about vampirism and anti-vampire procedures, *cf*. Dzieduszycki 2000; Żydok 2004). It is possible that the appearance of the inhumed man (limping, because one of his legs was shorter; probably deformed skull) resulted in him being considered dangerous after his death, hence the application of the mentioned measures.

7. CHRONOLOGY

The chronology of the grave is based on a ^{14}C date obtained from a fragment of a long bone in the Poznań Radiocarbon Laboratory: Poz-121192 – 4225±35 BP. After calibration, for which the OxCal v. 4.2.3 program (Bronk Ramsey 2013) and IntCal13 calibration curve (Reimer *et al*. 2013) were used, there is a 94.5% probability that the age of the sample, and thus also of the grave, can be set between 2909 BC and 2680 BC (Fig. 14). This chronology is compatible with the absolute dating of other Złota culture sites located across the Sandomierz Upland (Włodarczak 2019, 192-193).

8. SUMMARY

The funerary feature from Kleczanów, discovered accidentally in 2014, represents a type of niche grave that is characteristic of sites from the Sandomierz Upland associated with the Złota and Corded Ware cultures. The inventory of the grave is typical of the Złota culture. It is dated from 2909 BC to 2680 BC. A 25-year-old male was buried inside. He was crippled: one leg was shorter than the other due to an improperly healed fracture. His body was subjected to various ritual measures (*e.g*., his skull was separated from the rest of the body and deposited in a stone-lined cache). The grave inventory consisted of at least three vessels (one mug with a handle and two amphorae), two stone plaques (belt elements), a bone awl, a flint arrowhead, and animal remains (pig mandible, limb bones of a roe deer, a sheep or goat, and an unspecified bird). Snail shells were also found in the grave niche, but it is not certain whether they were intentionally deposited inside, or (as such discoveries are most often interpreted) they got there accidentally. There is a probability that someone entered the grave a relatively short time after the inhumation. This may explain the displacement of the bones and the damage sustained to two vessels. It is also possible that some elements of the grave inventory were taken away. We do not know if it was a single burial or part of a larger cemetery of the Złota culture. It is certain, however, that another person was buried a dozen metres away from the discussed funerary feature (also in a niche grave, but linked with the early phase of the Kraków-Sandomierz group of the Corded Ware culture). Along with the recently published graves from Sandomierz (Bajka *et al*. 2018) and Święcica (Bajka and Sieradzka 2019), the feature from Kleczanów considerably enriches the corpus of sources associated with the funerary rituals of the Złota culture across the Sandomierz Upland and, owing to the acquisition of another absolute date (^{14}C), the chronology of this archaeological culture. The fact that the two accidentally discovered graves, one associated with the Złota culture and the other one linked with the Corded Ware culture, are located in close proximity to one another indicates that they are part of a multicultural Neolithic necropolis. Exploring this site would provide us with new materials important for understanding the mutual relations between the Złota and Corded Ware cultures. Undertaking systematic research of the cemetery is advisable due to the fact that it is endangered by agricultural and construction activities.

Translated by Piotr Moskała

References

Bajka M. and Sieradzka E. 2019. The Złota culture grave from Święcica, site 30, Sandomierz district. *Sprawozdania Archeologiczne* 71, 243-271.

Bajka M., Florek M., Kozak-Zychman W., Makowiecki D., Szmyt M. and Trzaska A. 2018. Grób ludności kultury złockiej z Sandomierza, stan. 1 (Mały Rynek), woj. świętokrzyskie. *Fontes Archaeologici Posnanienses* 52, 137-172.

Barga-Więcławska J. A. and Jedynak A. 2014. The contribution of mollusc shells in the reconstruction of the natural environment and the human economy of the northern part of the Sandomierz Upland in the third millennium BC – the case study of site 63 in Krzczonowice (south-eastern Poland). *Sprawozdania Archeologiczne* 66, 285-314.

Bargieł B. 1990. Badania wykopaliskowe na terenie Iwaniska w województwie tarnobrzeskim. In J. Gurba (ed.), *Sprawozdania z badań terenowych Katedry Archeologii UMCS w 1990 roku*. Lublin: Wydawnictwo UMCS, 18-24.

Bargieł B. and Florek M. 1990. Grób kultury złockiej w Starym Garbowie na stan. 3, woj. Tarnobrzeg. *Sprawozdania Archeologiczne* 41, 77-83.

Bargieł B., Florek M. and Libera J. 2001. Groby ludności kultury ceramiki sznurowej i mierzanowickiej ze stanowiska 1 w Malicach Kościelnych, woj. świętokrzyskie. *Sprawozdania Archeologiczne* 53, 231-258.

Borkowski W. 1987. Neolithic and Early Bronze Age heart-shaped arrow heads from the Little Poland Upland. In J. K. Kozłowski and S. K. Kozłowski (eds), *New in Stone Age archaeology* (= *Archaeologia Interregionalis* 8). Warszawa, Kraków: Wydawnictwa Uniwersytetu Warszawskiego, 147-181.

Boroń T. 2019. Wyroby krzemienne. In P. Włodarczak (ed.), *Wilczyce, stanowisko 10. Norma i precedens w rytuale pogrzebowym małopolskiej kultury ceramiki sznurowej*. Kraków, Niepołomice, Pękowice: Wydawnictwo i Pracownia Archeologiczna Profil-Archeo, 59-64.

Bronk Ramsey C. 2013. OxCal. Version4.2.3 Oxford Radiocarbon Accelerator Unit Research Laboratory for Archeology. Oxford (http://c14.arch.ox.ac.uk/oxcal).

Buko A. 1993. Wzgórze Salve Regina. In S. Tabaczyński (ed.), *Sandomierz. Badania 1969-1973*. 1. Warszawa: Instytut Archeologii i Etnologii PAN, 311-318.

Buko A. and Ścibior J. 1991. Zespół grobowy starszej fazy kultury ceramiki sznurowej z Kleczanowa koło Sandomierza. *Sprawozdania Archeologiczne* 43, 115-126.

Dzieduszycki W. 2000. Wiara w świat demonów. Potencjalne możliwości jej oddziaływania na zwyczaje funeralne w przeszłości. In J. Wrzesiński (ed.), *Czarownice. Funeralia Lednickie. Spotkanie 2*. Wrocław, Sobótka: Muzeum Ślężańskie im. S. Dunajewskiego w Sobótce, 9-23.

Florek M. 2012. Badania archeologiczne w Złotej koło Sandomierza w latach 2002-2004 i 2012. *Zeszyty Sandomierskie* 33, 66-68.

Gąssowska E. 1962. Odkrycia grobów kultury ceramiki sznurowej w pow. Sandomierz. *Wiadomości Archeologiczne* 28, 88.

Kośko A. 1992. Z badań nad tzw. horyzontem starosznurowym w rozwoju późnoneolitycznej kultury społeczeństw Kujaw. *Acta Universitatis Lodziensis. Folia Archaeologica* 16, 85-95.

Kozak-Zychman W. and Szarlip A. 2014. *Szczątki kostne z pochówku kultury złockiej w miejscowości Kleczanów, gm. Obrazów, pow. sandomierski, woj. świętokrzyskie*. Unpublished manuscript. Lublin: Institute of Archaeology, Maria Curie-Skłodowska University in Lublin.

Krzak Z. 1961. *Materiały do znajomości kultury złockiej*. Wrocław, Warszawa, Kraków: Instytut Historii Kultury Materialnej PAN.

Krzak Z. 1970. *Cmentarzysko kultury złockiej „Nad Wawrem" w Złotej*. Wrocław, Warszawa, Kraków: Instytut Historii Kultury Materialnej PAN.

Krzak Z. 1973. Zagadnienie kultury złockiej. In J. Kowalczyk (ed.), *Z badań nad neolitem i wczesną epoką brązu w Małopolsce*. Wrocław: Instytut Historii Kultur Materialnej Polskiej Akademii Nauk, 121-139.

Krzak Z. 1976. *The Złota Culture*, Wrocław, Warszawa, Kraków, Gdańsk: Instytut Historii Kultury Materialnej PAN.

Kurzawska A. 2019. Muszle ślimaków. In P. Włodarczak (ed.), *Wilczyce, stanowisko 10. Norma i precedens w rytuale pogrzebowym małopolskiej kultury ceramiki sznurowej*. Kraków, Niepołomice, Pękowice: Wydawnictwo i Pracownia Archeologiczna Profil-Archeo, 141-143.

Machnik J. 1979. Krąg kulturowy ceramiki sznurowej. In W. Hensel and T. Wiślański (eds), *Prahistoria ziem polskich. 2. Neolit*. Wrocław, Warszawa, Kraków, Gdańsk: Zakład Narodowy im. Ossolińskich, Wydawnictwo Polskiej Akademii Nauk, 337-411.

Makowiecki D. and Makowiecka M. 2008. Depozyt szczątków zwierzęcych z grobu ludności kultury amfor kulistych z Chodzieży, stan. 3. Nowe informacje. In J. Bednarczyk, J. Czebreszuk, P. Makarowicz and M. Szmyt (eds), *Na pograniczu światów. Studia z pradziejów międzymorza bałtycko-pontyjskiego ofiarowane Profesorowi Aleksandrowi Kośko w 60. Rocznicę urodzin*. Poznań: Wydawnictwo Poznańskie, 371-379.

Moucha V. 1958. Příspěvek k časovému zařazení eneoliticeských pasových zápon. *Archeologické Rozhledy* 10, 62-77.

Nosek S. 1967. *Kultura amfor kulistych w Polsce* (= *Prace Komisji Archeologicznej* 8). Wrocław, Warszawa, Kraków: Polska Akademia Nauk. Oddział w Krakowie.

Pasterkiewicz W. 2017. *Sprawozdanie z archeologicznych badań wykopaliskowych przeprowadzonych w 2016 roku na stanowisku nr 23 w Sadowiu, pow. opatowski,*. Unpublished manuscript: Sandomierz Delegation of the Regional Monuments Protection Office in Kielce. Kielce.

Reimer P. J. *et al*. 2013. IntCal13 and marine13 radiocarbon age calibration curves 0-50,000 years cal BP. *Radiocarbon* 55, 1869-1887.

Ścibior J. 1990. Badania na Wzgórzu Salve Regina w 1988 roku. In S. Tabaczyński (ed.), *Sandomierz. Badania 1969-1973*. 1. Warszawa: Instytut Archeologii i Etnologii PAN, 318-322.

Wilk S. 2006. Grób niszowy (nr 2) kultury złockiej ze stan. 2 w Książnicach, pow. Busko Zdrój. *Śląskie Sprawozdania Archeologiczne* 48, 109-134.

Wilk S. 2014. Comments on the origins of niche graves in the Złota cultura. *Baltic-Pontic Studies* 19, 157-188.

Wiślański T. 1966. *Kultura amfor kulistych w Polsce północno-wschodniej*. Wrocław, Warszawa, Kraków: Zakład Narodowy Ossolińskich, Instytut Historii Kultury Materialnej PAN.

Wiślański T. 1979. Dalszy rozwój ludów neolitycznych. Plemiona kultury amfor kulistych. In W. Hensel and T. Wiślański (eds), *Prahistoria ziem polskich*. 2. *Neolit*. Wrocław, Warszawa, Kraków, Gdańsk: Zakład Narodowy Ossolińskich. Wydawnictwo Polskiej Akademii Nauk, 260-299.

Włodarczak P. 2008. Kultura złocka i problem genezy kultury ceramiki sznurowej w Małopolsce. In J. Bednarczyk, J. Czebreszuk, P. Makarowicz and M. Szmyt (eds), *Na pograniczu światów. Studia z pradziejów międzymorza bałtycko-pontyjskiego ofiarowane Profesorowi Aleksandrowi Kośko w 60. Rocznicę urodzin*. Poznań: Wydawnictwo Poznańskie, 555-576.

Włodarczak P. 2014. The traits of Early-Bronze Pontic cultures in the development of old upland Corded Ware (Małopolska groups) and Złota culture communities. *Baltic-Pontic Studies* 19, 7-52.

Włodarczak P. 2019. Grób 15 z Wilczyc na tle środkowoeuropejskim: odmienność i reguła w rytuale pogrzebowym małopolskiej kultury ceramiki sznurowej/Grave 15 from Wilczyce against the Central European background: distinctness and rules in burial rites of the Corded Ware Culture in Lesser Poland. In P. Włodarczak (ed.), *Wilczyce, stanowisko 10. Norma i precedens w rytuale pogrzebowym małopolskiej kultury ceramiki sznurowej*. Kraków, Niepołomice, Pękowice: Instytut Archeologii i Etnologii PAN, Stowarzyszenie Archeologów Terenowych STATER, Wydawnictwo i Pracownia Archeologiczna Profil-Archeo, 169-208.

Żydok P. 2004. Wczesnośredniowieczne pochówki antywampiryczne. In Z. Kobyliński (ed.), *Hereditatem cognoscere. Studia i szkice dedykowane Profesor Marii Miśkiewicz*. Warszawa: Państwowe Muzeum Archeologiczne, 38-66.

SPRAWOZDANIA ARCHEOLOGICZNE 72/2, 2020
PL ISSN 0081-3834
DOI: 10.23858/SA/72.2020.2.2016

Paweł Jarosz[1], Jerzy Libera[2]

EARLY BRONZE AGE BARROW IN JAWCZYCE, SITE 1, WIELICZKA FOOTHILLS, LESSER POLAND

ABSTRACT

Jarosz P., Libera J. 2020. Early Bronze Age barrow in Jawczyce, site 1, Wieliczka Foothills, Lesser Poland. *Sprawozdania Archeologiczne* 72/2, 307-326.

Barrow 11 at site 1 in Jawczyce is the first burial mound in the Wieliczka Foothills, and also in the whole of Lesser Poland, dated to the 19th and 18th centuries BC and associated with the late phase of the Mierzanowice culture. The grave under the mound had a wooden construction, and within it were found faience beads as well as four flint arrowheads. The interment was not preserved. The radiocarbon date acquired from charcoal is 3580±35 BP (Poz-101091), which is 1974-1888 BC after calibration. This dating can be correlated with the beginnings of the late phase of the Mierzanowice culture. The mound in Jawczyce combines older Final Neolithic traditions (the barrow) with Early Bronze ones (the grave goods, arrangement of the deceased). Therefore, it significantly supplements current knowledge of the funeral rite of the Mierzanowice culture.

Keywords: Early Bronze Age, barrow grave, Wieliczka Foothills, faience beads
Received: 27.05.2020; Revised: 28.06.2020; Accepted: 31.08.2020

1 Institute of Archaeology and Ethnology, Polish Academy of Sciences, Sławkowska st. 17, 31-016 Kraków, Poland; ptjarosz@gmail.com; https://orcid.org/0000-0002-9481-3007
2 Institute of Archaeology, Maria Curie-Skłodowska University; M. Curie-Skłodowska sq. 4, 20-031 Lublin, Poland; jlibera@o2.pl; https://orcid.org/0000-0002-5233-9124

1. INTRODUCTION

Site 1 in Jawczyce, Wieliczka district, is located about 3 km south-east of Wieliczka. It is situated at the culmination of one of the hills in the Wieliczka Foothills, with a height reaching to 304 m a.s.l. (Kondracki 2000, 322, 323). This hill spreads along a W-E axis through Jawczyce and Wiatowice (Wieliczka district), sloping slightly eastwards to the valley of Potok Królewski within the Cracow Submountain Region (Fig. 1; Solon *et al.* 2018). Currently, the majority of the hill is covered with forest.

Mounds in forest complexes in the area of Jawczyce and Wiatowice were discovered by Piotr Galas (1948). Then, during excavations as part of the Carpathian Archaeological Expedition in 1952, headed by Andrzej Żaki, the presence of mounds in this region was confirmed, and new ones were found (Żaki 1952). In the years 1960-1961, during the same expedition, selected burial mounds were explored (Zoll-Adamikowa and Niżnik 1963), revealing burials of the Corded Ware and Mierzanowice cultures (Jawczyce, site 1, barrow 2), as well as mounds of the Early Middle Ages (Jawczyce, site 1, site 8 and site 3; Wiatowice, site 1, site 4). Settlement features of the Funnel Beaker culture (Jawczyce, site 1, barrow 2) and Mierzanowice culture (Jawczyce, site 2) were also discovered under mounds. Further

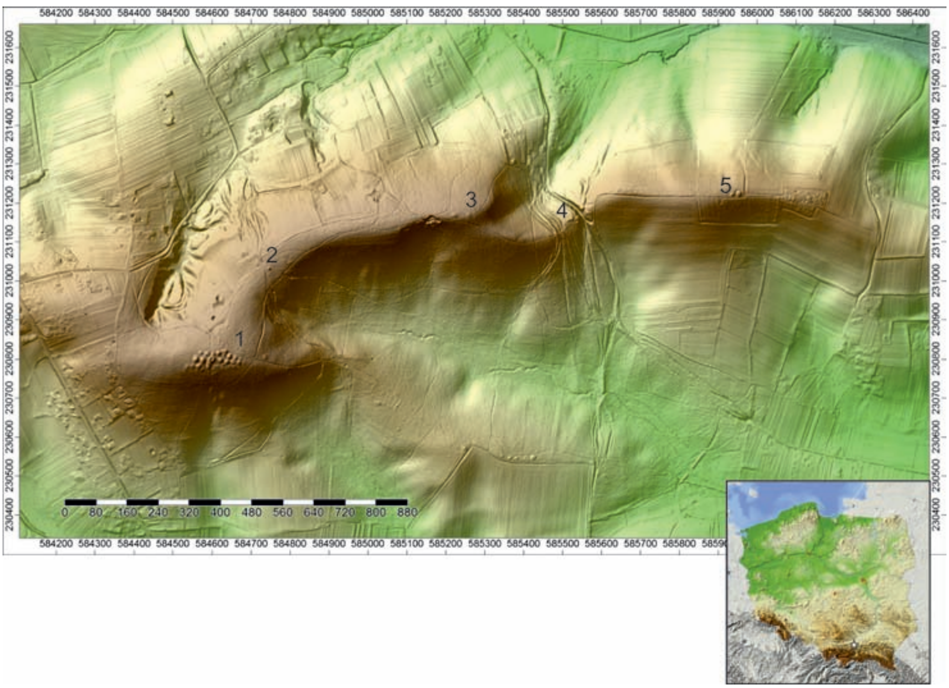


Fig. 1. Location of barrows in Jawczyce and Wiatowice in the Wieliczka Foothills. 1 – Jawczyce, site 1; 2 – Jawczyce, site 2; 3 – Jawczyce, Babia Góra site; 4 – Jawczyce, site 3; 5 – Wiatowice, site 1. Illustrated by P. Jarosz and A. Sznajdrowska-Pondel

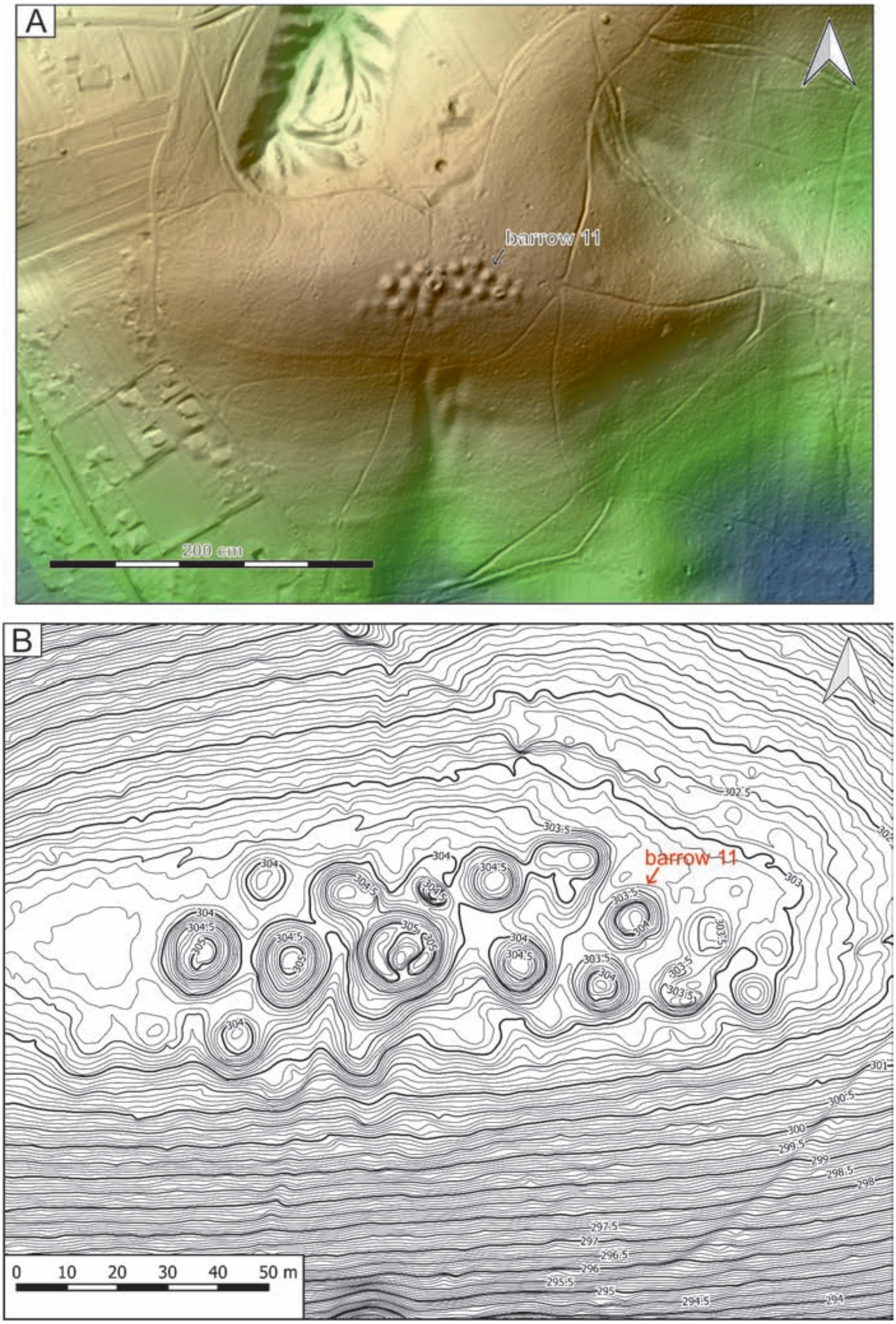


Fig. 2. Jawczyce, site 1. A, B – height plans.
Illustrated by P. Jarosz and A. Sznajdrowska-Pondel

investigations of destroyed Early Medieval mounds within this area were conducted in 2005 at site 1 in Wiatowice (Jarosz 2006) and in 2008 at site 2 in in Jawczyce (unpublished excavations of P. Jarosz).

In 2017, excavations of barrow 11 at site 1 in Jawczyce were conducted. A grid of ares was first delineated with primary north-south and east-west lines. Based on the data acquired from airborne laser scanning (LIDAR), an outline of the site was made (Fig. 2). It was therefore possible to verify the arrangement of the mounds that was made in the 1960s (Zoll-Adamikowa and Niżnik 1963).

2. MATERIALS – DESCRIPTION OF BARROW 11

The mound was slightly oval in shape, stretched along a SW-NE axis with major and minor axes of 12 and 10.5 m, respectively, and a height of about 80 cm (Fig. 3: A, B). The mound was destroyed by the roots of several trees, as well as two windthrows located in its eastern part. Excavations were initially conducted to a depth of 70 cm in the well-preserved, western part of the mound, and after the discovery of the central grave pit, the heavily damaged eastern half of the mound was explored to the same depth. Forty-centimeter-wide profile witnesses were left between the quarters. The examined area was 90 m^2 (Fig. 3: C).

The upper layer of the mound was a dark brown forest humus 10-15 cm thick. Below, there was a light brown layer, with a thickness of about 10 cm in the central part of the mound and about 20-30 cm at its edges. Beneath, in the central part of the mound, there was a yellow layer. Its thickness was about 50 cm, gradually decreasing towards the edge of the embankment (Fig. 4). Some sandstones were found in it. At a depth of about 80 cm from the highest point of the barrow, there was a layer of primeval humus, yellow-brown in colour and with a thickness of about 15 cm. The mound was built on this layer. Deeper down, there was a layer of yellow loess with a thickness of about 80-90 cm, and beneath it layers formed laminates with thicknesses of several cm to about 10 cm. They were formed by sand (eroded sandstones) and yellow-orange clay.

During the exploration of subsequent levels of the embankment, single lumps of fired clay, charcoal and small fragments of clay vessels were discovered. Technologically, they can be linked with the Neolithic (Funnel Beaker culture?) and the Early Bronze Age. Nearly 50 stone artefacts, mainly of silica rocks, were also found. The vast majority of them can be associated with the Upper or Late Palaeolithic, including scrapers, combined tools, a burin, a truncated piece and blade debitage. Only single products should be associated with the Final Neolithic or the Early Bronze Age (these artefacts will be the subject of a separate study). The arrangement of ceramic fragments within the mound was random.

Under the central part of the barrow, a burial pit (grave 1) was discovered. Around it, a layer that was formed during the construction of the pit was visible.

Grave 1

A grave pit was discovered at a depth of about 90 cm from the highest point of the barrow. It was clearly visible against the background of the primeval level and was orientated along a W-E axis. The western wall of the pit was clearly rounded, and the remaining sides

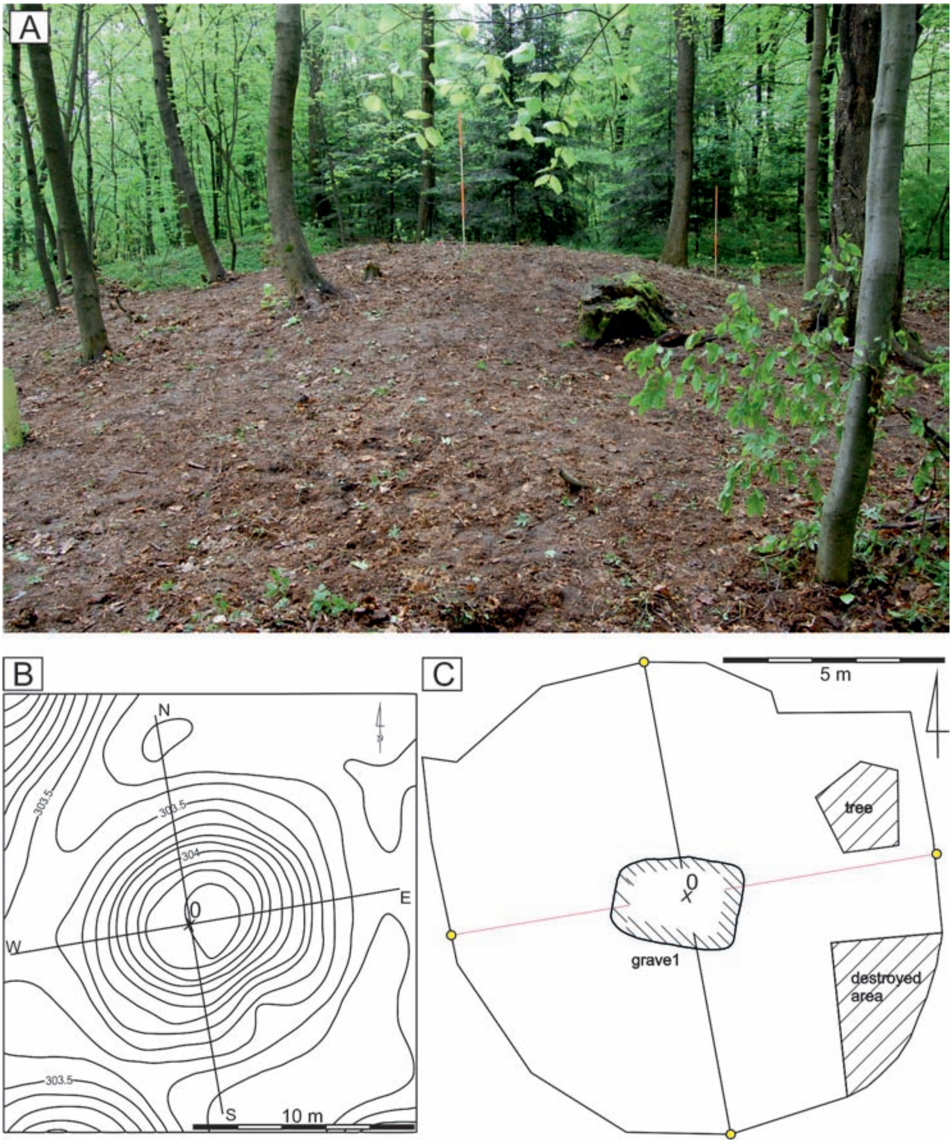


Fig. 3. Jawczyce, site 1, barrow 11. A – barrow before excavations (photo by P. Jarosz); B – height plan (illustrated by J. Ożóg); C – plan under the barrow (illustrated by P. Jarosz and T. Oberc)

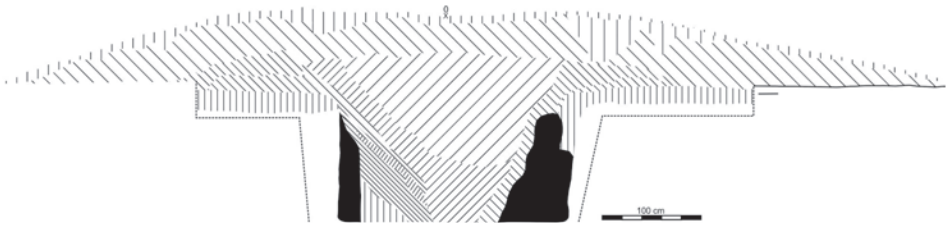


Fig. 4. Jawczyce, site 1, barrow 11. Cross-section of the barrow and the grave along the N-S axis (illustrated by P. Jarosz)

were straight with rounded corners. The dimensions of the pit were 320 × 240 cm (Fig. 5: A). The flat bottom of the grave was at a depth of 220 cm, *i.e.* it was dug into the primeval surface to about 130 cm. In the bottom part, at a depth of about 210 cm, the dimensions of the pit decreased slightly to about 280 × 220 cm (Fig. 5: B). At this level, the fill consisted of two main parts: the outer border and the inner part of the grave. The former was brown and light grey in colour and had a width of up to 40 cm. Possibly, this was a trace of a wooden construction, which was also visible in the arrangement of layers in the profile of the pit (Fig. 4). The inner part of the grave had a rectangular shape with dimensions of 205 × 150 cm, and was formed of a light brown layer. A collection of faience beads was discovered, primarily in the western part of the grave. In the central part, four flint arrowheads were found (Fig. 5: B). Three of them were found in a group, and the fourth one was discovered to the east of them. In the same part of the feature, next to the cluster of beads, an organic residue was found – probably tree bark (?). Inside this material, there was a copper earring. Within the grave, no traces of the skeleton were found, which was undoubtedly placed in sandy and clay layers, where it has completely decayed.

Grave inventory:

1. Medium, stubby, symmetrical arrowhead made of chocolate flint with a contour approximate to an isosceles triangle. It had slightly convex lateral edges finished with slightly arcuate wings passing into the sharply concave base (Fig. 6: 1). It was formed by a flat surface pseudogroove retouch on a unilaterally convex flake, which is indicated by both the flat-convex side contour and a similar cross-section. Dimensions: length 20 mm, width 13 mm, thickness 4 mm; weight 0.52 g.

2. A slender symmetrical arrowhead made of erratic flint with a contour similar to an isosceles triangle, with straight lateral edges passing into a sharply indented base (Fig. 6: 2). It was formed by a flat surface pseudogroove retouch on a unilaterally convex flake, which is indicated by both the flat-convex side contour and a similar cross-section. Dimensions: length 23 mm, width 12 mm, thickness 3 mm; weight 0.42 g.

3. A reconstructed medium stubby arrowhead made of Jurassic flint, possessing a contour similar to an isosceles triangle, with slightly convex lateral edges finished with slightly arcuate wings passing into a sharply indented base (Fig. 6: 3). It was formed by a flat surface

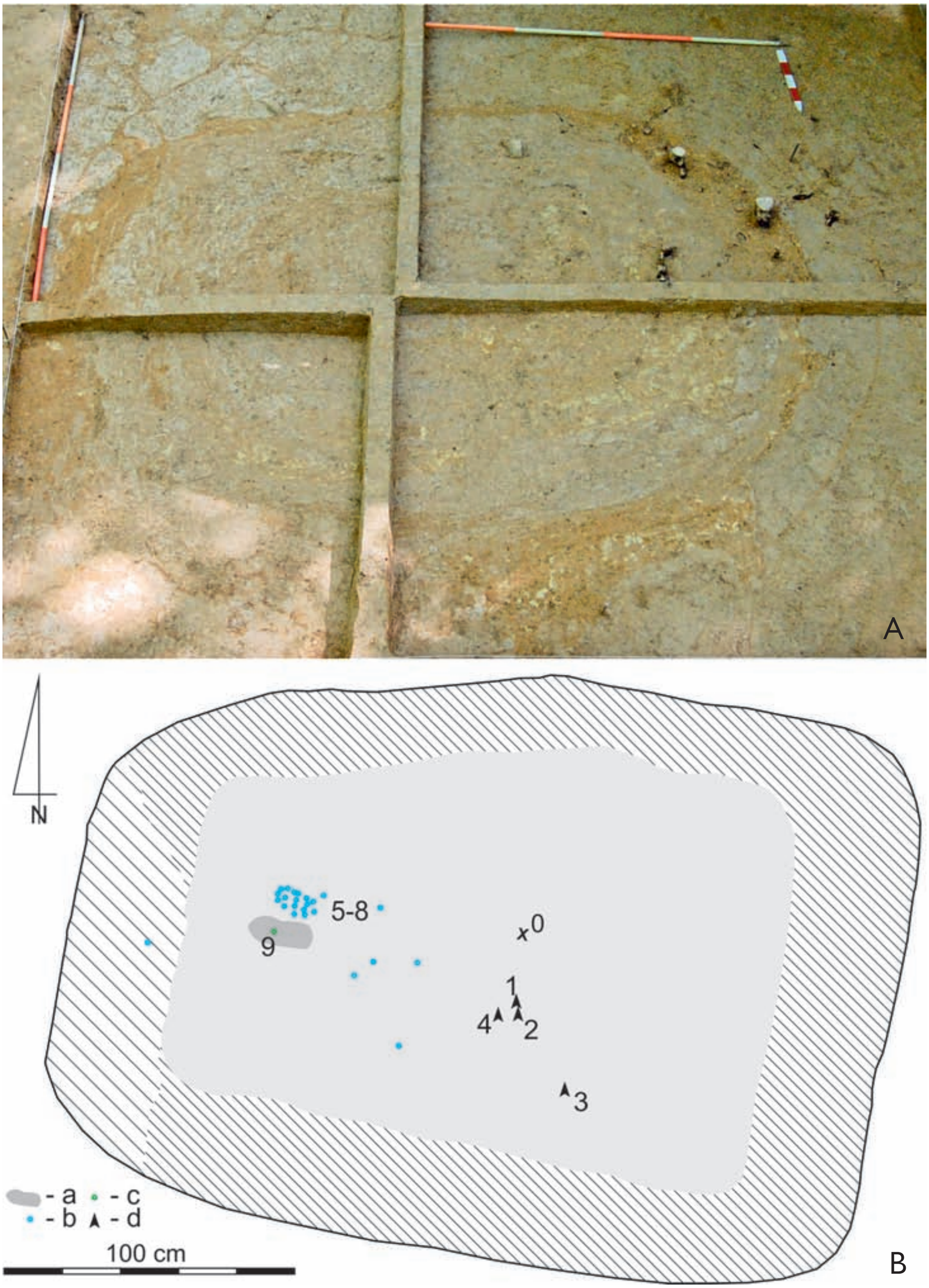


Fig. 5. Jawczyce, site 1, barrow 11. A – Horizontal plan of the grave at a depth of 80 cm (photo by P. Jarosz); B – Horizontal plan of the grave at a depth of 210-220 cm (illustrated by P. Jarosz); a – residues of organic substance; b – faience beads; c – copper earring; d – flint arrowheads

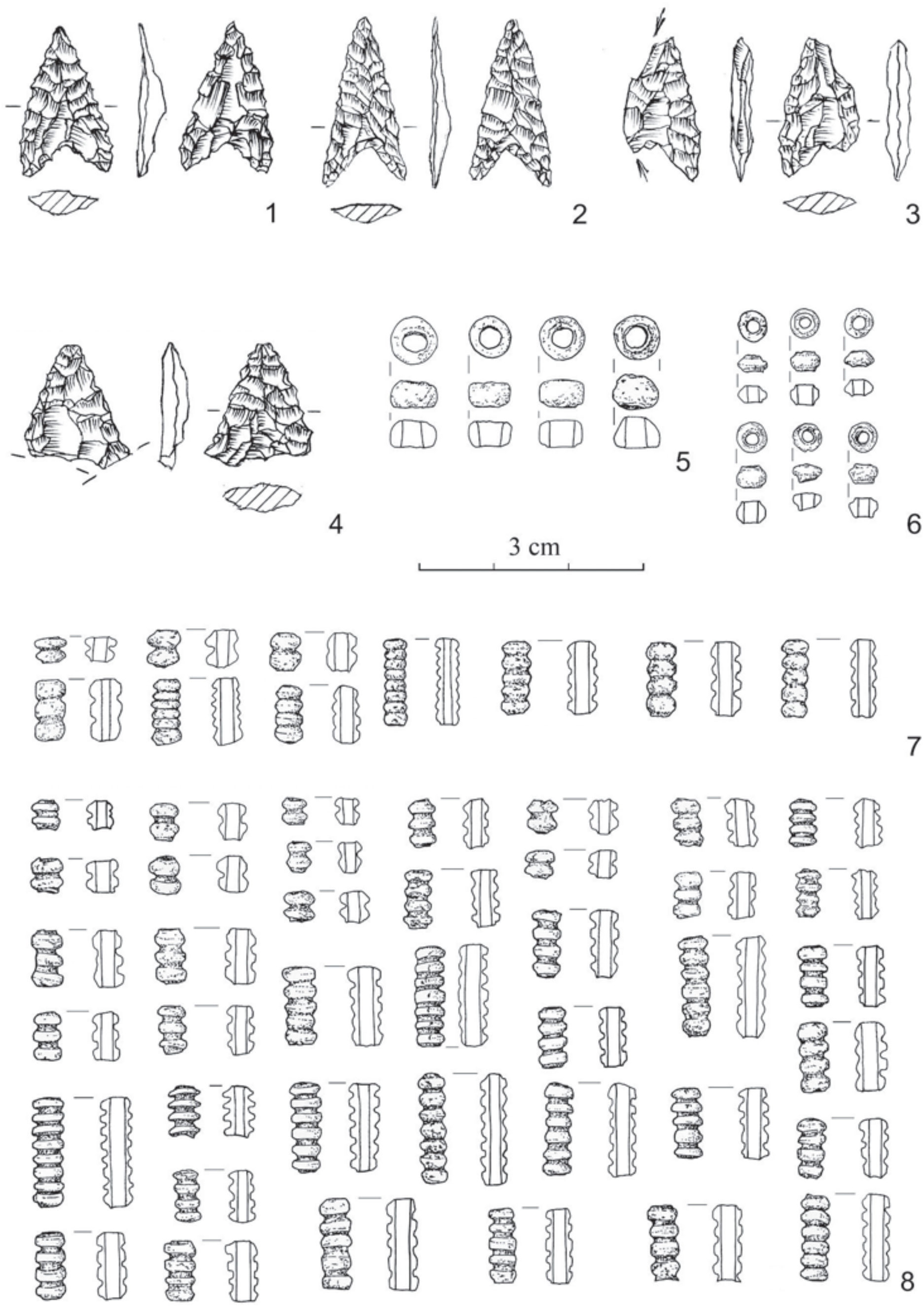


Fig. 6. Jawczyce, site 1, barrow 11. Grave goods (illustrated by J. Ożóg).
1-4 – flint arrowheads; 5-8 – faience beads

pseudogroove retouch, probably on a scaled flake, which is indicated by both the axial lateral outline and the cross-section. On one lateral edge, there are micro negatives of strikes similar to those from a burin – three on the top, one on the wing. Dimensions: length 19 (reconstructed 21) mm, width 10 (actual 11) mm, thickness 3 mm; weight 0.6 g.

4. A stubby arrowhead made of chocolate flint with a contour approximate to an equilateral triangle, with straight lateral edges passing into the base, probably indented in an arch (uncertain due to broken wings). It was formed by a flat surface pseudogroove retouch on a unilaterally convex flake, which is indicated by both the side contour and the cross-section (Fig. 6: 4). Dimensions preserved: length 17 mm, width 14 mm, thickness 4 mm; weight 0.73 g.

5. One-segmented faience beads with shades of blue and green (Fig. 6: 5). They are ring-shaped and have a conical (with truncated apex) or cylindrical longitudinal cross-section. Dimensions: outer diameter 5-6 mm, inner diameter 2-3 mm, height 4-5 mm.

6. One-segmented faience beads with shades of blue and green (Fig. 6: 6). They are ring-shaped, cylindrical or biconical in longitudinal cross-section. Dimensions: diameter 4 mm, hole diameter 1 mm, height 2-3 mm.

7. Multisegmental faience beads with connectors; 2 to 8 parts; shades of blue and green in colour (Fig. 6: 7). In longitudinal cross-section, segments were ring-shaped, cylindrical or biconical. Dimensions: length from 3 to 15 mm, outer diameter 2-4 mm, inner diameter 1-2 mm, diameter of connectors 2 mm.

8. Multisegmental beads; 2 to 7 parts connected by necks; blue and green in colour (Fig. 6: 8). In longitudinal cross-section, segments were ring-shaped, cylindrical or biconical. Dimensions: length from 3 to 14 mm, diameter 2-4 mm, hole diameter 1-2 mm.

9. Fragment of a circular copper earring with wire of circular cross-section. Wire diameter 2 mm.

3. CULTURAL AND CHRONOLOGICAL ANALYSIS

The chronology of the investigated barrow was determined by radiocarbon dating of charcoal and artefacts found at the bottom of the burial pit. The date obtained from the charcoal located in the western part of the pit near the organic substance was 3580±35 BP (Poz-101091), which, after calibration, is 1974-1888 BC (68.2%; Fig. 7). This dating can be correlated with the beginnings of the late phase of the Mierzanowice culture (Kadrow and Machnik 1997). Faience beads are also associated with the late phase of this culture. They occur in the burial complexes of the Samborzec, Szarbia and Giebułtów groups (Kadrow and Machnik 1997, 98, 108, 117), as well as in the Strzyżów culture (Kadrow 1995, 88; Bargieł 2006). They are dated within the first half of the second millennium BC, specifically the years 1950-1600. Some of the oldest dates obtained for graves with this type of equipment were acquired for grave 8 at site 30 in Stryjów, Krasnystaw district (Budziszewski

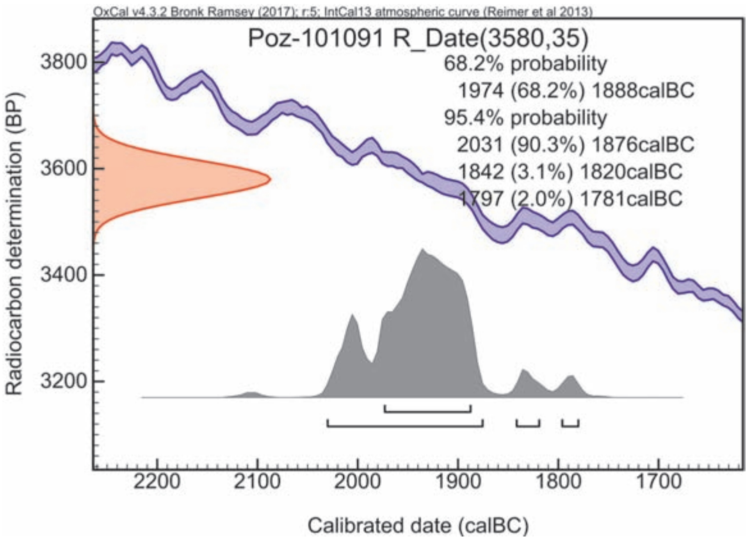


Fig. 7. Jawczyce, site 1, barrow 11. Calibration graph of radiocarbon dating

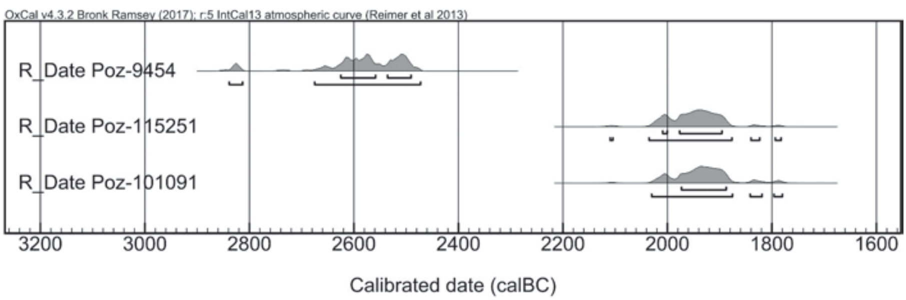


Fig. 8. Jawczyce, site 1. Radiocarbon dates obtained from graves

et al. 2016), which is slightly younger than ours – 3545±30 BP (Poz-66520), or 1940-1782 BC after calibration (68.2%) – and from grave 750 in Skołoszów, Jarosław district, site 7 – 3480±35 BP (Poz-82440), which, after calibration, is 1877-1750 BC (68.2%; Rybicka *et al*. 2017, 128, Table 2; 138, 139, Fig. 27, 28).

The investigated barrow is located within a cemetery of 17 mounds (Fig. 2: A, B). In addition to barrow 11, two additional mounds have been excavated so far. Chronologically, the oldest one (No. 2) was erected above the grave of an individual of the Corded Ware culture community. The date 4050±35 BP (Poz-9454), obtained for the skeleton, allows us to situate the time of its creation at the end of the first half of the third millennium before Christ: 2626-2491 BC (68%; Jarosz and Włodarczak 2007, 73). Above the ancient ground level, a grave (No. 2) dated to the Early Bronze Age was placed. The date obtained for this grave was 3590±35 BP (Poz-115251). Calibration of this dating places it between 1977-1896 BC (62.7%; Fig. 8). This burial was equipped with a copper earring and beads made of fish vertebrae (Zoll-Adamikowa and Niżnik 1963, 32, 33, Fig. 10, 11). The third of the studied mounds (No. 13) was small (diameter about 6 m) and most likely should be connected with the period of the Early Middle Ages.

The dimensions (10-12 m in diameter and 80 cm high) as well as the location in the landscape of burial mound 11 from Jawczyce are similar to those of other mounds of the Corded Ware culture in south-eastern Poland (Włodarczak 2006; Machnik *et al.* 2009; Jarosz 2011, 258, Table 1). The mound of the Early Bronze Age in Stryjów, site 30, was similarly located (Budziszewski *et al.* 2016; Włodarczak 2017, 64-69). The sequence of the layers in the barrow is typical for prehistoric mounds located in the Carpathian foothills, *e.g.* Średnia, Przemyśl district, site 3, barrow 2 (Jarosz 2002), Bierówka, Jasło district, barrows A and B (Gancarski and Machnikowie 1986; 1990). The soil geochemical processes typical for this area, which led to leaching, were also visible. Therefore, fillings of features, as well as the primeval level, acquired a light grey colour (Komornicki *et al.* 1990).

The shape, size and orientation of the burial pit along a W-E axis, as well as constructions that were discovered under the mound, are typical for central barrow graves of communities of the Corded Ware culture in the upper basins of the Vistula, Bug and the Dniester, where such funeral structures dominate (see Sulimirski 1968; Górski and Jarosz 2006, 406, Fig. 5; Włodarczak 2006; Machnik *et al.* 2009; Jarosz 2011). The grave should be classified as large (320 × 240 cm) and of considerable depth (about 130 cm from the primeval soil level). The arrangement of layers by its walls indicates that it had an inner wooden structure, and probably also had a roof (Fig. 4, 9). The pit was surrounded by a typical earthwork, detectable in the form of a layer about 40 cm thick and 120 cm wide, which was formed during the digging of the burial pit (Fig. 4).

Comparable large graves containing extended wooden structures are known from the Early Bronze Age Nitra culture in Slovakia, e.g. Jelšovce, Nitra district, grave 444/85 (Bátora 1991, 105, Fig. 11). The preserved elements allow for the reconstruction of these graves in the form of mortuary houses, *e.g.* Branč, grave 31, and Mýtna Nová Ves, grave 262 (Bátora 1991, 102, 104, Fig. 9, 10). Wooden elements in graves of the Mierzanowice culture in the upper Vistula basin are generally in the form of hollow logs (Bąbel 2013b).

The interment, probably placed at the bottom of the pit, was not preserved. A reconstruction of the arrangement of the dead was possible due to the location of the grave goods. In the western part of the pit, within the organic substance (most likely tree bark), there was a fragment of a copper wire earring, along with faience beads nearby (Fig. 5: B; 6). Such items were discovered in graves of the Mierzanowice culture mainly near the head of the deceased, *e.g.* Stryjów, site 30 (Budziszewski *et al.* 2016, 390, Fig. 13), Mierzanowice, Opatów country, site 1, grave 153 (Bąbel 2013b, 171-173, 233-235), Jawczyce, site 1, barrow 2, grave 2 (Zoll-Adamikowa and Niżnik 1963). Therefore, it can be said that the deceased was

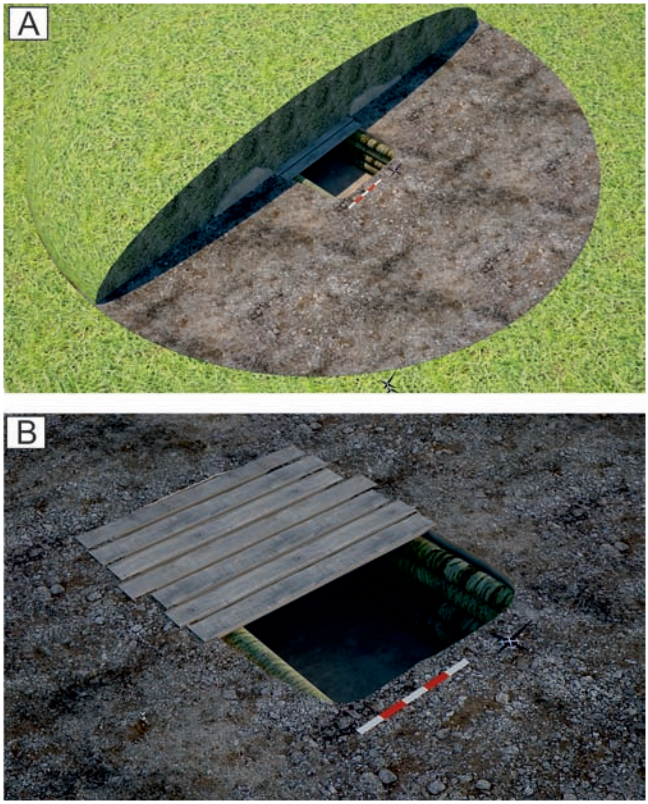


Fig. 9. Jawczyce, site 1, barrow 11.
A – Reconstruction of the barrow with a grave; B – reconstruction of the wooden construction in the grave (created by K. Rosińska-Balik)

buried with the head to the west, which is typical for men's graves at flat cemeteries of the Mierzanowice culture, *e.g.* Iwanowice, Kraków district, Babia Góra site (Kadrow and Machnikowie 1992, 69, Fig. 34), Mierzanowice, site 1 and Wojciechowice, Opatów district, site 1 (Bąbel 2013b, 75, Fig. 32). A similar arrangement of the deceased is noted at the flat cemeteries of the Nitra culture (Bátora 1991, 105, Fig. 11, 39; Šmíd 2006).

The single and multisegmental faience beads that were discovered in the grave differ from one another in shape and inner diameter (Fig 6: 5-8). They were most likely threaded on a strand or sewn to a textile (Fig. 10: A). Their colour during the discovery, regardless of shape, was blue or green. Some of them have weathered, obtaining a yellow or milky white colour. The single beads differ from one another in diameter and height (Fig. 6: 5, 6). In cross-section they are rounded, conical and biconical. Among the multisegmental beads, one can distinguish those whose elements are fused by necks of smaller diameter and those without such parts (Fig 6: 7, 8; 10: a-f). Moreover, within multisegmental beads, individual elements differ in shape and thickness in longitudinal cross-section. These beads have from two to several elements with a different shape in cross-section: cylindrical (Fig 10: a, f), with a rounded or profiled edge – two-conical (Fig. 10: b-d) or almost conical with a truncated apex (Fig. 10: e). A preliminary analysis of the beads indicates that they were made in at least several casts, or could have been made manually (Purowski 2019, 61, 62). The problem of the possibility of their local production in Central Europe is a contentious issue. The study of their microstructure and chemical composition indicates such a possibility (Robinson *et al.* 2004; Purowski 2020), but their import from Egypt cannot be ruled out (Gregerová *et al.* 2006; Bouzek 2015).

Comparable single and multisegmental beads were discovered mainly in the graves of the Mierzanowice culture in south-eastern Poland, *e.g.* Iwanowice, site Góra Klin, grave 6 (Machnikowie and Kaczanowski 1987, Fig. 32), Szarbia Zwierzyniecka (Baczyńska 1993, 16, Fig. 4: C; tabl. I: 4, 8), Skołoszów, site 7, grave 750 (Rybicka *et al.* 2017, 139, Fig. 28), Mierzanowice, site 1, graves 35, 36, 145, 153, 154 (Bąbel 2013a, 148-150; 2013b, Fig. 72: 2; 73: 3; 231: 5, 6; 237: 11; 242: 16), and Łubcze, Tomaszów Lubelski district, site 38, barrow 1,

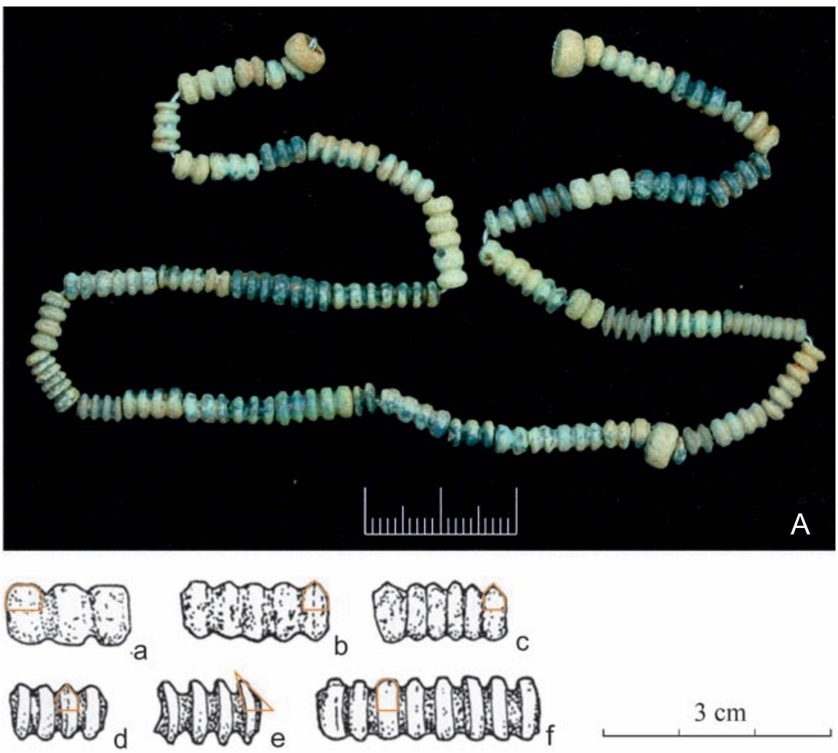


Fig. 10. Jawczyce, site 1, barrow 11. A – faience beads discovered in the grave (photo by P. Jarosz); a-f – examples of different variants of faience beads (illustrated by J. Ożóg)

grave 2 and 4 (Machnik *et al*. 2009, 111, Fig. 82: 3; 114, 85: 2; see also: Purowski 2019, 33, Fig. 3.2). However, they have also been discovered in Slovakia in the Nitra culture milieu (*e.g*. Bátora 1991, 104; Šmíd 2006) and the Košťany culture (*e.g*. Spišské Podhradie, grave 16, 200; Novotná and Soják 2016). Faience beads were also found in a grave dug into burial mound 5 in Kołpiec, Drohobycz district, by the Dniester (Sulimirski 1968, 134, Plate 8: 2) and in the ecumene of the Babino culture (Grigoriev 2019; Fig. 1: 3, 5, 6).

Four arrowheads discovered in the central part of the grave were made of various types of flinta: chocolate, Jurassic and erratic. Although only two of them are fully preserved, the morphological and metric features of the entire set is very comparable. Three of these artefacts are similar to an isosceles triangle, and have slightly convex – and in one case straight – arms (sides), but all of them have sharply indented bases. The fourth arrowhead resembles an equilateral triangle and probably had a different, arched, base. The preserved arrowheads are symmetrical in the frontal plane. All are bifacial forms shaped by flat, almost fully surface retouch, partly pseudogroove perpendicular or oblique.

Small double-walled blades are a permanent element of inventories of the Final Neolithic and Early Bronze Age cultures. Their shape, the way of forming the base, and their metric proportions can be found in some coherent sets of both the Corded Ware and Mierzanowice cultures, although they generally differ in numerous varieties / variants (*e.g*. Borkowski 1987; Włodarczak 2006; Bąbel 2013b, Fig. 41: 10-16; 53: 4-7, 10, 11). Examples of forms similar to an equilateral triangle (Fig. 6: 1-3) are discovered in the equipment of some burials dated generally to phase III of the Corded Ware culture in the Małopolska Upland (see: Włodarczak 2014, Fig. 15): grave 3 in Zielona, site 3 (Włodarczak 2006, Table XLVII: 10-12, 14), grave 100 in Mierzanowice, site 1 (Włodarczak 2006, Table LXII: 9) and grave 2 in Mydłów, site 37 (Włodarczak 2006, Table LXV: 18) and in the Rzeszów Submontane region: Mirocin, Przeworsk country, sites 24 and 27 (Machnik *et al*. 2019, Fig. 14: 22; 25: 19, 20) and Szczytna, Jarosław district, sites 5 and 6 (Hozer *et al*. 2017, Fig. 14: 22; 25: 19, 20). Similarly dated stubby forms that resemble isosceles triangles are much more common (Włodarczak 2006, *ibid*.). Analogies to arrowheads (Fig. 6: 2) in inventories of the Mierzanowice culture are: the symmetrical, slim form from grave 122 at Skołoszów, site 7 (Rybicka 2017, Fig. 3: 27), and the more stubby form from grave 27 in Mierzanowice, site 1 (Bąbel 2013b, Fig. 56: 1; 167: 2). In these considerations we did not discuss the stocky blade with broken wings (Fig. 6: 4). In both Corded Ware and Mierzanowice cultures, pseudogroove retouch was used, including in the production of small bifacial blades (*cf*. Libera, Zakościelna 2013, 223 et seq.). Parallels to the flint arrowheads from Jawczyce can also be found in the materials of the late phase of the Yamnaya culture (Klochko 2001, Fig. 25: 22-27; 30: 4) as well as late groups of the Catacomb culture in the Northern Pontic Region (Upper Prut; Toschev 2013, Fig. 6: 27, 28).

The occurrence of barrow graves at the turn of the 3rd and 2nd millennium BC is an exceptional phenomenon. Single mounds are also present in phases V and VI of the development of the Únětice culture (Kadrow 2001, 122): *e.g*. Łęki Małe, Grodzisk Wielkopolski district (Kowiańska-Piaszykowa 2008). Burial mounds are also detected around the middle Danube (Kadrow 2001, 132, Fig. 34; Bátora 2011, 166-168; Kern 2011, 174-176). During this period, an expansion of the Babino culture into the Bug River basin may also have occurred, and it is possible that it extended farther to the west, so the barrow patterns associated with the forest-steppe may have had an impact on the previously mentioned burial place in Stryjów and Łubcze, site 25, as well as Nedeżów, site 22, barrow 2 (Włodarczak 2019, 528).

In the basin of the upper Dniester river, there is a questionably dated mound in Rusiłów where a gold pendant, similar to the one discovered in a grave under the barrow in Stryjów, was found (Sulimirski 1968, Plate 8:1; Budziszewski *et al*. 2016, 394, Fig. 18).

In western and northern Europe in the Early Bronze Age, the frequency of barrows attributable to the Early Bronze Age is notably lower compared to the preceding and following periods (Bourgeois 2013, 168). However, as in the Mierzanowice culture, there are indications of reuse for some older mounds, and possibly of new barrows being constructed as well, but this is a rather rare event, perhaps restricted to only once every generation or even less (Bourgeois 2013, 186).

It is also important to notice the almost simultaneous presence of different burial traditions at the site in Jawczyce: barrow 11 and grave 2, which was dug into a mound of the Corded Ware culture (barrow 2), are nearly contemporary. The differences detected in the locations of burials are examples of the variation in the funeral rite during this period. The digging of burials associated with the Mierzanowice culture into older mounds is particularly evident in areas where the barrow rite of the Corded Ware culture survived until its decline (around 2300-2200 BC), *i.e.* in the Carpathian Foothills, *e.g.* Wola Węgierska (Machnik and Sosnowska 1998), Sokal Ridge – Wierszczyca, site 31, barrow 1 (Machnik *et al*. 2009) and in the upper Dniester basin, *e.g.* Łotatniki, barrow II (Sulimirski 1968, 137, Fig. 16: 3, Plate 6: 3: 15, 16, 10: 8). However, such barrow graves already connected with the early stage of the development of the Mierzanowice culture were discovered, for example, in Średnia, site 3, barrow 2, grave 4 (Jarosz 2002; 2018), Kulczyce, barrows 5 and 6 (Sulimirski 1968, 136-137), and Łubcze, site 25, barrow 2, grave 1 (Machnik *et al*. 2009, 64, Fig. 47).

4. CONCLUSIONS

The result of the investigation of barrow 11 at site 1 in Jawczyce was the discovery of a sepulchral place dated to the Early Bronze Age (Br A1b according to P. Reinecke; Vandkilde 1996, 140, Fig. 134). The erection of the mound should be synchronized with the early stage of the development of the late phase groups of the Mierzanowice culture – phase IVa, according to the division of Sławomir Kadrow (1995, 22-24). This is the period of large, flat cemeteries with skeletal burials that did not contain clay vessels: Iwanowice, Babia Góra site (Kadrow and Machnikowie 1992, 48, ryc. 7), Szarbia (Baczyńska 1993, 50-51), Świniary Stare (Juras *et al.* 2020, Table S1). A similar dating of 3620±40 BP (Poz-91860), which, after calibration, is 2031-1927 BC (68.2%), was acquired for a grave in a stone construction under the barrow in Stryjów, site 30, grave 10, in the Lublin Upland (Budziszewski *et al.* 2016, 384, Fig. 4).

Barrow 11, excavated at site 1 in Jawczyce, is a unique find for the Early Bronze Age. Its size and location in the landscape refers to the Final Neolithic mounds of the Corded Ware culture. Both the dimensions and orientation of the burial pit suit these older standards. However, the exclusion of ceramic vessels from the grave inventory is a widespread custom at that time, as was demonstrated during studies of the mound-covered funeral complex at the site in Stryjów in the Lublin Upland (Budziszewski *et al.* 2016). It is difficult to unambiguously determine whether the barrow erected at site 1 in Jawczyce should be associated with the movement of barrow communities from other areas, or whether it is rather a independent invention of the people living in the shadow of the Final Neolithic burial mounds. The barrow cemetery in Jawczyce is an important example of the repeated usage of a place for funeral purposes by communities that do not display any genetic relationships. The achieved results also indicate the importance of investigations of the highlands in south-eastern Poland. Excavations in Jawczyce revealed previously unknown, local cultural phenomena in the Early Bronze Age in the Wieliczka Foothills.

Acknowledgements

Investigations and analyses were co-financed by the National Science Center, grant No. NCN 2016/20/S/HS3/00307.

The following students of the Institute of Archaeology, Maria Curie-Skłodowska University (Lublin), participated in the excavations conducted by the authors of the publication: Michał Białek, Aleksandra Bochniak, Ewelina Bogudzińska, Anna Flis, Mateusz Jezuit, Bohdan Lisovskyi, Dominik Polewka, Dominika Siembida, Seweryn Szymczak. We would like to express many thanks for their work and enthusiasm. We also would like to thank the owner of the area – Mr. Kowalski for help in organizing the research.

References

Baczyńska B. 1993. *Cmentarzysko kultury mierzanowickiej w Szarbi, woj. kieleckie. Studium obrządku pogrzebowego*. Kraków: Wydawnictwo i Drukarnia Secesja.

Bargieł B. 2006. Kultura strzyżowska w świetle znalezisk grobowych. *Wiadomości Archeologiczne* 58, 65-99.

Bátora J. 1991. The reflection of economy and social structure in the cemeteries of the Chlopice-Veselé and Nitra cultures. *Slovenská Archeológia* 39, 91-142.

Bátora J. 2011. Pochovávanie pod mohylami v oblasti stredného Dunaja v závere eneolitu a na počiatku doby bronzovej. In H. Kowalewska-Marszałek and P. Włodarczak (eds), *Kurhany i obrządek* *pogrzebowy w IV-II tysiącleciu p.n.e.* Kraków, Warszawa: Instytut Archeologii i Etnologii PAN, Instytut Archeologii UW, 163-170.

Bąbel J. T. 2013a. *Cmentarzyska społeczności kultury mierzanowickiej na Wyżynie Sandomierskiej. Część 1. Obrządek pogrzebowy* (= *Collectio Archaeologica Ressoviensis* 24/1). Rzeszów: Fundacja Rzeszowskiego Ośrodka Archeologicznego, Instytut Archeologii UR.

Bąbel J.T. 2013b. *Cmentarzyska społeczności kultury mierzanowickiej na Wyżynie Sandomierskiej. Część 2. Źródła* (= *Collectio Archaeologica Ressoviensis* 24/2). Rzeszów: Fundacja Rzeszowskiego Ośrodka Archeologicznego, Instytut Archeologii UR.

Borkowski W. 1987. Neolithic and Early Bronze Age heart-shaped arrow-heads from the Little Poland Upland. In J. K. Kozłowski and S. K. Kozłowski (eds), *New in Stone Age archaeology* (= *Archaeologia Interregionalis* 8). Warsaw, Cracow: Instytut Archeologii UW, Instytut Archeologii UJ, 147-181.

Bourgeois Q. 2013. *Monuments on the horizon. The formation of the barrow landscape throughout the 3rd and 2nd millennium BC.* Leiden: Sidestone Press.

Bouzek J. 2015. Únětická kultura a civilizace východního Středomoří, Egypta a Mezpotámie. In J. Bátora and P. Tóth (eds), *Keď bronz vystriedal meď. Zborník príspevkov z XXIII. medzinárodného sympózia „Staršia doba bronzová v Čechách, na Morave a na Slovensku". Levice 8.–11. októbra 2013* (= *Archaeologica Slovaca Monographiae* 18). Nitra, Bratislava: SAV, 39-50.

Bronk Ramsey C. 2017. Methods for Summarizing Radiocarbon Datasets. *Radiocarbon* 59(2), 1809-1833.

Budziszewski J., Jarosz P., Libera J., Szczepanek A., Witkowska B. and Włodarczak P. 2016. Kurhany ze stanowiska 30 w Stryjowie, pow. krasnostawski. In P. Jarosz, J. Libera and P. Włodarczak (eds), *Schyłek neolitu na Wyżynie Lubelskiej.* Kraków: Instytut Archeologii i Etnologii PAN, 505-532.

Galas P. 1948. Jawczyce, pow. Wieliczka. *Z otchłani wieków* 17, 83.

Gancarski J., Machnikowie A. and J. 1986. Wyniki badań kurhanu A kultury ceramiki sznurowej we wsi Bierówka, gmina Jasło w woj. krośnieńskim. *Acta Archaeologica Carpathica* 25, 55-87.

Gancarski J., Machnikowie A. and J. 1990. Kurhan B kultury ceramiki sznurowej w Bierówce, gm. Jasło w świetle badań archeologicznych. *Acta Archaeologica Carpathica* 29, 99-124.

Górski J. and Jarosz P. 2006. Cmentarzysko kultury ceramiki sznurowej i trzcinieckiej w Gabułtowie. *Sprawozdania Archeologiczne* 58, 401-451.

Gregerová M., Hložek M. and Sulovský P. 2006. Přírodovědné analýzy fajánsového korálku z hrobu nitranské kultury ze Slatinic, okres Olomouc. *Slovenská Archeológia* 54(1), 33-40.

Grigoriev S. 2019. Central European Impulses in Eastern Europe in the Early Second Millennium BC. *Slovenská Archeológia* 67(2), 225-239.

Hozer M., Machnik J. and Bajda-Wesołowska A. 2017. Groby kultury ceramiki sznurowej i domniemane kultury mierzanowickiej w Szczytnej, pow. Jarosław – źródła, analiza, wnioski. In P. Jarosz and J. Machnik (eds), *Nekropolie ludności kultury ceramiki sznurowej z III tysiąclecia przed Chr. w Szczytnej na Wysoczyźnie Kańczuckiej* (= *Via Archaeologica Ressoviensia* 12). Rzeszów: Oficyna Wydawnicza Zimowit, 7-130.

Jarosz P. 2002. Kurhan kultury ceramiki sznurowej w Średniej st. 3, pow. Przemyśl. Wyniki badań wykopaliskowych prowadzonych w 2001 r. *Rocznik Przemyski* 38. *Archeologia* 2, 3-19.

Jarosz P. 2006. Badania ratownicze na stanowisku 1 w Wiatowicach, gm. Gdów, woj. małopolskie. *Acta Archaeologica Carpatica* 41, 161-170.

Jarosz P. 2011. Kurhany kultury ceramiki sznurowej na pogórzach i wysoczyznach karpackich. In H. Kowalewska-Marszałek and P. Włodarczak (eds), *Kurhany i obrządek pogrzebowy w IV-II tysiącleciu p.n.e.* Kraków, Warszawa: Instytut Archeologii i Etnologii PAN, Instytut Archeologii UJ, 255-277.

Jarosz P. 2018. The Settlement of the Corded Ware Culture and Early Phases of the Mierzanowice Culture in Carpathian Mountains. In A. Pelisiak, M. Nowak and C. Astaloş (eds), *People in the Mountains. Current Approaches to the Archaeology of Mountainous Landscapes*. Oxford: Archaeopress Publishing Ltd, 139-152.

Jarosz P. and Włodarczak P. 2007. Chronologia bezwzględna kultury ceramiki sznurowej w Polsce południowo-wschodniej oraz na Ukrainie. *Przegląd Archeologiczny* 55, 71-108.

Juras A., Makarowicz P., Chyleński M., Ehler E., Malmström H., Krzewińska M., Pospieszny Ł., Górski J., Taras H., Szczepanek A., Polańska M., Włodarczak P., Szyca A., Lasota-Kuś A., Wójcik I., Jakobsson M. and Dabert M. 2020. Mitochondrial genomes from Bronze Age Poland reveal genetic continuity from the Late Neolithic and additional genetic affinities with the steppe populations. *American Journal of Physical Anthropology* 2020; 1-13. DOI: 10.1002/ajpa.24057.

Kadrow S. 1995. *Gospodarka i społeczeństwo. Wczesny okres epoki brązu w Małopolsce*. Kraków: Instytut Archeologii i Etnologii PAN.

Kadrow S. 2001. *U progu nowej epoki. Gospodarka i społeczeństwo wczesnego okresu epoki brązu w Europie Środkowej*. Kraków: Instytut Archeologii i Etnologii PAN, Oddział w Krakowie.

Kadrow S. and Machnik J. 1997. *Kultura mierzanowicka. Chronologia, taksonomia i rozwój przestrzenny* (= *Prace Komisji Archeologicznej* 29). Kraków: Wydawnictwo Oddziału Polskiej Akademii Nauk w Krakowie.

Kadrow S. and Machnikowie A. and J. 1992. *Iwanowice. Stanowisko Babia Góra, część II. Cmentarzysko z wczesnego okresu epoki brązu*. Kraków: Secesja.

Kern D. 2011. Äneolithische und frühbronzezeitliche Hügelgräber in Ostösterreich. In H. Kowalewska-Marszałek and P. Włodarczak (eds), *Kurhany i obrządek pogrzebowy w IV-II tysiącleciu p.n.e.* Kraków, Warszawa: Instytut Archeologii i Etnologii PAN, Instytut Archeologii UJ, 171-178.

Klochko V. I. 2001. Weaponry of Societies of the Northern Pontic Culture Circle: 5000-700 BC. *Baltic-Pontic Studies* 10.

Komornicki T., Gerlach T., Zasoński S. and Oleksynowa K. 1990. Gleba w otoczeniu kurhanów neolitycznych w Bierówce koło Jasła oraz gleba w kurhanie B. *Acta Archaeologica Carpathica* 29, 125-142.

Kondracki J. 2000. *Geografia regionalna Polski*. Warszawa: Wydawnictwo Naukowe PWN.

Kowiańska-Piaszykowa M. 2008. *Cmentarzysko kurhanowe z wczesnej epoki brązu w Łękach Małych (Wilanowie) w Wielkopolsce* (= *Bibliotheca Fontes Archaeologici Posnanienses* 12). Poznań: Muzeum Archeologiczne w Poznaniu.

Libera J. and Zakościelna A. 2013. Retusz rynienkowaty w eneolicie i wczesnej epoce brązu na ziemiach polskich. In M. Nowak, D. Stefański and M. Zając (eds), *Retusz – jak i dlaczego? Wieloperspektywiczność elementu twardzowego* (= *Prace Archeologiczne* 66). Kraków: Uniwersytet Jagielloński, Instytut Archeologii, 215-239.

Machnik J., Bagińska J. and Koman W. 2009. *Neolityczne kurhany na Grzędzie Sokalskiej w świetle badań archeologicznych w latach 1988-2006. Z aneksami Jerzego Libery i Lucjana Gazdy*. Kraków: Polska Akademia Umiejętności.

Machnik J., Jarosz P. and Mazurek M. 2019. Groby ludności kultury ceramiki sznurowej w Mirocinie pow. Przeworsk. In P. Jarosz, J. Machnik and A. Szczepanek (eds), *Nekropolie ludności kultury ceramiki sznurowej z III tysiąclecia przed Chr. w Mirocinie na Wysoczyźnie Kańczuckiej* (= *Via Archaeologica Ressoviensia* 15). Rzeszów: Wydawnictwo Uniwersytetu Rzeszowskiego, 7-139.

Machnik J. and Sosnowska E. 1998. Kurhan ludności kultury ceramiki sznurowej z przełomu III i II tysiąclecia przed Chrystusem w Woli Węgierskiej, gm. Roźwienica, woj. przemyskie. *Rocznik Przemyski* 34. *Archeologia* 33, 3-20.

Machnikowie A. i J. and Kaczanowski K. 1987. *Osada i cmentarzysko z wczesnego okresu epoki brązu na „Górze Klin" w Iwanowicach*. Wrocław, Warszawa, Kraków, Gdańsk, Łódź: Zakład Narodowy im. Ossolińskich. Wydawnictwo Polskiej Akademii Nauk.

Novotná M. and Soják M. 2016. Gräberfeld der Košťany-Kultur in Spišské Podhradie (Zips). *Acta Archaeologica Carpathica* 51, 67-82.

Purowski T. 2019. *Od fajansu do szkła. Kontakty ziem polskich z głównymi centrami cywilizacyjnymi w II-I tys. p.n.e. w świetle badań archeometrycznych tworzyw szklistych*. Warszawa: Instytut Archeologii i Etnologii PAN.

Purowski T. 2020. New data on the technology of faience production in central Europe in the early bronze age. *Archaeometry* 62(3), 563-576.

Reimer P. J., Bard E., Bayliss A., Beck J. W., Blackwell P. G., Bronk Ramsey C., Grootes P. M., Guilderson T. P., Haflidason H., Hajdas I., Hatté C., Heaton T. J., Hoffmann D. L., Hogg A. G., Hughen K. A., Kaiser K. F., Kromer B., Manning S. W., Niu M., Reimer R. W., Richards D. A., Scott E. M., Southon J. R., Staff R. A., Turney C. S. M. and van der Plicht J. 2013. IntCal13 and Marine13 Radiocarbon Age Calibration Curves 0 – 50,000 Years cal BP. *Radiocarbon* 55(4).

Robinson C., Baczyńska B. and Polańska M. 2004. The origins of faience in Poland. *Sprawozdania Archeologiczne* 56, 79-154.

Rybicka M., Głowacz M. and Król D. 2017. Datowanie radiowęglowe wielokulturowego cmentarzyska ze Skołoszowa, stanowisko 7, pow. jarosławski, woj. podkarpackie. In M. Rybicka (ed.), *Wielokulturowe cmentarzysko w Skołoszowie, stanowisko 7, pow. jarosławski w kontekście osadnictwa z neolitu i wczesnej epoki brązu we wschodniej części Podgórza Rzeszowskiego*. Rzeszów: Oficyna wydawnicza Zimowit, 113-142.

Solon J., Borzyszkowski J., Bidłasik M., Richling A., Badora K., Balon J., Brzezińska-Wójcik T., Chabudziński Ł., Dobrowolski R., Grzegorczyk I., Jodłowski M., Kistowski M., Kot R., Krąż P., Lechnio J., Macias A., Majchrowska A., Malinowska E., Migoń P., Myga-Piątek U., Nita J., Papińska E., Rodzik J., Strzyż M., Terpiłowski S. and Ziaja W. 2018. Physico-geographical mesoregions of Poland: Verification and adjustment of boundaries on the basis of contemporary spatial data. *Geographia Polonica* 91(2), 143-170.

Sulimirski T. 1968. *Corded Ware and Globular Amphorae North-East of Carpathians*. London: University of London. The Athlone Press.

Šmíd M. 2006. Pohřebiště nitranské kultury ze slatinic, okres Olomouc. *Slovenská Archeológia* 54(1), 1-40.

Toschev G. N. 2013. In the west of the Catacomb area. *Baltic-Pontic Studies* 18, 72-85.

Vandkilde H. 1996. *From stone to bronze: the metalwork of the late Neolithic and earliest Bronze Age in Denmark*. Moesgard: Aarhus Universitetsforlag.

Włodarczak P. 2006. *Kultura ceramiki sznurowej na Wyżynie Małopolskiej*. Kraków: Instytut Archeologii i Etnologii PAN.

Włodarczak P. 2014. The Traits of early-bronze Pontic cultures in the development of old upland Corded Ware (Małopolska Groups) and Złota culture communities. *Baltic-Pontic Studies* 19, 7-52.

Włodarczak P. 2017. Małopolska at the beginning of the Bronze Age (2000-1600 BC). In U. Bugaj (ed.), *The Past Societies. Polish lands from the first evidence of human presence to the Early Middle Ages 3: 2000-500 BC*. Warszawa: Instytut Archeologii i Etnologii PAN, 50-85.

Włodarczak P. 2019. Małopolskie społeczności kurhanowe u schyłku neolitu i we wczesnej epoce brązu. In M. Szmyt, P. Chachlikowski, J. Czebreszuk, M. Ignaczak and P. Makarowicz (eds), *VIR BIMARIS. Od kujawskiego matecznika do stepów nadczarnomorskich. Studia z dziejów międzymorza bałtycko-pontyjskiego ofiarowane Profesorowi Aleksandrowi Kośko* (= *Archaeologia Bimaris – Dyskusje* 7). Poznań: Uniwersytet im. Adama Mickiewicza w Poznaniu, Instytut Archeologii, Zakład Prahistorii Europy Środkowo-Wschodniej, 519-532.

Zoll-Adamikowa H. and Niżnik J. 1963. Z badań kopców-mogił w Jawczycach i Wiatowicach (Podkarpacie Polskie) w latach 1960-1961. *Acta Archaeologica Carpathica* 5, 25-39.

Żaki A. 1952. Początki osadnictwa w Karpatach Polskich. *Wierchy* 24, 99-116.

SPRAWOZDANIA ARCHEOLOGICZNE 72/2, 2020
PL ISSN 0081-3834
DOI: 10.23858/SA/72.2020.2.1734

Marcin Burghardt[1]

CLASSIFICATION AND CHRONOLOGY OF THE COLLECTION OF ARROWHEADS FROM THE ASH-HILL FOUND IN THE HILLFORT OF THE SCYTHIAN CULTURAL CIRCLE IN CHOTYNIEC, SITE 1, JAROSŁAW DISTRICT

ABSTRACT

Burghardt M. 2020. Classification and chronology of the collection of arrowheads from the ash-hill found in the hillfort of the Scythian Cultural Circle in Chotyniec, site 1, Jarosław district. *Sprawozdania Archeologiczne* 72/2, 327-355.

The paper presents the results of a typo-chronological analysis of arrowheads from the ash-hill found in the hillfort of the Scythian cultural circle in Chotyniec, site 1, Jarosław province. During the 2016-2018 excavation campaigns, 38 such specimens were discovered. All arrowheads from Chotyniec could be linked to the Northern Black Sea region, where they have good analogies. Thanks to a detailed chronological analysis of the arrowheads, using the data from quiver sets from Scythian graves, it was possible to establish that they could be dated between the end (or maybe even the second half) of the 7th century to the middle of the 6th century B.C. Referring to chronological schemes of the Scythian cultural circle, the described collection of artefacts would be linked to the final phases of archaic Scythia (stage ESC-3), which are synchronous with the second half of the HaD1 and the HaD2 phase in the periodization of cultures of Central Europe.

Keywords: Scythian archaeology, Early Scythian Culture, Early Iron Age, Weapons, Periodization, Classification
Received: 06.02.2020; Revised: 20.05.2020; Accepted: 28.06.2020

1 Institute of Archaeology Rzeszów University, Moniuszki st. 10, 35-015 Rzeszów, Poland; marcin.burghardt86@gmail.com; https://orcid.org/0000-0002-9915-7539

1. INTRODUCTION

Without a doubt, one of the most important archaeological discoveries of recent years is the settlement in Chotyniec (site 1) in the Jarosław district. Despite the site having been known for a long time, no systematic investigations were done until 2016. For this reason, the chronology of its development, use and collapse remained undetermined, although many archaeologists tried to place it in the early Middle Ages or even later (*e.g.*, Kunysz 1968, 46). The state of research changed in 2016-2018 when the first excavations of the site were carried out (Czopek *et al.* 2017; 2018, 54, 56, 199, 291-303). Despite the fact that the range of fieldwork did not cover a large area of the settlement (in 2016, four test pits were explored, including one through the embankment wall and the other three located in the northern part of the internal area, while in 2017-2018, an area of about 160 m^2 was explored), extremely interesting discoveries were made. The artifacts and immovable sources obtained during fieldwork allowed for the specification of their cultural affiliation, and enabled the site to be assigned to the complex of other open settlements in the vicinity, representing the forest-steppe variant of the Scythian cultural circle (Czopek *et al.* 2018, 165-167, 197-202, 204, 210). Thus, they significantly expanded the boundaries of the occurrence of this cultural phenomenon in a north-westerly direction.

The settlement is located on the border of the upland of the Tarnogrodzkie Plateau and the valley of the Wisznia and San Rivers (Fig. 1; see also Czopek *et al.* 2018, fig. 5.2-5.3). The site has an irregular ellipse with dimensions of 750 × 600 m, which gives an area of approximately 0.36 km^2 (Fig. 2). The entire hillfort area was surrounded by an embankment, preserved in the southeastern part, covered by trees. The width in this zone is about 30 m, and its height is 3-4 m. The test pits prepared in 2016 did not reveal the presence of any internal structures within it. The research conducted in the north-eastern part of the internal zone was more fruitful. The main subject of these studies was a small, but visible elevation covered with numerous fragments of pottery, animal bones and lumps of daub, occurring within the darkened part of the ground surface. Already, at the initial stage of research, it turned out that those relics are remains of an ash-hill (*zolnik*), which is typical ritual space for Eastern European (mainly forest-steppe) settlement sites from the Bronze Age and the early Iron Age. The object had a slightly oval shape with a diameter of about 17-18 m. Its base was a small, conical artificial mound made of yellow clay, which was built on previously leveled terrain. The upper layers consist of traces of burning, with numerous artifacts and post-consumer animal bones. These layers in many places were separated by "inclusions" of yellowish clay of varying thickness. No other artifacts were recorded within them. Based on observations of the stratigraphy, it can be assumed that the ash-hill was used during at least two phases, which should be associated with the described layers of burning, animal bones and various findings. Unfortunately, due to the occupation of a large part of the settlement by a farm in the second half of the 20th century, the upper layers of the ash-hill were only partly preserved.

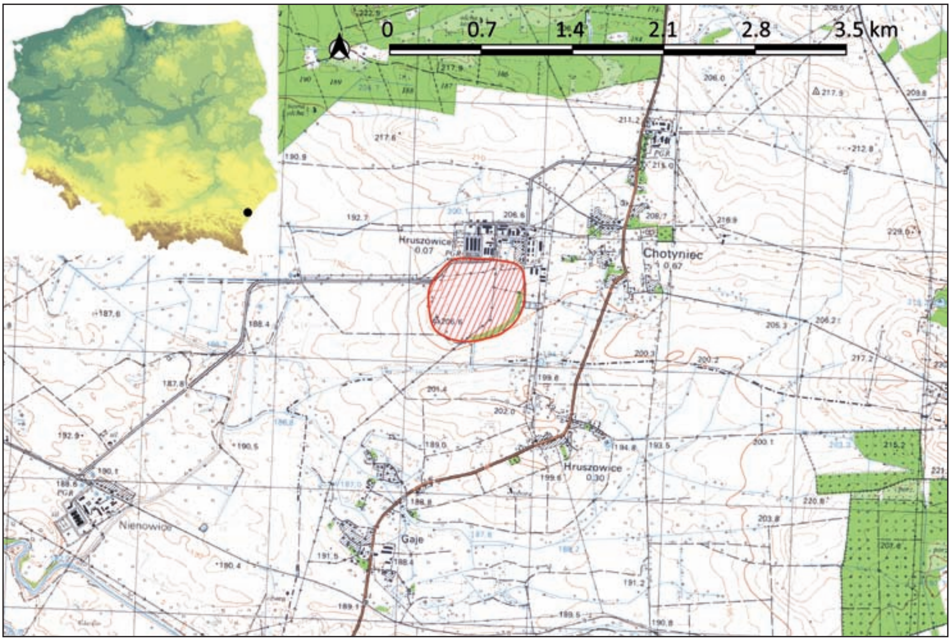


Fig. 1. Chotyniec, site 1, Jarosław district. Location of hillfort of the Scythian Cultural Circle

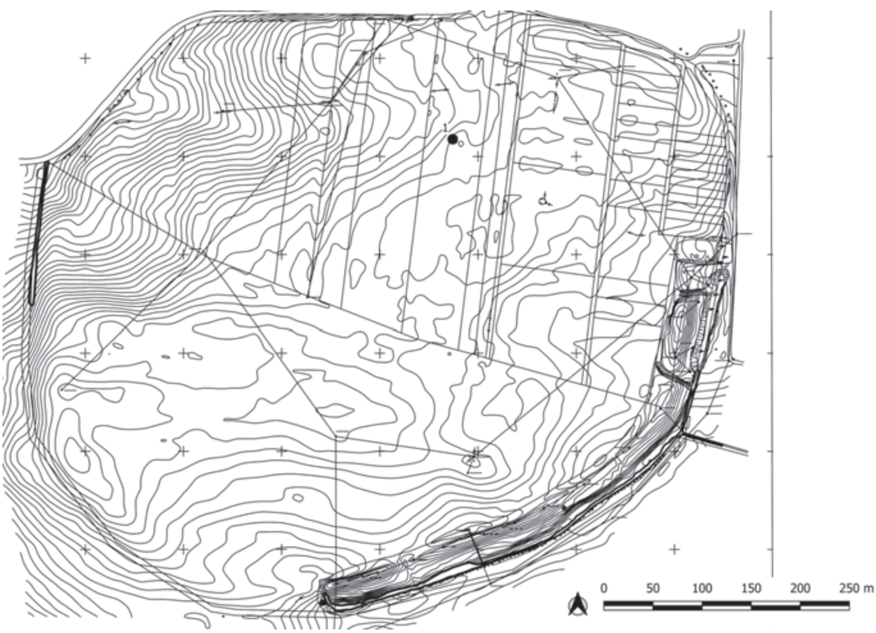


Fig. 2. Chotyniec, site 1, Jarosław district. Situational altitude plan of the hillfort: ash-hill (1)

During the research, which took place in 2017-2018, an extremely large amount of artifacts was found. In addition to animal bones, likely remains from various ceremonies that regularly took place here, an unusually large amount of pottery fragments, as well as numerous metal artifacts (mainly bronze and, to a lesser extent, iron; even some fragments made of gold) and bones were found. In total, more than 18,500 fragments of pottery

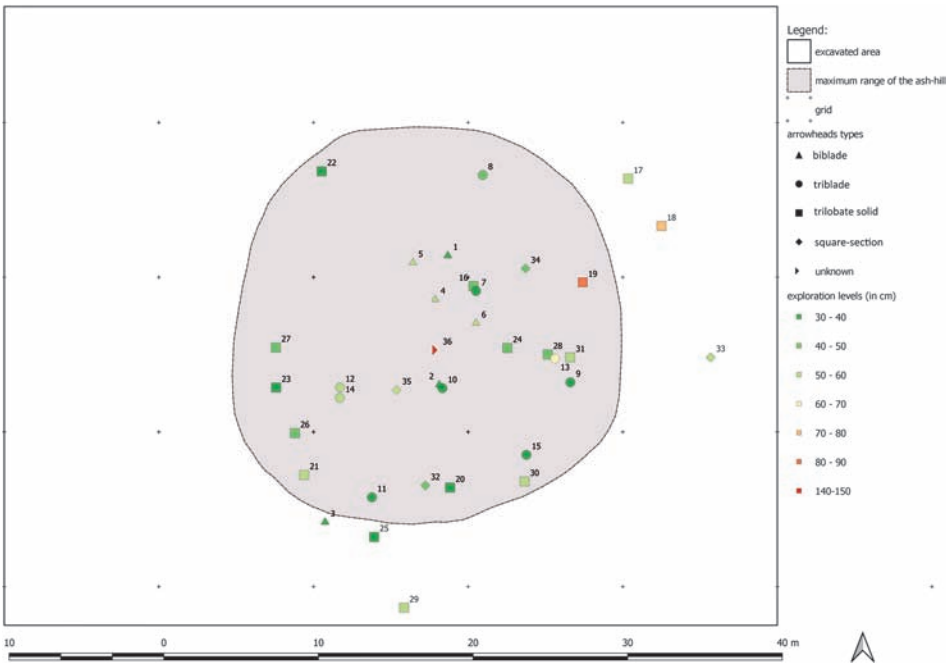


Fig. 3. Chotyniec, site 1, Jarosław district.
Distribution of arrowheads in ash-hill from Chotyniec with reference to the exploration levels

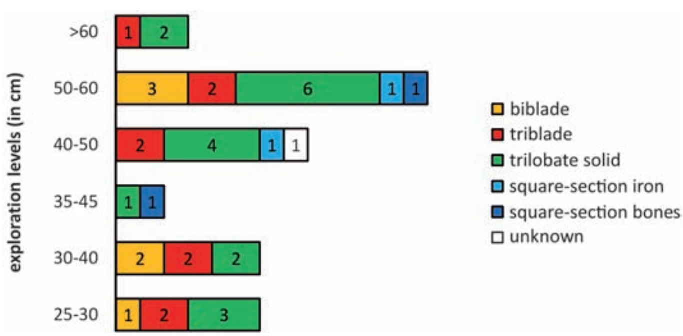


Fig. 4. Chotyniec, site 1, Jarosław district.
Number and form of arrowheads in relation to particular exploration levels

were recorded, among which, apart from the largest group of hand-made, local pottery, imported Greek amphorae (almost 200 fragments) as well as 148 bronze and 50 iron artifacts were particularly noteworthy. The collected sources are completed by single fragments of gold and bone items. Among the metal artifacts, the numerous arrowheads are particularly important for the analysis presented in this paper. Their presence was revealed within all exploratory layers (Figs 3 and 4). It should be noted that, as with the rest of the material (apart from artifacts from the arable layer), these objects occurred only within the layers of burning.

The presented paper is part of the research program *On the border between two worlds. Chotyniec agglomeration of the Scythian cultural circle – stage I: field research*, funded by the National Science Centre, No. 2017/27/B/HS3/01460. The main purpose of this article is to present the collection of arrowheads obtained during the excavations in the area of the ash-hill in 2016-2018. In addition, I would like to prepare an analysis of the collection in the present classification system. And finally, I will examine the chronology of the assemblage of arrowheads, as well as the ash-hill itself.

2. CLASSIFICATION OF ARROWHEADS

The presented collection consists of 38 arrowheads made from various materials, mainly bronze, as well as from iron and bone specific form of 37 of whose could be determined. According to commonly accepted classification systems of such arrowheads (*e.g.*, Meliukova 1964, 16-29, fig. 1; Petrenko 1967, 44-48; Ochir-Goriaeva 1996, 42-50; Hellmuth 2006, 193, Abb. 2), four main groups (sections) can be distinguished based on the cross-section of the arrowhead's body: the first one includes biblade specimens, the second group includes triblade specimens, the third group is made up of trilobate solid arrowheads, and the fourth is composed of square-section ones. While artifacts from Chotyniec belonging to classes I-III were made from bronze, group IV covers rare iron and bone specimens. The frequency of those main categories of arrowheads is presented in the chart in Fig. 5.

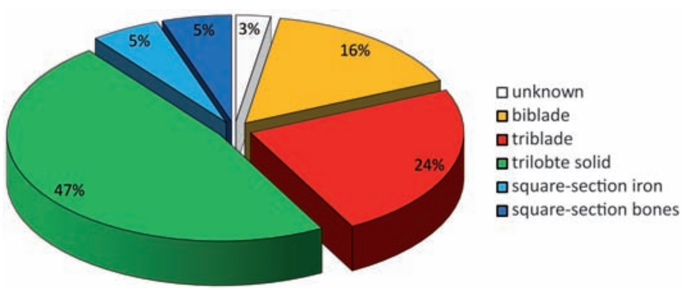


Fig. 5. Chotyniec, site 1, Jarosław district. Frequency of types (groups) of arrowheads

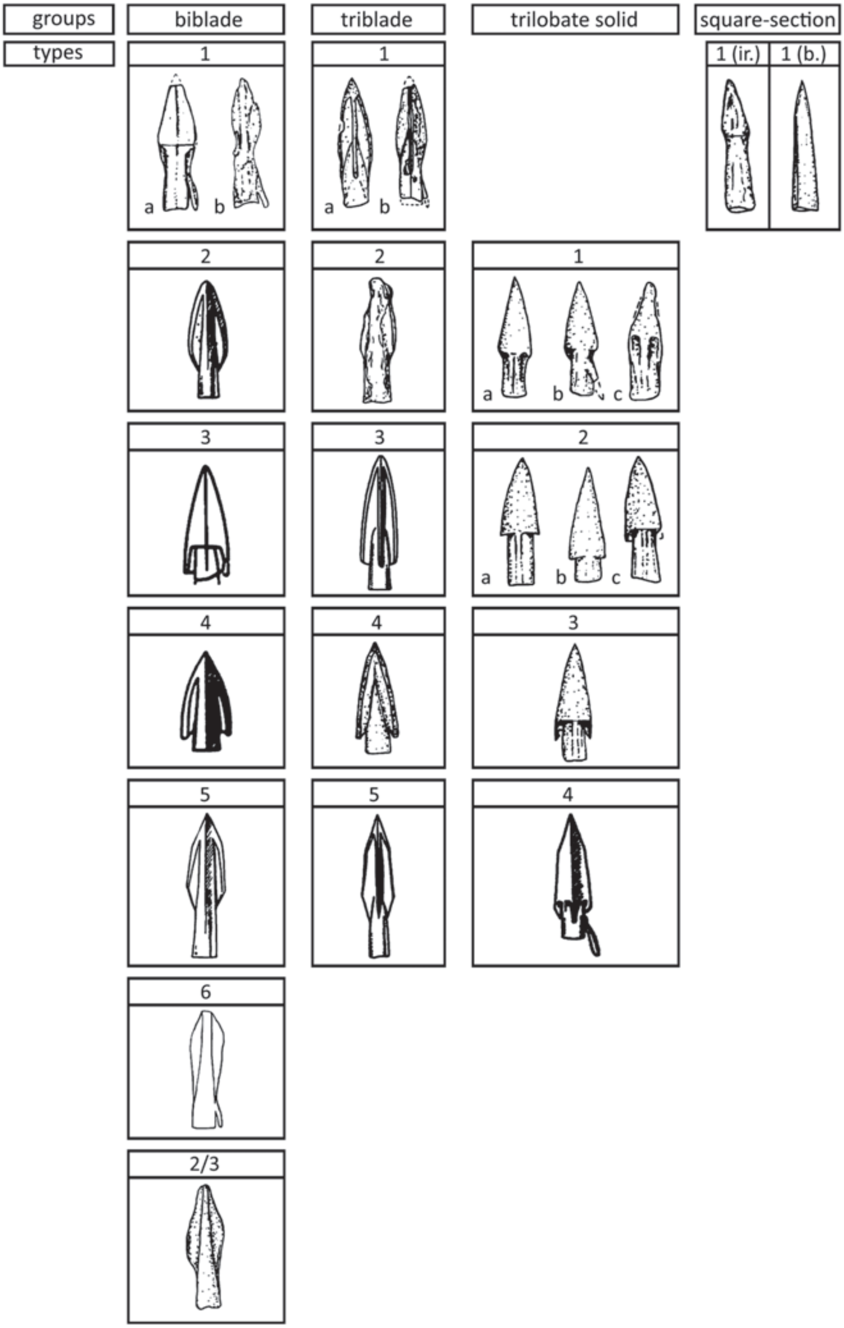


Fig. 6. Chotyniec, site 1, Jarosław district. Typological differentiation of arrowheads found in the ash-hill from Chotyniec (description in text)

The second feature of arrowheads used in their classification is the shape of the blade (leaf). In the collection from Chotyniec, the following varieties can be distinguished:

• a laurel-shaped blade, with the largest width more or less in the middle of its length;

• a leaf-shaped blade, with the maximum width in the lower part;

• a triangular blade, with more or less curved edges;

• a different shape of blade, with at least one of the edges extended to form a barb. In the case of triblade and trilobate solid types, all edges are extended, and the outline of the blade itself takes the form of a triangle with more or less arched edges. Barbed biblade arrowheads, which are absent in the analyzed collection, could have either two barbs, formed in a similar way as in triblade and trilobite species (*e.g.*, Smirnova 1993, fig. 8: 6), or they can have a blade of oval or rhomboid-oval form with only one prolonged edge (type 4 of group I according to Meliukova – 1964, fig. 1);

• a rhomboid-shaped the blade.

Based on these criteria, as well as on the classification of A. I. Meliukova (1964, 16-29, fig. 1) and A. Hellmuths (2006, 193, Abb. 2), several types were identified in each group. However, not all of them are represented in the analyzed set (Fig. 6). Nonetheless, they were included in the presented classification due to their presence in quiver sets with analogous arrowheads, similar to the findings form Chotyniec. In this way, among the first three groups of arrowheads different types were distinguished:

Group I – six types: 1 – with laurel-shaped blade; 2 – with a leaf-shaped blade; 3 – with a triangular blade and profile with slightly arched edges; 4 – with a triangular blade and two barbs, or an oval or rhomb-oval blade and only one barb; 5 – with a polygonal, most often hexagonal-shaped blade; 6 – with a blade of rhomboid form that can be symmetrical or asymmetrical. Among the assemblage from Chotyniec, only types 1 and 6 were identified Additionally, the transitional type 2/3 was identified based on the presence of an atypical, asymmetric outline of the blade – one side in a laureate form, while the second one was leaf-shaped. Forms representing belonging to types 2-4 are known from a grave from kurhan No. 2 found in Perebikivtsy (Smirnova 1993, fig. 8: 1, 2, 6; 9: 1) from the range of the West Podolian group of the Early Scythian Culture (ESC), and from the burial mound excavated by D. G. Shults near the stanitsa of Kelermes (Galanina 1995, fig. 3: 29-31) in the North Caucasus. In A. I. Meliukova's classification, these arrowheads were classified in the following types: I/3, I/6, and I/4. The fifth type is represented by arrowheads from Perebikivtsy, burial mound No. 2 (Smirnova 1993, fig. 8: 3-5, 9: 1);

Group II – five types were distinguished, according to the blade shape in an analogous way to the first group. In the collection from Chotyniec, findings of types 1, 2 and 4 are represented. Arrowheads of types 3 and 5 are known from mound No. 2 in Perebikivtsy (Smirnova 1993, fig. 8: 7, 8, 11, 12, 17; 9: 2-5, 10, 11);

Group III – four types: 1 – with laurel-shaped blade; 2 – with a triangular blade and more or less curved edges; 3 – with a triangular blade with barbs; 4 – with a polygonal (hexagonal) blade. Among the collection from Chotyniec, the first three types are represented.

Arrowheads of type 4 are known, along with others from the aforementioned group in Perebikivtsy, mound No. 2 (Smirnova 1993, fig. 9: 6).

Additionally, in the existing classification systems, apart from the shape of the blade, the form of the socket – either projecting or interior – is also taken into account. In the analyzed collection, all specimens made of bronze have a separate sockets of different lengths. Secondary morphological features are also important elements in the classification of Scythian arrowheads. These include the presence of a spur, the form of the blade and its transition into the socket, and the shape of the barbs in the case of triangular specimens.

Group I – Biblade arrowheads

Type 1 (I-1). Biblade arrowheads with a blade in the shape of a laurel leaf. They are divided into two variants:

• variant a (I-1-a – group-type-variant). Biblade arrowhead with a laurel-shaped blade with a flat lower part, and an upper part of a rhomboid form. The socket is clearly separated and has a rhomboid cross-section and a spur. Dimensions: length – 32 mm, the largest width of the blade – 10 mm, the diameter of the socket inlet – 7 mm, the diameter of the socket at the base of the blade – 5 mm. Weight: 3.1 g (Fig. 7: 1);

• variant b (I-1-b). Biblade arrowhead with a laurel-shaped (?) blade the socket is clearly separated and passes into the midrib and spur. Dimensions: length – 36 mm, the largest width of the blade – 8 mm, the diameter of the socket inlet – 7 mm, the diameter of the socket at the base of the blade – 6 mm. Weight: 2.9 g (Fig. 2: 1; 7: 2).

Type 6 (I-6). Biblade arrowhead with a massive, asymmetrical, rhomboidal blade, with the largest width in its upper part. The socket is separated, short, passing into the midrib, with a spur. The presented type is unfinished – in the top part of the blade, remains of gating systems is recorded. Dimensions: length – 36 mm, the largest width of the blade – 10 mm, the diameter of the socket inlet – 7 mm, the diameter of the socket at the base of the blade – 7 mm. Weight: 3.7 g (Fig. 2: 6; 7: 3).

Type 2/3 (I-2/3). Biblade arrowhead with an asymmetrical blade. One side of the blade is in the shape of a laurel leaf, while the second one is slightly less curved. The socket is clearly separated, passing into a midrib, without a spur. Dimensions: length – 39 mm, the largest width of the blade – 12 mm, the diameter of the socket inlet – 8 mm, the diameter of the socket at the base of the blade – 7 mm. Weight: 3.2 g (Fig. 2: 5; 7: 4).

In addition to the above-described classification, the analyzed collection also contained a fragment of another biblade arrowhead (Fig. 2: 4). Unfortunately, due to the poor condition (only a part of the blade preserved) a detailed description of its form is impossible.

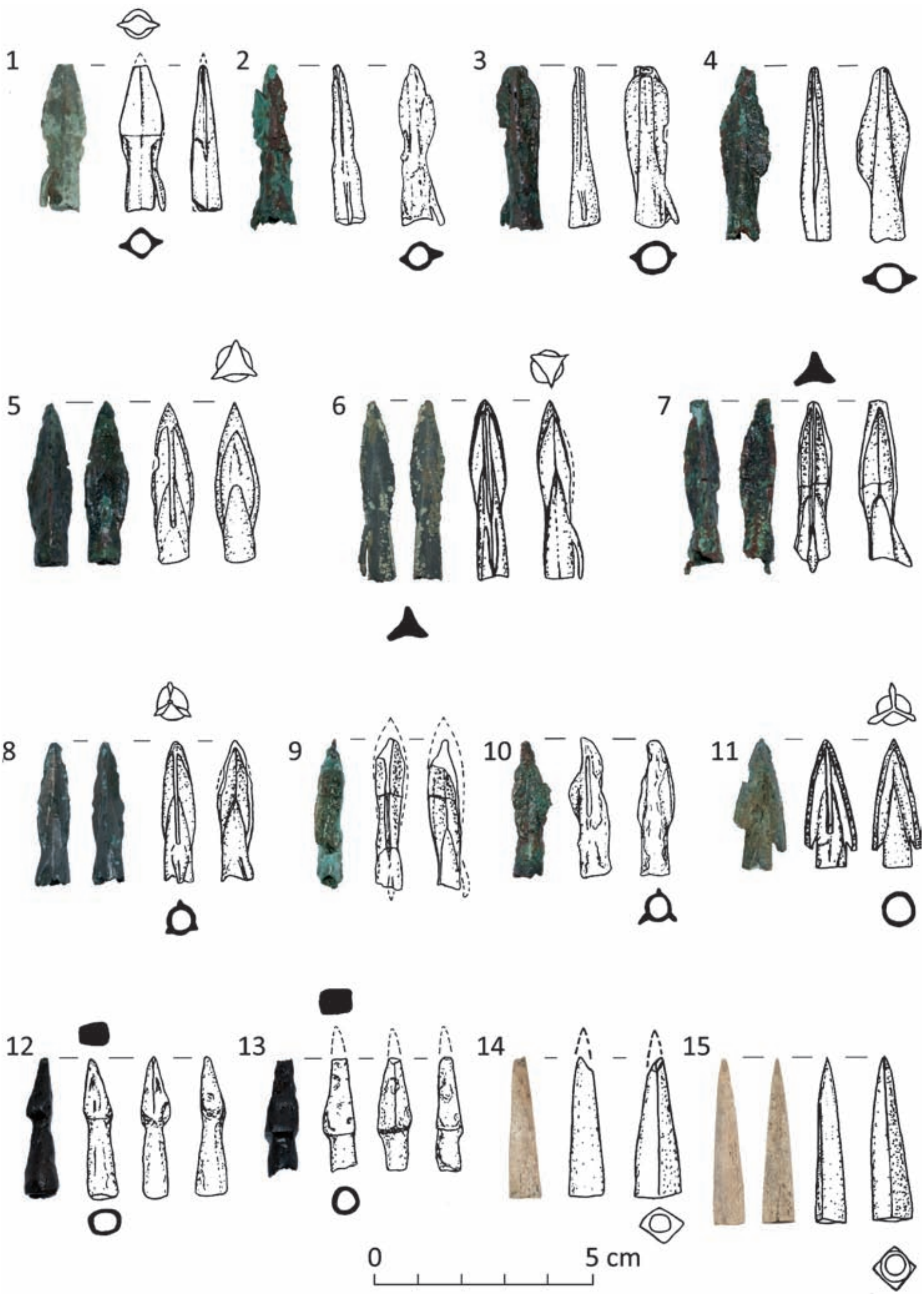


Fig. 7. Chotyniec, site 1, Jarosław district.
Biblade, triblade, and square-section arrowheads

Group II – triblade arrowheads

Type 1 (II-1). Triblade arrowhead with a laurel-shaped blade. Due to the presence or of a spur, two variants were distinguished:

• variant a (II-1-a). A triblade arrowhead with a laurel-shaped, visible short socket without a spur. Dimensions: length – 36 mm, the largest width of the blade – 10 mm, the diameter of the socket inlet – 7 mm, the diameter of the socket at the base of the blade – 7 mm. Weight: 3.7 g (Fig. 2: 14; 7: 5);

• variant b (II-1-b). Five triblade arrowheads with laurel-shaped blades, separated socket and spurs of various length. Dimensions: length – 32-39 mm, the largest width of the blade – 7-8 mm, the diameter of the socket inlet – 6-7 mm, the diameter of the socket at the base of the blade – 5.5-6 mm. Weight: 2.7-3.3 g (Fig. 2: 8, 11; 7: 6-9; Czopek *et al.* 2017, fig. 13).

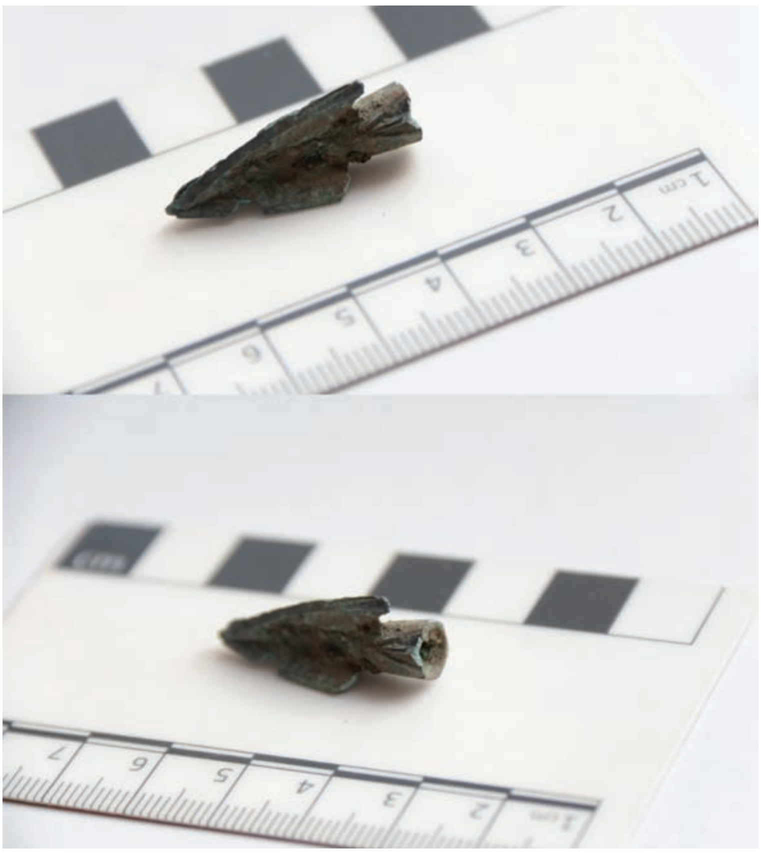


Fig. 8. Chotyniec, site 1, Jarosław district. Detail of the type II-2 arrowhead type

Type 2 (II-2). A triblade arrowhead with a partially preserved leaf-shaped blade (?), a separate socket, and no spur. Dimensions: length – 32 mm, the largest width of the blade – 10 (?) mm, the diameter of the socket inlet – 8 mm, the diameter of the socket at the base of the blade – 7 mm. Weight: 3.1 g (Fig. 2: 12; 7: 10).

Type 4 (II-4). A triblade arrowhead with a massive triangular blade, arched edges and diagonally-cut barbs. The socket is separated and has no spur. On the socket, engravings are present in the form of an inverted letter “V” with a bar (Fig. 8). The “V” is directed with its arms towards the inlet of the socket. Dimensions: length – 28 mm, the largest width of the blade – 12 mm, the diameter of the socket inlet – 7 mm, the diameter of the socket at the base of the blade – 6 mm. Weight: 1.9 g (Fig. 2: 7; 7: 11).

Group III – trilobate solid arrowheads

Type 1 (III-1). Trilobate solid arrowheads with narrow leaf-shaped blades and separate sockets. Due to the manner in which the blade transitions into the socket and also due to the presence of the burr, this type is divided into three variants:

• variant a (III-1-a). Two trilobate solid arrowheads with narrow leaf-shaped blades. The lower parts of the blades are beveled, overlapping a separate socket without a spur. Dimensions: length – 29-30 mm, the largest width of the blade – 8 mm, the diameter of the socket inlet – 7 mm, the diameter of the socket at the base of the blade – 6 mm. Weight: 2.7-3 g (Fig. 2: 14; 9: 1, 2). It is possible that a similar arrowhead was found in a water drain. On the other hand, the state of preservation of its socket makes the presence of a spur uncertain. In comparison with the aforementioned examples, the blade is also more massive;

• variant b (III-1-b). Three trilobate solid arrowheads with narrow leaf-shaped blades. The lower parts of the blades are beveled to the separated socket with a spur. Dimensions: length – 27-29 mm, the largest width of the blade – 8-9 mm, the diameter of the socket inlet – 6-7 mm, the diameter of the socket at the base of the blade – 6 mm. Weight: 2.8-4 g (Fig. 2: 19, 26, 9: 3-5);

• variant c (III-1-c). Trilobate solid arrowhead with narrow leaf-shaped blades and engravings near the edges, extracted socket, without spur. Dimensions: length – 28 mm, the largest width of the blade – 9 mm, the diameter of the socket inlet – 7 mm, the diameter of the socket at the base of the blade – 7 mm. Weight: 3 g (Fig. 2: 16; 9: 6).

Type 2 (III-2) is represented by trilobate solid arrowheads with triangular blades, more or less curved edges and separated sockets. Due to the manner in which the blades transition into the socket, it is divided into three variants:

• variant a (III-2-a). Two trilobate solid arrowheads with a triangular, arched blade, straight-cut edges and a clear transition to the socket. The sockets are separated and have various lengths. There are no spurs. In one of the examples, the upper part of the blade was not preserved (cut?). Dimensions: length – 18-35 mm, the largest width of the blade –

9-10 mm, the diameter of the socket inlet – 7 mm, the diameter of the socket at the base of the blade – 6-7 mm. Weight: 2.8-3.7 g (Fig. 2: 18; 27; 9: 7-8);

• variant b (III-2-b). Trilobate solid arrowhead with a triangular blade, straight-cut edges and a short, separated socket. The transition of the blade into the socket is smooth. Dimensions: length – 31 mm, the largest width of the blade – 10 mm, the diameter of the socket inlet – 7,5 mm, the diameter of the socket at the base of the blade – 7 mm. Weight: 3.5 g (Fig. 2: 30; 9: 9);

• variant c (III-2-c). Two trilobate solid arrowheads with a triangular, arched blade. Edges are cut straight and covered with engravings, which frame the separated socket. Dimensions: length – 31-32 mm, the largest width of the blade – 9 mm, the diameter of the socket inlet – 7 mm, the diameter of the socket at the base of the blade – 6-7 mm. Weight: 3.2-4 g (Fig. 2: 17; 9: 10-11).

Type 3 (III-3). Three trilobate solid arrowheads with a triangular, arched blade and extended edges, ending diagonally in the form of barbs. In the lower part, some engravings partially frame the separated socket. One arrowhead has a bent tip (due to impact with a hard object). Dimensions: length – 30-33 mm, the largest width of the blade – 11 mm, the diameter of the socket inlet – 7 mm, the diameter of the socket at the base of the blade – 6.5 mm. Weight: 4-4.8 g (Fig. 2: 24, 28, 29; 9: 12-14). In two cases, small holes are present on the "barbs". This may suggest that they were casted in the same molding form. In this context, the differences visible between them, manifested in the different lengths of the socket, could have arisen as a result of their further elaboration (cutting the socket?).

Finally, in the collection of bronze trilobate solid arrowheads, we can note three partially preserved arrowheads (including one with socket). Unfortunately, we are unable to define their original form.

Group IV – square-section arrowhead

Arrowhead made of iron. Type 1. Two square-section arrowheads made of iron with a separate sockets of different lengths. Dimensions: length – 25-31 mm, the largest width of the blade – 6-7 mm, the diameter of the socket inlet – 7 mm, the diameter of the socket at the base of the blade – 5 mm. Weight: 2-2.6 g (Fig. 2: 32, 33; 7: 12, 13).

Arrowhead made of bone. Type 1. Two square-section arrowheads made of bone. In one case the tip of the blade is not preserved. The dimensions are about: length: 30-36 mm; width – 7 mm, the inner diameter of blade base – 4 mm. Weight: 1.1-1.3 g (Fig. 2: 34, 35; 7: 14, 15).

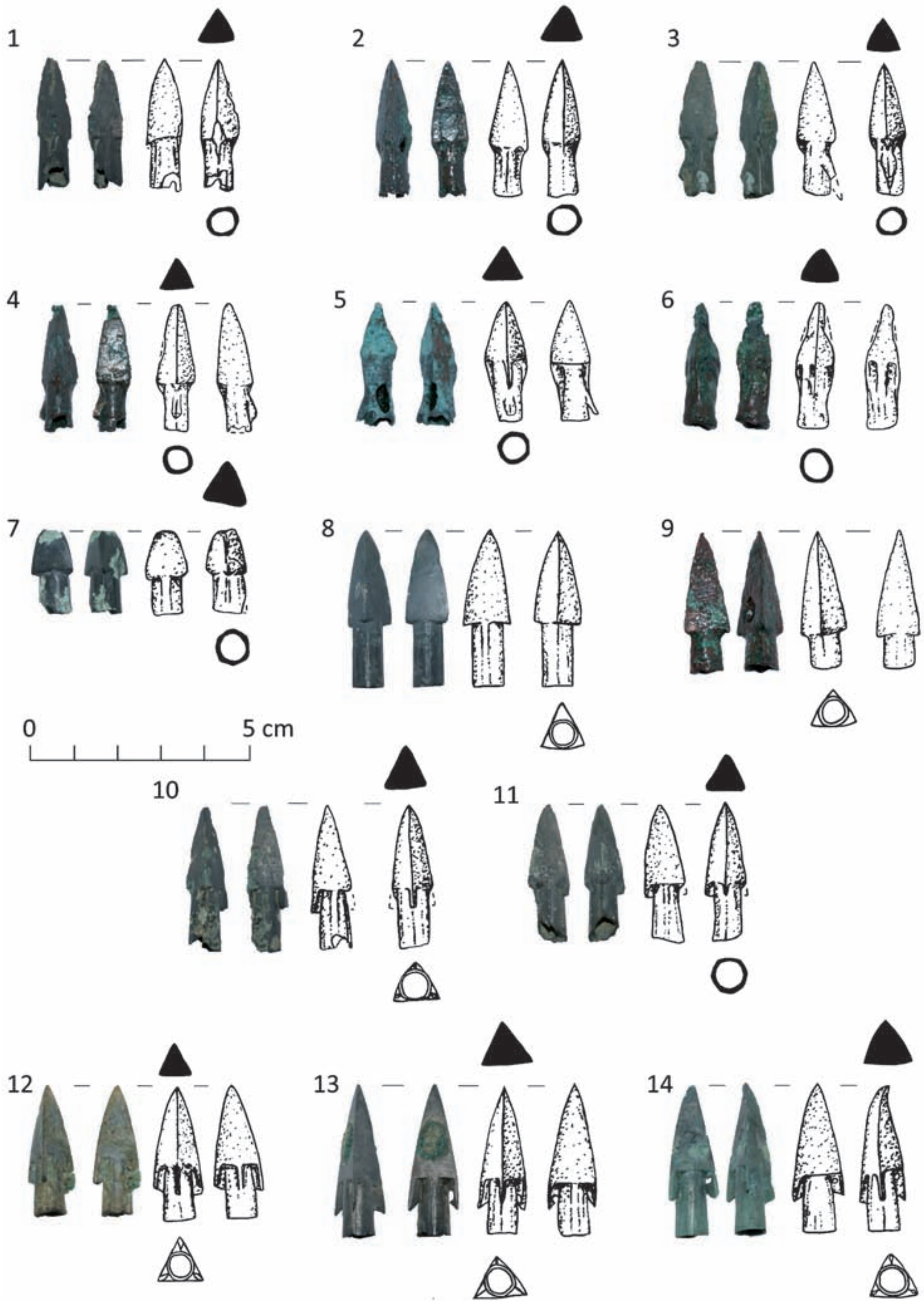


Fig. 9. Chotyniec, site 1, Jarosław district.
Trilobate solid arrowheads

3. THE COLLECTION FROM CHOTYNIEC IN THE CONTEXT OF THE CLASSIFICATION SYSTEM OF OTHER SCYTHIAN ARROWHEADS

Biblade arrowheads with laurel- and leaf-shaped blades, analogous to type I-1 among Chotyniec findings, are sometimes referred to as the so-called Kelermes type. In A. I. Meliukova's classification, they are included in the second type. Among arrowheads from Chotyniec, two of four variants of this type are represented. Arrowheads with a "bipartite" blade (I-1-a variant in the Chotyniec classification) are attributed to the third variant, while arrowheads with a laurel-leaf-shaped blade, with the midrib passing into the socket (I-1-b variant), belong to the second variant (Meliukova 1964, 18, fig. 1). An item with an asymmetric, leaf-shaped blade (type I-1/2) does not find an analogy in A. I. Meliukova's work. She includes examples with a leaf blade, with the largest width in the lower part, in the third type of the first group. Nevertheless, the lack of the spur suggests that the described artifacts are closer to the fourth variant (I/3/4 – group/type/variant) of this type. The absence of a spur is also characteristic for the first and fourth variants of the second type of arrowheads with a laurel-shaped blade. Moreover, the forms of the blades of arrowheads from Chotyniec suggest a closer relationship to the second type, but in the first group (I/2/1). The items of the I-1-b variant also find their equivalents in the classification of Scythian arrowheads from the hillfort in Smolenice-Molpír, prepared by A. Hellmuth (2006, 193, fig. 2). In this classification, the 1b variant of group IA is the most similar. Generally, the blades are in the shape of an almond (laurel), with a long socket, the length of which is about half of the entire arrowhead.

The second group of biblade arrowheads from Chotyniec is type I-6. According to A. I. Meliukova's (1964, 16, fig. 1) divisions, biblade arrowheads made of bronze, and with a rhomboid outline, were included in the first type of the first division. This type is divided into five variants based on the proportion of the blade, its symmetry or asymmetry, the length of the socket and finally the presence/absence of the spur. The asymmetric form of the blade is also one of the determinants of the arrowheads of the Zhabotin or Ehdzhe-Zhabotin type (Illinska 1973, 14, fig. 1; Polin 1987, 21-23; Daragan 2010, 565; 2015, 133). In comparison with the typical examples, the analyzed arrowhead differs slightly in the form of its blade, which is more curved, as well as in regard to its largest width, which is placed higher. This situation may be a consequence of the fact that the described item is unfinished. It is worth mentioning that the final shape of the arrowhead was determined by the technology of its preparation, especially the final stage associated with its sharpening. Each type of elaboration could significantly change the shape of the blade. This may lead to a considerable diversity of forms that can be associated with a particular type of arrowhead (in this case asymmetrically rhombic), even if they have been cast in the same molded form (see Daragan 2010, 565) Therefore, it is difficult to find more accurate analogies to the described artifact from Chotyniec. We can only try to point to arrowheads with some similar features – among which are certain examples from burial mound No. 469 at Aksiutintsy upon Sula (excavations of N. E. Brandenburg); these were attributed by A. I. Meliukova (1964, plate 6: L, 1) to the third variant of this type. Similar examples also come from the vicinity of Izium upon Donets (Illinska 1973, fig. 2: 4, b, e, z).

Triblade arrowheads have been included in the second group by A. I. Meliukova. Examples analogous to those found in Chotyniec (types II-1, II-2 and II-4) can be attributed to the first three types. The first of them (type II/1) is characterized by a laurel-shaped blade, the second (type II/2) by a leaf blade with the largest width located in its lower part, while the third type (II/3) takes the form of a triangle (Meliukova 1964, 19, fig. 1). Among examples with a leaf-shaped blade, similar to the biblade arrowheads, some them are referred to the so-called Kelermes type. Nevertheless, three variants can be distinguished. The first two of them have a separate socket, with a spur (variant II/1/2) or without it (variant II/1/1), while the third variant (II/1/3) has no separated socket at all (Meliukova 1964, 19, fig. 1). In the analyzed collection, the first two variants of this type are found. They were included in variants II-1-b and II-1-a, respectively. In the classification of A. Hellmuth (2006, 193, fig. 2), these artifacts correspond to the arrowhead included in group IIA. These specimens, like most other types distinguished by this researcher, are divided into several variants differing in the ratio of the length of the socket to the length of the entire artifact, as well as by the presence of a spur on the socket.

The second type of triblade arrowheads present in the collection is classified as type II-2. This is in relation to the second type of the second division, according to A. I. Meliukova's classification (1964, 19, fig. 1), while in this group, only arrowheads of the second variant (II/2/2) do not have a spur.

The third form of triblade arrowheads that can be distinguished in the presented collection is a single type with a massive blade, curved edges and blades beveled at the bases (type II-4). In the literature, this kind of artifact is sometimes referred to as triangular-arched or triblade with a massive, arched point. Arrowheads of this variety, although they generally have blades cut at right angles to the socket, were included by A. I. Meliukova (1964, 19) in the first and second variants of the third type (II/3/1 and II/3/2). They differ also in the length of the socket. In this context, the presented artifacts can be referred to the second variety with a relatively short socket. In the classification of A. Hellmuth (2006, 193, fig. 2), the described arrowheads from Chotyniec can be associated with group IIG. A particularly interesting analogy for this kind of artifact comes from the Scythian culture settlement from the vicinity of Pozharnaya Balka in the Worskla River basin. It presents the same form as the analyzed arrowhead (Alekseev 2014, fig. 7; Daragan 2015, fig. 10: 32), but it is also covered by an engraving in the shape of a "bird's foot" on the socket (Alekseev 2014, 7). Apart from it, cuttings like this are sometimes interpreted as ornaments or "signatures" of craftsman – makers who mark their own products with their own designs (Daragan 2015, 128). However, these arrowheads have a different form of the blade, or the engravings are placed elsewhere, sometimes as part of a more complex decoration (Alekseev 2014, fig. 3-4; Daragan 2015, fig. 2: 1).

In A. I. Meliukova's (1964, 19, fig. 1) system, **trilobate solid arrowheads** are represent the third group, consisting of ten types, two of whom were identified in Chotyniec. The first of them includes arrowheads with a leaf-shaped blade. In the Chotyniec classification, they are considered to be type III-1. This type is divided into four variants, while items from Chotyniec can be classified into three of them. The first variant (III/1/1) includes examples with a spur located on the socket. In the collection from Chotyniec, they represent variant III-1-b. The second one (III/1/2) is characterized by the lack of a spur and the presence of grooves on the edges. In the presented set, they are included in variant III-1-c. The third variant is analogous to arrowheads of variant III/1/3, which is distinguished by the absence of a spur on the socket. In the classification of Chotyniec artifacts, they are included in variant III-1-a.

Arrowheads of type III/2 with trilobate solid blades are analogous to types III-2 in the Chotyniec classification, as well as to III-3 in A. I. Meliukova's (1964, 19, 22, fig. 1) system, with the following four different varieties. The first one (variant III/2/1) represents examples with a triangular blade, straight-cut edges and a distinct socket. In the presented classification, they were included in variant III-2-a. Another variation considered by the mentioned author refers to the sixth variant, which includes items with a triangular and straight-cut blade, and without a clear difference between the body and socket. In the collection from Chotyniec, this type represents variant III-2-b. A. I. Meliukova also proposed two additional varieties of arrowheads with grooves in the lower parts of the blades. They frame the socket with small "wings". However, they differ in the way in which the "wings" are cut off – some are cut at right angles to the socket and belong to the eighth variant (III/2/8), while in the ninth variant (III/2/9) the "wings" are cut diagonally. Arrowheads from Chotyniec of analogous forms are grouped in the c variant of type III-2 and type III-3, respectively. Examples of variants III-2-a and III-2-b with straight-cut "wings" also find their equivalents in V. G. Petrenko's classification from the forest-steppe, right bank of Dnieperland, dating back between the 5th and 3rd centuries BC. He included trilobate solid arrowheads with triangular, arched blades and a separate socket in the second type of the third group. In this group, specimens with straight-cut edges are included in the first and fourth variants. In the first of them, the transition of the blade into the socket is clearly visible, in contrast to the second type (Petrenko 1967, 46-47, plate 34: 197, 211, 212).

Iron arrowheads with a square-shaped cross-section and separate sockets do not find analogies among the Scythian cultural circle. Generally, arrowheads of this type, known from the area inhabited by the Scythians, can be divided into three groups, which differ in the way of sticking to the spars, the shape of the blade and the technique of manufacture and elaboration. The first group can be characterized by flat arrowheads with a leaf-shaped blade and a tang, the second by arrowheads with separated, round sockets, while the third one includes the so-called "barbed" specimens (Shramko 2009, 384, fig. 2-6).

Apart from them, there are also a few finds from Scythian quiver sets with shapes that bear similarities to bone arrowheads with square-shaped cross-sections, but in this case without sockets. Iron arrowheads with a separate socket and a square-shaped cross-section are also not known from the range of other nomadic groups from the Early Iron Age (*e.g.*, Ochir-Goriaeva 1996, 49-50, fig. 6). However, for the described artifacts, analogies can be found outside the zone occupied by the Scythians. Some were recorded in the context of the Lusatian culture in Wicina (Michalak 2013, 51, 81, fig. 65: 12), which was destroyed by "assailants using Scythian-like weapons" (Chochorowski 2014, 32, fig. 19). Visible differences between the finds from Chotyniec and Wicina (*e.g.*, the length of the socket and a slightly different cross-section), though still close to square-shaped should be explained by technical issues, including – first of all – difficulties in obtaining identical arrowheads by different blacksmiths, especially if they are of small size.

Bone arrowheads with a square-shaped cross-section were classified by A. I. Meliukova (1964, 19, fig. 1) in group IV. Apart from them, this group also included items with a circular cross-section, which were absent in the collection from Chotyniec. In A. Hellmuth's (2006, 193, fig. 2) classification, the Chotyniec arrowheads can be included in the KN variant with a square-shaped cross-section.

4. CHRONOLOGY OF CHOTYNIEC ARROWHEADS

For determining the chronology of the arrowheads from the ash-hill in Chotyniec, we need to focus on establishing a general chronological framework. For this purpose, the dating of individual types of artifacts was made. Undoubtedly, biblade arrowheads with asymmetric, rhomboidal blades of type I-6 can be considered as the oldest. A. I. Meliukova (1964, 18) points out the connections of this type with the pre-Scythian period (8th-7th centuries BC). She connects only a few findings of this type with the first chronological group, and dated them between the end of the 7th – the beginning of the 6th century BC. A similar chronological frame for arrowheads with a rhomboidal head was prepared by V. A. Illinska. In addition, she divided this kind of item into two types: the Zhabotin type represents arrowheads with a long, separated socket, and is dated between the second half of the 7th century to the turn of the 7th/6th centuries BC, while slightly older finds (the beginning and the first half of the 7th century) are associated with arrowheads of the Endzhe type, characterized by a more massive form and a blade with a length almost equal to the entire artifact's length (Illinska 1973, 15, 17). S. V. Polin (1973, 31) quite often suggested difficulties in the unambiguous separation of both types and proposed combining them under the common name of the Endzhe-Zhabotin type. The chronology of this form of arrowhead was mainly connected with the Novocerkassk group from the 8th and 7th centuries BC. However, Polin took into account the possibility of their use in a later period as well. In his opinion, the end of their use is finally in the middle of the 7th century BC, when they were replaced by arrowheads with blades in the shape of a laurel leaf. L. K. Galanina (1983, 42; 1995, 50) suggests a longer duration of this kind of weapon. In her opinion, they could have even been used in the third quarter of the 7th century BC. A chronology between the 8th and the 7th centuries BC was also assigned by I. N. Medvedskaya (1992, 87). Based on the findings of earlier researchers, including G. Kossak (1987, 24-86), she considered the use of this type of arrowhead as a determinant of the first stage of the Scythian culture (so-called ESC-1), related to the end of the 8th century and the early 7th century BC. The dates of finds from the West Podolian ESC group, in which some rhomboidal arrowheads were found (see the list of finds of this type of arrowhead in Burghardt 2015, table 1), cover the entire 7th century BC (Bandrivskyy 2010, table 1; Kowalski-Biłokryłyy 2012, 183-186, table 33-35).

Biblade and triblade arrowheads with a leaf-shaped blade of the Kelermes type, which can be combined with I-1 (variant b) and II-1 from Chotyniec, are younger then the Endzhe-Zhabotin type. A. I. Meliukova (1964, 18) considers them as the most common form of the quiver sets of the first chronological group. A similar dating for this type of arrowhead was described by S. V. Polin and N. I. Medvedskaya. According to this first researcher, the Kelermes type appeared around the middle of the 7th century BC, replacing the Endzhe-Zhabotin type, and was present until the first quarter of the 6th century BC (Polin 1987, 23, 31). In turn, I. N. Medvedskaya (1992, 87) treats this type as one of the determinants of the second and third stages of the ESC (respectively, the first half and third quarter of the 7th century BC, and the fourth quarter of the 7th and the beginning of the 6th century BC). The first chronological group is also connected to the triblade second type of arrowheads of A. I. Meliukova's classification, which is generally found in sets with biblade and triblade examples (see Meliukova 1964, table 1; plate 6).

Based on the findings of A. I. Meliukova (1964, 19), an arrowhead with a massive triangular blade with arched edges, and beveled at the base (type II-4), should be considered as the youngest among all triblade arrowheads from Chotyniec. In her opinion, some of the triblade varieties with triangular blades (II/3/1-3 and 6 variants) appeared and spread only in the beginning of the 6th century BC. On the other hand, they are not known from finds from the end of the 7th century BC. I. N. Medvedskaya has the opposite opinion. She assumes that these types of arrowhead appeared already at the end of the second stage of the ESC, and became dominant in the later stage, *i.e.*, in the second half of the 7th and the beginning of the 6th century (Medvedskaya 1992, 94-95). Also, M. N. Daragan suggests a similar chronology. According to her, they appear a bit earlier, in the first half of the 7th century, when it comes to a fundamental change of quiver sets, resulting due to the optimization of this type of weaponry. In effect, we can observe a gradual spread of triblade arrowheads of the described type, followed later by trilobate solid examples (Daragan 2010, 584-585, 586). In addition to the quiver sets from the ESK (or the first chronological group according to A. I. Meliukova), sometimes they are also found in younger burial complexes related to the second chronological group, which is dated between the second half of the 6th century and the first half of the 5th century BC (Meliukova 1964, 21, table 2), or the beginning of the 6th – the beginning of the 5th century BC (Polin 1987, 31-32).

To the first chronological group we could attribute also a few trilobate solid arrowheads with leaf-shaped and triangular (or arched) blades of types III/1 and III/2, according to A. I. Meliukova's classification. This observation concerns only some of their varieties. In the analyzed collection from Chotyniec, these forms include the arrowheads of all three variants of type III-1 and some examples of the III-2-a variant. Trilobate solid arrowheads are more often found in the quiver sets of the second chronological group. In addition to varieties known from earlier assemblages, a number of new specimens appeared. Similar forms to artifacts found in Chotyniec were included in III/2/6 (III-2-b variants of the Chotyniec series) and III/2/8 (III-2-c) variants and III/2/9 (III-3) type by A. I. Meliukova (1964, 19-23). However, they are not frequent (Meliukova 1964, table II). On the other hand, it should be noted that analogous arrowheads were also found in the quiver sets in some burials of the West Podolian ESC group (Doliniany, k. 2; Kruglik, k. 1; Perebikivtsy, k. 2, sets of quivers No. 1 – Smirnova 1993, fig. 2: 12-14; 5: 1-2; 8: 20-22) related to the third quarter of the 7th century BC or slightly wider to the fourth quarter (end) of the 7th – the beginning (or the entire first half) of the 6th century BC (Smirnova 1993, 111, 112, 116; Kowalski-Biłokryłyy 2012, 184, 186, table 33). Thus, their chronological frames overlap with the dating of most other types of arrowheads, with the exception of the "archaic" Endzhe-Zhabotin type.

To summarize the above observations, it can be concluded that the collection of arrowheads from the ash-hill recorded in Chotyniec should be linked to the first chronological group. Thus, it should be synchronized with the Early Scythian Period, traditionally dated within the entire 7th and the first half of the 6th century BC. At the same time, some elements appeared that are considered as more characteristic for the second chronological group by A. I. Meliukova. She underlined the better quality of trilobate solid and triblade arrowheads over biblade ones, as well as the presence of new forms among them. However, these impressions are an effect of the limitations of the database (see Daragan 2016, 62; 2017, 85-86) that was available to A. I. Meliukova during her research. Turning now to newer remarks, the quiver sets of the Kelermes type, with biblade triblade arrowheads (including those typical for this stage, similar to type II-4) and also trilobate solid ones, appeared already in the first half (2nd quarter) of the 7th century BC (Medvedskaya 1992, 87-88; Smirnova 1993, 105-106; Galanina 1995, 50; Daragan 2010, 584-585, 586). The spread of triblade and trilobate solid arrowheads went further in the next period, in the second half of the 7th century BC, when they became the dominant form. On the other hand, biblade examples lose their popularity (Daragan 2010, 600), and even some "archaic" arrowheads were almost out of use. Their presence in this period is treated as a kind of anachronism (arrowheads of the Endzhe-Zhabotin type). In addition, one should point out the existence of a certain regionalism in the distribution of individual forms of arrowheads (Smirnova 1993, 105-106). It manifests itself in a different proportion of trilobate solid specimens in a set. They are especially frequent in the West Podolian ESC group, where they are components of many quiver sets (Burghardt 2015, 146-147, fig. 4). As shown above, some forms (mainly trilobate solid ones same as III-2-b, III-2-c and III-4 variants of the Chotyniec series) appeared in the same grave inventories. According to A. I. Meliukova, they could be dated between the second half of the 6th century and the first half of the 5th century BC. However, they should be attributed rather to the period between the second half (probably the end) of the 7th to the beginning (or the entire first half) of the 6th century BC. In light of these findings, it can be concluded that the connection of this collection of arrowheads with the early Scythian period is irrefutable. Moreover, the dominance of triblade and trilobate solid specimens over biblade forms, in the presence of only a few “archaic” forms (arrowheads of type I-6/Endzhe-Zhabotin), suggests that the beginning of the Chotyniec collection should not be older than the middle of the 7th century BC.

The lack of triblade arrowheads of “basic” type with straight-cut leaves equal to the base of the non-separate socket (Meliukova 1964, fig. 1 – types II/5, II/6 and II/9; Daragan 2017, 53) seems to be crucial for determining the upper chronological framework of the Chotyniec collection. This observation is important because artifacts of this type are a mandatory element of quiver sets of the second chronological group synchronized with the Middle Scythian period (Meliukova 1964, 19-22, table II; Daragan 2017, 53, 82-89, 101). Its beginning is traditionally established to the middle (the second and third quarters) of the 6th century BC (Alekseev 2003, 156). Thus, the analyzed assemblage should not be younger than the middle of the 6th century BC.

Concluding this part of the considerations on the general chronological frames of arrowheads from Chotyniec, it should be noted that limiting their dating only to the early stage is also based on the other features of the collection. The first one is the weight of the artifacts. According to M. N. Daragan (2015, 158-160, 164) there is a strong correlation between the shape of the arrowhead, and thus its chronology and weight. First of all, we should point out the results of her analyses of the weight of trilobate solid and triblade specimens from the early and middle Scythian period. According to them, the scope of this parameter for arrowheads from the 7th century BC ranges from 1.5 to 5 g, while the artifacts weighing 3-4 g are the most popular. On the other hand, the weight of the arrowheads between the 6th and the first half of the 5th century BC does not exceed a value of 2-3 g (M. N. Daragan 2016, 159). The weight of triblade and trilobate solid arrowheads from Chotyniec is about 3-4 g (limit values of 1.3 and 6.1 g), which represents a typical range for the early Scythian period. Another element connecting the analyzed assemblage with the early Scythian period is the engraving in the shape of a “bird’s leg”, discovered on an arrowhead of type II-4. Taking into account the other findings, this type of ornamentation appeared only on artifacts from the early Scythian period and the first half of the 7th century BC (Shramko 2006, 41; Alekseev 2014, 7). The location of the ornamentation on the arrowhead from Chotyniec resembles the younger group of those artifacts. It is worth mentioning, that both of this type arrowheads from the forest-steppe left-bank of Dnieperland were found not in graves, but in settlement sites (Pozharnaya Balka, the western fortifications of the Belskoe hillfort). In addition, the arrowhead from Belskoe was found in an ash-hill (feature No. 5), thus in the same context as in Chotyniec. The chronology of both artifacts is close to the beginning of the second quarter to the third quarter of the 7th century BC (Shramko 2006, 41-42; Daragan 2010, fig. V.49), with younger and more precise dates (the mid-third quarter of the 7th century BC) for Pozharnaya Balka, which represents the same type of arrowhead as the find from Chotyniec. Thus, arrowheads of type I-6 can be considered as determinants of the oldest stage of formation of the analyzed collection.

The second issue in the dating of arrowheads collected in the ash-hill in Chotyniec is an attempt to verify the degree of homogeneity of the analyzed assemblage. The stratigraphic observations of the layers forming the pit indicate at least two stages of its duration. The "younger" phase is not fully recognized due to the significant destruction of its upper parts. Thus, it cannot be certain that arrowheads refer to different chronological periods. At the same time, there are no other artifacts among them that can be clearly associated with other, younger chronological groups than the first one. Moreover, we can also observe the lack of "younger" findings near or in the vicinity of the ash-hill. For this reason, we assume that assigning chronological frames younger then the early-Scythian period is unjustified. Some important remarks can be made due to the observation of ash-hills from the forest area of Dnieperland. In the case of some of them that are confirmed to be multiphased, we can observe that mostly arrowheads and other artifacts are divided in horizons that could be easily dated (*e.g.*, Shramko 2006; Daragan 2010, fig. V: 49).

Another issue is the selection of sources for chronological analysis. In these terms, quiver sets placed in graves are the most relevant. However, this group of sources cannot be directly combined with settlement findings, including the collection from Chotyniec. Sets of arrowheads placed in the grave were consciously assembled (a separate issue is the reasons of selection of these kind of artifacts together – *e.g.*, Chochorowski 2014, 36-37; Daragan 2016, 72-73), while the arrowheads found in residual contexts are usually accidental. Their composition may be a result of various factors, the simplest being that they were lost by the owners. On the other hand, it should be noted that the above-mentioned observations of some of the ash-hills from areas located further east of Chotyniec indicate a clear chronological horizons of artifacts, including numerous arrowheads. They can be combined with specific stages of their use. Moreover, it must also be pointed out that the sets could be not purely accidental. The abundance of arrowheads among post-consumer animal bones suggests their use for killing animals, whose meat was eaten during various types of ritual feasts made in the area of the ash-hills. Another possibility that should be taken into account is their loss by the owners during various religious activities related to the use of this type of object. Finally, it cannot be ruled out that they are deliberately deposited in such locations (as votive/ritual gifts?). However, this hypothesis is difficult to

Table 1. Selected assemblages of grave goods with quiver sets similar to arrowheads found in the ash-hill from Chotyniec

Complex (Region)	Number	Material			Groups I			Groups II				Groups III				Chronology (in century BC)	Notice
		br	i	b	1	6*	other	1	2	4	other	1	2	3	other		
Aksiutintsy, barrow No. 467 (Sulaland)	5	+	-	-	1 (b)	-	1	2 (a,b)	-	-	-	1 (b)	-	-	-	1st half 7 (Medvedskaya 1992)	-
Aksiutintsy, barrow No. 469 (Sulaland)	11	+	-	-	-	1	-	6 (a,b)	-	-	3	1 (b)	-	-	-	1st half 7 (Medvedskaya 1992)	-
Lenkovtsy (West Podolian group ESC)	28	+	-	-	7 (b)	5*	-	3 (a,b)	3	4	4	2 (a)	-	-	-	1st half 7 (Kowalski-Biłokryłyy 2012)	-
Likhachevka (Vorsklaland)	55	+	-	-	21 (b,-)	-	2	5 (b)	3 (+)	8	7	1 (a)	-	-	8	1st half – half 7 (Daragan 2010)	-
Kelermes, barrow No. 24 (North Caucasus)	76	35	-	1 (c)	25 (b,-)	12*	+	18 (a,b)	-	-	2	13 (a-c)	-	-	5	half – 3rd ćw. 7 (Galanina 1995)	-
Malaya Ofirna (Forest-Steppe Right-Bank of the Dnieperland)	110	+	-	-	15 (b)	-	2	4 (a,b)	-	55	26	2 (a,b)	-	-	6	half – 2nd half 7 (Daragan 2010) or the end 7 (Kovpanenko *et al.* 1989)	-
Ostiniazhka, barrow No. 474 (Forest-Steppe Right-Bank of the Dnieperland)	12	9	2	1	2 (b)	1*	-	4 (b)	2	-	-	-	-	-	-	2nd half 7 (Kovpanenko *et al.* 1989)	-
Aksiutintsy, Starshaya Mogila (Sulaland)	177	138	31	8 (c, sq)	12 (a,b)	-	83	15 (a,b)	-	4	20	-	1 (a)	-	-	2nd half 7 (Daragan 2010) or 4th quarter of 7 – the beginning 6 (Grechko 2013)	-
Repiahtovaya Mogila, burial No. 1 (Forest-Steppe Right-Bank of the Dnieperland)	97	88	5	4 (c)	+ (b,-)	-	+	+ (a,b)	-	+	+	+ (a,b)	+ (a)	-	-	3rd/4th quarter of 7 (Grechko 2013) or the end 7 – the beginning 6 (Kovpanenko *et al.* 1989)	-

Repnahtovaya Mogila, burial No. 2, set of quivers No. 2 (Forest-Steppe Right-Bank of the Dnieperland)	124	+	-	-	11 (b)	-	-	34 (a,b)	-	-	60	-	-	19	-	no later than the end 7 (Daragan 2010), 2nd quarter of 7 – 1st quarter of 6 (Grechko 2013) or 1st half 6 (Kopylov and Rusakov 2014)	set of quivers coexisting with the Greek amphorae
Kruglik (West Podolian group ESC)	19	16	1	2 (sq)	-	1*	2	4 (a,b)	2 (+)	2	-	-	4 (a,c)	-	2	4th quarter of 7 or the end 7 – the beginning 6 (Kowalski-Biłokryłyy 2012)	-
Berestnnagi, barrow No. 82 (Forest-Steppe Right-Bank of the Dnieperland)	13	+	-	-	1 (b)	1*	1	7 (b)	-	-	-	3 (a,b)	-	-	-	the end 7 – the beginning 6 (Kovpanenko *et al.* 1989)	-
Kharpy, barrow No. 25 (lower Don)	86	+	+	+ (c, sq)	+ (b)	-	+	+ (a,b)	+ (+)	+	+	+ (c)	+ (c)	-	+	the end 7 – 1st half 6 (Kopylov and Rusakov 2014)	set of quivers coexisting with the Greek amphorae
Doliniay, barrow No. 2 (West Podolian group ESC)	13	11	1	1 (sq)	-	-	2*	5 (a,b)	1 (+)	1		-	1 (c)	-	-	1st quarter of 6 (Kowalski-Biłokryłyy 2012)	* bronze specimen of archaic form
Perebikivtsy, barrow No. 2, set of quivers No. 1 (West Podolian group ESC)	133	+	-	-	-	-	5	-	18 (+,-)	2	28	4 (a)	51 (b)	+	-	1st quarter of 6 (Kowalski-Biłokryłyy 2012) or 1st/2nd quarter of 6 (Grechko 2013)	19 copies combined groups II and III
Novoaleksandrovka, barrow No. 7, burial No. 8 (lower Don)	72	+	-	-	13 (a,b)	4*	29	-	-	7	19	-	-	-	-	1st half 6 (Kopylov and Rusakov 2014)	set of quivers coexisting with the Greek amphorae

Description: types are recorded in Fig. 6. Where possible, information included in brackets presents variants distinguished within individual types. A plus (+) indicates a spur on the socket, while a minus (-) indicates its absence. Abbreviations: b – bone, br – bronze, c – circular cross-section (bone arrowheads), i – iron, sq – square-section cross-section (bone arrowheads); Group I, type 6 – an asterisk (*) indicates arrowheads of Endzhe-Zhabotin type, but different then arrowhead from Chotyniec. Sources: Doliniay, barrow No. 2; Kruglik, barrow No. 1; Lenkovtsy, barrow No. 1; Perebikivtsy, barrow No. 2 – Smirnova 1993; Kelermes, barrow No. 24 – Galanina 1995; Kharpy – Kopylov and Rusakov 2014, Daragan 2016; Likhachevka – Daragan 2010; Malaya Ofirna; Repiahtovaya Mogila, burials No. 1 and 2 – Daragan 2015; Novoaleksandrovka, barrow No. 7, burial No. 8 – Koreniako and Lukiashko 1982; other – Meliukova 1964 prove. Thus, it can be assumed with a high degree of probability that the sets of arrowheads found in the ash-hills may have a uniform chronological position, although seemingly accidental.

In some way, arrowheads found in subsequent layers may reflect the developmental trends of this category of military items. Of course, this does not mean that the arrowheads found in settlement contexts can be easily compared with quiver sets found in graves. It is more reasonable to describe them in relation to each other in terms of the convergence of their forms (their specific types and variants), while in the case of grave goods, their larger series related to specific time horizons should be taken into account.

In the analysis of 17 burials, we can identify at least four varieties of arrowheads analogous to the finds from Chotyniec (in the case of the Endzhe-Zhabotin type, the presence of this form was enough). Four chronological groups can also be further divided (Table 1). The first division is formed by artifacts that are dated to the first half of the 7th century BC, the second one comes from the second half of same century, the third represents graves that can be generally dated between the second half (end) of the 7th century and the beginning (1st half) of the 6th century BC, while the fourth one refers to the first half of the 6th century BC. They are also different sets of arrows placed in quivers and treated as grave goods. The first two (from the first and second half of the 7th century BC), does not contain I-1-variants of biblade arrowheads or III-2 and III-3 types of trilobate solid arrowheads. In comparison with the arrow sets typical of burials from the second half (end) of the 7th and the first half of the 6th century BC, the Endzhe-Zhabotin type was represented by different varieties. On the other hand, in quivers from the first half of the 6th century BC, the presence of III-1-a and III-2-a variants was not noted; however, examples of this form are known from other sites with the same chronology (*e.g.*, burial No. 22 in the Diunnyj necropolis on the lower Don – Kopylov and Rusakov 2014, fig. 2: 5).

Summing up, it can be concluded that the collection of arrowheads from Chotyniec, found in two different (utility?) levels of the ash-hill, can be considered as a homogeneous assemblage. This possibility is mainly indicated by their convergence with quiver sets placed in burial complexes from the end (or the entire 2nd half) of the 7th and the first half (or at least its beginning) of the 6th century BC. The presence of all forms of bone and bronze arrowheads analogous to those found in Chotyniec was noted in this period. The only exceptions are specimens made of iron. For them, an analogy in the Scythian world cannot be found.

An additional argument in favor of such dating of the analyzed collection are fragments of imported Greek amphorae from the same layers. Found in the central part of the ash-hill fragments of an amphora from Klazomenai can be dated between the 7th century and the first decades of the 6th century BC (Sezgin 2004, 173-175). Their presence is worth noticing because pottery of this type was used for wine transport – a drink related to the ritual sphere. Undoubtedly, the presence of this kind of pottery should be explained in this way. Moreover, amphorae were deposited shortly after transferring to their final destinations. Thanks to that, it is possible to prepare an accurate and precise chronological analysis. No less important is the fact that amphorae from this production center (with slightly later dating), as well as from other contemporary workshops also located in Ionia (*e.g.*, Miletus), are frequent components of the grave goods of the burial complexes from the end of the 7th – the first half (the end of the 2nd quarter) of the 6th century BC (Kopylov and Rusakov 2014, 175-177; Daragan 2016, 71). Amphorae of this type were found with quiver sets similar to those in the assemblage of Chotyniec arrowheads.

In summary, the collection of arrowheads discovered during the excavations in the ash-hill in Chotyniec seems to be homogeneous, and its dating should be limited most probably between the second half of the 7th century and the first half of the 6th century BC, or more precisely, at the end of the 7th century BC. On the other hand, it should be noted, that convergences and relations in assemblages of artifacts (arrowheads and amphora) from Chotyniec and other early-Scythian burials from the end of this period (end of the 7th – the first half of the 6th century BC), which form the basis of such dating, do not exclude the possibility of its earlier chronology within the 7th century BC (at least its 2nd half). This may be partly suggested by the spatial distribution of arrowheads. So far we can treat bi-blade arrowheads, especially types I-6 and II-4 with the "bird's leg" ornamentation on the socket, as the oldest, while types III-2 and III-3 seemed to be the youngest ones. The analysis of their distribution in relation to the borders of the ash-hill (Fig. 3) showed that the first, older group, was found predominantly in its central part, while the potentially "younger" artifacts were found on its outskirts or even beyond its borders. There are two ways of interpreting this situation. For one thing, the collection is not homogeneous and is associated with various stages of the functioning of the ash-hill, although not beyond the early-Scythian period. In this context, the older phase should be referred to at least the middle of the 7th century BC. In this time, triblade arrowheads (including type II-4, considered as typical for this period) and trilobate solid ones appeared, and the Endzhe-Zhabotin type disappeared. The younger stage should be dated between the end of the 7th (its 4th quarter?) century and the first half of the 6th century BC, when trilobate solid arrowheads of types III-2 and III-3 were in use, and Greek amphorae were deposited in Scythian burials. The second explanation is that the situation is the result of post-depositional processes. It should be noted that the ash-hill itself has the form of a small mound, with slopes covered with archaeological material, including arrowheads or traces of burning. Thus, it can be assumed that the spatial distribution of the mentioned findings may be the result of the "sliding" of these layers. In addition, it should be noted that the above-described amphorae fragments came from the same layers where the presence of the potentially oldest arrowhead of type I-6 was marked. Although they were discovered at slightly different depths (the arrowhead was slightly lower than the amphora), it should be noted that both these categories of artifacts often coexist, as in the mentioned grave goods (see Table 1). However, this issue requires careful analysis of all the layers, not only in terms of the relations between them and other layers, but also in terms of the presence of different artifacts, which can be treated as kinds of chronological "markers" (other metal findings, hand-made pottery, imported wheel made pottery, *etc.*). Only on the basis of these kinds of observations, in conjunction with the results of radiocarbon dating, will precise interpretation be possible.

5. FINAL REMARKS

Analysis of arrowheads found in the ash-hill in Chotyniec, site 1, conducted in terms of their morphological diversity and chronology allowed for their assignment within the early-Scythian period. This coincides with the dating of other categories of artifacts (amphorae). At the same time, detailed analysis of the chronology of the whole collection, supported by observations of quiver sets placed in graves, allowed for the chronological framework to be narrowed to between the second half (end) of the 7th century and the first half of the 6th century BC. In chronological systems related to the Scythian cultural circle, the collection can be referred the final stages of the development of archaic Scythia (ESC-3 phase, according to N. Medvedskaya), which can be synchronized with the HaD1 (half of it) – HaD2 phases, according to M. Traschel (2004). At the same time, it cannot be precluded that the chronology of findings could be switched to the middle of the 7th century BC.

The presented results allow us to look again at some issues related to the occurrence of Scythian arrowheads in present-day Poland. Apart from the artifacts from the early-Scythian period found in the hillfort in Chotyniec and functionally-related settlements (Czopek *et al.* 2018, 197-198, 270, fig. 20: 4), as well as finds from settlements and funerary contexts associated with population groups other than "Scythian" ones (Czopek *et al.* 2015, 193-196, 197, 208-213, table 1, 3-4; 2018, 277, 308), finds of arrowheads from Przemyśl are particularly interesting (Czopek *et al.* 2015, table 1, No 29). Their location at a relatively short distance from the Chotyniec agglomeration may indicate their possible link to the activity of its residents. It cannot be ruled out that stray finds of arrowheads from the first chronological group of A. I. Meliukova's classification in the basins of the Tanew and Wieprz Rivers (Chełm, Dorohusk, Róża, Stary Machów, Wieprzec, Wolica Śniatycka – see Czopek *et al.* 2015, table 1, No. 5, 7, 30, 31, 38-39, 41) could be interpreted in the same way. It is worth mentioning that the environmental conditions of this part of the Lublin region show strong links with the forest area, and thus it was the most attractive zone for the population of the Scythian cultural circle.

On the other hand, S. Czopek and K. Trybała-Zawiślak (2019) pointed out other possible activities of the population associated with this center. During the interpretation of the significance of the settlement in Chotyniec (and its entire agglomeration), they suggested the possibility of the participation of warriors (or some of them) in invasions in Central Europe, which occurred between the turn of 7th/6th centuries and the fourth quarter of the 6th century BC (Chochorowski 2014, 32-43). In their opinion, this may be justified due to the location of the Chotyniec agglomeration in the border zone from which the warriors taking part in these invasions (the West Podolian ESC group – see Chochorowski 2014, 43) were most likely recruited. The results of the formal analysis of the Chotyniec arrowheads also confirm this thesis. Particularly important here are iron specimens with square-section blades and separate sockets. As has been shown above, such artifacts are known only from the discussed site and from the layers of destruction in Wicina. Moreover, additional convergences in the sets of arrowheads from both sites can be noted. Besides biblade and triblade examples of the Kelermes type, these include artifacts referring to the few arrowheads of type III-2 from Chotyniec (Michalak 2013, fig. 65: 7). Of course, taking into account a whole range of objections appearing in the comparison of arrowheads from various contexts (from the eash-hill and the demolished defensive settlement; Chochorowski 2014, 37), the convergence of some forms cannot be considered as an argument that clearly supports the above hypothesis. It should rather be treated as another premise indicating the possibility of the participation of warriors from Chotyniec in invasions in Central Europe. Undoubtedly, this issue requires further research, including an analysis of the origin of the material from which the arrowheads from both sites were made.

References

Alekseev A. Yu. 2003. *Khronografiya Evropiyskoy Skifii VII–IV vekov do n.e.* Sankt-Peterburg: Gosudarstvennyi Ermitazh.

Alekseev A. Yu. 2014. Strely-zmni u rannikh kochevnikov Evrazii. In S. I. Lukiashko (ed.), *Voyna i voennoe delo v skifo-sarmatskom mire. Materialy mezhunarodnoy nauchnoy konferentsi pamiati A. I. Meliukovoy (s. Katalnik, 26-29 aprelia 2014 g.).* Rostov-na-Donu: Izdatelstvo YuNTs RAN, 5-10.

Bandrivskyy M. S. 2010. Pamiatky serednodnistrovskoyi (zahidnopodilskoyi) grupy rannozaliznogo viku v tsentralnoyevropeyskiy khronologichniy shkali ta problemy periodyzatsiyi. *Materialy i doslidzhennia z arkheologii Prykarpattia i Volyni* 14, 76-113.

Burghardt M. 2015. Weapon and the military of the population of the West Podolian group of the Early Scythian culture in the light of sepulchral sources. *Materiały i Sprawozdania Rzeszowskiego Ośrodka Archeologicznego* 36, 143-166.

Chochorowski, J. 2014. Scytowie a Europa Środkowa – historyczna interpretacja archeologicznej rzeczywistości. *Materiały i Sprawozdania Rzeszowskiego Ośrodka Archeologicznego* 34, 9-58.

Czopek S., Pawliw D., Trybała-Zawiślak K. and Wojcieszczuk N. 2015. New discoveries of arrowheads of Scythian type from Polish-Ukrainian borderland (San, Bug and upper Dniester drainage basin). *Acta Archeaeologica Carpathica* 50, 191-216.

Czopek S., Trybała-Zawiślak K., Tokarczyk T., Ocadryga-Tokarczyk E., Burghardt M, Adamik-Proksa J. and Rajpold W. 2017. Pierwsze sprawozdanie z weryfikacyjnych badań na grodzisku z wczesnej epoki żelaza w Chotyńcu. *Materiały i Sprawozdania Rzeszowskiego Ośrodka Archeologicznego* 38, 291-305.

Czopek S., Trybała-Zawiślak K., Wojceszczuk N., Osaulczuk O., Bobak D., Gębica P., Jacyszyn A., Pasterkiewicz W., Pawliw D., Petehyrycz W., Połtowicz-Bobak M. and Wacnik A. 2018. *Przemiany kulturowo-osadnicze w dorzeczu rzeki Wiszni w epoce brązu i we wczesnej epoce żelaza w kontekście zmian prahistorycznej i wczesnohistorycznej ekumeny*. Rzeszów: Wydawnictwo Uniwersytetu Rzeszowskiego.

Daragan M. N. 2010. *Nachalo rannego zheleznogo veka v Dneprovskoy Pravoberezhnoy Lesostepi*. Kiev: KNT.

Daragan M. N. 2015. Nakonechniki strel predskifskogo i ranneskifskogo vremeni: tekhnologiya izgotovleniya, metrologiya i markirovka. In E. F. Korolkova (ed.), *Arkheologiya bez granits. Kollektsii, problemy, issledovaniya, gipotezy* (= *Trudy Gosudarstvennogo Ermitazha* 77). Moskva: Izdatelstvo Gosudarstvennogo Ermitazha, 127-170.

Daragan M. N. 2016. O kolchannom nabore ranneskifskogo vremeni iz pogrebenia 1, kurgana 4 u s. Gladkovschina. In A. Balakhvantsev and S. Kullanda (eds), *Kavkaz i step na rubezhe epokhi pozdney bronzy i rannego zheleza. Materialy mezhdunarodnoy nauchnoy konferentsii, posviaschennoy pamyaty Marii Nikoloaevny Pogrebovoy. Moskva, 25-27 aprelia 2016 g*. Moskva: Institut vostokovedeniya RAN, 62-75.

Daragan M. N. 2017. O formirovanii skifskikh kolchannykh naborov vtoroy poloviny VI v. do n.e. *Stratum plus* 3, 51-111.

Galanina L. K. 1983. Ranneskifskie uzdechnye nabory (po materialam Kelermsskikh kurganov). *Arkheologicheskiy Sbornik Gosudarstvennogo Ermitazha* 24, 32-55.

Galanina L. K. 1995. Ranneskifskie strelkovye nabory iz Kelermesskikh kurganov. *Arkheologicheskiy Sbornik Gosudarstvennogo Ermitazha* 32, 40-52.

Grechko D. S. 2013. O pamiatnikah Kimmeriytsev i „ranneskifskoy" kultury. *Stratum plus* 3, 133-154.

Hellmuth A. 2006. Smolenice-Molpír im Licht skythischer Angriffe auf die hallstattzeitlichen Siedlungen nördlich und südlich der Mährischen Pforte. *Slovenská Archeológia* 54(2), 191-208.

Illinska V. A. 1973. Bronzovi nakonechniki stril tak zvanogo zhabotinskogo i novocherkaskogo tipiv. *Arkheologiya* 12, 13-26.

Kopylov V. P. and Rusakov M. Yu. 2014. O verkhney khronologicheskoy granitse kolchannykh naborov v pogrebalnykh kompleksakh ranneskifskogo vremeni. In S. I. Lukiashko (ed.), *Voyna i voennoe delo v skifo-sarmatskom mire. Materialy mezhunarodnoy nauchnoy konferentsii pamiati A. I. Meliukovoy (s. Katalnik, 26-29 aprelia 2014 g.)*. Rostov-na-Donu: Izdatelstvo YuNTs RAN, 172-182.

Koreniako V. A. and Lukiashko S. I. 1982. Novye materialy ranneskifskogo vremeni na levoberezhe Nizhnego Dona. *Sovetskaya Arheologiya* 3, 149-164.

Kossak G. 1987. Von den Anfängen des skytho-iranischen Tierstils. In L. Galanina, N. Grach, H.-J. Kellner and G. Kossac (eds), *Skythica. Vorträge zur Entstehung des skytho-iranischen Tierstils und zu Denkmälern des Bosporanischen Reichs anlässlich einer Ausstellung der Leningrader Ermitage in München 1984*. München: Beck, 25-86.

Kowalski-Biłokryłyy J. 2012. Chronologia grupy zachodniopodolskiej scytyjskiego kręgu kulturowego. *Materialy i Doslidzhennya z arkheologii Prikarpattya i Volyni* 16, 160-189.

Kovpanenko G. T., Bessonova S. S. and Skoriy S. A. 1989. *Pamytniki skifskoy epokhi Dneprovskogo Lesostepnogo Pravoberegu (Kievo-Cherkasskiy region)*. Kiev: Naukova dumka.

Kunysz A. 1968. Grodziska w województwie rzeszowskim. *Materiały i Sprawozdania Rzeszowskiego Ośrodka Archeologicznego za rok 1966*, 25-87.

Medvedskaya I. N. 1992. Periodizatsiya skifskoy arkhaiki i Drevni Vostok. *Sovetskaya Arheologiya* 1992(3), 86-107.

Meliukova A. I. 1964. *Vooruzhenie skifov* (= *Arkheologiya SSSR*. *Svod Arkheologicheskikh Istochnikov D1-4*). Moskva: Nauka.

Michalak A. 2013. Przedmioty metalowe z badań grodziska w Wicinie w latach 2008-2012. In A. Jaszewska and S. Kałagate (eds), *Wicina. Badania archeologiczne w latach 2008-2012 oraz skarb przedmiotów brązowych z Wiciny* (= *Biblioteka Archeologii Środkowego Nadodrza* 7). Zielona Góra: Wydawnictwo Fundacji Archeologicznej, 217-240.

Ochir-Goriaeva M. A. 1996. Nakonechniki strel kochevnikov Nizhnego Povolzhia. *Rossiyskaya arkheologiya* 1996(1), 41-54.

Petrenko V. G. 1967. Prevoberezhe Serednego Pridneprovia v V-III vv. do n. e. *Arkheologiya SSSR* D 1-4. Moskva: Nauka.

Polin S. V. 1987. Khronologiya rannoskifskikh pamiatok. *Arhheologiya* 59, 17-36.

Sezgin Yu. 2004. Clazomenian Transport Amphorae of the Seventh and Sixth Centuries. In A. Moustaka, E. Skarlatidou, M.-C, Tzannes and Y. Ersoy (eds), *Klazomenai, Teos and Abdera, metropoleis and colony: proceedings of the International Symposium held at the Archaeological Museum of Abdera: Abdera, 20-21 October 2001*. Thessaloniki: University Studio Press, 169-183.

Shramko I.B. 2006. Ranniy period v istorii gerodotivskogo Gelonu (za materialami rozkopok zolnika nr 5). In *Bilskoe gorodische ta yogo okruga (do 100-richchia pochatku polovikh doslidzhen)*. Kyiv: Shliakh, 33-56.

Shramko B. A. 2009. Zheleznye nakonechniki strel Skifii. In S. S. Bessovoa (ed.), *Epokha rannego zheleza. Sbornik nauchnykh trudov k 60-letiyu S. A. Skorogo*. Kiev-Poltava: Institut arkheologii NAN, 383-393.

Smirnova G. I. 1993. Pamiatniki srednego Podnestrovia v khronologicheskoy skheme ranneskifskoy kultury. *Rossiyskaya Arkheologiya* 1993(2), 101-118.

SPRAWOZDANIA ARCHEOLOGICZNE 72/2, 2020
PL ISSN 0081-3834
DOI: 10.23858/SA/72.2020.2.2023

Sergey B. Valchak[1], Sergey D. Lysenko[2], Nikolai Yu. Gorbol[3], Sergey N. Razumov[4], Nikolai P. Telnov[5], Vitalij S. Sinika[6]

GRAVES OF THE BEGINNING OF THE EARLY IRON AGE IN BARROW 1 OF THE "RYBKHOZ" ("FISH FARM") GROUP IN THE LOWER DNIESTER REGION

ABSTRACT

Valchak S. B., Lysenko S. D., Gorbol N. Yu., Razumov S. N., Telnov N. P., Sinika V. S. 2020. Graves of the beginning of the Early Iron Age in barrow 1 of the "Rybkhoz" ("Fish farm") Group in the Lower Dniester region. *Sprawozdania Archeologiczne* 72/2, 357-371.

Two graves of the Pre-Scythian period (Chernogorovka culture) from barrow 1 of the "Rybkhoz" ("Fish farm") group near Glinoe village, Slobodzeya district, on the left bank of the Lower Dniester are considered on the broad background of analogies. The issues of chronology and morphology of some categories of adornments are analyzed. Particular attention is drawn to burial 8 with two bronze temporal pendants. There are no analogies to these adornments in the materials of the Chernogorovka culture. The decorative endings of these pendants resemble the design of the backs of the eastern Mediterranean ("nodular") fibulae, especially items with three spherical or biconical thickenings. Rings-pendants from burial 14 do not find complete matches among the adornments of the Chernogorovka culture. At the same time, these products are similar to adornments from contemporaneous North Caucasian sites due to their massiveness and non-closed ends. Both graves date back to the 9th – the first half of the 8th century BC.

Keywords: The Pre-Scythian period, the Chernogorovka culture, the North-West Black Sea region, graves, bronze temporal pendants, rings-pendants, astragali

Received: 04.06.2020; Revised: 18.06.2020; Accepted: 31.08.2020

1 Institute of Archaeology of the Russian Academy of Sciences, Dmitry Ulyanov St. 19, 117292, Moscow, Russian Federation; valchaks@yandex.ru; https://orcid.org/0000-0002-9573-5928
2 Institute of Archaeology of the National Academy of Sciences of Ukraine, Geroev Stalingrada Ave. 12, 04210, Kiev, Ukraine; suraganga@yandex.ru; https://orcid.org/0000-0001-6878-0216

INTRODUCTION

Studies of archaeological sites of the Early Iron Age on the territory of the northwest Black Sea region have been conducted for over 120 years. During this period, many Scythian, Sarmatian, and Chernyakhov graves were studied in the region. At the same time, very few burials of the Pre-Scythian time (Chernogorovka culture) have been discovered there so far.

Therefore, only 11 graves have been investigated on the left bank of the Dniester over the past 30 years. A barrow with two burials (main and secondary) was excavated near the town of Slobodzey (Yarovoy *et al.* 2002) in 1992. The secondary grave was found near Mokra village, Rybnitsa district, in 1994 (Sinika *et al.* 2016, 73-74, 82-83, No. 64, 65). All other burials that were studied were found near Glinoe village, Slobodzeya district. These included the secondary grave in barrow 1 (Fidelsky and Sinika 2010, 165-166, fig. 16: 1-4), discovered in 1995, and three secondary burials in barrow 4 of the "Sad" ("Garden") group studied in 2015 (Valchak *et al.* 2019). Two secondary graves in barrow 1 of the "Rybkhoz" ("Fish farm") group and two secondary burials in barrow 1 of the "Plavni" ("Overflow") group were discovered in 2019.

Thus, each new burial, which has not yet been put into scientific circulation, deserves meticulous attention and comprehensive study, taking into account the paucity of graves of the Pre-Scythian time.

This paper for the first time publishes and analyzes two graves discovered in 2019 during the excavation of barrow 1 of the "Rybkhoz" ("Fish farm") group, near Glinoe village, Slobodzeya district, on the left bank of the Lower Dniester. The site was located 2.2 km northeast of the intersection of the Tiraspol-Dniester highway with Lenin street of Glinoe village, and 0.11 km southwest of the Glinoe-Pervomaisk road, on the plateau located on the right bank of the river Krasnaya.

Barrow 1 of the "Rybkhoz" group was excavated in parallel trenches using machines. Five baulks were made along the west – east line. All the baulks were 0.6 m wide. The Central baulk was 40 m long, the 1st North and 1st South baulks were 36 m long, and the 2nd North and 2nd South baulks were 32 m long (Fig. 1). The mound was damaged by deep plowing (up to 0.4 m). Its height from the present surface was 0.6 m. The height of the mound above the ancient horizon was 0.7 m from R_o at the time of the start of research.

3 People's Friendship University of Russia, Miklouho-Maclay St. 6, 117198, Moscow, Russian Federation; gorbol13@gmail.com; https://orcid.org/0000-0002-6497-7430
4 Pridnestrovian State University named after T. G. Shevchenko, 25 Oktiabria St. 128, 3300, Tiraspol, Moldova; razum_22@rambler.ru; https://orcid.org/0000-0001-6030-9390
5 Pridnestrovian State University named after T. G. Shevchenko, 25 Oktiabria St. 128, 3300, Tiraspol, Moldova; telnov_nikolai@mail.ru; https://orcid.org/0000-0001-6878-0216
6 Pridnestrovian State University named after T. G. Shevchenko, 25 Oktiabria St. 128, 3300, Tiraspol, Moldova; sinica80@mail.ru; https://orcid.org/0000-0002-1621-9205

Twenty-four burials were discovered in the barrow: ten burials of the Pit Grave cultural and historical community, one grave of the Ingul Catacomb culture (?), three burials of the Late Bronze Age, two graves of the Chernogorovka culture, six burials of the Medieval nomads, and two indefinable graves.

MATERIALS FROM THE GRAVE 8

Grave 8 (secondary) was found 8 m north of R_0. It was made in the undercut in the northern part of the barrow (Fig. 1; 2: 1). The burial chamber partially overlapped an earlier burial in a rectangular pit oriented along a west-east axis, which belongs to the Pit Grave cultural and historical community of the Early Bronze Age.

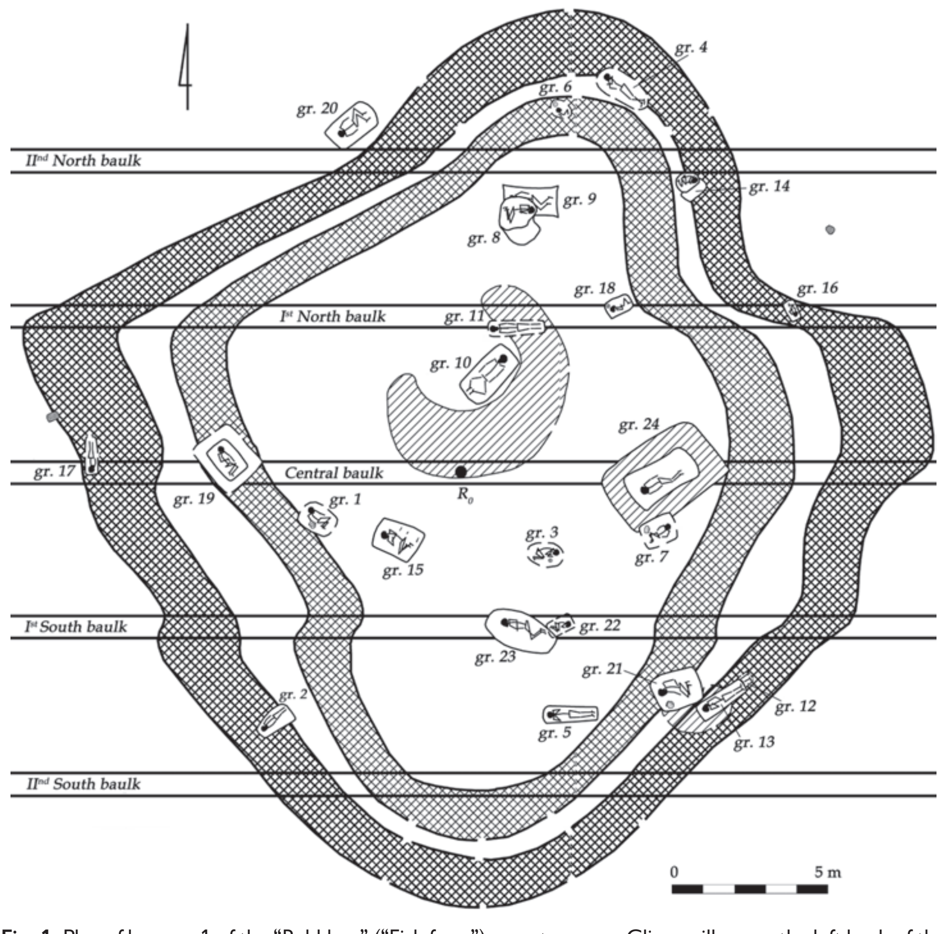


Fig. 1. Plan of barrow 1 of the "Rybkhoz" ("Fish farm") cemetery near Glinoe village on the left bank of the Lower Dniester (illustrated by S. N. Razumov)

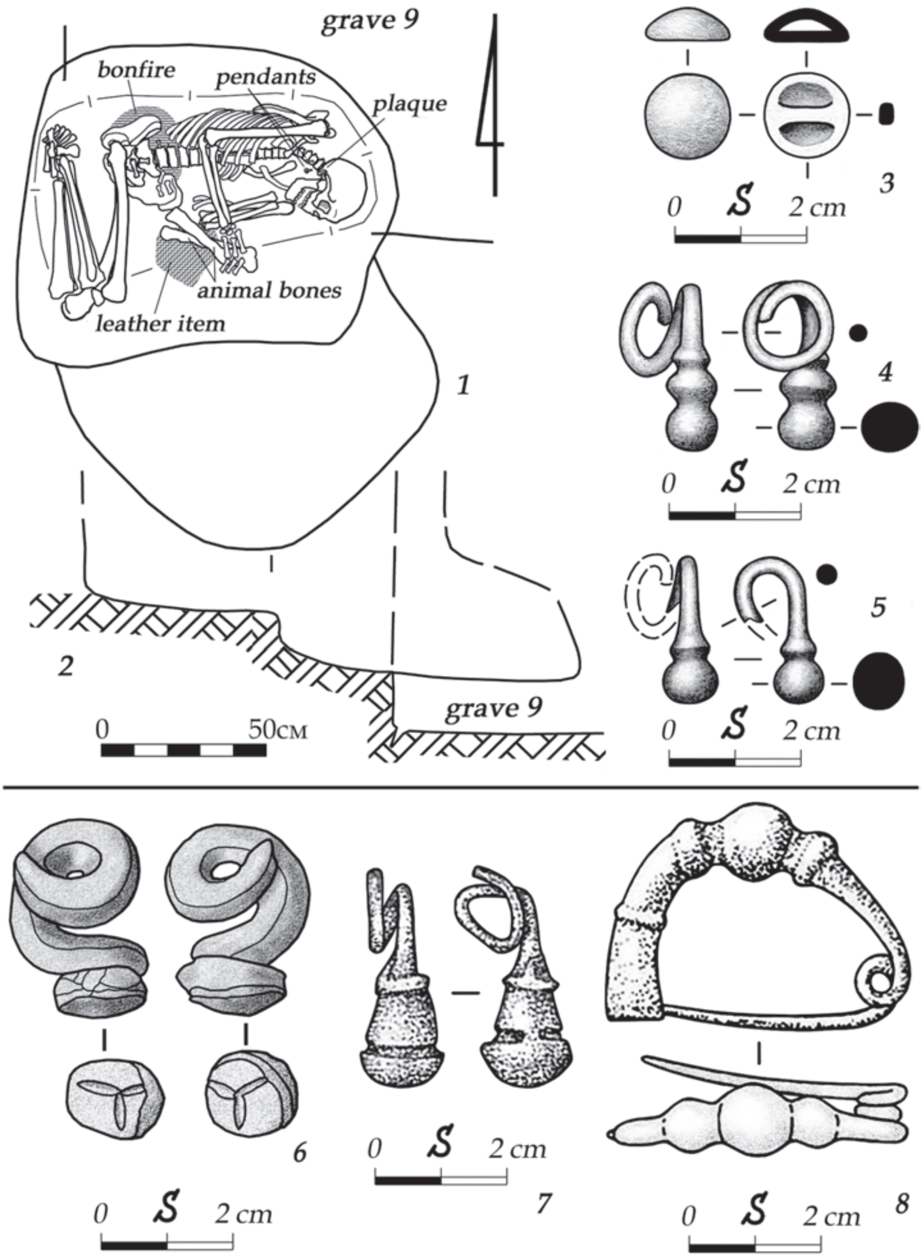


Fig. 2. Grave Glinoe/Rybkhoz 1/8: plan (1) and section (2) of the burial (illustrated by S. N. Razumov), 3 – bronze plaque, 4, 5 – bronze temporal pendants (illustrated by S. D. Lysenko), 6 – bronze temporal pendants from burial Tselinnoe 16/3 (after Makhortykh 2005, fig. 153: 4, 5), 7 – bronze pendant from the Cozia settlement (after Kashuba 2000, fig. XXVII: 43); 8 – bronze “nodular” fibula from the Brad settlement (after Kašuba 2006, Abb. 3: 1)

The entrance pit had a rectangular shape with dimensions of 1 × 0.75 m and a depth of 1.14 m from R_o, and was oriented along a NW-SE axis. It was fixed at the level of -0.94 m from R_o.

There was a *burial chamber* of irregular, sub-trapezoidal shape, with dimensions of 1.1-0.5×0.9 m along the bottom and a depth of 1.33 m from R_o, oriented along an east-west axis to the north of the entrance pit. The chamber vault was preserved to a height of about 0.4 m above the bottom. The chamber is separated from the entrance pit by a step with a height slightly greater than 0.2 m.

The skeleton of the adult person lay on the bottom of the chamber in a medium-crouched position on the left side, head to the east. The right hand was bent at the elbow at a right angle, and the wrist overlapped the elbow joint of the left arm, which was strongly bent at an acute angle. The left hand was located near the chin. Earth-moving animals moved phalanges of the left hand into the pelvic area. The femora were located almost at right angles to the axis of the spine; the tibiae were strongly bent at an acute angle. Two long bones of cattle were lying under the right hand.

The layer of brown organic decay from a mat, 1 × 0.5 m in size, was noted under the skeleton. Remains of a bonfire, in the form of a round ash spot and burnt clay, with a diameter of about 0.25 m, were recorded under the pelvis.

Composition and location of grave goods. The decayed remnants of a leather product, sub-triangular in plan, with dimensions of about 220 × 180 mm and a thickness of about 10 mm, was found in front of the skeleton. The bones of an animal were located on top of it. Two bronze casted pendants were found in the cervical vertebrae, the right one lying on the skull, and the left one lying under it (1, 2). A bronze plaque lay at the right temple (3).

Description of the finds

1. Bronze temporal pendant (right). The suspension is made of a rod, round in cross-section and tapering to the end, which was spirally twisted into an incompact ring in one and a half turns. Three thickenings are vertically located at one end; the upper two are biconical, the lower is spherical. The total dimensions of the product are 26 × 14 × 15 mm. The diameter of the ring is 14 mm. The diameter of the rod is 2.8-4 mm. The total length of the decorative end is 16 mm; the diameter of the thickenings is 6 mm, 8 × 9 mm, and 8 × 9 mm (Fig. 2: 2).

2. Bronze temporal pendant (left). The suspension is made of a rod, round in cross-section and tapering to the end, which was spirally twisted into an incompact ring for more than one turn (part of the ring is broken off). Two thickenings are vertically located at one end; the upper is biconical, the lower is spherical. Suspension length is 22 mm. The diameter of the ring is 13 mm. The diameter of the rod is 3-3.5 mm. The total length of the decorative ending is 10 mm; the diameter of the thickenings is 6 mm, and 8 × 9 mm (Fig. 2: 3).

3. Bronze convex plaque. The item is round in plan and segmental in cross-section. The eye is casted, and is rectangular in cross-section. It is located in the same plane as the lower part ("hidden loop"). The diameter of the plaque is 13 mm; the height is 5 mm. The plate thickness is 2 mm. The dimensions of the eye section are 3 × 2 mm (Fig. 2: 4).

ANALYSIS OF THE FUNERARY RITE AND GRAVE GOODS

Burials in undercuts in the Pre-Scythian period are quite common (Goshko and Otroshchenko 1986, 174-175; Makhortykh 2005, 54-55, 98), but they are also known in the previous period. Thus, graves in undercuts are widespread in the Dnieper-Prut Babino culture of the transition from the Middle to the Late Bronze Age (Dvornichenko 1968, 5-15; Sharafutdinova 1982, 48-51, 141; Savva 1992, 71; Litvinenko 2009, 8-9). The literature also mentions burials in undercuts during the final period of the Late Bronze Age, attributable to the Belozerka culture (Otroshchenko 1986, 131-132; Vanchugov 1990, 52, 56). However, after closer examination, this attribution becomes unreliable, and all of the "Belozerka" complexes with undercuts actually belong to the Chernogorovka culture of the Early Iron Age. Thus, V. V. Otroshchenko concluded that "the carriers of the Belozerka culture did not bury their dead either in the undercuts or in the catacombs", having analyzed all cases of "Belozerka" burials with undercuts and cases of direct stratigraphy of Belozerka and Chernogorovka graves (Otroshchenko 2001, 191).

The funerary rite of burial 8 in barrow 1 is distinguished by some peculiarity in the position of the left hand, the wrist of which was located in the front of the skull. The position of the hands near the face is more characteristic for the steppe sites of the Bronze Age, but occasionally finds correspondence among Pre-Scythian burials. In particular, the position of the left hands near the face was noted in the graves Krasnoe 1/7, on the left bank of the Lower Dniester, and Kalinovka 1/2, on the left bank of the Lower Bug (Makhortykh 2005, fig. 97: 1, 105: 1, 2). An individual with both arms bent at the elbows and placed towards the face was found in the burial Orlovka 1/8, on the left bank of the Lower Danube, and in the grave of Balka Bashmachka (stone construction 4) on the right bank of the Lower Dnieper (Makhortykh 2005, fig. 54: 1, 2, 122: 1, 2).

Bonfire remnants found under skeletal remains have been recorded in the northwestern Black Sea region to date only in the secondary Pre-Scythian (Chernogorovka) burial 13 in barrow 4 of the "Sad" ("Garden") group, near Glinoe village on the left bank of the Lower Dniester (Valchak *et al*. 2019, 141). We should note that this grave was studied in a mound located 1.7 km northwest of barrow 1 of the "Rybkhoz" group. However, other manifestations of the use of fire in the funerary rite are known in the region. The burning of wooden supra-burial structures and the partial cremation of the deceased ("bones were burned to black") were recorded in the widely known grave Slobodzeya 3/3, which was the main burial in its barrow (Yarovoy *et al*. 2002, 292-293, fig. 3). This grave is located

11.83 km northwest of barrow 1 of the "Rybkhoz" group. Barrow 1 of the Zalts cemetery, on the left bank of the Kuchurgan firth (Odessa region, Razdelnaya district, Limanskoe village), was located at the same distance, but to the east-south-east of our mound. Traces of partial cremation ("the right calcaneus is burned") were noted there in grave 1 (Ivanova *et al.* 2005, 9).

Traces of burning of funerary structures were noted outside the northwest Black Sea region in the Chernogorovka graves in barrows 2, 4, and 5 near Cotiujeni village (Sholdaneşti district) on the right bank of the Middle Dniester (Levitsky and Kashuba 2011, 240, fig. 2), in Vysokaya Mogila 1/5 (Zaporizhzhya region, Vasilyevka district, Balki village) and in Zolotaya Balka 14/3 (Kherson region, Novovorontsovsky district) on the left bank of the Lower Dnieper (Makhortykh 2005, 324, 333). Partial cremation was recorded in the Sokolovo II 3/4 burial (Dnepropetrovsk region, Novomoskovsky district) in the Orel-Samara interfluve. "The bones of the limbs, thoracic region, and sinciput are noticeably burned" (Makhortykh 2005, 359). Coals were discovered in the filling of the Kolpakovka III 1/1 burial (Dnepropetrovsk region, Magdalinovsky district) on the left bank of the Lower Dnieper (Makhortykh 2005, 338).

However, most interesting for us are the three Chernogorovka funerary structures, in which the same rite is recorded as in the Glinoe/Sad 4/13 and the Glinoe/Rybkhoz 1/8 burials on the left bank of the Lower Dniester. A two-layer bedding was noted under the skull of the deceased in the complex Zvonetskoye I 15/2 (Dnepropetrovsk region, Solonyansky district) on the right bank of the Lower Dnieper, "consisting of ash and small fragments of calcined bones, covered with a thin layer of chalk," in addition to burnt soil and coals in the fill of the undercut (Makhortykh 2005, 330, fig. 87: 1). "The highest concentration of charcoal and granules of burnt soil, which were also included in the fill of the grave and, probably, taken from the funeral feast bonfire" was found under the skeleton in the burial Peschanka 1/5 (Dnepropetrovsk region, Novomoskovsky district) in the Orel-Samara interfluve (Makhortykh 2005, 350-351, fig. 123: 5). Finally, the bottom of the structure was "sprinkled with ash and lime" in the eponymous site Chernogorovka 1/2 (Donetsk region, Seversk city) in the Middle Seversky Donets region (Makhortykh 2005, 365).

Here, we can only add that the burning of the bottom of the pit is also mentioned for two burials of the flat cemetery Cartal III on the Left bank of the Lower Danube (Bruyako 2013, 176).

The grave goods from the burial Glinoe/Rybkhoz 1/8 are quite remarkable. The bronze plaque with a hidden loop discovered here finds many analogies among the adornments of the Koban culture of the North Caucasus, starting from the turn of the 2nd-1st millennium BC and throughout the 8th-7th centuries BC. (Kozenkova 1998, 36-37, tab. X: 3). V. I. Kozenkova considers them "buttons", but it seems that the plaques served as an integral part of the sewed and fixed decor of clothing items. There are sometimes several exemplars present in certain graves. Their use would be very difficult as buttons with a hidden loop

(Kadieva *et al*. 2020, 171-172, fig. 2: 1-6). In the case under consideration, the plaque could serve as a decoration for a headdress or a band-crown made of organic material (Goshko and Otroshchenko 1986, 176).

Temporal pendants or earrings, analogous to those found in burial 8 of barrow 1, are not known to us in the Pre-Scythian sites on the southern edge of Eastern Europe (including the forest-steppe zone and the North Caucasus). They only vaguely resemble the Pre-Scythian items of precious metals and bronze, which have disc-shaped endings that are ornamented with three lines diverging from the center (Fig. 2: 6). Such pendants ("lamb horns") are well known in the steppe sites of the Chernogorovka culture of the Lower Dnieper region (Dubovskaya 1993, 143-144; 1994, 23, fig. 4: 32-35; Makhortykh 2005, 69-70, 105, fig. 30:18-20, 35; Tarasova 2004, 24-25; 2005, 122-126, fig. 1-4). Chernogorovka pendants differ fundamentally from pendants from "Rybkhoz" by the shape of their decorative endings. We also could not find direct analogies in the more eastern regions.

We identified only one piece of jewelry that could conditionally be considered a close analogy to our pendants at Pre-Scythian sites of the northwest Black Sea region and the Balkan-Danube region as a whole. The item in question is from the layer of the Cozia settlement (on the right bank of the Middle Prut, Romania, Iaşi County, Costuleni commune) of the Cozia-Saharna culture (Fig. 2: 7). The find was initially interpreted as a fragment of the back of a "nodular" fibula (Kashuba 2000, 327, fig. 27: 43; Kašuba 2006, Abb. 7: 1). M. T. Kashuba dates the find to the first half of the 9th century BC (Kashuba 2000, fig. XXXXIX: 13; Kaşuba 2003, fig. 9: 7). Temporal adornments from the Glinoe/Rybkhoz 1/8 complex unequivocally allow us to consider the find from Cozia as a pendant.

The style of the decorative endings of the pendants from "Rybkhoz" and Coziaresemble the design on the backs of the Eastern Mediterranean ("nodular") fibulae, especially the exemplars with three spherical or biconical thickenings (Fig. 2: 8). Similar fibulae were dated by researchers in different ways: HaC (Vinski and Vinski-Gasparini 1962: 276, 279, Sl. 95, 99, 108); 9th-7th centuries BC (Gergova 1978, 297-298, Tab. I: 7,15); 8th century BC (Toncheva 1980, 68-69, Pl. XXVII: 7, 8, 10); 10th-9th centuries BC and the beginning of the 8th century BC (Melyukova 1979, 30, fig. 5: 17); HA B_3, or 8th century BC (Chochorowski 1993, 165, 191, 193, ryc. 26: 6, 40: 2); the first half to the middle of the 9th century BC (Kashuba 2000, fig. XXXXIX: 12, 14; Kaşuba 2003, fig. 9: 8); and the second half of the 10th to the 9th century BC (Kašuba 2006, Abb. 13). In most cases, all these dates coincide with the Pre-Scythian period in the North Black Sea region. The most eastern find of such a fibula comes from the cemetery of the Koban culture Kumbulta in the mountains of North Ossetia (Gergova, 1978: 297-298, Tab. I: 15).

As far as we know, the flat burial ground at Kartal III is the closest site to the "Rybkhoz" cemetery in which such fibulae were found. This archaeological complex is located 185 km southwest in a straight line from the "Rybkhoz" barrow group. The cemetery and the settlement date back to $HaB_2/B_3 – C_1$, the period of the "Middle Hallstatt" (= Pre-Scythian period) in the framework of the (10th) 9th-8th centuries BC (Bruyako 2013, 169-171, 178-181, 186, fig. 8: 1, 4; 2017, 312). The orientation of those buried in the south-southeast sector of Kartal III should be noted (Bruyako 2013, Table 3), as it may indicate the legacy of the Belozerka traditions in the funerary rite.

The Cozia settlement is located 152 km to the northwest of our site, on the right bank of the Middle Prut, from where the closest analogy to the pendants from the grave Glinoe/ Rybkhoz 1/8 on the left bank of the Lower Dniester comes. At the same time, the nearest site of the Cozia-Saharna culture is the settlement of Brad (Romania, Bacau County, Negri commune) on the left bank of the Siret, where nodular fibulae were discovered. It is located 220 km west of the "Rybkhoz" barrow group.

Thus, we can carefully date grave 8 of barrow 1 of the "Rybkhoz" group to the Pre-Scythian time – most likely, back to the period from the 9th to the first half of the 8^{th} century BC.

MATERIALS FROM THE GRAVE 14

Grave 14 (secondary) was found 12 m northeast of R_0. It was made in the undercut, on the edge of the circular ditch surrounding the burials of the Early and Middle Bronze Age (Fig. 1; 3: 1, 2).

The entrance had a rectangular form with rounded corners. It was oriented along a northeast – southwest axis, and fixed at a level of -1.1 m from R_0. Its size was 0.75 × 0.5 m, and its depth was 1.29 m from R_0.

The burial chamber of an irregular, sub-trapezoidal shape, with dimensions of 0.67 × 0.4-0.6 m along the bottom and a depth of 1.45 m from R_0, was made to the northwest of the entrance pit and was oriented along a northeast-southwest axis. The chamber vault was preserved to a height of about 0.45 m above the bottom. It was separated from the entrance pit by a step about 0.25 m high.

The skeleton of a child (about 5-6 years old) lay at the bottom of the chamber in a medium-crouched position on the left side, head to the east. The right arm was bent at the elbow at a right angle, and its wrist, which was destroyed, lay on the left elbow joint. The left arm lay, probably, in front of the chest and was bent at the elbow at an acute angle, while the wrist was likely be near the chin (offset by a hole). The left femur was at a right angle to the spinal column, and the tibia was at an acute angle to it. The bones of the right leg, which were at an acute angle to the spinal column, were tightly pressed each to other and overlapped the upper part of the left femur. The decay under and around the skeleton was not found (Fig. 3: 1).

Composition and location of grave goods. The set of six astragali of small cattle (4) was in front of the skeleton, between the pelvis and chest. A bronze pendant was found at the frontal bone (1). Bronze temporal rings (2, 3) lay near the skull, one of them being near the right clavicle, and the other under the skull.

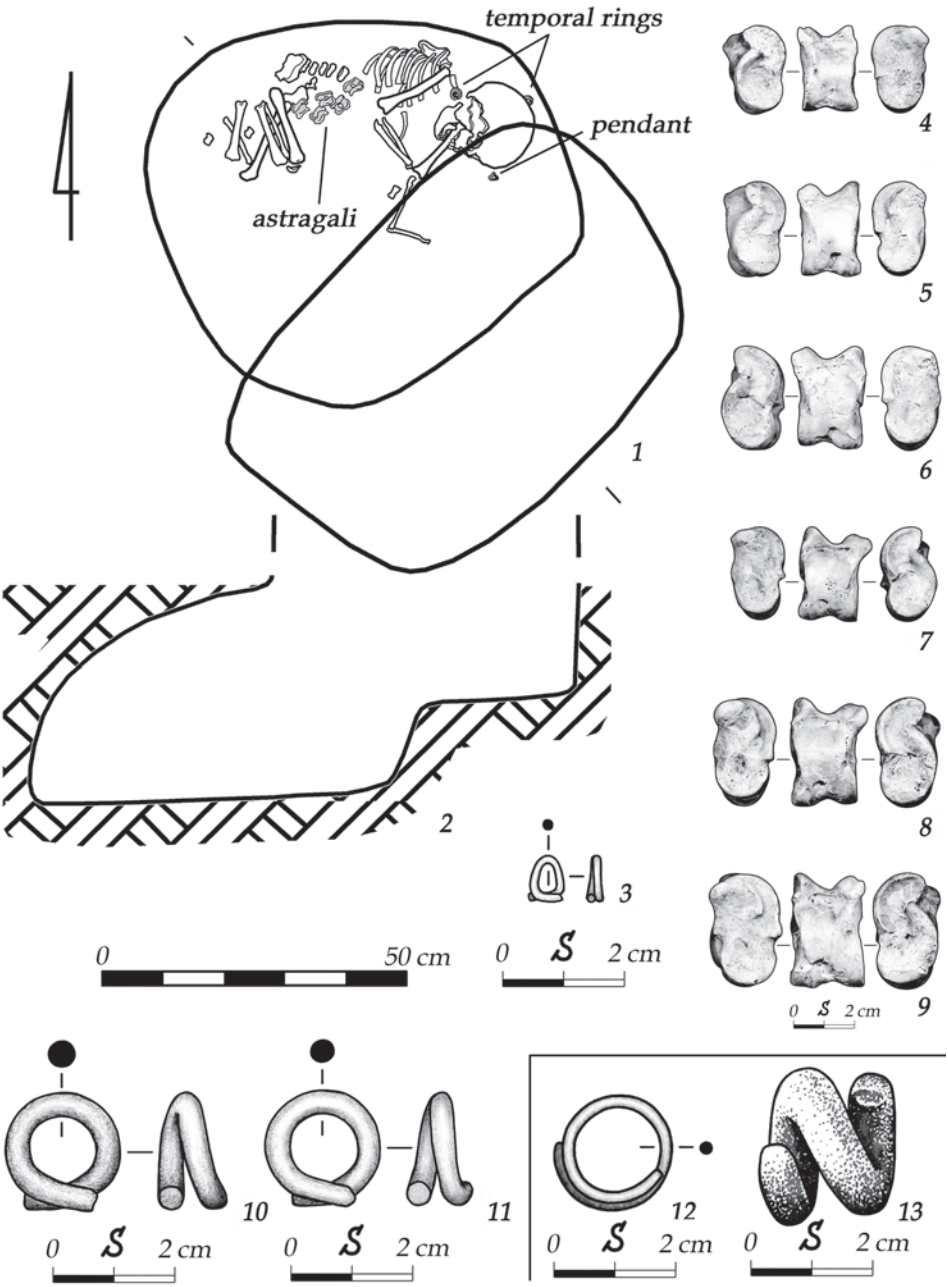


Fig. 3. Grave Glinoe/Rybkhoz 1/14: plan (1) and section (2) of the burial, 3 – bronze ring-pendant, 4-9 – astragali, 10, 11 – bronze temporal rings-pendants; 12 – bronze temporal ring-pendant from the burial Trapovka 16/9 (after Vanchugov *et al* 1976, fig. 3: 7); 13 – bronze ring-pendant from the Serzhen'-Yurt settlement (after Kosenkova 2001, fig. 36: 8)

Description of the finds

1. Bronze ring-pendant with ends extending one after another. It is made of a rod with a round cross-section, twisted into a ring in 1.25 turns. The diameter of the ring is 7.5 × 6 mm; the diameter of the rod is 1.5 mm (Fig. 3: 3).

2. Bronze ring-pendant with ends extending one after another (near the back of the head). It is made of a rod with a round cross-section, twisted into an incompact ring in 1.2 turns. The diameter of the ring is 19 mm; the diameter of the rod is 4 mm (Fig. 3: 10).

3. Bronze ring-pendant with ends extending one after another (under mandibula). It is made of a rod with a round cross-section, twisted into an incompact ring in 1.2 turns. The diameter of the ring is 19 mm; the diameter of the rod is 4.5 mm (Fig. 3: 11).

4. Six astragali of small cattle (three of them are right and the other three are left). Sizes are from 28 × 20 × 19.5 mm to 38 × 25 × 22.5 mm (Fig. 3: 4-9).

ANALYSIS OF THE FUNERARY RITE AND GRAVE GOODS

Certain features of the funerary rite in the grave Glinoe/Rybkhoz 1/14 find numerous analogies among the Pre-Scythian sites in the south of Eastern Europe (Valchak *et al.* 2019, 164-165). These include the undercut construction, the eastern orientation, the positioning of one of the wrists near the elbow joint or lain on top of the wrist of the other hand.

Temporal pendants made of a bronze (and other metals) rod twisted in the form of a ring, with the ends of the rod extending one after the other, are an enduring attribute of graves, from the Early Eneolithic to the beginning of the Early Iron Age. Such items are known from sites of various archaeological cultures in the vast expanses of Eastern Europe and cannot help to establish any narrow chronology if there is no other characteristic inventory in the complex.

Various types of rings-pendants, made with different metals, and with ends that face one another, are known at the sites of the Belozerka culture: Strumok 7/1 (Odessa region, Tatarbunary district) and Krinichnoe (Odessa region, Bolgrad district) on the left bank of the Lower Danube, and Kochkovatoe (Odessa region, Tatarbunary district) in the Danube-Dniester interfluve (Vanchugov 1990, 95, 97, fig. 35: 14, 15, 37: 10). They were also found in the Pre-Scythian sites of the North Black Sea region: Slobodzeya 3/3 on the left bank of the Lower Dniester (Yarovoy *et al.* 2002, 295, fig. 6: 3); Zimogorye 2/5 (Lugansk region, Slavyanoserbsk district) in the Middle Seversky Donets region (Makhortykh 2005, 69, 105, fig. 30: 9, 32); and Shakhaevsky-I 7/5 (Rostov region, Bagaevskaya district) in the Don region (Lukyashko 1999, 82, fig. 70: 2), as well as sites in the steppe (Valchak 2013, 52, fig. 3: 4) and mountain areas of the Northern Caucasus (Kozenkova 1998, 34-35, tab. IX: 10, 12).

The rings-pendants with non-closed and converging ends are, in most cases, rolled rather haphazardly and asymmetrically. A ring-pendant found on the skull in burial 9 of barrow 16 near Trapovka village (Odessa region, Tatarbunary district) in the Danube-Dniester interfluve (Vanchugov *et al*. 1976: 219-220, fig. 2: 3, 3: 7) is the closest analogy to the finds from “Rybkhoz”. The diameter of the ring is 1.8 cm; the diameter of the rod is 0.2 cm (Fig. 3: 12). This ring is almost the same as ours in terms of its diameter and the precision of its manufacture. However, it is made of a rod two times thinner than the rings from the “Rybkhoz”.

The exact ratio between the diameter of the rod and the relatively small diameter of the temporal rings from the Glinoe/Rybkhoz 1/14 complex makes them appear quite massive. In addition, these rings have two more features that are not characteristic for most such products of the Late Bronze Age/Early Iron Age of the North Black Sea region. These features are the distance between the ends of the ring (noticeable when viewed from the side) and the truncation (sharp chopping off) of the ends of the rod from which they are made. This combination of features (visual massiveness, flattening of the ends, the distance between the ends) draws our attention to the materials from the North Caucasus, where such finds are not uncommon. Thus, a massive ring-pendant of 1.7 turns, between the ends of which there is a gap, was part of a hoard of adornments found within the V lower horizon of the Koban culture settlement of Serzhen-Yurt (Chechnya, Shali district – Fig. 3: 13). The hoard is dated to the 10th-8th centuries BC (Kozenkova 2001, 80, 110, fig. 36: 8). The combination of general massiveness with the flattened (as if chopped off) ends is quite typical for Koban culture bracelets, characterizing the general style of certain categories of adornments in the region (*e.g.*: Kozenkova 2004, Pl. 34, 35).

We emphasize that the presence of a gap between the ends of the ring (noticeable when viewed from the side) is one of the characteristic features of the rings in the pendants from the grave Glinoe/Rybkhoz 1/8, as well as for the Chernogorovka pendants in the form of “lamb horns”.

The bronze pendant found at the frontal part of the skull is a little more informative. It may have served as a clip for a leather crown, or as a decoration of a headdress. Such a situation was recorded in the Pre-Scythian graves of the Chernogorovka culture of the North Black Sea region (Goshko and Otroshchenko 1986, 176; Makhortykh 2005, 68-69) and the steppe Ciscaucasia (Korenyako 1982, 65-66, fig. 2: 5, 6) many times.

The astragali from the burial Glinoe/Rybkhoz 1/14 are also a relatively infrequent, but characteristic find at the sites of the Pre-Scythian period (Makhortykh 2005, 70). They were also found in the flat graves of the Kartal III (Bruyako 2013, 175-176). Additionally, astragali are also known in Bronze Age burials. They are present in Pre-Scythian graves in an amount from one to several specimens. We should note that in 2019, three astragali were found in the area of a child’s spinal column in secondary burial 1 of barrow 1 of the “Plavni” (“Overflow”) group near Glinoe village, on the left bank of the Lower Dniester. In this grave, the child lay in a strongly crouched position with his head to the southeast.

However, the absence of other finds prevents us from definitively attributing this burial to either the Bronze Age or the Pre-Scythian period. At the same time, there is no doubt that the grave was constructed during one of these periods.

Thus, the grave goods and the position of the deceasedmake it possible to attribute the Glinoe/Rybkhoz 1/14 burial to the Chernogovka culture, and to date it between the 9th and the first half of the 8th century BC.

CONCLUSION

In conclusion, we should draw attention to some general regularities in the funerary rite of burials 8 and 14 from barrow 1 of the "Rybkhoz" group. Both of them were sunk into the northern floor of the mound. Entrance pits of both graves are located southeast of the burial chamber. The position and orientation of the deceased are similar. All of this suggests that both burials were sunk into the Bronze Age barrow in a rather narrow chronological range. They are interconnected, and represent a single "cemetery" of the Chernogorovka culture.

There are reasons to consider grave 8 somewhat earlier than burial 14. However, a larger sample of such sites and finds from the North Black Sea region, as well as throughout Eastern Europe as a whole, is necessary for a deeper substantiation of this thesis.

It seems that the features of the funerary rite and the inventory of each of the published graves will be useful in the future in determining the cultural and chronological position of such sites.

Acknowledgment

We express our sincere gratitude to Dr. habil. in Historical Sciences Igor V. Bruyako (Odessa, Ukraine) for advisory assistance in the preparation of the present work, including for indicating the find from the Cozia settlement as an analogy to the pendants from the burial Glinoe/Rybkhoz 1/10.

References

Bruyako I. V. 2013. O polze arkheologii v poiskakh sushchego (Zametki o fakticheskom soderzhanii ponyatiya «frako-kimmeriyskiy» gorizont). *Stratum plus* 3/2013, 155-190.

Bruyako I. V. 2017. Kollektsiya psaliev predskifskogo vremeni iz Kartala. *Stratum plus* 3, 311-327.

Chochorowski J. 1993. *Ekspansja kimmeryjska na tereny Europy Środkowej*. Kraków: Uniwersytet Jagielloński.

Dubovskaya O. R. 1993. Voprosy slozheniya inventarnogo kompleksa chernogorovskoy kultury. *Arkheologicheskiy almanakh* 2, 137-160.

Dubovskaya O. R. 1994. Lokalnye zony chernogorovskoy kultury (po materialam skorchennykh pogrebeniy). *Rossiyskaya arkheologiya* 2, 15-29.

Dvornichenko V. V. 1968. Pogrebeniya s podboyami epokhi pozdney bronzy v Severnom Prichernomore. In I. V. Yatsenko (ed.), *Sbornik dokladov na IX i X Vsesoyuznykh arkheologicheskikh studencheskikh konferentsiyakh*. Moscow: Moskovskiy gosudarstvennyy universitet, 5-15.

Fidelsky S. A. and Sinika V. S. 2010. Dva novykh stepnykh kimmeriyskikh pogrebeniya (k voprosu o severokavkazskikh vliyaniyakh na Yugo-Vostochnuyu Evropu v predskifskiy period. *Revista arheologică. Serie nouă* VI(1), 164-170.

Gergova D. 1978. Contributions to the problem of Thrako-Caucasian relations in the Iron Age. *Pulpudeva* 3, 296-304.

Goshko T. Yu. and Otroshchenko V. V. 1986. Pogrebeniya kimmeriytsev v katakombnykh i podboynykh sooruzheniyakh. *Sovetskaya arkheologiya* 1, 168-183.

Ivanova S. V., Petrenko V. G. and Vetchinnikova N. E. 2005. *Kurgany drevnikh skotovodov mezhdurech'ya Yuzhnogo Buga i Dnestra*. Odessa: Institut arkheologii NAN Ukrainy.

Kadieva A. A., Valchak S. B. and Demidenko S. V. 2020. Muzhskie pogrebeniya predskifskogo vremeni v vytyanutom polozhenii na mogilnike Zayukovo-3. *Kratkie soobshcheniya Instituta arkheologii RAN* 258, 165-180.

Kashuba M. T. 2000. Rannee zhelezo v lesostepi mezhdu Dnestrom i Siretom (kultura Koziya-Sakharna). *Stratum plus* 3/2000, 241-488.

Kaşuba M. 2003. Periferia de est a complexului hallstatian timpuriu cu ceramică incizată şi imprimată (secolele X-VIII î. e. n. în interfluviul Nistru-Siret). In: E. Sava (ed.), *Interferenţe cultural-cronologice în spaţiul nord-pontic*. Chişinău: Insitutul de Arheologie si Etnografie Academiei de Ştiinţe a Republicii Moldova, 183-210.

Kašuba M. 2006. Fibeln mit Bügelkugeln in der Moldau und Anmerkungen zum ägäischen Einfluss im 10. – 9. Jh. v. Chr. *Prähistorische Zeitschrift* 81(2), 213–235.

Korenyako V. A. 1982. Pogrebeniya predskifskogo vremeni na Vostochnom Manyche. *Kratkie soobshcheniya Instituta arkheologii RAN* 170, 64-70.

Kozenkova V. I. 1998. *Materialnaya osnova byta kobanskikh plemen. Western variant* (= Svod arkheologicheskikh istochnikov B2-5). Moskva.

Kozenkova V. I. 2001. *Poselok-ubezhishche kobanskoy kultury u aula Serzhen'-Yurt v Chechne kak istoricheskiy istochnik (Severnyy Kavkaz)*. Moscow: Nauka.

Kozenkova V. I. 2004. Biritualizm v pogrebalnom obryade drevnikh «kobantsev». Mogilnik Tereze kontsa XII–VIII v. do n.e. (= *Materialy po izucheniyu istoriko-kulturnogo nallediya Severnogo Kavkaza* 5). Moskva.

Levitsky O. G. and Kashuba M. T. 2011. Kurgany u s. Kotyuzhen' na yuge Srednego Podniestrovia i problema «frako-kimmeriyskikh» drevnostey (opyt izucheniya «pustykh» pogrebeniy»). *Arkheologicheskie vesti* 17, 239-258

Litvinenko R. A. 2009. *Kulturne kolo Babine (za materialami pokhovanikh pamiatok)*. Theses of the dissertation of a doctor of historical sciences. Kyiv.

Lukyashko S. I. 1999. *Predskifskiy period na Nizhnem Donu*. Azov: Azovskiy kraevedcheskiy muzey.

Makhortykh S. V. 2005. Kimmeriytsy Severnogo Prichernomoria. Kiev: Shlyakh.

Otroshchenko V. V. 1986. Belozerskaya kultura. In S. S. Berezanskaya, V. V. Otroshchenko, N. N. Cherednichenko and I. N. Sharafutdinova, *Kultury epokhi bronzy na territorii Ukrainy*. Kiev: Naukova dumka, 117-152.

Otroshchenko V. V. 2001. Problemi periodizatsii kultur serednoi ta piznoi bronzi pivdnia Skhidnoi Evropi (kulturno-stratigrafichni zistavlennya). Kyiv: Institute of Archeology of the National Academy of Sciences of Ukraine.

Savva E. N. 1992. *Kultura mnogovalikovoy keramiki Pruto-Dnestrovskogo mezhdurechia*. Kishinev: Shtiintsa.

Sharafutdinova I. N. 1982. *Stepnoe Podneprove v epokhu pozdney bronzy*. Kiev: Naukova dumka.

Sinika V. S., Razumov S. N. and Telnov N. P. 2016. *Arkheologicheskoe nasledie Pridnestrovia*. Tiraspol: Poligrafist.

Tarasova N. V. 2004. Visochnye podveski – «barani rozhki» predskifskogo perioda. In Problemy istorii i arkheologii Ukrainy. Materialy V Mezhdunardnoy nauchnoy konferentsiyu. Kharkov: Nauchno-metodicheskiy tsentr, 24-25.

Tarasova N. V. 2005. Visochnye podveski iz dragotsennykh metallov predskifskogo perioda. *Nizhnevolzhskiy arkheologicheskiy vestnik* 7, 122-132.

Toncheva G. 1980. Chronologie du Hallstatt Ancien dans la Bulgarie de Nord-Est (= *Studia Thracica* 5). Sofia: Academia Litterarum Bulgarica, Institutum Thracicum.

Valchak S. B. 2013. Raskopki mogilnika Nacherziy v Adygee. In A. N. Voroshilov (ed.). *Vostochnoevropeyskie drevnosti*. Voronezh: Nauchnaya kniga, 47-57.

Valchak S. B., Sinika V. S., Łukasik S., Pospeshny L. and Gorbol N. Yu. 2019. Predskifskie pogrebeniya gruppy «Sad» u s. Glinoe na levoberezhe Nizhnego Dnestra. *Journal of archaeology, anthropology and interdisciplinary studies* 1, 159-182.

Vanchugov V. P. 1990. *Belozerskie pamyatniki v Severo-Zapadnom Prichernomore*. Kiev: Naukova dumka.

Vanchugov V. P., Zaginaylo A. G. and Toshchev G. N. 1976. Okhrannye raskopki u s. Trapovka Odesskoy oblasti. In Z. V. Pershina (ed.), *Arkheologicheskie i arkheograficheskie issledovaniya na territorii Yuzhnoy Ukrainy*. Kiev, Odessa: Odesskiy gosudarstvennyy universitet, 214-224.

Vinski Z. and Vinski-Gasparini K. 1962. O utjecajima istočno-alpske halštatske culture i balkanske ilirske culture na slavonsko-srijemsko Podunavlje. *Arheoloski radovi i rasprave* II, 263-293.

Yarovoy E. V., Kashuba M. T. and Makhortykh S. V. 2002. Kimmeriyskiy kurgan u pgt. Slobodzeya. In N. A. Ketraru (ed.), *Severnoe Prichernomore: ot eneolita k antichnosti*. Tiraspol: Tipar, 279-343.

SPRAWOZDANIA ARCHEOLOGICZNE 72/2, 2020
PL ISSN 0081-3834
DOI: 10.23858/SA/72.2020.2.1864

Erwin Gáll[1], Florin Mărginean[2]

ARCHAEOLOGICAL DISCOVERIES LINKED TO THE "FIRST GENERATION" OF THE AVAR CONQUERORS LIVING EAST OF THE TISA DURING THE 6TH-7TH CENTURIES. THE GRAVE CLUSTER IN NĂDLAC – SITE 1M

ABSTRACT

Gáll E., Mărginean F. 2020. Archaeological Discoveries Linked to the "First Generation" of the Avar Conquerors Living East of the Tisa During the 6th-7th Centuries. The Grave Cluster in Nădlac – Site 1M. *Sprawozdania Archeologiczne* 72/2, 373-407.

Four graves were excavated on site 1M at Nădlac. They could be dated to the the second part of the 6th century and the first part of the 7th century AD. Based on the ^{14}C analysis, grave 86 can most probably be dated between 532 and 609 AD. This result indicates that the woman inhumed in the grave, aged 40-55 years, was very probably an immigrant who came from the East. The funerary rituals documented on site 1M in Nădlac can fit within the repertory of the regional environment characteristic of the area east of the Tisa in the the 6th and 7th centuries. Certain aspects of the ritual, however, like the burial of an entire calf in grave 86, draw attention to the danger of generalizations.

In addition, we have attempted to perform a brief analysis of various aspects of the development of the different concepts related to the nomadic lifestyle of the analyzed populations.

Keywords: graves, funerary ritual, ^{14}C analysis, Early Avar Period, Lower Mureş
Received: 27.04.2020; Revised: 17.05.2020; Accepted: 22.07.2020

1 Institute of Archaeology "Vasile Pârvan", Strada Henri Coandă 11, Bucureşti 010667, Romania; erwin.gall@iabvp.ro; https://orcid.org/0000-0002-5923-3461
2 Museum Arad, Piaţa George Enescu 1, Arad 310131, Romania; finnlands@yahoo.com; https://orcid.org/0000-0002-5601-807X

1. INTRODUCTION

The rescue excavations performed along the route of the Nădlac–Nădlac–Pecica highway sector, Plot 1 km, and along the connection road with the city of Nădlac (Figs 1 and 2) have led to the discovery of several sites (86 archaeological features on 1.5 ha) dated to different historical periods – among them, a burial ground with four graves from the Early Avar Age (Fig. **3**). Site 1M was delimited on the basis of surface surveys between km 0+000 – 0+300, near the Romanian-Hungarian border.

2. GEOGRAPHIC LOCATION OF THE DISCOVERIES

Site 1M is located 7 km north of the present-day course of the river Mureş and 5 km north-east of the city of Nădlac. This area belongs to the geographic unit called the High Western Plain, or the Banat-Crişana Plain (Posea 1997, 11-12) – the eastern part of the Great Plain. The area of Nădlac belongs to the group of terminal piedmont-type plains, or tabular plains, with loess hills that look like piedmonts. It has remained higher than the surrounding low plain. It is, in fact, the remainder of a large dejection cone of the Mureş (Posea 1997, 34). The group of graves was located on a slight rampart (Fig. 3).

3. RESEARCH METHODOLOGY

The surface of the site, severely affected by previous excavations, was uncovered with the aid of excavators with grading blades. After the removal of the topsoil, which measured about 0.2 m on average, the team coordinated the removal of a series of layers, each measuring up to 0.1/0.2 m deep. After these deposition levels were removed, the team delimited the features that became apparent in the cultural layer.

In the case of the graves discovered on site 1M in Nădlac, the pits were delimited inside wider features attributed to other historical periods. Thus, the precise identification of the grave pits has not always been possible (see the case of Ftr. 77).

When the two infrastructure projects were connected, another archaeological site was discovered less than 400 m away, on the Hungarian side of the border. Colleagues from Szeged have attributed that site to the Early Medieval Period. There, they have researched not only graves with niches (from the second part of the Avar Age), but also part of a settlement, and all the features have been dated to the later period of the Avar Khaganate (Pópity 2015, 93-114). It is thus very likely that the four graves under discussion here are connected to some of the discoveries made in Hungary.

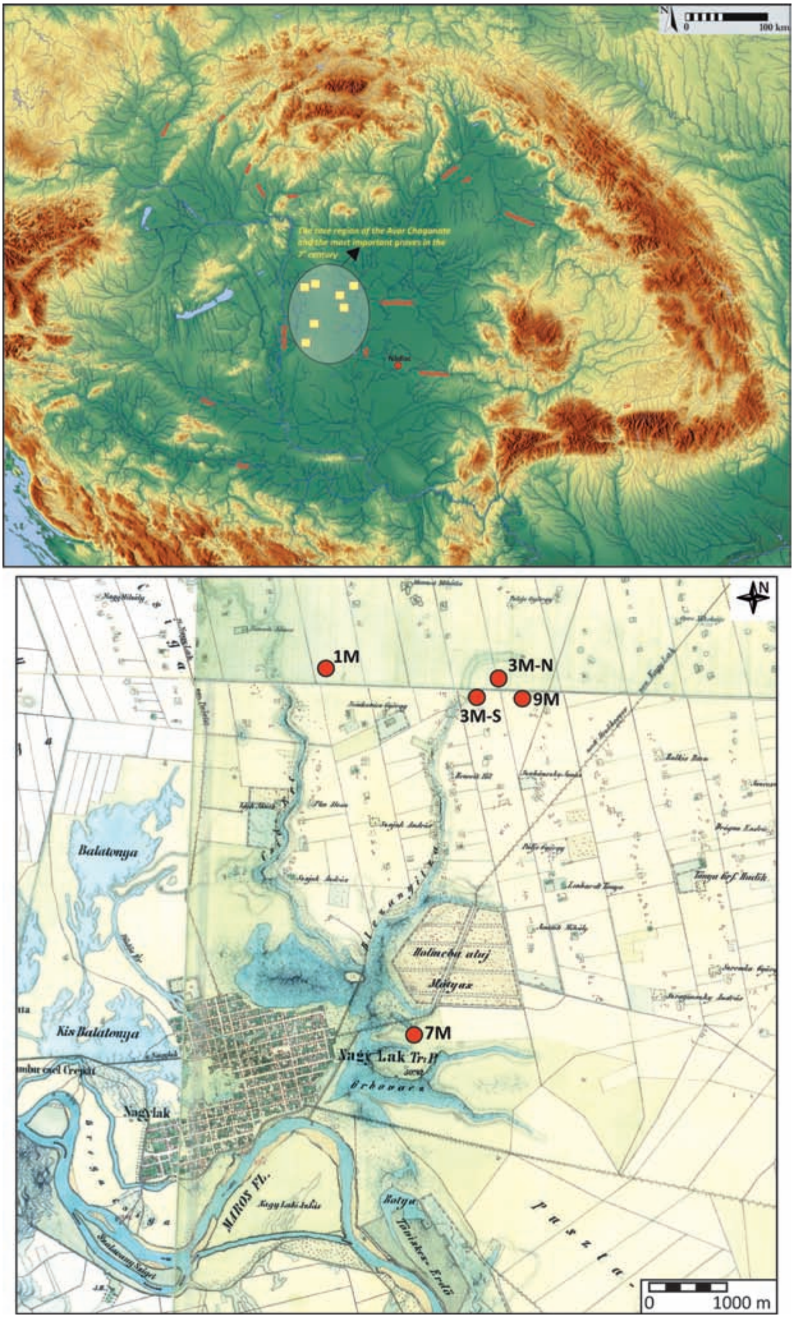


Fig. 1. A – The location of Nădlac and the position of the richest graves of the 7th century in the Carpathian Basin. B – Nădlac: Avar Age funerary sites 1M, 3M-N, 3M-S, 9M projected onto the map of the 2nd Military Survey (illustrated by Erwin Gáll and Florin Mărginean)

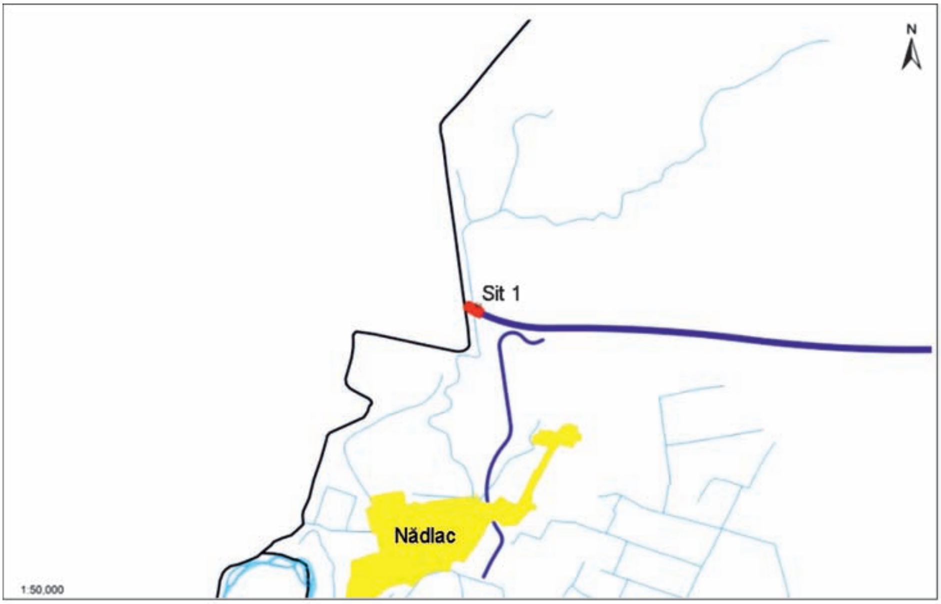


Fig. 2. Nădlac – Arad motorway. Map with the location of site 1M
(illustrated by Florin Mărginean)

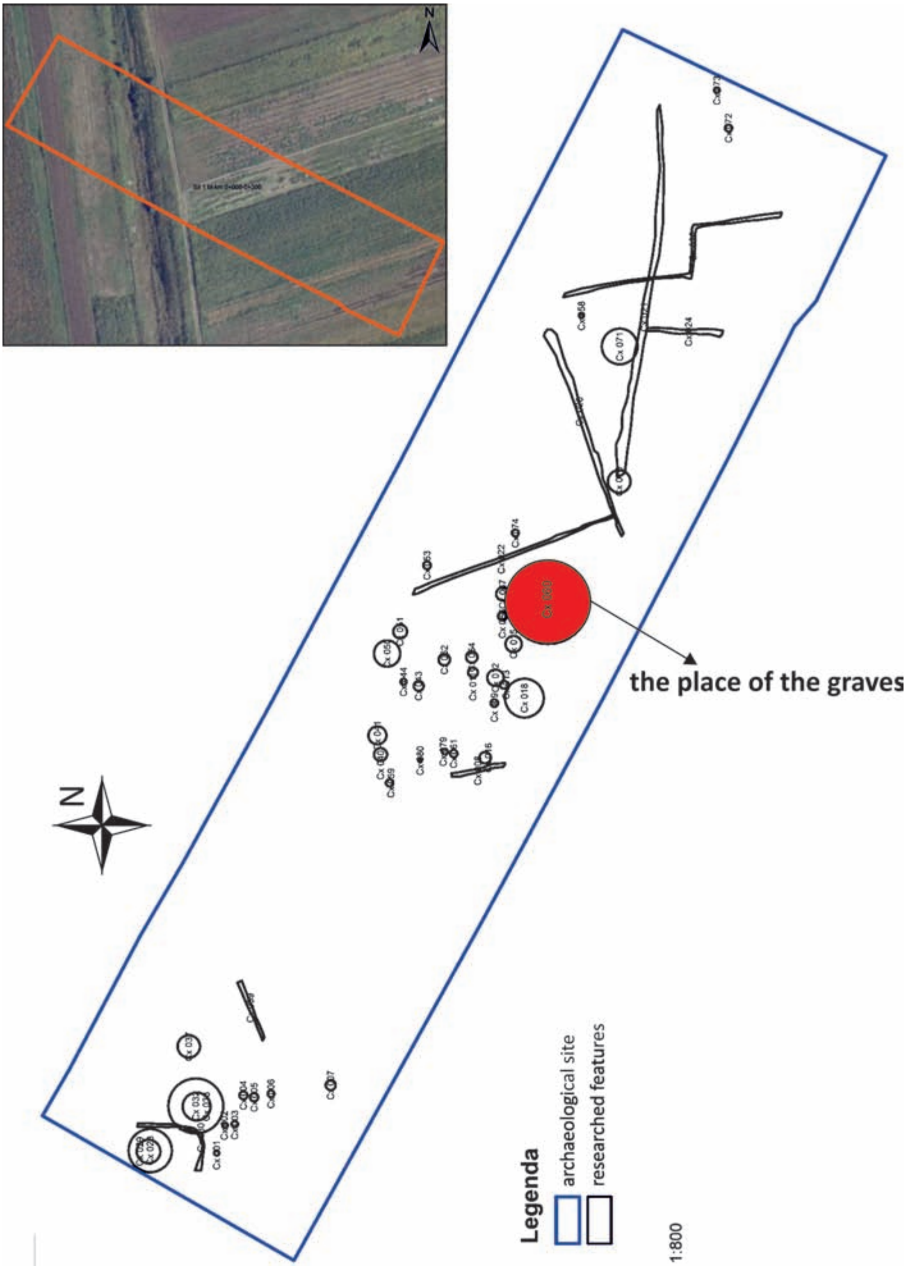


Fig. 3. Nădlac-1M. General map of the archaeological excavations and the precise locations of the graves (illustrated by Adrian Ursuțiu)

4. DESCRIPTION OF THE GRAVES

(a broader anthropological and archaeozoological analysis can be found in: Andreica Szilagyi and Peter 2020; Dumitraşcu 2020)

The funerary features investigated on Site 1M (Fig. 4), four in number, have been labeled Ftr. 77 (Fig. 5), Ftr. 78 (Fig. 6), Ftr. 81 (Fig. 7) and Ftr. 86 (Figs. 8 and 9). All four graves overlapped other features, attributed either to Prehistory or to the Sarmatian Period, according to their contents.

Of the features under discussion here, three (Ftr. 78, Ftr. 81, and Ftr. 86) are oriented E-W, and one, Ftr. 77, is oriented N-S. Almost all lacked an inventory – it was only in Ftr. 77 that the team identified a fragmentary iron item, probably part of a buckle, near the knee. The dating and attribution to the 6^{th}-7^{th} century of feature Ftr. 77, oriented N-S, remains debatable; we also remain cautious on the matter considering the absence of radiocarbon analyses (^{14}C). The interred bodies lay in a supine position with the arms on the thorax (Ftr. 77), on the abdomen (Ftr. 78) or extended along the body (Ftr. 86).

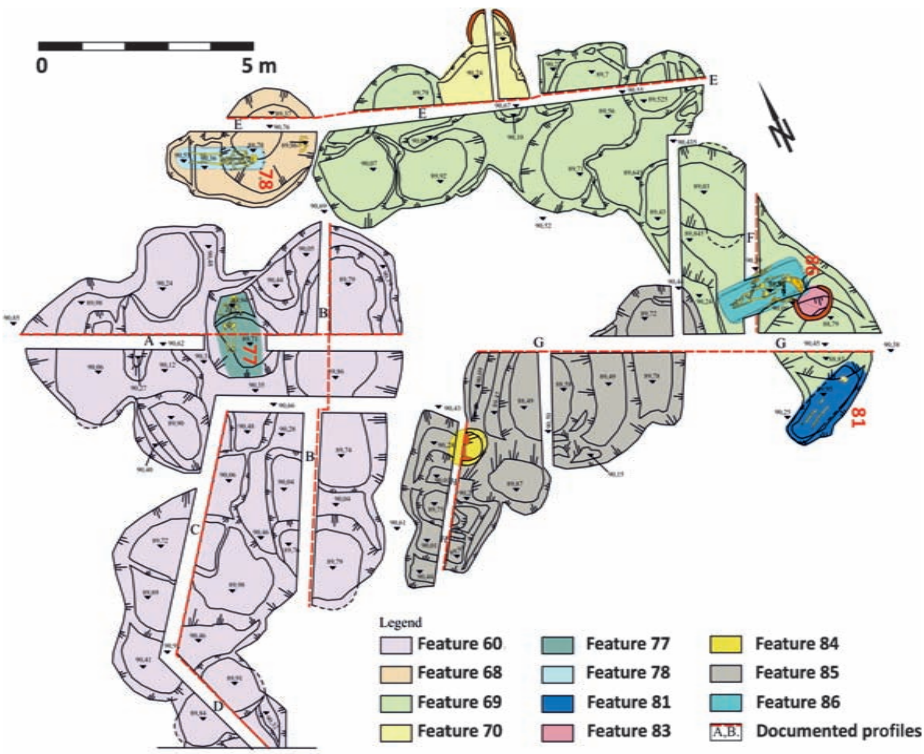


Fig. 4. Nădlac-1M: plan with the locations of the graves: Feature 77, Feature 78, Feature 81, and Feature 86 (illustrated by Adrian Ursuțiu)

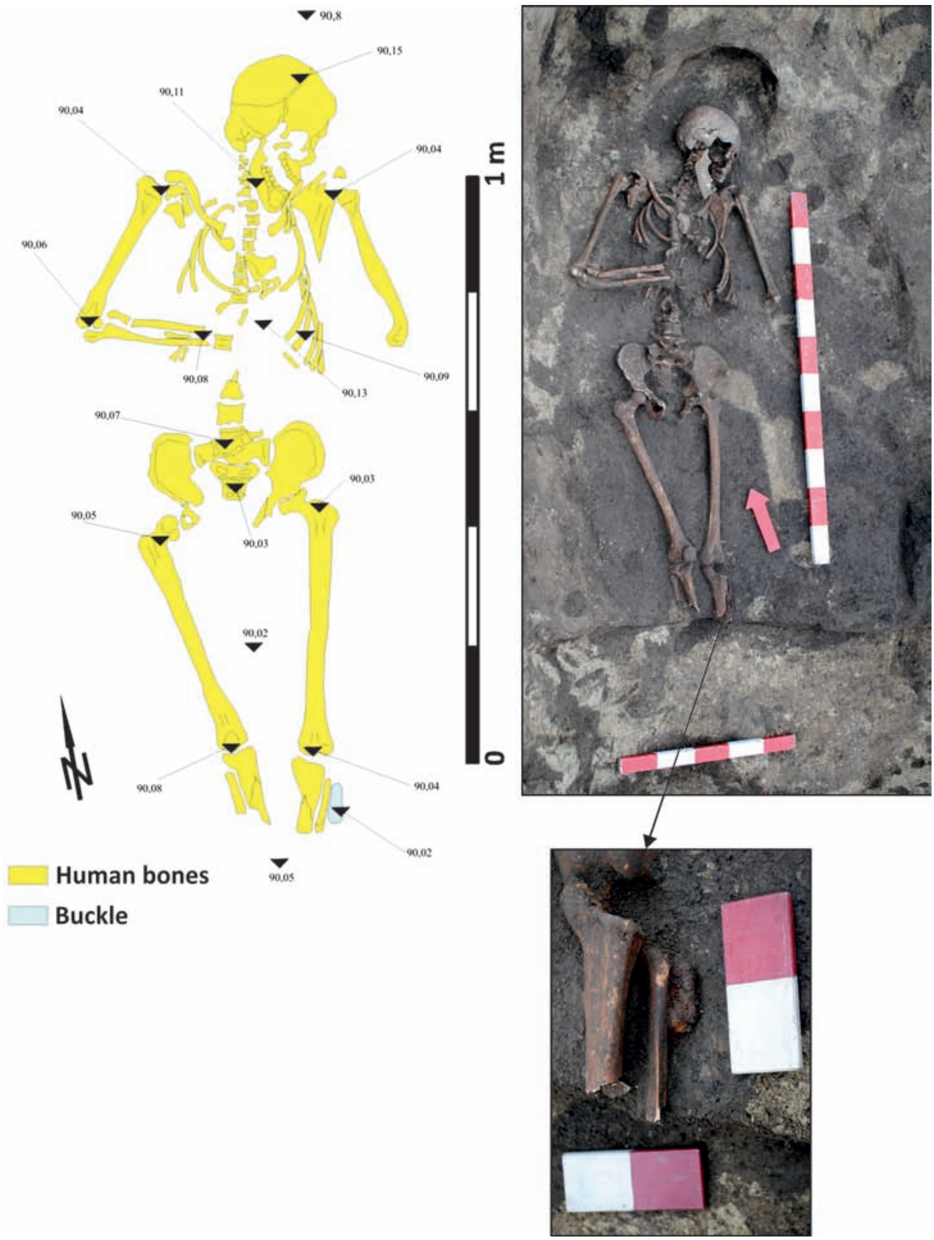


Fig. 5. Nădlac-1M: Feature 77
(illustrated by Malvinak Urák; photo by Adrian Ursuțiu)

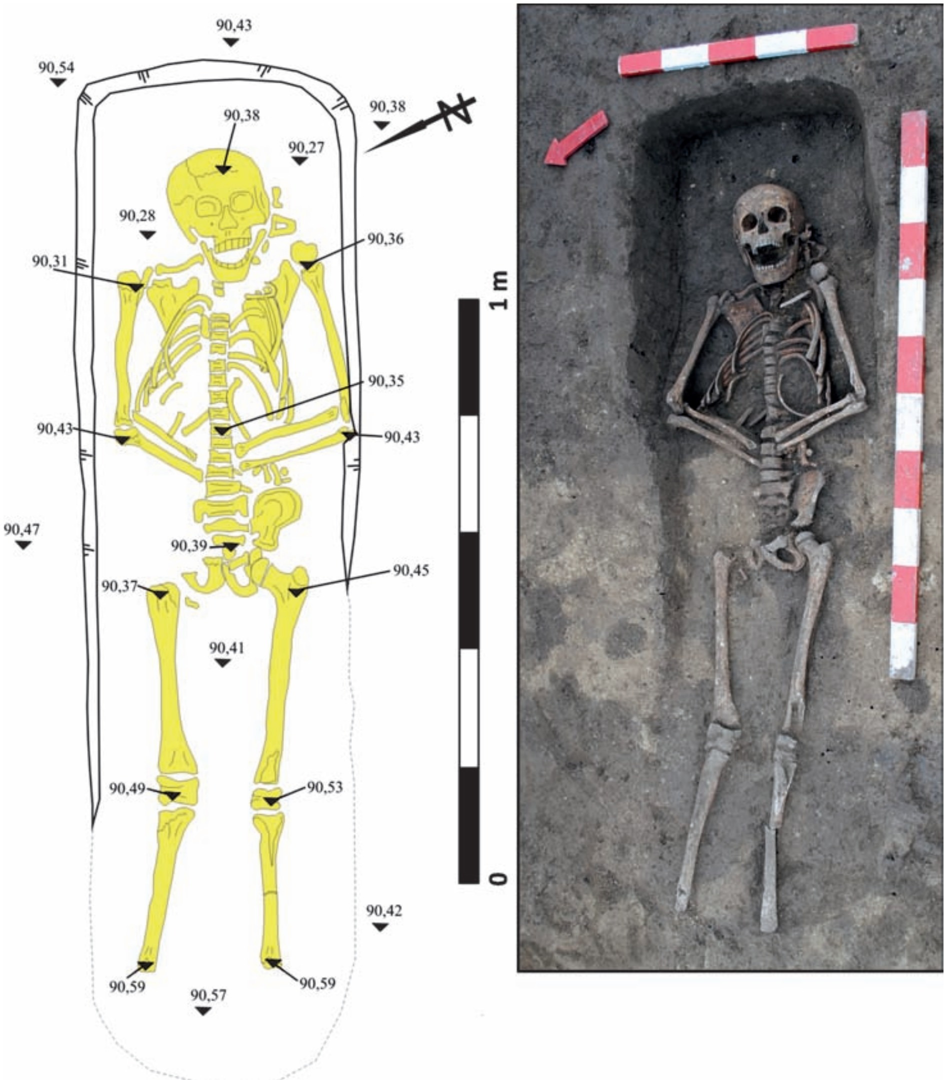


Fig. 6. Nădlac-1M: Feature 78
(illustrated by Malvinak Urák; photo by Adrian Ursuțiu)

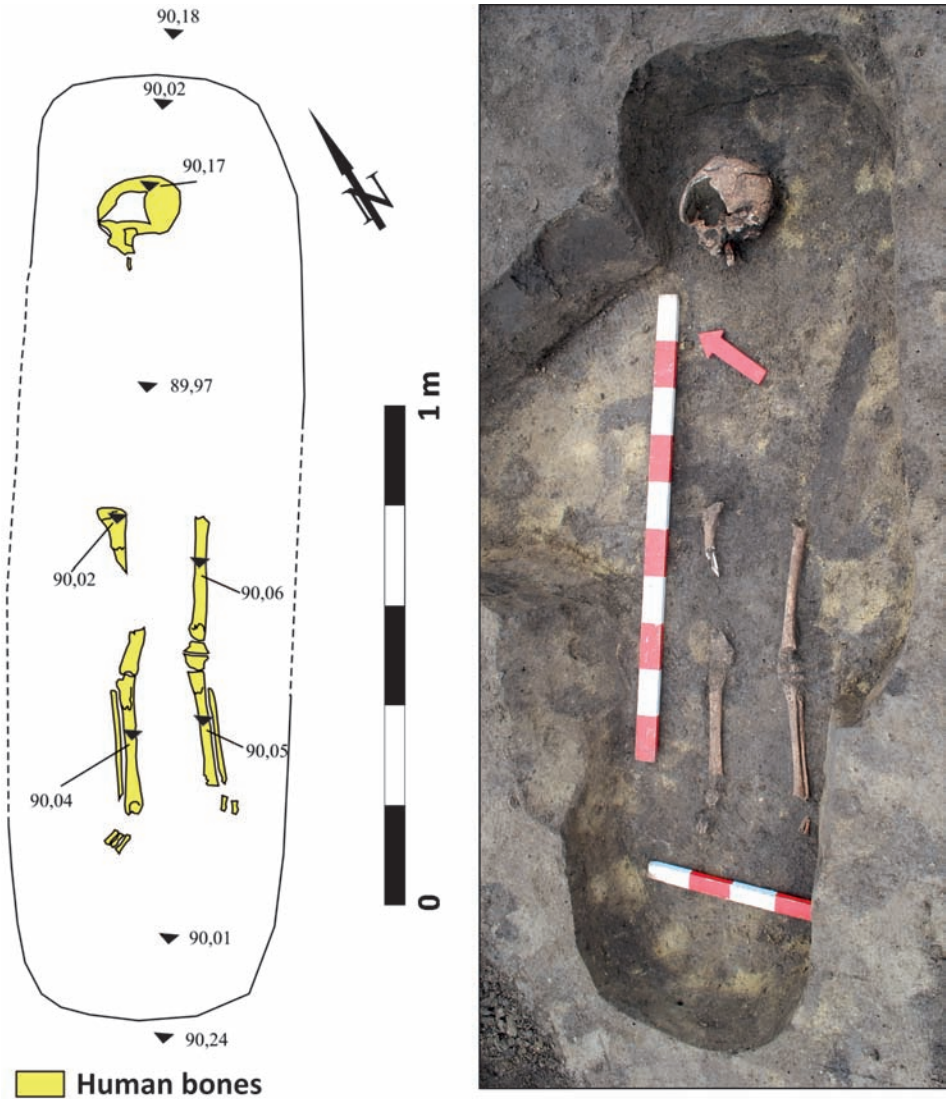


Fig. 7. Nădlac-1M: Feature 81
(illustrated by Malvinak Urák; photo by Adrian Ursuțiu)

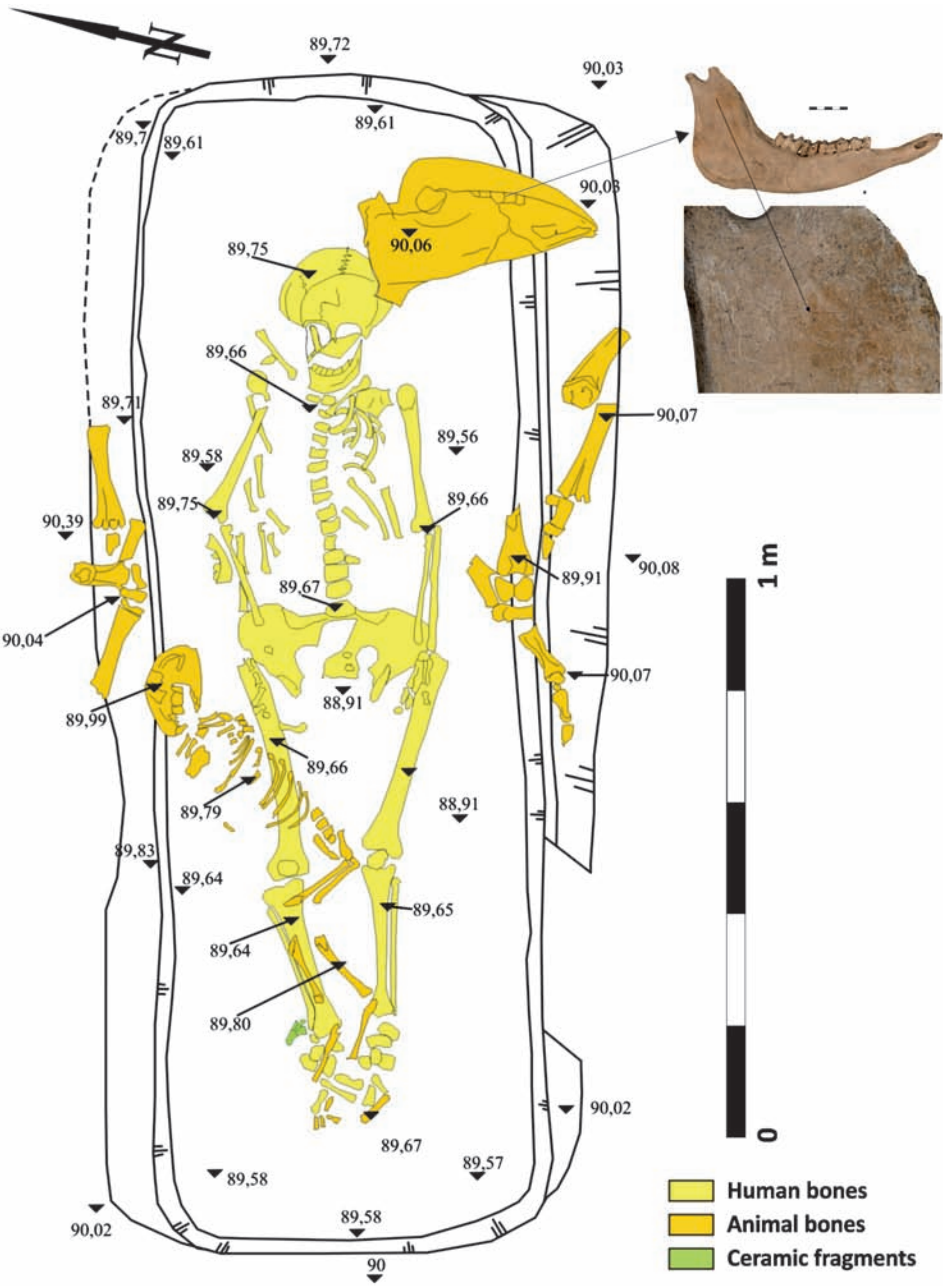


Fig. 8. Nădlac-1M: Feature 86 (with right mandible with cut marks)
(illustrated by Malvinak Urák; photo by Valentin Dumitrașcu)

Fig. 9. Nădlac-1M: Feature 86
(photo by Adrian Ursuțiu)

Ftr./Grave 77 (Fig. 5)

Inhumation. Orientation: N-S. Grave pit shape: at the level of identification it seems to have been rectangular with rounded corners. The grave cuts through an older, large pit. Thus, the identification of the shape and depth of the grave is relative. Grave pit size: ±1.7 m. Depth: approx. 0.7 m.

The deceased lay in a supine position, with the head turned left (eastwards). The arms had been bent and placed upon the thorax. The lower limbs were stretched, brought closer together towards the heels. Skeleton length: 164.7 cm.

Gender: very probably male. Age: *adultus*, 18-23 years.

Funerary inventory: an iron buckle was preserved near the left knee; the item was very corroded, apparently rectangular in shape with rounded corners.

Ftr./Grave 78 (Fig. 6)

Inhumation. Orientation: NE-SW. Grave pit shape: rectangular with rounded corners and slightly oblique walls. The bottom of the pit was slightly tilted, higher by the lower limbs and lower towards the skull. The grave overlapped an older pit. Grave pit size: 1.96 m. Depth: 0.4 m.

The deceased lay in a supine position, with the arms bent and placed upon the abdomen. The lower limbs were stretched straight.

Skeleton length: 151 cm.

Gender: indeterminate. Age: *infant II,* 12-13 years.

No other elements of funerary ritual had been deposited in the grave.

Ftr./Grave 81 (Fig. 7)

Inhumation. Orientation: NE-SW. Grave pit shape: a rectangular shape became apparent at identification, more visible in the western part. The pit walls were slightly oblique and the bottom was straight. Taking into consideration the fact that the median part of the skeleton was missing, the grave was very likely disturbed by a subsequent pit that partially overlapped it. Grave pit size: 1.9 m. Depth: 1 m.

According to the position of the bones that were preserved *in situ*, the deceased lay in a supine position, with the head to the right (north-west) and the lower limbs extended.

Skeleton length: 135 cm.

Gender: indeterminate. Age: *infant I-II,* 7.5-8 years.

No other elements of funerary ritual had been deposited in the grave.

Ftr./Grave 86 (Figs 8 and 9)

Inhumation. Orientation: ENE-WSW. Grave pit shape: the grave was identified inside an older and larger feature; the grave pit was rectangular, with rounded corners. The pit walls were slightly oblique, and towards the bottom they formed a small step. The bottom of the pit was flat. Pit size: at identification, the pit measured 2.05 m in length and approximately 0.67 m in width.

The deceased lay in a supine position, with the head turned to the left. The right arm was slightly bent and placed upon the pelvis, while the left arm was extended along the body. The lower limbs were also extended and placed closer together towards the heels.

Skeleton length: 144.8 cm.

Gender: female. Age: *maturus II-senilis*, 40-55 years.

Depositions of animal offerings:

1. A cow's skull (*adultus*) had been deposited on the left side of the deceased's head and limb elements of (probably) the same animal had been placed on both sides of the pit.

2. An entire calf (*juvenis*) had been deposited over the lower right limb of the deceased.

Traces of a coffin could not be observed due to the conditions of the discovery, but it is certain that the body had been spatially separated through something from the butchered parts of the animals deposited in the grave.

A pottery fragment, probably disturbed, was recovered from the area of the phalanges of the lower right limb. The fragment is irrelevant to the grave in question.

5. FUNERARY RITUALS AND REGIONAL ANALOGIES

The funerary rituals documented on site 1M in Nădlac can be included in the repertory of the regional environment characteristic of the area east of the Tisa in the second part of the 6th and the first half of the 7th centuries. Gábor Lőrinczy has performed a synthetic analysis, taking into consideration only the funerary sites in Hungary, without a catalogue of discovered graves (Lőrinczy 1998, 343-372; Lőrinczy 2016, 155-165). The four graves – though almost devoid of inventory items – can be dated, based on the specific funerary rituals, between the second half of the 6th century and the first half of the 7th century. They display general characteristics similar to those of graves discovered east of the Tisa. Such characteristics (typical to the rituals practiced in, but not exclusive to the area east of the Tisa and shared by the funerary discoveries on site 1M), include the following:

1. The E-W orientation (or NE-SW or SE-NW);

2. N-S orientations are rarer (and thus we cannot state with certainty that the grave labeled Ftr. 77 belongs to the 6th-7th centuries);

3. The so-called composite graves, inside which the deceased had been spatially separated from the offerings (*1. graves with catacomb-type niche; 2. stepped graves; 3. graves with side niche*). In the case of Site 1M in Nădlac, in Ftr. 86 we were able to document a grave pit that included side steps, characteristic to this period;

4. The defining characteristic of the funerary ritual in this region undoubtedly refers to the deposition of offerings consisting of sacrificed animals, as is the case inside feature Ftr. 86.

Until now, in the area east of the Tisa, besides a small number of animals deposited in their entirety (only horses and, in a few cases, sheep; Gulyás 2015, 499) there were many more numerous situations when only parts cut off such animals had been deposited in the

Fig. 10. Kövegy–Nagyföldek, grave 12 (after Benedek and Marcsik 2017, Pl. 24)

graves. Among these types of depositions, a significant number of remains consisted of horse, cattle, sheep, and goat bones. We have to emphasize, that no regional statistic is available, only analyses of certain sites such as Kövegy and Nădlac-3M-N (Benedek and Marcsik 2017, table 2; Gáll 2017, figs 12 and 53). In the cases where certain animal parts were selected as food offerings (such as those of birds), they were especially deposited near the head of the deceased (just like pottery containers).

4.1. In the case of grave Ftr. 86, the skull, distal bones, and the first vertebra of an adult domestic cow (*Bos taurus*) were located on both grave steps, spatially separated from the human body, ca. 20-25 cm from it; the bone remains display traces of the tool used to butcher the animal. One should also note that animal parts that did not contain meat were deposited. The manner of deposition and the placement of the deceased in Ftr. 86 (with the steps created on the left side of the pit) were almost identical to grave 12 in Kövegy-Nagy-földek, belonging to a woman aged 23-25 years (Fig. 10; Benedek and Marcsik 2017, 371-372, tables 7 and 24), as well as to the discovery in Makó-Mikocsa halom (Gulyás *et al.* 2018, fig. 1); these two funerary sites are located *ca.* 5 km and 19 km from Site 1M in Nădlac. One should also note that remains of an adult female cow had been discovered in the woman's grave.

This type of deposition, consisting only of parts from sacrificed adult cattle, is characteristic to the regions east of the Tisa (such is the case of Ftr. 86), but similar cases are also known in several other places, such as Szekszárd-Bogyiszló út (*Transdanubia*). However, we also wish to mention the fact that not all funerary discoveries made or even published have been analyzed (not by far!), so such statements should be regarded with maximum care (Gulyás 2015, 504).

4.2. The complete skeleton of a newborn calf was discovered in grave 12 from Kövegy-Nagy-földek (not far from Nădlac-1M), in the area of the buried woman's pelvis and right femur (Fig. 10). The deposition consisted only of the butchered bones of the calf, (Benedek and Marcsik 2017, 371-372, table 7).

Though the presumed complete absence (?) of entire animal depositions in the same space as the deceased is often mentioned in scientific discussions regarding the graves of the funerary spots known east of the Tisa (Lőrinczy 2016, 157), the situation on Site 1M in Nădlac draws attention to the danger of generalizations. We can interpret this as a perpetual need of specialists – derived from nationalist methodology – to construct black-and-white pictures; an aspect that might be connected to the concept of cultural uniformity. This situation might lead to a great number of hypotheses, but one cannot support them sufficiently with arguments. Still, we maintain our view that besides its general aspects, micro-community social psychology also recognizes a series of exceptional attitudes that cannot be explained. At the same time talking into account repertory all such natural phenomena (that we call "*exceptions*") in order to clearly see whether this uniform picture of funerary rituals is indeed factual or rather just a scientific creation.

6. DATING OF THE FUNERARY SPACE

The dating of the four graves from Nădlac-1M is made difficult by the relatively poor inventory, and because of this, the chronological observations have been based on the first phase – specifically, on certain aspects of the funerary practices. However, we must mention the absence of any artefact categories with more precise dating from the graves.

As archaeology has shown in the last decades, the main characteristic of 6th-7th century burials in the *Transtisa* area is the orientation of the graves with an E-W tendency (the great majority; Lőrinczy 1987-1989, 161-171).

Because of the absence of chronologically informative grave inventories, we were forced to make use of radiocarbon analysis. We were able to collect samples from grave Ftr. 86. Based on the analyses and the calibrations, as one can see in Fig. 11, grave Ftr. 86 can most probably be dated between 532 and 609.

What can we infer from these data? First of all, we can say with confidence that it is most certainly a grave that can be dated to the final third of the 6th century, *i.e.* the first generation of conquerors of this region of the Lower Mureş. In a previous analysis, Csanád Bálint scrutinized the issue and was able to conclude that, in fact, the graves of the first

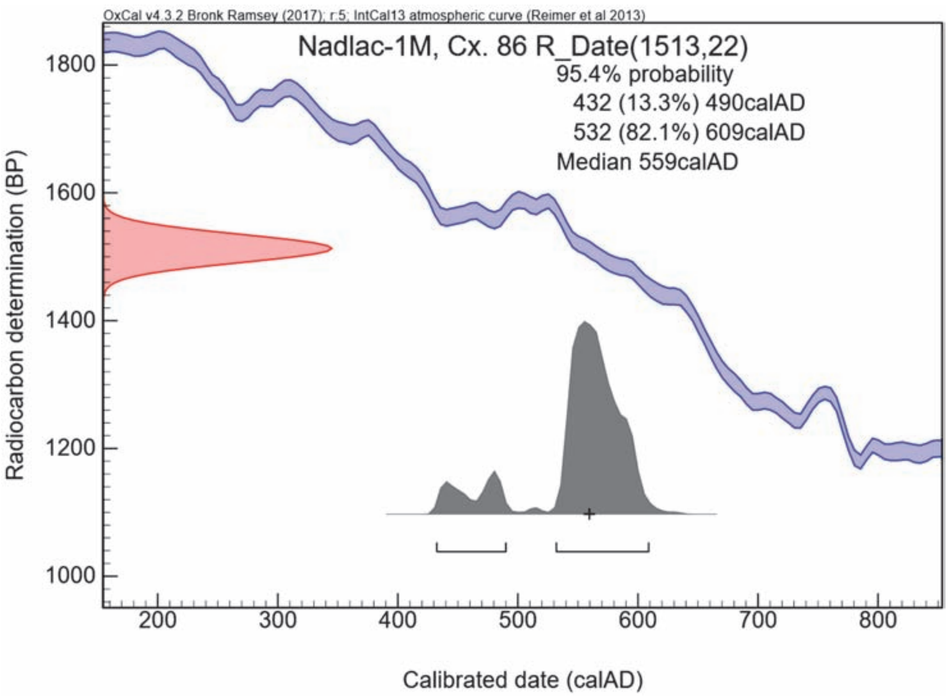


Fig. 11. ^{14}C analyses of samples from grave Ftr. 86 (prepared by Victor Sava)

generation of conquerors are entirely missing (Bálint 1995, 310-311). Against this statement, we could provide another explanation: at this moment, as shown by Fig. 11, the so called "first generation" of Avars (namely the *oriental conquerors*) in the Lower Mureş region is very clear.

7. STATISTICAL APPROACH TO ALL FUNERARY SITES IN THE AREA OF THE LOWER MUREŞ DURING THE FIRST PART OF THE AVAR ERA, AND THE ISSUE OF THE FIRST GENERATION OF "CONQUERING AVARS" EAST OF THE TISA

The largest concentration of funerary discoveries called, in specialized literature, "the funerary horizon east of the Tisa" is located in the Mureş – Criş – Tisa area, in the southern area of the Mureş down to Mokrin (taking into consideration the drawbacks of research in the Serbian Banat, but also in Romania, it is difficult to establish the geographic extent of these types of funerary places, see: Gáll and Romát 2016, 433-438). The area in question holds a significant concentration of such discoveries, which become more sparse to the north – especially north of River Criş, where one finds a much smaller number of researched funerary sites. No extended repository has yet been made and illustrated on a map that includes all micro-regions east of the Tisa; such finds are only encountered in partial mappings of the Mureş – Criş – Tisa area and of Banat (Lőrinczy 1998, 343-372; Gáll and Romát 2016, 457-466: Appendix 2). According to Gábor Lőrinczy's statistical approach, the discoveries of this type made east of the Tisa consist of around 230 funerary sites with a total number of 1700 graves (Lőrinczy 2016, 156). The largest burial grounds have been researched in Szegvár – containing 370 graves (Lőrinczy 2020) and Makó – with more than 251 graves (Balogh 2016, 109-120). The other funerary places discovered in these areas are mainly noticeable through grave clusters (see Fig. 12).

Few discoveries had been made up to the year 2010 on the Romanian side. Those that had been made included discoveries in Peregu Mare (Gáll 2017, Pl. 252-254), the silversmith grave discovered in Felnac, oriented E-W and containing horse parts as depositions (Hampel 1900, 117-123; Dömötör 1901, 62-66), or the graves in Felnac-Complexul Zootehnic, discovered in 1975 (Mărginean and Băcueţ 2015, 216-220). To these, one can add the N-S oriented grave found in Sânpetru German, dated with a coin issued between 616 and 625 by Heraclius and Heraclius Constans (Dörner 1960, 423-433). The number of these funerary discoveries has considerably increased with the start of infrastructure and sewage system works; the best examples are those of the excavations performed in the area of Nădlac (where Avar Period funerary discoveries were made on the following sites: 1M, 3M-N, 3M-S, 7M, and 9M), and the area of the city of Pecica (where Avar Period funerary discoveries were made on the following sites: Site 15, Rovine, Est-Smart Diesel, Duvenbeck, and Forgaci [?]) – a total of around 268 graves more than the few known until then!

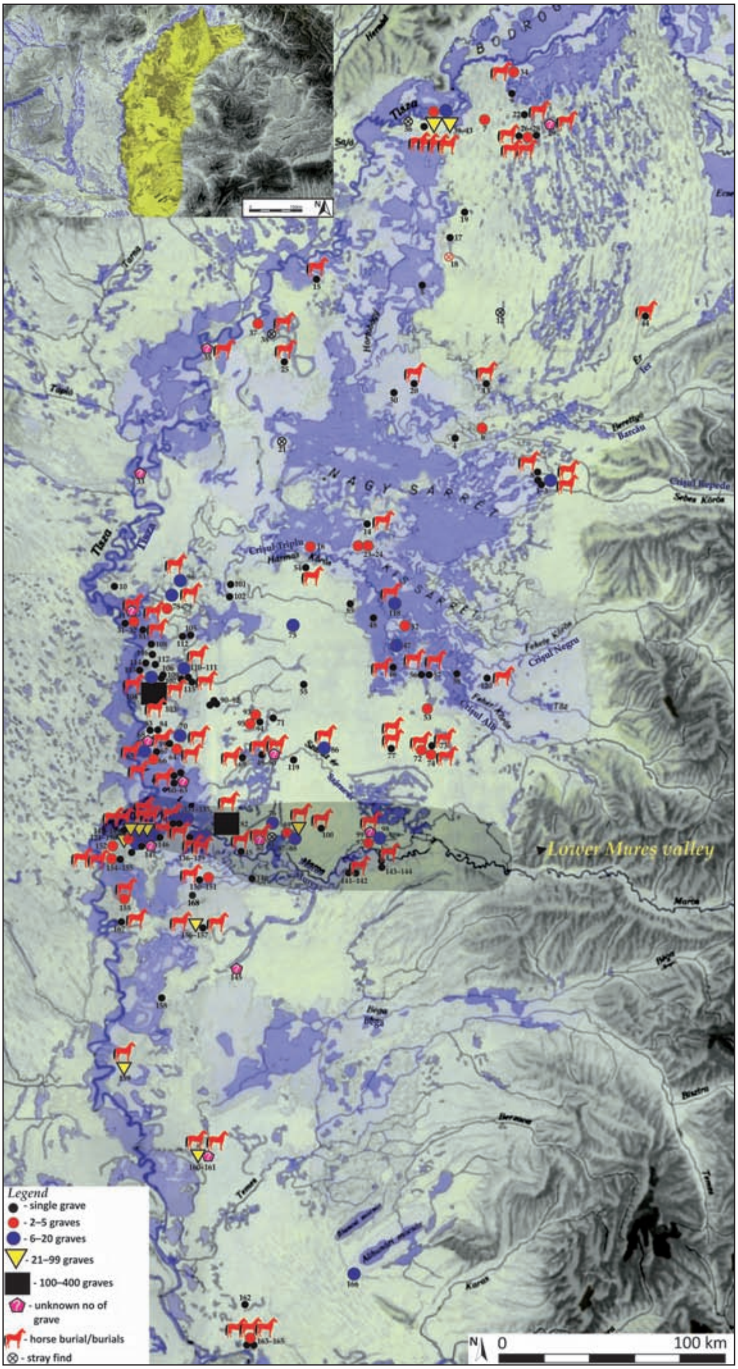


Fig. 12. The distribution of the funerary sites in the first part of the Avar Age in the regions of Transtisa

Archaeological sites

The regions to the north of Criș river: 1. Ártánd-F 14211. határkő (1 grave); 2. Ártánd-Platthy Miklós birtoka (1 grave); 3. Ártánd-Kapitány-Dűlő, Róth-Tanya (10-12 graves); 4. Bakonszeg–Berettyó folyó (stray finds+1 grave); 5. Balmazújváros–Tsz tanyaközpont (1 grave); 6. Berettyóújfalu–Herpály (4 graves); 7. Bashalom-Csengőspart (3 graves); 8. Biharkeresztes-Lencséshát (1 grave); 9. Buj-Hiller-gőzmalom (1 grave); 10. Cibakháza (1 grave); 11. Csépa (unknown no. of graves); 12. Debrecen-Kossuth utca (stray finds); 13. Derecske-DNy határa, M35 (1 grave); 14. Dévaványa-Köleshalom gr. 75 (1 grave); 15. Egyek (1 grave); 16. Gyoma 264. lelőhely Ugari tanyák-dülő (3 graves); 17. Hajdúböszörmény-Vidi Puszta, Erdős Imre tanyája (1 grave); 18. Hajdúböszörmény-Zeleméri puszta (stray finds); 19. Hajdúdorog–Városkert út (1 grave); 20. Kaba–belterületi sír (1 grave); 21. Kisújszállás-Iléssy L. birtoka (stray find); 22. Kótaj (1 grave); 23. Körösladány (2 graves); 24. Körösladány-Dózsa TSz, Fazekas-tanya 7/107 (3 graves); 25. Kunmadaras-Újvárosi temető (1 grave); 26. Nyíregyháza-Moszkva utca 9 (1 grave); 27. Nyíregyháza-Városi kertészet, kertgazdaság (1936) (3 graves); 28. Nyíregyháza (1937) (1 grave); 29. Nyírtura-Propper S. Földje (several graves); 30. Püspökladány-Szé u. 13 (1 grave); 31. Szelevény (1 grave); 32. Szelevény-Mennyasszonypart (4 graves); 33. Szolnok-Gépjavító Vállalat (several graves); 34. Tiszabercel-Vékásdűlő (3 graves); 35. Tiszabura-Védőgát (several graves); 36. Tiszadada-Szomjas József tanyája (stray find); 37. Tiszaderzs-Szentimrei út (4 graves); 38. Tiszaszentimre-Református templom (stray find); 39. Tiszavasvári-Dózsa telep, Határút (4 graves); 40. Tiszavasvári-Kashalmi dűlő (6 graves); 41. Tiszavasvári-Eszenyi-telek (1 grave); 42. Tiszavasvári-Koldusdomb (24 graves); 43. Tiszavasvári-Utasér-part-dűlő (26 graves); 44. Valea lui Mihai (1 grave)

The area between the rivers Mureș–Criș–Tisza: 45. Apátfalva (1 grave); 46. Békéscsaba-Szarvasi és Csórvási útelágazás (1 grave); 47. Békéscsaba-Repülőtér 2/95. lelőhely (15–20 graves + other graves); 48. Békés-Hidashát (1 grave?); 49. Békéssámson-Móricz Zs. u. 12 (1 grave); 50. Békéssámson (unknown no of graves); 51. Csanádpalota-Országhatár-M43 Site 56 (stray find); 52. Doboz-Hajdúírtás (4 graves); 53. Elek-Kispél, Homokbánya, Ottlakai Szőlők (1 or 2 graves); 54. Endrőd-Doboskert (1 grave); 55. Gerendás (1 grave ?); 56. Gyula-Szentbenedek/Pusztaszentbenedek (1 grave [?]); 57. Gyula-Szövetkezeti téglagyár (1 grave [?]); 58. Gyulavári-Site 15 Paradicsomdűlő (pyre finds [deposited in a separate, sacrifcial pit]); 59. Hódmezővásárhely-Dózsa Tsz. LPG (1 grave); 60. Hódmezővásárhely-Gorzsa, 744 Kovács tanya (1 grave); 61. Hódmezővásárhely-Gorzsa, Héthalom-dűlő (unknown no. of graves); 62. Hódmezővásárhely-Gorzsa, Mózes M. Földje (1 grave); 63. Hódmezővásárhely-Gorzsa, Nagy I. P. Tanya (1 grave [?]); 64. Hódmezővásárhely-IV. téglagyár (4 graves); 65. Hódmezővásárhely-Kishomok, Kovács tanya (16 graves); 66. Hódmezővásárhely-Kishomok, Mérai porta 5349 (2 graves); 67. Hódmezővásárhely-Koppáncs II (1 grave); 68. Hódmezővásárhely-Solt-Palé, Katona I. halma (a few graves); 69. Hódmezővásárhely-Szárazérdűlő, Rostás-tanya (1 grave); 70. Hódmezővásárhely-Vásártér/Szabadságtér (6+?+1 graves); 71. Kardoskút-Molnár Z. özvegyének földje (1 grave); 72. Kevermes- Homokbánya (2 graves); 73. Kevermes-Alkotmány utca (1 grave); 74. Kevermes-Bercsényi utca (3 graves); 75. Kondoros (6 graves); 76. Kövegy-Nagyföldek (17 graves, 2 pits); 77. Kunágota-Balázs J. telke (1 grave); 78. Kunszentmárton-Habranyi telep (10 graves); 79. Kunszentmárton-Péterszög (2 graves); 80. Magyarcsanád-Bökény (a few graves); 81. Magyartés-Zalota (1 grave [?]); 82. Makó-Mikócsa-halom (251 graves); 83. Mártély-Csanyi part, Szegfű-kocsma (1 grave); 84. Mártély-Veisz-föld (1 grave [?]); 85. Mezőberény-Régi tót temető (sometimes: Nemeskereki) (probably 1 grave); 86. Mezőkovácsháza-Új Alkotmány Tsz. (16 graves); 87. Nădlac-9M (10 graves); 88. Nădlac-3M-N (24 graves); 89. Nădlac-1M (4 graves); 90. Nagymágocs-Állami gazdaság (1 grave [?]); 91. Nagymágocs-Árpádtelep (1 grave [?]); 92. Nagymágocs-Veres-halom (1 grave); 93. Orosháza-Bónum (4 graves); 94. Orosháza-Községporta, Szűcs-tanya (1 grave); 95. Orosháza-Dénes téglagyár (probably 2 graves); 96. Öcsöd-MRT 96a (12 graves); 97. Pecica Site 15/1 (4 graves); 98. Pecica-Smart Diesel (9 graves); 99. Pecica (a few graves); 100. Peregu Mare (1 grave [?]); 101. Szarvas-Régi piactér (1 grave [?]); 102. Szarvas-Változó dűlő (1 grave); 103. Szegvár-Oromdűlő (370 graves); 104. Szegvár-Sápoldal/1–2, Jószai Bálint tanya/7 (10 graves); 105. Szentes-Belsőecser-F-9. Tábla (1 grave); 106. Szentes-Berekhát, Farkas Imre földje (1 grave); 107. Szentes-Borbásföld (1 grave); 108. Szentes-Bökény (1 grave); 109. Szentes-Derekegyházoldal 77/a, Pataki-föld (1 grave); 110. Szentes-Dónát, Kórógypart, Balogh J. földje (12 + possible 7 graves); 111. Szentes-Fertő, 21 Takács F. földje (1 grave); 112. Szentes-Jaksor 7, Meleg J. tanyája (1 grave); 113. Szentes-Kökényzug, Jaksor 1, Molnár I. földje (1 grave); 114. Szentes-Kurcapart, Tóth J. u. 32 (1 grave); 115. Szentes-Lapistó 26, Lami I. és Pál F. földje (1 grave); 116. Szentes-Sárgapart, Hékédi újtelep, Kurcapart (1 grave [?]); 117. Szentes-Vásárhelyi út 13 (1 grave); 118. Tarhos-Tarhospuszta (6 graves [?]); 119. Tótkomlós-Békkéssámsoni út 48 (1 grave); 120. Vărșand-Laposhalom/Movila dintre vii (1 grave [?])

Banat: 121. Deszk-D, Kukutyin, Simonné földje (12 graves); 122. Deszk-G, Klárafalva Kukutyin, Klárafalva Faragó (58 graves); 123. Deszk-H (22 graves); 124. Deszk-L-Klárafalva-Kukutyin (13 graves); 125. Deszk-O, Czuczi III, Ferencszállás (8 graves); 126. Deszk-P, Klárafalva Kukutyin (6 graves); 127. Deszk-R (5 graves); 128. Deszk-S (1 grave); 129. Deszk-Sz (1 grave); 130. Deszk-T, Ördögh (71 graves); 131. Ferencszállás-Lajtár Gy.-Bárdos P. halma (8 graves); 132. Klárafalva-B (17 graves); 133. Klárafalva-C, Tóth M. udvara (1 grave); 134. Klárafalva-G, Vasút utca (6 graves); 135. Klárafalva-Hegyesi földje (1 grave); 136. Kiszombor-E, Kiss J. tanya (13 graves); 137. Kiszombor-J, Jakos M. halma (1 grave); 138. Kiszombor-O, Ronay-szántóföld (7 graves); 139. Kiszombor-B, Blaskovich Ferencné földje (8 graves); 140. Sânnicolau Mare-Saravale (1 grave); 141. Sânpetru German-Goliat, ter. lui E. Borsos (sacrificial pit); 142. Sânpetru German-Magazin (1 grave); 143. Felnac-Malul Mureșului (1 grave); 144. Felnac-Complexul Zootechnic (1 grave); 145. Lunga-una din grădinile satului (without information); 146. Kübekháza-Kisbéb (1 grave [?]); 147. Tiszasziget-Vedresháza (unknown no of graves); 148. Szőreg-Homokbánya (1 grave); 149. Szőreg-Téglagyár (23 graves);150. Dudeștii Vechi-Pusta Bucova Mov. IX (sacrificial pit); 151. Dudeștii Vechi-Pusta Bucova Mov. V (2 graves); 152. Sprski Krstur (2 graves); 153. Novi Kneževac-pr. lui B. Budzsák-Tallyán (3 + ? graves); 154. Novi Kneževac-cetatea Tallyán (1 grave); 155. Banatsko Aranđelovo (3 graves); 156. Mokrin-Vodoplav (75 graves); 157. Mokrin-Humke Blizanice (1 grave); 158. Bočar-northern part (1 grave); 159. Kumane (20–30 graves); 160. Aradac-Mečka site (98 graves); 161. Aradac-Jarmure la Humke (unknown no of graves); 162. Glogonj-Glogonskij Rit (1 grave); 163. Pančevo-Naj Najeva ciglana (2 graves); 164. Pančevo-Naselje Tesla (1 grave); 165. Pančevo-Žarka Zrenjanina street (1 grave); 166. Banatski-Karlovac-Kalvarja (5+? graves); 167. Čoka-Tüzköveshalom (1 grave); 168. Vălcani (3 graves).

Table 1. Funerary and isolated discoveries in the lower area of the Lower Mureş

Funerary site	No. of graves	Horse burials / partially horse burials	Dating	Bibliography
1. Nădlac 9M	10 graves		Second part of the 6^{th} c. – first half of the 7^{th} c.	Gáll 2017, 22-25, Pl. 3-9, pl. 132-136, pl. 228-229
2. Nădlac 3M-N	24 graves	partially horse burial	Second third of the 7^{th} c.	Gáll 2017, 116-143, Pl. 92-131, pl. 205-227, pl. 244-251
3. Nădlac 1M	4 graves		Ftr. 86: second part of the 6^{th} c.; the other graves: Second part of the 6^{th} c. – first half of the 7^{th} c.	
4. Peregu Mare	stray finds	*Traces of the horse burials (stirrups, horse bits)*	Second part of the 6^{th} c. – first half of the 7^{th} c.	Gáll 2017, Pl. 252-254
5. Apátfalva	stray finds, 1 grave	*Traces of the horse burial (stirrup, horse bit)*	First half of the 7^{th} c.	Kisléghi Nagy 1911, 319: kép; ADAM 2002, Vol. I.: 24; Kisléghi Nagy 2010, 86
6. Makó-Mikocsa halom	251 graves	partially horse burials	Second part of the 6^{th} c. – first half of the 7^{th} c.	Balogh 2016, 109-120
7. Magyarcsanád	stray finds, a few graves	*Traces of the horse burial (stirrup, horse bit)*	Second part of the 6^{th} c. – first half of the 7^{th} c.	Csallány 1961, 140-141, Taf. CCVIII; ADAM 2002, Vol. I, 230-231
8. Csanádpalota	stray finds		Second part of the 6^{th} c. – first half of the 7^{th} c.	Balogh 2014, 97, 3. kép 2, 2. táb. 3
9. Kövegy	17 graves		Second part of the 6^{th} c. – first half of the 7^{th} c.	Benedek and Marcsik 2017, 369-442
10. Pecica-Smart Diesel	9 graves		Second part of the 6^{th} c. – early years of the 7^{th} century	Unpublished. Only the Cx8a was published: Mărginean 2017, 145-146, Pl. 3
11. Pecica-site 15/1	14 graves		First two thirds of the 7^{th} c.	Unpublished
12. Pecica-site 15/2	42 graves		7^{th} – 8^{th} c. (?)	Unpublished

13. Sânpetru German-Goliat	sacrificial pit		Second part of the 6th c. – first half of the 7th c.	Dörner 1970, 456
14. Sânpetru German-Magazin	1 grave	partially horse burial	Second third of the 7th c.	Dörner 1960, 423-433
15. Felnac-Magaspart	1 grave	horse burial (without more precise data)	Second third of the 7th c.	Hampel 1900, 117-123; Dömötör 1901, 62-66; Hampel 1905, Vol. II: 392-396, Fig. 1-26, 747-751, Vol. III: Taf. 446
16. Sânnicolau Mare / Saravale – Mina Major	1 grave		Second part of the 6th c. – first half of the 7th c.	Medeleț 1998, 307-316
17. Kiszombor-site E	13 graves	entire horse skeleton	First two thirds of the 7th c.	Móra 1932, 57-58; Kiss 1962, 154; ADAM 2002, Vol. I, 201-202
18. Kiszombor-site J	stray finds		Second part of the 6th c. – first half of the 7th c.	ADAM 2002, Vol. I, 202
19. Kiszombor-site O	7 graves		First third of the 7th c.	Csallány 1939, 122-126; ADAM 2002, Vol. I, 201
20. Kiszombor-site B	8 graves		First third of the 7th c.	Móra 1932, 56, 59; Csallány 1939, 170; ADAM 2002, Vol. I, 201
21. Ferencszállás-Lajtár Gy. halma	8 graves		First two thirds of the 7th c.	Csallány 1940, 122, Pl. XVI/8; Kalmár 1943, 154-155, Pl. XXV/17; ADAM 2002, Vol. I, 139
22. Klárafalva-site B	17 graves	partially horse burial	First half / first two thirds of the 7th c.	ADAM 2002, Vol. I, 204-205
23. Klárafalva-site C	1 grave		Second part of the 6th c. – first half of the 7th c.	ADAM 2002, Vol. I, 205
24. Klárafalva-site G	6 graves		First half / first two thirds of the 7th c.	ADAM 2002, Vol. I, 205
25. Klárafalva-Hegyesi földje	1 grave		Second part of the 6th c. – first half of the 7th c.	ADAM 2002, Vol. I, 205-206
26. Deszk-site D	12 graves	partially horse burial	Second part of the 6th c. – first half of the 7th c.	Csallány 1943, 160-173
27. Deszk-site G	58 graves	entire horse skeleton, partially horse burial	Second part of the 6th c. – first half of the 7th c.	Csallány 1939, 126-129, Taf. I/2, IV, VI, VIII/6-12
28. Deszk-site H	22 graves	entire horse skeleton, partially horse burial	Second part of the 6th c. – first half of the 7th c.	ADAM 2002, Vol. I, 110

Table 1.

Funerary site	No. of graves	Horse burials / partially horse burials	Dating	Bibliography
29. Deszk-site L	13 graves	entire horse skeleton	Second part of the 6^{th} c. – first half of the 7^{th} c.	Csallány 1939, 122, 137, 140; ADAM 2002, Vol. I, 110.
30. Deszk-site O	8 graves	partially horse burial	First half / first two thirds of the 7^{th} c.	ADAM 2002, Vol. I, 110
31. Deszk-site P (Ferencszállás-Kukutyin)	6 graves	partially horse burial	Second part of the 6th c. – first half of the 7^{th} c.	Csallány 1940, Taf. XIII; Kalmár 1943, 152-153, Taf. XXIV/11, Taf. XXV/2; Csallány 1969-1971, 13-16, Abb. 1, Taf. I-II; ADAM 2002, Vol. I, 111
32. Deszk-site R	5 graves		Second part of the 6^{th} c. – first half of the 7^{th} c.	Csallány 1940, 122; ADAM 2002, Vol. I, 111-112
33. Deszk-site S	1 grave		Second part of the 6^{th} c. – first half of the 7^{th} c.	Csallány 1940, 122; ADAM 2002, Vol. I, 112
34. Deszk-site Sz	Unknown no of graves / 1 certainly from the Early Avar Age		Second part of the 6^{th} c. – first half of the 7^{th} c.	Csallány 1968, 59-70; ADAM 2002, Vol. I, 112
35. Deszk-site T	71 graves	entire horse skeleton	The first two thirds of the 7^{th} c.	Csallány 1968, 59-70; ADAM 2002, Vol. I, 112-113
36. Szőreg-Homokbánya	1 grave	partially horse burial	Second part of the 6^{th} c. – first half of the 7^{th} c.	ADAM 2002, Vol. I, 366.
37. Szőreg-Téglagyár	23 graves	partially horse burial	Second part of the 6^{th} c. – first half of the 7^{th} c.	Csallány 1961, 147, Abb. 18; Lőrinczy 1994, 328-330
38. Pecica-Rovine/Căprăvanul Mic	2 graves		Second half of the 6^{th} century	Unpublished
39. Felnac-Complexul Zootehnic	2 graves		First half of the 7^{th} century	Mărginean and Băcueț 2015, 215-226

The present paper does not aim to create a repository encompassing the territory between the Tisa, the Western Carpathians, and the Banat Mountains, though we publish a map here with all the funerary discoveries (see Fig. 12). In the first step, we have attempted to compile a list of discoveries dated to the first part of the Avar Period (*ca.* 570-670/680), focused strictly on the line of the Lower Mureş until its confluence with the Tisa – Table 1.

What conclusions can one draw?

1. The burials of entire horses are well-known but represent a small quantity of the burials with animals (Deszk-site G grave 8, Deszk-site H grave 18, Deszk-site L grave 13, Deszk-site T graves 21, 42, Kiszombor site E grave 2).

1. Deposits of animal parts (cattle, horses, goats, fowl) are attested in almost all of the 39 funerary sites. In the partial horse burials, we can document deposits of the horse tack items in only a few cases (Nădlac-3M-N 351, Sânpetru German, Makó-Mikocsa halom, Deszk-P); such artifacts were most often missing.

2. Out of the 662 registered graves, a single funerary site (Makó) contained a large cluster of graves (251); most of the others consisted of isolated graves or groups of between 1 and 20 graves that can be connected to the lifestyle of this population living east of the Tisa.

3. The dating of these sites is an ever greater problem. As one can see, in most cases they can be dated to a general interval, *i.e.* between the second half of the 6th century and

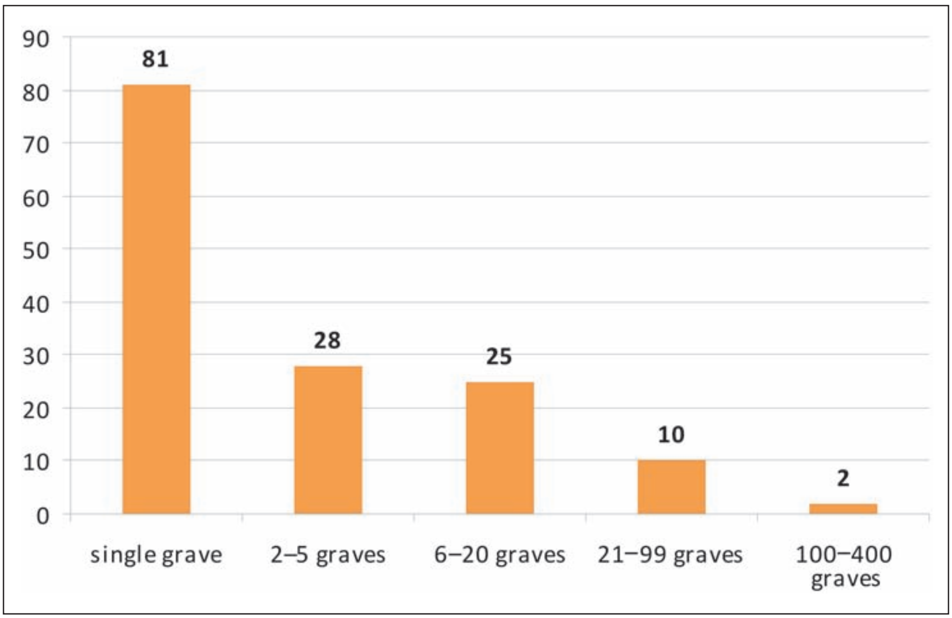


Fig. 13. The number of sites based on the quantity of graves investigated

the first half/first two thirds of the 7th century. In very few cases can these funerary sites or isolated graves be dated more precisely:

3.1. Nădlac, Ftr. 86, and Pecica-Smart Diesel graves Ftr. 8A, Ftr. 437, Ftr. 448, and Ftr. 455, on the base of ^{14}C analyses could be dated to the second half of the 6th century and the early years of the 7th century, respectively. It is very likely that they represented the "first generation" of the oriental (Avar) conquerors in the Carpathian Basin.

3.2. In the first third of the 7th century (?) (Kiszombor-site B).

3.3. In the first two thirds of the 7th century (Deszk-site O, T, Kiszombor-sites E and O, Ferencszállás-Lajtár Gy. halma, Klárafalva-sites B, G).

3.4. In the first half of the 7th century (Apátfalva, Felnac-Complexul Zootehnic, Pecica-site 15/1).

3.5. In the second third of the 7th century (Felnac-Magaspart, Nădlac 3M-N, Sânpetru German-Magazin).

The distribution of the funerary sites in all microregions of Transtisa leads us mentioned above hypotheses, even though we must take into account the state of research. Out of the 1516 registered graves in all regions from the east to the Tisa and until the Carpathians, only two funerary sites (Makó-Mikócsa halom and Szegvár-Oromdűlő) contained a large cluster of graves; otherwise, the vast majority are isolated graves – groups containing between 1 and 5 graves (see Figs. 12 and 13).

As the result of this analysis, the number of graves from archaeological excavations can be divided into 5 large groups:

A. single grave: 81 cases;

B. 2-5 graves: 28 cases;

C. 6-20 graves: 25 cases;

D. 21-99 graves: 10 cases;

E. 100-400 graves: 2 cases.

What could this phenomenon mean in relation to the sociological realities of the 6th-7th centuries? Based on the statistics of the number of graves, in this phase of the research, we find relevant the number of funerary sites which only contain a single grave (81) or a few graves (28), and likewise, those sites with only up to 20 graves remain important (25). Without extrapolating the available data, we must assert that the rescue excavations of the last decades – over large areas in Hungary and also in Romania – prompted by various investments in building, infrastructure, *etc.* – have shown us that the existence of funerary places with only a few graves are not a result of the state of research, but rather represent sociological realities (a medium-range nomadic lifestyle?) of the 6th-7th centuries, detectable due to archaeology (Figs 12 and 13).

8. THE SITE IN NĂDLAC, THE FUNERARY DISCOVERIES EAST OF THE TISA, AND THE THEORIES REGARDING EASTERN EUROPEAN ANALOGIES

Taking into consideration the fact that the archaeology of the Migration Era and the Early Medieval Period in Eastern and Central Europe is strongly tied to national-Darwinian concepts of the 19th century (Frank 1987, 171-188) and to linear evolutionist concepts, respectively, researchers practicing the *linear* and/or the *retrospective* method (Langó 2005, 175-340) and mixed argumentation (in the case of the Avar Age archaeology: Bálint 1995, 63-67) have searched for and found funerary discoveries to which they connected the funerary sites in the area between rivers Tisa – Mureş – Criş. Thus, some of these discoveries in a funerary context have been related to migration, an aspect to which we can also connect the cluster of graves at Site 1M in Nădlac.

In the first decades of the 20th century, Dezső Csallány, one of the most significant representatives of Hungarian archaeology at the time, discovered similar funerary situations in the eastern part of Europe, following his research in Deszk, Kiszombor and Szőreg (performed by him and by Ferenc Móra). According to the main school of thought during the period, Csallány associated these finds with a population attested to in the written sources, namely the Kutrigurs.

Csallány's 1934 theory had a profound impact on the development of research, as his observations, made during the 1930s, remained unchanged for almost 70 years, even if in some cases there were diverging opinions (such as those expressed by Béla Kürti). For the sake of clarity, we have attempted to systematize the development of this theory chronologically – Table 2.

As one can see, representatives of Hungarian archaeology have imagined and found analogies in the *"East"*, displaying a continuous preference for them since the 19th century (Bálint 2007, 545-546), according to a paradigm close to evolutionism, creating in this case a *migrationist model* along the E-W direction. (Probably) under the influence of Csallány's theory, Soviet and post-Soviet archaeology, through R. S. Orlov, adopted the theory, labeling the archaeological phenomenon west of the Don the "Sivašovka horizon", chronologically dated between the second part of the 6th century and the middle of the 7th century, connecting it to an entity known from the written sources, the Kutrigurs (Orlov 1985, 100-105). According to another opinion, already developed during the post-Soviet period, the *Sivašovka* funerary horizon only appeared around the middle of the 7th century (integrated into the *Pereschepina* archaeological culture), including among its characteristics cultural elements from Central Asia, and existed until the 8th century (Komar *et al.* 2006, 245-374; Komar 2006, 242). On the basis of archaeological data combined with historical sources (a typical case of *mixed argument*), the authors of the theory reached the conclusion that this funerary horizon could be associated in the first phase with the Western Turkic population, and in the second phase with the Khazars that reached these regions later (Komar *et al.* 2006, 360-373). Thus, one can easily observe that Csallány's theory obviously influenced the archaeologists of the Soviet Era who connected their excavations west of the Don and north of the Crimean Peninsula to the Kutrigur-Bulgar entity. Subsequently, however, they extended the envisaged area until the Volga (Artamonov 1962, 79-102).

After O. V. Komar collected the discoveries attributed to the nomads in Eastern Europe, the *Sivašovka* Horizon was included in the *Pereschepina Archaeological Culture* as its second chronological phase, defined as the *Sivašovka* Horizon (between 665 and 685). Komar has also stressed the fact that these archaeological funerary sites reflect social differences (Komar 2006, 241-242).

Table 2. The theories regarding the "origin" of the population living east of the Tisa during the 6th-7th centuries

Author	Macro group mentioned in the written sources	Funerary characteristics of the group
Dezső Csallány (Csallány 1934, 212)	Kutrigurs	"Oriental" characteristics: the grave in Zinovjev
Dezső Csallány (Csallány 1939, 133-134)	Avars	Presumed analogies of the graves with niches in the funerary rituals from Siberia and Mongolia
János Harmatta (Harmatta 1954, 205)	Kutrigurs-Bulgars	Analogies with the "Bulgarian" burials along the Volga
Gyula Török (Török 1973, 130)	Kutrigur population, with Sarmatian origins	on the basis of excavations in the Lower Volga region, with analogies rather connected to the shape of the grave pits
Péter Somogyi (Somogyi 1987, 145-147)	Kutrigur population identified north of the Black Sea on the basis of the written sources	a) similar rituals in the areas of the Black Sea Basin and the Carpathian Basin: a1) similar E–W orientations in both areas; a2) stepped graves; a3) partial burials with horses
István Bóna (Bóna 1990, 115)	Kutrigurs	
Béla Kürti (Kürti 1996, 128-130)	population from Central Asia	Analogies with the Dzhetyasar archaeological culture; the graves with niches, formally connected to the catacomb-type graves, are not encountered beyond the eastern part of Kazakhstan, while stepped graves and those with depositions consisting of partial horse remains are encountered as far as Mongolia
Gábor Lőrinczy (Lőrinczy 1998, 355)	population with origins in the Eastern European steppes	a) NE–SW and E–W orientations; b) partial animal offerings, butchered parts; c) the grave was divided, separating the area of the human body and that of the animal parts sacrificed during the burial ritual (graves with catacomb-type niche; stepped graves; graves with side niche); d) the deposition of a pottery container with food or drink, usually near the head; e) sheep's leg deposited in the grave

Table 2.

Author	Macro group mentioned in the written sources	Funerary characteristics of the group
Gábor Lőrinczy (Lőrinczy 2016, 155-165)	Kutrigur population	a) NE–SW and E–W orientations; b) partial animal offerings (does not differentiate nor explain the graves that contained horse tack elements in addition to horse remains), cut marks; c) remains of skinned animals; d) the grave was divided, separating the area of the human body and that of the animal parts from animals sacrificed during the burial ritual (graves with catacomb-type niche; stepped graves; graves with side niche); e) the use of coffins; f) the deposition of a pottery container, usually near the head; g) sheep's leg deposited in the grave
Bencze Gulyás (Gulyás 2015, 499-512)	a) "identical origins" of the population in the Eastern European steppes to those of the population in the Carpathian Basin; b) the population movements of the 4th century triggered by the Huns changed the ethnic-political map of Eastern Europe; c) *Mongoloid* elements became apparent among the Late Sarmatian population; d) the closest analogies for the burials in the Carpathian Basin are those in the Volga – Don area and the northern region of the Caucasus (known through the Sarmatian-Hun material); e) the Sivašovka Horizon is a "creation" and cultural mix between the newly arrived and the conquered population ("the Sarmatian substrate"); f) chronologically, the funerary sites from both regions are dated to the 6th–7th centuries; g) part of this population joined the Avars around the 550s	a) food offering, often with metal containers, deposited near the head; b) the artificial deformation of the skull; c) the E–W orientation is not a definitive characteristic of the horizon of funerary discoveries east of the Tisa, nor is it of the Sivašovka funerary horizon

The analogies identified by Hungarian, Austrian, and Post-Soviet archaeologists are distributed over an enormous area, from the northern part of the Black Sea until the Volga; from this perspective, the tendency of homogenizing and relating the finds to a certain type of macro-group identity is strange to say the least. Thus, as one can see, this research approach explains the phenomenon in the Carpathian Basin in general as the result of a migration of a population from Eastern Europe. Based on observations regarding the dating of the chronological material, the hypothesis can be seriously doubted since ritual characteristics of this kind are known since the "Hun" Era. During the 6th-7th centuries, the E-W and NE-SW orientations already appeared besides the general N-S orientation in the region of the Volga and the Don (Pokrovsk, Tuguluk), but specialists are also aware of graves with horse remains in Üllő and Sângeorgiu de Mureş, as well as the region of Odesa, in Kubej. Both the grave in Kubej and the one in Pokrovsk contain graves with a niche: Gulyás 2015, 505).

Turning to the area of the Tisa – Mureş – Criş rivers (Fig. 12), no necropolises are known from this wide territory; only isolated graves or groups of graves have been attested (Fig. 14). Thus, only 150 graves are known from this macroregion, but they cannot be dated with great precision. It is obvious that, based exclusively on the belt appliques or the elements of horse tack with identical datings in both areas (6th-7th century), the members of the communities documented at the funerary sites east of the Tisa cannot be identified as descendants of the population of the *Sivašovka* Horizon for a simple reason: they were contemporary!

9. FINAL CONSIDERATION: FROM ETHNICITY TO MIGRATIONISM AND "SCIENTIFIC NIHILISM"?

After this brief analysis, what can one say about the grave cluster from Nădlac – Site 1M, and in general about the necropolises from east of the Tisa? Based on a system of subjective criteria, archaeologists have created *ethnic* groups that they wished to connect to the most often contextual names of entities described by the written sources. We should be more cautious with (if not abandon entirely) the *national-Darwinist* tendencies in the entrenched idea of connecting funerary rituals to certain cultural/ethnic entities, especially in relation to wide or very wide geographic distances. These tendencies are also confirmed by the observations below:

1. The deposition of horse parts (head and legs on one side of the deceased) is not only known from the area north of the Black Sea (Fig. 14) or the Volga region during the 6th-8th centuries, but also from the funerary discoveries recorded so far in East Kazakhstan (the finds in Manyak, Lagerevo, Borovsk, Blizhniye, Elbany XIV, Chernoozerje, Zharly, Chilikry, and Egiz Kojtas prove this observation; Botalov 2015, 9) and in the area of Tuva, close to the Mongol region (Botalov 2015, 9). Thus, this is one of the significant elements on the basis of which the specificity of the Sivašovka Funerary Horizon has to be excluded, considering the geographic distribution of this tradition. We believe not to err much by connecting the other partial animal burials (cattle, sheep, and goats) to this tendency displayed by the populations of the Eurasian steppes. In our opinion – taking into account the state of

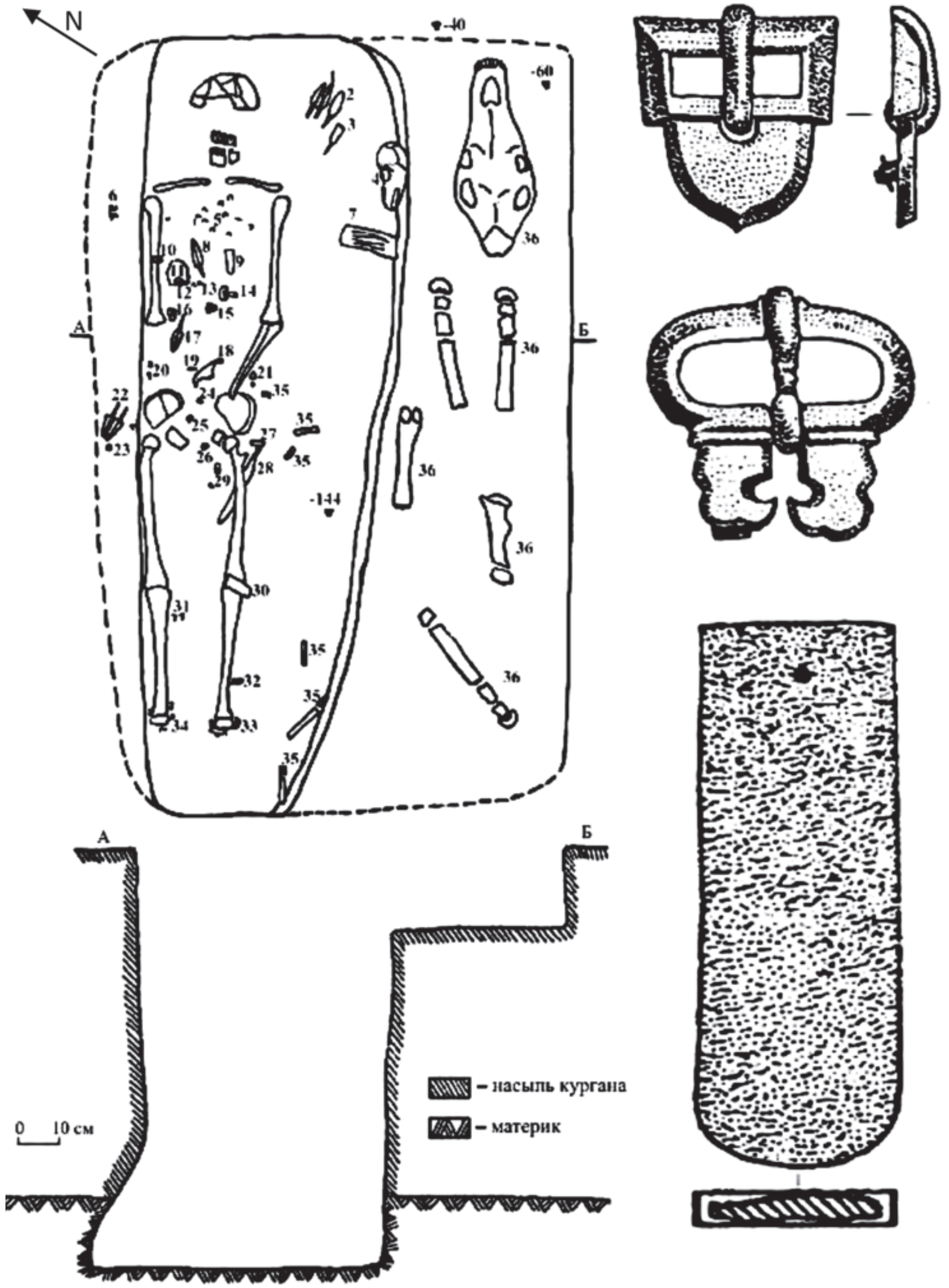


Fig. 14. Kostogryzovo, Kurgan 1, grave 7 (after Комар *et al*. 2006, ris. 36, 37/1, 2, 9)

research – this is a funerary tendency manifested over wide areas of the Eurasian steppes, along the "Eurasian Highway" of which the Carpathian Basin is undoubtedly the western end, as proven by the Avar and Magyar conquests.

2. We agree with Bence Gulyás' observations that the E-W orientation of the burials east of the Tisa cannot be considered a characteristic or ethno-cultural indication (Gulyás 2015, 503). Nevertheless, we believe that this aspect should continue to be analyzed in order to clarify what is understood as "ethnicity"/"ethnical marker" (According to Siniša Malešević, ethnicity cannot be identified in the social space, as it is a "hot potato" for sociologists: Malešević 2004, 1-3) and to decide if one can speak of ethnicities east of the Tisa. Thus, we believe that – both in the case of the *Sivašovka* Horizon and of the population living east of the Tisa – one should show more caution, more restraint regarding their so-called horizontal identity, since, on the one hand, one cannot document such identities archaeologically (a more detailed debate in Gáll 2017, 149-152, where we have shown that the inventory of the graves in Nădlac 3M-N and 3M-S rather reflects the opposite situation), and on the other, we tend to create a picture closer to our own time – a transitional period from the national to the post-national era (Nițu 2014) – than to the period of the 6th-8th centuries. We believe that these nomad communities, living both in the area east of the Tisa and from Eastern Europe to the Great Wall of China – with a relatively similar dynamic, mobile lifestyle, but also displaying enormous differences – could have shared close funerary traditions without sharing a group identity that researchers from Dezső Csallány until today have attributed to them.

These observations, which tend towards a heterogeneous approach, are also strengthened by ethnological observations. As we know from ethnological research, the populations from the steppes did not form ethnic groups with horizontal identities (Friedmann 1999, 11-12) specific to the modern era of the masses.

Anthropological studies describe a system of "conical clans" as a dynamic model of social organization, which is already apparent during the time of the Mongols (Somfai 2017, 343-355). It would seem that this model is also relevant when describing the socio-political organization of nomadic peoples in earlier periods. Dávid Somfai-Kara discerns various clans: *i.e. the personal clan, the maternal clan, the clan of the wife, of the married daughter, of the brother-in-law*. Clan relations generally form a complex social network in which competition for power is an inherent phenomenon. This can be detected in the short-lived nature of power structures established by nomadic "big men" (Sahlins 1963, 283-303) and their entourages (or clans), the most famous being *e.g.* Temujin, the "world conqueror". As a result of such historical-sociological processes, one clan could obtain the absolute power, under which various "*brother clans*" could continue to compete for power, rising higher and higher within a conical social structure. This resulted in a continuous fluctuation of elites, which also explains why one finds a range of different ethnonyms in the sources – often within a brief period of time – as such names could relate to the fighting elites of a society, which quickly reintegrated themselves during their struggle for power.

They could be recorded under different names in the narrative sources for different reasons. The clan system was a network of complex social structures, in the creation of which modern institutions (*e.g.* common language as an expression of identity) were of secondary or negligible importance. The early Avar power structure was forged in the social context of diverse, manifold and very mobile nomadic communities, who inhabited the region between the Urals and the Carpathians – it also embodied these features. All of these factors explain the aspects of the cultural heterogeneity in the Transtisa region.

3. We do not exclude a biological and cultural connection between these communities from the Carpathian Basin and the area of the Eurasian steppes. Still, archaeology is no longer enough for such observations, and such theories should be undoubtedly confirmed by DNA analyses and *strontium isotope* analyses.

4. Future researches might clarify, through *strontium isotope* analyses, including in the case of the graves from Nădlac-1M, whether one can speak of a macro-geographic migration, or whether these were the descendants of some population already formed in these areas, who submitted to Bayan and his "steppe state" structures, as Walter Pohl has labeled the nomad political powers from the Carpathian Basin (Pohl 2003, 271-272).

5. The Schmorl's node observed on the skeleton in Ftr. 77 may suggest that the individual submitted his body to intense physical effort. Such nodes are formed through activities such as the flexion and bending of the spine, but they can also appear through trauma caused by weightlifting. This case obviously raises the issue of the occupations and lifestyle of the individuals buried in Nădlac 1M.

6. We believe we should also mention the almost identical gender and age of the human skeleton (belonging to a 40-55 year-old woman) and the cattle skeleton (belonging to an adult cow). In our opinion, the fact that the woman and the animal were close in age can be undoubtedly connected to their gender. Though, studying a larger sample, we cannot note a rule regarding this aspect (Gáll 2017, figs 53 and 54).

From this perspective, the "cultural unity" of the Transtisa region in the 6-7th centuries must be considered much more approximate speculative. These final statements stress our choices of scientific methodology – namely that each case must be analyzed in its context, without resorting to the uniformities so specific to a given methodological approach.

Acknowledgments

We would like to express our heartfelt thanks to Victor Sava for carbon data processing. English translation by Ana Maria Gruia. The archaeological excavations were carried out by the team: Sorin Ilie Cociş and Adrian Ursuțiu, Alpar Dobos, Szabolcs Ferencz, Vlad Andrei Lăzarescu, Silvia Mustată, Coriolan Horațiu Opreanu, and Costin Daniel Țuțuianu.

This paper was supported by the Thematic Excellence Programme – NKFIH-832-15/2019 – 'Late Avar Reform and its consequences'.

References

ADAM 2002. Archäologische Denkmäler der Awarenzeit in Mitteleuropa. 1-2. In J. Szentpéteri (ed.), *Varia Archaeologica Hungarica* 13. Budapest: Publicationes Instituti Archaeologici Academiae Scientiarum Hungaricae.

Andreica Szilagyi L. and Peter S. 2020. Analiza antropologică a scheletelor descoperite la Nădlac – situl 1M. *Studii şi Cercetări de Istorie Veche şi Arheologie* 71, in print.

Artamonov M. I. 1962. *Istoriya khazar*. Leningrad: Izd-vo Gos. Ermitazha.

Balogh Cs. 2014. Az avar kori gúlacsüngős fülbevalók. *Kuny Domokos Múzeum Közleményei* 20, 91-158.

Balogh Cs. 2016. Karpat Havzasi'nda bir Avar yay Ustasinin Mezar Kalintilari Eski Türklerde Bileşik (Kompozit) yay Yapimina Ýlişkin Arkeolojik Bulgular. *Art-Sanat Dergisi* 6, 109-120.

Bálint Cs. 1995. *Kelet, a korai avarok és Bizánc kapcsolatai* (= *Magyar Őstörténeti Könyvtár* 8). Szeged: Balassi Kiadó.

Bálint Cs. 2007. On „Orient-preference” in archaeological research on the Avars, proto-Bulgarians and conquering Hungarians. In J. Henning (ed.), *Post-Roman Towns, Trade and Settlement in Europe and Byzantium* (= *Millenium-Studies* 5/1). Berlin, New York: Walter de Gruyter, 545-567.

Benedek A. and Marcsik A. 2017. Kora avar kori temetőrészlet Kövegyről. Új temetkezési szokások a Tisza – Körös – Maros mentén a kora avar korból. In Sz. T. Gábor and P. Czukor (eds), *Úton a kulturák földjén. Az M43-as autópálya-országhatár közötti szakasz régészeti feltárásai és a hozzá kapcsolódó vizsgálatok*. Szeged: Móra Ferenc Múzeum, 369-442.

Botalov S. G. 2015. Late-Hun and Early-Turk Period of V-VIII Centuries in Ural-Kazakh Steppes. *Journal of Eurasian Studies* 7/4, 8-16.

Bóna I. 1990. Beiträge zum asiatischen Ursprung der awarenzeitlichen partiellen Pferdebestattungen. *Wosinszky Mór Múzeum Évkönyve* 15, 113-124.

Csallány D. 1934. A Szentes-lapistói népvándorláskori sírlelet. *Dolgozatok a M. Kir. Ferencz József Tudományegyetem Archaeologiai Intézetéből* 9-10, 206-214.

Csallány D. 1939. Kora-avarkori sírleletek. *Folia Archaelogica* 1-2, 121-180.

Csallány D. 1940. Kora-avarkori edények Magyarországon. *Dolgozatok a M. Kir. Ferencz József Tudományegyetem Archaeologiai Intézetéből* 16, 118-144.

Csallány D. 1943. A Deszk D számú temető avar sírjai. *Archaelogiai Értesítő* 56, 160-173.

Csallány D. 1961. *Archäologische Denkmäler der Gepiden im Mitteldonaubecken (454-658 u. Z.)* (= *Archaelogia Hungarica* 38). Budapest: Ungarischen Akademie der Wissenschaften.

Csallány D. 1968. Neue Ergebnisse der awarenzeitlichen Forschungen in Ostungarn. *Študijné zvesti. Archeologický ústav SAV* 16, 59-70.

Csallány D. 1969-1971: Avar kori páncélok a Kárpát-medencében. *A Jósa András Múzeum Évkönyve* 12-14, 7-44.

Dömötör L. 1901. Újabb lemezsajtoló présminták Fönlakról. *Archaelogiai Értesítő* 21, 62-66.

Dörner E. 1960. Mormînt din epocă avară la Sînpetru German. *Studii şi Cercetări de Istorie Veche* 11, 423-433.

Dörner E. 1970. Cercetări şi săpături arheologice în judeţul Arad. *Materiale şi Cercetări Arheologice* 9, 445-465.

Dumitraşcu V. 2020. Analiza arheozoologică a ofrandelor dintr-un mormânt din perioada avară timpurie de la Nădlac – Situl 1m (jud. Arad). *Studii şi Cercetări de Istorie Veche şi Arheologie* 71, in print.

Frank T. 1987. Anthropology and Politics. Craniology and Racism in the Austro-Hungarian Monarchy. *Hungarian Studies* 3/1-2, 171-188.

Friedmann L. M. 1999. *The Horizontal Society*. New Haven: Yale University Press.

Gáll E. 2017. *At the Periphery of the Avar Core Region: 6th-8th Century Burial Sites near Nădlac (The Pecica–Nădlac Motorway Rescue Excavations)* (= *Patrimonium Archaeologicum Transylvanicum* 13). Paris and Budapest: L’Harmattan.

Gáll E. and Romát S. 2016. Observations on the Present Stage of the Archaeological Research of the Avar Period in the Banat. A Few Observations on the Development of Settlement Area in this Region and some Early Medieval Cultural-Sociological Phenomena. In Á. Bollók, G. Csiky and T. Vida (eds), *Archäologische und historische Studien. Festschrift für Csanád Bálint zum 70. Geburtstag/BETWEEN BYZANTIUM AND THE STEPPE. Archaeological and Historical Studies in Honour of Csanád Bálint on the Occasion of His 70th Birthday*. Budapest: Hungarian Academy of Sciences, 433-468.

Gulyás B. 2015. Újabb adatok a kora avar kori Tiszántúl kelet-európai kapcsolataihoz. In A. Türk (ed.), *Hadak Útján XXIV. A népvándorláskor fiatal kutatóinak XXIV. konferenciája Esztergom, 2014. november 4-6/Conference of Young Scholars on the Migration Period November 4-6, 2014, Esztergom.* 1 (= *Studia ad Archaeologiam Pazmaniensia/Magyar Őstörténeti Témacsoport Kiadványok* 3/1). Budapest, Esztergom: Archaeolingua, 499-512.

Gulyás S., Balogh Cs., Marcsik A. and Sümegi P. 2018. Simple calibration versus Bayesian modeling of archaeostatigraphically controlled ^{14}C ages in an Early Avar Age cemetery from SE Hungary: results, advantages, pitfalls. *Radiocarbon* 60(5), 1335-1346.

Hampel J. 1900. A fönlaki koraközepkori préselőmintákról. *Archaelogiai Értesítő* 20, 117-123.

Hampel J. 1905. *Alterthümer des frühen Mittelalters in Ungarn*, Vol. I-III. Braunschweig: Druck und Verlag von Friedrich Vieweg und Sohn.

Harmatta J. 1954. Beszámoló Fettich Nándor „Régészeti tanulmányok a késői hun fémművesség történetéhez” c. könyvének megvitatásáról. *Archaelogiai Értesítő* 81, 204-206.

Kalmár J. 1943. Népvándorláskori akasztóhorgok és veretek. *Archaelogiai Értesítő* 56, 149-159.

Kisléghi Nagy Gy. 1911: Torontál megye őstörténete. In S. Borovszky (ed.), *Torontál vármegye. Magyarország vármegyéi*. Budapest: Országos Monográfia Társaság, 304-328.

Kisléghi Nagy Gy. 2010. *Archaelógiai Napló*. Szeged, Temesvár: Móra Ferenc Múzeum kiadója.

Kiss A. 1962. *Az avarkori lovastemetkezés szokásának vizsgálata*. Pécs: A Janus Pannonius Múzeum Évkönyve, 153-162.

Kürti B. 1996. Régészeti párhuzamok a kárpát-medencei avar kori fülkesírok (Stollengräber) keleti eredetéhez. *Tisicum* 9, 125-135.

Komar A. V. 2006. Pereshchepinskij kompleks v kontekste osnovnykh problem istorii i kultury kochevnikov Vostochnoj Evropy VII-nach. VIII. v. In: *Stepi Evropy v epokhu srednevekovia. Tom 5. Khazarskoe vremja. Sbornik nauchnyh rabot*. Donetsk: DonNU, 7-244.

Komar A. V., Kubyshev A. I. and Orlov R. S. 2006. Pogrebeniia kochevnikov VI-VII vv. iz severo-zapadnogo Priazovia. In: *Stepi Evropy v epokhu srednevekovia. Tom 5. Khazarskoe vremja. Sbornik nauchnyh rabot*. Donetsk: DonNU, 245-374.

Langó P. 2005: Archaeological research on the conquering Hungarians: A review. In B. G. Mende (ed.), *Research on the prehistory of the Hungarians: A review* (= *Varia Archaeologica Hungarica* 18). Budapest, 175-340.

Lőrinczy G. 1987-1989. Megjegyzések a kora avar kori temetkezési szokásokhoz. A tájolás. *A Jósa András Múzeum Évkönyve* 30-32, 161-171.

Lőrinczy G. 1994. *Megjegyzések* a *kora avarkori temetkezési szokásokhoz* (A *fülkesíros temetkezés*). In: G. Lőrinczy (ed.), *A kőkortól a középkorig. Tanulmányok Trogmayer Ottó 60. születésnapjára*. Szeged: Csongrád Megyei Múzeumok Igazgatósága, 311-335.

Lőrinczy G. 1998. Kelet-európai steppei népesség a 6-7. századi Kárpát-medencében. Régészeti adatok a Tiszántúl kora avar kori betelepüléséhez. *A Móra Ferenc Múzeum Évkönyve* – SA 4, 343-372.

Lőrinczy G. 2016. A tiszántúli VI–VII. századi sírok és temetôk sajátosságai. A kora avar kori népesség továbbélése a VII–IX. században a Körös–Tisza–Maros-közén. *A Jósa András Múzeum Évkönyve* 58, 2016, 155-176.

Lőrinczy G. 2020. *A szegvár-oromdűlői 6-7. századi temető* (= *Studia ad Archaeologiam Pazmaniensia* 14/*Magyar Őstörténeti Témacsoport Kiadványok* 8). Budapest and Szeged: Martin Opitz Kiadó 2020.

Malešević S. 2004. *The Sociology of Ethnicity*. London, Thousand Oak and New Delhi: SAGE Publications.

Mărginean F. 2017. O aşezare din perioada avară târzie şi urme de locuire din vremea arpadienilor la Mureşul de Jos. Descoperirile arheologice de la Pecica ”Est/Smart Diesel”, jud. Arad. In F. Mărginean, I. Stanciu and D. Băcueţ-Crişan (eds), *Locuirea medievală timpurie din Transilvania şi vecinătăţi* (= *Orbis Mediaevalis* 1). Cluj-Napoca: Mega, 141-184.

Mărginean F. and Băcueţ D. 2015. Archaeological discoveries in the dark millennium at Felnac – Complexul Zootehnic (Arad county). *Ziridava Studia Archaeologica* 29, 215-226.

Medeleţ F. 1998. O descoperire de factură avară la Sânnicolau Mare (jud. Timiş). *Analele Banatului Serie Nouă* 6, 307-316.

Móra F. 1932. Néprajzi vonatkozások szegedvidéki népvandorláskori és korai magyar leletekben. *Ethnographia* 48, 54-68.

Niţu C. 2014. *Cosmopolitismul. Către o nouă paradigmă în teoria politică*. Iaşi: Adenium.

Orlov R. S. 1985. Kultura kochevnikov IV-VIII vv. In: *Etnokulturnaya karta territorii Ukrainskoy SSR v I. tys. n. e.* Kiev: Naukova dumka, 98-105.

Pohl W. 2003. A Non-Roman Empire in Central Europe: the Avars. In: H-W. Goetz, J. Jarnut and W. Pohl (eds), *Regna and Gentes. The Relationship between Late Antique and Early Medie-*

val peoples and kingdoms in the transformation of the Roman World. Leiden, Boston: Brill, 571-596.

Posea G. 1997. *Câmpia de vest a României (Câmpia Banato-Crişană)*. Bucureşti: Editura Fundatiei „România de Mâine".

Sahlins M. D. 1963. Poor man, rich man, big-man, chief: political types in Melanesia and Polynesia. *Comparative Studies in Society and History* 5, 283-303.

Somfai-Kara D. 2017. Modern török nyelvű etnoszok kialakulása Közép- és Belső-Ázsiában. In B. Sudár (ed.), *DENTUMOGER I. Tanulmányok a korai magyar történelemről* (= *MTA BTK Magyar Őstörténeti Témacsoport Források és tanulmányok* 2). Budapest: MTA Bölcsészettudományi Kutatóközpont, 343-355.

Somogyi P. 1987. Typologie, Chronologie und Herkunft der Maskenbeschläge. Zu den archäologischen Hinterlassenschaften osteuropäischer Reiterhirten aus der pontischen Steppe im 6. Jahrhundert. *Archaeologia Austriaca* 71, 121-154.

Török Gy. 1973. VII. századi sírok Kerepesről. *Folia Archaelogica* 24, 113-134.

SPRAWOZDANIA ARCHEOLOGICZNE 72/2, 2020
PL ISSN 0081-3834
DOI: 10.23858/SA/72.2020.2.2095

Tomasz Dzieńkowski[1], Marcin Wołoszyn[2], Iwona Florkiewicz[3], Radosław Dobrowolski[4], Jan Rodzik[5], Irka Hajdas[6], Marek Krąpiec[7]

DIGGING THE HISTORY. ABSOLUTE CHRONOLOGY OF THE SETTLEMENT COMPLEX AT CZERMNO-CHERVEN' (EASTERN POLAND). RESEARCH STATUS AND PERSPECTIVES

ABSTRACT

Dzieńkowski T., Wołoszyn M., Florkiewicz I., Dobrowolski R., Rodzik J., Hajdas I., Krąpiec M. 2020. Digging the history. Absolute chronology of the settlement complex at Czermno-Cherven' (eastern Poland). Research status and perspectives. *Sprawozdania Archeologiczne* 72/2, 409-466.

The article discusses the results of the latest interdisciplinary research of Czermno stronghold and its immediate surroundings. The site is mentioned in chroniclers' entries referring to the stronghold Cherven' (Tale of Bygone Years, first mention under the year 981) and the so-called Cherven' Towns. Given the scarcity of written records regarding the history of today's Eastern Poland, Ukraine, and Belarus in the 10th and 11th centuries, recent archaeological research, supported by geoenvironmental analyses and absolute dating, brought a significant qualitative change. In 2014 and 2015, the remains of the oldest rampart of the stronghold were uncovered for the first time. A series of radiocarbon datings allows us to refer the erection of the stronghold to the second half/late 10th century. The results of several years' interdisciplinary research (2012-2020) introduce qualitatively new data to the issue of the Cherven' Towns, which both change current considerations and confirm the extraordinary research potential in the archeology of the discussed region.

Keywords: Polish-Rus' borderland; Cherven'; Cherven' Towns; strongholds; absolute chronology; interdisciplinary research
Received: 08.06.2020; Revised: 18.06.2020; Accepted: 15.07.2020

1 Institute of Archaeology Maria Curie-Skłodowska University in Lublin, Pl. Maria Curie-Skłodowska 4, 20-031 Lublin, Poland; dzienkowskitomek@poczta.onet.pl; https://orcid.org/0000-0002-3899-3170
2 Institute of Archaeology University of Rzeszów, Moniuszki 10, 35-015 Rzeszów, Poland; marcinwoloszyn@gmail.com; Leibniz Institute for the History and Culture of Eastern Europe (GWZO), Reichsstr. 4-6, 04109 Leipzig, Germany; marcin.woloszyn@leibniz-gwzo.de; https://orcid.org/0000-0001-5319-6746

I. INTRODUCTION

Strongholds have always been – and still are – regarded as the most important archaeological sites representing early medieval Slavic culture. Zorian Dołęga-Chodakowski (in fact: Adam Czarnocki [1784-1825]), one of the fathers of Slavic archaeology, believed that it is the construction of strongholds that differentiates the Slavs from other peoples (*cf*. Abramowicz 1991, 11-22). Today we know, of course, that this is not true, but fortified settlements still attract the attention of medievalists: "These sites have long been portrayed as physical, monumental and landed manifestations of fractured states, high levels of warfare – external and internecine – and a growing localization of elite power" (Christie and Herold 2016, XIX).

Progress in the development of the natural sciences contributed to the establishment of a more a precise chronology of the excavated sites. Hence, since the time of the "dendrochronological revolution" (on dendrochronology and archaeology *cf. e.g*. Polaček and Dvorská eds 1999; Biermann 2013), the amount of data based on the results of archaeological investigations has continued to increase, including data pertaining to strictly historiographic works dedicated to, *e.g*., the origins of Eastern Europe or Poland (basic data on the archaeological image of early Piast Poland – Kara 2015; historical studies included archaeological data – *e.g*., Lübke 2004; Mühle 2020, 265; mutual relationship of archaeology and history – Sikorski 2018). Paradoxically, a stronghold in Czermno (Tomaszów Lubelski district, Lubelskie voivodeship; Fig. 1), although identified with historical Cherven' as early as in 1817 – noteworthy, according to the aforementioned Zorian Dołęga-Chodakowski (more on the subject – Musin and Wołoszyn 2017) – remains barely recognized even today!

Cherven' appears in one of the oldest references to the Polish-Ruthenian border. *Tale of the Bygone Years* reports that in 981 [6489], the Ruthenian prince Vladimir "[...] marched upon the Lyakhs and took their cities: Peremyshl', Cherven', and other towns, all of which are subject to Rus' even to this day" (PVL, 95). Widespread is the assumption that the ethnonym "Lyakhs" indicates "Poles" (subjects of Piasts), thus the statement that "Lyakhs" have lost Cherven' serves as a baseline for the reconstruction of the eastern border of tenth-century Poland (*i.e*., the princedom of Mieszko I [966-992]). Therefore, the verification of the thesis about the identification of the stronghold in Czermno with Cherven'

3 Institute of Archaeology University of Rzeszów, Moniuszki 10, 35-015 Rzeszów, Poland; iwonaflorkiewicz@gmail.com; https://orcid.org/0000-0001-9888-2942
4 Faculty of Earth Sciences and Spatial Management Maria Curie-Skłodowska University in Lublin, Kraśnicka 2cd, 20-718 Lublin, Poland; rdobro@poczta.umcs.lublin.pl; https://orcid.org/0000-0002-6504-5643
5 Faculty of Earth Sciences and Spatial Management Maria Curie-Skłodowska University in Lublin, Kraśnicka 2cd, 20-718 Lublin, Poland; jan.rodzik@poczta.umcs.lublin.pl; https://orcid.org/0000-0001-7266-0516
6 ETH Zürich Laboratory of Ion Beam Physics, Otto-Stern-Weg 5, CH-8093 Zürich, Switzerland; hajdas@phys.ethz.ch; https://orcid.org/0000-0003-2373-2725
7 AGH University of Science and Technology Faculty of Geology, Geophysics and Environmental Protection, Mickiewicza 30, 30-059 Cracow, Poland; mkrapiec@agh.edu.pl; https://orcid.org/0000-0003-4270-1668

Fig. 1. Czermno (Tomaszów Lubelski district, Lubelskie voivodeship). The stronghold and its hinterland; Photo by K. Trela, illustrated by J. Ożóg; computer processing by R. Ratajczak. A – an aerial view of the stronghold (site 1); B – the early medieval settlement complex (simplified: the plan also includes local names); a – area of the settlement; b – causeways and tracks; c – rampart; d – inhumation cemeteries; e – marshy area; f – Sieniocha River channel prior to the 1960s improvement projects; I-IV – places of acquiring samples for dendrochronological analysis in 1997; V-VI – hoards found in the Czermno stronghold (2010-2011); VII-VIII – hoards found in Perespa in 2014 (VII) and 2015 (VIII). Selected sites: 1 – Czermno, site 1 (the stronghold [Polish names: Grodzisko; Zamczysko]); 2 – Czermno, site 2 (fortified settlement beyond the walls [Polish names: Podgrodzie bliższe; Wały; Zameczek; Mały Zameczek]); 3 – Czermno, site 3 (the so-called "further" open settlement, beyond the walls [Polish names: Podgrodzie dalsze; Podzamcze])

from *Tale of the Bygone Years* has long aroused the intense interest of historians, and still does today.

Both the limited number of written sources regarding eastern Poland in the 10^{th} and 11^{th} centuries, as well as the fact that the name Cherven' is relatively popular in the Slavonic territories (see Zschieschang 2017, 182) – *e.g.*, the stronghold Cherven' in Bulgaria (see Dikov 2020) – are among the main reasons for the diverse hypotheses concerning location of Cherven' (see Błachowska 2017 for a comprehensive review of the discussion). For over half a century, historians have been eagerly anticipating archaeological efforts to elucidate the chronology of the stronghold in Czermno and its identification with Cherven' (*cf. e.g.* Poppe 1954, 228-229; Labuda 1996, 28). It is important to mention a series of excavation campaigns (1940; 1952; 1976-1979; 1985; 1997), as well as the acquisition of the first dendrochronological datings for Czermno in 1997 (see below IV.2.4.4). The oldest dates from the rampart allowed researchers "[…] to assume that the samples come from trees felled at the end of the first half of the 11^{th} c. or later" (Kara and Krąpiec 2000, 308). This would imply that Czermno did not exist in 981, hence it could not have been a victim of the above-mentioned expedition of the Rus' troops! Such a statement would have – as already mentioned – far-reaching consequences for our knowledge of the course of the eastern border of the early Piast state. Although Andrzej Urbański emphasized the limited credibility of these dates (Urbański 2000, 242), this did not stop historians from denying the identification of Cherven' and Czermno (*cf. e.g.* Tyszkiewicz 2004, 195; Matla-Kozłowska 2008, 170-219). The reaction of Elżbieta Kowalczyk-Heyman was much more accurate. The researcher – being fully aware of the methodological deficiencies of the 1997 excavations, as well as the earlier ones from the 1970s, emphasized primarily the need for comprehensive study of the issue of the Cherven' Towns (Kowalczyk-Heyman 2000, 56; see also Poleski 2004, 386-387; 2013, 189, footnote 128).

Consequently, in 2008-2012, when the international Cherven' Towns research team was completed, it seemed clear that we should not limit ourselves to the elaboration and publishing of past investigations, but also include in the research agenda verification excavations, primarily in order to resolve the question of the reliability of the thesis concerning the relatively late (11^{th} c.) chronology of the Czermno stronghold.

The following text summarizes investigations undertaken by our team from 2013-2020. Regrettably, recent changes pertaining to research carried out under the National Program for the Development of Humanities does not allow for further financing of excavations. Thus, we were not able to complete the examination of the entire rampart of the stronghold. While it seems evident to us that our excavations should be carried on further (see below, V), we nonetheless consider the results of the research from 2013-2020 deserving of publication. Longstanding delays in the publication of results from excavations on early medieval sites are not a vulnerability of the archeology of Eastern Poland alone (see *e.g.* Kurnatowska 1997; Brather 2008); nevertheless, the history of research in Czermno serves as an excellent example of the importance of a relatively swift introduction of results into scientific circulation. Awareness of past delays arrears has additionally mobilized our team to prepare this study.

II. REMARKS ON THE RESEARCH METHODOLOGY

Current research in Czermno is a joint enterprise of archaeologists, historians, onomasts, palaeogeographers and specialists in natural-science dating methods.

Given the vast array of literature discussing interdisciplinarity in research on the past (*cf. e.g.* Banaszkiewicz 2006; Meier and Tillessen 2011; Buko 2016; Izdebski *et al.* 2016; Hardt 2019), we are not going to formulate general theses and guidelines regarding this issue. Not long ago, Gerard Labuda (1916-2010), a senior scholar of Polish mediaeval studies, pointed to the need to separate the research workshops of historians and archaeologists, who he thought should confront each other only at the level of independently established facts (*cf. e.g.* Labuda 2001, 268). In essence, this concept is described by the well-known motto of General Helmuth von Moltke (1800-1891) *Getrennt marschieren – vereint schlagen*. Nowadays, such a perspective is rather criticized, and the need to cooperate at an early stage of research is emphasized, as recently stated by Philipp von Rummel: "The German proverb 'marching separately but striking together' of diverse historical subdisciplines, citing the strategic military advice of the 19th century Prussian general Helmuth von Moltke, is therefore not possible either, and particularly not in the collaboration of humanities and natural sciences: Before we march we have to decide where to head" (von Rummel 2019, 203; see also: Sikorski 2012; Urbańczyk 2017, 186).

In our research on Czermno, we tried to work together and not in parallel – we hope that we succeeded.

The title of the article is not intended to discredit the efforts of historians whom archaeologists would like to replace. We do not feel overwhelmed by the *Tyranny of the Historical Record* as happens to some archeologists (*cf.* Thurston 1997). The truth is, however, that archeology plays and will play an increasingly important role in the study of East-Central and Eastern Europe, including the Polish-Rus' borderland, since we are at in possession of but a few written records concerning its early history in the 10th-12th centuries (for recent literature about the increasing significance of archaeology in studies of the Early Middle Ages: Nagy *et al.* 2018, 3; Curta 2019, 15).

III. CZERMNO SETTLEMENT COMPLEX. STATE OF RESEARCH

III.1. Written sources and archival maps

Although the reconstruction of the history of the Polish-Rus' borderland begins, in general, with an analysis of the aforementioned expedition of Vladimir in 981, it should be emphasized that the volume of information regarding the history of today's Eastern Poland and western Ukraine and Belarus in the 10th and 11th centuries is minimal. The situation changes only in the 13th century, for which detailed information is provided by the *Galician-Volhynian Chronicle* (*cf*. Bartnicki 2008).

It should be stressed here that Rus' sources provide us with much more information than those originating in the Latin Circle. Although Thietmar describes the battle between the forces of the Bolesław the Brave and Jaroslav the Wise in July 1018, he does not know the name of the river on which this skirmish took place ("On 22 July, the duke [Bolesław – Authors] came to a certain river, where he ordered his army to set up camp and prepare the necessary bridges", *cf*. Thietmar VIII.31, 382-383).

Gallus Anonymus reports colorfully and in detail about the successes of Polish forces in battles with Ruthenians "at the river Bug"; however, these fragments prove his literary artistry more than his knowledge of geography (*cf*. Gallus I.7., 45, I.10., 51-54; see Cetwiński 2005; Althoff 2009, 410; in particular Żmudzki 2015; 2017).

On the other hand, in Ruthenian sources, the Cherven' stronghold is frequently mentioned, for the first time in 981 [6489], when the Ruthenians conquered it. In 1018 [6526], the first king of Poland, Boleslaw the Brave, occupies the Cherven' Towns, and in 1031 [6539], Jaroslav the Wise regains them.

From that time, Cherven' remained within Rus' (see Jusupović 2017 for the entire list of mentions and detailed analysis).

Cherven' was not mentioned among the strongholds destroyed during the first Mongol invasion (re: the havoc of the neighboring stronghold in Volodymyr-Volynskyi, *cf*. *Chronicle*, 50) or among the fortifications of the lands of Galicia-Volhynia, which Burundai ordered the Romanovichi to destroy in 1259 [6769] as a part of the repression (*cf*. *Chronicle,* 78-79). The last mention about Cherven' refers to 1289 [6797; *cf*. *Chronicle,* 113), after which it disappears from the history pages. It cannot be ruled out that neighboring Belz took over its role, although the stronghold did not have a direct successor (*cf*. Janeczek 2016).

For the association of today's village of Czermno with the Cherven' stronghold known from the written sources, the description in the *Galician-Volhynian Chronicle* of the Polish-Ruthenian fights in 1266 [6776] is of prominent importance (*cf*. *Chronicle*, 85).

In this context, the recent observations of Adrian Jusupović, showing the evolution of the spelling of the name "Cherven'" in codices dated from the 14th-16th c. (Червѣнъ→Червьнъ→Чермно), should not be ignored (Jusupović 2017, 33, Fig. 4). They constitute an additional – paleographic – premise for identifying Cherven' with the contemporary village of Czermno.

In bringing to a close the short description of the written sources, it is important to return to the issue of the accuracy of the first mentioned date of the stronghold – 981 [6489]. As discussed above, according to a widespread assumption, the dating of the Czermno fortifications to either before or after 981 determines the legitimacy of its association with Cherven'. It is worth emphasizing in this context that of the three Polish-Rus' conflicts (981/1018/1031), only the chronology of the Kyiv expedition of Bolesław the Brave (summer 1018), as described by (the very well informed) Thietmar, is without question (for Thietmar see papers in: Cottin and Merkel eds 2018). Furthermore, the dating of Vladimir's expedition to Cherven' to 981 is not unequivocal. This has been pointed out repeatedly; recently, Adrian Jusupović articulated it very clearly, writing that "[…] it must be concluded that Nestor described a certain historical process in three dates (entries), only one of them certain, namely 1018. The other two were presumably manufactured by Nestor himself, who knew from his sources about the rivalry of the rulers of Poland and Rus' over the border region, one that lasted approximately fifty years, possibly a little longer, and ended the success of Yaroslav the Wise. Consequently, both narratives entered under the year 981 and 1031 in the *Tale of the Bygone Years*, in addition to containing brief histories, or better said, stages of the conflict over the Cherven' Towns and Przemyśl, are – let me emphasize this – artificial milestones in the historical process and important testimony to the territorial growth of Rus'" (Jusupović 2017, 49).

It should be borne in mind, when comparing radiographic and dendrochronological dates from Czermno, that the assumption they should be older than 981 to confirm the association of Czermno with Cherven' can be regarded as *Tyranny of the Historical Record*. Written records inform us that Cherven' was captured before 1018, but it cannot be excluded that it took place a little later than 981.

The oldest cartographic image of the stronghold in Czermno is dated only to the end of the 18th century, and was prepared for the so-called Josephine Map (*Josephinische Landesaufnahme*; *cf*. Fig. 2: A). Certainly, its analysis does not provide a basis on which to establish the chronology of the stronghold; it is, however, an important source for the reconstruction of the past landscape of the site, particularly river courses (comments from the *Josephinische Landesaufnahme*, along with subsequent maps are also helpful; see Janeczek 2016 for an erudite analysis of this category of sources).

III. 2. Environmental data

III.2.1. Material and research methods

The primary research task was to define the contemporary environmental conditions in the vicinity of Czermno, and to reconstruct the early medieval ones, with particular focus on the impact of anthropogenic changes. The following research activities furthered this goal: (1) query of archival cartographic materials (Jan Rodzik, Przemysław Mroczek); (2) geological, geomorphological, and pedological surveys, both on the site and in the surroundings (Radosław Dobrowolski, Jan Rodzik, Przemysław Mroczek); (3) sedimentological analysis of deposits and soil sequences in 70 profiles of soil catenas, as well as in the geological drillings (Radosław Dobrowolski, Jan Rodzik, Przemysław Mroczek); (4) geospatial analysis of the site with the use of GPS techniques and GIS modelling (Piotr Zagórski);

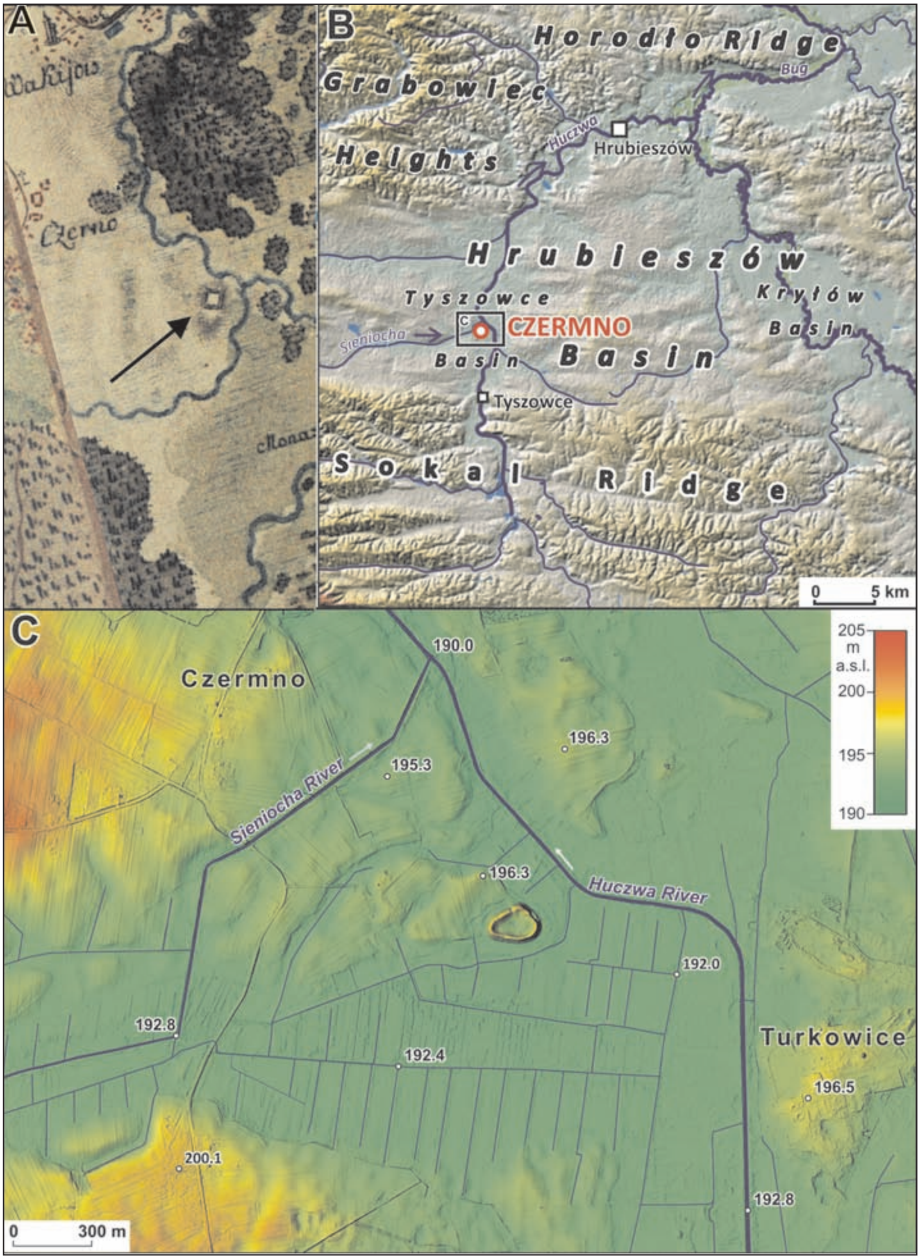


Fig. 2. Czermno (Tomaszów Lubelski district, Lubelskie voivodeship). Location of the site on contemporary and archival maps; computer processing by R. Ratajczak. A – Czermno on the Josephine Map of Galicia (the Mieg Map, 1779-1783; after Janeczek 2016, Fig. 4); B – Czermno on the background of the mesoregions of Eastern Poland (after Solon *et al*. 2018); C – digital elevation model of the stronghold and its vicinity, prepared by P. Zagórski (after Dobrowolski *et al*. 2016b)

(5) palynological analysis (Krystyna Bałaga) of two biogenic sediment profiles (outer moat and Huczwa river palaeochannel); (6) accelerator mass spectrometry radiocarbon dating (AMS) of 32 samples taken from benchmark profiles (Irka Hajdas). The location of the site was analyzed in the context of geomorphological, geological, climatic, hydrological, pedological and floral conditions (Dobrowolski *et al.* 2016b; 2018).

III.2.2. Location and environmental conditions

Czermno is located within macroregional unit of the Western Volhynian Upland, and mezoregional unit of the Hrubieszów Basin (Solon *et al.* 2018). Its western part includes the Tyszowce Basin, drained partially by the Huczwa river, formed by soft carbonates of the late Cretaceous (marls and chalk). Locally, the sediments are superimposed by patches of boulder-clay of the Elsterian glaciation, sands and silts of the Saalian glaciation, and loess-like sandy-dusty sediments of the Weichselian glaciation (Dobrowolski *et al.* 2016b; 2018). The Tyszowce Basin constitutes a part of the West-East passage, several kilometers wide, limited by the loess edges of the Sokal Ridge from the south, and Grabowiec Heights and Horodło Ridge from the north (Fig. 2: B). The passage, characterized by relatively convenient conditions for movement and travel, connects Lublin and the Volhynian Uplands (Maruszczak 1972).

The thickness of Quaternary sediments in the floor of the Huczwa River valley exceeds 20 m. Loamy sediments with lenses of sand constitute the lower part, while the upper one is built of carbonaceous silts that accumulated in the course of the Weichselian glaciation (Wojtanowicz 1974). In the course of the Late Weichselian, the sediments were cut through to a depth of several meters by riverine erosion in variable climatic conditions. In the Holocene, silts were decalcified in the upper parts by soil-forming processes. Nowadays, their surface forms an above-the-floodplain terrace, which in Czermno is situated approximately at 195 m a.s.l. Between the former and current mouth of the Sieniocha River into the Huczwa River, the terrace developed the form of a fan cut by a system of palaeochannels of the Sieniocha River (Fig. 2: C). The discussed terrain form served as a basis for the principal elements of the entire settlement structure, primarily with regard to its natural predispositions. The stronghold and adjacent suburbs were located on isolated elevations of the cone, while arcuate hollows/channels located in between were deepened and transformed into moats (Dobrowolski *et al.* 2016b; 2018).

The upper terrace rises 2-3 m over the floodplain. The latter is built with deposits of predominantly biogenic nature – peats and gyttja (with sandy insertions). In general, the thickness of the deposits is 1-2 m; however, in the depressions of the Huczwa River palaeochannels, it reaches 4 m. The area in question is characterized by the strong influences of the continental climate, including harsh winters, hot summers, as well as relatively low cloud cover and rainfalls. The annual average air temperature is 7.2°C, with the average for July reaching 17.7°C, and for January -4.3°C. The average annual precipitation is equal to approximately 550 mm. The snow cover remains here for a long time (75-80 days), while the growing season is relatively short – 213 days (Kaszewski 2008). Among the consequences of the relative continental nature of the climate, limited water resources and low spring efficiency and density are noteworthy, although the groundwater level of the Cretaceous-Quaternary floor is relatively shallow (Michalczyk and Wilgat 2008). The Huczwa River, running through Czermno, flows into the Bug River in Gródek near Hrubieszów (Fig. 2: B). Thus, the river course connects two important settlement and defensive centers of the so-called Cherven' Towns. The average flow of the Huczwa River at its confluence with the Bug River is 4.2 m/s (Michalczyk and Wilgat 2008), while in the vicinity of Czermno it reaches 2-3 m/s. The gradient of the Huczwa River in its lower course is <0.5‰, which is typical for the lowland rivers. Nowadays, a majority of the Huczwa River course is regulated and straightened. Traces of former meanders are, however, discernible in its lower course. Undoubtedly, in the Middle Ages the river was longer and deeper, with a lower gradient, slower stream, and more even flows – sufficient to transport tree trunks and flat-bottomed boats with commodities (Dobrowolski *et al*. 2016b; 2018).

The mosaic of soil types in the vicinity of Czermno results from the transitional nature of the climate, diverse surface formations, and the groundwater level. The largest area around Czermno is covered by Luvisols, formed on dusty sediments, silts, and clayish sands, usually occurring along with Cambisols. Such soil types can be described as relatively light and favorable for agricultural activity. The most fertile soils – Chernozems, included in the highest quality classes – occur in the loess areas southwards and northwards from Czermno. Hydromorphic soils – Gleysols and Histosols – appear in the bottoms of the Huczwa and Sieniocha river valleys (Turski *et al*. 2008).

In geobotanical terms the surroundings of Czermno are dominated by oak-hornbeam forests (*Tilio-Carpinetum)* and patches of Continental pine-oak forests (*Querco*-Pinetum) (Matuszkiewicz 2007). The latter ones served as the major source of construction wood for the stronghold and adjacent settlements (Dobrowolski *et al*. 2016b; 2018).

III.3. Archaeological data

III.3.1. Stronghold, settlements, and cemeteries

The settlement complex in Czermno, situated on the middle Huczwa River (left-bank tributary of the Bug River), occupies an area of 150 hectares (Figs 1 and 2). The stronghold (site 1; also known as *Zamczysko*), with dimensions of approximately 190 × 120 m, is the focal point of the entire structure. Its ramparts are preserved to a height of 6 m (measured from the outside). They are located on a dry island at the confluence of the Huczwa River and the old channel of the Sieniocha River, straightened and turned into an artificial channel in the course of recent land development works.

Another dry island, separated by a wet hollow, neighbors the stronghold from the west. In the local tradition, the place is known as *Wały*, *Zameczek*, *Małe Zamczysko* or *Mały Zameczek*. An archaeological site located there is described as a *nearby* suburb or Czermno, site 2, in the archaeological literature. Apparently, as indicated by incomplete data, it was also fortified (see below IV.2.4.4). Directly to its north-west, an *outlying* borough is situated, marked as Czermno, site 3, which, in the local tradition, is known as *Podzamcze*. It occupies the highest of the dry elevations in the floodplain of the Huczwa River. Beside the settlement, an inhumation cemetery was discovered.

A group of further sites, also occupying elevations and dry islands of various size, extends to the west and north-west of the stronghold, among them Czermno, site 4, Czermno, site 5, and Czermno, site 6. Sites Czermno 4 and Czermno 6 also include inhumation cemeteries, situated next to the settled areas.

Other early medieval sites are situated on the southern bank of the Sieniocha River. An elongated, two-kilometer long embankment (Czermno, site 66) that spans the banks of the Huczwa and Sieniocha Rivers, encloses the entire complex from the south. Nowadays, it is preserved only in part, but even in the 1950s its height reached approximately 50 cm, with the width of the base reaching up to 6 m.

The aforementioned sites are located on the left bank of the Huczwa River. Another extensive early medieval settlement, accompanied by an inhumation cemetery, is situated on the right bank, on the so-called *Ostrów*, in the land of a now-defunct hamlet called *Doliwa* (the apellation *Doliwo* was also in the use). In the archaeological literature, it is described as Wronowice, site 1, or Wronowice-Doliwo, site 1.

As was already mentioned, the first description of fortifications in the village of Czermno dates back to 1817. Archaeological research began here over a hundred years later, during World War II (1940). The excavations were headed by the Ukrainian archaeologist Levko Chikalenko, and focused on site 3. In 1952, a research team led by Konrad Jażdżewski excavated the interior of the stronghold (site 1). Further excavations, headed by Jan Gurba, were carried out in 1976-1979. While the works from 1940 and 1952 can be described as preliminary reconnaissance, the excavations of Jan Gurba's research team were, in turn, of permanent character. The works concentrated on the stronghold (including ramparts), the suburb (site 2), and the cemetery/settlement (site 3). In 1985, Andrzej Urbański excavated a small test-pit on site IIG (wooden trackway; Fig. 3: A). Another small-scale excavation took place in 1997 in order to obtain wood samples for dendrochronological analyses. The works were headed by Andrzej Urbański and Jan Gurba. In the same year, Irena Kutyłowska conducted excavations on site 3 (Fig. 4; for further information about excavation campaigns in the years 1940-1997 see: Florek and Wołoszyn eds 2016; Auch 2017).

Surveys with the use of metal detectors took place in 2010-2011 (team of Andrzej Kokowski, Marcin Piotrowski, and Artur Troncik), as well as in 2015 (Marcin Przybyła). The works from 2010-2011 brought excellent results (*cf.* Piotrowski and Wołoszyn 2012), which

Fig. 3. Czermno (Tomaszów Lubelski district, Lubelskie voivodeship). Wooden structures – vestiges of the trackways; computer processing by R. Ratajczak. A – site IIG. Wooden structures, discovered in the excavation area of 1985 (Photo by A. Urbański); B – wooden piles visible in 2016 on the ground surface at the foot of the stronghold (Photo by M. Wołoszyn)

triggered the emergence of the international research team dedicated to the elaboration and publication of the results of past research in Czermno and Gródek.

Although the research program, funded by the National Program for the Development of Humanities, focused on the publication of data from previous research, it also included excavations in Czermno. In 2013-2014, the fieldworks, headed by Marcin Piotrowski, Iwona Florkiewicz, and Marcin Wołoszyn, were concentrated on site 3 and site 1 – the rampart. In the years 2014-2016, the excavations, under the direction of Tomasz Dzieńkowski and Marcin Wołoszyn, included site 1 – the rampart of the stronghold, and site 70.

The re-examination of the stronghold's rampart in 2014-2016 can be regarded as the biggest research effort of the entire project. The scope of fieldwork included three trenches, marked as 1/2014, 2/2015, and 3/2016 (2014 – 5 × 10 m; 2015 – 4 × 15 m; 2016 – 3 × 3 m), with a total area of 119 m^2 and a depth of 2.5 to 6 m (Fig. 5). The rampart was investigated along a length of 25 m; the trenches encompassed its top, a part of the outer slope, and the inner slope, as well as its junction with the layers of the stronghold interior. The three-year-long excavation campaign brought recognition of approximately 60% of the entire width of the fortifications (further works on the outer slope are indispensable; see V below).

From 2013-2016, comprehensive measurements and drilling for soil samples were executed by the team of Radosław Dobrowolski in order to reconstruct the palaeoenvironmental conditions. These data made a significant contribution to the Czermno settlement complex research agenda (see IV.1 below).

Concurrently, from 2011-2015, Marek Poznański, Robert Solecki, Michał Aniszewski, and Piotr Kittel conducted archaeological and palaeoenvironmental investigations on site 68 in Czermno (Solecki *et al.* 2019). In 2013, Łukasz Pospieszny carried on geophysical prospections on sites 1, 2, and 3 (*cf.* Pospieszny 2016).

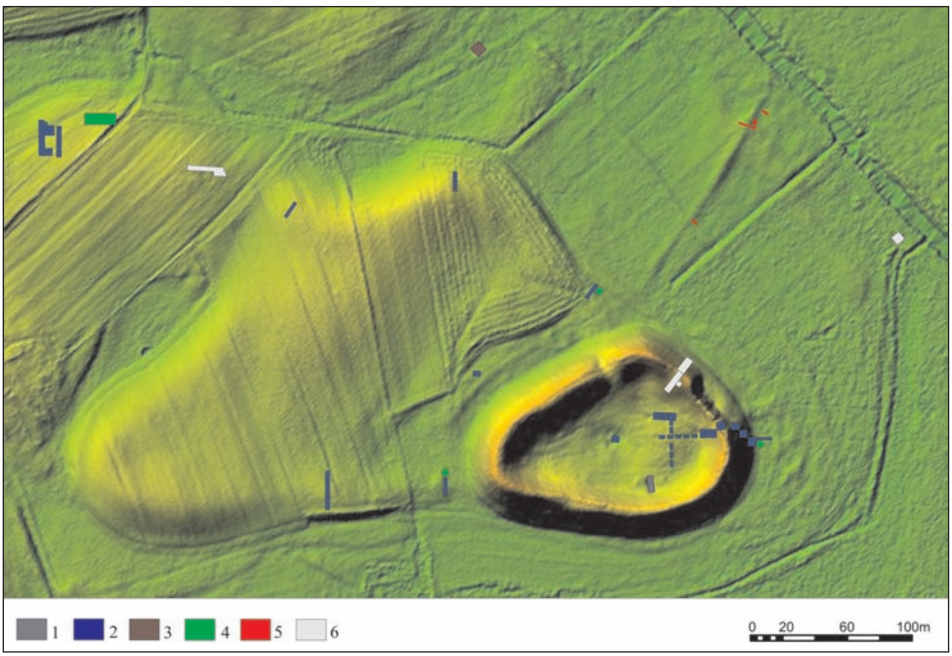


Fig. 4. Czermno (Tomaszów Lubelski district, Lubelskie voivodeship). Digital elevation model of the stronghold and its vicinity. Sites 1-3 with location of archaeological trenches excavated in 1952-2016 (areas surveyed with the use of metal detectors in 2010-2011 and 2015 are not marked); prepared by P. Zagórski and T. Dzieńkowski. 1 – 1952 (team of Konrad Jażdżewski); 2 – 1976-1979 (team of Jan Gurba); 3 – 1985 (team of Andrzej Urbański); 4 – 1997 (team of Irena Kutyłowska & Andrzej Urbański); 5 – 2012-2015 (team of Marek Poznański); 6 – 2013-2016 (research project *Golden apple of Polish archaeology...*)

In 2015, the museum in Tomaszów Lubelski acquired two excellent hoards discovered in the vicinity of the Czermno stronghold (in the village of Perespa). In the following year, Jolanta Bagińska and Łukasz Wyszyński from the museum conducted verification excavations thereof, obtaining further fragments of jewellery from the deposit (see below IV.2.3).

The location (approximate in some cases) of trenches hitherto explored in the settlement complex in Czermno are presented in Figs. 4 and 5.

Despite the long-lasting research history, however, the state of our knowledge on the Czermno settlement complex remains incomplete. As stated above, research carried out in 1940 and 1952 should be regarded as nothing more than preliminary sondages. Regretta-

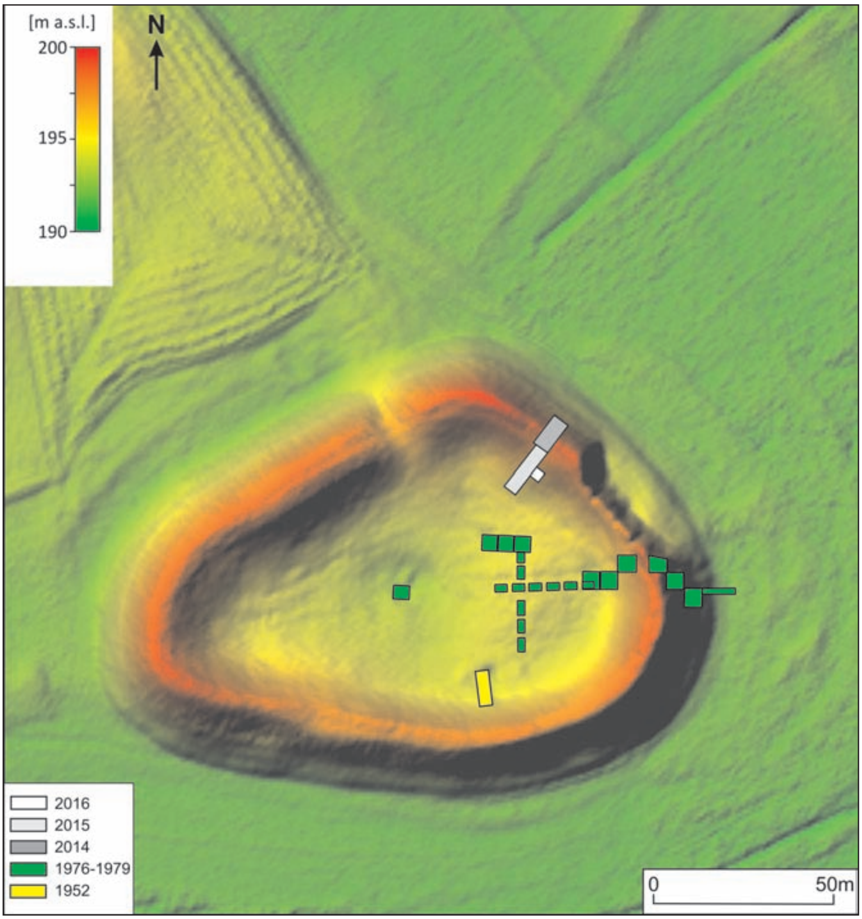


Fig. 5. Czermno (Tomaszów Lubelski district, Lubelskie voivodeship), site 1 (stronghold). Location of archaeological trenches excavated in 1952, 1976-1979, 2014-2016; prepared by P. Zagórski and T. Dzieńkowski. 1952 – team of Konrad Jażdżewski; 1976-1979 – team of Jan Gurba; 2014-2016 – research project *Golden apple of Polish archaeology...*

bly, we are lacking basic data on archaeological layers and features discovered in the course of large-scale excavations held in the years 1976-1979, as well as in 1997 (see Florek 2016a for the details and comments). The inaccuracies are particularly severe in the case of excavations carried on at the stronghold. Despite the relatively large scale of the area excavated, it is hardly possible today to reconstruct the stratigraphic sequence, the structure of the built-in area in the stronghold's interior, or the range of the cemetery (given the numerous human remains acquired from the trenches within the ramparts). Apparently, the cemetery is stratigraphically younger than the stronghold, although we do not have unequivocal evidence (*e.g.*, burial pits cutting the relics of settlement features).

The rampart was excavated only in 1977, and, regrettably, only a portion of it was excavated. Furthermore, the majority of the trenches did not reach the subsoil, and the drawings of cross-sections are incomplete, frequently lacking descriptions and interpretation. Similar remarks concern the excavations undertaken in 1997. Samples for dendrochronological analyses were taken from their stratigraphic contexts without detailed prospection, location, or appropriate documentation – neither drawings nor photographs.

Similar inadequacies apply to the research carried out in 1976 and in 1977 on site 3. Although excavations encompassed an area of 3.4 ares and yielded discoveries of several houses, along with storage pits and skeleton graves, we are lacking basic documentation, *i.e.*, plans of the unearthed archaeological features.

Such a defective state of recognition of the settlement complex in Czermno was the catalyst for – as was already mentioned – the renewal of excavations in Czermno, included in the research project *Golden apple of Polish archaeology*...

III.3.2. Trackways

Publications dedicated to Czermno frequently mention wooden piles visible in the ground, or bridges discovered, which were to enable travel between the various parts of the settlement complex (research in 1940; see Chikalenko 1998). Konrad Jażdżewski refers to remains of bridges in the report from excavations held in 1952. He describes a four-meter-wide construction, consisting of four rows of wooden posts covered with planks. Such a structure was discovered, with a length of 100 m, between the stronghold and the River (Wronowice-Doliwo, site 1; nowadays – site 68; *cf.* Jażdżewski 1959, 73ff).

Wooden constructions have also been documented in other parts of the settlement complex in Czermno; regrettably, only a few of them can be located today (even approximately). Given the incomplete field documentation, the results of research conducted by Andrzej Urbański in 1985 on site IIG (today – Czermno, site 67; Fig. 3), are of primary importance. He excavated a small fragment of a wooden bridge that led from the banks of the Huczwa River towards the *nearby suburb* (site 2). A concentration of 58 wooden posts, arranged in eight groups, partially visible at the ground level, and partway sunk into peat layers, was uncovered in an 8 × 8 m trench, which was excavated to a depth of 90 cm.

Among but a few finds, potsherds, fragments of glass bracelets, and spindle-whorls (among them, one of Ovruch slate) should be mentioned (*cf*. Florkiewicz and Urbański 2016).

In 2010, Marek Poznański initiated prospections focused on trackway remains around the stronghold in Czermno. In the course of excavations held on site 68 (2012-2015), vestiges of more than 50 posts were discovered (Solecki *et al*. 2019).

Additional wooden structures were documented in 2014, in the course of rescue excavations preceding the construction of the lookout tower in the bank of the Huczwa River (Czermno, site 70). The finds can be interpreted as fragments of a trackway or a dyke lined with fascine, probably to harden the muddy ground (Wołoszyn *et al*. 2016a, Fig. 64).

III.3.3. Stray finds (hoards)

It should be stressed that but a few finds from Czermno refer to the period before the late 10th century. A series of sites in the vicinity of the stronghold, discovered in the course of surveys, can be – in general – referred to the 8th-10th and 9th-10th centuries (potsherds; *cf*. Dzieńkowski and Sadowski 2016). An element of an Avar-type belt suit, dated to the 8th century was discovered in 2014 (Wołoszyn *et al*. 2016b; Figs. 4, 5: 1). It was found in the outer layers of the rampart. Although it is the oldest early medieval find from the site, it cannot be, however, regarded as a premise to date the erection of the stronghold back to the 8th century. Undoubtedly, these finds (potsherds, Avar-type belt suit) indicate an open settlement functioning on the site (or in the vicinity) in the given period.

Both the beginning, as well as the decline of the stronghold are, however, elucidated by four deposits of silver jewellery. In 2011, in the course of the aforementioned survey, with the use of metal detector, two silver hoards were discovered in the interior of the stronghold. Regrettably, we do not know their primary stratigraphic context. Several years later, another two silver deposits were found in the neighboring village of Perespa (Perespa, site 81 – discovery from 2014, and site 85 – discovery from 2015; for its location see Fig. 1: B).

Indubitably, the aforementioned collections of jewellery are not of decisive value in the discussion on the chronology of the settlement complex in Czermno, although it is worth considering them in further studies.

IV. CHRONOLOGY OF THE COMPLEX IN LIGHT OF CURRENT RESEARCH

IV.1. Contribution of natural sciences

The results of comprehensive environmental research have enabled the reconstruction of selected elements of the geographical environment in the period preceding the construction of the stronghold and adjacent settlements, in particular: (1) determination of mineral and biogenic sediment succession within the valleys of the Huczwa and Sieniocha Rivers in the vicinity of the stronghold, along with (2) separation of natural and anthropogenic lithological segments (Fig. 6: A), (3) reconstruction of the palaeomorphology of the area, together with palaeohydrological interpretation focused on the evolution of the riverbed system (Fig. 6: A-B), (4) evaluation of anthropogenic transformation of topology and hydrology in the immediate vicinity of the site, as well as (5) reconstruction of the history of vegetation, both in the context of its natural succession and the impact of anthropopressure on the trends of subsequent changes (Fig. 6: C-D).

Principal conclusions resulting from the environmental studies described above indicate that: (1) increased medieval settlement activity in the area in question started in the 7th-8th centuries (as indicated by the significant growth of anthropogenic bioindicators, recorded in a chronostratigraphically correlated benchmark profile of the outer moat – CZ-29; Fig. 6: C), i.e., in a period of relatively dry and cold climatic conditions (Fig. 6: D), and with predominantly coniferous communities occupying the sandy habitats in the vicinity of the site; (2) intensive landscape transformations (i.e. adaptation of the valley topology for settlement purposes) were carried out on a large scale in the following centuries (significant leveling of land, reorganization of drainage, construction of moats, embankments and log roads), (3) human impact on the environment was particularly intense, as shown by reliable multi-proxy data (among others, increase in the share of crops and ruderal plants, two distinct phases of oak felling), in the mid-9th century, at the turn of the 10th and 11th centuries, as well as in the second half of the 12th century, (4) all major settlement phases were associated with a relatively warm and humid climate (Fig. 6: C).

The intensity of settlement between the 10th and 13th centuries is difficult to ascertain. Economic activity in the area of the stronghold complex decreases significantly from the first half of the 11th century up to the mid-12th century. The development of deciduous forests, reconstruction of the mixed forest stand and decreasing share of open areas with cereal cultivation are among the principal factors of the process.

Subsequent intensification of the human economy, coinciding with the early medieval climate optimum, started in the mid-12th century. Palynological indicators document significant deforestation, an increase in pastures, cultivated fields, and fallow areas (permanent up to the present day; see Dobrowolski *et al.* 2018).

IV.2. Contribution of archaeology

The aforementioned methodological weaknesses of the excavations held in Czermno, both in the 1970s and in 1997, have left a wide array of questions regarding the chronology of the settlement complex in Czermno unanswered.

Undoubtedly, the chronology of the fortifications is among the most important issues (rampart on site 1). We decided, however, to preface the considerations on this subject with comments on three other categories of archaeological sources.

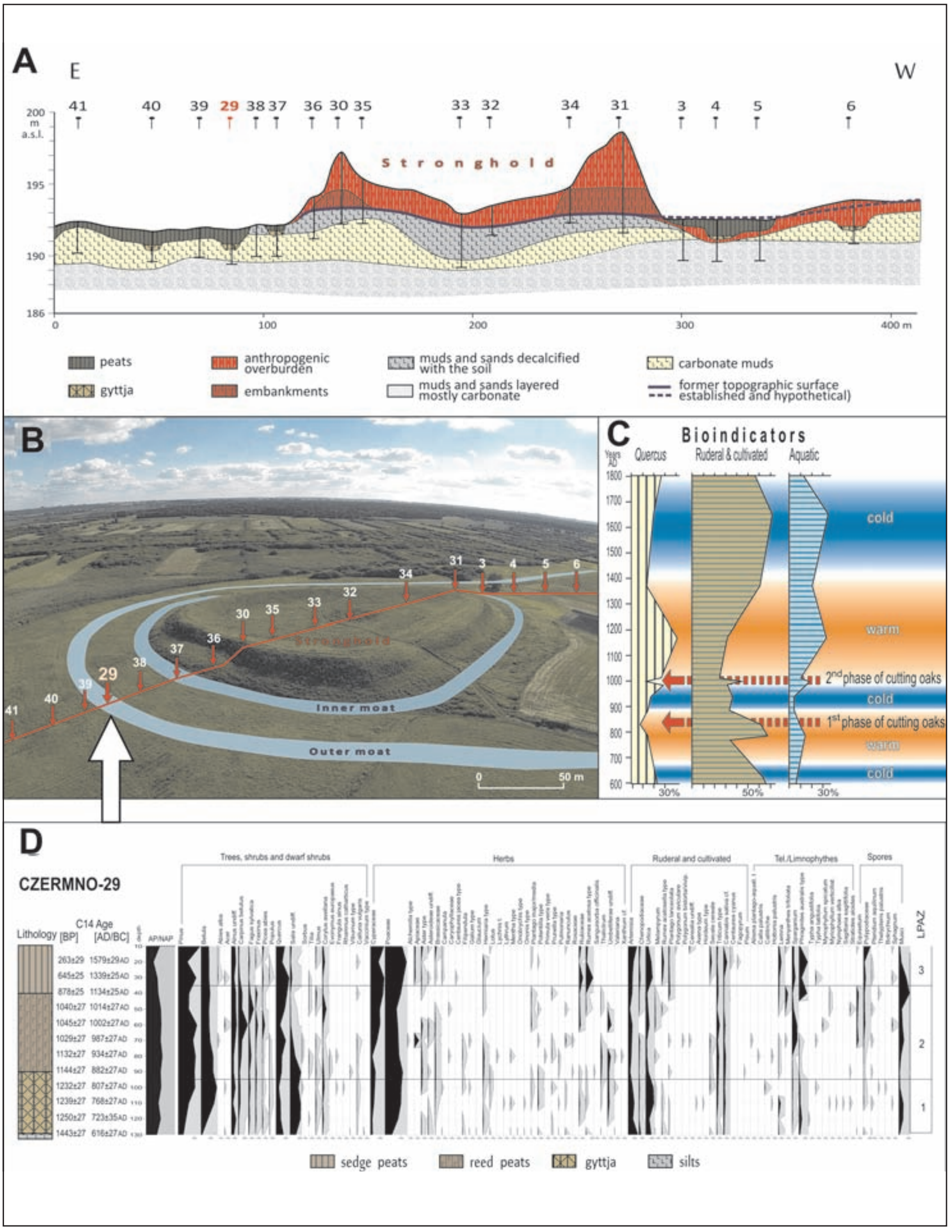


Fig. 6. Czermno (Tomaszów Lubelski district, Lubelskie voivodeship). Main results of environmental investigations; prepared by P. Zagórski.

A – geological cross-section through the stronghold in Czermno (location as Fig. 6: B); B – distribution of the drillings in the Czermno site (Photo by Mariusz Gala/Zdzisław Cozac Media Promocja); C – main bioindicators based on pollen diagram from CZ-29 profile (after Dobrowolski *et al.* 2016b); D – pollen diagram CZ-29 with the results of radiocarbon dating (after Dobrowolski *et al.* 2016b)

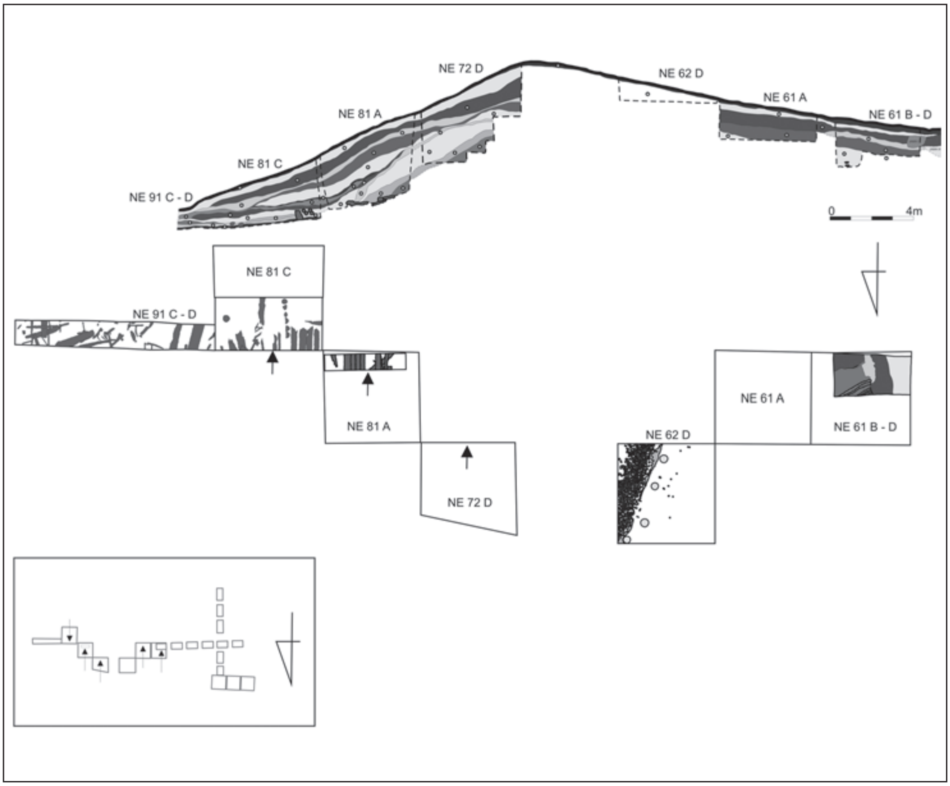


Fig. 7. Czermno (Tomaszów Lubelski district, Lubelskie voivodeship), site 1 (stronghold). Excavations in 1977. Reconstructed cross-section of the rampart and plan of the trenches with remains of wooden constructions (after Kamińska-Koj and Koj 2016; rampart profiles marked with arrows); prepared by T. Dzieńkowski, computer processing by R. Ratajczak

IV.2.1. Inhumation cemeteries

As a matter of fact, there are no clear premises for establishing the chronology of skeletal burials discovered either in the interior of the stronghold (site 1; chronology of the grave discovered on the rampart will be discussed below, in the context of chronology of the fortifications – see IV.2.4) or at site 3. The latter provided 15 skeletal graves, unearthed in 2013, along with a group of archaeological features of typically settlement functions (foundation pit [?] among them). Stratigraphic data indicate that the burials are younger than the settlement features. Radiocarbon dates of samples taken from skeletons found in double grave No. 14, obtained in the Poznań Radiocarbon Laboratory, generally point to the 12th-13th centuries (^{14}C: 1059 [0.4%] 1063; 1154 [95.0%] 1264; 1276 [95.4%] 1392) as the period during which the necropolis was functioning (Voloshyn *et al*. 2014).

IV.2.2. Premises for absolute chronology of the trackways

The location of Czermno in the wet valleys of the Huczwa and Sieniocha Rivers forced the construction of bridges to enable travel between particular sites. Their vestiges were investigated in the most comprehensive way in 1985, in the course of excavations on site IIG, located between the suburb (site 2) and the Huczwa River (Fig. 3: A). In 1997, a new trench (2 × 6 m) was opened east of the area excavated in the 1980s. Wooden posts, unearthed in the trench and interpreted as the foundations of a trackway, provided eight samples for dendrochronological analysis. The results, obtained in the Marek Krąpiec Laboratory, are as follows: after 1175, after 1200, and 1186, 1202, 1203). Additional samples were taken from the posts situated in the middle of the trackway, as well as from a pile located outside the trackway and inclined towards it. The results, obtained in the Marek Krąpiec Laboratory, are as follows: 1189, after 1215, after 1242, and 1240, 1242 (*cf*. Krąpiec 1998, 38-39; Urbański 2000, 240ff., Tab. 1; Florkiewicz and Urbański 2016; see Table 1).

Datings obtained in 1997 proved the functioning of wooden structures in the 12th-13th centuries (1186-1242). Given the fact that a certain part of the samples refers to the period

Table 1. Settlement complex in Czermno.
Results of dendrochronological datings of samples acquired in 1997 (after Krąpiec 1998, 38-39; Urbański 2000; updated by M. Krąpiec); prepared by T. Dzieńkowski and M. Krąpiec

Sample No. on Fig. 1	Sample		Number of rings	Sapwood	Date I	Date II
Rampart/stabilization constructions						
1	Are 81, qr. C	oak beams, outer part (basis) or elements of stabilization of the rampart	85	lack	939-1023	after 1030
1	Are 81, qr. C		58	lack	943-1000	after 1007
2	Trench II D		111	lack	910-1020?	after 1027?
2	Trench II D		82	lack	962-1043	after 1050?
Trackway constructions						
3	Trench II G	trackways (oak posts)	128	117-128	1115-1242	1242
3	Trench II G		102	102	1131-1232	after 1242
3	Trench II G		125	114-125	1116-1240	1240
4	Post		260	lack	946-1205	after 1215
4	Post		62	48-62	1142-1203	1203
4	Post		77	68-77	1110-1186	1186
4	Post		99	86-99	1104-1202	1202
4	Post		122	lack	1044-1165	after 1175
4	Post		114	103-114	1077-1190	after 1200
4	Post		121	120-121	1072-1192	1203 (-6/+8)
4	?	?	47	lack	1136-1182	after 1189

after 1240, one can assume that the settlement complex survived the first Mongol invasion (capture of Kyiv – 1240; raid on Poland and Hungary – 1241).

Discoveries of recent years prove that the trackways also functioned earlier. Although wood samples from site 68 have not provided dendrochronological dates, radiocarbon analysis conducted in the Marek Krąpiec Laboratory resulted in dates (with a probability range of 95,4%) of 776-982 AD, 975-1155 AD, 1021-1155 AD, and 1038-1213 AD (Aniszewski *et al.* 2015, 22; Solecki *et al.* 2019). A vertical, pointed wooden post, unearthed in 2014 at site 70, provided a dendrochronological date of 999 AD (Marek Krąpiec Laboratory; *cf.* Wołoszyn *et al.* 2016a).

IV.2.3. Chronology of silver hoards from Perespa and Czermno with regard to the functioning of the Czermno settlement complex

The precise chronology of jewellery discovered in Perespa near Czermno requires thorough study, although the hoards were hidden undoubtedly in the 10th century (mid-10th c., first half of the 10th c.?). Significantly, both of the assemblages include not only items with clear east European analogies (*e.g.*, lunulas), but also objects typical of East-Central Europe (eastern Austria [Burgenland], Czechia, Transylvania), and also of post-Great-Moravian character (earrings of a form well known from Stará Kouřim refer to the first half of the 10th century (!); *cf.* Wołoszyn *et al.* 2016b, 702-709; Poleski 2017, 86-87, with remarks on analogies with Stará Kouřim); Duczko 2018, 544 (with remarks on finds from Drassburg in Burgenland; description of the site – see: https://histarch.univie.ac.at/mitarbeiterinnen/univ-prof-dr-claudia-theune/projekte/abgeschlossene-projekte/reiterkrieger-und-burgenbauer-die-fruehen-ungarn-und-das-deutsche-reich-vom-9-11-jahrhundert/die-mittelalterliche-burg-von-drassburg/ [accessed: 28.05.2020]).

Certainly, hoards from Perespa do not provide premises for, *e.g.*, the chronology of erection of the Czermno stronghold rampart. The deposits testify, however, to the formation of a local elite in the 10th century, with decidedly supra-regional contacts.

In the course of the aforementioned metal detector survey in 2011, two hoards of silver jewellery were discovered in the interior of the Czermno stronghold (for their location see Fig. 1: B). Regrettably, both assemblages are deprived of archaeological context. Typological analysis points to the second half of the 13th or the early 14th century as the most probable time of deposition (*cf.* Piotrowski and Wołoszyn 2012). Apparently, at the time the hoards were deposited, the stronghold had ceased to exist.

IV.2.4. Archaeological excavations in Czermno in 1977, 1997, 2014-2016

IV.2.4.1. Excavations of the rampart in 1977

The archaeological work on the stronghold in 1977 was the first large-scale investigation of the rampart, and perhaps the most important in the course of the entire excavation campaign held in the 1970s (Florek and Wołoszyn eds 2016). The principal goal was to cut the fortification line by an east-west axis, to obtain a complete cross-section of the stratigraphic sequence (Figs. 4-5, 7). Following the above-mentioned criteria, six trenches with different parameters were opened during the research – four on the eastern, outer slope (No. 72D, 81A, 81C, 91C-D), and two on the western, inner slope (No. 61A, 62D; Kamińska-Koj and Koj 2016,194, 204; Florek 2016a, 243-246; 2016b, 275-283; Fig. 7). Trench 51B-D, located at the junction of the rampart and the interior of the stronghold, explored in 1977-1978, also yielded substantial information. The results gave background to separate two construction phases of the rampart and establish their preliminary chronology (Kamińska-Koj and Koj 2016, 195-196). The rampart of the older phase was placed on a wooden grate, secured from the outside with a fence and a wooden-clay structure, serving as a breastwork, which was later destroyed by fire. In the younger phase, the upper part of the embankment was elevated and rebuilt with the use of a combined grate-and-box wall construction. The entire chronological frame of the stronghold, synchronized with the results of the excavations held in 1952, was separated into the following sequential phases: 1) fortified (?) settlement and initial phase of stronghold construction in the 10th century, including Level 3 (the oldest) and layer 10 – sandy-clayish subsoil with relics of the wooden rampart construction on its top (lower layers 11-13 were also of natural origin); 2) occupation of the stronghold until its destruction in the 11th century, including Level 2, rampart layers 5-9, and layer 4 – defined as a layer of conflagration of the rampart; 3) reconstruction of the rampart and occupation of the stronghold until its final destruction in the 12th-13th centuries, including Level 1 and rampart layers 1-3 (*cf*. Kamińska-Koj and Koj 2016, 200, 210; Florek 2016b, 278-280; Florkiewicz and Sikora 2016).

*

The discovery of the suburb rampart on site 2 (excavations in 1976 and 1979) should also be mentioned here. Wooden relics unearthed there can be interpreted as remains of a fence and wooden stabilization of the embankment construction (Pomarański 2016, 378-381). Given the relatively small scope of excavations, it was not possible to identify the structural details of the rampart, its parameters, or its course. Regrettably, we are lacking the data necessary to establish the chronology of the fortifications.

IV.2.4.2. Sampling archaeological wood in 1997

In the last decade of the 20th century, Andrzej Urbański recommenced excavations in Czermno in order to obtain wood samples from the rampart and trackway constructions for dendrochronological dating (*cf*. Urbański 2000). Four spots were selected (Fig. 1: 2; Table 1):

No. 1 – at the foot of the eastern part of the stronghold rampart (site 1), south of trench 91C-D, lack of precise location – according to the Author: "[…] samples from wooden construction uncovered in the outer rampart base, in the vicinity of the stack construction and the older fence" (Urbański 2000, 240), which indicates that the samples were taken from the junction of trenches 81C and 91D (location: Fig. 1: B: I); results – after 1007 AD, after 1030 AD (without outer sapwood);

No. 2 – hollow between the rampart and the suburb area – site IID, excavated in 1979. Two layers of wood were uncovered and considered to be elements of the trackway (I) and wall support (II). Samples were taken from the lower level (II), uncovered in a test-pit adjacent to the trenches from the 1970s (Urbański 2000, 240; 2016, 595, 614; location: Fig. 1: B: II); results – after 1027 AD, after 1050 AD (without outer sapwood);

No. 3 – outer part of the suburb rampart (site IIF); samples were taken from constructions uncovered in 1979, which were associated with the embankment and fence supporting its outer slope (location: Fig. 1: B: III); lack of the results;

No. 4 – area between the suburb (site 2) and the Huczwa River, indicated as site IIG (location: Fig. 1: B: IV).

Excavations in 1985 revealed two rows of wooden stakes and horizontal beams, considered as relics of a wooden trackway. Eight samples of wood were taken in 1997 from a test-pit (2 × 6 m) situated east of the older trench (Urbański 2000, 240; Florek 2016a, 248; Florkiewicz and Urbański 2016, 385-388; (*cf*. Figs. 1 : B : III; 5; Table 1).

Following the author of the research (Urbański 2000, 242), it should be stressed here that the samples obtained in 1997 are deprived of stratigraphic context, which radically reduces the value of the results obtained.

IV.2.4.3. Rampart investigation in 2014-2016

New excavations on the stronghold started in 2014 and continued for the next two years. The primary strategic goal was the rampart – well-preserved, 30 meters wide, and six meters high. Two trenches – 1/2014, 5 × 10 m, and 2/2015, 4 × 15 m – cut the eastern part of the fortification along a NE-SW axis. Trench 3/2016 (3 × 3 m), was located in the area of the discovered burial and the remains of the rampart constructions (Figs. 5, 8-9). The arrangement of the trenches allowed for the investigation of the fortifications along a length of 25 m, including the upper face and a part of the outer slope of the rampart (trench 1), as well as its inner slope and the junction of the rampart and the interior of the stronghold (trench 2, 3; Fig. 5). Over the course of three seasons, researchers excavated an area of 119 m^2, with the depth of the trenches ranging from 2.5 up to 6 m. The works followed the rules of a stratigraphic method of exploration. A volume of 249 stratigraphic units was distinguished and marked with ordinal numbers from 1000 to 1099, and 2000-2150. Stratigraphic analysis led to the selection of 188 units related to the construction, functioning and destruction of the fortifications. To complete the statistics, a set of 20,393 finds is worth mentioning, along with a series of 127 samples, which finally provided 22 radiocarbon (plus two samples from grave 14 on site 3) and 9 dendrochronological dates.

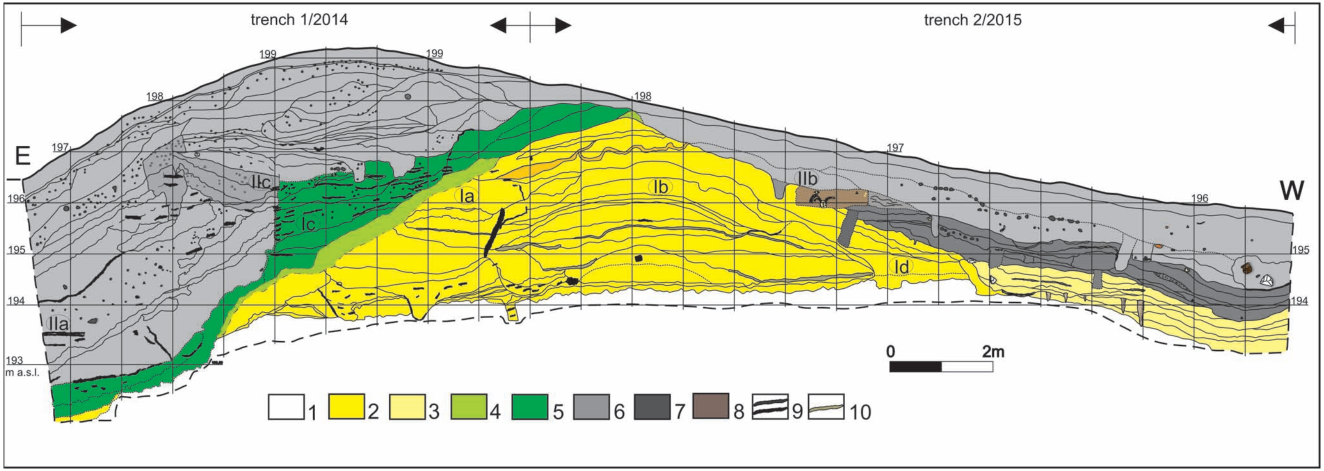


Fig. 8. Czermno (Tomaszów Lubelski district, Lubelskie voivodeship), site 1 (stronghold). Cross-section of the rampart excavated in 2014-2016, with phases Ia-Id, and IIa-IIc; prepared by T. Dzieńkowski, computer processing by R. Ratajczak.
1 – subsoil level; 2 – embankment of the rampart, Ia and Ib; 3 – stronghold's interior layers, phase I; 4 – levelling (s.u. 1042_1); 5 – embankment of the rampart, Ib; 6 – embankment of the rampart, Ia-IIc; 7 – stronghold's interior layers, phase II; 8 – burial; 9 – wooden constructions; 10 – peat

Fig. 9. Czermno (Tomaszów Lubelski district, Lubelskie voivodeship), site 1 (stronghold). Excavations 2014-2015; Photo by T. Dzieńkowski, computer processing by R. Ratajczak.
A-B – southeastern profile of the rampart; C-F, H – wooden constructions of the rampart I, II (C – construction Ia; D – construction Ic; E – construction IIa; F – wood, phase I; H – construction IIc), G – stronghold's interior construction and layers, phase I, II

Results of the last three excavation seasons are undoubtedly groundbreaking – they gave a solid basis for the verification of previous conclusions and provided a significant volume of completely new data, not to mention the re-examination of approximately 60% of the rampart. The new data set, supported with information from excavations held in the 1970s and 1990s, allows for a thorough analysis of the stratigraphy and construction details of the wall, along with the establishment of a preliminary chronological frame.

The conclusions described below followed a standard research procedure. Field data went through detailed analysis, focused on the association of stratigraphic units according to such criteria as structure, stratigraphic relations, and anthropogenic content. As a result, layer groups related to the sequential phases of rampart construction have been separated. A series of radiocarbon and (less numerous) dendrochronological datings for wooden elements of wall construction allowed for the establishment of a preliminary chronology of the building phases. Archaeological finds, from both the original rampart structure and secondary deposits, were included in the chronological analysis, though on a limited scale. Analysis of the stratigraphy and absolute chronology data indicate two (I, II) phases of the construction and use of the rampart (Figs. 8-11).

Rampart I

Subsoil

Both former and present conclusions are consistent – the stronghold was erected on a headland of an upper fluvial terrace, elevated above the floodplain by 3 m (*cf*. Dobrowolski *et al*. 2016, 120; 2018). Data from trenches 1-3 (2014-2016) indicate that the primary soil layer was partially levelled over a length of 15-16 m. The highest elevation ordinate of the area, equal to 194.5 m a.s.l., was documented in the central part, with a slight decline towards the eastern edge of the trench, down to 193.8 m a.s.l. (Fig. 8).

Earthworks and constructions Ia and Ib

A thirteen-meter-wide rampart, made of earth and wood, was constructed on a levelled surface. The embankment was formed of yellow, sandy silt, interleaved with layers of peat and gray clay. Despite the use of a uniform material, the east (Ia) and west (Ib) sections of the rampart differed in terms of construction details. The eastern part consisted of an earthen embankment, 5-6 meters wide, internally strengthened by several levels of wooden constructions (Figs. 8, 9: A, C). Additionally, the foundations of the eastern part were prepared differently – the top of the subsoil was covered with a layer of branches and planks, as indicated by traces of decomposed wood (s.u. 2025; the reference to stratigraphic units serves ordering and information purposes – *cf*. Table 2, 4; for technical reasons s.u. numbers are not marked on profile drawing, Fig. 8, 9). The internal part of the embankment was stabilized with the use of stakes and fascine. Three rows of one-meter-tall stakes with a diameter of approximately 10 cm, embedded in the ground (subsoil) up to 20-30 cm, were documented on the level of the natural soil (s.u. 2030, 2031, 2115). Excavation works

Table 2. Czermno. Results of dendrochronological datings of oak samples acquired from rampart and trackway constructions (excavations 2015; after Krąpiec 2015a); prepared by T. Dzieńkowski

Sample No.	Description	Rampart/ construction	Number of rings	Sapwood	Dating of sequence	Date of felling
CZER41	Trench 1/2014; stake from rampart (s.u. 2000_{18})	IIa	61	-	918-978?	after 985
CZER46	Trench 1/2014; beam from rampart (s.u. 2000_{15})	IIa	81	-	893-973	after 983
CZER47	Trench 1/2014; root beneath rampart	I?	70	-	898-967?	after 973
CZER48	Trackway (site 70)	-	97	-	894-990	after 1000
CZER49	Trench 1/2014; beam from rampart (s.u. 2000_{17})	IIa	102	-	878-979	after 989
CZER51	Trench 1/2014; beam from rampart (s.u. 2000_{11})	IIa	120	112-120+5	877-996+5	1001 (-0/+8)

uncovered 3-4 stakes in each row, with upper and lower heights ranging between 193.6-194.2 and 195 m a.s.l. (Level I). An analogous line of stakes was discovered in the embankment, approximately 1 m above the subsoil. This time, up to eight stakes in a row were registered, on the level between 195 and 196.1 m a.s.l. (s.u. 2021; Level II). Another wooden construction occurred in the upper part of the embankment, on the level of 196-197.1 m a.s.l., although its structure was not clearly legible. It consisted of horizontally-placed wooden elements, apparently beams/planks or stakes, which were, regrettably, in a bad state of preservation (s.u. 2105; Level III). The wood was heavily decomposed, although with no traces of exposure to fire. Given the size and arrangement of the stakes, it is hardly possible to consider them as a part of a defensive structure. Presumably, they protected the earthen parts of the embankment from sliding apart. Although no traces of braid were found, the distance between the stakes, equal to approximately 10 cm, indirectly hints to its presence. It should be noted that, also, no remains of horizontal wooden elements have been identified between the stakes.

The stakes and beams from Levels I-III formed a "stepped" structure stabilizing embankment Ia, adjacent to the western part of the rampart (Ib), 6.5-7 m wide. Embankment Ib consisted of alternating horizontal and embowed layers of earth (s.u. 2087, 2101, 2111) and peat (s.u. 2109).The inner part contained no traces of wooden constructions, whereas posts and stakes forming the rampart wall were discovered at its western edge (s.u. 2084, 2084a, 2091-2093).

Both embankments Ia and Ib, although different in terms of constructional details, were erected simultaneously, as indicated by the traces of levelling of the natural soil, the homogenous earthen material applied to the construction (yellow and grey silt interleaved with peat), and the stratigraphic relations of layers overlapping each other. Apparently, rampart sections Ia and Ib were built as a series of alternate levels – starting from rows of stakes and a lower embankment in the eastern part, followed by embowed layers of earth in the western section, and enhanced with stakes and braid, again in the eastern portion. Such an arrangement was documented up to a height of 3 m. The clay material utilized in the construction was acquired from the neighboring Sieniocha and Huczwa River valleys (Dobrowolski *et al*. 2016, 120).

Construction Ic

The aforementioned elements of the rampart, as well as the subsequent stages of construction, are unambiguous. The reconstruction of stratigraphic relations on the eastern edge of the rampart (Ia), along with the construction of the wooden wall (Ic), however, appears to be more problematic. Particularly, the layer marked as s.u. 1042_1, sloping diagonally and covering a set of horizontal and slightly elevating deposits, poses certain interpretive dilemmas (Figs. 8-9: A). The extent and structure of layer 1042_1 indicate changes, possibly temporary exposure of the embankment interior to variable weather conditions (leaching traces), therefore indicating either short or long interruption of construction works. The documented sequence of layers raises some ambiguities and provokes discussion. The question arises whether the Ic construction was not erected in the place of pre-existing structures, *e.g*. a rampart facade? Such a supposition is supported by the stratigraphy in regard to the "rising" layers below s.u. 1042_1. The units would be deposited in such a position only due to a vertical barrier. Unequivocal conclusions cannot be drawn, however, mostly due to the lack of legible traces of destruction, conflagration or construction works. We hope to resolve this issue in the course of further research.

Such an episode, although requiring further clarification, ended with the erection of subsequent construction elements. Layer 1042_1, along with the other deposits of embankment Ia, served as a basis for the groundwork, consisting of two to three wooden beams (preserved only partially; s.u. 1087a, 2012; footwall at the level of 195-195.2 m a.s.l.). It supported the vertical wooden wall, preserved to a height of 1-1.4 m, fastened with long horizontal beams (s.u. 2011; Fig. 9: D), anchored in the core of embankment Ia. Regrettably, ties between the above-described elements are currently not legible. the entire construction formed a simple hutch lacking a back wall, filled with hardened (tamped) gray earth (s.u. 1087), and stabilized with planks and branches laid crosswise to the rampart line (the form approximates a single-track stack construction, though more chaotic).

Presumably, the eastern wall of the rampart (Ic) was secured by clay and wood (s.u. 1095_1, 2009, 2015), as indicated by remains of padding at the foot of the rampart, along with traces of wood processing, including the trunk that provided a dendrochronological date. A hollow or ditch of intentional character (ditch E) was discovered as well.

Western construction (Id) and junction with stronghold interior

Only the lower parts of the elements comprising the western face of the wooden rampart wall were preserved. Negatives of wooden posts with diameters of 20-30 cm (s.u. 2091-2093) can be regarded as remains of vertical elements (so-called pilots), spaced evenly apart (about 20-30 cm), that supported the horizontal construction (s.u. 2084), which consisted of wooden beams (30-40 cm wide), arranged parallel to the fortification line. Both of the elements constituted the inner side of the rampart wall (Figs. 8, 9: B, G). Posts

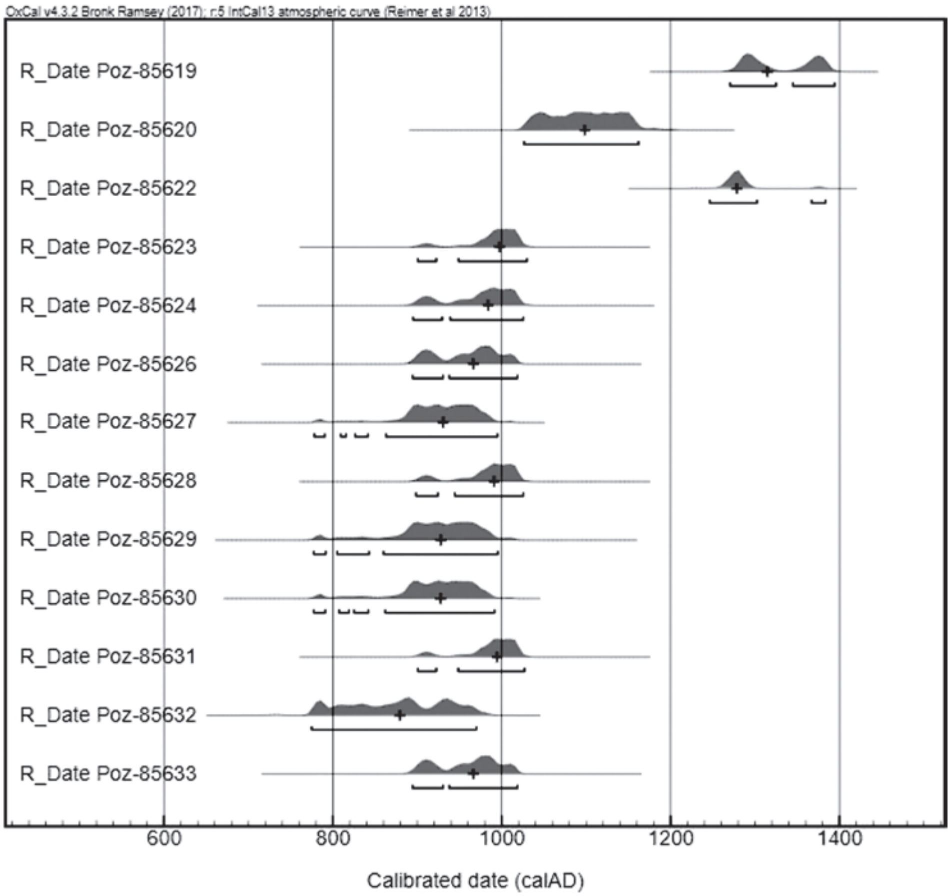


Fig. 10. Czermno (Tomaszów Lubelski district, Lubelskie voivodeship), site 1 (stronghold). Radiocarbon datings of organic residues on potsherds (after Auch 2017); prepared by T. Dzieńkowski

with braiding, in turn, limited the construction from the side of embankment Ib. The estimated width of the "barrier" filled with earth is about 1.3-1.4 m.

Excavation results indicate that the area by the inner face of the rampart was built up. The inhabitation zone is marked by discoveries of postholes, with diameters of 20 cm, and vertical stakes – traces of braid construction, documented in an area, about 2-2.5 m wide, between the rampart and the inner ditch (W). The posts supported the roof construction, while the stakes and braid padding protected against waterlogging. They served to stabilize the horizontal planks – a street surface or a house floor. The aforementioned constructions, discovered in the occupational layer of gray soil (s.u. 2066), were documented as deposits of decomposed wood (without traces of conflagration), only rarely preserved as elongated planks/beams. Pottery finds acquired from the occupational layer, according to the studies and ^{14}C dates of Michał Auch, correspond to a time between the second half of the 10th century and the mid-12th century (Type III – 10th-11th c.; Type VIII – second half of the 10th – 12th c.; *cf*. Auch 2017,110, 220, 263-280; 2018, 197-201; Fig. 10).

Ditches

Traces of two intentionally arranged hollows/ditches, filled with water and alluvia, were discovered both on the western, inner side of the rampart, as well as on the eastern, outer side (Fig. 8). The height of the inner ditch was measured to be about 193.8-194 m a.s.l. Its depth ranged to 50 cm, while its width was over 1 m (the full width exceeded the area excavated). Apparently, the ditch drained water from the area adjacent to the rampart. An analogous structure discovered on the outer side of the rampart presumably fulfilled similar functions, yet it was excavated on a small scale only. The ditch, sunk into the ground up to 60 cm, had a documented height of 192.4 m a.s.l., with a width exceeding 1.3 m. Regularly arranged padding (s.u. 2015), as well as traces of wood processing, including a felled tree trunk that provided a dendrochronological date, were noted in the vicinity of the ditch.

Stratigraphy, chronology, and reconstruction of rampart I

Stratigraphic analysis indicates that the oldest rampart was erected on the levelled surface of an elevation in the middle of the river valley. Its width reached 13 m. The rampart included two embankments – eastern (Ia), stabilized by wooden stakes, planks, and braiding (Ic), and western (Ib), constructed exclusively with earth, limited by a vertical wooden wall (Id). Both of the structures were built simultaneously, as indicated both by the range of natural surface leveling, as well as by the identical material used in their construction (grey-yellow silt and peat), containing a scarce number of finds with little diagnostic value. The wooden wall separating the rampart from the stronghold interior was built with beams stabilized by posts and braiding from the inner side. A much more complicated situation was found in the eastern part, given the presence of an oblique layer cutting the horizontal embankment structure. Apparently, it testifies to a temporary, fairly

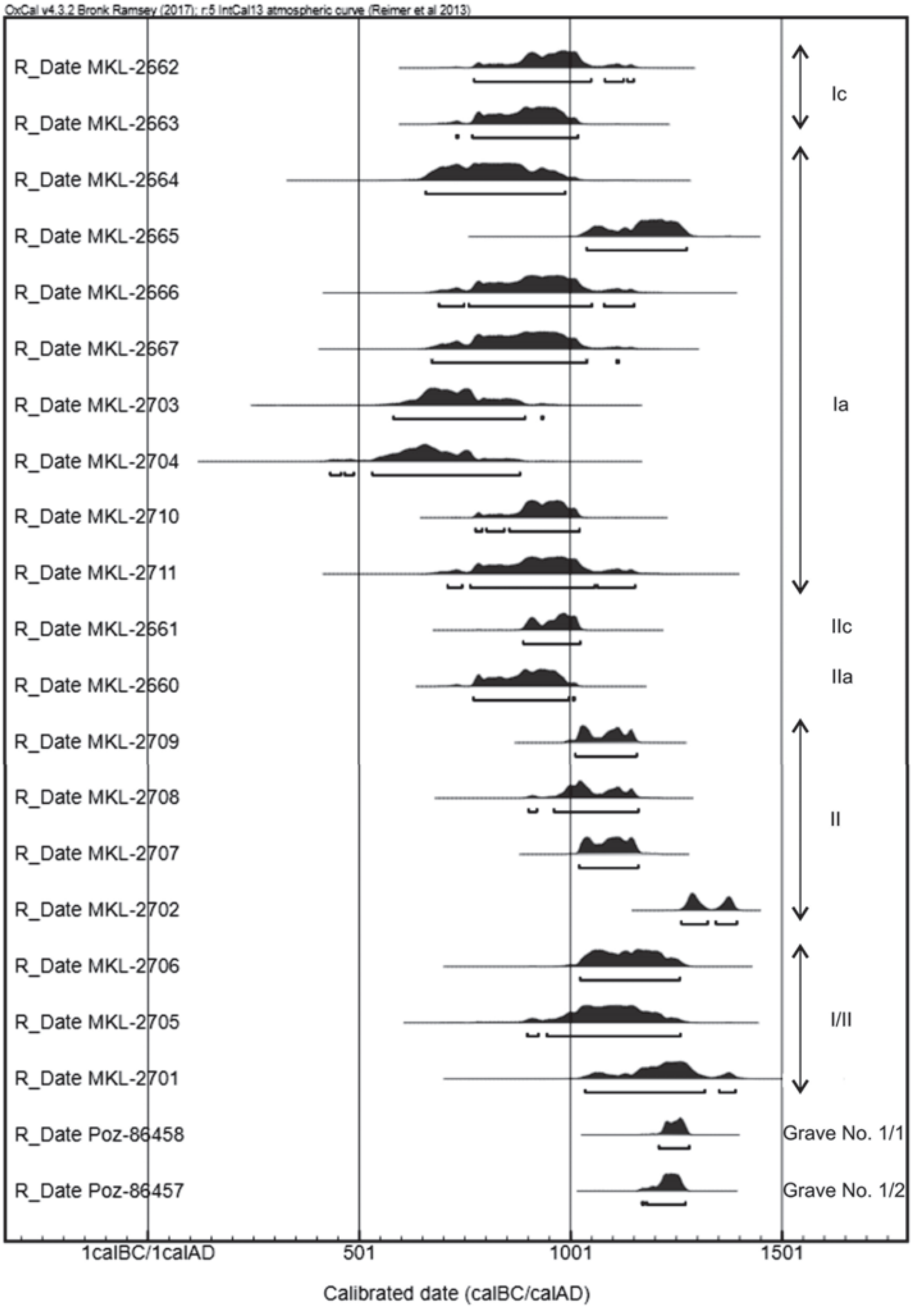


Fig. 11. Czermno (Tomaszów Lubelski district, Lubelskie voivodeship), site 1 (stronghold). Rampart Ia, Ic and II (inner constructions and grave 1/2016) – results of radiocarbon datings (after Krąpiec 2015c and Wołoszyn *et al*. 2018); prepared by T. Dzieńkowski

short, break in the construction works. Such an event – a change of building concept – was followed by the erection of the outer wall of the rampart. It was built 0.5-1 m above the elevation surface, in the form of a wooden structure (box, hutch?), consisting of horizontal beams stabilized by tamped, firm layers of humus overlapped by wood. The destruction of the upper part hinders our ability to reconstruct the details.

Stratigraphically defined components of rampart I (Ia, Ib, Ic, Id) underwent chronological analysis with the use of dendrochronological and radiocarbon datings (*cf*. Krąpiec 2015a, 2015b, 2015c; Figs. 8; 9: B; 11). Dendrochronological analysis provided but a single date – after 973 AD, which was obtained from the trunk of a felled tree found at the foot of rampart I, regrettably without the sapwood layer (Fig. 9: E, F). The trunk was not an element of the rampart structure; nonetheless, its connection with construction works seems undeniable. Radiocarbon dating brought much better results. Analyses yielded 10 dates – eight for wooden elements of embankment Ia, and two for structure Ic (*cf*. Krąpiec 2015c). Samples from embankment Ia were acquired from stakes of Level II (s.u. 2021) and Level III (s.u. 2105), while structure Ic provided samples from planks (s.u. 1086). The results are illustrated in Figure 11 and Table 4. Dates of nine samples vary between the 9th and, primarily, the 10th to the early 11th century, with a 95% probability range. Within the 68% confidence interval, six dates do not exceed the 11th century, while three of the samples reach the second decade of the 11th century. Such results should not be, however, considered as unequivocal, since dates indicating early 11th century cannot be rejected. Nonetheless, interpretation of the probability distribution of the dates (after calibration) for the samples at issue points to the 10th century as having the highest plausibility, with the median in its second half for six of the samples.

Two ^{14}C samples (Nos. MKL-2703 and MKL-2704) provided slightly earlier dates (Fig. 11). Presumably, they were obtained from the so-called old wood, reused in the constructions, since border dates in both ranges reach from the end of the 9th century up to the 930s. The only sample clearly distinguishable from the others is No. MKL-2665, with a range between the 1040s and 1270s. The sample was obtained from a stake construction (s.u. 2021, Level II) dated to the 10th century; given the lack of other samples enabling verification, it was excluded from the analysis. The following radiocarbon samples were taken from occupational layers adjacent to the rampart. In terms of stratigraphy, the earliest phase of occupation of the stronghold (rampart I) is represented by s.u. 2066 (occupational level1/a). It contained huge amounts of decomposed wood, lacking traces of fire, that yielded samples for dating. The results obtained indicate 1023 (95.4%) and 1259 calAD (Table 4) with equal probability. It should be, however, borne in mind that the formation of occupational layers was a long-lasting process, and not a single event. Furthermore, given but a single sample, it is difficult to draw far-reaching conclusions.

Rampart II – enlargement of the fortification

The subsequent stage of the functioning of the stronghold includes the rebuilding of rampart I, namely its enlargement outwards. The relevant parts of the fortifications were investigated in the 1970s and in 1997, when dendrochronological samples were acquired at the foot of the rampart, although the results did not solve chronological questions. Acquisition of the complete cross-section of the rampart in the course of the last excavation campaign (2014-2016) was shown to be nearly impossible. Thus, only the upper part of the outer slope, which included relics of wooden constructions, was thoroughly investigated. Stratigraphic analysis and technical data, however, point to a planned extension, considering existing embankments. Nonetheless, given the lack of complete data, the following conclusions are to be regarded as preliminary.

Construction IIa

The western edge of wooden structure IIa was uncovered in 2014. It consisted of five horizontal beams, each 30 cm wide (entire items and preserved fragments – s.u. $2000_{1\text{-}18}$; Figs. 8, 9: E), stacked on top of one another, forming a side-wall of a wooden box (?). The box is preserved from the ground beam at 192.6 m a.s.l. up to 193.7-193.9 m a.s.l. (upper part). In terms of stratigraphic relations, it was located above the fill of the ditch (E), the leveling layer of clay (s.u. 1095), and the wooden padding (s.u. 2015). The construction was located at a distance of approximately 1 m from the slope of the elevation, and 2 m from the façade of wall Ic. Two lower beams (s.u. $2000_{14,\ 17}$) were provided with intentionally cut holes for mounting vertical posts. Structure II can be interpreted as the remains of a sidewall of a box construction, which appears to have been open on one side, given the traces of anchoring and lack of vestiges of the back wall. Beams provided samples for dendrochronological dating (see below). Given the limited range of excavation, complete reconstruction of described part of the fortification appears to be hardly plausible – this is particularly true of the most distant, eastern part of the construction, preliminarily investigated in the 1970s, which is still awaiting re-examination.

Western wall IIb and junction with the stronghold interior

As evidenced by stratigraphic data, the rearrangement of the fortifications also included rebuilding the western wall, which secured the rampart from the stronghold's interior, in order to both widen the area inside and raise the occupation level. A shift of the wall 2.5-3 m eastwards was the first significant change. The second one was associated with construction techniques. Two postholes (s.u. 2056a and 2060), along with negatives of beams preserved in layer 2056, constitute remains of a new vertical edge of the rampart. It was composed of a 1.8-meter-wide barrier, which included two separate wooden walls, built of horizontal beams stabilized by vertical posts, with the space in-between filled with earth. On the west side, layers associated with the occupation of the interior of the adhered to the rampart (Figs. 8; 9: B, G). Two occupational levels were distinguished: 2a – stratigraphically older, including a layer of gray soil (s.u. 2047) with finds and constructions (posts B, D), which accumulated on the levelling layer of chalk (s.u. 2053a), 2b – the younger one, which also included gray soil (s.u. 2040, 2041) along with burnt material (s.u. 2054), constructions (post, s.u. 2073, beam s.u. 2068), and a levelling layer of chalk (s.u. 2053). Double burial 1 (see below), which was dug into the destroyed rampart construction and occupational layer, was the youngest structure discovered (2/b; Wołoszyn *et al.* 2018). The grave was covered by the debris of the destroyed rampart (s.u. 2032, 2033; 2/c; Figs. 8; 9: B).

Among the remains of housing structures adjacent to the rampart, a construction consisting of large, 60- to 70-centimeter-wide posts (s.u. 2079, 2080, 2081, 2083) shallowly embedded in the ground, and filled with conflagration layers, deserves particular attention. The posts were arranged along an E-W axis. Three of them were spaced every 40-50 cm, while the fourth one was placed 3 m westwards. Given the present state of research, it is hard to determine the construction type (building?), and stratigraphic relations with the aforementioned occupational layers remain unclear as well. It cannot be excluded, however, that the traces of fire correspond with layers of burnt matter registered in unit 2070, which were related to the final stage of rampart I or the early phase of rampart II. Vestiges of occupation of the stronghold, described above, such as occupational layers, constructions, and the burial, provided samples for radiocarbon dating (see Table 4).

Breastwork – construction IIc

In the course of excavation, the remains of the upper part of the rampart – the so-called breastwork – were discovered. It was composed of a type of vertical wall built of horizontal beams (s.u. 1074; 195,95-196,82 m a.s.l.), probably supported with posts; however, given the state of preservation, precise reconstruction is hardly feasible. One cannot exclude that postholes discovered 4-4.5 m westwards (s.u. 1085, 1085a; 196,8 m a.s.l.) were associated with a wooden wall closing the entire construction. The interior of the „box" was filled with loose gray earth, containing a considerable number of finds (s.u. 1081).

Rampart II was 25 m wide in its entirety. Apparently, it was built in the form of a „terrace" construction (IIa) surmounted by breastwork – a row (or two) of 3- to 4-meter-wide wooden boxes (IIc; Fig. 9: H) – or another defensive structure. Concentrations of daub and postholes, discovered in 1977 on the western slope of the rampart, along with negatives of beams and posts found in 2015, indicate that the zone in question was provided with additional fortifications, although it is hard to reconstruct them in detail (Fig. 8).

Grave 1/2016

A double burial, partly dug into the rampart, was discovered in the course of the excavations held on site 1. It included the skeletons of a man and a child, placed deponed in a barely-visible burial pit (Wołoszyn *et al.* 2018). The male skeleton was in an atypical position – strongly flexed shrunken and headless. The grave inventory, including a battleaxe and 13 silver temple-rings, can be dated to the 13th century. The archaeologically established chronology finds its confirmation in the radiocarbon analysis, which points to the 1220s-1260s (^{14}C – male skeleton: 1217 AD [68.2%] 1261 calAD; 1181 AD [94.2%] 1273 calAD; skeleton of the child: 1224 AD [68.2%] 1270 calAD; 1210 AD [95.4%] 1281 calAD; Table 4). Both the discovery and dating of the burial are of primary importance for the chronology of the rampart, since they indicate the 1260s as the beginning of the gradual cessation of the stronghold's use (see Wołoszyn *et al*. 2018). A detailed analysis of the burial with the participation of anthropologists will be presented separately.

Chronology of rampart II

Samples of wood from rampart II and charcoal from occupational layers underwent a series of analyses – dendrochronological (four samples) and radiocarbon (12 samples), performed in 2014-2016 (Krąpiec 2015a, 2015b, 2015c; Fig. 11; Table 4). It should be noted that if we take into account the dendrochronological dates obtained in the 1990s, along with the latest samples from the area outside the stronghold, the total number of dates will increase to 23 (Urbański 2000; Krąpiec 2015a, 2015b). Radiocarbon dates obtained from 13 samples of organic residues preserved on potsherds, acquired from the stronghold, suburb, and neighboring settlements, should also be taken into consideration (Auch 2017, 263-280; Fig. 10).

The dendrochronological analysis – the most precise dating method applied for archaeological data – included four samples taken from stakes associated with rampart II, along with five samples of archaeological wood obtained from the outer infrastructure. In the latter case, samples were taken from constructions located in the vicinity – from the wooden trackway (site 70, one sample), and from a site situated one kilometer to the west (four samples). The results enable the reconstruction of the entire process of building activity, both in the stronghold as well as beyond. Regrettably, sapwood was only preserved in two samples – one from the rampart and the other from the vicinity of the stronghold; thus, we are in possession of merely two precise dates. The latter dates, therefore, indicate but a *terminus post quem*.

Samples from the rampart were acquired from construction IIa, preliminarily defined as a "box" (Table 2):

– upper beam with a hole (s.u. 2000_{11}) – 1001 AD (-0/+8);
– beam with a hole (s.u. 2000_{15}) – after 983 AD;
– lower beam with a hole (s.u. 2000_{17}) – after 989 AD;
– wooden stake (s.u. 2000_{18}) – after 985 AD.

The sample from the trackway provided, in turn, a date after 999 AD (Wołoszyn *et al*. 2016a; 2016b). Dates for the wood from the vicinity of the stronghold are as follows: 1040 AD (-5/+8), after 976, after 979, and – the youngest one – after 1203 AD (Krąpiec 2015a; 2015b; Table 3).

Table 3. Results of dendrochronological datings of oak samples from the vicinity of the Czermno stronghold (excavations 2012; after Krąpiec 2015b); prepared by T. Dzieńkowski

Sample No.	Description	Number of rings	Sapwood	Dating of sequence	Date of felling
CZER42	oak beams	65	-	905-969	after 976
CZER43		140	-	1054-1193	after 1203
CZER44		65	-	905-972	after 979
CZER50		98	91-98	983-1035?	1040 (-5/+8)

The conclusions that can be drawn from these results shed some light on the chronology of the entire settlement complex. The date 1001 AD (-0/+8; 1008 AD), obtained for the upper beam from rampart IIa, is of key importance here. It indicates that rearrangement of the fortification could have been initiated in the first/second decade of the 11th century. It is worth noting that the results obtained in 1997 refer to the period after 1007 and 1027 AD, although – regrettably – both of the samples were deprived of the sapwood layer. The second precise date, albeit from outside of the stronghold, points to the 1040s (1040 AD, including sapwood). It is unfortunate that the sample was obtained thanks to an accidental discovery, thus it lacks precise location and stratigraphic context. Presumably, the result indicates a subsequent stage of building activity, corresponding with dates obtained for the rampart construction – after 1030, and after 1050 AD. Such a convergence may indicate the extension of construction works in the first half of the 11th century. Seemingly, the stronghold was first reassembled, while the subsequent works spread over the wider area, and included the entire infrastructure, i.e., the building of houses in the adjacent open settlements, along with roads and wooden trackways.

Setting aside dendrochronology, 12 samples of wood from the rampart constructions, charcoal from the occupational layers, and human remains from grave 1 underwent radiocarbon dating (Krąpiec 2015c; Wołoszyn *et al.* 2018). The analysis included samples from ramparts IIa and IIc. In the first case, a wood fragment from „box IIa" (s.u. 2000_{14}) provided a date of 902-1018 calAD, with a probability range of 68.2%, and 890-1025 calAD, with a probability range of 95.4%. Noticeably, the results are within the limits of the 10th and early 11th centuries. Bearing in mind that the dendrochronological analysis of the beam with the sapwood layer from the same construction (s.u. 2000_{11}) points to the first decade of the 11th century, there is no contradiction between the dendrochronology and the results of the radiocarbon analysis that determine *terminus ante quem* 1018 and 1025.

Analysis of wood remains from the breastwork construction (IIc; s.u. 1074) also brought interesting results (Fig. 9: H; Table 4). The samples provided a date of 779-983 calAD, with a probability range of 68.2%, and 772-1011 calAD, with a probability range of 95.4%. The structure is contemporaneous with, or stratigraphically younger than, the „box" of rampart IIa, which results in a similar statement as above – the extension of the eastern part of the fortification (IIa), along with the erection of the breastwork (IIb), took place in the first/second decade of the 11th century at the latest (1011 calAD, though with a probability range of 0.6%). It must be kept in mind, regrettably, that we are at the disposal of merely one sample, despite the fact that the result corresponds with the dendrochronological date of 1001 AD (-0/+8).

Radiocarbon dates for the zone adjacent to the rampart derive from wooden constructions and charcoal remains from occupational layers. The former case includes samples taken from two of four posts (s.u. 2081 and 2083) discovered at a height of 194.30-194.50 m a.s.l. Their stratigraphic position remains slightly unclear. Most likely, the posts functioned in the 11th – 12th centuries, as indicated by the results of radiocarbon analyses: s.u. 2081-961 (93.0%) 1161 calAD; s.u. 2083-1021 (95.4%) 1161 calAD. Charcoals from the upper and younger stratigraphic level, related to the functioning of rampart II, provided the youngest chronological markers. Single ^{14}C samples were taken from s.u. 2035/2047 and s.u. 2088 and 2033.The results are between the 11th and the mid-12th centuries (s.u. 2035/2047-1013 [95.4%] 1158 calAD; in accordance with the results for samples from posts s.u. 2081 and 2083), and between the 12th and 13th centuries (s.u. 2033-1263 [56.9%] 1325 calAD; s.u. 2088-1155 [68.2%] 1297 calAD).

Clarification of the chronology of the youngest settlement level was obtained thanks to research carried out in 2016, particularly the discovery of the burial dug into the rampart layers described above and covered by debris from the fortifications. Radiocarbon dates of samples of human remains confirmed that the burial can be attributed to the time span between the 1230s-1240s and the 1260s. The results also confirm – though indirectly – that the gradual destruction of the fortifications began after the mid-13th century at the latest, indicating *terminus ante quem* for the formation process of the occupational layers (Wołoszyn *et al*. 2018).

The aforementioned dates are congruent with the results of the radiocarbon analyses of wood samples obtained by the team of Marek Poznański. They are between the late 10th and the mid-12th to the early 13th centuries (*cf*. Aniszewski *et al*. 2015; results with a probability range of 95.4%: MKL-1416, 975-1155 calAD; MKL-1629, 1021-1155 calAD; MKL-1841, 1038-1213 calAD; MKL-2373, 776-982 calAD). Building activities in the 12th and 13th centuries are, in turn, confirmed by the dendrochronological dates obtained in 1997 (*cf*. Table 1): 1186AD, 1202, 1203, 1203, and the youngest ones – 1240 and 1242 AD. The data listed above indicate sequential repairs of the trackways, conducted in the 1180s, the early 13th century, and the mid-13th century at the latest. Samples from the trackways that brought dates referring to the oldest settlement phase are sparse. Among them, a radiocarbon date of 776-982 calAD, with a probability range of 95.4% (sample MKL-2373), which indicates the 980s as the youngest date, as well as a dendrochronological date after 999 AD from a post of the trackway construction, are worth mentioning (Krapiec 2015c; Aniszewski *et al*. 2015; Wołoszyn *et al*. 2016a).

Table 4. Results of radiocarbon datings of wood samples acquired in the Czermno stronghold (excavations 2013-2016; after Krąpiec 2015c); prepared by T. Dzieńkowski

No.	Decription	Phase of rampart/constructions/ interior/graves	Sample No.	Conventional date [BP]	Calibrated dates	
					Sigma 1 68.2% calAD	Sigma 2 95.4% calAD
1	Czermno, site 1 Trench 1/2014; s.u. 1074	IIc	MKL-2660	1135±50	779 (4.3%) 790 830 (2.6%) 837 866 (61.3%) 983	772 (94.8%) 997 1001 (0.6%) 1011
2	Czermno, site 1 Trench 1/2014; s.u. 2000_{14}	IIa	MKL-2661	1070±40	902 (14.5%) 920 961 (53.7%) 1018	890 (95.4%) 1025
3	Czermno, site 1 Trench 1/2014; s.u. 1086_{1}	Ic	MKL-2662	1070±70	889 (68.2%) 1025	773 (89.1%) 1050 1083 (4.8%) 1127 1136 (1.5%) 1151
4	Czermno, site 1 Trench 1/2014; s.u. 1086_{2}	Ic	MKL-2663	1130±60	778 (4.5%) 790 828 (3.9%) 839 865 (55.9%) 987	732 (0.4%) 735 769 (95.0%) 1019
5	Czermno,site 1 Trench 1/2014; s.u. 2021_{1}	Ia	MKL-2664	1210±90	690 (19.0%) 791 760 (47.9%) 894 932 (1.2%) 937	659 (95.4%) 989
6	Czermno, site 1 Trench 1/2014; s.u. 2021_{3}	Ia	MKL-2665	840±70	1055 (7.9%) 1077 1154 (60.3%) 1265	1040 (95.4%) 1276
7	Czermno, site 1 Trench 1/2014; s.u. 2021_{5}	Ia	MKL-2666	1100±90	778 (3.6%) 791 805 (2.4%) 815 825 (3.9%) 841 862 (58.3%) 1022	690 (5.1%) 750 761 (84.8%) 1052 1081 (5.5%) 1152
8	Czermno, site 1 Trench 1/2014; s.u. 2021_{7}	Ia	MKL-2667	1130±90	777 (5.1%) 793 801 (63.1%) 989	674 (95.1%) 1040 1140 (0.3%) 1115
9	Czermno, site 1 Trench 2/2015; s.u. 2088	Ia/Ic/II?	MKL-2701	780±90	1155 (68.2%) 1297	1035 (89.3%) 1318 1352 (6.1%) 1390
10	Czermno, site 1 Trench 2/2015; s.u. 2033	interior, level 2/c	MKL-2702	680±40	1276 (42.2%) 1306 1363 (26.0%) 1385	1263 (59.9) 1325 1344 (38.5%) 1394
11	Czermno, site 1 Trench 1/2014; s.u. 2105d	Ia	MKL-2703	1310±80	642 (65.1%) 777 793 (2.0%) 801 848 (1.1%) 853	583 (95.2%) 894 933 (0.2%) 937

12	Czermno, site 1 Trench 1/2014; s.u. 2105b	Ia	MKL-2704	1370±90	584 (58.7%) 722 740 (9.5%) 767	433 (1.6%) 459 467 (1.5%) 489 533 (92.3%) 882
13	Czermno, site 1 Trench 2/2015; s.u. 2070	interior, level 1/a or 2/a	MKL-2705	950±90	1015 (68.2%) 1186	898 (2.5%) 924 945 (92.9%) 1260
14	Czermno, site 1 Trench 2/2015; s.u. 2066	interior, level 1/a	MKL-2706	890±70	1045 (24.8%) 1098 1119 (43.4%) 1215	1023 (95.4%) 1295
15	Czermno, site 1 Trench 2/2015; s.u. 2083	interior, constructions II?	MKL-2707	950±35	1029 (18.1%) 1051 1083 (37.2%) 1127 1135 (12.9%) 1151	1021 (95.4%) 1161
16	Czermno, site 1 Trench 2/2015; s.u. 2081	interior, constructions II?	MKL-2708	1000±50	986 (43.3%) 1049 1086 (19.2%) 1124 1137 (5.7%) 1150	901 (2.4%) 921 961 (93.0%) 1161
17	Czermno, site 1 Trench 2/2015; s.u. 2035/2047	interior, level 2a?	MKL-2709	970±35	1020 (26.4%) 1049 1085 (32.0%) 1125 1137 (9.8%) 1150	1013 (95.4%) 1158
18	Czermno, site 1 Trench 1/2014; s.u. 2105a	Ia	MKL-2710	1100±50	890 (68.2%) 993	777 (2.8%) 792 803 (6.0%) 845 857 (86.6%) 1023
19	Czermno, site 1 Trench 1/2014; s.u. 2105c	Ia	MKL-2711	1090±90	778 (3.1%) 791 807 (1.3%) 813 826 (3.4%) 841 863(60.3%) 1025	711 (2.9%) 745 764 (84.4%) 1059 1065 (8.1%) 1154
20	Czermno, site 1 Trench 2/2015; s.u. 2053	interior, level 2a/2b	MKL-2712	1160±60	776 (54.4%) 901 921 (13.8%) 953	694 (6.4%) 746 763 (88.9%) 994
21	Czermno, site 1 Trench 3/2016	II; grave No. 1; skeleton 1 (adult)	Poz-86457	805 ± 30	1217 (68.2%) 1261	1170 (1.2%) 1174 1181 (94.2%) 1273
22	Czermno, site 1 Trench 3/2016	II; grave No. 1; skeleton 2 (child)	Poz-86458	780 ± 30	1224 (68.2%) 1270	1210(95.4%)1281
23	Czermno, site 3	grave No. 14/1	Poz-86459	665 ± 30	1283 (36.2%) 1306 1364 (32.0%) 1385	1276(50.1%)1321 1349(45.3%)1392
24	Czermno, site 3	grave No. 14/2	Poz-86461	840 ± 30	1166 (63.5%) 1224 1235 (4.7%) 1241	1059 (0.4%) 1063 1154(95.0%)1264

IV.2.4.4. Rampart I and II. Chronology, construction, analogies

Stratigraphic data, in conjunction with with the absolute chronology, point to relatively high dynamics of building activities separated by subsequent stages, although performed in a fairly short period. Hence, tracking down the exact periods of activity with the use of archaeological sources appears to be nearly impossible. Clarification of the beginnings of the settlement complex still remains a key question; therefore, sets of radiocarbon dates from rampart I, rampart II, and the adjacent zone serve as indispensable sources of support. Given the results discussed above, we can assume that the rampart was erected in the second half of the 10th century, or – more confidently – at the end of the 10th century, and was completed in a relatively short period – by the early 11th century. Building activities began with the construction of rampart I (Ia, Ib, Id, and – after a short break – Ic). Extension of the rampart in the early 11th century followed a relatively short period of occupation of the stronghold. It seems fairly probable that the "explosion" of settlement, as registered in surveys and statistics of finds in the Archaeological Survey of Poland (Polish: Archeologiczne Zdjęcie Polski), was among the main factors (apart from the political ones) that forced the extension of rampart II, as well as the widening of the occupational area within the fortifications (see Dzieńkowski and Sadowski 2016). The outer structures of the rampart were built with the use of wood from trees cut in the early 11th century (dendrochronological dates: 1008 AD, after 1007 AD, after 1027 AD; ^{14}C – *t.a.q.* 1011 AD). Consequently, construction works could have begun in the second decade of the 11th century, at the earliest. Dendrochronological dates from constructions of rampart II (after 1030 AD, after 1050 AD), as well as a date from the vicinity of the stronghold (1040 AD), indicate an intermittent and staggered construction/remodeling process for the fortifications, lasting until the mid-11th century. Both archaeological finds and radiocarbon analyses of wood and human remains corroborate the relatively long functioning of the rampart, up to the 1260s, when the process of gradual destruction started (Wołoszyn *et al*. 2018).

The rampart of the Czermno stronghold stood out from the other fortifications due to its diverse and extensive structure and its remarkable height. Both ramparts I and II were built with the use of combined techniques and various constructional elements (Figs 8 and 9).

In terms of the construction and parameters, embankments I and II do not have direct analogies in the Polish-Ruthenian border zone. The majority of strongholds built in the 9th-11th centuries in the middle Bug River basin can be characterized by a relatively small area, ranging between 0.12 and 0.5 ha (Kulczyn, Busieniec, Sajczyce). The group of large, several-hectare fortified sites is scant (1.5 ha for Dorohucza, 5-7 ha for Gućiów and Skibice; *cf*. Poleski 2004, 2013; Dzieńkowski and Wołoszyn 2018). The strongholds were defended by four- to eight-meter-wide ramparts (only sporadically reaching a height of up to eight meters). Among the construction types of the ramparts, the simplest and the most widespread was an earthen (*e.g*., Tarnów, Sajczyce) or earthen/wooden embankment, with traces of wood used to stabilize both the surface and the earthwork (Busieniec, Kanie), or with a breastwork in the form of a fence or palisade (Dorohucza). A few objects, however, can be singled out by a more solid rampart construction. Individual wooden boxes constituted a part of the rampart structure in Kulczyn, Majdan Nowy, and most likely in Klarów. More complex earthen/stone/wooden constructions were recognized only in Busówno (phase 1B). It should be, however, stressed that, notwithstanding constructional differences, the widths of ramparts described above were similar, within the range of 5-6 m.

The situation changed in the second half of the 10th century and in the 11th century, with the erection of strongholds in Sąsiadka, Gródek, and – slightly later – in Jurów and Horodysko. The aforementioned objects functioned until the 13th-14th centuries (Kalaga ed. 2013; Dzieńkowski and Kuśnierz 2018; Wołoszyn ed. 2018; Banasiewicz ed. 2019). The strongholds listed above are variable in terms of the space within the fortifications – from 0.12 up to 1 ha. Discernibly bigger ramparts, reaching widths between 10 and 15 m, were built predominantly with the use of a box construction, consisting of one or two rows of wooden crates (Poleski 2004, 2013). The following brief outline demonstrates differences between rampart construction patterns applied in Czermno and the other strongholds located in the interfluve of the Wieprz and Bug Rivers.

The situation on the eastern side of the Bug River, both in its upper course and by the Dniester, appears to be equally complicated, mainly due to the state of research of the early medieval strongholds in the western and southern territories of modern-day Ukraine. Among but a few monographs, the "classic" work of Pavel Rappoport (1967) and the catalogue of strongholds prepared by Andrey Kuza (1996) deserve mentioning, although we also have at our disposal new data for such centers as Volodymyr-Volynskyi, Lutsk, Zvyenyhorod, Belz, and Halych (Terskyy 2002; 2006; 2010; Liwoch 2003; Hupalo 2014; Petryk 2015). As the research increases, previous and current assessments undergo the verification process, hence the number of strongholds with combined earthen/wooden rampart constructions rises significantly. Notwithstanding the updates, strongholds surrounded by earthen embankments still predominate in the western and southern territories of Rus'. One can give a series of examples from both Volhynia and Halych land (*e.g.*, Ostrozhes 10th-11th c., Stupnica 10th-11th c., Rappoport 1967, 121; Kuza 1996, 159; Liwoch 2003, 269-270). Widths of the embankments vary between 8 and 16 m, while their heights are between 2 and 8 m. Parameters of ramparts with wooden structures are different as well. The most widespread are, however, earthen embankments with wooden boxes or, less frequently, with a fence on the top. The stronghold in Lutsk can serve as an example – the 10- to 12-meter-wide rampart included an embankment and breastwork that can be reconstructed in the form of wooden box. Given the chronology of pottery finds, the stronghold was built in the late 10th century to the 11th century, and functioned until the 13th century (Terskyy 2006, 42-43, Fig. 28). Our knowledge about the fortifications of Volodymyr-Volynskyi – a pivotal early medieval power center of the province – is considerably lower, primarily due to the much smaller extent of the excavations and trouble locating the so-called "dytynec". As evidenced by new data, it was probably situated in the western part of the modern-day town, and was surrounded by an earthen/wooden rampart (embankment made of clayish soil with breastwork in the form of a wooden wall) dated between the 10th and 11th centuries (Terskyy 2002, 20; 2010, 67-79; Petryk 2015, 268-271).

Fortifications with inner wooden structures (boxes, barriers) or constructions in the type of a building/hutch enclosing the shaft from the inside constitute a relatively large group – the stronghold in Halych can serve as an example. New excavations of the developed, centuries-old fortification system of Halych-Krylos, carried on between 1992 and 1996, provided a new, significant set of information (Liwoch 2003, 247-249). The results point out that the building of the rampart surrounding the central stronghold (14 m wide) and the southern fortification line (7 m wide) began already in the 10th century. Each rampart consisted of an embankment provided with a fence/wooden wall (rampart 1, 2, 3). They were accompanied by another eleven-meter wide embankment with an outer fence, and wooden boxes, each four meters wide, and without a back wall (rampart 4). Fortifications of the central stronghold were constituted by two rows of 3- to 3.5-meter-wide wooden boxes set on a solid foundation built of clay. Boxes of the inner row were lacking the back wall; thus, they could have served residential and economic functions. The entire width of the oldest phase of fortifications reached 14 m. A similar, though wider, rampart (33 meters wide), consisting of several rows of wooden boxes, was discovered in the course of excavations held in 1981 and 2001 on the Maiden Nezalezhnosti in Kyiv (Sahaydak 2009, 259-277; Petryk 2015, 269). The rampart surrounded the so-called Yaroslav Town. Sherds of pottery found below its foundation can be dated to the 10th and 11th centuries. Constructional solutions applied in the rampart of Belgorod (Kyiv province, Ukraine) appear to be slightly different (Kuza 1996, 171; Kolchin 1985, 216, figs. 7, 8). The lower part of the defensive construction was stabilized by an embankment, while the upper one took the form of a building.

The above description of the fortifications of selected strongholds representing various geographical zones (interfluves of the Wieprz, Bug, Styr, and Dniester Rivers) explicitly demonstrates the significant congruencies of the constructional solutions applied, *i.e.*, embankments, fences/wall, boxes. Given that, one can point to certain details of the construction of the Czermno stronghold rampart, *e.g.*, the methods of elaborated stabilization of rampart Ia, that find analogies in the middle Bug area, and others, such as the open boxes (lacking a back wall), that resemble rampart structures of the Halych stronghold. Controversies arise when analyzing the entire construction, characterized by the application of combined techniques, although the majority of problems result from the scale of destruction of the rampart, as well as its incomplete recognition. Rampart I finds no direct analogy in the classification system elaborated by Jacek Poleski (2004). Its basic structure – a large embankment with inner stabilization – refers to the type WII, although both the inner and outer vertical constructions encasing the rampart are closer to type WIV, not to mention the difficult-to-reconstruct breastwork construction (box? defense building?). Given the current state of research, reconstruction of rampart II is hardly feasible. Undoubtedly, it included a large embankment from the outside, strengthened with wooden constructions (boxes?) from the inside – with a wall provided with a breastwork in the form of a box (?). Such questions require, however, further investigation. Queries of formal analogies among archaeologically investigated types of ramparts in the strongholds of Greater and Lesser Poland, where grate and box constructions are predominant, pose similar difficulties (*cf*. Poleski 2004; Kara 2009; Dulinicz 2003).

Analysis of the Czermno stronghold rampart should also include data concerning its parameters, particularly the notable width of the construction, ranging between 13 and 25 m. Strongholds that emerged in the middle Bug River basin up to the 10th century were characterized by embankments that were 5-6 m wide. Conversely, certain strongholds of Lesser Poland, *e.g*., Zawada (9th-10th c.), are surrounded with twenty-five-meter-wide ramparts (Zawada, rampart II, V, northern; Poleski 2004, 126, 332-333, type WIIC; 2013). In the course of the 10th and 11th centuries, the widths of the ramparts of middle-Bug strongholds increased, primarily as a result of the application of elaborate defensive constructions. Only the ramparts of large, significant centers of the early Piast state, such as Gniezno and Poznań, or – on the other hand – the aforementioned principal strongholds of Rus' in Halych and Kyiv, reached similar dimensions. The rampart of the stronghold in Ostrów Tumski in Poznań was up to 20 m wide and 8 m high. After the extension in the 970s-980s, its width reached 30-35 m (Kóčka-Krenz *et al*. 2004, 142, 148; Kóčka-Krenz 2005; Kara 2009, 240, 273, 290). The rampart surrounding the Gniezno stronghold attained a similar width (20-25 up to 30 m). The construction consisted of piles of beams strengthened with wooden hooks (Sawicki 2001, 92; Kara 2009). Fortifications of the stronghold in Tum, dated to the early 10th century (phase 1C) are of particular interest, primarily with regard to the environmental conditions of their location. A fifteen-meter-wide rampart was mounted on marshy ground, with the use of a wooden underlay. The overground part consisted of an earthen/wooden embankment, strengthened with a grate construction (Stasiak and Trojan 2014, 68-69). Equally impressive are the dimensions of ramparts surrounding the principal centers of the Rus' princedom, *e.g*., Kyiv – 33 m, Halych – 14-20 m (Liwoch 2003, 246-247; Sahaydak 2009, 266).

Based on the present state of research, analyses of the construction, parameters, and chronology of Czermno stronghold fortifications indicate the following:

1) building techniques distinguish both rampart I and II from strongholds located in the middle Bug River basin, despite certain commonalities, such as stabilization of the embankment with layers of wood, typical for the majority of the fortifications;

2) quadrilateral structures in the form of a box lacking a back wall find analogies in rampart constructions of the Halych stronghold, although questions surrounding such constructions require further studies;

3) given the widths of both of the ramparts – 13 m (I) and 25 m (II), fortifications of the Czermno stronghold mirror the imposing ramparts of principal power centers, both in the Piast (Poznań, Gniezno, Tum) as well as the Rurikid (Kyiv, Halych) states;

4) absolute chronology analysis indicates that rampart I was erected in the second half to the late 10th century, and after a relatively short period was remodeled in the first or second decade of the 11th century. Given that, further excavations and an attempt to determine the chronology of the rampart in the suburb of Czermno (site 2) appear to be indispensable next steps.

V. CONCLUDING REMARKS

The pivotal research question we strive to answer in this article is: was the stronghold in Czermno erected as late as the 11th century? If so, it cannot be identified with Cherven' stronghold, mentioned in the *Tale of the Bygone Years* in the context of the expedition of Vladimir the Great in 981.

The answer is unequivocal – information about the late (eleventh century) chronology of the settlement complex in Czermno, introduced into the scientific circulation two decades ago, is but a misunderstanding. It stems from the deficiencies of excavations in the 1970s (trenches on the rampart were excavated up to 0.6-3 m; today, we know that the thickness of the layers reaches 6 m), perennial delays in the publishing of source materials, and a certain "overzealousness" of historians. They (at least some of them) succumbed to the magic of dendrochronology and did not want to (or were unable to) understand the meaning of Andrzej Urbański's remarks, when he clearly stated that: "Given the lack of a stratigraphic sequence in the place of the samples' acquisition, we are uncertain if the fragments of defensive constructions dated to the first half of the 11th century refer to the oldest fortifications of the stronghold [...]" (*cf*. Urbański 2000, 242).

Given the principles of cooperation between archaeologists and historians, the attempt to establish the chronology of the Czermno-Cherven' fortifications, undertaken in 1997, is a vivid example of what such a cooperation **should not look like**.

The oldest, central part of the Czermno fortifications was unearthed in 2014-2015. Seemingly, they were constructed in the second half / at the end of the 10th century. Such an assumption is supported by both absolute datings of wood residues discovered in the course of the excavations as well as the results of palaeobotanical research, proving extensive oak cutting in the given period (apparently for construction of the rampart). Worth noting is that the oldest pottery assemblages from Czermno refer to the aforementioned period as well. The first wooden trackways were constructed also in the second half of the 10th century – this is another argument for the formation of the settlement complex at that time, hence it is difficult to imagine that these constructions, requiring a considerable amount of work, served the transportation needs of small, "rural" settlements only. Last but not least – the silver hoards from Perespa, hidden in the mid-10th century (?), indicate the presence of social elites, interested in such sophisticated jewellery.

Regrettably, the determination of the moment of erection of the oldest fortifications is supported only by radiocarbon dating and not dendrochronology. By their very nature, the ^{14}C dates give a fairly broad time frame, hence the question remains whether they date the erection of the fortifications strictly to the period before 981. It should be, however, borne in mind that the reliability of referring Vladimir's expedition to 981 can be regarded as limited, as stated above (see III.1.). Although this does not release our team from attempts to determine the most accurate date of construction of the rampart on site 1 in Czermno, it is, however worth recalling that the date recorded in the *Tale of the Bygone Years* should not be "fetishized".

It must be emphasized in turn that the results of palaeobotanical analyses indicate that the cutting of trees (oak) took place in the mid-9th century as well. The research indicates the presence of a moat (?) already in the 7th or 8th century. It must be clearly acknowledged that, at present, this data cannot be confirmed by archaeological research. This does not mean that they are false; the state of recognition of the settlement complex in Czermno is still incomplete, thus we can assume to a high degree of probability that site 2 was also fortified. We cannot exclude that in the course of further investigations these fortifications will turn out to be older than the stronghold at site 1.

The rampart of phase II was erected at the beginning of the 11th century. It was a large, complex structure, evidently larger than the fortifications of the other strongholds known from the Bug River basin. Perhaps such a great investment indicates the growing significance of Czermno as a border stronghold, for which the expanding monarchies of the Piasts and Rurikids began to compete.

Either way, the "watery" location of the stronghold increased its defensive qualities.

As already mentioned (see III.1.), Cherven' appears for the last time in written sources around 1289 [6797]. Dendrochronological dates prove that the repairs of the trackways also occurred after 1240, *i.e.*, after the Mongol invasion, which also affected the region in question. In 1259 (6769), in turn, Burundai ordered the destruction of fortifications in western Rus'.

These events can probably be associated with the grave of a decapitated man and a child dug into the inner embankment of the rampart (grave No. 1/2016). Both traditional and radiocarbon analyses allow the burial to be dated to the mid-13th century / 1240s-1260s (see IV.2.4.3). It seems hardly possible that the rampart simultaneously served as both a fortification and a necropolis. Thus, we can consider burial No. 1/2016 as an archaeological argument for the decline of the stronghold in the second half of the 13th century. We cannot exclude that the aforementioned decision of Burundai contributed to the destruction of the fortifications in Czermno.

The stratigraphic context of the hoards discovered in Czermno in 2011 remains unclear (see IV.2.3). We can, however, assume to a certain degree of probability that their deposition in the interior of the stronghold took place when the glory years of Cherven' were behind it. Was a skeletal cemetery situated there at that time? Given the number of human skeletons discovered in the interior of the stronghold, as well as on the site 3 (where human remains are visible even on the surface), it can be acknowledged that the stronghold was transformed into a necropolis (such as, *e.g.*, Ostrów Lednicki). The limited number of radiocarbon dates for the skeletons from Czermno hinders the verification of that preliminary hypothesis.

To return to the question of cooperation between archaeologists and historians raised at the beginning of this study (see II), it is worth emphasizing that all the above-mentioned conclusions are of a preliminary nature. It is worth warning historians in advance, since, as Poznań medievalist Dariusz A. Sikorski concludes: "Quickly, as per the historian's experience, the obsolescence of archaeological 'knowledge' leads to understandable discouragement [...] and to increasing distrust of archaeologists who 'change their minds too quickly'. What is obvious for archaeologists to understand, since they confront it on a daily basis, when the results of one season of excavation can significantly change previously accepted conclusions, the historian considers as chaos in archeology and a lack of solid foundations. The growing expectation that archaeologists will develop a final conclusion on a given issue appears to be completely unattainable given the constantly developing methodology of archeological science" (Sikorski 2012, 64).

The question of the relatively poor state of research on the Czermno stronghold, recurring several times in our considerations, is not just a ritual complaint. One can look at it "point-wise" and combine several research seasons in Czermno with excavations, *e.g.* in Giecz, uninterrupted since 1949, or in Gniezno, where almost 60 excavation seasons have been carried on since 1936. This issue deserves, however, a slightly broader perspective that focuses on the problem of the state of recognition of early medieval Poland. In fact, it is a derivative of the so-called Millennium research program, implemented in the time of the Polish People's Republic. Many reasons, both strictly scientific and political, resulted in the fact that – despite preliminary declarations – the scope of archaeological research was incomparably higher in Silesia, Greater Poland, and Pomerania than in the lands east of the Vistula river. The differences in the financing of scientific research are today even easier to grasp – thanks to the transparency in public spending.

Considerations of the sources of differentiation of the European East and West and the ways to overcome it are not our primary goal. We are just attempting to make the reader aware of the practical consequences of differences in the funding of scientific research in Poland. Maps of the early Piast state, frequently published since the "dendrochronological revolution" took place, "end" on the line of the Vistula river (*cf. e.g.* Kurnatowska 2002, Fig. 2; Buko 2008, Figs. 85, 90; Kara 2015; Urbańczyk 2016, Fig. 1; Trzeciecki 2016, Fig. 22). None of our team believes that Mieszko I was born in eastern Poland, but one cannot help noticing that the eastern reach of the strongholds dated by the methods of the natural sciences coincides with the map of the distribution of funds for financing scientific research in Poland (*cf.* Wołoszyn 2020, 224-230). The reform of science, currently implemented in Poland, will clearly strengthen the – already enormous – divergences between the main centers and the civilization peripheries. This will inevitably affect our knowledge of both early medieval Eastern and Western Poland – it is worth remembering!

In closing the article, we would like to clearly declare that the resumption of excavations in Czermno remains an absolute priority in our further activities. Our investigations will focus on the comprehensive recognition of the rampart excavated in 2014-2016 (including the moat), followed by research on the trackways, and a monograph of the silver hoards and finds from the metal detecting prospections held in 2010-2011. The cemetery at site 3, along with its heritage conservation, constitutes a separate set of problems.

Acknowledgments

This article was written as part of the project *The Golden Apple of Polish archaeology. Stronghold complexes at Czermno and Gródek (Cherven' Towns) – chronology and function in the light of past and current research*, part 2 (Ministry of Science and Higher Education, Warsaw, NPRH, Project No. 11H 18 0344 86).

This article focuses on archaeological issues. In considering source material, studies in English were preferred. Written sources are also cited in English translations; their comprehensive analysis (along with references to editions in the original language) can be found in the erudite publications of Andrzej Janeczek and Adrian Jusupović, cited in our text.

Rus' chroniclers counted years from Creation and not from Incarnation (*cf.* Franklin and Shepard 1996, XI-XII). In the following lines, the year according to the Latin time calculation comes first, followed by the year according to the chronology of medieval Rus' chroniclers, presented in square brackets; *e.g.*, 981 [6489].

Description of Polish-Rus' conflict in 1018 [6526] and 1031 [6539] includes the term "Cherven' Towns" instead "Cherven'" (PVL, 132, 136). This is most likely a copyist's mistake (more on the subject: Poppe 1964, 168; Jusupović 2017, 58). The issue of the meaning of the term "Cherven' Towns" will not be considered thoroughly in this article.

The participants of *The Golden Apple of Polish archeology...* project focus on the results of research not only in Czermno, but also in Gródek. Results from the latter were not discussed in the text; about the project itself see https://grodyczerwienskie.pl/en/.

English translation: Maciej Trzeciecki (Warsaw). Information about research in Giecz: Teresa Krzysztofiak (Ostrów Lednicki), Gniezno: Tomasz Sawicki (Gniezno). We would like to express our gratitude to the numerous visitors of the excavations in Czermno that shared with us their knowledge in attempts to interpret uncovered layers – in particular: Andrzej Buko (Warsaw), Yura Lukomski (Lviv), Vasyl Petryk (Lviv), Jacek Poleski (Cracow).

References

Written sources

Chronicle, *The Galician-Volynian Chronicle: The Hypatian Codex II*. G. A. Perfecky (ed.), Harvard Series in Ukrainian Studies 16/2. Munich: W. Fink, 1973.

Gallus Anonimus, *Gesta Principum Polonorum. The Deeds of the Princes of the Poles*. Paul W. Knoll, F. Schaber (eds). Central European Medieval Texts 3. Budapest, New York: The Central European University Press, 2003.

PVL, *The Russian Primary Chronicle. Laurentian Text*. S. H. Cross, O. P. Sherbowitz-Wetzor (eds). Cambridge Massachusetts: The Medieval Academy of America, 1953.

Thietmar, *Ottonian Germany. The Chronicon of Thietmar of Merseburg*. D. A. Warner (ed.). Manchester, New York: Manchester University Press, 2001.

Studies

Abramowicz A. 1991. *Historia archeologii polskiej XIX i XX wiek*. Warszawa, Łódź: Oficyna Bibliofilów.

Althoff G. 2009. Spielregeln und Ironie im Gallus Anonymus. *Frühmittellaterliche Studien* 43, 407-415.

Aniszewski M. Drożdżek M., Solecki R. and Witomski P. 2015. Analysis and Conservation of Waterlogged Wooden Objects from the Early Medieval Archaeological Site of Czermno. *Annals of Warsaw University of Life Sciences – SGGW. Forestry and Wood Technology* 92, 18-25.

Auch M. 2017. *The early medieval settlement complex at Czermno in the light of results from past research (up to 2010). Pottery finds* (= *U źródeł Europy Środkowo-Wschodniej/Frühzeit Ostmitteleuropas* 2:3), Kraków, Leipzig, Rzeszów, Warszawa: Geisteswissenschaftliches Zentrum Geschichte und Kultur Ostmitteleuropas [GWZO], Instytut Archeologii i Etnologii PAN, Instytut Archeologii UR.

Auch M. 2018. Przemiany w produkcji garncarskiej na terenie kompleksu osadniczego w Czermnie we wczesnym średniowieczu. In T. Nowakiewicz, M. Trzeciecki and D. Błaszczyk (eds), *Animos labor nutrit. Studia ofiarowane Profesorowi Andrzejowi Buko w siedemdziesiąta rocznicę urodzin*. Warszawa: Instytut Archeologii i Etnologii PAN, Instytut Archeologii UW, 191-206.

Banasiewicz-Szykuła E. (ed.). 2019. *Grody Lubelszczyzny od XI do XIV wieku* (= *Skarby z Przeszłości* 20). Lublin: Wojewódzki Urząd Ochrony Zabytków w Lublinie.

Banaszkiewicz J. 2006. History and archaeology – together or separate? Some remarks by a Medieval historian on the use and misuses of history by archaeologist. *Archeologia Polona* 44, 195-201.

Bartnicki M. 2008. The Halych-Volhynian Chronicle as a Source for the History of Central Eastern Europe in the 13th Century. In W. Falkowski (ed.), *Palatium, Castle, Residence* (= *Quaestiones Medii Aevi Novae* 13). Warszawa: „Societas Vistulana", 349-368.

Błachowska K. 2017. Cherven' Towns: "golden apple" of archaeology – "gordian knot" of historiography: the region's history up to 1340 in the perspective of polish, Russian and Ukrainian historians, 19th-20th centuries. In M. Wołoszyn (ed.), *From Cherven' Towns to Curzon Line: the* *lands on the Middle Bug during the Middle Ages and the historiographic perspective on the formation of Poland's eastern border, 18th-21st cc.* (= *U źródeł Europy Środkowo-Wschodniej/Frühzeit Ostmitteleuropas* 3:2). Kraków, Leipzig, Rzeszów, Warszawa: Leibniz-Institut für Geschichte und Kultur des östlichen Europa [GWZO], Instytut Archeologii i Etnologii Polskiej Akademii Nauk, Instytut Archeologii Uniwersytetu Rzeszowskiego, II, 17-594.

Biermann F. 2013. Möglichkeiten und Probleme naturwissenschaftlicher Datierungen frühslawischer Siedlungsbefunde. In M. Dulinicz, S. Moździoch (eds), *The early Slavic Settlement in Central Europe in the light of new dating evidence* (= *Interdisciplinary Medieval Studies* 3). Wrocław: Instytut Archeologii i Etnologii PAN, 11-22.

Brather S. 2008. Slawenbilder. 'Slawische Altertumskunde' im 19. und 20. Jahrhundert. In S. Brather, V. Spinei and G. Bilavschi (eds), *Archaeology and Identity. Central and East Europe in the Earlier Middle Ages* (= *Florilegium magistrorum historiae archaeologiaeque Antiquitatis et Medii Aevi* 2). Bucureşti: Editura Academiei, 87-128.

Buko A. 2008. *The archaeology of Early Medieval Poland: Discoveries – Hypotheses – Interpretations (East Central and Eastern Europe in the Middle Ages, 450–1450* 1). Leiden, Boston: Brill.

Buko A. 2016. Źródła pisane i archeologia: przykład Góry Katedralnej w Chełmie. *Kwartalnik Historyczny* 123, 221-246.

Cetwiński M. 2005. *‚Rex insulsius' i ‚parasitis exercitus'* czyli pycha Rusina ukarana (Gall, I,10; Kadłubek, II, 12). In J. Dudek, D. Janiszewska and U. Świderska-Włodarczyk (eds), *Europa Środkowo-Wschodnia. Ideologia, historia a społeczeństwo. Księga poświęcona pamięci Profesora Wojciecha Peltza*. Zielona Góra: Oficyna Wydawnicza Uniwersytetu Zielonogórskiego, 323-334.

Chikalenko L. 1998. Spravozdannia z raskopok v okolitsiakh starodavnogo Chervna v litku 1940 roku. *Zapiski naukovogo tovaristva imeni Shevchenka* 235, 623-635.

Christie N. and Herold H. 2016. Introduction. Defining and Understanding Defened Settlements in Early Medieval Europe: Structures, Roles, Landscapes and Communities. In N. Christie and H. Herold (eds), *Fortified Settlements in Early Medieval Europe. Defended Communities of the 8th-10th Centuries*. Oxford: Oxbow Books, 19-28.

Cottin M. and Merkel L. (eds). 2018. *Thietmars Welt: ein Merseburger Bischof schreibt Geschichte: Merseburg, 15. Juli bis 4. November 2018*. Petersberg: Michael Imhof Verlag.

Curta F. 2019. *Eastern Europe in the Middle Ages (500–1300)*, I (= *Brill's Companions to European History* 19). Leiden, Boston: Brill.

Dikov I. 2020. 14th Century Murals with 'Warrior Saints' Found in Newly Discovered Church in Medieval City Cherven in Northeast Bulgaria. *Archaeology in Bulgaria* (http://archaeologyinbulgaria.com/2020/04/02/14th-century-murals-with-warrior-saints-found-in-newly-discovered-church-in-medieval-city-cherven-in-northeast-bulgaria/ [accessed on: 12.05.2020]).

Duczko W. 2018. Post-wielkomorawski fenomen: wczesnośredniowieczna sztuka złotnicza w środkowej i wschodniej Europie. In B. Gediga, A. Grossman and W. Piotrowski (eds), *Inspiracje i funkcje sztuki pradziejowej i wczesnośredniowiecznej* (= *Biskupińskie Prace Archeologiczne 13/ Prace Komisji Archeologicznej* 22). Biskupin, Wrocław: Muzeum Archeologiczne w Biskupinie, Polska Akademia Nauk – Oddział we Wrocławiu, Instytut Archeologii i Etnologii Polskiej Akademii Nauk, 535-549.

Dulinicz M. 2003. Mazowsze we wczesnym średniowieczu. Jego związki z „państwem gnieźnieńskim". In W. Chudziak (ed.*), Civitas Schinesghe cum pertinentiis*. Toruń: Uniwersytet Mikołaja Kopernika, Instytut Archeologii, 89-120.

Dzieńkowski T. and Sadowski S. 2016. Surface surveys within the area of the settlement complex in Czermno. In M. Florek and M. Wołoszyn (eds), *The early medieval settlement complex at Czermno in the light of results from past research (-2010). Material evidence* (= *U źródeł Europy Środkowo-Wschodniej/Frühzeit Ostmitteleuropas 2:1*). Kraków, Leipzig, Rzeszów, Warszawa: Geisteswissenschaftliches Zentrum Geschichte und Kultur Ostmitteleuropas [GWZO], Instytut Archeologii i Etnologii PAN, Instytut Archeologii UR, I, 85-118.

Dzieńkowski T. and Kuśnierz J. 2018. Archaeological excavations of the rampart of the Gródek upon the Bug River stronghold in 1952-1954. In M. Wołoszyn (ed.), *The early medieval settlement complex at Gródek upon the Bug River in the light of results from past research (1952-1955). Material evidence* (= *U źródeł Europy Środkowo-Wschodniej/Frühzeit Ostmitteleuropas* 4). Kraków, Leipzig, Rzeszów, Warszawa: Leibniz-Institut für Geschichte und Kultur des östlichen Europa, Leipzig, Instytut Archeologii i Etnologii PAN, Instytut Archeologii UR, 267-308.

Dzieńkowski T. and Wołoszyn M. 2018. Grody „plemienne" (VIII-X w.) i z okresu przełomu X/XI wieku ze wschodniej Lubelszczyzny. In E. Banasiewicz-Szykuła (ed.), *Grody z okresu plemiennego na Lubelszczyźnie* (= *Skarby z przeszłości* 19). Lublin: Wojewódzki Urząd Ochrony Zabytków w Lublinie, 175-236.

Dobrowolski R., Bałaga K., Buczek A., Alexandrowicz W. P., Mazurek M., Hałas S. and Piotrowska N. 2016a. Multi-proxy evidence of Holocene climate variability in Volhynia Upland (SE Poland) recorded in spring fed fen deposits from the Komarów site. *The Holocene* 26(9), 1406-1425.

Dobrowolski R., Rodzik J., Mroczek P., Zagórski P., Bałaga K. and Hajdas I. 2016b. The early medieval settlement complex at Czermno – the environmental conditions. In M. Florek, M. Wołoszyn (eds), *The early medieval settlement complex at Czermno in the light of results from past research (-2010). Material evidence* (= *U źródeł Europy Środkowo-Wschodniej/Frühzeit Ostmitteleuropas* 2:1). Kraków, Leipzig, Rzeszów, Warszawa: Geisteswissenschaftliches Zentrum Geschichte und Kultur Ostmitteleuropas [GWZO], Instytut Archeologii i Etnologii PAN, Instytut Archeologii UR, I, 119-140.

Dobrowolski R., Rodzik J., Mroczek P., Zagórski P., Bałaga K., Wołoszyn M., Dzieńkowski T., Hajdas I. and Fedorowicz S. 2018. Environmental conditions of settlement in the vicinity of the mediaeval capital of the Cherven Towns (Czermno site, Hrubieszów Basin, Eastern Poland). *Quaternary International* 493, 258-271.

Florek M. 2016a. The history of the archaeological research on the hillfort complex at Czermno in the years 1972-1997. In M. Florek, and M. Wołoszyn (eds), *The early medieval settlement complex at Czermno in the light of results from past research (-2010). Material evidence* (= *U źródeł

Europy Środkowo-Wschodniej/Frühzeit Ostmitteleuropas 2:1). Kraków, Leipzig, Rzeszów, Warszawa: Geisteswissenschaftliches Zentrum Geschichte und Kultur Ostmitteleuropas [GWZO], Instytut Archeologii i Etnologii PAN, Instytut Archeologii UR, I, 241-274.

Florek M. 2016b. The results of archaeological research made in 1972-1997 within the hillfort complex at Czermno. In M. Florek and M. Wołoszyn (eds), *The early medieval settlement complex at Czermno in the light of results from past research (-2010). Material evidence* (= *U źródeł Europy Środkowo-Wschodniej/Frühzeit Ostmitteleuropas* 2:1). Kraków, Leipzig, Rzeszów, Warszawa: Geisteswissenschaftliches Zentrum Geschichte und Kultur Ostmitteleuropas [GWZO], Instytut Archeologii i Etnologii PAN, Instytut Archeologii UR, I, 275-328.

Florek M. and Wołoszyn M. (eds). 2016. *The early medieval settlement complex at Czermno in the light of results from past research (-2010). Material evidence* (= *U źródeł Europy Środkowo-Wschodniej/Frühzeit Ostmitteleuropas* 2). Kraków, Leipzig, Rzeszów, Warszawa: Geisteswissenschaftliches Zentrum Geschichte und Kultur Ostmitteleuropas [GWZO], Instytut Archeologii i Etnologii PAN, Instytut Archeologii UR, I, II.

Florkiewicz I. and Sikora P. 2016. Remarks on the excavation conducted in Czermno in 1952. In M. Florek and M. Wołoszyn (eds), *The early medieval settlement complex at Czermno in the light of results from past research (-2010). Material evidence* (= *U źródeł Europy Środkowo-Wschodniej/Frühzeit Ostmitteleuropas* 2:1). Kraków, Leipzig, Rzeszów, Warszawa: Geisteswissenschaftliches Zentrum Geschichte und Kultur Ostmitteleuropas [GWZO], Instytut Archeologii i Etnologii PAN, Instytut Archeologii UR, I, 219-240.

Florkiewicz I. and Urbański A. 2016. Czermno, site IIG. Wooden structures discovered in 1985. In M. Florek and M. Wołoszyn (eds), *The early medieval settlement complex at Czermno in the light of results from past research (-2010). Material evidence* (= *U źródeł Europy Środkowo-Wschodniej/Frühzeit Ostmitteleuropas* 2:1). Kraków, Leipzig, Rzeszów, Warszawa: Geisteswissenschaftliches Zentrum Geschichte und Kultur Ostmitteleuropas [GWZO], Instytut Archeologii i Etnologii PAN, Instytut Archeologii UR, I, 385-419.

Franklin S. and Shepard J. 1996. *The Emergence of Rus 750-1200*. London, New York: Addison Wesley Longman Limited.

Hardt M. 2019. Schriftliche Überlieferung und Archäologie im Widerspruch? Zu einigen Aufenthaltsorten ostfränkischer Könige und kriegerischen Aktionen gegen die Elbslawen. In S. Freund, Belitz M. and Reeb A. (eds), *Die Königspfalzenlandschaft Sachsen-Anhalt und der Osten* (= *Palatium. Studien zur Pfalzenforschung in Sachsen-Anhalt* 5). Regensburg: Schnell & Steiner, 23-34.

Hupalo V. 2014. *Zvenyhorod i zvenyhorodska zemlia u XI-XIII stolittiakh (sotsioistorichna rekonstruktsiya)*. Lviv: Instytut ukrayinoznavstva im. I. Krypiakevycha NAN Ukrainy.

Izdebski A., Holmgren K., Weiberg E., Stocker S.R., Büntgen U., Florenzano A., Gogou A., Leroy S.A.G., Luterbacher J., Martrat B., Masi A., Mercuri A.M., Montagna P., Sadori L., Schneider A., Sicre M.A., Triantaphyllou M. and Xoplaki E. 2016. Realizing consilience: How better communication between archaeologists, historians and natural scientists can transform the study of past climate change in the Mediterranean. *Quaternary Science Reviews* 136, 5-22.

Janeczek A. 2016. The landscape of the region around Cherven'-Czermno in the Late Medieval and the Early Modern Period. In M. Florek and M. Wołoszyn (eds), *The early medieval settlement complex at Czermno in the light of results from past research (-2010). Material evidence* (= *U źródeł Europy Środkowo-Wschodniej/Frühzeit Ostmitteleuropas* 2:1). Kraków, Leipzig, Rzeszów, Warszawa: Geisteswissenschaftliches Zentrum Geschichte und Kultur Ostmitteleuropas [GWZO], Instytut Archeologii i Etnologii PAN, Instytut Archeologii UR, I, 141-194.

Janeczek A. 2017. Territorial structures of the Region on Upper Bug River in the High and Late Middle Ages. In M. Wołoszyn (ed.), *From Cherven' Towns to Curzon Line: the lands on the Middle Bug during the Middle Ages and the historiographic perspective on the formation of Poland's eastern border, 18th-21st cc.* (= *U źródeł Europy Środkowo-Wschodniej/Frühzeit Ostmitteleuropas* 3:1). Kraków, Leipzig, Rzeszów, Warszawa: Leibniz-Institut für Geschichte und Kultur des östlichen Europa [GWZO], Instytut Archeologii i Etnologii PAN, Instytut Archeologii UR, I, 107-157.

Jażdżewski K. 1959. Ogólne wiadomości o Czermnie-Czerwieniu. *Archeologia Polski* 4(1), 67-86.

Jusupović A. 2017. „Червенъ и ины грады" or „гроды Червеньскыя"? History of the domain of Cherven' in the written record (9th-13th cc.). In M. Wołoszyn (ed.), *From Cherven' Towns to Curzon Line: the lands on the Middle Bug during the Middle Ages and the historiographic perspective on the formation of Poland's eastern border, 18th-21st cc.* (= *U źródeł Europy Środkowo-Wschodniej/Frühzeit Ostmitteleuropas* 3:1). Kraków, Leipzig, Rzeszów, Warszawa: Leibniz-Institut für Geschichte und Kultur des östlichen Europa [GWZO], Instytut Archeologii i Etnologii PAN, Instytut Archeologii UR, I, 31-105.

Kamińska-Koj L. and Koj L. 2016. From the archaeological investigation of the early medieval stronghold rampart at Czermno. In M. Florek and M. Wołoszyn (eds), *The early medieval settlement complex at Czermno in the light of results from past research (-2010). Material evidence* (= *U źródeł Europy Środkowo-Wschodniej/Frühzeit Ostmitteleuropas* 2:2). Kraków, Leipzig, Rzeszów, Warszawa: Geisteswissenschaftliches Zentrum Geschichte und Kultur Ostmitteleuropas [GWZO], Instytut Archeologii i Etnologii PAN, Instytut Archeologii UR, II, 193-244.

Kalaga J. (ed.). 2013. *Sutiejsk. Gród pogranicza polsko-ruskiego w X-XIII wieku. Studium interdyscyplinarne*. Warszawa, Pękowice: Instytut Archeologii Uniwersytetu Warszawskiego, Wydawnictwo i Pracownia Archeologiczna Profil-Archeo, Ministerstwo Kultury i Dziedzictwa Narodowego Narodowy Instytut Dziedzictwa.

Kara M. 2009. *Najstarsze państwo Piastów – rezultat przełomu czy kontynuacji? Studium archeologiczne*. Poznań: Instytut Archeologii i Etnologii PAN.

Kara M. 2015. Medieval historical studies and Medieval archaeology about the origin of the Piast State. An overview. *Archeologia Polona* 48/2010, 37-58.

Kara M. and Krąpiec M. 2000. Możliwość datowania metodą dendrochronologiczną oraz stan badań dendrochronologicznych wczesnośredniowiecznych grodzisk z terenu Wielkopolski, Dolnego Śląska i Małopolski. In H. Samsonowicz (ed.), *Ziemie polskie w X wieku i ich znaczenie w kształtowaniu się nowej mapy Europy*. Kraków: Universitas, 303-327.

Kaszewski B. M. 2008. *Warunki klimatyczne Lubelszczyzny*. Lublin: Wydawnictwo Uniwersytetu Marii Curie-Skłodowskiej.

Kolchin B. A. 1985. Inzhenernye sooruzheniya. In B. A. Kolchin (ed.), *Drevniaia Rus. Gorod, zamok, selo* (= *Arkheologiya SSSR*). Moskva: Nauka, 170-218.

Kóčka-Krenz H. 2005. Najstarszy Poznań. In Z. Kurnatowska and T. Jurek (eds), *Civitas Posnaniensis. Studia z dziejów średniowiecznego Poznania* (= *Poznańskie Towarzystwo Przyjaciół Nauk, Wydział Historii i Nauk Społecznych, Prace Komisji Historycznej* 62). Poznań: Poznańskie Towarzystwo Przyjaciół Nauk, 27-42.

Kóčka-Krenz H., Kara M. and Makowiecki D. 2004. The Beginnings, Development and the Character of the Early Piast Stronghold in Poznań. In P. Urbańczyk (ed.), *Polish Lands at the Turn of the First and the Second Millennia*. Warsaw: Institute of Archaeology and Ethnology Polish Academy of Sciences, 125-166.

Kowalczyk-Heyman E. 2000. Momenty geograficzne państwa Bolesława Chrobrego. Na styku historii i archeologii. *Kwartalnik Historyczny* 57, 41-76.

Krąpiec M. 1998. Oak dendrochronology of the Neoholocene in Poland. Folia Quaternaria 69, 5-134.

Krąpiec M. 2015a. *Wyniki analizy dendrochronologicznej prób drewna z Czermna, gm. Tyszowce* (typecript in the archive of the Institute of Archaeology of the University of Rzeszów). Rzeszów.

Krąpiec M. 2015b. *Wyniki analizy dendrochronologicznej prób drewna z Czermna (gm. Tyszowce) przechowywanych w Muzeum w Krasnymstawie* (typecript in the archive of the Institute of Archaeology of the University of Rzeszów). Rzeszów.

Krąpiec M. 2015c. *Zestawienie wyników datowań radiowęglowych* (typecript in the archive of the Institute of Archaeology of the University of Rzeszów). Rzeszów.

Kurnatowska Z. 1997. Czy millenium było 'tragedią polskiej archeologii'? In M. Głosek (ed.), *Archeologia i starożytnicy. Studia dedykowane Profesorowi Andrzejowi Abramowiczowi w 70 rocznicę urodzin*. Łódź: Instytut Archeologii i Etnologii Polskiej Akademii Nauk, 147-156.

Kuza A.V. 1996. *Drevnerusskie gorodischa X-XIII vv*. Svod arkheologicheskikh pamiatnikov. Moskva: Rossiyskiy gumanitarnyi nauchnyi fond.

Labuda G. 1996. Głos w dyskusji. In M. Parczewski and S. Czopek (eds), *Początki sąsiedztwa. Pogranicze etniczne polsko – rusko – słowackie w średniowieczu: materiały z konferencji, Rzeszów, 9-11 maj 1995*. Rzeszów: Muzeum Okręgowe, 27-28.

Labuda G. 2001. Budownictwo sakralne Gniezna i Poznania na przełomie X/XI wieku w świetle źródeł pisanych. In S. Skibiński (ed.), *Polska na przełomie I i II tysiąclecia. Materiały Sesji Stowarzyszenia Historyków Sztuki, Poznań, listopad 2000*. Poznań: Stowarzyszenie Historyków Sztuki, 267-286.

Liwoch R. 2003. Stan badań nad grodziskami wczesnośredniowiecznymi i z początków późnego średniowiecza na zachodniej Ukrainie (obwody: iwano-frankowski, lwowski i tarnopolski). *Materiały i Sprawozdania Rzeszowskiego Ośrodka Archeologicznego* 24, 213-297.

Lübke C. 2004. *Das östliche Europa* (= *Die Deutschen und das europäische Mittelalter* 2). München: Siedler Verlag.

Maruszczak H. 1972. Wyżyny Lubelsko-Wołyńskie. In M. Klimaszewski (ed.), *Geomorfologia Polski* 1. Warszawa: PWN, 340-384.

Matla-Kozłowska M. 2008. *Pierwsi Przemyślidzi i ich państwo (od X do połowy XI wieku). Ekspansja terytorialna i jej polityczne uwarunkowania*. Poznań: Wydawnictwo Poznańskie.

Matuszkiewicz J. M. 2007. *Zespoły leśne Polski*. Warszawa: Wydawnictwo Naukowe PWN.

Michalczyk Z. and Wilgat T. 2008. Wody. In S. Uziak and J. Turski (eds), *Środowisko przyrodnicze Lubelszczyzny*. Lublin: Lubelskie Towarzystwo Naukowe, 113-209.

Meier T. and Tillessen P. 2011. Von Schlachten, Hoffnungen und Ängsten: Einführende Gedanken zur Interdisziplinarität in der Historischen Umweltforschung. In T. Meier and P. Tillessen (eds), *Über die Grenzen und zwischen den Disziplinen. Fächerübergreifende Zusammenarbeit im Forschungsfeld historischer Mensch-Umwelt-Beziehungen*. Budapest: Archaeolingua, 19-44.

Mühle E. 2020. *Die Slawen im Mittelalter zwischen Idee und Wirklichkeit*. Köln: Böhlau /Vandenhoeck Ruprecht Verlage.

Musin A. and Wołoszyn M. 2017. *The birth of a myth: the first indentification of Cherven' and description of the hillfort at Czermno and its hinterland in 19th century accounts*. In M. Wołoszyn (ed.), *From Cherven' Towns to Curzon Line: the lands on the Middle Bug during the Middle Ages and the historiographic perspective on the formation of Poland's eastern border, 18th-21st cc.* (= *U źródeł Europy Środkowo-Wschodniej/Frühzeit Ostmitteleuropas* 3:1). Kraków, Leipzig, Rzeszów, Warszawa: Leibniz-Institut für Geschichte und Kultur des östlichen Europa [GWZO], Instytut Archeologii i Etnologii PAN, Instytut Archeologii UR, I, 401-442.

Nagy B., Schmieder F. and Vadas A. 2019. Introduction. In B. Nagy, F. Schmieder and A. Vadas (eds), *The Medieval Networks in East Central Europe: Commerce, Contacts, Communication*. London, New York: Routlege.Taylor & Francis Group, 1-7.

Petryk V. 2015. Kniazivski stolytsi Rusi-Ukrayiny (X-XIII st.). In Yu. Loza (ed.), *Istorychnyy atlas Ukrayiny*. Kyyiv: Mapa, 268-271.

Piotrowski M. and Wołoszyn M. 2012. Czermno/Cherven – archaeological investigation of an Early Rus' medieval town in Eastern Poland in 2010-2011: a preliminary report. In M. Salamon, M. Wołoszyn, A. Musin, P. Špehar, M. Hardt, M. P. Kruk and A. Sulikowska-Gąska (eds), *Rome, Constantinople and Newly-Converted Europe: Archaeological and Historical Evidence* (= *U źródeł Europy Środkowo-Wschodniej/ Frühzeit Ostmitteleuropas* 1:2). Kraków, Leipzig, Rzeszów, Warszawa: Geisteswissenschaftliches Zentrum. Geschichte und Kultur Ostmitteleuropas [GWZO], Instytut Archeologii i Etnologii PAN, Instytut Archeologii UR, II, 359-389.

Poláček L. and Dvorská J. (eds) 1999. *Probleme der mitteleuropäischen Dendrochronologie und naturwissenschaftliche Beiträge zur Talaue der March* (= *Internationale Tagungen in Mikulčice V. Spisy Archeologického Ústavu AV ČR Brno* 15). Brno: Archeologický Ústav Akademie Věd České Republiky Brno.

Poleski J. 2004. *Wczesnośredniowieczne grody w dorzeczu Dunajca*. Kraków: Instytut Archeologii UJ, 386-387.

Poleski J. 2013. *Małopolska w VI-X wieku. Studium archeologiczne*. Kraków: Instytut Archeologii UJ.

Poleski J. 2017. Kontakty plemion zamieszkujących tereny Polski z państwem morawskim i państwem czeskim w IX i X wieku a problem kształtowania się państwa pierwszych Piastów. In W. Drelicharz, D. Jasiak and J. Poleski (eds), *Spór o początki Państwa Polskiego: Historiografia, tradycja, mit, propaganda*. Kraków: Historia Iagellonica, 49-98.

Pomarański R. 2016. Czermno, site 2 – hillfort suburb settlement. Analysis of finds from trenches IIA and IIB. In M. Florek and M. Wołoszyn (eds), *The early medieval settlement complex at Czermno in the light of results from past research (-2010). Material evidence*(= *U źródeł Europy Środkowo-Wschodniej/Frühzeit Ostmitteleuropas* 2:2). Kraków, Leipzig, Rzeszów, Warszawa: Geisteswissenschaftliches Zentrum Geschichte und Kultur Ostmitteleuropas [GWZO], Instytut Archeologii i Etnologii PAN, Instytut Archeologii UR, II, 377-421.

Poppe A. 1958. Gród Wołyń. Z zagadnień osadnictwa wczesnośredniowiecznego na pograniczu polsko-ruskim. *Studia Wczesnośredniowieczne* 4, 227-300.

Poznański M. 2011. Aerial Surveys of the Earthwork Castle in Czermno. Preliminary Interpretations and Reconstructions of the Early Medieval Elements oft he Settlement Complex. *Analecta Archaeologica Ressoviensia 5*, 439-456.

Rappoport P. A. 1967. *Voennoe zodchestvo zapadnorusskikh zemel X-XIV vv.* (= *Materialy i issledovaniya po arkheologii SSSR* 140). Moskva, Leningrad: Nauka.

von Rummel Ph. 2019. Conclusion and Perspectives. In S. Brather-Walter (ed.), *Archaeology, history and biosciences. Interdisciplinary Perspectives* (= *Ergänzungsbände zum Reallexikon der Germanischen Altertumskunde* 107). Berlin, Boston: De Gruyter, 199-203.

Sahaydak M. 2009. Novi dani pro ukriplennia „Mista Yaroslava" (za materialamy arkheolohichnykh doslidzhen 1981 i 2001 rokiv). In *Fortetsia. Zbirnyk zapovidnyka „Tustan": na poshanu Mykhayla Rozhka*, 1. Lviv, Kamula: DIKZ „Tustan", 259-277.

Sikorski D. 2012. Archeologia i historia we wzajemnych relacjach i w praktyce naukowej badaczy wczesnego średniowiecza. In M. Brzostowicz, M. Przybył and D. A. Sikorski (eds), *Archaeologia versus historiam – historia versus archaeologiam czyli jak wspólnie poznawać średniowiecze*. Poznań: Poznańskie Towarzystwo Przyjaciół Nauk, 49-78.

Sikorski D. A. 2018. Jak wyglądałaby nasza wiedza o historii Polski bez źródeł archeologicznych. In A. Buko, K. Kollinger and S. Jędrzejewska (eds), *Badania Interdyscyplinarne (Materiały V Kongresu Mediewistów Polskich*). Rzeszów: Wydawnictwo Uniwersytetu Rzeszowskiego, IV, 23-39.

Solecki R., Aniszewski M., Poznański M. and Zdeb K. 2019. Wyniki badań archeologicznych pomostu (stan. 68) przy grodzisku w Czermnie, pow. tomaszowski. *Wiadomości Archeologiczne* 70, 250-260.

Solon J., Borzyszkowski J., Bidłasik M., Richling A., Badora K., Balon J., Brzezińska-Wójcik T., Chabudziński Ł., Dobrowolski R., Grzegorczyk I., Jodłowski M., Kistowski M., Kot R., Krąż P., Lechnio J., Macias A., Majchrowska A., Malinowska E., Migoń P., Myga-Piątek U., Nita J., Papińska E., Rodzik J., Strzyż M., Terpiłowski S. and Ziaja W. 2018. Physico-geographical mesoregions of Poland – verification and adjustment of boundaries on the basis of contemporary spatial data. *Geographia Polonica* 91/2, 143-170.

Stasiak W. and Trojan M. 2014. Gród łęczycki w okresie przedpiastowskim (faza I, koniec VIII – koniec X wieku). In R. Grygiel and T. Jurek (eds), *Początki Łęczycy. 2. Archeologia o początkach Łęczycy*. Łódź: Muzeum Archeologiczne i Etnograficzne w Łodzi, 65–75.

Terskyy S. 2002. *Arkheolohiya doby Halytsko-Volynskoyi derzhavy. Katalog vystavky. Arkheolohichni zbirky Halychyny i Volyni*, 1. Lviv: Instytut ukrayinoznavstva im. I. Krypiakevycha NAN Ukrainy, Lvivskyy istorychnyy muzey.

Terskyy S. 2006. *Luchesk X-XV st*. Lviv: Natsionalnyy universytet „Lvivska Politekhnika".

Terskyy S. 2010. *Kniazhe misto Volodymyr*. Lviv: Natsionalnyy universytet „Lvivska Politekhnika".

Thurston L. T. 1997. Historians, prehistorians, and the tyranny of the historical record: Danish state formation through documents and archaeological data. *Journal of Archaeological Method and Theory* 4/3, 239-263.

Trzeciecki M. 2016. The emergence of the territorial state. In M. Trzeciecki (ed.), *The Past societies 5: 500 AD – 1000 AD*. Warsaw: Instytut Archeologii i Etnologii PAN, 277-341.

Turski R., Uziak S. and Zawadzki S. 2008. Gleby. In R. Turski and S. Uziak (eds), *Środowisko Przyrodnicze Lubelszczyzny*. Lublin: Lubelskie Towarzystwo Naukowe, 211–315.

Tyszkiewicz J. 2004. The Oldest Border of the Piast State: an attempted Summary. *Questiones Medii Aevi Novae* 9, 183-204.

Urbańczyk P. 2016. Central places as foundations of the early Piast state. In I. Bugarski, O. Heinrich-Tamáska, V. Ivanišević and D. Syrbe (eds), *Grenz Übergänge: spätrömisch, frühchristlich, frühbyzantinisch als Kategorien der historischarchäologischen Forschung an der mittleren Donau. Akten des 27. Internationalen Symposiums der Grundprobleme der frühgeschichtlichen Entwicklung im Mittleren Donauraum, Ruma, 4.-7.11.2015*. Remshalden: Greiner, 343-354.

Urbańczyk P. 2017. Mediewistyka jako antropologia. In L. Słupecki, P. Sierżęga, A. Rozwałka and M. Dzik (eds), *Recepcja i odrzucenie. Kontakty międzykulturowe w średniowieczu (Materiały V Kongresu Mediewistów Polskich),* Rzeszów: Wydawnictwo Uniwersytetu Rzeszowskiego, I, 183-197.

Urbański A. 2000. Nowe datowanie grodziska w Czermnie nad Huczwą. In A. Buko and Z. Świechowski (eds), *Osadnictwo i architektura ziem polskich w dobie Zjazdu Gnieźnieńskiego*. Warszawa: Generalny Konserwator Zabytków, Instytut Archeologii i Etnologii Polskiej Akademii Nauk, Stowarzyszenie Patria Polonorum, 239-243.

Urbański A. 2016. Site 2 (suburb settlement) in the early medieval settlement complex at Czermno in Tyszowce commune, Zamość Voivodeship. From the research excavation of 1979. In M. Florek and M. Wołoszyn (eds), *The early medieval settlement complex at Czermno in the light of results from past research (-2010). Material evidence* (= *U źródeł Europy Środkowo-Wschodniej/Frühzeit Ostmitteleuropas* 2:2). Kraków, Leipzig, Rzeszów, Warszawa: Geisteswissenschaftliches Zentrum Geschichte und Kultur Ostmitteleuropas [GWZO], Instytut Archeologii i Etnologii PAN, Instytut Archeologii UR, II, 593-623.

Voloshyn M., Piotrovskyy M., Florkevych I., Grochecki K. 2014. Kompleks gorodyscha v Chermno: pydsumki archeologychnych doslydzhen u 2013 roci. Poselennia i mogylnyk Chermno-3 (archeologichnyy analyz) (= *Nukovi studiyi* 7), Lviv, Vynnyky: Vydavnyctvo Apriori, 226-260.

Wojtanowicz W. 1974. Sytuacja geologiczno-geomorfologiczna grodziska Czermno. In *Przewodnik XII Ogólnopolskiego Zjazdu Polskiego Towarzystwa Geograficznego*. Lublin: Polskie Towarzystwo Geograficzne, 48-51.

Wołoszyn M. 2020. Wie betreibt man Archäologie in einem Land, in dem es nur um „warmes Wasser aus dem Wasserhahn" geht? Zur frühgeschichtlichen Archäologie in Polen nach der Wende. In J. Drauschke and R. Prien (eds), *Quo vadis, Frühgeschichtliche Archäologie Standpunkte und Perspektiven* (= *Studien zu Spätantike und Frühmittelalter* 9). Hamburg: Verlag Dr. Kovač, 187-269.

Wołoszyn M. (ed.). 2017. *From Cherven' Towns to Curzon Line: the lands on the Middle Bug during the Middle Ages and the historiographic perspective on the formation of Poland's eastern border, 18th-21st cc.* (= *U źródeł Europy Środkowo-Wschodniej/Frühzeit Ostmitteleuropas* 3). Kraków, Leipzig, Rzeszów, Warszawa: Leibniz-Institut für Geschichte und Kultur des östlichen Europa [GWZO], Instytut Archeologii i Etnologii PAN, Instytut Archeologii UR, I-II.

Wołoszyn M. (ed.). 2018. *The early medieval settlement complex at Gródek upon the Bug River in the light of results from past research (1952-1955). Material evidence* (= *U źródeł Europy Środkowo-Wschodniej/Frühzeit Ostmitteleuropas* 4). Kraków, Leipzig, Rzeszów, Warszawa: Leibniz-Institut für Geschichte und Kultur des östlichen Europa, Leipzig, Instytut Archeologii i Etnologii PAN, Instytut Archeologii UR.

Wołoszyn M., Florkiewicz I., Krąpiec M., Nosek E.M., Stępiński J. and Lityńska-Zając M. 2016a. Czermno, Site No. 70. From the 2014 Rescue Excavation on the Huczwa River Bank. In J. Popielska-Grzybowska, J. Iwaszczuk and B. Józefów-Czerwińska (eds), *Meetings at the borders. Studies dedicated to Professor Władysław Duczko* (= *Acta Archaeologica Pultuskiensia* 5). Pułtusk: Institute of Anthropology and Archaeology, 239–250.

Wołoszyn M., Florkiewicz I., Dzieńkowski T., Sadowski S., Nosek E. M. and Stępiński J. 2016b. Cherven before Cherven Towns. Some remarks on the history of the Cherven Towns area (eastern Poland) till the end of 10th century. In Á. Bollók, G. Csiky and T. Vida (eds), *Zwischen Byzanz und der Steppe. Archäologische und historische Studien. Festschrift für Csánad Bálint zum 70. Geburtstag*. Budapest: Institute of Archaeology, Research Centre for the Humanities, Hungarian Academy of Sciences, 689-717.

Wołoszyn M., Dzieńkowski T. and Florkiewicz I. 2017. Przyczynek do studiów nad Grodami Czerwieńskimi. Rogowa łyżeczka z Czermna z badań wykopaliskowych w 2015 roku. In M. Dzik and G. Śnieżko (eds), *Fines testis temporum. Studia ofiarowane Profesor Elżbiecie Kowalczyk-Heyman w pięćdziesięciolecie pracy naukowej*. Rzeszów: Instytut Archeologii UR/Instytut Archeologii UW/Polskie Towarzystwo Historyczne/Towarzystwo Miłośników Historii/Wydział Historyczny UW, 367-378.

Wołoszyn M., Dzieńkowski T., Kuźniarska K., Nosek E., Stępiński J., Florkiewicz I. and Włodarczak P. 2018. Dying and Dating. A burial in the rampart of the stronghold in Czermno-Cherven' and its significance for the chronology of the Cherven' Towns. In J. Drauschke, K. Kühtreiber, E. Kislinger, T. Kühtreiber, G. Scharrer-Liska and T. Vida (eds), *Lebenswelten zwischen*

Archäologie und Geschichte. Festschrift für Falko Daim zu seinem 65. Geburtstag. Mainz: Römisch-Germanisches Zentralmuseum, 459-480.

Zschieschang Ch. 2017. Das früh- und hochmittelalterliche Siedlungsumfeld von Trepcza, Czermno und Gródek im Lichte der Toponomastik: eine methodische und areale Standortbestimmung. In M. Wołoszyn (ed.), *From Cherven' Towns to Curzon Line: the lands on the Middle Bug during the Middle Ages and the historiographic perspective on the formation of Poland's eastern border, 18th-21st cc.* (= *U źródeł Europy Środkowo-Wschodniej/Frühzeit Ostmitteleuropas* 3:1). Kraków, Leipzig, Rzeszów, Warszawa: Leibniz-Institut für Geschichte und Kultur des östlichen Europa [GWZO], Instytut Archeologii i Etnologii PAN, Instytut Archeologii UR, I, 161-227.

Żmudzki P. 2015. New Versions of the Tales of Gallus Anonymus in the Chronicle of Master Vincentius. *Acta Poloniae Historica* 112, 141-57.

Żmudzki P. 2017. Wędka króla Rusinów (Gall Anonim, ks. 1, rozdz. 7). *Studia Źródłoznawcze* 55, 27-50.

SPRAWOZDANIA ARCHEOLOGICZNE 72/2, 2020
PL ISSN 0081-3834
DOI: 10.23858/SA/72.2020.2.1733

Ewa Anna Lisowska[1], Sylwia Rodak[2]

A HILLFORT COMPLEX IN MYŚLIBÓRZ IN THE SUDETY MOUNTAINS

ABSTRACT

Lisowska E. A., Rodak S. 2020. A hillfort complex in Myślibórz in the Sudety Mountains. *Sprawozdania Archeologiczne* 72/2, 467-510.

The Myślibórz Gorge, located within the Kaczawy Foothills, is well-known to environmentalists and scholars studying the past. The investigations launched in the 1990s made it possible to determine the chronology of three of the archaeological sites in this area. In 2018, two hillforts – on the Kobylica and Golica hills – were investigated. Czech literature classifies such hillforts as the ostrožna-type. The excavations of these hillforts made it possible to establish to date them between the 9th and 10th centuries.
The hillforts were located on hilltops with similar altitudes above the sea level, less than 200 m from each other. Such a spatial arrangement made it possible to control the gateway to the Myślibórz Gorge from the north-east. Reasons for developing a defensive system in the southern part of the gorge are obscure, as is the role that two other early medieval hillforts played in it. Was it simply a warning system, or rather part of a comprehensive network of defensive sites?

Keywords: Early Middle Ages, hillforts, mountain archaeology, Sudetes, blacksmith production, landscape archaeology
Received: 05.05.2020; Revised: 11.05.2020; Accepted: 03.09.2020

1 Institute of Archaeology Wrocław University, Szewska st. 48, 50-137 Wrocław, Poland; ewaliskamail@gmail.com; https://orcid.org/0000-0002-0444-9513
2 Indenpendent researcher, Wrocław, Poland; sylrod@poczta.onet.pl; https://orcid.org/0000-0003-0321-834X

1. INTRODUCTION

Early medieval hillforts are an inherent element of the archaeological landscape in the Sudetes. Located in their lower parts – the Sudety Foothills and the Lusatian Highlands – these hillforts once constituted a defensive system with a complex network of mutual connections. The Myślibórz Gorge and its direct neighbourhood are of particularly high analytical value in studies of the early medieval defensive structures. The archaeological excavations conducted in June 2018 aimed to shed more light on these objects, which were not previously investigated at a significant scale. The main objectives were to verify the chronology of the structures and examine their defensive features.

The Myślibórz Gorge is situated in the eastern part of the Kaczawy Foothills, within a micro-region named Chełmy or the Złotoryja Foothills. The area is part of the Western Sudetes Foreland. The bedrock consists of rocks genetically associated with the Kaczawa metamorphic unit (Paleozoic greenschist slates, greenschists, diabases and phyllites) and the Neogene basalts visible in a few places as particularly appealing columns (Baranowski *et al.* 1998; Kowalski 1978; Migoń 1999). The latitudinally orientated bed of the Jawornik River constitutes the axis of the gorge. The local geomorphological landscape also features numerous rock promontories and outliers. The area is part of the Chelmy Landscape Park and has been a nature reserve since 1962. The sites with hart's-tongue fern are under special protection (Wiśniewski and Horoszko 2013; Łaborewicz *et al.* 2010, 55).

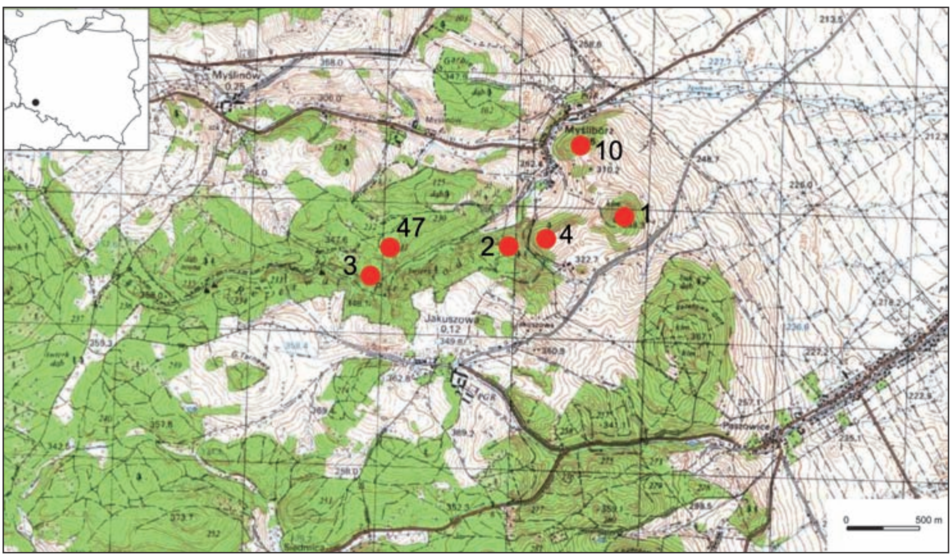


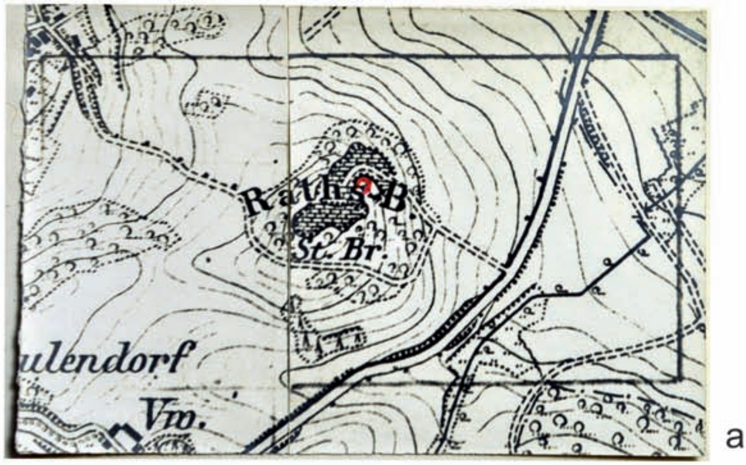
Fig. 1. Wąwóz Myśliborski, Jawor district. Location of archaeological sites mentioned in the paper (produced by E. Lisowska, on the background of a topographic map)

So far, the area has yielded as many as five defensive sites and one burial mound cemetery. The first site, Skałki (AZP sheet 81-20, no. 10 in the village), lies closest to Myślibórz (*ca.* 300 m away) on a hill overlooking the village from the east. Another defensive site on the Rataj hill (AZP sheet 81-20, no. 1 in the village) is situated *ca.* 600 m south-east of the village and *ca.* 600 m east of the Jawornik River valley. In the central part of the Myślibórz Gorge, defensive structures were raised on the Golica (AZP sheet 81-20, no. 2 in the village) and Kobylica (AZP sheet 81-20, no. 4 in the village) hills. The hills overlook the valley, where a small gorge of the Kobylica stream joins it. They were built on rocky promontories *ca.* 600 m south-west of Myślibórz. In the southern part of the Jawornik River valley, *ca.* 1.5 km south-west of the village, another defensive site was identified (AZP sheet 81-19, no. 3 in the village). Since the hill does not have any geographic name, we shall use the term used before World War II: *Schanzberg* (The archives cite both the name *Schanzberg* and *Schweden Schanzen*. In this text, we used the shorter term). Approximately 300 m north-east of this site, on elevated terrain on the other side of the gorge, a burial mound cemetery was located (AZP sheet 81-19, no. 47 in the village; Fig. 5).

2. THE STATE OF ARCHAEOLOGICAL RESEARCH IN THE MYŚLIBÓRZ AREA

Historians and archaeologists were already familiar with the defensive sites in the Myślibórz Gorge in the 19th century (Knie 1845, 533; Drescher 1866/67, 78; Schuster 1869, 107; Zimmermann 1874, 210; Behla 1888, 172). In the final part of this century, information files were made for hillfort no. 1 on the Rataj Hill, no. 2 on the Golica hill, and no. 3 (*Schanzberg*). The files included a brief description of the terrain (Fig. 2), the exact locations and sizes of the enclosures, and references to the literature, which was quite modest that the time (State Archives in Wrocław, Provincial Government Department in Silesia, sign. 716; Archeological Museum, Branch of the Wrocław City Museum, Scientific Documentation Department-Research Archives: DzDN-AN, sign. MA/A/114, unnumbered page – MBl. Kolbnitz; sign. MA/A/149, p. 6; sign. MA/A/278; sign. MA/A/286; sign. MA/A/291; sign. MA/A/292; sign. MA/A/379; sign. MA/A/394c; sign. MA/A/465b, p. 96; sign. MA/A/no number). An analysis of the above plans shows that the sites were often incorrectly marked on the archival *Messtischblatt* maps. The descriptions often refer to the neighbouring hillforts and locations. It is difficult to identify the reasons behind over a dozen discrepancies concerning the forms, locations, and locally used names of the hills featuring the defensive objects (Figs 2 and 3). The errors remained unaltered in the post-war period, so much of the research was probably based on inaccurate archival documentation.

The hillfort/castle on Rataj hill (site no. 1) was the first investigated. The descriptions of its original form and size are difficult to verify, since a later basalt quarry destroyed it



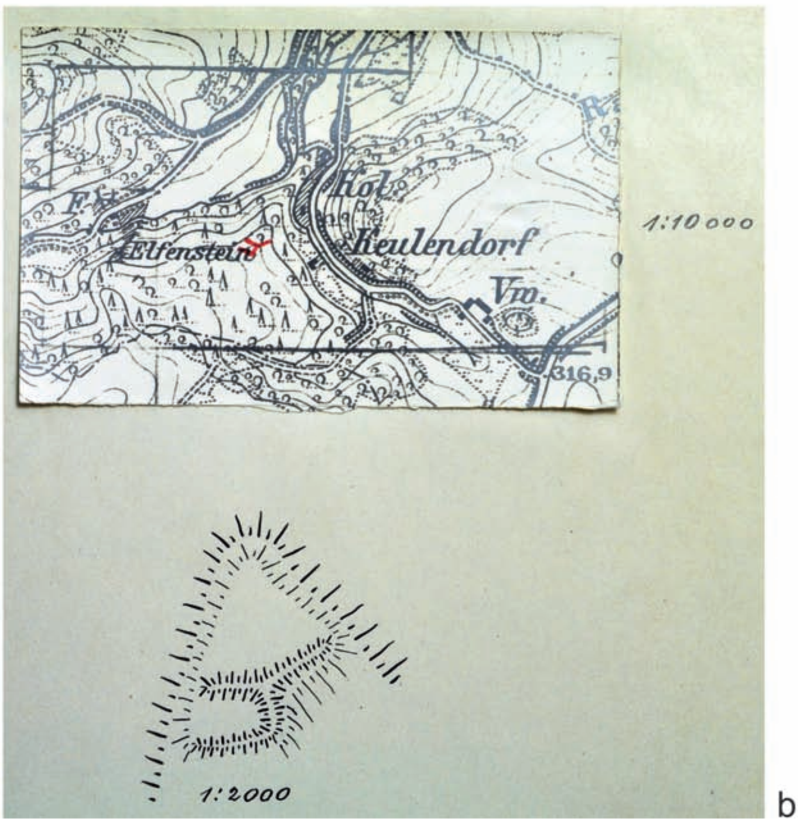


Fig. 2. Myślibórz, Jawor district. Documentation made before 1945.
a – site no. 1 on Rataj hill; b – erroneously marked outline of the ramparts on Golica hill
(Archives of the Archaeological Museum in Wrocław)

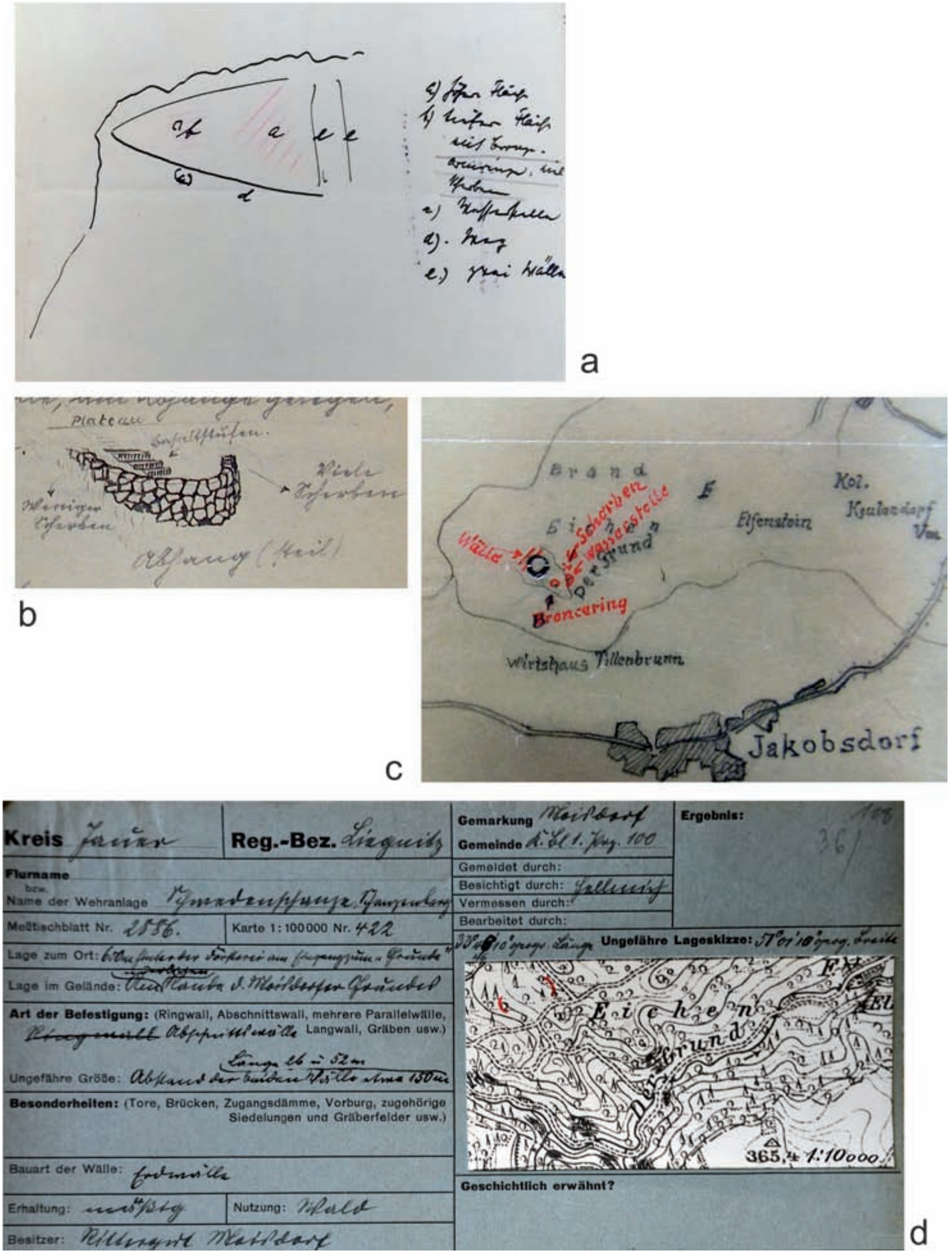


Fig. 3. Myślibórz, Jawor district. Documentation made before 1945.
a – schematic outline of the ramparts and location of the finds at site no. 3; b – sketch of the rampart fortifications at site no. 3; c – location of site no. 3; d – information file for site no. 3 from the so-called Max Hellmich Files with the erroneously marked rampart outline (Archives of the Archaeological Museum in Wrocław; State Archives in Wrocław, Provincial Government Department in Silesia)

almost completely. The situation is different at sites 2 and 4. The form of the ramparts indicated on the map for the site of Myślibórz 2 (on Golica hill) did not match the real form. According to the German investigations, the embankment enclosing the area on the rocky promontory had an additional, perpendicularly orientated section enclosing the space outside of the hillfort. Such structures do exist within the neighbouring hillfort – located on Kobylica hill and marked as site no. 4. It is possible that the authors of the old documentation confused the sites and illustrated the plan of the Golica hillfort with the outline of the ramparts from the neighbouring Kobylica (Fig. 2). This assumption rests on two premises. First, for over 100 years, no documented activities which could change the morphology of the ramparts have taken place on the hills. Second, such an arrangement is relatively rare: in Silesia it is identified only at this one site.

Also, the archival documentation available for hillfort no. 3 (*Schanzberg*), located on the northern side of the Jawornik River valley, is incorrect. The actual SW-NE orientation of the ramparts appears to be close to S-N, and they were drawn too far from the valley bottom (Fig. 3). It is worth mentioning that in 1881, the Museum of Silesian Antiquities

Fig. 4. Map made before 1945 with the distribution of archaeological sites in the Myślibórz area. Marked sites 1, 2, 3. Sites 4 and 10 marked with a pencil with no number indicated (Archives of the Archaeological Museum in Wrocław)

(Museum Schlesischer Altertürmer) acquired seven iron bowls, which – according to most of the scholars – were found at this site (Rzeźnik 2006, 193). Only, the erroneous description by Hans Seger indicated that they were found on Rataj hill (Seger 1928, 143).

In the years 1918-1932, Max Hellmich conducted surface surveys and made information cards for three hillforts located in the analysed area (Myślibórz site no. 1; site no. 2; site no. 3). The scholar published his list in the paper *Schlesische Wehranlagen* (Hellmich 1930, 44). Although Max Hellmich was considered a brilliant cartographer, he used the earlier, erroneous drawings. Thus, he maintained the incorrect information on the rampart arrangement at site nos. 2 and 3. The analysis of the map preserved in the Archives of the Archaeological Museum in Wrocław reveals one more interesting fact, which might explain the previous mistakes. Apart from the three sites marked in red (Myślibórz sites 1, 2 and 3), the map features three pencil-drawn circles in places where sites 4 and 10 are situated (Fig. 4). Therefore, all of the objects were most probably identified before 1945, but the exceptionally diversed morphology of the area confused the investigators. For instance, the description of the Rataj hillfort indicates its location on the hilltop named *Kuchenberg* – a former name of Skałka hill, where site 10 is situated. Such mistakes remained unverified in the documentation made at the end of the 1950s (archives of the Provincial Office of Monument Protection in Legnica).

The available documentation originating from before 1945 indicates that:

1. None of the hillforts were excavated and, therefore, full information on the chronology of the sites was not available.
2. Three (Myślibórz sites 1, 2 and 3) had information files and maps; for two of them the outlines of the ramparts were erroneously marked – sites 2 and 4 were confused.
3. Site no. 3 yielded seven iron bowls of the Silesian type.
4. The chronology of the sites was generally determined as medieval.
5. The scholars most probably had knowledge of all of the sites.
6. Selected finds and a spring coming out from the foot of the hillfort at site no. 3 appeared on a hand-sketched plan.
7. German scholars did not record the existence of the burial mound cemetery (most probably they were not aware of it).

In 1959 and 1966, Tadeusz Kaletyn, the Provincial Officer for the Preservation of Archaeological Monuments, initiated surface surveys at the discussed sites. The investigations were able to establish the approximate chronology of the hillforts (Kaletyn 1968, 290; Kaletynowie and Lodowski 1968, 99-101; Lodowski 1980, 100; Prus 2007, 81-82). Site no. 1, located on the top of Rataj hill, was dated between the 14th and 15th centuries; site no. 2, on the rocky promontory locally named Golica, was generally described as medieval; and, site no. 3, situated on the slope of a nameless promontory (earlier *Schanzberg*) deep in the Myślibórz Gorge, was thought to be possibly early medieval. After the war, two objects from the Myślibórz area also appeared in the catalogue by Włodzimierz Antoniewicz and Zofia Wartołowska (1964).

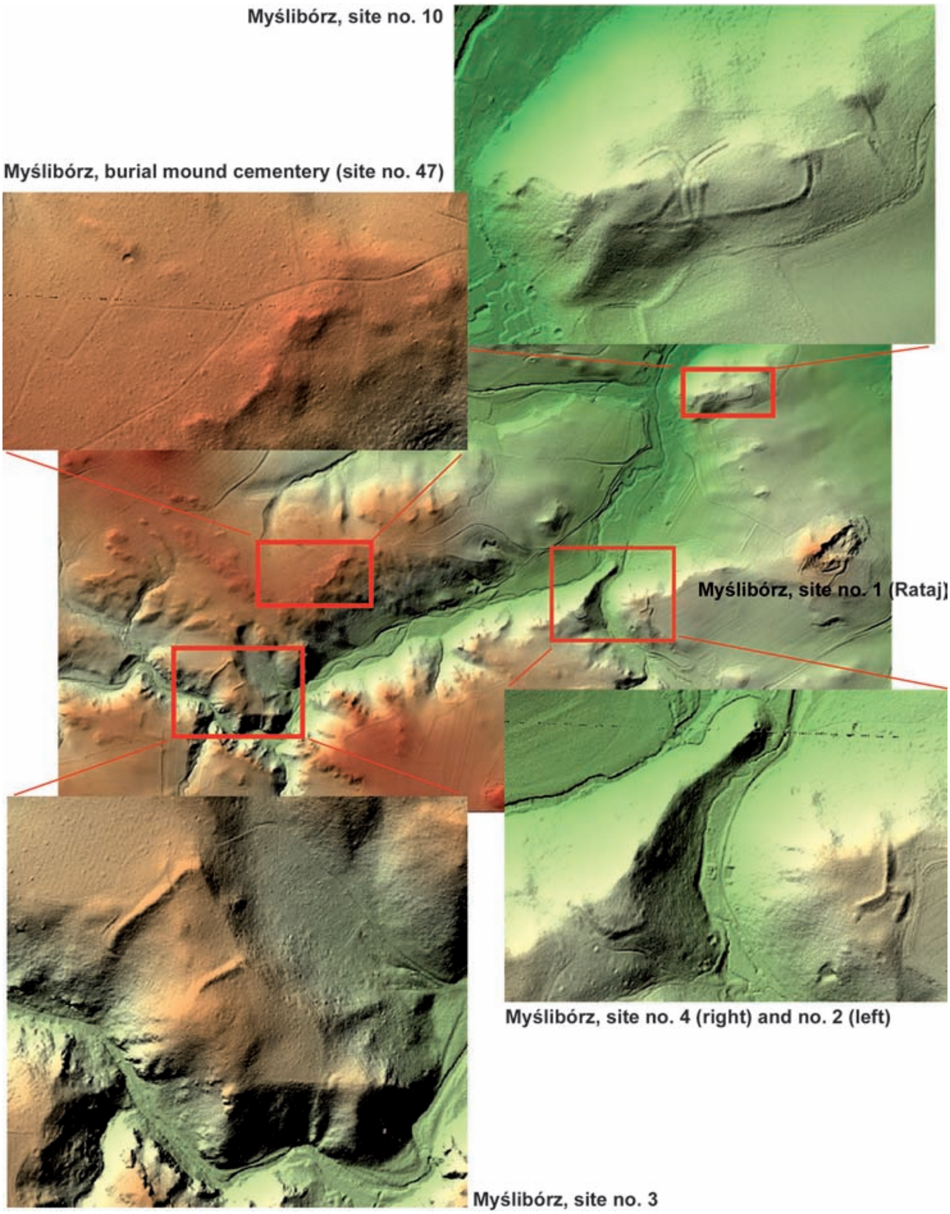


Fig. 5. Digital terrain model of the Myślibórz Gorge area with sites discussed in the paper (produced by E. Lisowska and M. Mackiewicz)

Fig. 6. Myślibórz, Jawor district, site no. 10. Selected 9^{th}-10^{th}-century pottery found in 1994 (collection of the Institute of Archaeology, University of Wrocław) (photo by E. Lisowska)

Further research on the function and chronology of the structures in Myślibórz Gorge was conducted in the years 1994-1997. In 1994, the Sudety Research Group, including Artur Boguszewicz, Jarosław Bronowicki, Aleksander Limisiewicz and Andrzej Wiśniewski, launched surface surveys and small-scale test excavations on a few sites in the Myślibórz, Paszowice and Chełmiec areas. The investigations resulted in the identification of several new sites, including a burial mound cemetery (Myślibórz, site no. 13) and the hillfort on the top of Skałka hill (marked in the AZP as Myślibórz, site no. 10). Although the team marked this hillfort as new, it is present in the pre-war and 1950s documentation. At that time, however, it was often confused with the site on Rataj hill. As a result, it was not entered into the register of archaeological monuments. Four of the hillforts (Myślibórz, sites 1, 4 and 10) and the burial mound cemetery were investigated with test trenches and full-scale excavations (Boguszewicz 1994; Jarysz 1997; Jarysz and Limisiewicz 1998), which allowed for a more precise chronology of the sites to be determined (Fig. 5). Discovering Bronze and Early Iron Age layers with early medieval (9^{th}-10^{th} century) pottery sherds at site no. 3 was a great surprise. The ten test trenches made it possible to partially investigate the structure of the ramparts, as well as a dwelling house containing pottery sherds characteristic of the Lusatian culture. The acquired material originated mostly in the Late Bronze and possibly Early Iron Age. According to the hypothesis of Radosław Jarysz, the object might have been built at the end of the Bronze Age (Lusatian culture) and briefly used in the Early Middle Ages (8th?-10th centuries: Jarysz 1997, 166). A similar situation occurred at the burial mound cemetery, where – apart from the Lusatian culture pottery sherds – a few sherds with early medieval features were identified. Out of the four investigated mounds, one yielded some 9th-10th-century pottery sherds and the other, Lusatian culture materials. Since only a fragment of the cemetery was investigated, it was difficult to determine the chronology of the particular graves (prehistoric or early medieval). Three out of the four investigated mounds contained stone structures. Two (nos. 4 and 2) had a quadrangular stone nucleus oriented according to the cardinal directions, which might help establish their dating. Mounds incorporating this type of stone structure are characteristic of the Slavic cremation burial custom and classified as type IIIC (Zoll-Adamikowa 1979, 103-115). In the few Lusatian culture mounds, no such structures were recorded, which is chronologically significant (Malinowski 1961).

In 1994, the research group also investigated the newly discovered site no. 10, located on the top of Skałka hill, overlooking the village of Myślibórz from the east. The archaeologists, led by Artur Boguszewicz, made a 1 × 1 m trench (in the northern part, at the base of the inner side of the rampart), which yielded ten pottery sherds, dated by Paweł Rzeźnik between the 9th and 10th centuries (Fig. 6).

After 1997, no excavations took place in the Myślibórz Gorge area. The local people state that various items of probably prehistoric and medieval origin are being found in the area of Myślibórz and Jakuszowa.

3. THE INVESTIGATIONS OF THE KOBYLICA AND GOLICA HILLFORTS IN 2018

These two sites overlook the mouth of a small gorge in which the Kobylica stream flows. The excavations aimed to establish their precise chronology and examine their inner layout and the relationship between them. Additionally, samples for environmental and soil analyses were taken. A magnetometer survey, conducted by Maksym Mackiewicz, Maciej Ehlert and Barłomiej Myślecki from the Archeolodzy.org foundation (Mackiewicz *et al.* 2018; Mackiewicz *et al.* 2018a), preceded the excavations. The survey made it possible to select a few promising areas with magnetic anomalies (Mackiewicz and Myślecki 2014; 2015; Sikora *et al.* 2015; Schmidt 2015), which might accompany archaeological features (Fig. 7: a). The area, surveyed with a Bartington Grad-601-2 fluxgate gradiometer, occupied 0.47 ha on Kobylica hill and 0.39 ha on Golica hill. The most distinctive bipolar anomalies, reaching up to the -50/+50 nT range (in some of the places even up to 100 nT), occurred on the rampart lines. Anomalies visible at the ends of the embankments indicate that the locations where the structures ended. Therefore, we might assume that the rampart outlines were preserved completely, and their terminal parts did not slide down the slope (Fig. 7: c). In some of the measurements, high deviations might have been caused by the presence of rubble consisting of strongly magnetic basalts. At both sites, the distribution of the po-sitive and negative anomalies, suggesting the presence of archaeological features, was irregular. Only features 1 and 2, recorded on Golica hill, were identified with

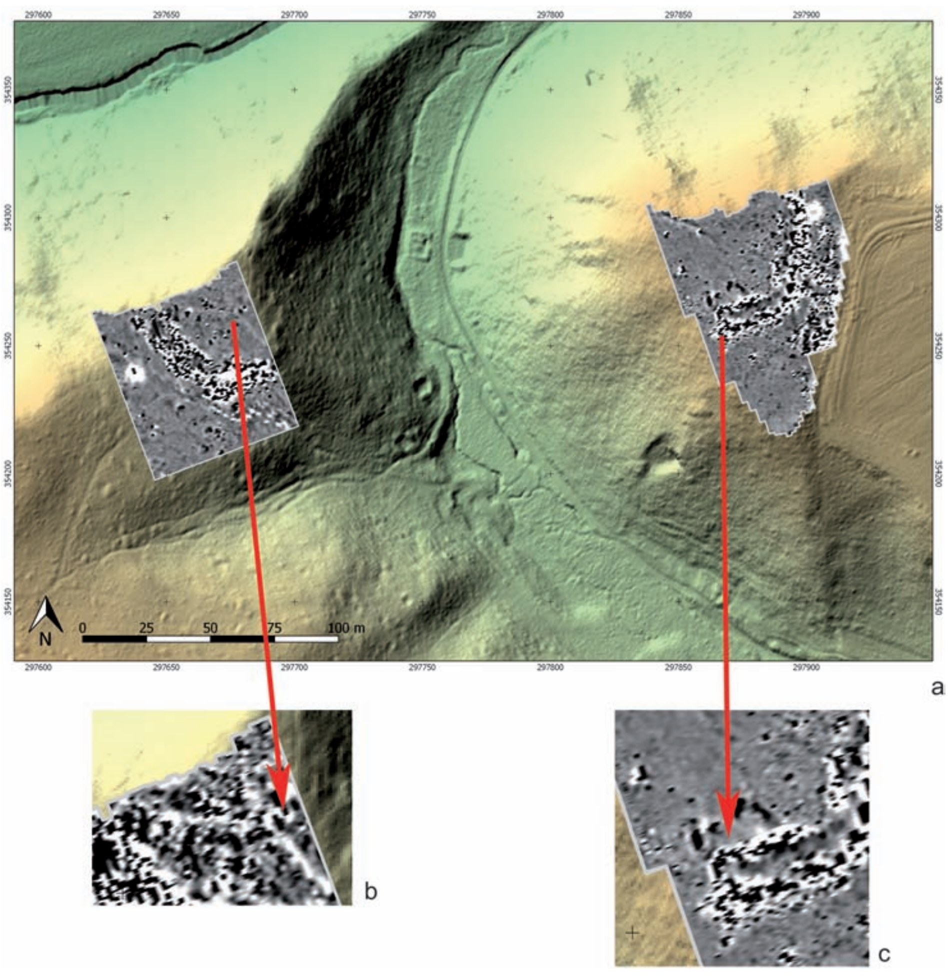


Fig. 7. Examples of magnetic anomalies recorded on sites no. 2 and no. 4 in Myślibórz. a – measurement area; b – anomalies showing the outline of the end of the rampart at site no. 4; c – linear anomaly within site no. 2 (produced by M. Mackiewicz and E. Lisowska)

the magnetometric survey. Other trenches situated on the visible anomalies did not bring satisfying results. Moreover, the Golica hillfort yielded a linear anomaly, which might indicate the existence of a small ditch dividing the courtyard of the hillfort (Fig. 7: b).

3.1. The investigations of the Kobylica hillfort

The hillfort, marked in the records as site no. 4 in Myślibórz, is located on the top of Kobylica hill (330,2 m a.s.l.), overlooking the Jawornik River valley. Its shape is irregular and the courtyard is located on a steeply ended promontory, enclosed with a semicircular, 65-metre long rampart. Additionally, the rampart had a branch on its outer side. The outline of the branch was rectangular, with one open end from which the hillfort could be accessed (Fig. 8). The total length of this part of the embankment was 37 m. The first line of the ramparts enclosed an area of 1200 m². If we include the 200 m² behind the second

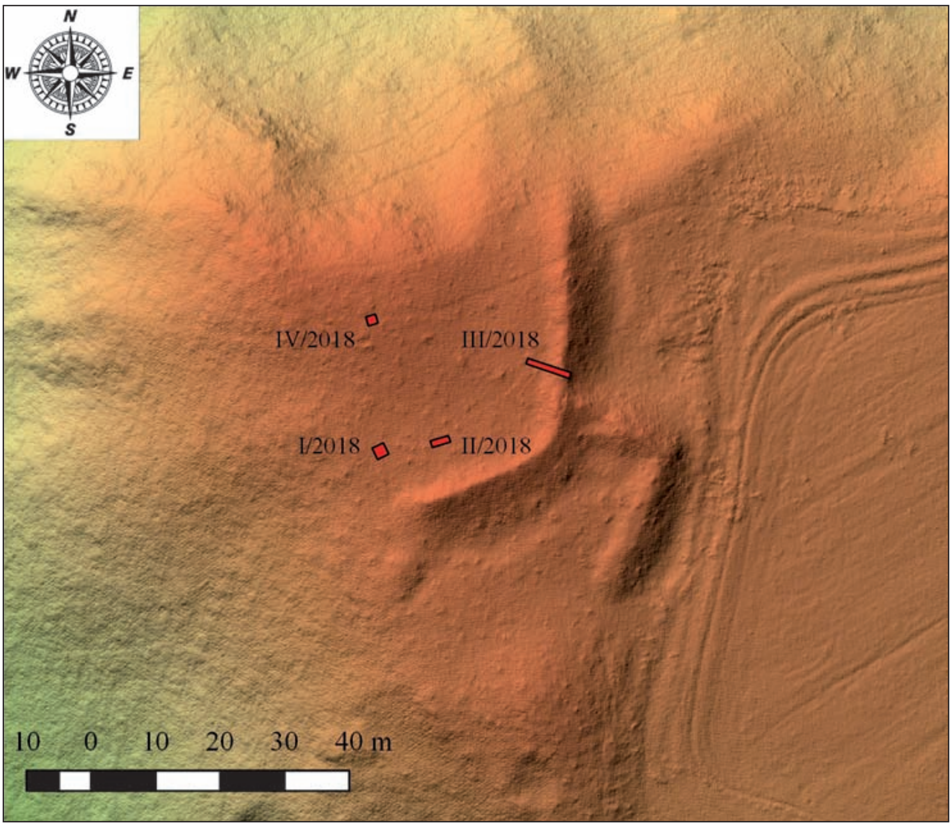


Fig. 8. Myślibórz, Jawor district, site no. 4. Digital terrain model of the hillfort's defensive features and distribution of excavation trenches in 2018 (produced by S. Rodak)

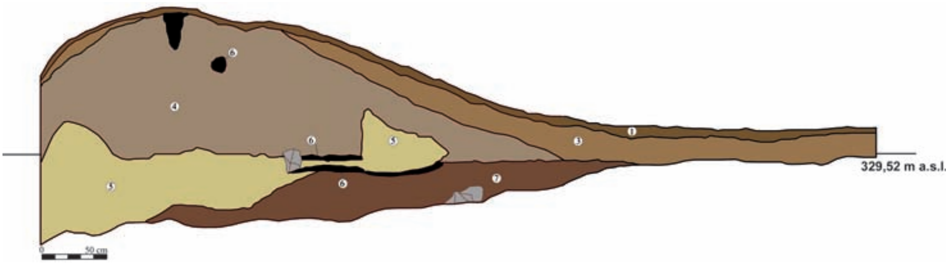


Fig. 9. Myślibórz, Jawor district, site no. 4. Cross-section of the rampart in trench no. III/2018 (produced by E. Lisowska and S. Rodak)

line of the ramparts, the whole structure had an area of 1400 m². The excavators made four trenches – three inside of the hillfort and one that cut across the rampart (Fig. 8). No archaeological features interpreted as buildings or settlement structures, or testifying to household or production activities were recorded inside of the hillfort. Directly under the layer of forest litter, a weathered yellow rock was unearthed. Its top layer included mostly medium- and fine-grained fractions, while the bottom layer, immediately above the solid rock, included a large number of sharp-edged, small rock fragments. Only the trench cutting the rampart yielded – besides the already mentioned layers – a few-centimetre thick layer of brownish soil immediately under the forest litter. It was visible along a length of 1.5 m on the inner side of the embankment. The layer produced ten pottery sherds. The trenches on Kobylica hill had a total area of 15.25 m² and yielded 20 early medieval pottery sherds, including so-called smooth pottery (Pankiewicz 2012, 91-92). Besides the broken vessels, in trench I/2018, 20 cm below the surface, a flint flake was found. A similar number of sherds (21) and bird bones were found in a small trench (1 × 1 × 0.6 m), located in the northern part of the hillfort in 1994 (personal communication with Artur Boguszewicz). Such a disproportion between the quantity of the acquired material and the area of the trench might indicate that the potential human activities took place mostly in the northern part of the site – not investigated in 2018. The magnetic anomalies in the southern part of the site might have possibly resulted from the magnetism of the volcanic rocks. In trenches from 2018, such rocks occurred close to the surface – immediately under the layers of the topsoil and the weathered rock (up to 40 cm).

Trench III/2018, cutting the rampart in the eastern part of the site, provided much more interesting data (Fig. 9). Its size was 1 × 6 m. Under the 5-centimetre layer of topsoil/forest litter (layer no. 1), on the inner and outer side of the rampart, a dark brown, layer (between 1 and 20 cm thick) with small, sharp-grained stones was found (layer no. 3). A very compact, slightly lighter, brown-yellowish layer with very numerous sharp-grained stones was immediately beneath it (layer no. 4). Their stratigraphic relation indicated that the material flowing down the rampart formed layer no. 3, while layer no. 4 was the original fill of the earth-and-stone rampart. On its top, fragments of a vertically oriented, burnt

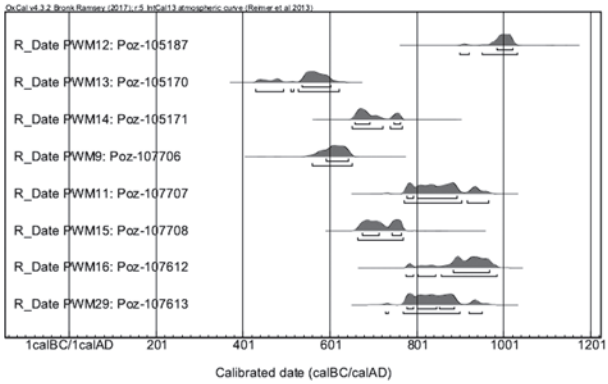


Fig. 10. AMS results of charcoal samples from sites 2 and 4. PWM 12, PWM 13, PWM 14 – samples taken from the rampart of site no. 4, PWM 9, PWM 9, PWM, 11, PWM, 15, PWM, 16, PWM 29 – samples taken from trench no. I/2018 at site no. 2 (produced by M. Furmanek)

structure of wood (oak and hornbeam) were found. Under the compact soil with stones (layer no. 4), there was a light-yellow, clay-dust layer with a saddle-shaped section (layer no. 5). Below it, a burnt layer, 5-10 centimetres thick, was found (layer no. 6) on top of loose, dark brown gravel (layer no. 7). Among the charcoal pieces, only specimens of oak were identified (Sady 2019, 24-25). Furthermore, in the top stratum of the clay layer (no. 5) a grey-shaded area with a few charcoal fragments was observed, which might indicate the presence of additional wooden fortifications. The examined structure matches the WIIB type of rampart according to Jacek Poleski's classification (Poleski 2004, 125-126). This type includes ramparts in the form of earthworks with a trapezoidal or triangular section, and a palisade or other structure resting on poles arranged in a line, a few metres from one another. Such ramparts occurred in the 8th and 9th centuries in Moravia (Procházka 1990; Galuška 1998). Until the end of the 10th century, they were also present in Greater and Lesser Poland (Hilczerówna 1967, 158-161; Poleski 2004, 125). However, the Silesian examples have not been thoroughly investigated (Jaworski 2005). A similar structure occurred in the damaged ramparts of the hillfort in Witostowice, in the Strzelin Hills (Moździoch 1984, 182). The cross-section of the Witostowice rampart included a layer of light clay with pieces of charcoal. It is thicker on the outer and inner sides of the rampart than in the centre (compare also Jaworski 2005, 171-173). The Witostowice rampart most likely had a stone facing; the stones are now scattered (Jaworski 2005, 172). Despite the structural similarities, the facing makes it different from the Kobylica earthworks.

The investigated remains of the rampart might give us some clues as to the building process. The first step was most probably levelling the surface around the hilltop with gravel (layer no. 7), which was later covered with oak branches or strewn with glowing charcoal for depuration. On such ground, the alleged outer and inner wooden structure was placed and fixed with the clay-dust layer. The remaining space was filled with soil and small stones. An additional wooden fortification, resting on vertical poles spaced a few metres from one another, was most likely placed on top of the rampart.

The C14 analyses, conducted in Poznań using the AMS method, utilised three charcoal samples. The results were ambiguous, but indicated that the rampart had been built generally in the Early Middle Ages (Fig. 10). The results were calibrated with the OxCal v4.2.3 software (Reimer *et al.* 2013).

3.2. The investigations of the Golica hillfort

The other investigated site was the hillfort located on the top of Golica (340 m a.s.l.), less than 200 m from site no. 4, as the crow flies. It has been previously discussed in the literature and dated to the Early Middle Ages (Jaworski 2005, 61). As in the other hillfort, a high rampart encloses its courtyard, located on the edge of a rocky promontory (Fig. 11).

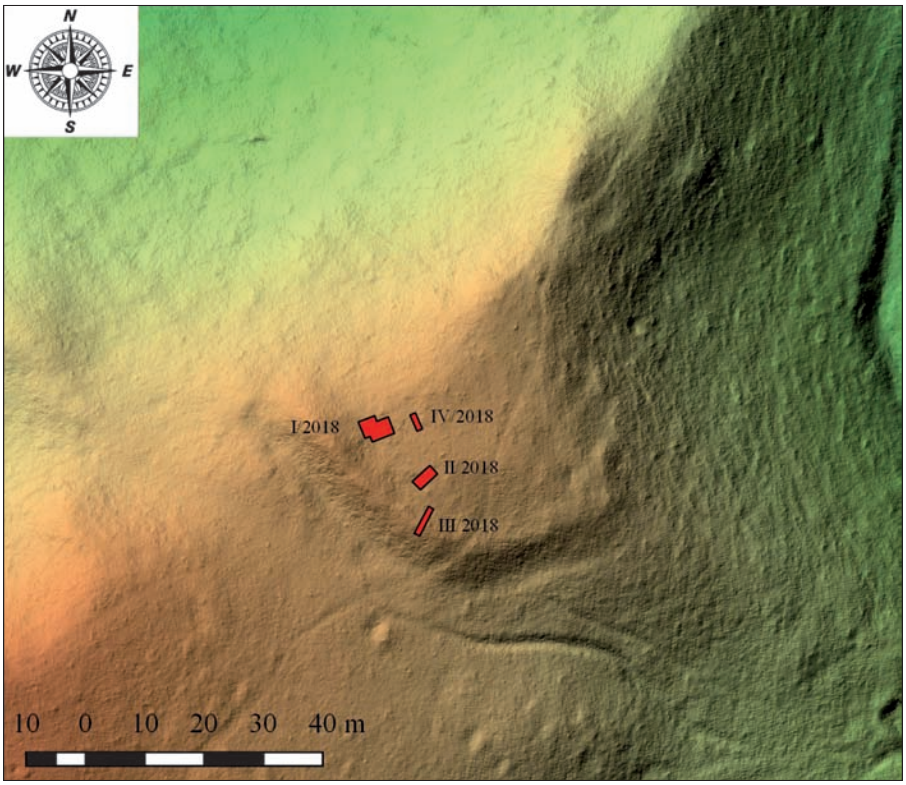


Fig. 11. Myślibórz, Jawor district, site no. 2. Digital terrain model of the hillfort's rampart outline and distribution of excavation trenches in 2018 (produced by A. Mikołajczyk)

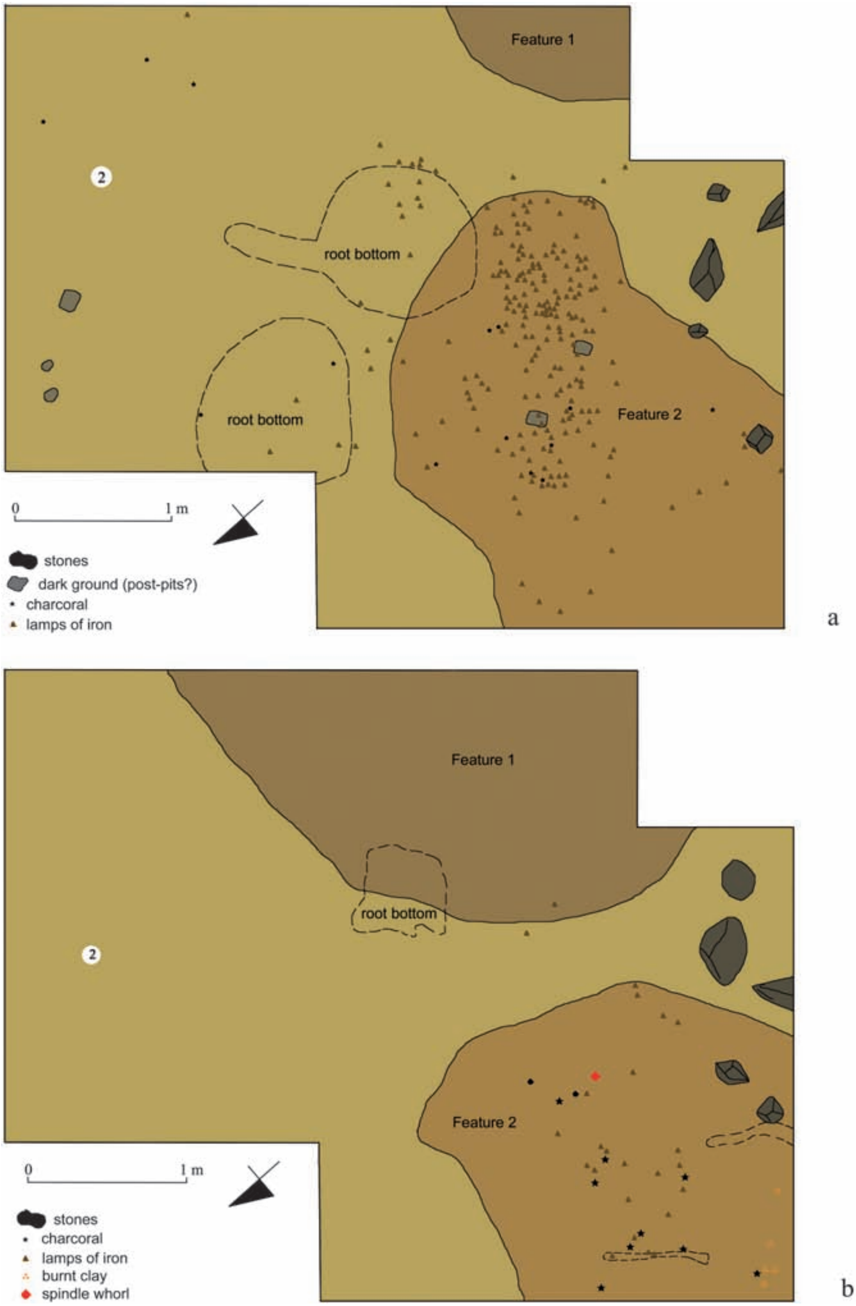


Fig. 12. Myślibórz, Jawor district, site no. 2. Trench I/2018 with features and distribution of slag and charcoal pieces. a – planum 15 cm below the ground; b – planum 25 cm below the ground (produced by E. Lisowska)

The semicircular embankment is 64 metres long and encloses a space of 11,200 m^2. On its outer side, there is a small, dry moat, which is very apparent in the western part of the site and disappearing towards the east. It was dug most probably during the construction of the rampart. Close by the outer side of the embankment is a funnel-shaped pit with a 14-metre-long ditch descending towards the bottom of the Kobylica River valley. The function of this complex is unknown. Nor do we know whether the structure might be associated with production/household activities in the vicinity of the hillfort in the Early Middle Ages.

Three excavation trenches were made inside of the hillfort in the places where magnetic anomalies occurred (Fig. 11), which was in the western part of the site, close to the rampart. As in the Kobylica hillfort, one of the trenches cut through the rampart and allowed for the examination of its structure. The trenches in the courtyard yielded three archaeological features. Feature 2, discovered in trench I/2018, produced the most exciting finds. The excavated portion was oblong, parallel to the rampart and measured 2-2.5 × 3 metres (Fig. 12: a, b). A massive tree root damaged the eastern part of the feature. The finds included over 200 pieces of iron slag, of which 197 did not exceed 1 cm, and 11 were 3-6 cm. Larger lumps of slag were concentrated in the eastern part of the feature at metres 1 and 2. Besides the slag pieces, the feature yielded almost 300 pottery sherds, a ceramic spindle whorl and fragments of two nails. This significant concentration of slag pieces originated most probably in a blacksmith workshop operating here in the Early Middle Ages. The shape and form of the iron slag pieces (compare section 4.3) suggests that they might have been parts of a destroyed bloom.

The Sudetes do not abound in finds associated with the forging of iron blooms dated to the 9th and 10th centuries. The closest match to the Myślibórz feature are the 9th or 10th century remains of a hearth found at the Gilów hillfort (Jaworski and Pankiewicz 2008, 189-190). The Gilów hearth survived in a much better condition than the Myślibórz find. It was located in trench XV, within the so-called "main" hillfort. The device from Gilów consists of the remains of a burnt dome and a cake-shaped concentration of a few dozen iron lumps inside of the dome. The archaeologists interpreted it as a free-standing forging hearth, approximately 50 cm in diameter (Jaworski and Pankiewicz 2008, 189). Unlike the find from Myślibórz, which most probably operated within a house, the Gilów furnace was situated at least 10 metres away from the closest settlement structures. The object from Myślibórz is most probably a heavily damaged, originally cake-shaped structure, which is indicated by a significant concentration of large lumps of iron slag within just one square metre. The scattered charcoal pieces of oak, maple and fir (Sady 2019, 25-27) found in the feature's fill with the slag lumps indicate how badly damaged the device was. The charcoal was sent to the Poznań Radiocarbon Laboratory for chronological verification (Fig. 11).

Evidence of iron processing in the Sudetes is scarce. Besides the device from Gilów, only slag and iron blooms found in Grodziszcze, Świdnica district, indicate the presence of local workshops within the hillforts. A large number of them occurred in a dwelling house

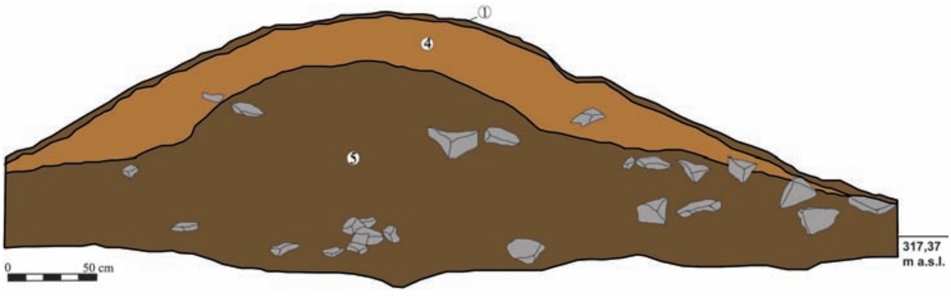


Fig. 13. Myślibórz, Jawor district, site no. 2. Cross-section of the rampart in trench no. III/2018 (produced by E. Lisowska, S. Rodak)

(feature 5), and isolated specimens in the three additional features (Pankiewicz 2005, 57-58). They made neither a compact structure, as in Gilów, nor a concentration matching the Myślibórz find. According to the author (Pankiewicz 2005, 58), the presence of slag lumps in a dwelling house might be associated with the final stage of iron processing, that is, the forging of the final products. None of the discussed sites yielded finds of smithing tools.

Blacksmith workshops more often occurred in the archaeological record in the lower parts of the western Sudetes – the Lusatian Highlands (Jaworski 2005, 258) – and at the sites located within the Sudeten foreland, which, geographically, does not belong to this region: *e.g.*, in Żarek (Piwko 1984), Železnice (Kozák 1969; Šalda 1969, 33, 104), Wysocko (Lodowski 1976; 1980) and Chotěbuz-Podobora (Kouřil 1994, 97-98).

Another feature from trench I/2018 contained only pottery sherds. Since only a small portion of it was excavated, its function cannot yet be determined. Trench II/2018 produced the last of the features: a relatively deep, irregular niche. Its upper parts yielded two early medieval pottery sherds. The fill consisted of loose soil mixed with small, sharp-edged stones. Most probably, the feature was initially a source of rock material used for the rampart. After the construction of the rampart construction was completed, the feature was filled with the remaining material to level the courtyard area. The presence of a pottery sherd in the top part of the feature might indicate that the levelling occurred before the hillfort was settled. Similar pits for extracting rock material were observed inside of the Gilów hillfort (Jaworski and Pankiewicz 2008, 184-188). In Gilów, only some of the pits were filled up and levelled. The remaining ones are still visible as depressions in the terrain.

The fortifications on Golica hill consisted of a rampart closing access to the rocky promontory with a moat on its outer side. The highest elevation difference between the remains of the rampart and the moat was 4 m. The trench was situated in the central part of the rampart. Inside of it, the investigators found a shaft core filled with very compact soil, mixed with small stones and a few specimens exceeding 20 cm (Fig. 13). This layer was covered with a slightly lighter and less compact layer with stones. No wooden constructions survived. Based on the fill, the embankment matches type II (WIIA), according to Jacek Poleski, in which the main element was the earthen rampart (Poleski 2004, 124). Wooden elements, which have not preserved, might also have been utilised (Poleski 2004, 124-125).

4. SMALL FINDS

4.1. Pottery

The archaeological investigations of the two hillforts in Myślibórz produced 320 early medieval pottery sherds. Most of them were found at site no. 2 on the top of Golica, in trench I/2018, located at the hillfort's courtyard close to the rampart. The remaining sherds come from the nearby trench II/2018 and the Kobylica hillfort.

Most of the vessels from Myślibórz were made of clay tempered with grains of sand and crushed stone, predominantly in the range of approximately 1-1.5 mm (temper classified as medium-grained – 37%) and about 0.5 mm (fine-grained temper – 16%). The fine-grained temper is often hard to identify macroscopically on the surface of the sherds, but is relatively well-visible on the fracture surfaces. In 20% of the sherds, both fine and medium-sized grains occurred. This type of temper was classified as fine- and medium-grained. In the bodies of the vessels, large grains of crushed stone measuring about 1.5-2 mm occurred (temper classified as medium- and large-grained – 6%). Additionally, in some of the specimens in the analysed sherd assemblage, mica temper of various fractions was identified (in total 21%; Pankiewicz 2012, 35-37).

The vessels from Myślibórz featured a slightly coarse outer surface with palpable grains (67%) or a smooth surface (33%). The deposition conditions seem to have strongly affected the surfaces of the vessels. A significant portion of the sherds are weathered, and the surface seems coarse due to the macroscopically visible grains of temper. Additionally, some of the sherds have a dusty-clayish coating of soil, which makes their colour light brownish. Presumably, most of the vessels featured initially a smooth, dark grey outer surface.

Out of the 320 pottery sherds, we selected 138 for a more thorough typological and stylistic analysis. We managed to reconstruct significant parts of 54 vessels. The vessels were hand-built with the use of the coiling technique and later turned on a potter's wheel. Turning affected mostly their rims, necks and shoulders (29 vessels). In some of the vessels, traces of rotation were only visible on the rims (2 specimens) or extended to the upper parts of the bodies (2 specimens). In all of the specimens, the inner side displays traces of smoothing with wet cloth. No fully-turned vessels were identified. On a few flat bottoms, prints of the wheel's axis occurred (Fig. 15: b, c, g, h; 16: d). Walls with a mean thickness ranging between 0.7 cm and 0.9 cm prevail (38 speciments). Besides them, thick-walled (over 1 cm – 5 specimens) and thin-walled (0.5-0.6 cm – 7 specimens) vessels occurred. The Myślibórz vessels were fired light brown or brown (37 specimens), brick-red (10 specimens)

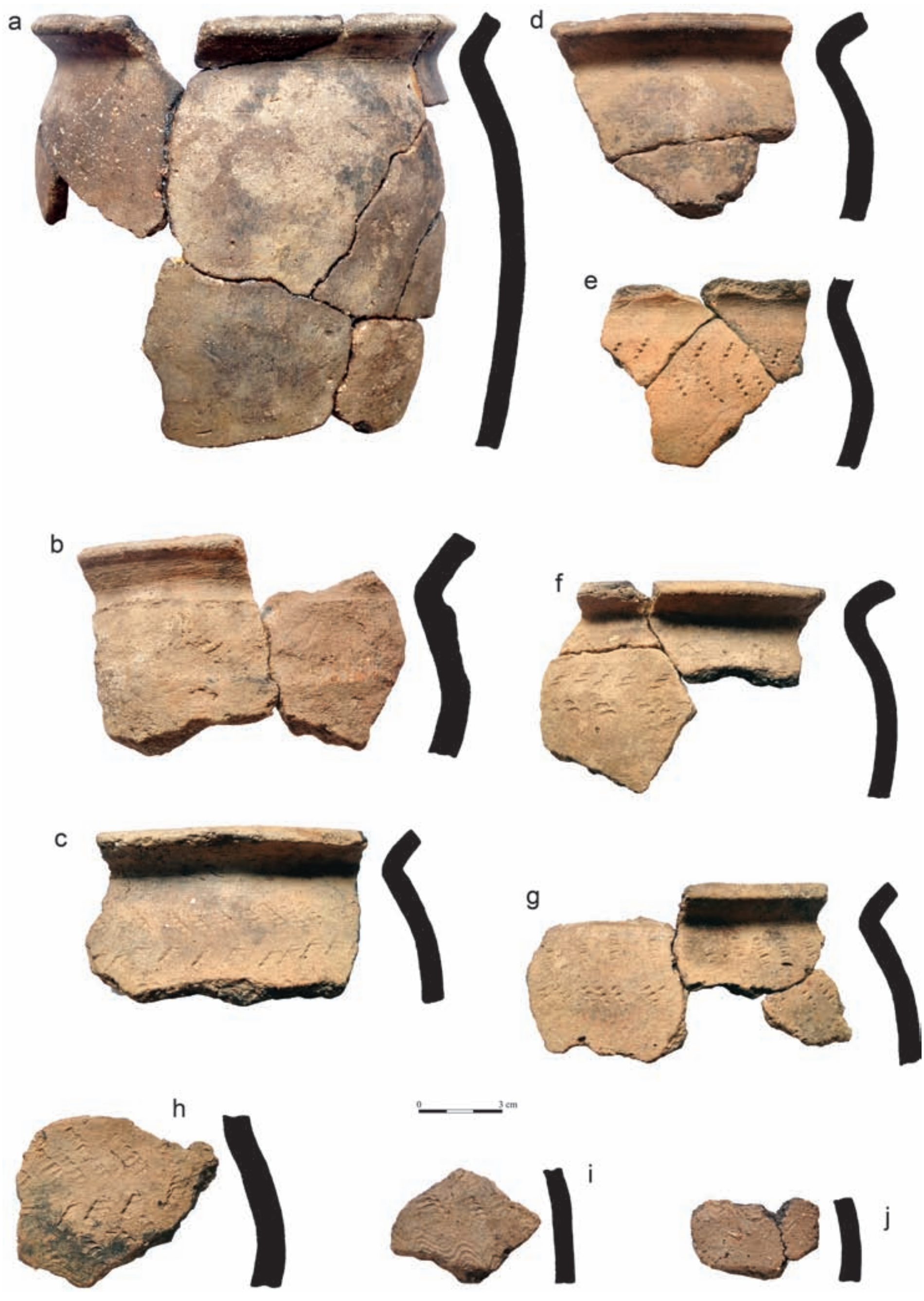


Fig. 14. Myślibórz, Jawor district. Selected pottery finds from site no. 4 (produced by E. Lisowska)

Fig. 15. Myślibórz, Jawor district. Selected pottery finds from site no. 2 (produced by E. Lisowska)

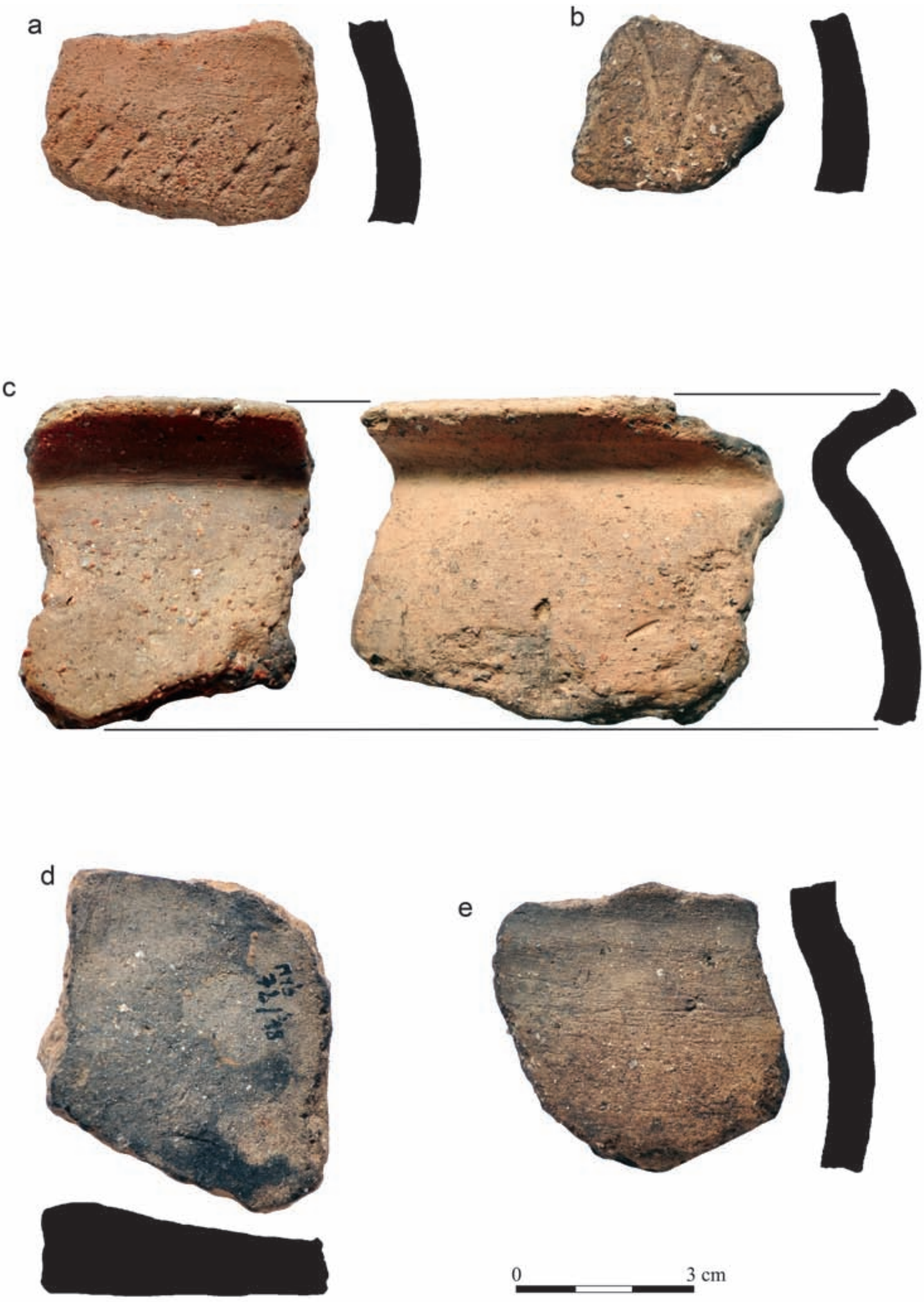


Fig. 16. Myślibórz, Jawor district. Selected pottery finds from site no. 2 (produced by E. Lisowska)

and cream-coloured (1 specimen). A few of the vessels were fired in reductive conditions, which made them grey or dark grey (6 examples).

The forms reconstructed from the Myślibórz pottery assemblage represent several typological groups. One such group includes vessels with S-shaped profiles and flat bottoms (group A, according to Aleksandra Pankiewicz; 2012, 40-47). Among them, specimens with short, arched necks and slightly profiled shoulders and bodies prevail. Their rims are most often straight, rounded, diagonally trimmed or with an additional groove around the outer edge; alternatively, they are gently marked on the upper edge, with a horizontally trimmed inner edge (7 specimens; Fig. 14: d, f; 15: a, d; 16: c). Vessels with barely marked shoulders and bodies (4 specimens) also have rims with a horizontally trimmed edge, sometimes with a groove around the rim or a small projection on its bottom surface (Fig. 14: a, e). Such vessels were popular in the Early Middle Ages and recorded in several south Silesian hillforts, *e.g.*, in Dobromierz, Gilów, Niemcza and Będkowice (Pankiewicz 2012, 78-79). Similar S-shaped pots with a short, arched neck also occurred within the hillfort marked as site no. 3 in the Myśliborz Gorge (Jarysz and Limisiewicz 1998, Fig. 11). Isolated specimens of weakly shouldered vessels (1 vessel – Fig. 14: c) with a short neck, separated from the shoulder with a small offset, and with various outer edges were identified (2 specimens – Fig. 14: b, 15: f). The latter have their matches at the Gilów (Pankiewicz 2012, Fig. 16: e, 17: c, 22: d, 30: h), Graniczna (Pankiewicz 2012, Fig. 35: b), Grodziszcze (Pankiewicz 2012, Fig. 42: f) and Mierczyce (Pankiewicz 2012, Fig. 83: d) hillforts, as well as at the settlement site in Kamieniec Ząbkowicki (Pankiewicz 2012, Fig. 67: a, b). It is worth mentioning that most of them have a comb decoration. Undecorated specimens occurred only in Mierczyce and Kamieniec Ząbkowicki. Such a vessel was also identified during the last excavation season in Myślibórz and classified as smooth pottery – despite the severely damaged outer surface (Fig. 14: b). The rims preserved in the Myślibórz pottery assemblage suggest that the vessels were large (rim diameter between 16 and 24 cm – in 6 vessels), and medium-sized (rim diameter up to 15 cm – in the further 6 vessels).

Decorated vessels constitute a small percentage of the assemblage. They were most often ornamented with a row of single, double or even triple diagonal comb prints, arranged in a herringbone pattern (6 vessels – Fig. 14: e, f, g; 15: a; 16: a). In isolated specimens, the double comb-print rows arranged in the herringbone pattern had an additional wavy line (Fig. 14: c). The ornamentation covered only the upper parts of the bodies down to the curve. In the analysed assemblage, undecorated vessels – the so-called smooth pottery – dominated (13 vessels – Fig. 14: a, b, d; 15: d, e, f; 16: c, e).

The ceramic material used for the production of the smooth pottery was carefully prepared and based on well-selected, small- and medium-grained temper. The slightly dried vessels were polished, which made their texture smooth and the grains of temper only visible on the fracture surfaces (Pankiewicz 2012, 91-92). The smooth pottery from Myślibórz includes specimens with only a slight curvature, a short, arched neck and, most often, a rounded rim with the outer edge trimmed on the outer side. We assume that most

Fig. 17. Myślibórz, Jawor district, site no. 2. Spindle whorl found in trench I/2018 (photo by E. Lisowska)

of the sherds not used for the formal reconstruction belonged to this category. It is noteworthy that many of the pottery pieces included medium-grained temper and, at the same time, were of smooth texture and light brown colour. Some of the vessels made of clay with small-grained temper and decorated with comb ornaments might have possibly also belonged to this group in technological terms. Most of the reconstructed pottery forms come from the two excavated features in trench I/2018 at site no. 2 on Golica hill (features 1 and 2). Thus, the assemblage can be treated as consistent. Pottery assemblages from both of the hillforts were homogeneous, which confirms that the sites functioned simultaneously.

Smooth pottery was found at several archaeological sites in the southern part of Silesia and the Sudety mountains (Pankiewicz 2003, 145-148; 2005, 25-26, 70; 2012, 91-97; Jaworski and Pankiewicz 2007, 89-90; Stoksik and Paternoga 2009, 34-35). It constituted a large percentage of the ceramic material from the hillforts of Będkowice in the Ślęża Massif (Pankiewicz 2012, 93, Plate 1: a, c, e; 2: a-c, e, f) and Grodziszcze in the Sudety Foothills (group I – Pankiewicz 2005, 24-25; Plate 17: c, n; 18: i; 19: b, c; 21: a, c, h; 22: f, g; 25: g; 26: g, j, l, m; 27: a, g; 28: g, i; 31: c-f; 32: a, e, f), as well as from the settlement site in Stary Zamek (Pankiewicz 2012, 93, Plate 125: a, b; 126: a; 127: b, i). The vessels were also abundant at many other sites located between the Bóbr River basin in the west (*e.g.* in Wleń castle and Jelenia Góra-Grabary; Niegoda and Piekalski 1996, Fig. 1; Wrocławski 2001) and the Eastern Neisse in the east (*e.g.* the hillfort in Witostowice; Moździoch 1984, Fig. 28: e; Pankiewicz 2012, 93). According to the present state of research, smooth pottery is characteristic of Silesia and might be dated to the second half of the 9th and first half of the 10th century (Pankiewicz 2012, 94-97, 205).

4.2. Spindle whorl

A ceramic spindle whorl was found in feature no. 2 in trench I/2018, made at the Golica hillfort (Fig. 17), 30 cm below the ground level. It was manufactured of untempered clay with a natural, 2-3% content of a small-grained temper. The completely preserved, barrel-shaped spindle whorl is cream-coloured and lacks ornamentation. Its diameter is 28 mm, and its height is 15 mm. The opening is slightly hourglass-shaped, with a diameter of 8 mm at its narrowest point.

4.3. Lumps of iron

Trench I/2018 in the Golica hillfort yielded over 200 lumps of slag, mostly in feature no. 2, in an area damaged by a tree root (Fig. 18). The lumps occurred mostly 7-20 cm below the ground level. Their highest density was observed between 10-15 cm below the ground within metres 1 and 14. The size of the lumps usually did not exceed 1 cm; only 11 fragments were between 1-7 cm. In total, 197 small lumps and 11 specimens over 1 cm were found. Judging from their shape, they were forging slag (Bartuška and Pleiner 1968): bowl-shaped and amorphous, with randomly solidified surfaces (Crew 1996; McDonnell 1991; Bachmann 1982; Suliga *et al.* 2002, Orzechowski and Wrona 2015). They are most probably parts of a destroyed forging bloom. Because of its location inside of a house, it might have been part of a hearth used for heating and cooking (Jasiewicz and Pelczyk 2002, 271).

4.4. Remaining metal items

Each of the hillforts yielded a single metal item. Feature no. 2 in trench I/2018 on Golica hill produced a rectangular-sectioned shaft of a forged nail (lacking the head). In trench III/2018 on Kobylica hill, an oblong eleven-centimetre-long, significantly corroded and barely identifiable item was found.

Fig. 18. Myślibórz, Jawor district, site no. 2. Bowl-shaped slag pieces found in trench I/2018 (photo by E. Lisowska)

4.5. Flint flake

An isolated flake from erratic flint was found in trench I/2018 on Kobylica hill, in a layer between the weathered rock and the forest humus.

5. EARLY MEDIEVAL FORTIFICATION SYSTEM IN MYŚLIBÓRZ GORGE

Myślibórz Gorge is one of the narrowest passages through the Kaczawy Foothills towards the south-west. Entering the deeper parts of the mountains through this gorge required passing the hillfort on the southern side (site no. 10), followed by two hillforts at the mouth of the Kobylica stream valley (sites no. 2 and no. 4), and finally approaching the Lusatian culture hillfort adapted by the early medieval communities (site no. 3). The pathway through Myślibórz Gorge runs on the flat bottom of the gorge, featuring with a few narrow passes between the rocks. Walking from the mouth of the gorge in the north-east, the first and narrowest of these passes is located behind site no. 3.

We used two types of software to conduct a visibility analysis for the five defensive structures in the area. The assumption which allows for such an analysis is that the area surrounding the sites lacked trees, which were cut to raise the ramparts and houses, as

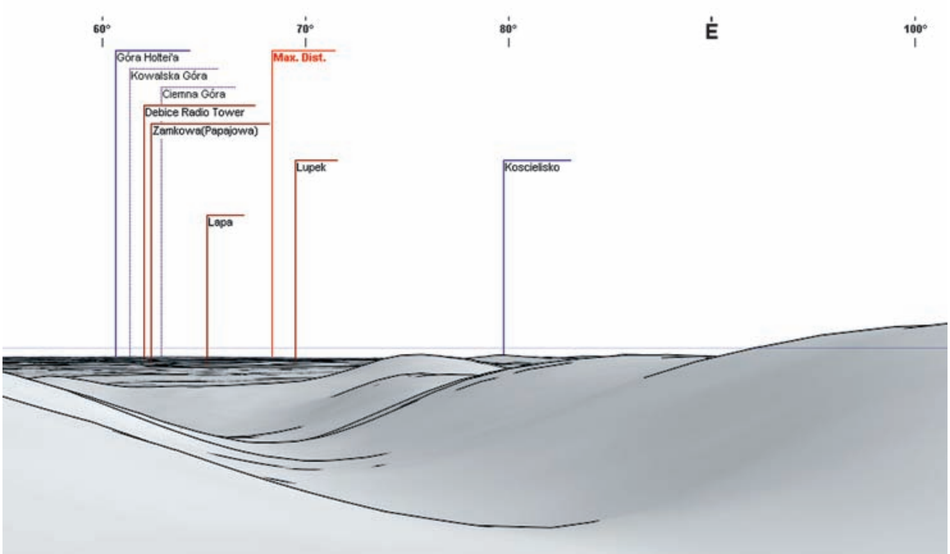


Fig. 19. View from site no. 3 towards the north-east, generated with the Zugspitze software (with permission by Ulrich Deuschle, https://www.udeuschle.de/panoramas/makepanoramas_en.htm)

well as to repair and heat them in the autumn and winter seasons (Williams 2000; Kaplan *et al.* 2009; Szabo *et al.* 2015). A microscale analysis was conducted in ArcGIS based on the digital terrain model made with the GRID network geometry (Kampczyk *et al.* 2016). We assumed the average height of the observer to be 1.60 m (compare – data on the height of early medieval populations: Piontek 2014, 83). Visibility was determined with the *"viewshed analysis"* function (Wheathley and Gillings 2000; 2002, 202-206). Another analysis determining the range of visibility from the selected points was a simulation conducted with the Zugspitze software (www.udeuschle.de). It generated the farthest possible observable points and compared the landscape elements visible from each of these points (Fig. 19, Table 2). Besides the four sites with 9th and 10th century materials, the analysis included a point located on Rataj hill, where a castle had functioned in the (12th?) 13th-14th century (Boguszewicz 1996; 2010, 237-239; Chorowska *et al.* 2009, 173-175). Although no finds from the 9th or 10th centuries were recorded there, it is the highest summit in the area with the widest visibility range. According to Krzysztof Jaworski (2019), such places – even if not permanently settled – were most probably used as observation points. From these points, potential threats could be communicated quickly and effectively, as they were located close to permanently inhabited sites (a 10-20-minute walk away). Evidence of such observation points might be found about a dozen kilometres east of Myślibórz Gorge, at an early medieval hillfort located on Basalt Mountain in Strzegom and on the nearby Krzyżowa Mountain. The hillfort was destroyed by a stone (mostly basalt) quarry. It was mostly the German scholars who established and published its chronology (Bersu 1930; Jaworski 2005, 68-70). On the top of Krzyżowa Mountain K. Jaworski discovered lines incised in the stone which represent three engravings of Nine Men's Morris board game, also known as The Mill Game, or Merels (Jaworski 2019). Krzysztof Jaworski cautiously links them to the 11th-12th century hillfort on the neighbouring Basalt Mountain.

Because of the size of the examined structures in the micro-area of Myślibórz Gorge (Fig. 20, 21, 22), some of the points within them allowed observers to see one another, and some did not (Table 1). This is especially true of site no. 3, which offered a view of each of the other sites (1, 2, 4 and 10) – if the observer was in the right position. Different places within site no. 3 allowed for viewing different neighbouring sites. For instance, an observer standing on the top of the outer rampart of site no. 3 could only see site no. 1, and not structures on sites 2, 4 and 10. Moving down towards the inner rampart, they would walk out of the blind spot and all at once notice the potential observers at sites 2 and 4. Walking further down behind the line of the inner rampart they could notice observers standing within site no. 10.

The fortification system in Myślibórz Gorge allows for viewing almost 90% of the study area – depending on the position of the observer. Considering the limitations of human vision, the distances between the places most remote from each other (*e.g.*, site nos. 3 and 10; 1 and 3) were such that a person at one site probably could not see a single person at another site. However, observing more distinctive and sizeable objects, such as smoke or

Table 1. Mutual visibility range from the Myślibórz hillforts with the record sheet of distance between them in a straght line and relative hights (up and down)

Site number, local name, altitude in m a.s.l.	Distance in metres – in a straight line	Viewed site	Altitude difference down	Altitude difference up
Site no. 1 – Rataj, 350 m a.s.l.	850 m	Site no. 2 (small part of the site visible)	60 m	50 m
Site no. 1 – Rataj, 350 m a.s.l.	2000 m	Site no. 3 (half of the site area visible)	80 m	80 m
Site no. 1 – Rataj, 350 m a.s.l.	600 m	Site no. 4 (whole site visible)	45 m	25 m
Site no. 1 – Rataj, 350 m a.s.l.	580 m	Site no. 10 (whole site visible)	45 m	10 m
Site no. 2 – Golica, 342 m a.s.l.	850 m	Site no. 1 (only northern part visible)	60 m	50 m
Site no. 2 – Golica, 342 m a.s.l.	1150 m	Site no. 3 (only central part between the ramparts visible)	70 m	80 m
Site no. 2 – Golica, 342 m a.s.l.	180 m	Site no. 4 (whole site visible)	40 m	30 m
Site no. 2 – Golica, 342 m a.s.l.	870 m	Site no. 10 (whole site visible)	80 m	55 m
Site no. 3 – Schanzenberg, 350 m a.s.l. in the highest point	2000 m	Site no. 1, (only small part visible if viewed from the area between the outer and inner rampart)	80 m	80 m
Site no. 3 – Schanzenberg, 350 m a.s.l. in the highest point	1150 m	Site no. 2, (only small part visible if viewed from the area between the outer and inner rampart)	80 m	70 m
Site no. 3 – Schanzenberg, 350 m a.s.l. in the highest point	1370 m	Site no. 4, (only small part visible if viewed from the area between the outer and inner rampart)	90 m	70 m
Site no. 3 – Schanzenberg, 350 m a.s.l. in the highest point	1900 m	Site no. 10 (only small part visible if viewed from the lowest, southern part of the promontory)	90 m	55 m
Site no. 4 – Kobylica, 330 m a.s.l.	600 m	Site no. 1 whole site visible	25 m	45 m
Site no. 4 – Kobylica, 330 m a.s.l.	180 m	Site no. 2 whole site visible	30 m	40 m

Table 1.

Site number, local name, altitude in m a.s.l.	Distance in metres – in a straight line	Viewed site	Altitude difference down	Altitude difference up
Site no. 4 – Kobylica, 330 m a.s.l.	1370	Site no. 3 only central part between the ramparts visible	70 m	90 m
Site no. 4 – Kobylica, 330 m a.s.l.	760 m	Site no. 10 whole site visible	30 m	15 m
Site no. 10 – Skałki, 315 m a.s.l.	580 m	Site no. 1 whole site visible	10 m	45 m
Site no. 10 – Skałki, 315 m a.s.l.	870 m	Site no. 2 whole site visible	55 m	80 m
Site no. 10 – Skałki, 315 m a.s.l.	1900 m	Site no. 3 (only the lowest part below the inner rampart visible)	55 m	90 m
Site no. 10 – Skałki, 315 m a.s.l.	760 m	Site no. 4 whole site visible	15 m	30 m

Table 2. Visibility range of the farthest point from the examined sites based on the simulation made with the Zugspitze software (stars marks distances beyond the visibility range of human sight)

Site	Viewing direction (field of vision 120°)	Potentially farthest visible point	Visible strategic points
No. 1 – Rataj	NE NW SE SW	80 km* 75 km* 62 km* 54 km	Strzegom Hills, Ślęża Massif, Chełmiec (Waldenburg Mountains), Giant Mountains
No. 2 – Golica	NE NW SE SW	81 km* 75 km* 63 km 53 km	Basalt Mountain, Ślęża Massif, Śnieżka and Czarna Kopa (Giant Mountains), Baraniec (Katzbach Mountains)
No. 3 – *Schanzberg/ Schweden Schanzen*	NE NW SE SW	80 km* 4 km 18 km 53 km	Jagodzina (Strzegom Hills), Basalt Mountain, Wielka Sowa, Giant Mountains
No. 4 – Kobylica	NE NW SE SW	65 km* 75 km* 52 km 28 km	Krzyżowa Mountain and Basalt Mountain (Strzegom Hills), Wielka Sowa and Owl Mountains, Chełmiec (Waldenburg Mountains),
No. 10 – Skałki	NE NW SE SW	80 km* 75 km* 62 km* 48 km	Strzegom Hills, Ślęża Massif, Chełmiec (Waldenburg Mountains), Łabski Szczyt (Giant Mountains)

a large bonfire, would be possible. The location of site nos. 2 and 4, situated only 180 m from each other, as the crow flies, would make it possible not only to see a human figure but also to identify their movement. In this way, the hillfort complex in Myślibórz Gorge, with a possible observation point or a small watch post on Rataj hill, constituted a unique and consistent defensive system.

As far as the areas outside of Myślibórz Gorge are concerned, each of the hillforts offers a different panoramic view. Thus, the complex makes it possible to see various strategic points. In theory, the farthest visible point from sites 1, 2, 3 and 10 is the area of the Oborniki Hills. A simulation made with the Zugspitze software estimates this distance to be 80 km. Noticing anything in the Silesian Lowland from such a distance is not possible considering the limits of human vision – even in favourable weather conditions (Bohren and Frazer 1986). The human sight range reaches up to $3.56*\sqrt{h}$ kilometres, where h is the sight height in metres above sea level (Weintrit 2013, 168). Assuming that the eyes of an observer looking towards the area of the Silesian Lowland (varying within the sight range between 100 and 120 m a.s.l.) are 1.6 m above the ground, and they stand on a hill that is 350 m high, the h height required to see an object 80 km away ranges between 231.6 and 251.6 m. In such a situation, the maximum range of visibility to the north varies between 54.1 km in the north-east and 56.4 in the north-west, where the elevation difference between the lowland area and the highest analysed point is 20 metres. The range of visibility is much more extensive towards the south and south-west due to the altitudes of the higher Sudety ranges (we used the same formula here but the sight direction is from the highest to the lowest point). For instance, Śnieżka (1602 m a.s.l.) – the highest summit in the Sudetes – might be observed from a distance of about 140 km if the weather conditions are favourable. Such calculations are not utilised by the GIS software, which uses the relation between the height of the observation point, the distance and the visibility angle of the Earth's surface (Wheatley and Gillings 2000; Smith and Cochrane 2011; Wheatley 1995)

The simulations discussed above allowed for a comparison of the possibilities of visibility analysis using two independent procedures. The ArcGIS software, which includes the height of the observer, the angle, and the maximum sight range, determines the maximum range of visibility without including the additional visibility index of $3.56*\sqrt{h}$ kilometres. The Zugspitze programme – used mostly by tourists – makes it possible to quickly generate panoramic views. It utilises a simple sketch background and GoogleMaps data. The users obtain information on the names of the summits, their altitudes and the distance between them, as the crow flies.

The particular hillforts (see Table 2) offer views of the most important strategic points in this part of Silesia: the Ślęża Massif, the Strzegom area with Krzyżowa Mountain, the Owl Mountains, and other places. Depending on the observation point, the views change slightly – mostly because some parts become obscured by the closest hills in the Kaczawy Foothills.

The visibility analysis indicates that at every stage of the passage through the gorge, a group of people travelling that way would be visible from at least one, and most often

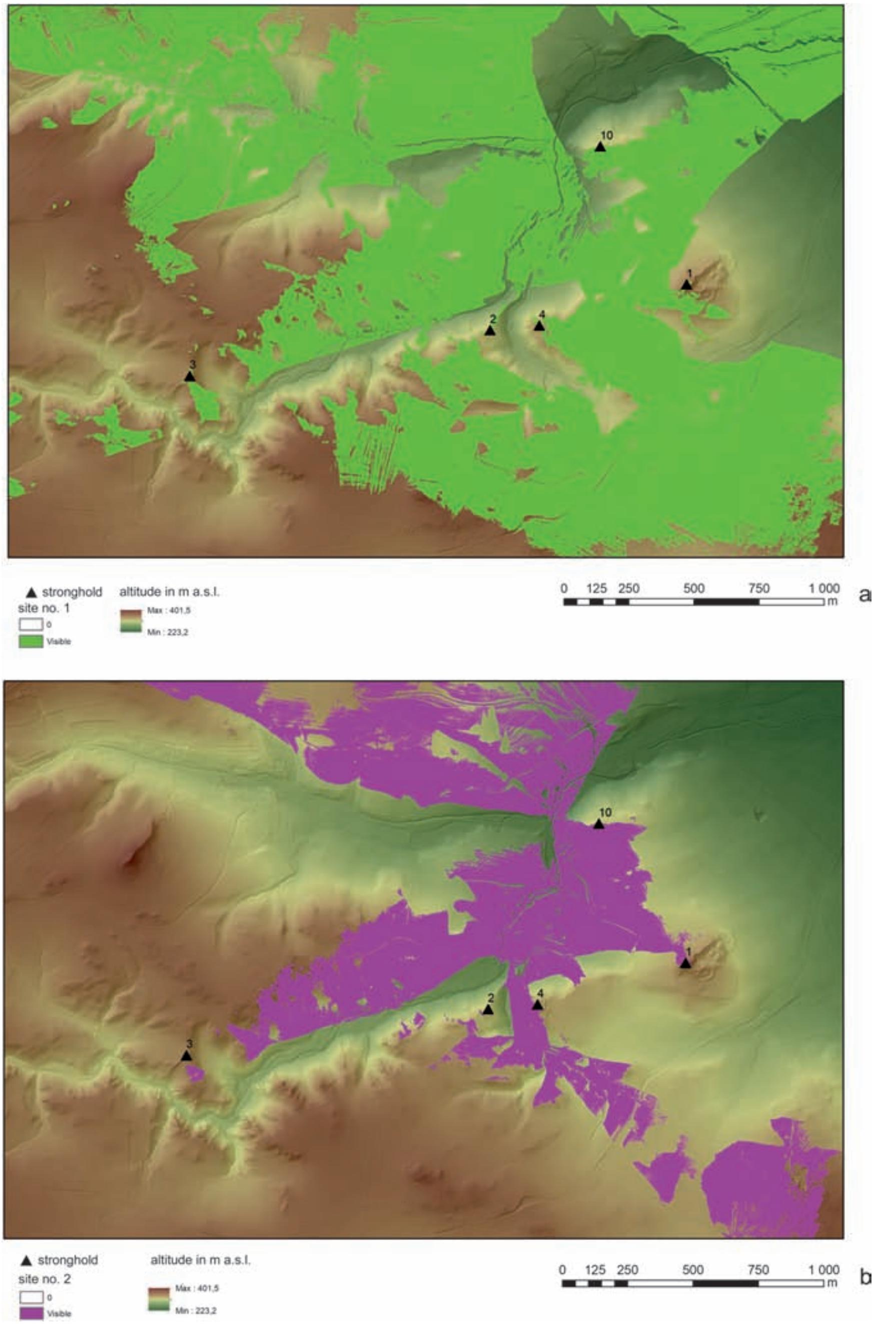


Fig. 20. Myślibórz Gorge, visibility range from the sites. a – visibility range from site no. 1 (Rataj); b – visibility range from site no. 2 (Golica) (produced by A. Mikołajczyk)

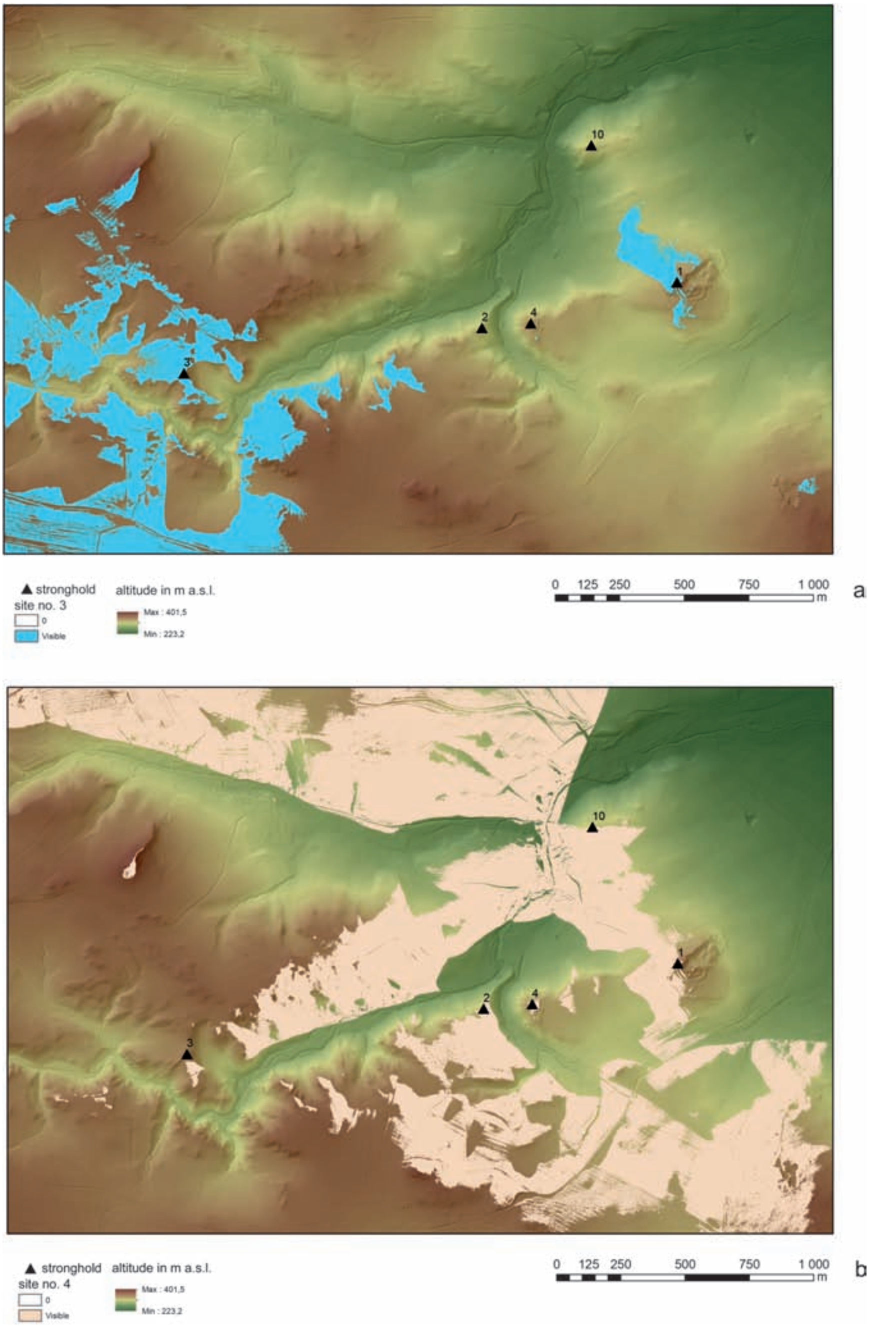


Fig. 21. Myślibórz Gorge, visibility range from the sites. a – visibility range from site no. 3 (*Schanzberg*); b – visibility range from site no. 4 (Kobylica) (produced by A. Mikołajczyk)

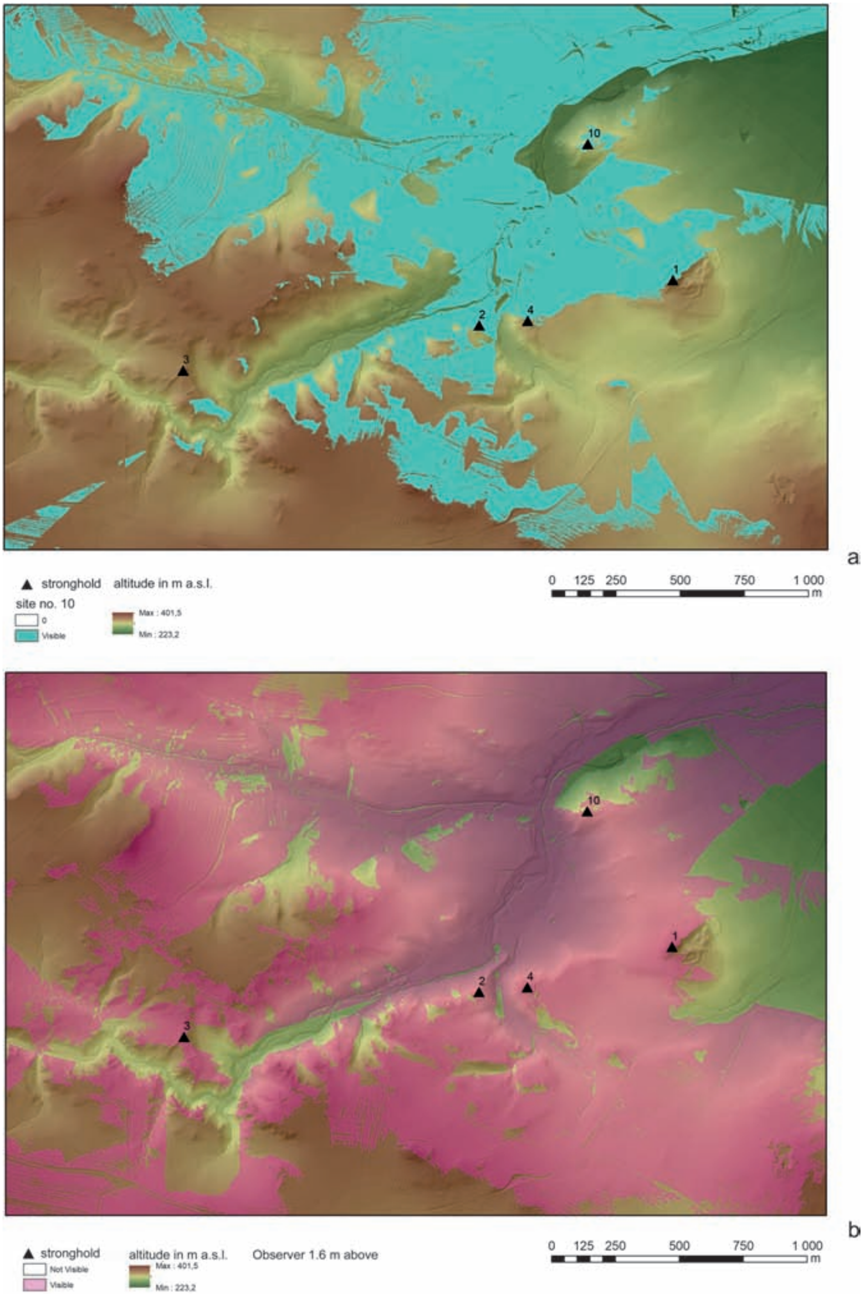


Fig. 22. Myślibórz Gorge, visibility range from the sites. a – visibility range from site no. 10 (Skałki); b – visibility range of the passage through Myślibórz Gorge from all of the examined sites: 1, 2, 3, 4 and 10 (produced by A. Mikołajczyk)

from two or more hillforts. Why was such a great effort made to raise structures to protect the passage through this area? The system does not have any parallels in Central Europe, and seems to be a unique solution situated in a specific geomorphological environment.

6. DISCUSSION

The rampart arrangements in the Myślibórz Gorge hillforts represent a few types. Two of the hillforts, which have transverse ramparts separating the rocky promontory from the accessible slope, are especially noteworthy. The Czech literature classifies them as the *ostrožna*-type (Turek 1957). Władysław Kowalenko, the first Polish scholar mentioning such structures, refers to them as promontory hillforts with a transverse rampart (Kowalenko 1938, 66f.), while Andrzej Żaki cites them as hillforts with sectional (barrier) ramparts (Żaki 1974, 38). Jerzy Olczak and Kazimierz Siuchciński mention them as single-spaced hillforts with a transverse rampart embanking the promontory at its base (Olczak and Siuchniński 1976, 118). Similar terms appear in several other hillfort classifications (Jaworski 2005; Poleski 2004; 2013; Wojenka 2010). Such structures occur both on the northern and southern side of the Carpathians and Sudetes, mostly in lowland hillforts located on river promontories (Tomková 1999; Olczak and Siuchniński 1976; Sláma 1986). Hillforts with transverse ramparts located on mountain promontories are relatively rare in comparison to their lowland counterparts. The only other place in the Sudetes where such structures occurred was in Stary Książ (Jaworski 1994; Jaworski 2005, 113). Hillforts of slightly different shapes, determined by the local terrain, were recorded in the Carpathian and Upper Silesian zone, e.g., in Mymoń, Sanok district, Kamieniec, Tarnowskie Góry district (Poleski 2013, 60-62, 335-336) and Kostolec, okres Piešťany (Ruttkay 2006). In Bohemia, they were found in Dneboh, okres Mlada Boleslav; Čtyřkoly, okres Lštěni; Chloumek, okres Mlada Boleslav; Chum, okres Mlada Boleslav; and Děčín. They are named *ostrožne na vybehu nauvsi* – promontory hillforts with a transverse rampart (Slamá 1986, 65-67, 72; Tomková 1999, 248).

The *ostrožna*-type defensive structures with uni- or multivallate earthworks emerged for the first time in the Lusatian culture in the Hallstatt A2 period (Veliačik 1983; Bartík 2015). Site no. 3 (*Schanzberg*) in Myślibórz, with structures interpreted as Lusatian culture houses, as well as 9^{th}-10^{th} century pottery sherds, is also a promontory enclosed with a double rampart. At the present stage of research, it is difficult to determine when the defensive features were raised, as it might have happened both at the turn of the Bronze and Iron Ages and in the Early Middle Ages. The artefacts and features discovered at the site (Jarysz 1997) suggest a prehistoric dating of the structures, which might have been potentially enhanced later, in the Early Middle Ages. For establishing a more certain chronology, new excavations with C14 sampling would be necessary.

Apart from the original form, the Myślibórz hillforts have a unique spatial relation to one another. So far, nothing indicates that any of them had been burnt, and a new, neighbouring structure was built to replace the old one. According to Andrzej Żaki (1958) and Jacek Poleski (2004), this was the case in the three hillforts located within the Dunajec River basin. The hillfort in Naszacowice, used from the second half of the 8th to the mid-9th century, was the earliest. After a fire, a new hillfort was built nearby, in Podegrodzie, on "Zamczysko" mountain. It functioned in the second half of the 9th century (Poleski 2004, 320), but was also soon destroyed by a fire. The ramparts on the neighbouring summit in Podegrodzie,"Grobla", were constructed at the time when the Zamczysko hillfort ceased to exist (Poleski 2004, 107).

A complex of neighbouring hillforts of similar chronology (8th-10th century) was also found in the Wisłoka River basin, in the Jasło-Krosno Basin. It consists of five hillforts: in Przeczyca, Trzcinica, Wietrzno, Brzezówka and Brzezowa (Poleski 2006; Szmyd 2017). The distances between them were much greater than between the Myślibórz Gorge hillforts, but they also allowed for the observation of the river and watercourse valley passes.

In the vicinity of Sanok, in the San River valley, a group consisting of a few hillforts was identified: hillforts in Horodno and Horodyszcze – probably of 8th-10th century chronology – and hillforts in Sanok and Sanok-Biała (Parczewski 1984; 1988; Parczewski and Pohorska-Kleja 1995; Kotowicz 2005; 2006; Ginalski *et al.* 2013; Zielińska and Kotowicz 2016). The did not all function simultaneously. The beginnings of the earliest of them, situated in the Trepcza area, might be dated from the end of the 9th through the 10th century. The later objects in Sanok and on Zamczysko mountain in Sanok-Biała Góra were established in the 11th or 12th century. Maria Zielińska and Piotr Kotowicz argue that their purpose was to protect the south-western part of the Principality of Halych, and particularly the trade route running through the Carpathians and the San River valley from the Kingdom of Hungary to Ruthenia, as well as its settlement hinterland in the Sanok area (Zielińska and Kotowicz 2019, 578). The characteristic feature of this hillfort complex and the complex in the Myślibórz Gorge, as least as far as the 9th and 10th century structures are concerned, is the presence of a nearby burial mound cemetery.

A defensive system similar to the one from Myślibórz Gorge was identified in Halych, Ukraine (Tomenczuk 2017). The complex was developed in three stages – beginning from the 10th until the 13th century. Between the 11th and 13th centuries, it included a few hillforts (later castles), palace complexes and a cemetery. In Bohdan Tomenczuk's opinion, its function was to guard the crossing, which was part of a few trans-European and local routes (Tomenczuk 2017, 521-522). The characteristic feature of the Myślibórz and Halych complexes is the presence of a transverse rampart at some of them. In both of the complexes, the distances between the particular hillforts were small and often did not exceed 1-1.5 km.

The Sudetes feature two further groups of clustered, similarly dated hillforts. The first of them was situated in the Strzegom area. It consists of five complexes: the hillfort on Graniczna mountain (from the second half of the 9th to the first half of the 10th century) and on Basalt Mountain in Strzegom (first phase: 9th-10th century), defensive structures in

Dobromierz, Pietrzyków (mid-10th century) and Gniewków (Bolkowice – the end of the 9th through the10th century) (Jaworski 2005, 64-70; Pankiewicz 2012, 90-104; Rodak 2017, 225, 232-233). Although distances between these structures vary from 3 to 20 km, the local geomorphological conditions made them function as a system, allowing for constant observation of the route from Strzegom towards Bohemia. Another hillfort cluster is located within the Żytawa-Zgorzelec Depression. It includes hillforts of Jauernick, Landeskrone, Koźlice (10th century), and Tylice (10th century; Jaworski 2005, 46-54; Fokt 2013, 49-50, 52-54, 57-59). Complexes consisting of two similarly dated hillforts are much more common. According to Dominik Nowakowski (2017), as many as seven of them were identified in Poland.

In light of the presented discussion, the defensive system in Myślibórz Gorge is the most spatially and chronologically coherent fortification complex established in the 9th and 10th centuries in the Sudetes. Most scholars agree that in the pre-state period, the area was inhabited by the *Trebouane* tribe (Lodowski 1980, 125; Jaworski 2005, 304-305, Tyszkiewicz 2000; Moździoch 2017, 136). The first document to mention this tribe was the *Prague document*, describing the geographical borders of the Prague diocese in 973. Despite the academic criticism of the data included in the 1086 copy of the document commissioned by Emperor Henry IV for the Prague diocese (Matla-Kozłowska 2008), many scholars use the information it contains to determine the territories inhabited by some of the Silesian tribes in the mid-10th century. Besides the *Trebouane*, the document mentioned tribes such as the *Zlasane*, *Dedosize*, *Milceni*, *Chrouati* and *Poberane*. The research results might strengthen the hypothesis by Krzysztof Fokt that the *Trebouane*, not mentioned in the *Bavarian Geographer*, might have settled the discussed area after this document had been issued and before the period referred to in the *Prague document* (Fokt 2016, 196). The chronology of the fortifications – not earlier than the final part of the 9th century (not considering the Early Iron Age phases of sites 3 and 47) and not later than the 10th century – is in concert with this hypothesis. What is more, the artefacts found at those sites were culturally homogeneous, and the visual effect of the hillforts dominating the space at the mouth of the gorge (discussed in this paper) was well-calculated.

Hence, the main question is that of the purpose of this system. In light of the discussed evidence from other areas, the most straightforward and rational explanation would be its purely defensive function. The system of hillforts built or adapted at the end of the 9th century protected the passage through Myślibórz Gorge. Such warning and defensive elements occurred in the Sanok area, Jasło Basin, Dunajec River basin, Halych and the Sudetes. However, in all of these cases except for Halych, the distances between the objects were greater than in the Myślibórz area. In this respect, the discussed defensive system is unique. The hillforts might have additionally protected sacred places (burial mound cemetery, spring, rock formations). However, the latter is only a speculation, lacking any archaeological and historical evidence. The deposition of the seven iron bowls of the Silesian type in the central part of the gorge suggests that the structures were in use in times of political unrest or wars. Possibly, the hillforts are silent witnesses of the "ephemeral tribes and the phoney war of giants" (Fokt 2016).

Acknowledgements

The investigations in Myślibórz Gorge were financed by the National Programme for the Development of Humanities, grant titled*: Economic Development in the Mountain Areas in the Early Middle Ages in Central European context* no. 2aH 15 0283 83. The authors would like to credit Krzysztof Jaworski, the Archeolodzy.org foundation: Maksym Mackiewicz, Bartłomiej Myślecki, Maciej Ehlert, Aleksander Limisiewicz, Krzysztof Demidziuk, Paweł Madera, Lucyna Jaworska and Artur Boguszewicz for their advice and invaluable remarks, as well as the other project participants who took part in the investigations in Myślibórz Gorge.

References

Antoniewicz W. and Wartołowska Z. 1964. *Mapa grodzisk w Polsce*. Warszawa: Państwowe Przedsiębiorstwo Wydawnictw Kartograficznych.

Bachmann H. G. 1982. *The identification of slags from archeological sites*. London: Routledge.

Baranowski Z., Haydukiewicz A., Kryza R., Lorenc S., Muszyński A. and Urbanek Z. 1998. Litologia i geneza zmetamorfizowanych skał osadowych i wulkanicznych jednostki Chełmca (Góry Kaczawskie). *Geologia Sudetica* 31, 33-60.

Bartík J. 2015. Hradiská z mladšej a neskorej doby bronzovej v Malých Karpatoch. In P. Jenčík and V. Struhár (eds), *Hradiská – svedkovia dávnych čias. Zborník odborných príspevkov o hradiskách a ich obyvateľoch*. Dolná Mariková: Občianske združenie Hradiská.

Bartuška M. and Pleiner R. 1968. Untersuchung der Schlackenproblem von Mühlthal. *Münchner Beiträge zur- und Früchgeschichte* 13, 97-101.

Behla R. 1888. *Die vorgeschichtlichen Rundwälle im östlichen Deutschland*. Berlin: Asher.

Bersu G. 1930. *Der Breite Berg bei Striegau. Eine Burgwalluntersuchung. Teil I. Die Grabungen*. Breslau: Schlesischer Altertumsverein.

Boguszewicz A. 1994. *Myślibórz, gm. Paszowice, grodzisko – stan. 1, Rataj – badania sondażowe w 1994 r*. Wrocław (Archive of Voivodship Office for the Protection of Monuments in Wrocław, delegacy in Legnica).

Boguszewicz A. 1996. *Fortyfikacje południowego pogranicza księstwa świdnicko-jaworskiego w XIII w. i na początku XIV wieku*. Wrocław Unpublished manuscript in Archive of Voivodship Office for the Protection of Monument in Wrocław, Delegacy in Wałbrzych. Wałbrzych.

Boguszewicz A. 2010. *Corona Silesiae. Zamki Piastów fürstenberskich na południowym pograniczu księstwa jaworskiego, świdnickiego i ziębickiego do połowy XIV wieku*. Wrocław: Wydział Nauk Historycznych i Pedagogicznych Uniwersytetu Wrocławskiego.

Bohren, C. F. and Fraser, A. B. 1986. At what altitude does the horizon cease to be visible? *American Journal of Physics* 54(3), 222-227.

Chorowska M., Dudziak T., Jaworski K. and Kwaśniewski A. 2009. *Zamki i dwory obronne w Sudetach. Księstwo Jaworskie II*. Wrocław: Wydawnictwo I-BIS.

Crew P. 1996. Bloom refining and smithing slag and other residues. *Historical Metallurgy Society: Archaeology Datasheet* 6.

Drescher R. 1866/1867. Über den gegenwärtigen Stand der Ermittelungen auf dem Gebiete des Schlesischen Heidentums. *Schlesien Vorzeit in Bild und Schrift* 1, 78.

Fokt K. 2013. Konstrukcje obwałowań grodów wschodniego Milska. *Śląskie Sprawozdania Archeologiczne* 55, 25-64.

Fokt K. 2016. Efemeryczne plemiona i „dziwna wojna" gigantów. Szkic z dziejów Słowian zamieszkałych u stóp Sudetów Zachodnich. In B. Chudzińska and M. Wojenka and M. Wołoszyn (eds), *Od Bachórza do Światowida ze Zbrucza. Tworzenie się słowiańskiej Europy w ujęciu źródłoznawczym. Księga jubileuszowa Profesora Michała Parczewskiego*. Kraków, Rzeszów: Instytut Archeologii i Etnologii PAN, Wydawnictwo Uniwersytetu Rzeszowskiego, 193-200.

Galuška L. 1998. Die großmährische Siedlungsagglomeration Staré Mesto – Uherské Hradište und ihre Befestigungen. In J. Henning and A. T. Ruttkay (eds), *Frühmittelalterlicher Burgenbau in Mittel- und Osteuropa*. Bonn: Habelt, 341-348.

Ginalski J., Glinianowicz M. and Kotowicz P. N. 2013 Elementy „południowe" w kulturze materialnej mieszkańców Kotliny Sanockiej w IX–X w. In J. Gancarski (ed.), *Transkarpackie kontakty kulturowe w okresie lateńskim, rzymskim i wczesnym średniowieczu*. Krosno: Muzeum Podkarpackie w Krośnie, 381-432.

Hellmich M. 1930. Schlesischen Wehranlagen. *Altschlesien* 3, 37-47.

Hilczerówna Z. 1967. *Dorzecze górnej i środkowej Obry od VI do początków XI wieku*. Wrocław: Zakład Narodowy im. Ossolińskich.

Jarysz R. 1997. Wstępne wyniki badań archeologicznych na grodzisku z epoki brązu i wczesnego średniowiecza w Myśliborzu, stan. 3, gm. Paszowice. *Śląskie Sprawozdania Archeologiczne* 39, 153-168.

Jarysz R. and Limisiewicz A. 1998. Badania archeologiczne cmentarzyska kurhanowego z epoki brązu i wczesnego średniowiecza w Myśliborzu stan. 13, gm. Paszowice. *Śląskie Sprawozdania Archeologiczne* 40, 239-249.

Jasiewicz Z. and Pelczyk A. 2002. Kuźnia jako element architektoniczny w krajobrazie wsi wielkopolskiej: od XVIII do XX wieku. *Studia Lednickie* 7, 265-293.

Jaworski K. 2005. *Grody w Sudetach (VIII-X wiek)*. Wrocław: Uniwersytet Wrocławski.

Jaworski K. 2019. Średniowieczne (?) plansze do gry w młynek z Góry Krzyżowej w Strzegomiu. In M. Cendrowska and M. Kopec and M. Mackiewicz and M. Masojć (eds), *XXI Śląskie Sympozjum Archeologiczne, Śląsk i ziemie ościenne w pradziejach, średniowieczu i czasach nowożytnych*. Wrocław: Instytut Archeologii Uniwersytetu Wrocławskiego, 118-120.

Jaworski K. and Pankiewicz A. 2007. Badania archeologiczne na szczycie Gromnika po II wojnie światowej. In K. Jaworski and A. Pankiewicz (eds), *Gromnik. Z dziejów zasiedlenia i zagospodarowania szczytu*. Wrocław: Instytut Archeologii Uniwersytetu Wrocławskiego, 79-122.

Jaworski K. and Pankiewicz A. 2008. Wczesno- i późnośredniowieczne założenie obronne na górze Gromnik na Wzgórzach Strzelińskich. Badania w 2005 roku. *Śląskie Sprawozdania Archeologiczne* 50, 209-234.

Kaletynowie M., T. and Lodowski J. 1968. *Grodziska wczesnośredniowieczne województwa wrocławskiego*. Wrocław: Zakład Narodowy im. Ossolińskich.

Kaletyn T. 1968. Sprawozdanie z działalności konserwatora zabytków archeologicznych na terenie woj. wrocławskiego w 1966 roku. *Silesia Antiqua* 10, 282-299.

Kampczyk A., Kusarek S. and Kustra M. 2016. Wpływ geometrii siatki GRID i TIN na dokładność NMT. *Przegląd Geodezyjny* 88(6), 6-14.

Kaplan Jed O., Krumhardt Kristen M. and Zimmermann N. 2009. The prehistoric and preindustrial deforestation of Europe. *Quaternary Science Reviews* 28, 3016-3034.

Knie J. G. 1845. *Alphabetischstatistisch-topographische Übersicht der Dörfer, Flecken, Städte und anderer Orte der Königl. Preuß. Provinz Schlesien*. Breslau: Verlag von Graß, Barth und Comp.

Kowalenko W. 1938. *Grody i osadnictwo grodowe Wielkopolski wczesnohistorycznej (od VII do XII wieku)*. Poznań: Polskie Towarzystwo Prehistoryczne.

Kotowicz P. N. 2005. System militarny Sanoka we wczesnym średniowieczu. *Acta Militaria Mediaevalia* 1, 61-86.

Kotowicz P. N. 2006. Zabytki archeologiczne z okolic grodziska wczesnośredniowiecznego „Horodna" w Trepczy, pow. Sanok, stan. 1. In J. Gancarski (ed.), *Wczesne średniowiecze w Karpatach polskich*. Krosno: Wydawnictwo Ruthenus Rafał Barski, 454-500.

Kowalski B. 1978. Osady cykliczne na przedpolu kaledonidów kaczawskich a rozwój powierzchni zrównania i sudeckiego uskoku brzeżnego na odcinku ich wschodniej części. *Prace Geograficzne WSP w Kielcach* l, 34-50.

Kouřil P. 1994. *Slovanské osídlení Českého Slezska*. Brno-Český Těšín: Archeologický ústav AV ČR (Brno).

Kozák V. 1969. *Železnice: Monografie*. Železnice: Václav Kozák.

Lodowski J. 1976. Grodzisko wczesnośredniowieczne koło Wysocka. *Śląskie Sprawozdania Archeologiczne* 18, 65-67.

Lodowski J. 1980. *Dolny Śląsk na początku średniowiecza (VI-X wiek) Podstawy osadnicze i gospodarcze*. Wrocław: Zakład Narodowy im. Ossolińskich.

Łaborewicz I., Pietrzak P., Papaj M., Nejranowska-Białka S., Szkiłądź M. and Gorzkowski R. 2010. *Góry i Pogórze Kaczawskie: kraina wygasłych wulkanów: przewodnik turystyczny*. Jelenia Góra: Wydawnictwo Turystyczne Plan.

McDonnell G. 1991. A model for the formation of smithing slags. *Materiały Archeologiczne* 26, 23-26.

Mackiewicz M. and Myślecki B. 2014. Od archiwalnej mapy po lotnicze skanowanie laserowe. Krajobraz archeologiczny wczesnośredniowiecznego grodziska w Chrzelicach na podstawie badań nieinwazyjnych. In A. Hořínková, P. Kovacřik and S. Stuchlík (eds), *Archeologický výzkum krajiny a aplikace ICT*. Opava: Slezská univerzita v Opavě, 159-178.

Mackiewicz M. and Myślecki B. 2015. Non-invasive research on medieval strongholds in Silesia. Case studies from Borucin (Silesian province) and Chrzelice (Opole province). *Archaeologia Polona* 53, 306-311.

Mackiewicz M., Rodak S., Lisowska E., Myślecki B. and Samborski P. 2018. A ja to do domu w obie strony miałem pod górkę… Prospekcja magnetyczna grodzisk wczesnośredniowiecznych i ich zaplecza w Sudetach i na Przedgórzu Sudeckim. In M. Wiewióra and T. Herbich (eds), *Metody geofizyczne w archeologii polskiej, Spotkanie V 21-23 listopada 2018*. Toruń: Wydawnictwo Naukowe Uniwersytetu Mikołaja Kopernika, 51-55.

Mackiewicz M., Ehlert M. and Myślecki B. 2018a. *Sprawozdanie z nieinwazyjnych badań magnetycznych dwóch założeń obronnych w obrębie Wąwozu Myśliborskiego (Myślibórz, gm. Paszowice, woj. dolnośląskie, stan. 2 i 4)*. Archive of the Institute of Archaeology University of Wrocław.

Malinowski T. 1961. Obrządek pogrzebowy ludności kultury łużyckiej w Polsce, *Przegląd Archeologiczny* 14, 5-135.

Malta-Kozłowska M. 2008. *Pierwsi Przemyślidzi i ich państwo (od X do połowy XI wieku): eskpansja terytorialna i jej polityczne uwarunkowania*. Poznań: Wydawnictwo Poznańskie.

Migoń P. 1999. Morfotektonika północnej części sudeckiego uskoku brzeżnego (Pogórze Kaczawskie). *Przegląd Geologiczny* 47(10), 946-950.

Moździoch S. 1984. Witostowice, woj. Wałbrzych. *Silesia Antiqua* 26, 180-188.

Moździoch S. 2017. From a tribe to state. The archaeology of the early Middle Ages in the interior area between the Odra and Bug rivers – the so-called „tribal period”. In M. Trzeciecki (ed.), *The Past Societies. Polish lands from the first evidence of human presence to the Early Middle Ages 5: 500 AD – 1000 AD*. Warszawa: Instytut Archeologii i Etnologii PAN, 123-167.

Niegoda J. and Piekalski J. 1996 Zamek we Wleniu. In K. Wachowski (ed.), *Kultura wczesnośredniowiecznego Śląska i Czech. Zamek*. Wrocław: Uniwersytet Wrocławski – Centrum Badań Śląskoznawczych i Bohemistycznych, 93-99.

Nowakowski D. 2017. Mittelalterliche Doppelburgen in Polen. Einleitung zur Forschungsproblematik anhand ausgewählter Beispiele aus Pommern, Schlesien, Groß- und Kleinpolen. In I. Beilke-Voigt and O. Nakoinz (eds), *Enge Nachbarn. Das problem von Doppelburgen und Mehrfachburgen in Bronzezeit und im Mittelalter* (= *Berlin Studies of the Ancient World* 47). Berlin: Edition Topoi, 247-281.

Olczak J. and Siuchniński K. 1976. Typologia wczesnośredniowiecznych grodzisk Pomorza Środkowego. *Slavia Antiqua* 23, 111-152.

Orzechowski S. and Wrona A. 2015. Warsztat kowalski ludności kultury przeworskiej – problem identyfikacji archeologicznej. In: *Davni maysterni ta vyrobnitstvo u Vislo-Dniprovskomu rekhioni* (= *Naukovi studii: Zbirnyk naukovykh pratsi* 8). Vynnyky, Zheshiv, Lviv: Istoryko-kraeznavchyi muzey m. Vynnyky, Instytut arkheologiyi Zheshivskoho uniwersytetu, 253-276.

Pankiewicz A. 2003. Ceramika z IX-X wieku z Grodziszcza, pow. Świdnica, na Przedgórzu Sudeckim. *Śląskie Sprawozdania Archeologiczne* 44, 175-188.

Pankiewicz A. 2005. *Grodziszcze. Wczesnośredniowieczne grodzisko plemienne na Przedgórzu Sudeckim* (= *Acta Universitatis Wratislaviensis No 2768*, *Studia Archeologiczne* 37). Wrocław: Wydawnictwo Uniwersytetu Wrocławskiego.

Pankiewicz A. 2012. *Relacje kulturowe południowego Śląska i północnych Moraw i Czech w IX-X wieku w świetle źródeł ceramicznych* (= *Acta Universitatis Wratislaviensis No 3372*, *Studia Archeologiczne* 43). Wrocław: Wydawnictwo Uniwersytetu Wrocławskiego.

Parczewski M. 1984. Prahistoryczne i średniowieczne źródła archeologiczne z doliny Górnego Sanu. Część I: odcinek Sanok-Wara. *Acta Archaeologica Carpathica* 23, 175-224.

Parczewski M. 1988. Sanok–Biała Góra, Woiwodschaft Krosno, Fundstelle 3 (Mehrkulturensiedlung, vorwiegend aus der Bronzezeit und frühen Mittelalter). *Recherches Archeologiques de 1986*, 41-47.

Parczewski M. and Pohorska-Kleja E. 1995. Najdawniejsze dzieje Sanoka. In F. Kiryk (ed.), *Sanok: dzieje miasta*. Kraków: Wydawnictwo Secesja, 45-88.

Piontek J. 2014. *Ludność dorzecza Odry i Wisły od późnej starożytności do średniowiecza warunki życia i stan biologiczny* (= Monografie 16). Poznań: Wydawnictwo Instytutu Antropologii.

Piwko R. 1984. Osada wczesnośredniowieczna na stanowisku 3 w Żarku, woj. Legnica. *Silesia Antiqua* 26, 63-93.

Poleski J. 2004. *Wczesnośredniowieczne grody w dorzeczu Dunajca*. Kraków: Instytut Archeologii UJ.

Poleski J. 2006. Przyczynek do poznania wczesnośredniowiecznego osadnictwa w polskiej części Karpat Zachodnich – dolina Dunajca i Raby. In J. Gancarski (ed.), *Wczesne średniowiecze w Karpatach Polskich*. Krosno: Muzeum Podkarpackie w Krośnie, 33-75.

Poleski J. 2013. *Małopolska w VI-X wieku. Studium archeologiczne*. Kraków: Instytut Archeologii UJ.

Procházka R. 1990. Charakteristika opevňovacich konstrukci předvelkomoravských a velkomoravských hradišti' na Morave. In V. Nekuda and J. Unger and M. Čižmář (eds), *Praveké a slovanské osídlení Moravy. Sbornik k 80. narozeninám Josefa Poulika*. Brno: Archeologický ústav AV ČR (Brno), 287-306.

Prus O. 2007 Katalog publikowanych stanowisk archeologicznych Dolnego Śląska, cz. 2. In J. Lodowski (ed.), *Katalog publikowanych stanowisk archeologicznych z terenu województwa legnickiego do 1982 roku*. Jelenia Góra: Muzeum Karkonoskie w Jeleniej Górze.

Reimer P. J, Bard E., Bayliss A., Beck J W., Blackwell P. G., Bronk Ramsey C., Buck C. E, Cheng H., Lawrence E. R, Friedrich M., Grootes P. M, Guilderson T. P, Haflidason H., Hajdas I., Hatté C., Heaton T. J, Hoffmann D. L, Hogg A. G, Hughen K. A, Kaiser K F., Kromer B., Manning S. W, Niu M., Reimer R. W, Richards D. A, Scott E M., Southon J. R, Staff R. A, Turney C. S. M. and van der Plicht J. 2013. Intcal13 and marine13 radiocarbon age calibration curves 0-50,000 years cal BP. *Radiocarbon* 55 (4), 1869-1887.

Rodak S. 2017. *Podstawy datowania grodów z końca X – początku XIII w. na Dolnym Śląsku* (= *In pago Silensi, Wrocławskie Studia Wczesnośredniowieczne* 4). Wrocław: Uniwersytet Wrocławski.

Ruttkay A. 2006. Významne archeologické lokality z včasného stredoveku v oblasti Považského Inovca. In K. Pieta and A. Ruttkay and M. Ruttkay (eds), *Bojná, Hospodárske a politické centrum Nitrianskeho kniežatstva* (= *Archeologica Slovaca Monographiae* 9). Nitra: Archeologický ústav SAV – Ponitrianske muzeum.

Rzeźnik P. 2006. Problem tezauryzacji mis żelaznych typu śląskiego w świetle studiów źródłoznawczych tzw. skarbów jednorodnych. *Fontes Archeologici Posnanienses* 42, 175-225.

Sady A. 2019. *Wyniki analiz archeobotanicznych. Raport projektu Rozwój gospodarki na obszarach górskich we wczesnym średniowieczu w Sudetach na tle środkowoeuropejskim*. Archive of the Institute of Archaeology University of Wrocław.

Schmidt A., Linford P., Linford N., David A., Gaffney C., Sarris A. and Fassbinder J. 2015. *EAC Guidelines for the use of geophysics in Archaeology, questions to ask and point to consider. EAC Guidelines 2*. Namur: Europae Archaeologia Consilium (EAC), Association Internationale sans But Lucratif (AISBL) (https://bradscholars.brad.ac.uk/bitstream/handle/10454/8129/eac_guidelines_2_final.pdf?sequence=1&isAllowed=y; entranc 14.06.2019).

Seger H. 1928. Die Schlesischen Silberfunde der spät-slawischen Zeit. *Altschlesien* 2(2), 129-161.

Sikora J., Kittel P. and Wroniecki P. 2015. To not see the forest for the trees. A non-invasive approach to the Góra Chełmo medieval hillfort. *Archaeologia Polona* 53, 506-509.

Sláma J. 1986. *Strédní Čechy v ranem středověku. II. Hradiště, příspěvky k jejich dějinám a významu* (= Praehistorica 11). Praha: Universita Karlova.

Smith C. and Cochrane E. 2011. How is visibility important for defence? A GIS analysis of sites in the western Fijian Islands. *Archaeologia Oceania* 46, 76-84.

Stoksik H. and Paternoga M. 2009. Techno-stylistyczne kategorie ceramiki wczesnośredniowiecznej z północnych rejonów Śląska w świetle analiz fizykochemicznych. *Szkło i Ceramika* 60 (3), 34-40.

Suliga I., Karbowniczek M., Góra M. and Orzechowski S. 2002. Studia porównawcze żużli dymarskich i miseczkowatych z Pokrzywnicy, stan. 1, gm. Pawłów, woj. świętokrzyskie. In S. Orzechowski (ed.), *Hutnictwo świętokrzyskie oraz inne centra i ośrodki starożytnej metalurgii żelaza na ziemiach polskich*. Kielce: Świętokrzyskie Stowarzyszenie Dziedzictwa Przemysłowego, 183-190.

Szabo P., Müllerová J., Suchánková S., and Kotačka M. 2015. Intensive woodland management in the Middle Ages: spatial modelling based on archival data. *Journal of Histical Geography* 48, 1-10.

Szmyd P. 2017. Using Geografic Information System (GIS) tools to determine the settlement preferences in the upper Wisłoka valley and to demarcate potential archeological sites on the example of Early Medieval sites. *Analecta Archaeologica Ressoviensia* 12, 299-327.

Schuster O. 1869. *Die alten Heidenschanzen Deutschlands*. Dresden: Woldemar Türk.

Šalda F. 1969. *Vlastivěda Jičínska* (= Monografie Jičín). Pardubice: Okres pedagogickeho středisko odboru školství a kultury ONV.

Tomenczuk B. 2017. Davniy Khalychna dnisterskomu Prikarpatti. Okremi pidsumky doslidzheni Khalitskoyi Arkheologichnoyi Ekspedytsii (1991-2012 rr.). In J. Garncarski (ed.), *Stan i potrzeby badań archeologicznych w Karpatach*. Krosno: Muzeum Podkarpackie w Krośnie, 521-540.

Tomková K. 1999. Ke kartografickému zobrazení českých raně středověkých hradišť. *Archeologie ve Středních Čechách* 3/2, 235-257.

Turek R. 1957. *Die frühmittelalterliche Stämmegebiete in Böhmen*. Praha: Československá společnost archeologická při Československé akademii věd v Praze.

Tyszkiewicz L. 2000. Warunki polityczne włączenia Śląska do państwa Piastów. In M. Młynarska-Kaletynowa and E. Małachowicz (eds), *Śląsk około roku 1000*. Wrocław: Polska Akademia Nauk, 73-87.

Veliačik L. 1983. *Die Lausitser kultur in der Slowakei*. Nitra: Archäologisches Institut der Slowakischen Akademie der Wissenschaften.

Weintrit A. 2013. *Marine navigation and safety of sea transportation. Navigational problems*. London, New York, Leiden: CRC Press: Boca Raton.

Wheatley D. 1995. Cumulative viewshed analysis: a GIS-based method for investigating intervisibility, and its archaeological application. In G. Lock and G. Stančič (eds), *Archaeology And Geographic Information Systems: A European Perspective*. London: Taylor&Francis Ltd., 171-186.

Wheatley D. and Gillings M. 2000. Vision, perception and GIS: developing enriched approaches to the study of archaeological visibility. In G. Lock (ed.), *Beyond the map. Archaeology and spatial technologies*. Amsterdam, Berlin, Oxford, Tokio, Washington DC: IOS Press, 1-27.

Wheatley D., Gillings M. 2002. *Spatial technology and Archaeology. The archaeological applications of GIS*. Boca Raton, London, New York, Singapure: Taylor&Francis Ltd.

Williams M. 2000. Dark ages and dark areas: global deforestationin the deep past. *Journal of Historical Geography* 26(1), 28-46.

Wojenka M. 2010. *Grody wczesnośredniowieczne na terenie dzisiejszej Polski, Czech i Słowacji (VII-X wiek) – wielkość i rozplanowanie*. Archive of the Institute of Archaeology Jagiellonian University, Kraków.

Wrocławski T. 2001. Rozpoznawcze badania archeologiczne w Jeleniej Górze-Grabarach, stan. 1. *Skarbiec Ducha Gór. Pismo poświęcone ochronie środowiska naturalnego, zabytków i dorobku kulturowego Kotliny Jeleniogórskiej* 3(19), 14.

Wiśniewski E. and Horoszko T. 2013. *Park Krajobrazowy Chełmy*. Myślibórz, Wrocław: Dolnośląski Zespół Parków Krajobrazowych.

Zielińska M. and Kotowicz P. N. 2016. Podgrodzia grodu na wzgórzu zamkowym w Sanoku w świetle nowszych badań. In B. Chudzińska and M. Wojenka and M. Wołoszyn (eds), *Od Bachórza do Światowida ze Zbrucza. Tworzenie się słowiańskiej Europy w ujęciu źródłoznawczym. Księga jubileuszowa Profesora Michała Parczewskiego*. Kraków, Rzeszów: Instytut Archeologii i Etnologii PAN, Wydawnictwo Uniwersytetu Rzeszowskiego, 569-580.

Zimmermann J. 1874. Berichte über die im Auftrage des Vereins für das Museum Schlesischer Alterthümer ausgeführten Untersuchungen einiger Ringwälle, Schanzen und Burgberge in Mittel- und Niederschlesien. *Schlesiens Vorzeit in Bild und Schrift* 2, 206-215.

Zoll-Adamikowa H. 1975. *Wczesnośredniowieczne cmentarzyska ciałopalne Słowian na terenie Polski* 1. Warszawa: Instytut Historii Kultury Materialnej PAN.

Żaki A. 1958. Naszacowice – Podegrodzie – Stary Sącz. *Acta Archaeologica Carpathica* 1(2), 219-225.

Żaki A. 1974. *Archeologia Małopolski wczesnośredniowiecznej*. Wrocław: Zakład Narodowy im. Ossolińskich.

SPRAWOZDANIA ARCHEOLOGICZNE 72/2, 2020
PL ISSN 0081-3834
DOI: 10.23858/SA/72.2020.2.1730

Hanna Olczak[1], Dariusz Krasnodębski[2],
Roman Szlązak[3], Joanna Wawrzeniuk[4]

THE EARLY MEDIEVAL BARROWS WITH KERBSTONES AT THE LEŚNICTWO POSTOŁOWO SITE 11 IN THE BIAŁOWIEŻA FOREST (SZCZEKOTOWO RANGE)

ABSTRACT

Olczak H., Krasnodębski D., Szlązak R., Wawrzeniuk J. 2020. The Early Medieval Barrows with Kerbstones at the Leśnictwo Postołowo Site 11 in the Białowieża Forest (Szczekotowo Range). *Sprawozdania Archeologiczne* 72/2, 511-537.

In the western part of the Białowieża Forest, on the grounds of the Szczekotowo Range, one can find one of the largest and most interesting Early Medieval sepulchral complexes in the Middle Bug River basin. One part of it is the cemetery at Leśnictwo Postołowo Site 11, which includes five burial mounds surrounded by settings of kerbstones. In a barrow, which was excavated in 2017, an inhumation burial of a woman dating back to the 12th century and equipped with a necklace of glass beads was discovered. This site is another excavated cemetery from the Białowieża Forest area, where – in contrast to other regions of the Upper Narew and Middle Bug River basins – the barrow was the most common type of grave in the younger phase of the Early Middle Ages. This article presents various aspects of the investigated burial, which undoubtedly casts new light on our knowledge about the Mazovian-Rus' cultural borderland during the period of state formation.

Keywords: Białowieża Forest, Early Middle Ages, barrow cemeteries, Mazovian-Rus' borderland
Received: 09.04.2020; Revised: 17.04.2020; Accepted: 15.07.2020

1 hannaolczak@yahoo.co.uk; https://orcid.org/0000-0003-3231-7347
2 Institute of Archaeology and Ethnology, Polish Academy of Sciences, Aleja Solidarności 105, 00-140 Warszawa, Poland; krasnodebskid@onet.poczta.pl; https://orcid.org/0000-0001-7096-1227
3 Institute of Archaeology, Cardinal Stefan Wyszyński University in Warsaw, Wóycickiego 1/3, building 23, 01-938 Warszawa, Poland; romszla@gmail.com; https://orcid.org/0000-0002-2111-5013
4 Institute of Archaeology, Cardinal Stefan Wyszyński University in Warsaw, Wóycickiego 1/3, building 23, 01-938 Warszawa, Poland; j.wawrzeniuk@uksw.edu.pl; https://orcid.org/0000-0002-2157-3559

INTRODUCTION

The cemetery forms part of a large multicultural sepulchral and settlement complex located in the western part of the Białowieża Forest (Hajnówka Forest District), in the so-called Szczekotowo Range (Figs 1 and 2). Numerous archaeological sites, which date from the Neolithic to the Modern period, are situated in an area of approximately 60 hectares on both banks of the Łutownia River, a tributary of the Narewka River. Most of them are remains of earthworks, such as Early Medieval barrows and mounds associated with modern

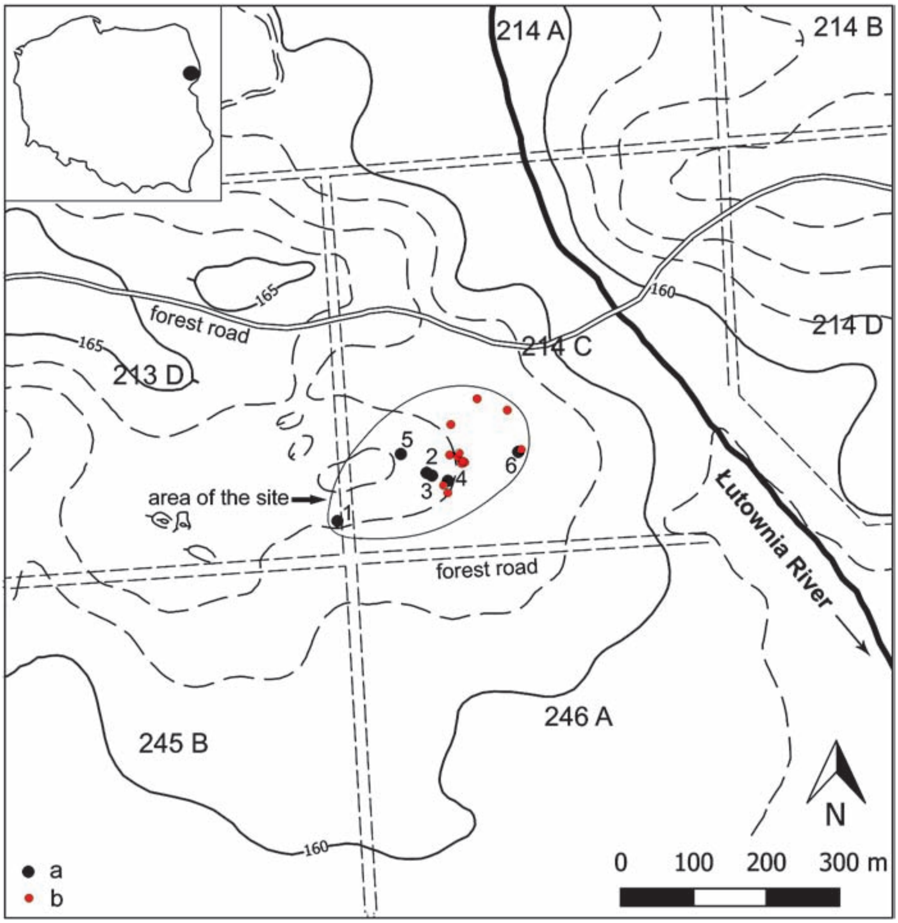


Fig. 1. Białowieża Forest, Leśnictwo Postołowo Site 11. Location of the site on topographic map: a – earthen mounds (1-5 – Early Medieval barrows, 6 – Modern mound), b – finds from field survey (source of the map: Head Office of Geodesy and Cartography). Illustrated by H. Olczak and R. Szlązak

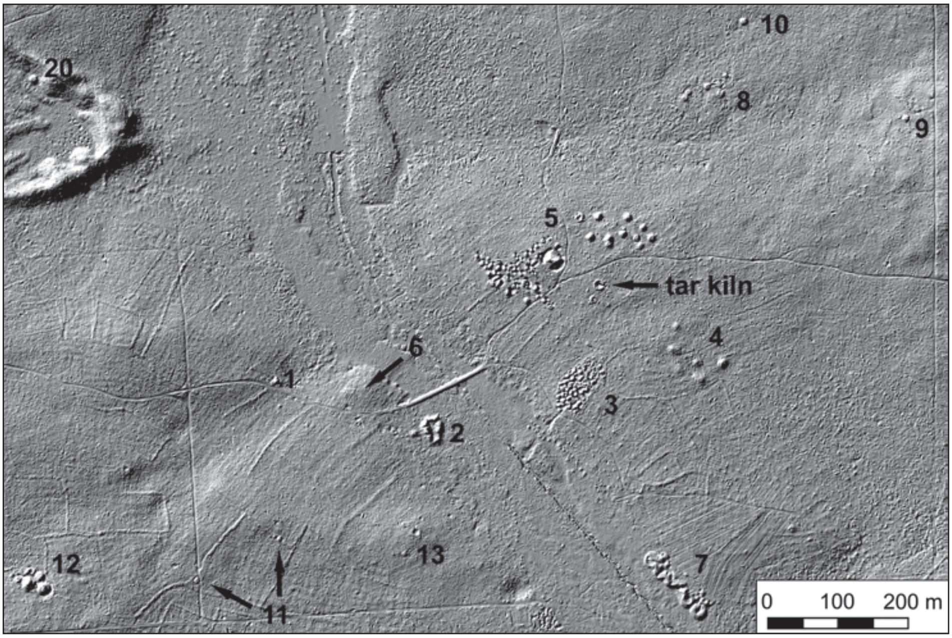


Fig. 2. Białowieża Forest, Leśnictwo Postołowo. Location of archaeological sites in the Szczekotowo Range and the surrounding area (the numbers refer to the numeration of archaeological sites in the Postołowo Forest Range): 1 – Modern mound kiln; 2 – Modern mound kiln and charcoal piles; 3, 11 – Early Medieval inhumation barrows; 4, 8-10, 12, 20 – earthen mounds of unknown chronology and function; 5 – Early Medieval cremation barrows, earthen mounds of unknown chronology and function and modern tar kiln; 6 – multicultural settlement; 7 – Modern charcoal piles; 13 – Modern rubble mound. After Krasnodębski and Olczak 2018, fig. 10

charcoal and tar production. The archaeological sites of the Szczekotowo Range were described for the first time at the beginning of the 20th century by German archaeologist Alfred Götze, who investigated the mounds in the Białowieża Forest in 1917-1918. Among other places, he excavated a few mounds at two Early Medieval cemeteries located on the east bank of the Łutownia River, in forest compartment nos. 214C and 214D: a cremation cemetery at Leśnictwo Postołowo Site 5 and an inhumation cemetery at Leśnictwo Postołowo Site 3 (Götze 1929, 518-521, 531-540). Due to the unique natural resources and the presence of numerous archaeological monuments, in the late 1970s, thanks to the efforts of Prof. Janusz B. Faliński, an archaeological and natural Szczekotowo Reserve was established in this area (Faliński 1980, 136-137). Subsequent excavations were not carried out in the Szczekotowo Range until almost 100 years after the research of Alfred Götze. In 2014 and 2016, an expedition of the Institute of Archaeology and Ethnology of the Polish Academy of Sciences in Warsaw (IAE PAS) not only investigated additional barrows, but also discovered several new sites, mainly settlements, and both the chronology and function

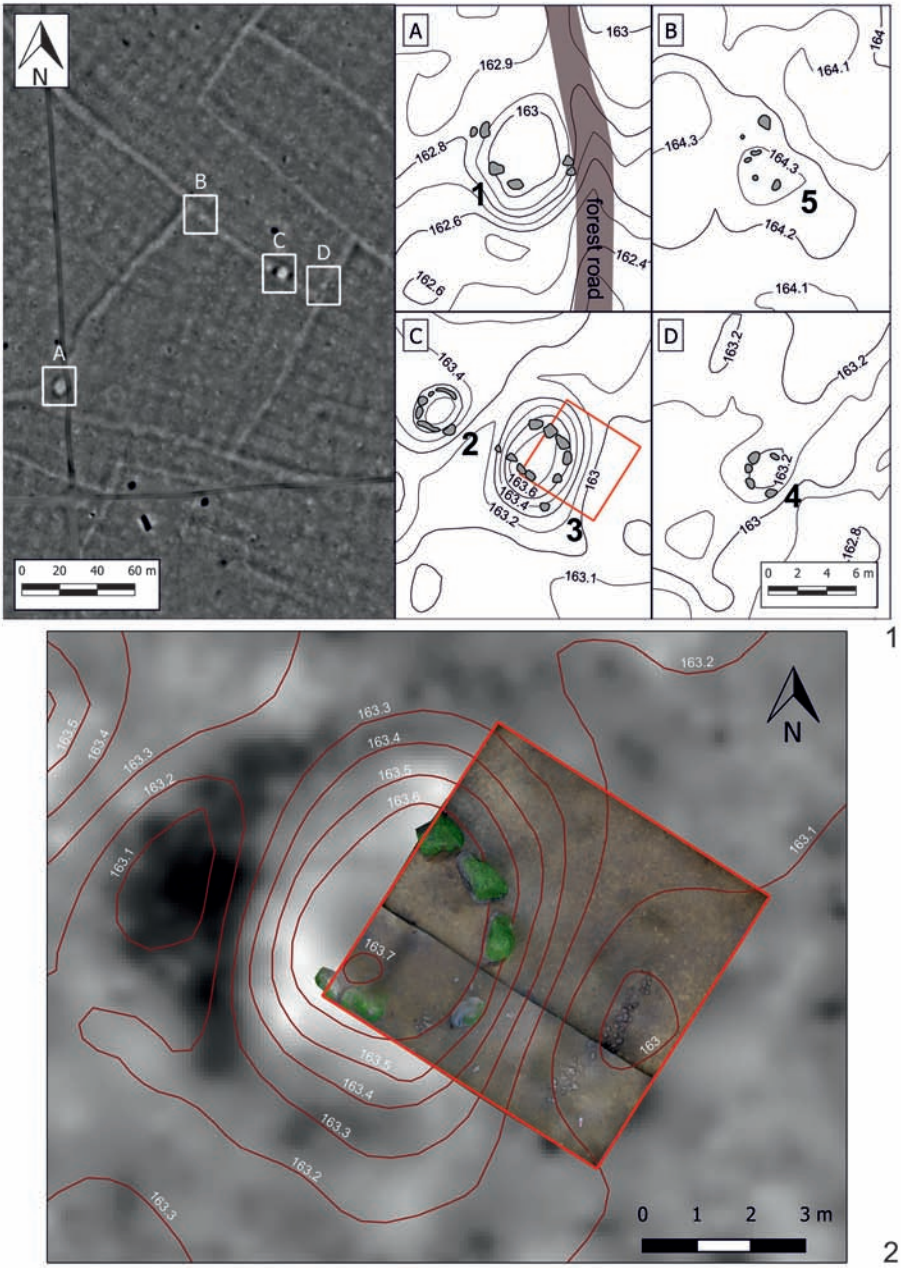


Fig. 3. Białowieża Forest, Leśnictwo Postołowo Site 11. 1 – area of the site according to Digital Elevation Model ISOK (Informatyczny System Ochrony Kraju in Polish, https://www.geoportal.gov.pl) and contour plans of the barrows; 2 – view of barrow no. 3 during excavation, using photogrammetry and Digital Elevation Model ISOK. Produced by M. Jakubczak and R. Szlązak

of already known sites were established (Krasnodębski and Olczak 2016; 2018, 38-43; Olczak *et al.* 2019, 57-61).

Leśnictwo Postołowo Site 11 is situated in the western part of the Szczekotowo Range (forest compartments 213D and 214C), on a small acclivity just to the west of the Łutownia River valley (*cf.* Fig. 1). It includes five round Early Medieval burial mounds (Fig. 3: 1), as well as relics of a multicultural settlement dated to the Neolithic period, the Early Iron Age or the Roman period, and the older phase of the Early Middle Ages. The site also revealed traces of human activity from the Modern period, in the form of a small mound, perhaps associated with charcoal production. In addition, there are low earth embankments in this area (*cf.* Fig. 3: 1), which are probably relics of an old, so-called Celtic field system.

The first information about the cemetery was published by Alfred Götze (1929, 518), who described one of the barrows (no. 1), located in forest compartment 213D, next to a forest road (Figs 1; 3: 1). Based on this, the site was added to the National Inventory of Historical Monuments under the name Puszcza Białowieska archaeological Site 21. A short mention of three barrows from forest compartment 214C was given by Janusz B. Faliński, who incorrectly interpreted them as flat graves surrounded by kerbstones (1980, 136). Irena Górska, who in the 1970s probably visited the site with Faliński, also mentioned the mounds located on the left bank of the Łutownia River, but did not give any details regarding them (Górska 1976, 112). In 1993, a field survey was carried out as a part of the Polish Archaeological Record (Archeologiczne Zdjęcie Polski or AZP in Polish), during which only the barrow mentioned by Alfred Götze was noticed (Site 45-91/17). In a catalogue developed in 1996 by Maciej Oszmiański, this mound was again the only one taken into account (Oszmiański 1996, Site 67, barrow no. 5). In 2016, the entire site was verified and described for the first time during the *Inventory of Cultural Heritage* project carried out by the IAE PAS as part of the *Assessment of the Condition of Biodiversity in the Białowieża Forest Based on Selected Natural and Cultural Elements* (Krasnodębski and Olczak 2018, 15). It was stated then that four features known from the National Inventory of Historical Monuments or mentioned in the relevant literature, along with the newly discovered fifth feature, due to their similar shape, form one barrow cemetery. Nearby remains of a modern mound (no. 6) and relics of a multicultural settlement were also considered to be a part of the same site (*cf.* Fig. 1).

Excavation at the site was carried out in the summer of 2017 by the Institute of Archaeology of the Cardinal Stefan Wyszyński University in Warsaw and the IAE PAS in Warsaw. It was part of the *Cultural and Natural Heritage of the Białowieża Forest* project, financed by the National Science Centre and headed by Prof. Przemysław Urbańczyk, in cooperation with Joanna Wawrzeniuk, PhD. The investigations were led by Hanna Olczak and Dariusz Krasnodębski, in cooperation with Roman Szlązak.

CHARACTERISTICS OF THE CEMETERY AND THE EXCAVATED BARROW

The burial mounds making up the cemetery are characterized by kerbstones arranged at their bases and, less often, on their slopes (Figs. 3: 1, 2; 4). Located on the western edge of the site (forest compartment 213D), mound no. 1 is about 8 m in diameter and about 0.5 m in height (Fig. 3: 1A). At its base lie seven large kerbstones, which are remnants of a setting of unknown shape. Two stones on the eastern side are probably preserved *in situ*, while others are secondarily displaced. The kerb's destruction may be related with the information provided by Alfred Götze, according to whom the mound had been excavated in the past (1929, 518). The other four barrows are located about 115-120 m to the northeast, in forest compartment 214C. They form roughly a line, which is oriented northwest – southeast (Figs. 1; 3: 1). The best-preserved mounds (nos. 2-4) are located close to each other, at a distance of a few to about 15 m. Two of them (nos. 2 and 4) are small – about 3 m in diameter and up to about 0.4 m in height. At their bases, there are partially destroyed, roughly square settings built of closely adjoining large stones, of which six or seven have survived to this day (Fig. 3: 1C, 1D). Between barrows 2 and 4 lies the largest mound (no. 3), about 9-10 m in diameter and about 0.8 m in height. In the upper part of its slope, ten kerbstones are visible, forming a partially damaged, rectangular or oval setting (Figs. 3: 1C; 4). At a distance of about 40 m to the northwest of this group lies another mound (no. 5), similar in size to barrows 2 and 4, with a kerb, of which only four or five stones have survived *in situ* (Fig. 3: 1B). In addition, a slight elevation was recorded north of burial mounds 2-5, which could be the remains of another, destroyed mound. All barrows from the eastern part of the cemetery are located on the top of the aforementioned embankments, while mound no. 1 is located near an intersection of two embankments (*cf*. Fig. 3: 1).

Barrow no. 3 was the one chosen for excavation. The kerbstones visible on its surface had lengths of 0.5-1.0 m, and roughly half of their height was underground (Figs. 3: 2; 4). Eight stones were probably *in situ* and created a rectangle or oval with an external length of about 4.5 m and a width of about 4.0 m, surrounding the top of the mound. The other two boulders, located in the lower part of the mound, were apparently dislocated. Between the kerbstones at the top of the barrow, there was a small depression with a diameter of about 1 m, indicating a former grave robbery. On the east and west, the mound was flanked by two pits, visible as slight depressions on the modern ground surface (*cf*. Fig. 3: 2).

The archaeological trench, measuring 6 × 6 m, was marked out in the north-eastern part of the barrow and included its middle part and the pit adjacent to it on the east (Figs 3: 1C, 2). The surface of the mound was covered with a thin layer of plant litter and modern humus (layer 1), with an average thickness of 0.1-0.2 m (Fig. 5: 2). On northern edge of the trench there was a small cluster of cobblestones (layer 7; Figs 5: 1; 6), which was possibly a remnant of the mantle originally covering the barrow. A dozen or so small-sized stones were also within a layer of brown sand (layer 4), which formed the mound's upper portion.

The thickness of this layer was difficult to estimate due to its high degree of destruction, but it probably reached about 0.5 m. Below, there was a layer of dark brown sand with a lot of small grey and brown patches, along with ferriferous inclusions (layer 10), which ranged from 0.2 m to 0.4 m in thickness. Small charcoals were registered in both layers of the mound, especially in the lower one. Single fragments of Early Medieval pottery, as well as prehistoric artefacts (pottery, flint artefacts) were also found. The mound was built on a layer of buried soil (layer 6), the top part of which had previously been removed. It was a brown sand, containing several dozen pieces of prehistoric and Early Medieval pottery, as well as a few flint artefacts. Under the mound, the thickness of this layer was about 0.1-0.3 m, while on the mound's edge it reached 0.4 m.

Inside the ring of kerbstones, at a depth of about 0.5 m below the top of the mound, a severely damaged burial of a woman who died aged 20-25 was discovered (Tomczyk 2018). The dead lay on the top of the mound's lower layer, with no burial pit visible around the skeleton (Figs 5: 1; 7). The deceased was placed in an upright position on her back, with her head facing northeast. Only parts of the skeleton are preserved *in situ*, for example the skull, left humerus, and left tibia and fibula bones. The only artefacts noticed near the burial were one half of an opaque black glass bead (Figs 8: 10; 9: 4) found near the tibia bone, and fragments of a transparent blue glass bead discovered a dozen or so centimetres

Fig. 4. Białowieża Forest, Leśnictwo Postołowo Site 11. Barrow no. 3 before the excavation. Photo by R. Szlązak

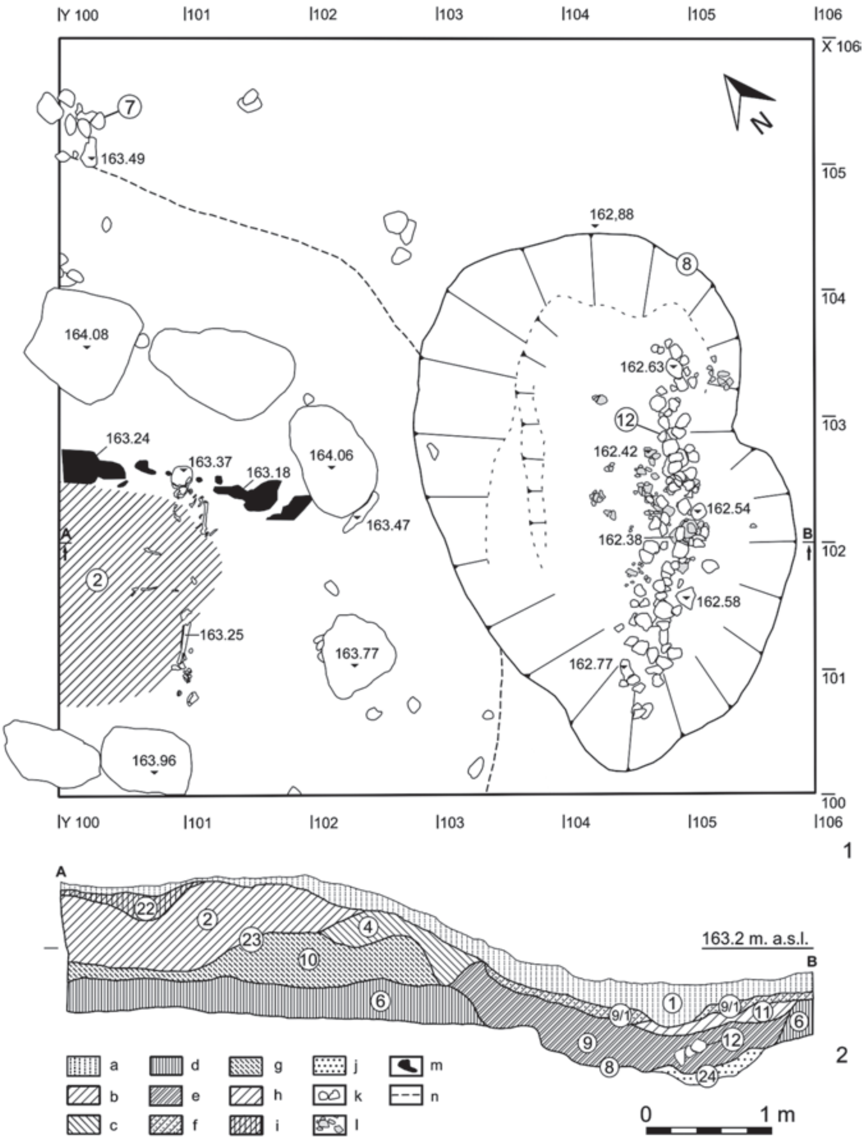


Fig. 5. Białowieża Forest, Leśnictwo Postołowo Site 11. Plan of barrow no. 3 (1) and the profile along line X=102 (2): a – plant litter and modern humus; b – brown sand with yellow-brown patches, charcoal fragments and small and medium-sized stones; c – brown sand with yellow-brown patches and some very small charcoal fragments; e – brown sand with a few small charcoal fragments; f – dark brown sand; g – dark brown sand with a lot of small grey and brown patches, including ferriferous inclusions and small charcoal fragments; h – gray sand with patches of gray-brown and light gray sand; i – loose dark brown and black sand with small amount of charcoal and wood fragments; j – slightly clayey brown sand with patches of yellow-brown and yellow sand; k – stones; l – pottery fragments; m – burned wood; n – reconstructed boundary of the mound. Illustrated by R. Szlązak and H. Olczak

Fig. 6. Białowieża Forest, Leśnictwo Postołowo Site 11. Barrow no. 3 after removing the modern humus from the northern part of the excavation. Photo by H. Olczak

Fig. 7. Białowieża Forest, Leśnictwo Postołowo Site 11. The inhumation burial in barrow no. 3 during exploration (view from the south). Photo by H. Olczak

north of the skull. The chest and right side of the skeleton were destroyed by the aforementioned grave robbery. The robbery pit (feature 23) was about 3 m in diameter in its upper portion, with a depth of about 0.8-0.9 m. It was filled with brown, dark brown, and black sand (layers 2 and 22), containing stones, charcoal and fragments of partially burnt wood. In the pit, bones belonging to the skeleton (mainly those ones from its upper portion) were found, together with nine complete glass beads and a few preserved fragmentarily, as well as several dozen pieces of pottery, mainly prehistoric ones. However, no items that could help to determine the time of the grave's destruction were found. The other parts of the skeleton were unearthed on the top of the mound and on its edge, just under the plant litter.

On the top of the mound's lower layer, at the same level as the burial, remains of a burned pine plank (or planks) were unearthed (Fig. 5: 1). Its preserved width was about 0.2-0.3 m, and its length – within the trench – was about 2 m. Charcoal and traces of burning found east of the plank suggest that it was originally longer. The plank was oriented northwest – southeast, roughly perpendicular to the skeleton. At the place where it intersected with the burial, only a few charcoals were noticed. They were found below the skull of the deceased.

A large pit (feature 8), oval in plan and basin-shaped in cross-section, was discovered at the east side of the mound's base (Figs 5: 1, 2). Its dimensions were about 4.0 × 2.8 m, with a maximum depth of about 0.7 m. Two layers of cobblestones (layer 12) were unearthed in the brown sand (layer 9) constituting the main part of the pit's fill. The stones formed a line with a length of about 3 m and a width of about 0.4-0.6 m, extending through the middle of the pit and oriented northeast – southwest (Figs 5: 1; 10). Below the stones, numerous pottery fragments from two Early Medieval vessels were discovered (Figs 11; 12). The dispersion of the sherds indicates that the pots could have originally been placed at the bottom of the pit, where they were subsequently covered in a natural way with falling stones, possibly originating from the disturbed mantle of the mound.

GRAVE GOODS AND OTHER EARLY MEDIEVAL FINDS

Glass beads

As a result of the excavation, nine complete and eight partly preserved glass beads have been found, as well as a dozen or so fragments, probably deriving from about three more specimens. The most numerous among them are transparent blue glass beads made by a winding technique (Figs 8: 1-9, 11-13; 9: 1-3). Many of them are heavily corroded or covered in a matt coating. The chemical analysis of three beads of this type revealed that they were made of lead silicate glasses stained with copper and manganese (Ginter 2020). The colour of some beads indicates that the glass used for production could have been dimmed, for example by tin. They are spherical or ring-shaped, with a diameter ranging from 0.95

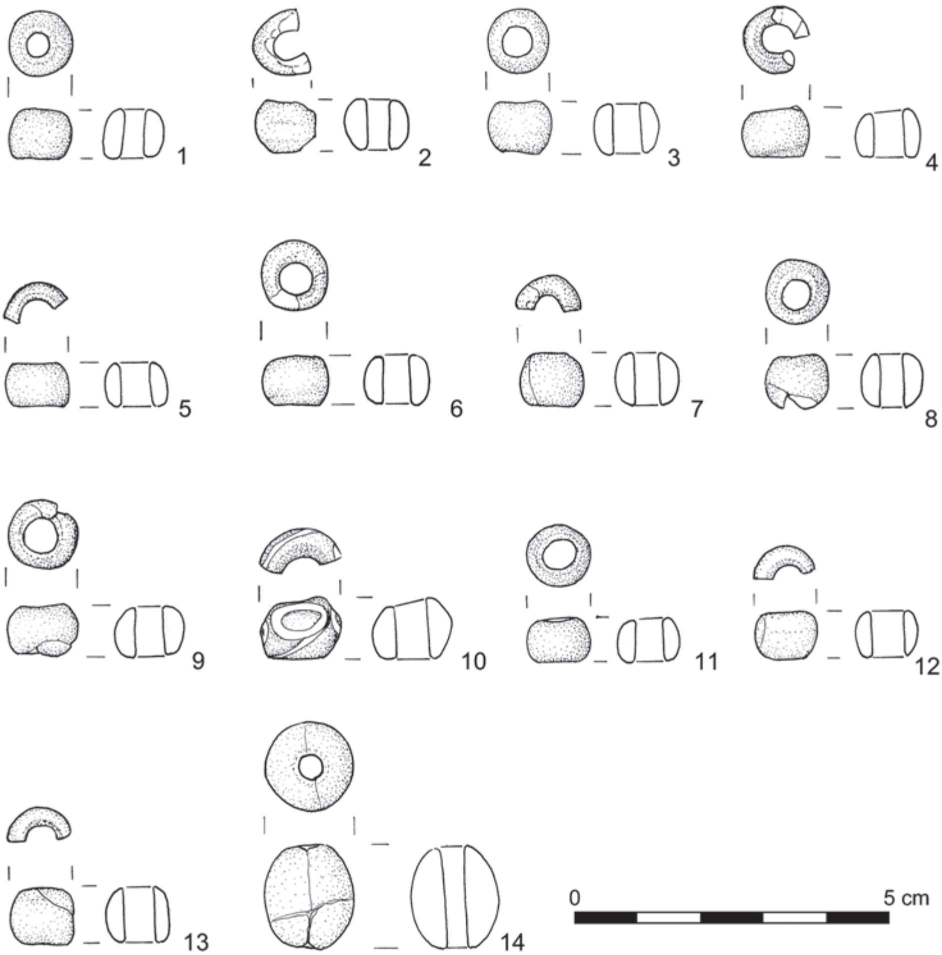


Fig. 8. Białowieża Forest, Leśnictwo Postołowo Site 11. Selection of glass beads from barrow no. 3: 1-8, 11 – robbery pit 23, layer 2; 9 – layer 4/robbery pit 23, layer 2; 10 – near the skeleton; 12-14 – robbery pit 23, layer 22. Illustrated by G. Nowakowska

to 1.08 cm, and a height ranging from 0.65 to 0.85 cm. Similar beads were also found in two graves at the neighbouring barrow cemetery at Leśnictwo Postołowo Site 3 (Götze 1929, 537, 540, plates 13: 1, 2). To the west of the Białowieża Forest, they were discovered at cemeteries in Kuraszewo (Jaskanis 1966, 246, plate XIII: 11 and the collection of the State Museum of History and Archaeology in Grodno), Zbucz Site 1 (Olczak *et al.* 2019, figs. 5.9: 5, 6) and Szczyty-Dzięciołowo Site 1 (Olczak and Krasnodębski 2019, fig. 11: 13). In more distant regions, beads of this type were found, among other places, at Daniłowo Małe Site 1, Suraż Site 2 (collection of the Podlachian Museum in Białystok), and Czarna

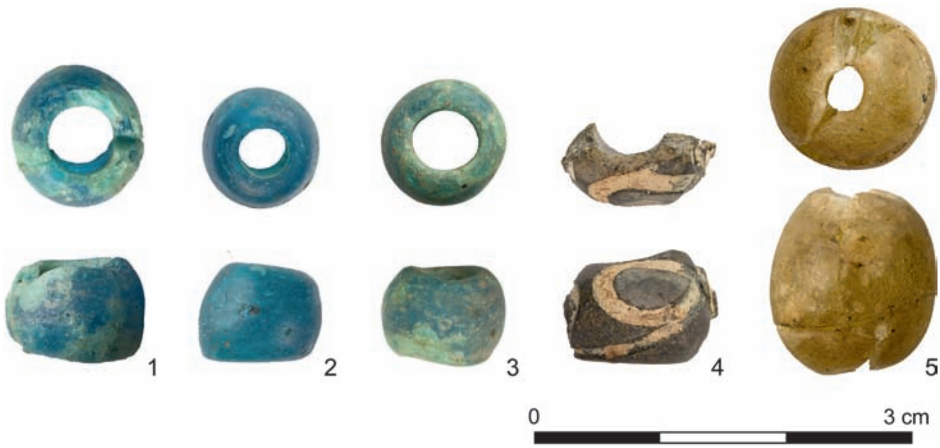


Fig. 9. Białowieża Forest, Leśnictwo Postołowo Site 11. Selection of glass beads from barrow no. 3: 1-3 – robbery pit 23, layer 2; 4 – near the skeleton; 5 – robbery pit 23, layer 22. Photo by R. Szlązak

Wielka Site 1 (Wajda 2014, 66, fig. 31: grave 199). It is usually assumed that beads of a similar shape and colour were produced mainly in the 12th and 13th centuries (Wajda 2014, 66-67).

One bead was made by winding highly transparent lead silicate glass with a light yellow colour (Figs. 8: 14; 9: 5). It is barrel-shaped, with a diameter of 1.35 cm and a height of 1.5 cm. Such large specimens of beads of this type are not known from this region. A slightly smaller barrel-shaped bead was found at Krupice Site 1 (Dzik 2015b, plate XVIII: 23). Beads made of glass with a similar colour, but of spherical shape, are known from the cemetery at Suraż Site 2 (Bieńkowska 2005a, plate VII: 5).

In addition, one half of an opaque black glass bead of a spherical shape, with a diameter of about 1.3 cm and a height of 0.8-0.9 cm, was found in the grave (Figs. 8: 10; 9: 4). It is decorated with narrow strips of opaque white glass, forming loops embedded in its core. The bead was made of lead silicate glass that was probably stained with iron oxide, while the glass of the decoration was stained with tin oxide (Ginter 2020). Beads of this type are believed to be made by a sintering method, but this has not been confirmed sufficiently (*cf.* Wajda 2016). Similar specimens were found at two nearby barrow cemeteries – at Leśnictwo Przechody Site 10 (Olczak *et al.* 2019, figs. 5.13: 14-17) and in the Ladzka Forest (Walicka 1958, fig. 2). Outside the Białowieża Forest, beads with similar ornaments were discovered, for example, at cemeteries at Krupice Site 1 (Dzik 2015, plate XVIII: 20), Rogawka Site 1 (Dzik 2016, figs. 17: 2; 18: 5, 6), Rybałty Site 1 (Rauhut and Długopolska 1975, 352, plate III: p, r, s) and Święck-Strumiany Site 3 (Jaskanis 2008, fig. 49: VI/N). They are usually dated to the 11^{th}-12^{th} centuries (Kuzina 2016, fig. 1: b, c; Pankiewicz *et al.* 2017, table 1).

Ceramics

Two groups of Early Medieval pottery were distinguished, related to various phases of the site's occupation: vessels turned on their whole surface on a potter's wheel, which are associated with the cemetery and vessels finished on the wheel only in their upper parts that can be connected to the older settlement. Both vessel types were made of ferruginous clays, probably obtained from local glacial deposits. The chemical analysis of the pottery samples indicates a clear homogeneity of the clays used during both periods. All the samples are characterized by a high content of iron trioxide and a low content of calcium oxide (Olczak 2018).

The first group of ceramics include two reconstructed pots discovered at the bottom of the eastern side pit (feature 8) and 16 fragments of other vessels, which were also found in the mentioned pit (4 fragments), along with specimens from both the layers of the mound (3 fragments), the buried soil (2 fragments), the robbery pit (4 fragment), and from the modern humus (3 fragments). The pots both have an S-shaped form and everted rims, and are decorated with incised horizontal grooves. The better preserved of them has a height of 21.7-22.0 cm, with a rim 21.6 cm in diameter and a base 10.6-11.0 cm in diameter (Figs. 11: 1; 12). Its base is concave, with a ballast of coarse-grained crushed stone. The pot was made of clay tempered with medium-grained (up to 0.2 cm) crushed stone, probably granite. The surface colour of the pot has changed as a result of secondary burning – it is orange on the inside and spotty on the outside, with soot stains. The second vessel, less well pre-

Fig. 10. Białowieża Forest, Leśnictwo Postołowo Site 11.
Barrow no. 3 during exploration. The row of cobblestones (layer 12) in the eastern side pit (feature 8).
Photo by H. Olczak

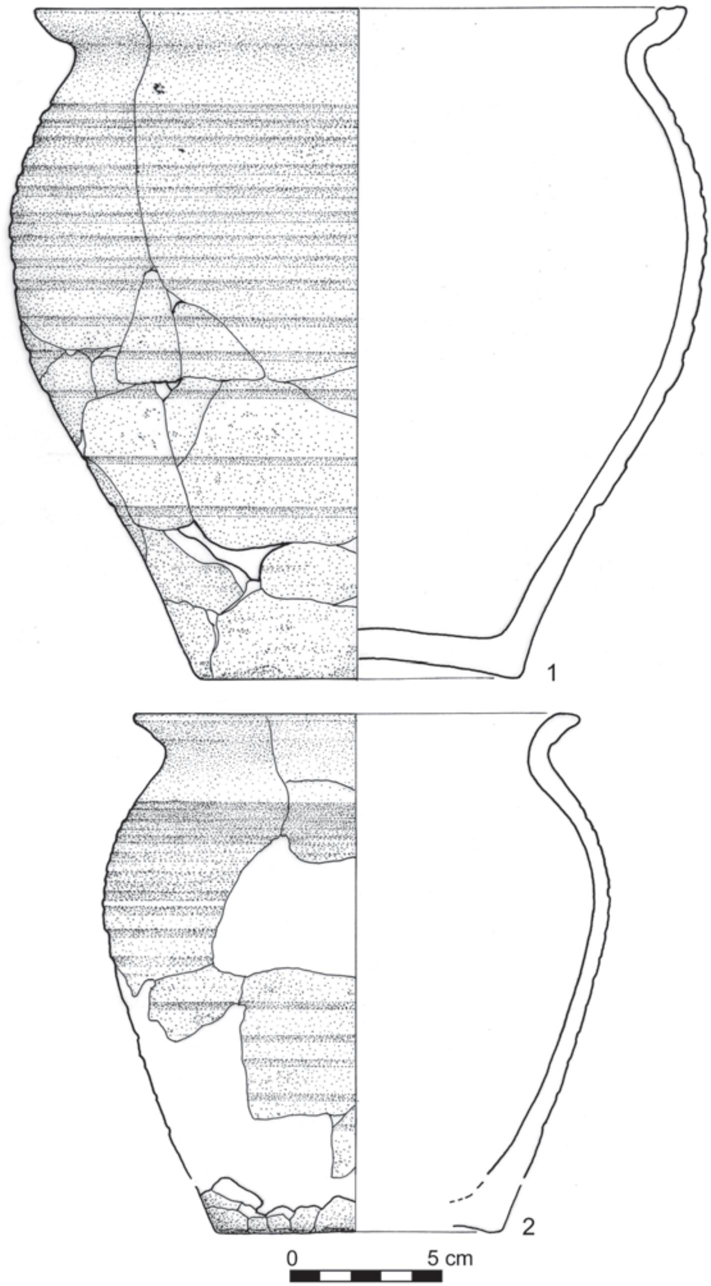


Fig. 11. Białowieża Forest, Leśnictwo Postołowo Site 11.
Pottery vessels found at the bottom of the eastern side pit (feature 8) of barrow no. 3.
Illustrated by G. Nowakowska and H. Olczak

served, has a height of about 16-17 cm, with a rim about 14.0-14.2 cm in diameter and a concave base about 9 cm in diameter (Fig. 11: 2). The vessel's external surface is spotted with soot stains, and its internal surface shows traces of probably secondary burning. The pot was made of clay tempered with medium-sized crushed stone (up to 0.2 cm).

Other ceramic finds associated with this phase are small and eroded pottery pieces, mainly body sherds. Among them are a fragment of lid with a diameter of about 12 cm (Fig. 13: 7), a rim deriving probably from a vessel with a cylindrical neck, and a flat base with a diameter of about 6 cm. The lid and a few body fragments are decorated with incised horizontal grooves (Figs. 13: 6, 7), while another fragment is decorated with grooves and a wavy line (Fig. 13: 8). The vessels were made of clay tempered with fine and medium-

Fig. 12. Białowieża Forest, Leśnictwo Postołowo Site 11.
One of the vessels found at the bottom of the eastern side pit (feature 8) of barrow no. 3 after reconstruction.
Photo by M. Osiadacz

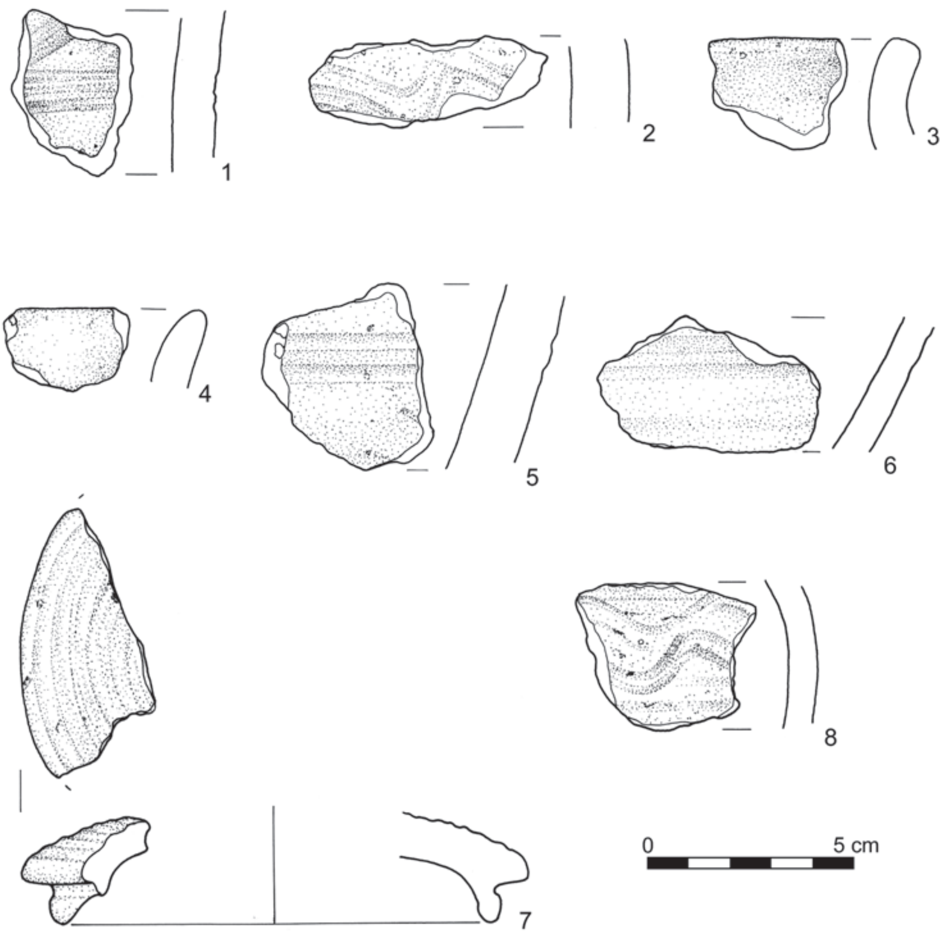


Fig. 13. Białowieża Forest, Leśnictwo Postołowo Site 11.
Selection of handmade and partly turned pottery (1-5) and wholly turned pottery (6-8):
1 – side pit 8, layer 9; 2 – layer 10; 3 – robbery pit 23, layer 22; 4, 5 – from the field survey;
6, 7 – modern humus (layer 1); 8 – side pit 8, layer 9/1.
Illustrated by G. Nowakowska and H. Olczak

grained crushed stone (up to 0.2 cm). The thickness of their walls ranges from 0.5 to 1.3 cm.

These vessels can be dated from the second half of the 11th century to the beginning of the 13th century. In terms of technique, as well as of shapes and decoration, they are similar to pottery found at many cemeteries of the Białowieża Forest and of the Leśna River basin in western Belarus. However, in contrast to the above-described pots, most vessels from graves in these areas were of small size, with a diameter and height no bigger than a few or a dozen or so centimetres (Götze 1929, plate 14; Walicka 1958, fig. 1; Korobushkina 1993, figs. 17: 6, 10, 11; Krasnodębski *et al.* 2005, figs. 8; 11: a; Olczak *et al.* 2019, figs. 5.6: 6-8; 5.13: 7, 18). Pots similar in size to the ones from the side pit 8 were found, for example, at the flat cemetery at Zbucz Site 1 (Olczak *et al.* 2019, fig. 5.9: 10) and in one of the barrows in Trostyanitsa in the Leśna River basin (Korobushkina 1993, 55, fig. 17: 17). Taking into account finds originating from settlements, similar pottery was registered at nearby sites Leśnictwo Przechody Site 6 and Leśnictwo Teremiski Sites 3 and 5 (Olczak 2016a; 2016b), as well as in the region of the western and north-western Kievan Rus' (Lysenko 1985, figs. 232: 4, 5; Malevskaia-Malevich 2005, figs. 11: 2; 14: 2; 38: 15; 39: 20; 48: 1). Particularly noteworthy is a fragment of the lid, because in the Middle Bug River basin these items are discovered very rarely. A fragment of an identical lid was found at the neighbouring settlement at Leśnictwo Postołowo Site 6 (materials from the IAE PAS research). Very similar lids are known from the urban centres of the north-western Kievan Rus', for example from Navahrudak (Malevskaia-Malevich 2005, figs. 25: 5, 7).

In addition, 17 fragments of partly turned vessels were discovered, including 3 rims, 1 base, and 13 body sherds. They were found mainly on the site's surface (7 fragments), but also in both layers of the mound (4 fragments), in the pit 8 (3 fragments), in the robbery pit (2 fragments), and in the buried soil (1 fragment). The vessels were hand made using the coiling technique and then turned on the potter's wheel, probably in their upper and middle parts. The clay was tempered with a coarse-grained or, less frequently, medium-grained crushed stone, probably granite, with an average granulation of about 0.2-0.3 cm. The wall thickness of the vessels ranged from 0.8 to 1.4 cm. Two rims of probably S-shaped pots (Figs 13: 3, 4), a secondarily burned rim, which could be a plate fragment, and a slightly concave base with a large amount of crushed stone ballast are worth mentioning. The vessels were decorated with incised horizontal grooves and with wavy lines (Figs 13: 1, 2, 5). Due to the technique and stylistic features, this pottery can be dated from the second half of the 8th century to the beginning or the middle of the 10th century. Similar vessels were found at several settlements located in the Białowieża Forest, for example at Leśnictwo Postołowo Site 6 (Krasnodębski and Olczak 2018, 40-43), Leśnictwo Przechody Site 6 (Olczak 2016b) and Leśnictwo Nowe Site 1 (Krasnodębski and Olczak 2006a, 76). They were also discovered in one of the barrows at the cemetery at Leśnictwo Teremiski Site 2 (Krasnodębski and Olczak 2006b; Krasnodębski *et al.* 2011, 153-155).

CHRONOLOGY OF THE BURIAL

Two radiocarbon analyses have been done to determine the burial's dating. Dating the plank unearthed in the mound gave a result of 920±30 BP (Poznań Radiocarbon Laboratory, Poz-99167). The calibrated age of this sample is 1028-1184 AD (probability 95.4%) or 1045-1098 AD and 1120-1157 AD (probability 68.2%). In contrast, a radiocarbon date of 620±30 BP (Poz-99066) was obtained for the charcoal from the side pit 8 (found under the layer 12). The calibrated age of this sample lies within the range 1292-1401 AD (probability 95.4%) or 1299-1324 AD, 1346-1372 AD and 1378-1393 AD (probability 68.2%). The result of the plank's radiocarbon analysis is consistent with the dating of the finds. Based on this, the 12th century can be taken as the most probable dating of the burial. On the other hand, the result of dating the charcoal from the pit 8 is not compatible with the finds and is probably not related to the period when the mound was built. It proves, however, that the pit was not filled up immediately after the funeral, but that it was a long-lasting natural process.

BURIAL RITE

Several features not typical to the Middle Bug River basin cemeteries have accumulated at the discussed site. The first distinguishing feature of the examined barrow is the burial's location within the mound, on a lower mound layer with a thickness of about 0.20-0.25 m. Burials of this kind are very rarely recorded in the Białowieża Forest. In this area, placing dead bodies beneath mounds, either on the ground surface or in burial pits, was the most widespread. A burial placed within a mound was perhaps discovered at the cemetery at Leśnictwo Przechody Site 10, but the information regarding it is not conclusive (barrow no. 13 according to Götze 1929, 529). On the Bielsk Plain, a burial of a similar type was found at Szczyty-Dzięciołowo Site 1 (Olczak and Krasnodębski 2019), and in the Drohiczyn Upland in Baciki Dalsze, Klukowo Site 1, and Korzeniówka Mała Site 2 (Dzik 2015c, 63). In the Belarussian region of Pobuże, burials placed within mounds constitute the smallest share among the examined features. They were registered at several cemeteries, for example in Hurki, Rataichicy, Svishchevo and Voiskaia (Korobushkina 1993, 26 and table 5).

Unusual for other inhumation burials of the region was the discovery of a burnt pine plank (or planks), which was lying on the top of the lower mound-layer on both sides of the skeleton, and probably under the skull as well. The remains of burnt planks or quadrangular enclosures are known from several older barrows with cremation burials located in the Białowieża Forest (Götze 1929, fig. 27; Krasnodębski *et al.* 2011, 153-155; Olczak *et al.* 2019, fig. 5.6: 1), but such constructions were not noticed in the later graves with inhumation burials. Two barrows with partial cremation from the Leśna River basin, in which large pieces of burnt wood were present next to the skeletons, are worth mentioning here. In grave no. 1 at the Lisovčicy cemetery, along the left side of the burial, there was a burnt log 2.4 m long, while smaller pieces of burnt wood were located at the head and feet of the dead (Korobushkina 1993, 46, 117-118). On the other hand, several pieces of burnt wood were laid on the skeleton's bones in barrow no. 25 at the cemetery in Khotinovo (Korobushkina 1993, 46, 126, and table 3). According to Tatiana N. Korobushkina, burials with partial cremation come from the period of the transition from pagan cremation to the

Christian rite of inhumation, when society did not want to completely abandon the use of fire in funeral rites (Korobushkina 1993, 45-46; *cf*. Musianowicz 1955, 272-273; Dzik 2012, 608-609). Another confirmation of the ancient funeral rites' survival in the Leśna River basin is the presence of a layer of ash and charcoal at the bases of many barrows, on which the bodies of the deceased were placed (Korobushkina 1993, 24-26). Evidence of fire usage in barrows with inhumation burials is also known from other Eastern Slavic regions, for example from the Neman River basin (Zvyaruga 2000, 87-88). This is particularly well-proven in the areas inhabited by the Radimichs, where frequent practices of placing dead bodies on extinguished hearths or wooden platforms have been reported (Soloveva 1963, 102; Sedov 1982, 154-155; Bogomolnikov 2004, 39). It seems that the discovery of the burnt plank in the discussed barrow may be just such a testimony to the reminiscence of old funerary customs during the period dominated by the skeletal rite. The plank could form part of an enclosure, while its unburned part did not survive, or it could be a remnant of the burnt-out hearth where the body of the deceased woman had been placed. Other evidence of fire usage in funeral rites is known from barrow no. 102 at the nearby cemetery at Leśnictwo Postołowo Site 3, in the burial pit of which traces of burnt wood, possibly from the lower part of a coffin, were recorded (Krasnodębski and Olczak 2016; Olczak *et al*. 2019, fig. 5.6: 2).

Another issue that needs to be discussed is the body orientation with its skull facing northeast. In the Białowieża Forest, a similar burial orientation was recorded only in grave no. 102 at the cemetery at Leśnictwo Postołowo Site 3 (Olczak *et al*. 2019, fig. 5.6: 2). The dead at barrows 90 and 91 at the same cemetery (Götze 1929, 538-539), as well as the ones in barrows 55, 63, and 65 at the cemetery at Leśnictwo Przechody Site 10 (graves nos. 13, 15, and 19 according to Götze 1929, 529-530), had their heads turned to the east. In addition, at the cemetery at Leśnictwo Postołowo Site 3, there were also cases of dead bodies placed with their heads facing southeast (barrow 62 and one of the burials in barrow 91, Götze 1929, 535-536, 539). In total, the eastern orientation in the Białowieża Forest, sometimes with a northern or southern deviation, has been noticed in about 40% of the examined burials, both male and female. Such a large proportion of graves with this orientation was not typical for the Middle Bug River basin, because the western orientation was the most common one in this area in the 11th-13th centuries (among others: Dzik 2015c, 59-63). The only exception in this respect is the flat-grave cemetery at Daniłowo Małe Site 1, where during the earlier phase, men were buried with their heads pointing east and women with their heads pointing west (Koperkiewicz 2003, 308-314; Olczak *et al*. 2019, 80). Also, in the area of Eastern Slavs from the beginning of the popularization of the inhumation burial, the western burial orientation of both sexes prevailed, with only a small share of other directions (see, *i.a*., Sedov 1961, 103-105; Korobushkina 1993, 14-16, with further literature there). In the Leśna River basin, an eastern or south-eastern burial orientation was noticed at five cemeteries (Hurki, Lyubashki, Rataichicy, Svishchevo and Voiskaia), but it was a distinct minority in that area (Korobushkina 1993, 14-15, 101, tables

1, 2, 5). In the Upper Neman River basin, barrows with an eastern orientation of dead bodies were also rarely recorded (Jaskanis 1962, 357; Zvyaruga 2000, 87, 104). The greatest number of eastern-oriented burials in Eastern Slavdom were noticed in the Upper Dnieper basin, in the region inhabited by historical Radimichs, but few of them were women's burials (Soloveva 1963; Bogomolnikov 2004, 35-37). Valentin Sedov explained this way of burying the dead in some areas of the northern Kievan Rus' as a result of the influence of the Balts, who had lived there before the Slavs (Sedov 1961; 1982, 120, 155). In reference to the cemeteries of the Leśna River basin, this view was questioned, among other reasons, due to the fully Slavic character of the grave goods (Korobushkina 1993, 14-17, 101-102). In the case of the Białowieża Forest, there are also no convincing arguments to explain this phenomenon. The insufficient state of research in the areas located to the north of the Upper Narew River and in the Upper Neman River basin does not allow for the confirmation nor the rejection of the hypothesis of possible Balt influences. From among several possible interpretations regarding the origin of a specific microregion in the Narewka River basin with a very large share of eastern-oriented burials, a thesis about the survival of customs from before the adoption of the Christian funeral rite in this region seems to be the most convincing. This thesis is plausible when one considers the distribution of the main strongholds and, therefore, the ecclesiastical centres in the 12th-13th centuries in the Mazovian-Rus' borderland and their large distance from the discussed area.

Another feature distinguishing the discussed burial mounds is the presence of settings of kerbstones, arranged at their bases (barrow nos. 2, 4, 5, and probably 1), or less often in their upper part (barrow no. 3). It cannot be ruled out that the examined barrow had been covered with a stone mantle that was completely destroyed later. This is indicated by remnants of a pavement on the mound's northern edge, as well as the presence of cobblestones in the side pit 8 and in the robbery pit. However, the small number of stones found lead to the assumption that the pavement could have covered only some part of the mound's surface. Stone mantles were not an indispensable feature of burial mounds with kerbstones, because in the cemeteries of the Leśna River basin they were only found at some of them (Korobushkina 1993, tables 1, 2, 5). In the case of some barrows in this region, pavements covering some parts of the mound's surface, or individual stones placed in their centres, were also recorded (Korobushkina 1993, 16).

In the Białowieża and Ladzka Forests, burial mounds surrounded by circular or rectangular settings of kerbstones are present at several sites. Alfred Götze described two barrows with square settings situated at inhumation cemeteries at Leśnictwo Przechody Sites 9 and 10 (Götze 1929, 515-518, 528-531). He also examined two mounds with quadrangular settings of small kerbstones, located at Leśnictwo Przechody Site 1, but he did not discover burials in them (Götze 1929, 526-528). Large stones were also preserved on slopes of the mounds or at their bases at Site 2 in Leśnictwo Krynica, but no human remains were found in the examined barrow (Wawrzeniuk 2017, 207-213). The next mounds with kerbstones are located at Leśnictwo Jelonka Site 1 (Götze 1929, 518) and Białowieża National Park Sites 22 and 30 (Górska 1976, 132, fig. 17; Krasnodębski and Olczak 2018, 22-23, fig. 13), but their chronology is not clear. Beyond the Białowieża Forest, the inhumation burial in a barrow that was probably surrounded by kerbstones was examined at the cemetery at Szczyty-Dzięciołowo Site 1 (Olczak and Krasnodębski 2019). In the Drohiczyn Upland, inhumation burials in barrows with settings of kerbstones were noticed at Baciki Dalsze (Zoll-Adamikowa 1975, fig. 15; Dzik 2015c, table 6), Czarna Cerkiewna Site 1 (Chilmon 1974, 310, 313-314), and probably in Kamianki (Musianowicz 1960, no. 123); similar constructions are also known from cemeteries in Łuzki (documentation at the State Archaeological Museum in Warsaw) and Czekanów (Zawadzka-Antosik 1982, 27) in the Siedlce Upland. In addition to barrows with stone constructions in the Białowieża Forest, there are also mounds consisting only of sand, which constitute the vast majority of the examined features. The largest group of inhumation barrows of the latter type is located only about 400 m from the discussed cemetery, at the site Leśnictwo Postołowo 3 (Götze 1929, 535-540; Olczak *et al.* 2019, 58-61). Mounds without stone settings are the only ones known from the older period (until the turn of the 10th and 11th centuries) from the area of the Białowieża Forest (Götze 1929, 531-535, 541; Krasnodębski *et al.* 2011, 150-155; Olczak *et al.* 2019, 57-58). It can therefore be assumed that burial mounds with settings of kerbstones appeared in the Narewka River basin as a result of external influences. The Leśna River and Upper Neman River basins, where barrows with kerbstones were a typical grave form in the younger period of the Early Middle Ages (Salewicz 1937, 166-169; Jaskanis 1962, figs. 2, 5; Korobushkina 1993, 11-17; Zvyaruga 2000, 104-106; Yurkavets 2006, 128, figs. 2: 1, 2), should be taken into account as potential areas from which this construction idea has been taken.

Side pits flanking the described burial mound on the east and west were most likely created as a result of taking soil for the mound's construction, as was the case of other barrows of this type. It is probable that the investigated pit had also a ritual function, as evidenced by the pottery found at its bottom. Traces of secondary burning and soot stains visible on the surfaces of the vessels show that they had probably been used in fire-related rituals. However, it cannot be excluded that these activities took place elsewhere, because no large charcoal fragments were found in the pit. One can also not exclude that the pots had originally been placed on the top of the barrow, from where they tumbled to the bottom of the pit. Regardless of which hypothesis one considers to be more likely, there are very few analogies in the area of the Narewka River basin for either the location of the vessels or their large size. The inhumation burials in this area are mainly known for small pots, deposited at the head or feet of the dead (Olczak and Wójcik 2019, 155-156). Perhaps the pottery fragments from Leśnictwo Krynica Site 2, which were found at the top of the mound, next to one of the large stones, could be related to similar rituals (Wawrzeniuk 2017, 209-210).

CONCLUSIONS

The Szczekotowo Range complex, which includes the cemetery in question, is one of the largest and best-recognized clusters of archaeological sites in the Polish part of the Białowieża Forest. A dozen or so groups of earthen mounds and at least several settlements are located in this area. Some of them have been excavated, while drilling and field surveys have been conducted at others. The first traces of human activity in the Szczekotowo Range can be dated to the late Mesolithic or the Neolithic, whereas intensive settlement activity began there around the turn of the Common Era and, with some periods of inactivity, lasted until the end of the 18th century (Krasnodębski and Olczak 2018, 38-43; Olczak *et al.* 2019, 57-61). An important factor attracting successive groups of settlers to this place was undoubtedly its convenient location on fertile soils in the Łutownia River valley, as well as the fact that in the first centuries of the Common Era, a large, partly deforested clearing had probably been created here, which might have been occupied more easily in subsequent periods than other, previously uninhabited areas of the Białowieża Forest.

The excavation at Leśnictwo Postołowo Site 11 brought further information about settlement in the Szczekotowo Range. New finds were collected confirming the occupation of these areas in the Neolithic and probably in the Pre-Roman period (Olczak 2018). Knowledge about the extent and dating of the settlement from the older phase of the Early Middle Ages, which spread along the left bank of the Łutownia River, has also been expanded. Above all, however, the obtained results contributed to the enrichment of our knowledge regarding Early Medieval funeral rites of the Mazovian-Rus' borderland. Since the research of Alfred Götze, the Białowieża Forest has been recognized as a region with an exceptionally high concentration of Early Medieval burial mounds (Götze 1929; Górska 1976; Faliński 1980; Oszmiański 1996; Bieńkowska 2005b, 242). Although in the last dozen or so years it has been shown that a large number of earthen mounds in this area probably had other functions (Krasnodębski and Olczak 2018, 17-29, further literature there), it is nevertheless undeniable that barrow burials prevailed here during both phases of the Early Middle Ages. Thanks to the excavation at the discussed cemetery, we have not only obtained confirmation of the region's links with Eastern Slavdom, but we have also unearthed an inhumation burial in a barrow, surrounded by a setting of kerbstones, for the first time in the Białowieża Forest. This discovery sheds new light on the other mounds with kerbstones located in this area, which were not previously excavated or where no human bones were discovered. The presence of quite a large group of such barrows suggests a close relationship between the regions of the Narewka River basin and the Leśna River and/or the Upper Neman River basins. It seems that the cemetery at Leśnictwo Postołowo Site 11 was located on the western edge of the zone of burial mounds with settings of kerbstones, while at the same time, the shape of three smaller barrows resembles the form of the flat graves with stone constructions of Mazovian type, which may suggest some influences of the burial rites of Western Slavs. The location of the cemetery is interesting – just a few hundred meters from the similarly dated necropolis at Leśnictwo Postołowo Site 3, but on the opposite riverbank. Another intriguing issue is the remoteness of one of the barrows (no. 1) from the others, which could indicate that it belongs to a separate cemetery or that for some reason, the person who was buried there had been isolated from others.

The age of the embankments on top of which four burial mounds in the eastern part of the site were situated is still unresolved. They occupy a considerable area on both banks of the Łutownia River, clearly distinguished by a higher position in relation to the surroundings. Similar earthworks, sometimes interpreted as old, so-called Celtic field boundaries, are known from many places in the Białowieża Forest (Krasnodębski and Olczak 2018, 29-30 and fig. 19). The location of the barrows on top of these earthworks, which were undoubtedly more clearly visible at the time when the cemetery was used than they are now, proves that at least some of those earthworks or boundaries were constructed prior to the younger phase of the Early Middle Ages. An issue requiring further research is the chronological relationship between these structures and the prehistoric and Early Medieval settlements located in this area.

References

Bieńkowska K. (Chilmon K.). 1974. Badania wykopaliskowe wczesnośredniowiecznych cmentarzysk kurhanowych w Czarnej Wielkiej i Czarnej Cerkiewnej, pow. Siemiatycze. *Sprawozdania Archeologiczne* 26, 301-316.

Bieńkowska K. 2005a. Cmentarzysko wczesnośredniowieczne w Surażu, woj. podlaskie. *Podlaskie Zeszyty Archeologiczne* 1, 121-166.

Bieńkowska K. 2005b. Przegląd badań archeologicznych prowadzonych na wczesnośredniowiecznych stanowiskach Podlasia w ostatnich 20 latach. In M. Dulinicz (ed.), *Problemy przeszłości Mazowsza i Podlasia* (= *Archeologia Mazowsza i Podlasia. Studia i Materiały* 3). Warszawa: Instytut Archeologii i Etnologii PAN, 241-247.

Bogomolnikov V. V. 2004. *Radimichi (po materialam kurhanov X-XII vv.).* Homel: Ministerstvo obrazovaniya Respubliki Belarus.

Chilmon K. (see Bieńkowska K.)

Dzik M. 2012. Bi-ritual burials in the central Bug river basin during the Middle Ages. In M. Salamon, M. Wołoszyn, A. Musin, P. Špehar, M. Hardt, M. P. Kruk and A. Sulikowska-Gąska (eds), *Rome, Constantinople and Newly-Converted Europe. Archaeological and Historical Evidence* 1 (= *U źródeł Europy Środkowo-wschodniej/Frühzeit Ostmitteleuropas* 1,1). Kraków, Leipzig, Rzeszów, Warszawa: Geisteswissenschaftliches Zentrum Geschichte und Kultur Ostmitteleuropas, Instytut Archeologii i Etnologii PAN, Instytut Archeologii Uniwersytetu Rzeszowskiego, 603-612.

Dzik M. 2015a. Early medieval stone barrows in the area in the Bug and the Upper Narew Rivers. *Archaeologia Polona* 48(2010), 121-138.

Dzik M. 2015b. *Przemiany zwyczajów pogrzebowych w międzyrzeczu Bugu i górnej Narwi (XI-XV w.)* 1. Rzeszów: Fundacja Rzeszowskiego Ośrodka Archeologicznego, Instytut Archeologii Uniwersytetu Rzeszowskiego, Państwowe Muzeum Archeologiczne w Warszawie, Muzeum Podlaskie w Białymstoku.

Dzik M. 2015c. *Przemiany zwyczajów pogrzebowych w międzyrzeczu Bugu i górnej Narwi (XI-XV w.)* 2. Rzeszów: Fundacja Rzeszowskiego Ośrodka Archeologicznego, Instytut Archeologii Uniwersytetu Rzeszowskiego, Państwowe Muzeum Archeologiczne w Warszawie, Muzeum Podlaskie w Białymstoku.

Dzik M. 2016. Średniowieczne cmentarzysko w Rogawce w pow. siemiatyckim w świetle badań Siergieja Dubinskiego w 1910 roku. *Światowit* 10(51) (2012), fasc. B, 205-236.

Faliński J. B. 1980. Rozmieszczenie kurhanów na tle zróżnicowania środowisk leśnych w Puszczy Białowieskiej i problem ich ochrony. In D. Jaskanis (ed.), *Zabytek archeologiczny i środowisko. Problemy zagospodarowania obiektów archeologicznych w aglomeracjach miejskich i kompleksach leśnych*. Warszawa: Państwowe Wydawnictwo Naukowe, 97-140.

Ginter A. 2020. *Opracowanie wyników analiz laboratoryjnych paciorków szklanych pozyskanych w trakcie badań archeologicznych na st. Leśnictwo Postołowo 11 (AZP 45-91/17), gm. Hajnówka*. Unpublished typewritten manuscript in Institute of Archaeology of the Cardinal Stefan Wyszyński University in Warsaw.

Górska I. 1976. Badania archeologiczne w Puszczy Białowieskiej. *Archeologia Polski* 21(1), 109-134.

Götze A. 1929. Archäologische Untersuchungen im Urwalde von Bialowies. In E. Stechow (ed.), *Beiträge zur Natur- und Kulturgeschichte Lithauens und angrenzender Gebiete* (= *Abhandlungen d. math.-naturw. Abteilung der Bayer* 14. Supplement). München: Verlag der Bayerischen Akademie der Wissenschaften in Kommission des Verlags R. Oldenburg München, 511-550.

Jaskanis D. 1962. Materiały z badań wczesnośredniowiecznego cmentarzyska w miejscowości Podroś koło Wołkowyska w BSRR. *Rocznik Białostocki* 3, 337-363.

Jaskanis D. 1966. Materiały z badań wczesnośredniowiecznego cmentarzyska z grobami ciałopalnymi w okolicy Kuraszewa w pow. Hajnówka. *Rocznik Białostocki* 6, 241-265.

Jaskanis D. 2008. *Święck. Wczesnośredniowieczny zespół osadniczy na północno-wschodnim Mazowszu*. Warszawa: Stowarzyszenie Naukowe Archeologów Polskich – Oddział w Warszawie, Muzeum Podlaskie w Białymstoku.

Koperkiewicz A. 2003. Związek płci z orientacją grobu we wczesnym średniowieczu na przykładzie cmentarzyska w Daniłowie Małym, w woj. podlaskim. In W. Dzieduszycki and J. Wrzesiński (ed.), *Kobieta – śmierć – mężczyzna* (= *Funeralia Lednickie* 5). Poznań: Stowarzyszenie Naukowe Archeologów Polskich, Oddział w Poznaniu, 307–324.

Korobushkina T. N. 1993. *Kurgany belorusskogo Pobuzhia X–XIII vv*. Minsk: Akademiia Nauk Belarusi, Institut Istorii.

Krasnodębski D. and Olczak H. 2006a. Badania archeologiczne przeprowadzone na uroczysku Stara Białowieża w oddz. 367A Puszczy Białowieskiej (AZP 45-92). *Podlaskie Zeszyty Archeologiczne* 2, 74-79.

Krasnodębski D. and Olczak H. 2006b. Badania archeologiczne w Puszczy Białowieskiej na stanowisku Teremiski-Dąbrowa, oddz. 338 A i B (AZP 45-92). *Podlaskie Zeszyty Archeologiczne* 2, 80-83.

Krasnodębski D. and Olczak H. 2016. Nekropole Puszczy Białowieskiej: dwa cmentarzyska kurhanowe na terenie Uroczyska Szczekotowo. In A. Buko (ed.), *Sprawozdanie z realizacji grantu MNiSW Początki chrześcijaństwa na pograniczu mazowiecko-ruskim (11H 12 0330 81, kierownik projektu prof. dr hab. Andrzej Buko)*. Unpublished typewritten manuscript in Institute of Archaeology and Ethnology PAS in Warsaw.

Krasnodębski D. and Olczak H. 2018. Puszcza Białowieska jako przykład badań archeologicznych na obszarach leśnych – wyniki i problemy przeprowadzonej w 2016 r. inwentaryzacji dziedzictwa kulturowego. *Podlaskie Zeszyty Archeologiczne* 3 (2017), 5-61.

Krasnodębski D., Olczak H. and Samojlik T. 2011. Wczesnośredniowieczne cmentarzyska Puszczy Białowieskiej. In S. Cygan, M. Glinianowicz and P. N. Kotowicz (eds), *„In silvis, campis… et urbe". Średniowieczny obrządek pogrzebowy na pograniczu polsko-ruskim* (= *Collectio Archaeologica Ressoviensis* 14). Rzeszów, Sanok: Fundacja Rzeszowskiego Ośrodka Archeologicznego, Instytut Archeologii Uniwersytetu Rzeszowskiego, Muzeum Historyczne w Sanoku, Muzeum Budownictwa Ludowego w Sanoku, 145-174.

Krasnodębski D., Samojlik T., Olczak H. and Jędrzejewska B. 2005. Early Mediaeval cemetery in the Zamczysko Range, Białowieża Primeval Forest. *Sprawozdania Archeologiczne* 57, 555-583.

Kuzina I. 2016. Glass beads in the northern regions of Rus': issues of trade routes and chronology. *Archeologia Polski* 61, 219-240.

Lysenko P. F. 1985. *Bereste*. Minsk: Akademiia Nauk Belorusskoi SSR, Institut Istorii.

Malevskaia-Malevich M. V. 2005. *Keramika zapadnorusskikh gorodov X-XIII vv*. (= *Institut Istorii Materialnoy Kultury. Trudy* 17). Sankt-Peterburg: Rossiyskaya Akademiya Nauk, Institut Istorii Materialnoy Kultury.

Musianowicz K. 1955. Przyczynki do osadnictwa mazowieckiego na Podlasiu w XII-XIII wieku. *Światowit* 21, 247-275.

Musianowicz K. 1960. Granica mazowiecko-drehowicka na Podlasiu we wczesnym średniowieczu. *Materiały Wczesnośredniowieczne* 5, 187-230.

Olczak H. 2016a. *Wstępne sprawozdanie z badań wykopaliskowych prowadzonych na stanowisku Leśnictwo Teremiski st. 5 (AZP 45-92/5), Puszcza Białowieska, Nadleśnictwo Białowieża, oddz. 339A, woj. podlaskie (nr pozwolenia 26/A/2016)*. Unpublished typewritten manuscript in Regional Office for the Protection of Monuments in Białystok.

Olczak H. 2016b. *Wstępne sprawozdanie z badań wykopaliskowych prowadzonych w oddz. 123C Puszczy Białowieskiej, Leśnictwo Przechody, Nadleśnictwo Browsk, woj. podlaskie (nr pozwolenia 27/A/2016)*. Unpublished typewritten manuscript in Regional Office for the Protection of Monuments in Białystok.

Olczak H. 2018. *Ceramika naczyniowa ze stanowiska Leśnictwo Postołowo 11, Puszcza Białowieska, oddz. 213D/214C*. Unpublished typewritten manuscript in Institute of Archaeology of the Cardinal Stefan Wyszyński University in Warsaw.

Olczak H. and Krasnodębski D. 2019. The cemetery in Szczyty-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.

Olczak H., Krasnodębski D. and Bieńkowska K. 2019. Elementy wczesnośredniowiecznych rytuałów funeralnych i kultowych w dorzeczu górnej Narwi w IX-XIII w.: nowe badania i analizy wcześniej pozyskanych źródeł. In A. Buko (ed.), *Początki chrześcijaństwa na pograniczu mazowiecko-ruskim w świetle wyników badań wybranych cmentarzysk*. Warszawa: Instytut Archeologii i Etnologii PAN, 55-99.

Olczak H. and Wójcik A. 2019. Ceramika naczyniowa z wczesnośredniowiecznych cmentarzysk dorzecza środkowego Bugu jako wskaźnik tradycji regionalnych i przemian kulturowych. In A. Buko (ed.), *Początki chrześcijaństwa na pograniczu mazowiecko-ruskim w świetle wyników badań wybranych cmentarzysk*. Warszawa: Instytut Archeologii i Etnologii PAN, 153-168.

Oszmiański M. 1996. *Inwentaryzacja kurhanów na terenie Puszczy Białowieskiej*. Unpublished typewritten manuscript in Regional Office for the Protection of Monuments in Białystok.

Pankiewicz A., Siemianowska S. and Sadowski K. 2017. *Wczesnośredniowieczna biżuteria szklana z głównych ośrodków grodowych Śląska (Wrocław, Opole, Niemcza)* (= *In pago Silensi. Wrocławskie Studia Wczesnośredniowieczne* 3). Wrocław: Uniwersytet Wrocławski, Instytut Archeologii.

Rauhut L. and Długopolska L. 1975. Cmentarzysko z XII – XIII w. w obudowie kamiennej w Rybałtach, pow. Siemiatycze. *Wiadomości Archeologiczne* 39(3), 339-372.

Salewicz K. 1937. Nowe stanowiska przedhistoryczne w pow. brzeskim. (Z badań Państwowego Muzeum Archeologicznego w Warszawie). *Z Otchłani Wieków* 12(11-12), 166-170.

Sedov V. V. 1961. Sledy vostochnobaltiyskogo pogrebalnogo obriada v kurganakh drevnei Rusi. *Sovetskaya Arkheologiya* 1961(2), 103-121.

Sedov V. V. 1982. Vostochnye slaviane v VI-XIII vv. In B. A. Rybakov (ed.), *Arheologiya SSSR c drevneyshikh vremien do srednevekovia v 20 tomakh*. Moskva: Nauka.

Soloveva G. F. 1963. K voprosu o vostochnoy orientirovke pogrebennykh v slavianskikh kurganakh XI-XIII vv. *Sovetskaya Arkheologiya* 1963(2), 95-106.

Tomczyk J. 2018. *Raport analiz materiałów szkieletowych*. Unpublished typewritten manuscript in Institute of Archaeology of the Cardinal Stefan Wyszyński University in Warsaw.

Wajda S. 2014. Wyroby szklane. In H. Karwowska (ed.), *Średniowieczne cmentarzysko w Czarnej Wielkiej stan. 1, woj. podlaskie (badania 1951-1978)* 2. Białystok: Muzeum Podlaskie w Białymstoku, 57-103.

Wajda S. 2016. Paciorki szklane z cmentarzyska w Uroczysku Jelonka, z badań 2014 r. In A. Buko (ed.), *Sprawozdanie z realizacji grantu MNiSW Początki chrześcijaństwa na pograniczu mazowiecko-ruskim (11H 12 0330 81, kierownik projektu prof. dr hab. Andrzej Buko), Aneks 5.3.I*. Unpublished typewritten manuscript in Institute of Archaeology and Ethnology PAS in Warsaw.

Walicka E. 1958. Wczesnośredniowieczne kurhany w Puszczy Lackiej pow. Bielsk Podlaski. *Wiadomości Archeologiczne* 25, 157-158.

Wawrzeniuk J. 2017. Kurhany Puszczy Ladzkiej w perspektywie dotychczasowych badań archeologicznych. In J. Wysocki (ed.), *Konserwacja zapobiegawcza środowiska* 4. *Dziedzictwo kulturowe w lasach. (= Archaeologica Hereditas* 8). Warszawa-Zielona Góra: Uniwersytet Kardynała Stefana Wyszyńskiego, Wydawnictwo Fundacji Archeologicznej, 201-213.

Yurkavets Y. 2006. Pakhavalnyia pomniki w vakolitsakh h. Hrodna. In H. Karwowska and A. Andrzejewski (eds), *Stan badań archeologicznych na pograniczu polsko-białoruskim od wczesnego średniowiecza po czasy nowożytne*. Białystok: Muzeum Podlaskie w Białymstoku, 127-138.

Zawadzka-Antosik B. 1982. Z problematyki pochówków dziecięcych odkrytych na cmentarzysku w Czekanowie, woj. siedleckie. *Wiadomości Archeologiczne* 47(1), 25-57.

Zoll-Adamikowa H. 1975. *Wczesnośredniowieczne cmentarzyska ciałopalne Słowian na terenie Polski. Cz. I. Źródła*. Wrocław, Warszawa, Kraków, Gdańsk: Zakład Narodowy imienia Ossolińskich, Wydawnictwo Polskiej Akademii Nauk.

Zvyaruga Y. G. 2000. Naselnitstva Panyamonnya. In P. F. Lysenka (ed.), *Arkhealogiya Belarusi* 3. *Syarednevyakovy peryad (IX-XIII stst.)*. Minsk: Natsyanalnaya Akademiya Navuk Belarusi. Instytut Gistoryi, Belaruskaya Navuka, 84-108.

SPRAWOZDANIA ARCHEOLOGICZNE 72/2, 2020
PL ISSN 0081-3834
DOI: 10.23858/SA/72.2020.2.2015

Beata Miazga[1], Sylwia Rodak[2],
Jeannette Jacqueline Lucejko[3], Erika Ribechini[4]

A UNIQUE EARLY MEDIEVAL PENDANT (*KAPTORGA*) FROM OPOLE GROSZOWICE (SILESIA, SW POLAND) IN THE LIGHT OF INTERDISCIPLINARY ARCHAEOMETRIC STUDIES

ABSTRACT

Miazga B., Rodak S., Lucejko J. J., Ribechini E. 2020. A unique early medieval pendant (*kaptorga*) from Opole Groszowice (Silesia, SW Poland) in the light of interdisciplinary archaeometric studies. *Sprawozdania Archeologiczne* 72/2, 539-554.

Finds of early medieval pendants, known as kaptorgas, are not common in Poland. For this reason, the *kaptorga* found in 1957 in Opole (Silesia), in southwest Poland, is all the more interesting. The artefact is housed in a museum, and on the occasion of its re-conservation, permission to conduct archaeometric studies was given. The kaptorga was subjected to analyses using nondestructive and minimally invasive techniques. Elemental tests with energy dispersive XRF and SEM-EDS spectrometers showed that the pendant is made of brass, not bronze sheet, as was originally thought. In its filling, there is a small fragment of plant-fiber thread (subjected to microscopic observations) and beeswax, which was identified using infrared spectroscopy and gas chromatography with a mass spectrometer.

Key words: kaptorga-pendant, early Middle Ages; Opole, Poland; non-destructive, archaeometry
Received: 27.05.2020; Revised: 18.07.2020; Accepted: 31.08.2020

1 Institute of Archaeology, University of Wrocław, Szewska 48, 50-139 Wrocław, Poland; beata.miazga@uwr.edu.pl; https://orcid.org/0000-0003-3714-1889
2 Independent researcher, sylrod@poczta.onet.pl; https://orcid.org/0000-0003-0321-834X
3 Department of Chemistry and Industrial Chemistry, University of Pisa, via G. Moruzzi 13, 56124 Pisa, Italy; jeannette.lucejko@unipi.it; https://orcid.org/0000-0002-7717-4039
4 Department of Chemistry and Industrial Chemistry, University of Pisa, via G. Moruzzi 13, 56124 Pisa, Italy; erika.ribechini@unipi.it; https://orcid.org/0000-0002-4978-2782

INTRODUCTION

In Polish lands, West Slavic jewellery became synonymous with the economic development of the early Piast state. Along with the construction of the early Piast system, specialised craft workshops were created, producing high-quality jewellery for the needs of local elites, centered around the ruler (Kóčka-Krenz 1993, 143-157). Slavic jewellery is most often found in hoards and on sepulchral sites. Amongst the most interesting and rare early medieval neck decorations found at archaeological sites are kaptorgas. Capsule pendants can be subdivided into rectangular and trapezoidal forms. The difference between them concerns not only the structural elements, but also the manner of decoration (Kóčka-Krenz

Fig. 1. Map of Europe with the location of the site Groszowice in Opole, where the kaptorga was found (illustrated by B. Miazga)

1993, 84-87; Sztyber 2008, 283). Rectangular kaptorgas were made of one piece of sheet metal, bent in half, with one end rolled into a tubular eye. Most often they were decorated with filigree and granulation. Trapezoidal pendants have a longer bottom edge in relation to the upper edge. In contrast to rectangular kaptorgas, the trapezoidal forms were made of two pieces of sheet metal connected by soldering (front part and sides as well as back part and bottom), topped with a lid. The decorations, which also covered the outer part of the recess, were embossed, and the dominant motifs were a representation of a walking quadruped or a bird with decorative plant elements (for example tree of life), both of which refer to the iconography of the world of the East. Pendants known from Polish territory were most often made of silver and bronze, less often of gilded silver, tin and copper. They occur most often in hoards and women's graves (Kóčka-Krenz 1993, 84, 86-87; Sztyber 2010, 45-46).

Trapezoidal kaptorgas are rare finds in Poland. They are known mainly from hoards and burial grounds, and less often from settlements and strongholds (Kóčka-Krenz 1993, 86-87). These products were probably manufactured on site, as evidenced by the find of a bronze mould matrix for casting trapezoidal kaptorgas from the 11th century in a burial ground in Brześć Kujawski (Jakimowicz 1939, 379-381; Kihl-Byczko 1970, 423-424, Fig. 1). It is difficult to determine their original function. In older literature, trapezoidal kaptorgas were considered to be imports from the East, which travelled to Polish territory via Ruś (Jakimowicz 1933, 103-131; Stattler 1966, 235-236; Sztyber 2010, 48 – older literature there). Other scholars, however, sought the resemblance of the kaptorgas in the so-called portable shrines which appeared first in Western Europe in the second half of the 7th century. The current state of research on these artefacts suggests that they are containers for magical amulets (Szczepkowska-Naliwajek 2000, 27; Sztyber 2010, 48). Primarily organic substances (from Lutomiersk and Opole – Groszowice; Nadolski *et al.* 1959, 81; Miśkiewicz 1969, 288) as well as millet or foxtail millet seeds (from Poznań-Śródka) were found in kaptorgas. These seeds are assigned a symbolic meaning referring to the elements of life, which in the age of Christianity can be associated with the resurrection (Kóčka-Krenz *et al.* 1995, 285; Pawlak 1998, 259). It seems that the content of the amulet was supposed to bring luck and prosperity to the owner (Szczepkowska-Naliwajek 2000, 26-27; Sztyber 2010, 49).

THE ARTEFACT AND ITS STUDY

Since 1965 the old village of Groszowice has been an integral part of the city of Opole, which is a well-studied early medieval site (Gediga 1959, Bukowska-Gedigowa and Gediga 1986, Moździoch 1991, 2006, Gediga and Holz 2012). From the end of the 19th century, Groszowice was known for having the oldest cement plant in Europe. In 1957, an early medieval burial ground was found (dated on 10th-11th cent.; Urbańska 1958, 60) during quarrying activities in the area of the cement plant, on a limestone and sandy hill over the

Odra valley. In the same year, archaeological research was carried out, and 38 skeletal graves were discovered (Wachowski 1975, 108-109). The location of the early medieval burial ground is not random. In the region of Silesia in the early Middle Ages, as well as in other regions of Poland, sepulchral places were most often found on sandy or gravelly hills. Most frequently, the cemeteries were discovered accidentally during exploitation of the aggregate (Miśkiewicz 1969; Kufel-Dzierzgowska 1975; Wachowski 1975, 22; Jagielska 2010, 130).

At the burial ground in Opole-Groszowice, the graves were oriented along an east-west axis, in which the head was oriented to the east. In the other cemeteries, it was a general rule that the dead bodies had been buried along an east-west axis. This rule is connected with the Christian funeral rite in Early Medieval Poland (Zoll-Adamikowa 1971, 39).

During the research in Opole-Groszowice, an assortment of valuable accessories were found inside the graves. They were equipped with West Slavic jewelry (for example, temple rings, rings, glass beads, amber beads, bronze bells), as well as everyday items (*e.g.*, knives, flints, iron awls, buckets, iron buckles). The unique early medieval pendant was an integral part of a necklace with amber and glass beads found in grave no. 38. In this burial of a woman of the age of *maturus*, an amulet with a bas-relief was also found placed on her right hand (Urbańska 1958; 1959, 165-189; Miśkiewicz 1969, 288; Wachowski 1975, 108-109). It was dated to between the middle of the 10th century to the third quarter of the 11th cent. (Holz 2005, 106).

The presence of the pendant and amulet – which are considered "magical" items – in grave no. 38 in the Early Medieval burial ground at Opole-Groszowice is puzzling. The state of research on such artifacts in Silesian cemeteries generally does not allow for a broader comparison and contextualization of "magical" grave finds (Przysiężna-Pizarska 2010). However, archaeometric analyses may well help to provide a broader view of sepulcral finds of pendants in the functional and cultural context of the early Middle Ages in Poland.

The kaptorga was described as a bronze, trapezoidal pendant, 3.7 cm long and 0.8 cm wide, which was made of two pieces of thin sheet metal (Fig. 1). The upper part of the kaptorga was surrounded by a bronze strip, with a plate attached to it, probably constituting a lid. A characteristic feature of this artefact is the embossed motif of a running animal with a stylised palmette. This decoration is surrounded by a double frame. On the side walls of the kaptorga there are two holes with fragmentarily preserved string. Inside the artefact, a filling, probably organic, was discovered (Holc 2005, 106). The pendant was among the grave furnishings, next to eleven glass and six amber beads (Miśkiewicz 1969, 288). The kaptorga was cleaned immediately after its discovery, though the methods used are unfortunately unknown. More than half a century later, the artefact is not in satisfactory condition. On the surface of the pendant, one can see not only a roughness constituting a corrosive layer, but also defects in the metal sheet or traces of repair (Fig. 2). The surface is matte, without metallic gloss. The colour of the corrosion products indicates a significant share of copper in the raw material. Therefore, re-conservation of the kaptorga was

Fig. 2. State of preservation of the kaptorga before conservation and archaeometric studies. A small fragment of the kaptorga's filling is visible (photo by B. Miazga)

necessary, which was carried out simultaneously with archaeometric studies of the artefact. After separating the artefact into individual elements, the metal parts were treated with a 5% sodium carbonate solution for several weeks. The bath was supported by mechanical procedures, which were carried out using soft high-speed polymer tools (Habras discs with granulation of several micrometers). After inhibition of corrosion in 1, 2, 3-benzotriazole solution, the artefact was dehydrated, and secured with a layer of Paraloid B72 after consolidation. The remainder of the organic substance was left outside the kaptorga so as to be fully visible during the artefact's display, per the decision of its custodians.

Chemical composition studies were carried out on an energy dispersive X-ray fluorescence spectrometer (Spectro Midex) with molybdenum X-ray tube and SDD detector. The diameter of the radiation beam was 0.7 mm, which required proper preparation of the artefact's surface. The device was equipped with a visualization system in the form of a 20 × magnification CCD camera, which facilitated the precise selection of the place for examination. The device was also calibrated on certified reference materials IARM-159A (MBH Analytical Ltd, UK), BCR-691 (Institute for Reference Materials and Measurements, EU) and from the BB group (Institute of Non-Ferrous Metals in Gliwice, Poland). The semi-quantitative analysis was performed based on the Fundamental Parameters procedure and included elements with an atomic number greater than 22 (studies in air prevent the measurement of concentrations of light elements). The control examination was a chemical analysis of a small fragment of the kaptorga's sheet on an energy dispersive spectrometer attached to a scanning electron microscope, which was carried out on a Hitachi S-3400N microscope equipped with a tungsten cathode. Images with 150-3500 × magnification and a maximum resolution of 3 nm were recorded using backscattered electrons (BSE). The content of all elements was determined by a Noran System7 analyzer with a ThermoScientific detector with 129eV resolution. Measurements were carried out at an accelerating voltage of 30 kV and a vacuum of 40Pa.

In addition to the studies conducted with the SEM, the artefact was observed using an Olympus SZX 9 (6.3-114x) light microscope equipped with an Olympus Camedia C-5060 digital camera. For larger magnifications in the 25x-1000 × range, a Nikon Eclipse LV100 metallographic microscope was used, in conjunction with the NIS Elements software, recording the image and enabling its analysis.

Chemical examination of the filling of the kaptorga was performed on a Thermo Nicolet FT 380 Fourier-transform infrared spectroscope with OMNIC software. The sample was examined using a pellet method after mixing it with spectrally pure potassium bromide. The examined spectral range covered 4000-400 cm^{-1} with 16 scans and a resolution of 4 cm^{-1}. The obtained absorption spectrum was analysed using the software search function in commercial electronic databases as well as in the IRUG Database and published literature on the subject. Gas chromatography coupled with mass spectrometry (GC-MS) was another analytical method used on the kaptorga filling. The sample was prepared by a recently published procedure (Andreotti A. *et al.* 2006), which consisted of alkaline hydrolysis (saponification) and subsequent extraction with n-hexane and diethyl ether. The aliquots of each of the two fractions were combined, dried and derivatised for GC/MS analysis, by adding the internal standards and BSTFA as a derivatising agent containing 1% trimethylchlorosilane. The sample was injected into the 6890N Network GC System (Agilent Technologies, Palo Alto, CA, USA) equipped with a PTV injector and coupled to a 5973 MS detector with quadrupole analyser (Lucejko *et al.* 2017).

RESULTS AND DISCUSSION

Metal components

The determination of the elemental composition of the artefact was carried out using XRF spot analysis (Fig. 3). Averaged results showed that the item was made of brass, with 74.7% copper content and less than 20% zinc addition. The average level of tin was 2.7% and lead 6.5% by weight. In addition, there is a trace amount of silver. The EDS spectrometer examination, performed for various areas of a few micrometers, also registered material heterogeneity (Fig. 4). The majority of the sheet metal displays a metallic phase rich in copper and zinc, amounting to 73.3% and 18.4% by weight, respectively. Small amounts of tin (2%) and lead (approximately 0.5%) (Fig. 5) were also determined to be present (analysis in points 1 and 2), Table 1. However, the examined surface area contains a different configuration of elements (Fig. 5, analysis 3-5): lead is predominantly present

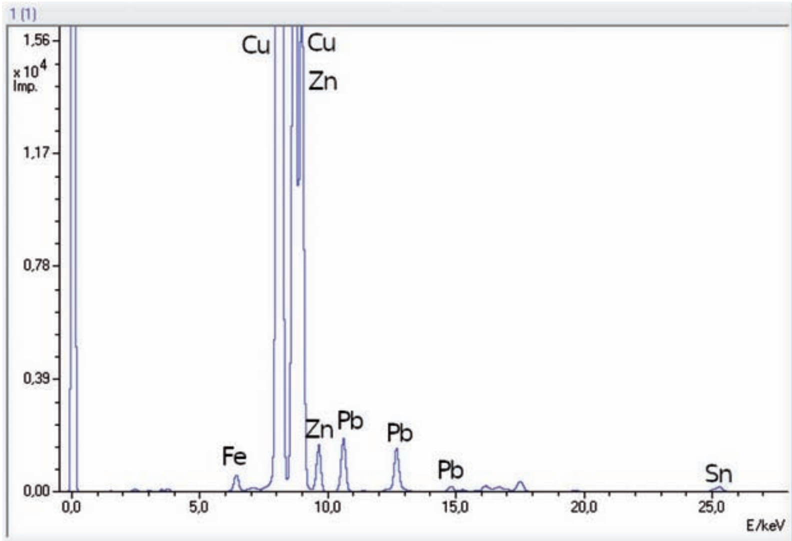


Fig. 3. ED-XRF spectrum of the kaptorga (illustrated by B. Miazga)

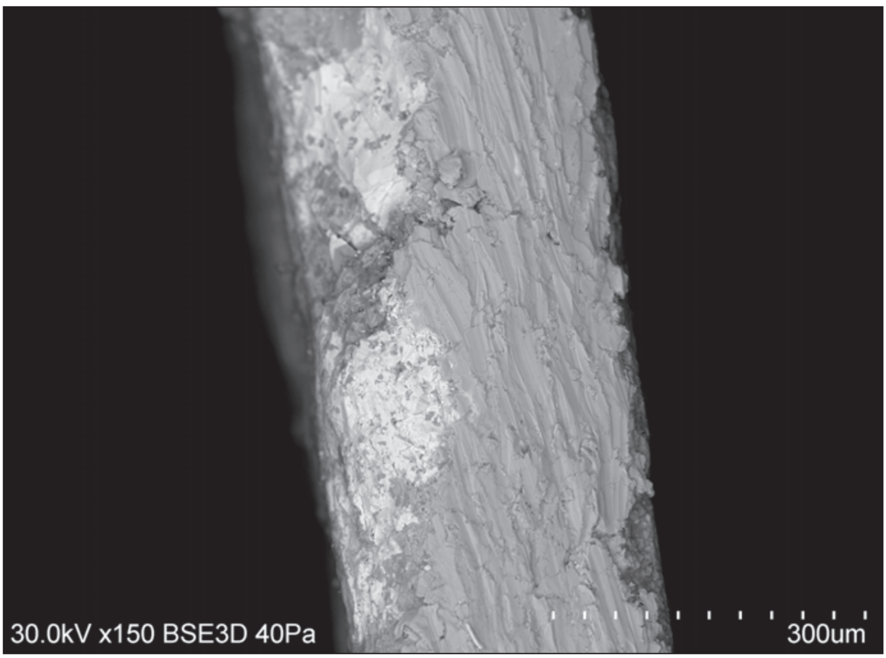


Fig. 4. Microscopic image of the cross-section of the kaptorga's metal sheet with visible heterogeneity of composition: the metallic phase containing significant amounts of copper (grey) and another phase rich in lead (white) or corrosive changes on the surface of the sheet metal (dark grey) are apparent (photo by B. Miazga)

Table 1. SEM-EDS results of elements determined on the sheet's cross section presented in Fig. 5 and in the corrosive layer visible in Fig. 6

Micro-area	Element (% wt.)							
	C	O	Ca	Fe	Cu	Zn	Sn	Pb
Cross section of the sheet (Fig. 5)								
Pt 1	3.2	2.2	-	0.2	73.4	18.4	2.1	0.4
Pt 2	3.0	2.2	-	0.2	73.4	18.4	2.0	0.8
Pt 3	6.1	24.9	-	-	5.1	1.0	0.4	62.5
Pt 4	5.2	17.3	0.2	-	7.1	1.1	0.5	68.6
Pt 5	4.1	17.6	-	-	5.2	1.3	0.5	71.3
Corrosion layer (Fig. 6)								
Pt 1	5.7	24.5	-	-	4.8	1.0	0.4	63.6
Pt 2	3.5	14.3	-	-	80.7	0.4	0.3	0.8
Pt 3	10.6	5.3	-	-	77.2	2.7	1.4	2.8
Pt 4	6.0	24.2	-	-	9.4	1.0	0.3	59.1

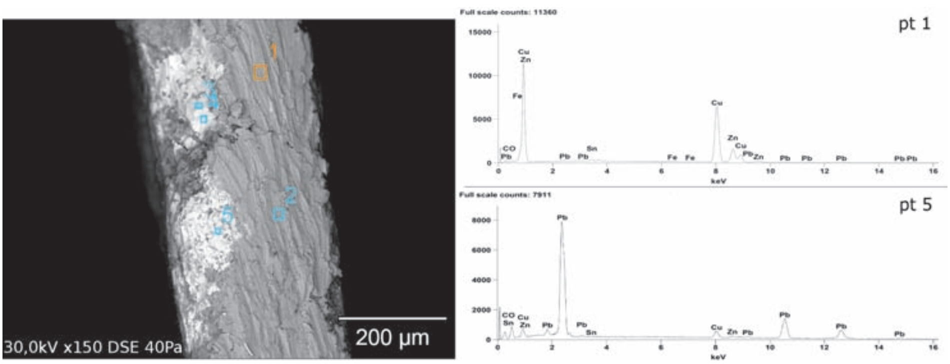


Fig. 5. Results of SEM-EDS examination of two selected microregions: point 1 – copper predominance, point 5 – lead-rich region (illustrated by B. Miazga)

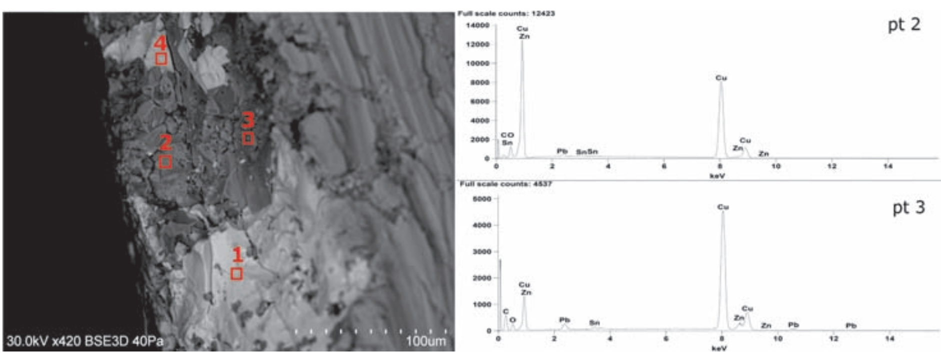


Fig. 6. Results of the SEM-EDS corrosion examination (illustrated by B. Miazga)

(concentration above 65%, Table 1), while copper and other metals are a definite minority. The explanation of this heterogeneity could include both imperfections in the preparation of brass sheet, as well as corrosion processes and the associated segregation of individual elements in the examined alloy. This hypothesis may be supported by the significant amount of oxygen and carbon found in places with a predominance of lead (Table 1), and the greater porosity of this area, indicating oxide or carbonate products of lead corrosion (Fig. 6). Another, quite likely explanation of the high lead signal is the possible presence of solder, which would have bound together the metal elements of the kaptorga. The part of the kaptorga examined on SEM-EDS comes from one of the strips joining the top and bottom parts of the artefact. This hypothesis seems to best explain the large presence of lead on the surface of the metal sheet and its much lower content in the cross section of the sheet.

Textile thread

A fragment of thread, 1 cm long and not exceeding 0.2 mm in diameter, was found on the inside of the kaptorga. The thread was composed of two single threads with a Z twist. In its current state, it is partially unravelled (Fig. 7), but it is apparent that it was made

Fig. 7. Textile thread preserved inside the kaptorga (photo by B. Miazga)

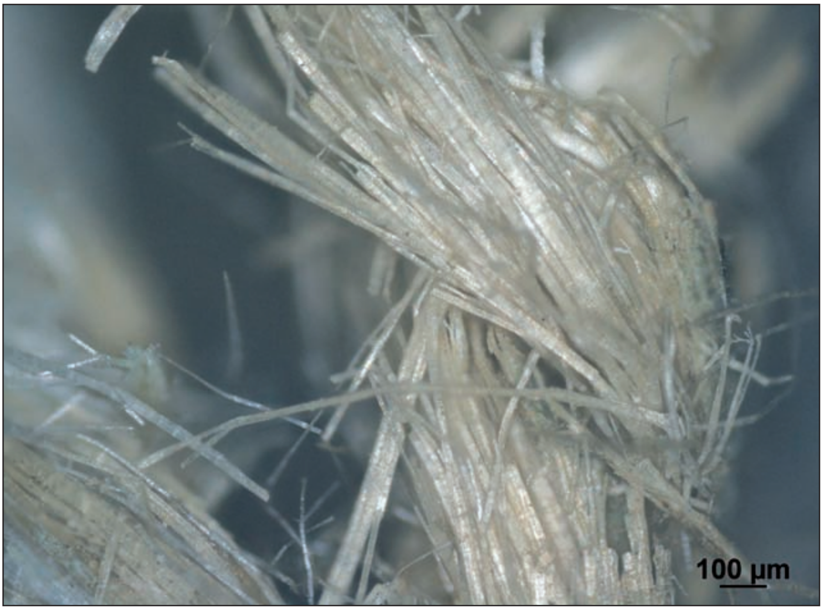


Fig. 8. Microscopic image of the thread preserved inside the kaptorga (optical microscopy, 50 × magnification) (photo by B. Miazga)

with an S twist. The structure of the thread can therefore be described as zz/S. Observation of the thread with microscopic magnification showed its structure was most probably composed of plant bast fibers – possibly flax (Fig. 8).

Examination of the wax deposit inside the *kaptorga*

The FT-IR infrared spectrum of the waxy substance (Fig. 9) indicated the organic nature of the sample. The intensive bands occurring in the region of 2900-2800, 1750, 1450, 1250 and above 700 cm^{-1} clearly indicated the presence of organic carbon compounds. Further analysis of the location and intensity of the bands showed bond vibrations occurring in hydrocarbons; 2922 and 2848 cm^{-1} to be the vibrations stretching the C-H bonds in alkanes (methyl and methylene groups). Other bands referred to as aliphatic hydrocarbon signals were identified for peaks 1473, 1463, 1376 and 730-720 cm^{-1}. Signals recorded on the spectrum in the region of 3434 cm^{-1} can be considered non-characteristic; their origin can be associated with vibrations stretching O-H bonds, occurring in various hydrocarbons. In turn, the peak located at 1736 cm^{-1} is interesting for sample identification, which should be associated with the C = O stretching vibration occurring in esters. Other signals classified as ester group signals can be recognised in the region of 1150-1250 cm^{-1}, where there is a very clear peak at 1174 cm^{-1}. Recognising the location of the aforementioned

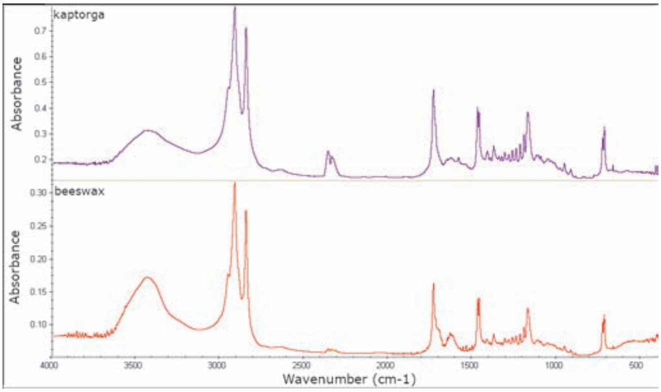


Fig. 9. Infrared spectrum of the organic sample from the inside of the kaptorga, recorded in absorbance mode, and comparison of this spectrum with the experimental spectrum of modern beeswax (illustrated by B. Miazga)

bands allows for a careful inference that the substance in question may be wax of animal origin. Data from the literature on wax studies indicate that it is a mixture of various fatty acids with an even number of carbon atoms, n-alkanes (with an odd number of carbon atoms), as well as wax esters and alcohols resulting from their hydrolysis. In addition, researchers also point to difficulties in studying wax from archaeological research. Stacey (2011) also notes the possibility of not finding signals from fatty acids in archaeological samples, which could be associated with the transformation of acids into salts as a result

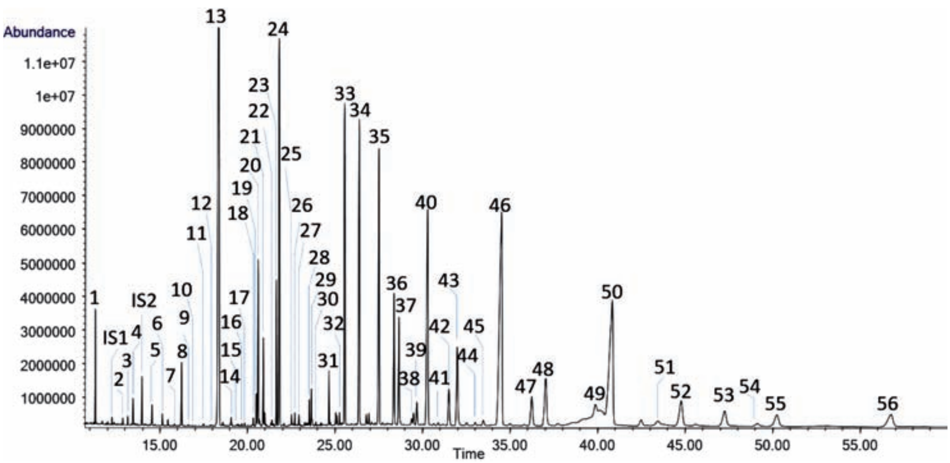


Fig. 10. Total ion current chromatogram of the resinous sample (the acidic and alcoholic species are present as TMS-derivatives). Labels refer to Table 2 (illustrated by J. J. Lucejko)

Table 2. Compounds identified in the sample (prepared by J. J. Lucejko)

No. of peak	Identified compound	No. of peak	Identified compound
1	butylated hydroxytoluene	29	15-OH- octadecanoic acid
2	dodecanoic acid (lauric acid)	30	docosanol
3	tridecanol	31	docosanoic acid
4	1,2-benzenedicarboxylic acid	32	ω-hydroxydocosanoic acid
5	azelaic acid	33	tetracosanol
6	tertadecanoic acid (miristic acid)	34	tetracosanoic acid
7	sebacic acid	35	hexacosanol
8	hexadecanoic acid methyl ester	36	1,22-dihydroxy docosane
9	pentadecanoic acid	37	hexacosanoic acid
10	hexadecano	38	1,24-dihydroxy tetracosane
11	11-hydroxy-dodecanoic acid	39	23-hydroxy tetracosanoic acid
12	palmitelaidic acid	40	octacosanol
13	palmitic acid	41	ω-hydroxy tetracosanoic acid
14	9-octadecenoic acid methyl ester	42	1,25-dihydroxy hexacosane
15	octadecanoic acid methyl ester	43	octacosanoic acid
16	heptadecanoic acid	44	1,26-dihydroxy hexacosane
17	octadecanol	45	ω-hydroxy hexacosanoic acid
18	16-hydroxy-9-octadecenoic acid methyl ester	46	triacontanol
19	15-hydroxy-hexadecanoic acid methyl ester	47	1,27-dihvydroxy octacosane
20	11-cis-octadecenoic acid	48	triacontanoic acid
21	stearic (octadecanoic) acid	49	hexacosyl hexadecanoate
22	αω -tetradecandioic acid	50	dotriacontanol
23	14-hydroxy hexadecanoic acid	51	1,29-dihydroxy triacontane
24	15-hydroxy hexadecanoic acid	52	dotriacontanoic acid
25	ω-hydroxy hexadecanoic acid	53	dotriacontil-15-idrossi-esadecanoato
26	11-eicosenoic acid	54	dotriacontaenoic acid
27	eicosanoic acid	55	tetratriacontanol
28	ω- OH-octadecanoic acid	56	tetratriacontanoic acid

of their deposition in a salty or alkaline environment, or the processes of wax aging or heating, resulting in the loss of volatile alcohols. Comparison of the spectrum of the examined sample with the experimental spectrum of modern waxes indicates that the sample contains significant amounts of beeswax (Fig. 9). The location and intensity of the bands present in beeswax, as in the medieval sample, are very similar, which further confirms its fairly good condition and rather low decomposition. However, the final confirmation of the presence of beeswax in the sample was provided by a more specialised examination using gas chromatography coupled with mass spectrometry. Figure 10 shows the chromatogram obtained in the GC/MS analysis of the sample. Table 2 lists the identified components that are principally constituted by a series of linear carboxylic acids (ranging from C12 to C34), ω-1-hydroxy acids (ranging from C12 to C32), linear alkanes (ranging from C19 to C33, not shown in Figure 10), linear alcohols (ranging from C24 to C36) and (ω -1)-diols (ranging from C24 to C32). In detail, the main acidic components are long chain (12-34 carbon atoms) linear monocarboxylic acids. The most abundant acids are palmitic acid (hexadecanoic acid, C16:0) and 15-hydroxy hexadecanoic acid, suggesting the presence of a wax. The presence of natural wax in the sample is also confirmed by the presence of long chain alcohols. Natural waxes are indeed complex lipid mixtures mainly consisting of long chain esters (cerides) of fatty acids with long chain alcohols, free fatty acids, hydroxyacids, alcohols, diols, and alkanes (Bonaduce and Colombini 2004; Regert *et al.* 2005; Andreotti *et al.* 2008). The molecular profile varies according to the type of wax and the degree of ageing. In particular, the peaks corresponding to lignoceric acid (#34, tetracosanoic acid, C24:0) in the fatty acid profile of all samples is indicative of the presence of beeswax, which, together with 15-hydroxy hexadecanoic acid (#24) and 15-hydroxy hexadecanoic acid (#23), suggests that they originate from the saponification of cerides (long chain esters contained in natural waxes). In conclusion, the molecular composition of the sample detected using gas chromatography-mass spectrometry (GC-MS) revealed the presence of beeswax.

CONCLUSIONS

This study of a medieval kaptorga, half a century after it was discovered, enabled us to shed new light on the artefact. This was due to a non-destructive archaeometric analysis using various methods. Thanks to them, the raw material from which the kaptorga sheet was made was correctly recognised. It is brass, containing about 20% zinc – not bronze, as previously thought. The amulet ‘holder’ was prepared from three separate elements cut from brass sheet, which were then joined with lead solder. This is indicated by the extremely high concentrations of lead on the kaptorga surface, identified in the course of elemental studies. Re-conservation not only enabled more effective cleaning and preservation of the artefact, but also became an incredible opportunity to study the individual elements of the kaptorga. The discovery of ‘new’, unexplored parts of the kaptorga, which resulted from the re-conservation, have proved to be important for the better recognition of the artefact’s structure. Microscopic observations made it possible to document and recognise a zz/S twisted plant thread. The organic filling of the kaptorga has been identified as beeswax by FT-IR and GC-MS examination. The early medieval pendant, as a result of widely planned archaeometric and conservation research, ceases to be an artefact, for which the conditional mode is used. Its structure is correctly recognised, and the results of these studies enrich the state of knowledge about kaptorgas and allow for further archaeological studies on this issue.

Acknowledgements

The authors would like to thank Ewa Matuszczyk and Elwira Holc from the Archaeology Department of the Muzeum Śląska Opolskiego for the opportunity to conduct the kaptorga examination. Special words of gratitude we also address to Dr hab. Małgorzata Grupa from the University of Nicolaus Copernicus in Toruń and Dr Elżbieta Myśkow from the University of Wrocław for help in analysing the threads.

References

Andreotti A., Bonaduce I., Colombini M. P., Gautier G., Modugno F. and Ribechini E. 2006. Combined GC/MS analytical procedure for the characterization of glycerolipid, waxy, resinous, and proteinaceous materials in a unique paint microsample. *Analytical Chemistry* 78 (13), 4490-4500. DOI: 10.1021/ac0519615.

Andreotti A., Bonaduce I., Colombini M. P., Modugno F. and Ribechini E. 2008. Characterisation of natural organic materials in paintings by GC/MS analytical procedures. In M. P. Colombini and L. Tassi (eds), *New Trends in Analytical, Environmental and Cultural Heritage Chemistry*. Kerala: Transworld Research Network, 389-423.

Bukowska-Gedigowa J. and Gediga B. 1986. *Wczesnośredniowieczny gród na Ostrówku w Opolu*. Wrocław: Zakład Narodowy im. Ossolińskich.

Bonaduce I. and Colombini M. P. 2004. Characterisation of beeswax in works of art by gas chromatography-mass spectrometry and pyrolysis-gas chromatography-mass spectrometry procedures. *Journal of Chromatography A* 1028(2), 297-306.

Gediga B. 1959 Badania w Groszowicach pow. Opole w roku 1959. *Śląskie Sprawozdania Archeologiczne* 2, 21.

Gediga B. and Holz E. 2012. *Opole – gród, miasto, stolica regionu. Gród na Ostrówku w Opolu*. Opole: Muzeum Śląska Opolskiego.

Holc E. 2005. Opole-Groszowice. In E. Tomczak (ed.), *Skarby ziemi wydarte. Górny Śląsk i Pogranicze*. Katowice: Wydawnictwo Śląskiego Centrum Dziedzictwa Kulturowego, 106.

Jagielska I. 2010. Wczesnośredniowieczne cmentarzysko na stanowisku Pyzdry 11. *Studia Lednickie* 10, 129-149.

Jakimowicz R. 1939. Nowe materiały do dziejów złotnictwa wczesnopolskiego. *Wiadomości Archeologiczne* 16, 378-385.

Kihl-Byczko E. 1970. W sprawie pochodzenia i funkcji kaptorg trapezowatych. In: W. Hensel (ed.), *I. Międzynarodowy Kongres Archeologii Słowiańskiej, Warszawa 14.-18. 9. 1965. vol. 5.* Wrocław, Warszawa, Kraków: Zakład Narodowy im. Ossolińskich, 423-428.

Kóčka-Krenz H. 1993. *Biżuteria północno-zachodnio-słowiańska we wczesnym średniowieczu*. Poznań: Wydawnictwo Naukowe Uniwersytetu im. A. Mickiewicza.

Kóčka-Krenz H., Pawlak P. and Sikorski A. 1995. Grób kobiety z wczesnośredniowiecznego cmentarzyska szkieletowego w Poznaniu-Śródce (przyczynek do interpretacji funkcjonalnej kaptorg). *Folia Praehistorica Posnaniensia* 7, 281-294.

Kufel-Dzierzgowska A. 1975. Wczesnośredniowieczne cmentarzyska szkieletowe w Polsce Środkowej. *Prace i Materiały Muzeum Archeologicznego i Etnograficznego w Łodzi* 22, 373-390.

Lucejko J., Connan J., Orsini S., Ribechini E. and Modugno F. 2017. Chemical analyses of Egyptian mummification balms and organic residues from storage jars dated from the Old Kingdom to the Copto-Byzantine period. *Journal of Archaeological Science* 85, 1-12.

Ménager M., Azémard C. and Vieillescazes C. 2014. Study of Egyptian mummification balms by FT-IR spectroscopy and GC-MS. *Microchemical Journal* 114, 32-41.

Miśkiewicz M. 1969. Wczesnośredniowieczny obrządek pogrzebowy na płaskich cmentarzyskach szkieletowych w Polsce. *Materiały Wczesnośredniowieczne* 6, 241-301.

Moździoch S. 1991. Funkcje gospodarcze śląskich grodów kasztelańskich w państwie wczesnopiastowskim. *Studia Lednickie* 2, 23-42.

Moździoch S. 2006. Początki grodu opolskiego w świetle źródeł archeologicznych. In A. Pobóg-Lenartowicz (ed.), *Jak powstało Opole? Miasta i jego książęta*, Opole: Wydawnictwo Uniwersytetu Opolskiego, 11-22.

Nadolski A., Abramowicz A. and Poklewski T. 1959. *Cmentarzysko z XI wieku w Lutomiersku pod Łodzią* (= *Acta Archaeologica Universitatis Lodziensis. Folia Archaeologica* 7). Łódź: Łódzkie Towarzystwo Naukowe; Wrocław: Zakład Narodowy im. Ossolińskich.

Namdar D., Neumann R., Goren Y. and Weiner S. 2009. The contents of unusual cone-shaped vessels (cornets) from the Chalcolithic of the southern Levant. *Journal of Archaeological Science* 36, 629-636.

Pawlak P. 1998. Wczesnośredniowieczne cmentarzysko „szkieletowe” w Poznaniu-Śródce w świetle badań w 1994 roku. *Slavia Antiqua* 39, 215-277.

Przysiężna-Pizarska M. 2010. Obrządek pogrzebowy ludności wczesnośredniowiecznego Śląska w świetle badań wykopaliskowych zespołu osadniczego „Ryczyn” koło Oławy. Manuscript of PhD thesis in archive of Institute of History, Opole University. Opole.

Regert M., Langlois J. and Colinart S. 2005. Characterisation of wax works of art by gas chromatographic procedures. *Journal of Chromatography A* 1091, 124-136.

Stacey R. J. 2011. The composition of some Roman medicines: evidence for Pliny’s Punic wax? *Analytical and Bioanalytical Chemistry* 401, 1749-1759.

Stattler E. 1966. Kontakty handlowe ludności wczesnopolskiej z krajami arabskimi we wczesnym średniowieczu (IX-XI w.). *Slavia Antiqua* 13, 199-267.

Szczepkowska-Naliwajek K. 2000. Wczesnośredniowieczne dzieła sztuki złotniczej na ziemiach polskich. In. M. Barbasiewicz (ed.), *Początki tysiąclecia. Autoryzowany zapis dwóch konferencji*. Warszawa: Towarzystwo Opieki nad Zabytkami, 17-27.

Sztyber A. 2008. Kaptorgi. Przykład kunsztu wczesnośredniowiecznego złotnictwa. *Alma Mater* 99, 283-286.

Sztyber A. 2010. Funkcje i znaczenie kaptorg we wczesnym średniowieczu. In P. Kucypera and S. Wadyl (eds), *Życie codzienne przez pryzmat rzeczy. Kultura materialna średniowiecza w Polsce* 1. Toruń: Wydawnictwo Naukowe Uniwersytetu im. M. Kopernika, 43-62.

Urbańska H. 1958. Sprawozdanie z prac wykopaliskowych prowadzonych na wczesnośredniowiecznych cmentarzyskach szkieletowych w powiatach Opole i Góra Śląska. *Śląskie Sprawozdania Archeologiczne* 2, 58-63.

Urbańska H. 1959. Wczesnopolskie cmentarzysko rzędowe koło wsi Groszowice w pow. opolskim. *Archeologia Śląska* 2, 165-189.

Wachowski K. 1975. *Cmentarzyska doby wczesnopiastowskiej na Śląsku*. Wrocław: Zakład Narodowy im. Ossolińskich.

Zoll-Adamikowa H. 1971. *Wczesnośredniowieczne cmentarzyska szkieletowe Małopolski*, cz. II. *Analiza*. Wrocław, Warszawa, Kraków, Gdańsk: Zakład Narodowy im. Ossolińskich.

SPRAWOZDANIA ARCHEOLOGICZNE 72/2, 2020
PL ISSN 0081-3834
DOI: 10.23858/SA/72.2020.2.1705

Jakub Niebylski[1]

THE REMAINS OF THE "BATTLE OF KRAKÓW", FOUGHT DURING WORLD WAR I, AS EXEMPLIFIED BY SITE SADOWIE-KIELNIK 1, KRAKÓW DISTRICT

ABSTRACT

Niebylski J. 2020. The remains of the "Battle of Kraków", fought during World War I, as exemplified by site Sadowie-Kielnik 1, Kraków district. *Sprawozdania Archeologiczne* 72/2, 555-584.

This article presents the archaeological remains of World War I that were discovered in 2016 at the multicultural site Sadowie-Kielnik 1, Kraków district. The fights that broke out there were part of the Battle of Kraków, which took place between November 16-25, 1914. The parties to the conflict were the armies of the Austro-Hungarian Monarchy and the Russian Empire. The consequence of this battle was the halting of the attack of the Russian Army towards the west, which resulted in pushing them out of Galicia. A collection of 145 artefacts related to both armies was analysed. Additionally, archaeological features – field fortifications – were interpreted as well. This helped to explain their strategic function and to determine which of the two armies built them. It was also possible to determine the date of their construction and the time during which these fortifications were occupied by the army.

Keywords: conflict archaeology, Kraków Fortress, Lesser Poland, military equipment and armaments, World War I

Received: 06.03.2020; Revised: 17.04.2020; Accepted: 09.05.2020

1 Institute of Archaeology and Ethnology, Polish Academy of Sciences, Sławkowska 17, 31-016 Kraków, Poland; jakub.m.niebylski@gmail.com; https://orcid.org/0000-0002-6507-6087

INTRODUCTION

The multicultural site Sadowie-Kielnik 1, Kocmyrzów-Luborzyca commune, Kraków district, has been known to researchers since 1987. It was discovered during the research project known as the Polish Archaeological Record (Polish name: Archeologiczne Zdjęcie Polski – AZP), and archived on the Archaeological Site Record Sheet (Polish abbreviation: KEZA) of AZP region number 100-57 (Niedziółka 2016, 122-125). The site is located on the Western Lesser Poland Loess Upland, in the convergence of two streams – the Pokojówka (formerly known as Goszcza – the right-bank tributary of the Szreniawa river), and the Sterkowiec (its right-bank tributary). The site covers part of a plateau of 32.5 ha, where many artefacts dated to the Neolithic (the Baden and the Lengyel cultures), as well as the Bronze (the Trzciniec culture) and the late Middle Ages, have been found (Fig. 1).

In 2016, excavations were conducted at this site in connection with the construction of the S7 expressway. Among other things, this resulted in the archaeological discovery of some military features in the form of a trench and a dugout. In charge of the field work in this section was Tomasz Fudali, MA. During the excavations in Sadowie, a fortified settlement of the Mierzanowice culture was discovered, which covered an area of over 5 ha (Przybyła *et al*. 2019, 332).

The defensive qualities and strategic location of the high plateau were used during World War I. This area, as a matter of fact, constituted a theatre of military operations of the Austro-Hungarian Monarchy and the Russian Empire. The distance from the site to the nearest Fortified Area of the Kraków Fortress is about 10 km.

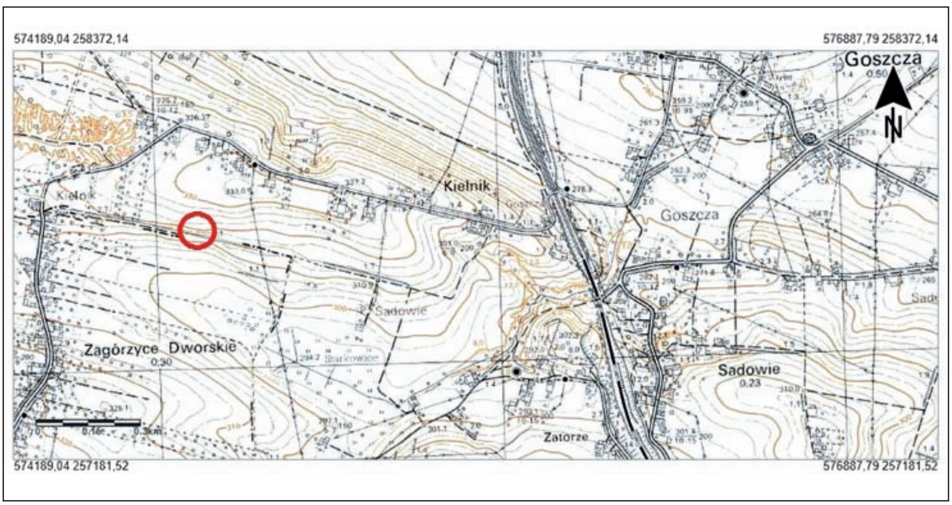


Fig. 1. Sadowie-Kielnik, Kocmyrzów-Luborzyca commune, site 1. Location of feature 135 (dugout). Modified by J. Niebylski

THE COURSE OF MILITARY OPERATIONS ON THE DISCUSSED TERRITORY DURING WORLD WAR I

The military operations took place in this area in November 1914, and were related to the so-called 'steamroller' of the Russian forces, attacking from the east. The commander--in-chief of the Russian Army, Grand Duke Nicholas Nikolaevich of Russia, sought to break the front between Radomsko and the Nida, to establish control in the Kraków Fortress and Silesia – and, as a consequence, to conquer the Czech territory and open the way to Berlin. The weakened Austro-Hungarian troops, in 59 divisions, withdrew to the west. Opposite the Austro-Hungarian Army and the army of the German Empire in the north, the army of the Russian Empire stood – in 95 divisions. The territories north, north-east and east of the city of Kraków were occupied by part of the 9th Russian Army, under the command of General of the Infantry Platon Alekseevich Lechitsky. His forces consisted of 13.5 divisions of infantry and three divisions of cavalry. Opposing them was the 4th Austro-Hungarian Army under the command of the infantry general, Archduke Joseph Ferdinand (Bator 2005, 102; Dąbrowski 2015, 118).

On November 14, 1914, the Russian Army launched an offensive aimed at capturing the Kraków Fortress. The chief of the General Staff of the Austro-Hungarian Army, Field

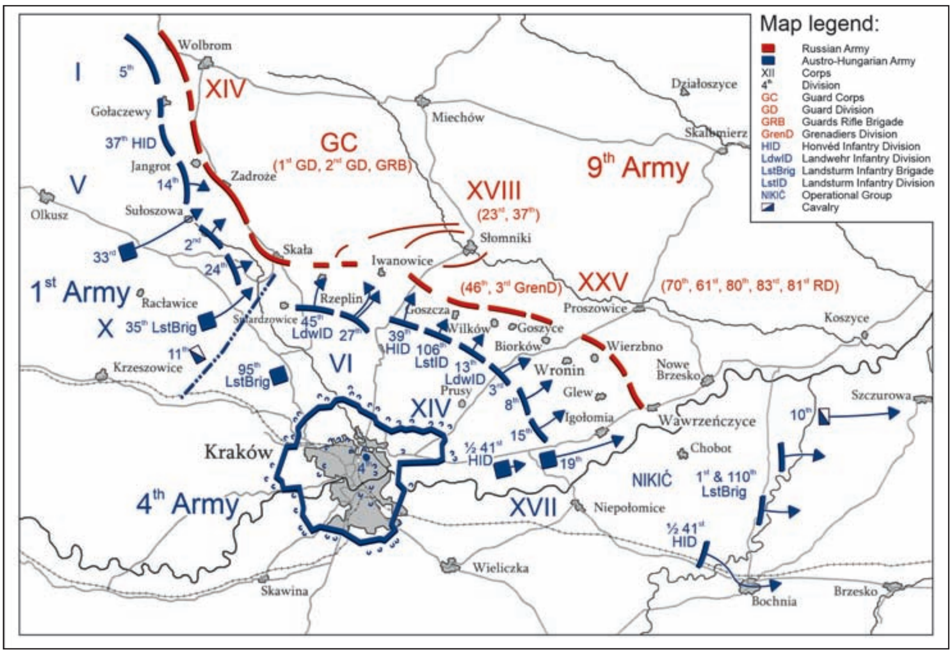


Fig. 2. Deployment of troops from November 16-18, 1914, in the Kraków area.
After Orman and Orman 2015, modified by K. Grzyb and J. Niebylski

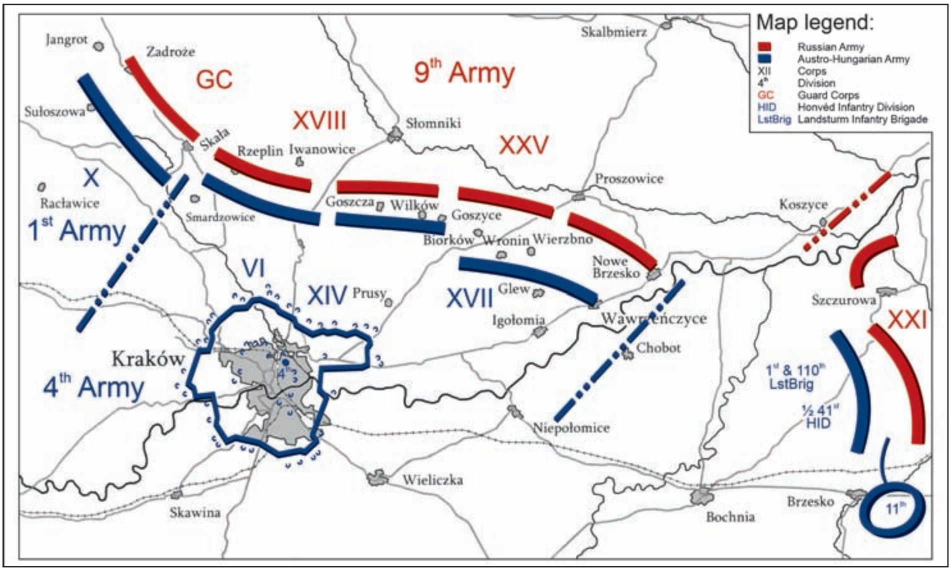


Fig. 3. Deployment of troops on November 19, 1914, in the Kraków area.
After Orman and Orman 2015, modified by K. Grzyb and J. Niebylski

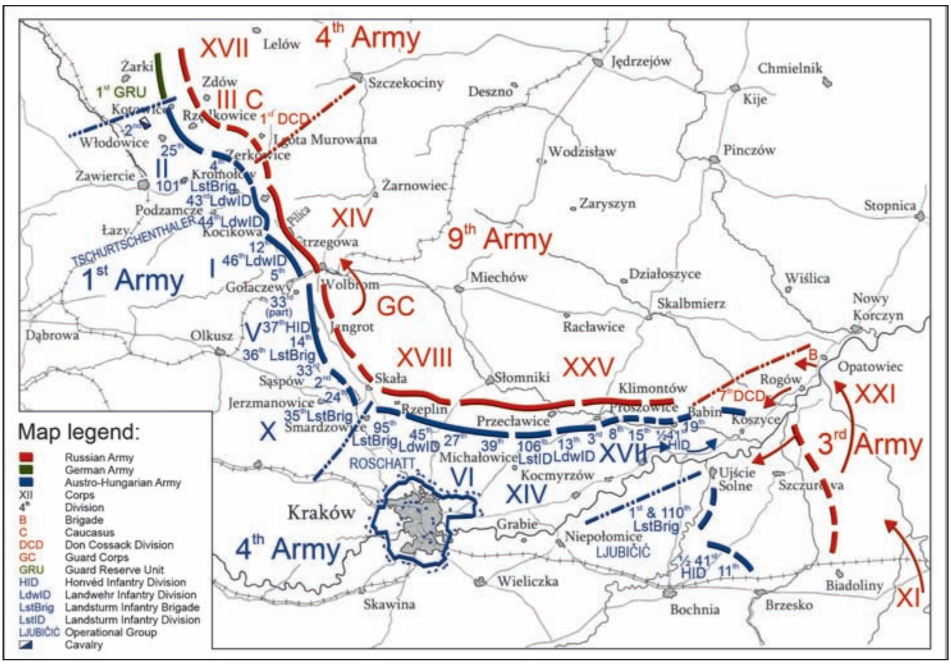


Fig. 4. Deployment of troops on November 22, 1914, in the Kraków area.
After Orman and Orman 2015, modified by K. Grzyb and J. Niebylski

Marshal Franz Conrad von Hötzendorf, developed a plan called "Operation Kraków", consisting in a pre-emptive strike near Kraków. This happened only on November 16 after the regrouping of troops, *i.e.*, two days after the Russians had launched their offensive at this section (Fig. 2). At that time, the Russian Army was successfully prevented from advancing any further by the artillery of the fortress on the Smardzowice-Wierzbno-Wawrzeńczyce line. The Austro-Hungarian Army also effectively drove the enemy out of their positions. On November 17, the units of the 39th Honvéd Infantry Division and the 27th Infantry Division reached the town of Goszcza after all-day battles (Niebylski 2020, 255; Orman and Orman 2015, 774, 778-779).

On November 18, 1914, the 39th Honvéd Infantry Division took part in heavy fighting northwest of the town of Goszcza, after which this division was stopped by the Russian Army (Horstenau 1932, 530). That day two forces merged: the XIV Corps under the command of Lieutenant-General Josef Roth and the group of Colonel General Karl Křitek, transferred to this operational region from the right bank of the Vistula. On November 19, 1914, the forces of the XIV Corps under the command of Lieutenant-General Josef Roth forced the attacking XVIII Corps of Russians to retreat toward the towns of Prusy and Goszcza; and, after the support of these operations by the group of Colonel General Karl Křitek, the front was moved towards the Szreniawa river (Fig. 3). That day, the 39th Honvéd Infantry Division suffered heavy losses (Niebylski 2020, 259; Orman and Orman 2015, 306).

The site of Sadowie-Kielnik 1, which is where the 27th Infantry Division and 39th Honvéd Infantry Division were fighting, is located about 1 km to the south-west of the town of Goszcza. The XIV Corps consisted of the 3rd and 8th Infantry Divisions and the 13th Schützen Division. That day, south of the Sadowie-Kielnik site, part of the XIV Corps, namely, the 106th Landwehr Infantry Division, were present; its left wing was protected by the 39th Honvéd Infantry Division, and further west by the 27th Infantry Division, grouped under the VI Corps. The Křitek group consisted of the 15th and 19th Infantry Divisions, the 96th Infantry Brigade and half of the 41st Honvéd Infantry Division. Opposite them, as part of the 9th Army of the Russian Empire at the section Wolbrom – Goszyce, the Guard Corps was stationed, along with the XXV Corps at the section Goszcza – Słomniki and the XVIII Corps from the town of Skała to the town of Słomniki (Niebylski 2020, 257-258; Orman and Orman 2015, 778-779).

On November 20, 1914, at 3:30 p.m., the Russian Army opened artillery fire at Fort 49 "Krzesławice" from hill 279, between the villages of Prusy and Łuczanowice (currently part of Kraków), which was only 2 km away from the fort. The light artillery battery, which did not cause significant damage, had at least 20 guns. Counterattacks were carried out by the defenders of the forts in the strength of 18 battalions and were assisted by 114 guns. As a result, they managed to seize the Russian cannons together with their caissons. That day, the Austro-Hungarian VI Corps continued to carry out offensive operations in the area of Goszcza. It was the last day of fighting in this area (Horstenau 1932, 54; Orman and Orman 2015, 341).

Among the consequences of the military operations in this area were great personal losses for both sides. In the Kocmyrzów-Luborzyca commune, 1599 soldiers were buried, in addition to five mass graves with unspecified numbers of deceased soldiers. As a result of the entire Kraków operation, 70,000 soldiers of the Austro-Hungarian Army were eliminated from further combat (Bator 2005, 113; Pałosz 2012, 340-348, 353).

Austro-Hungarian soldiers took many prisoners during the fighting in this area. Between November 18-19 alone, their number was 3,000. The wounded were transported to Kraków's hospitals by train. In total, after a counter-offensive near Kraków, 28,000 Russian soldiers were taken as prisoners of war (Bator 2005, 104-106, 108-109, 111-113).

The effect of military operations at this section of the front was a shift of its line, formerly lying on the Prądnik-Białucha-Wisła rivers, northwards to the Dłubnia-Szreniawa line (Fig. 4). Between December 2-6, 1914, the second assault on Kraków took place – this time from the opposite, southern side. The retreating Russian Army headed south-east, where the Austro-Hungarian Army won the key battle of Limanowa as part of the Łapanów-Limanowa operation. In the wake of the military successes of the Austro-Hungarian Army, the front moved east, eventually pushing the Russian troops out of Galicia (Bator 2005, 112-115).

FIELD FORTIFICATIONS – ARCHAEOLOGICAL FEATURES

At site 1 in Sadowie-Kielnik, a dugout, oriented along an EW axis (feature 135), was discovered, along with a trench with niches, running from the dugout towards the east (feature 133). It was connected to another trench, oriented on a NS axis (feature 133 and feature 147, probably continuing as feature 265). About 50 m east of it, there was a parallel trench (feature 148); and, similarly, 20 m to the west, there was another parallel trench (feature 275). Seventy meters east of feature 148, there was another parallel trench (feature 112); while, 60 m east of feature 112 was the next line (feature 96 and 107).

Inside the dugout, in its northeastern part, there was a brick stove (feature 134). Ten meters north of the north-east corner of the dugout, there was a single elongated object oriented on a NW-SE axis (feature 146). Therefore, five trench lines with similar spacing were captured, which were probably connected to each other with communication trenches that were situated beyond the excavated area, enabling the assault columns to reach the first line and to provide the necessary supplies and ammunition (Fig. 5).

In several cases, it is possible to determine the function of the features. Feature 148, within the boundaries of the construction site, ends with a firing position (feature 262) in the south, with a branch to the east, extending at a right angle to feature 148, probably acting as a shooting trench with a fire line towards the south. In its southern wall, a niche was made, serving as a convenient observation and shooting point. Feature 146 is a one-man prone foxhole, whose south-eastern part has two berms, allowing fire in this direction (Fig. 6).

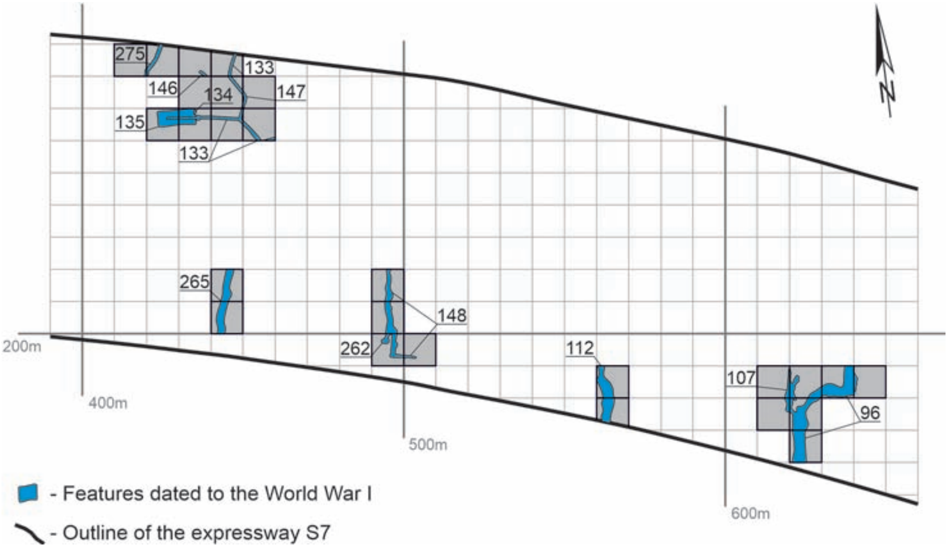


Fig. 5. Sadowie-Kielnik, Kocmyrzów-Luborzyca commune, site 1. Location of field fortifications related to World War I. Modified by K. Grzyb

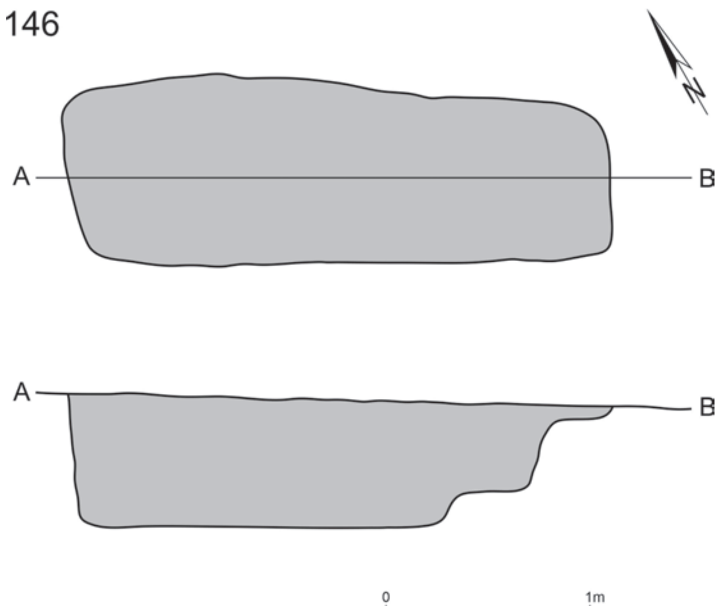


Fig. 6. Sadowie-Kielnik, Kocmyrzów-Luborzyca commune, site 1, feature 146 – plan and cross-section. Modified by K. Rosińska-Balik

The trench (feature 265) also has two berms formed on its eastern wall. The soldier standing at the bottom of the trench should be completely shielded from the direct fire of the enemy. The lower berm served as an elevated 'step' so that soldiers could maintain fire from it or observe the field, as well as rest. The upper berm, on the other hand, was a shelf for ammunition, equipment, weapon support, or sometimes an elbow support for soldiers taking a position with a rifle.

The dugout had a social function, as demonstrated by the presence of the stove. The trench reaching the interior of the dugout (feature 133) continues in the middle of it and has two berms in its southern wall. It can be assumed that it was possible to fire from the inside towards the south. The trench coming out of the dugout had two opposing niches for easier movement – it was a place for soldiers to pass each other (Fig. 7).

Considering the above, the examined field fortification line was built to conduct operations in the eastern direction, while the features oriented perpendicularly to the main lines allowed soldiers to direct fire toward the southern direction. It is possible that the captured features form the southern, flanking part of the layout. The course of the shooting

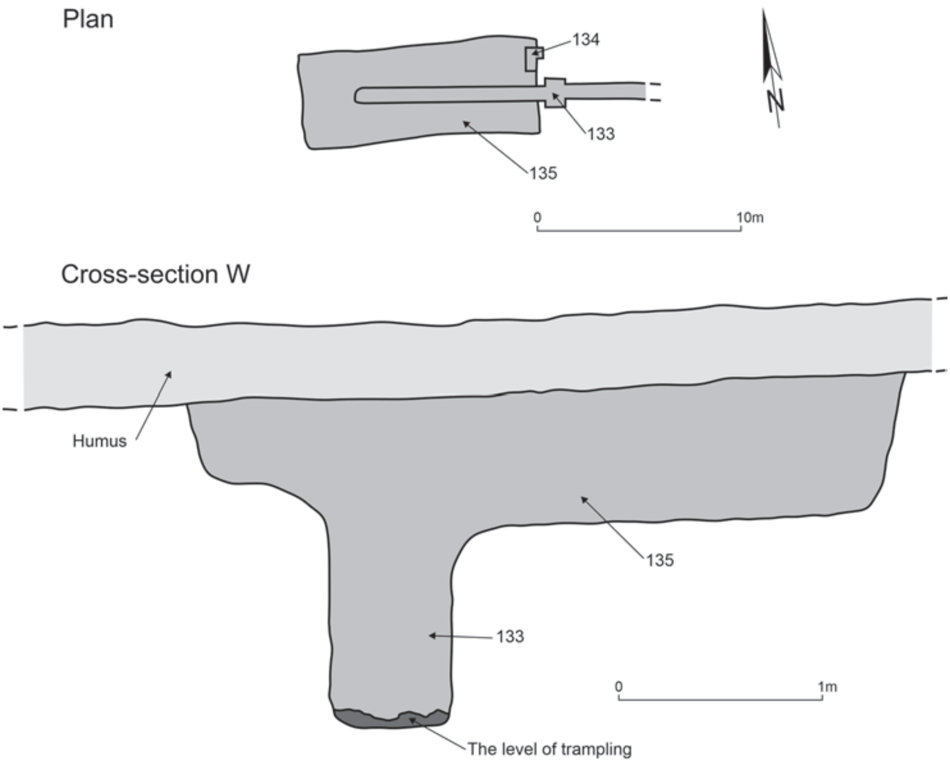


Fig. 7. Sadowie-Kielnik, Kocmyrzów-Luborzyca commune, site 1, features 133, 134 and 135 – plan and cross-section W. Modified by K. Rosińska-Balik

trenches was not planned in accordance with Austro-Hungarian regulations. They do not have characteristic perpendicularly-running 'promontories' situated every couple of meters from each other, with the trench going around them, at the back. They were built in Austro-Hungarian field fortifications for protective reasons – to limit the spread of debris and the percussion wave of exploding missiles and grenades. The 'promontories' were also used to limit the distance of fire in the trench – if the enemy got inside. The course of the trench line at this site forms a chain of 'broken' segments, rather than a straight line, which indicates the Russian school of engineering.

The distance between the parallel lines of the trench had been planned in such a way that it would not be possible to effectively throw a grenade at such a distance – since the range of an accurate throw is, on average, about 30 m. Leaving such a distance on the interfield also facilitates – if the line is occupied by the enemy – artillery operations, which need at least 150 m of field. Artillery shelling could cover both the interfield, the firing trench occupied by the enemy, as well as their base. Once craters formed after explosions of artillery grenades, it was possible to connect them with trenches, and in this way make positions for carrying out sorties. Additionally, explosions would destroy wire entanglements, facilitating the movement of soldiers to recapture lost trenches (Elterlein 2016, 17).

The depth of the features at the site varied. Their outlines were only clear at a depth of about 0.5 m due to intensive ploughing of the arable fields there. The one-man prone foxhole (feature 146) of about 2.7 m in length, was 1.1 m deep from the ground level, while the trench (feature 133) was 1 m wide and about 2.1 m deep. At its bottom, the level of trampling was determined, and some pieces of wood were found, which were probably the remains of platforms or of a structure protecting its walls. Also, its continuation (feature 265) was characterized by a depth of approximately 1.9 m. The trench (feature 148) was 1.1 m deep, while the shooting trench with a niche located at a right angle to it was 3 m deep. Another line of trenches running towards the east was more than 1.3 m deep, while another one, also directed towards the east had a depth of 1.8 m. The dugout (feature 135) was 12 m long, 5.2 m wide, and 1.2 m deep. The roofing must have been a wooden structure clearly elevated above the ground level. The lower berms of the features were at depths of 0.8-1.4 m. In places, the floors of the features were shallower. It should be taken into account that the depth of these features did not give soldiers complete vertical protection. The soil removed while they were being dug out was mainly deposited for the breastwork, and a smaller amount was used for the rear part of the ditch. The dugout, however, was probably constructed all the way round.

The brick stove (feature 134) was constructed of bricks that might have come from the surrounding buildings, as well as sun-dried bricks made on site. It was located on the inside of the eastern wall of the dugout, about 0.5 m from the northeast corner. The horizontal projection was rectangular, 0.95 × 0.6 m, with access from the south. The fire chamber consisted of a single row of bricks arranged using the stretcher bonding. Inside the stove, at its eastern wall, a brick chimney, 0.4 × 0.4 m, was built, which was located in a niche in

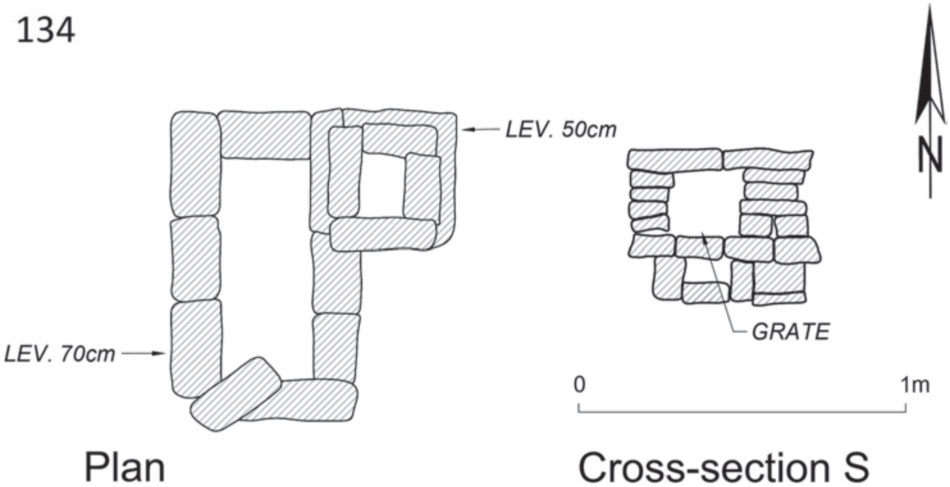


Fig. 8. Sadowie-Kielnik, Kocmyrzów-Luborzyca commune, site 1, feature 134 (brick stove) – plan and cross-section S. Modified by K. Rosińska-Balik

the wall, and as a result, the chimney did not need to be built through the roof of the dug-out itself. In the central part of the stove, there was a chamber with a cross-section of 0.3 × 0.3 m and a depth of 0.7 m. It connected vertically with the ash pan located below. The chamber was separated from the ash pan by a grate made of four rifles without stocks, put close together, with their barrels directed to the outside of the stove. The muzzles of the rifle barrels touched. They were all stacked up with their iron sights directed upwards, except the one on the far right, which was slightly rotated outwards. From the left they were as follows: a Mannlicher M1895, a Steyr M1912, a modernized, model 1 Mosin M1891, and a Mannlicher M1895. The barrels of the two middle rifles were slightly bent downwards about 25-30 cm from the muzzle of the barrel, while the barrel of the far right rifle was bent towards the remaining rifles, so as not to leave any free space, because the metal part of the rifle on the side of the stock (with the receiver and cartridge chamber) is much wider than the barrel (Figs 8-10).

CLASSIFICATION AND INTERPRETATION OF THE FINDS

During the archaeological research, 145 artefacts related to features 133, 134 and 135 were found. Some of them, of which there were 205 in total, were only in fragments. The finds can be divided into four categories:

1. Personal items of soldiers
2. Elements of uniforms and military equipment

Fig. 9. Sadowie-Kielnik, Kocmyrzów-Luborzyca commune, site 1. View of the brick stove from the south (feature 134). Photo by T. Fudali

Fig. 10. Sadowie-Kielnik, Kocmyrzów-Luborzyca commune, site 1. View of the partially dismantled brick stove from the west (feature 134). Photo by T. Fudali

3. Weapons, small arms and artillery ammunition
4. Elements and equipment of field fortifications

1. Personal items of soldiers

This groups includes such artefacts as a safety pin and three coins (Fig. 11).

The safety pin has a single-coil spring about 0.5 cm in diameter. Its length is about 4.2 cm. It shows signs of repair by a soldier, who bent the end of the pin after part of the clasp had broken off. It represents the type patented by Walter Hunt on April 10, 1849. It was most likely used to fasten civilian clothes under uniforms (*e.g.*, sleeveless vests), or possibly to repair uniforms (*e.g.*, to fasten the lapels of a uniform below the neck if the hook in the hook-and-eye tore off).

Regarding the Russian coins, there are two specimens, each of which is worth 1 kopeck. In the case of the first coin, the complete year of issue is not legible, while the second one was minted in 1911. The Austro-Hungarian coin, worth 10 hellers, dates from 1895.

2. Elements of uniforms and military equipment

This group consists of uniform buttons, which belonged to soldiers on both sides of the conflict, along with two army buckles, hooks, elements of ammunition knapsacks, and a pan from a mess kit (Fig. 12-13).

The first of the three uncovered buttons was intended for a uniform of M1908 provenance of the Austro-Hungarian Monarchy. It is made of brass. The surface of the obverse is smooth, convex and has a rim curled towards the reverse. The diameter is 2.1 cm. Its shank was broken off (*Adjustierungsvorschrift*... 1911, 47; Schall 2014, 64). The second button, M1857, comes from a Russian uniform. Its diameter is 2.2 cm. The obverse is arched with an image of an eagle (Sbornik... 1915, 559-560). Its shank was bent and broken. The third button also represents M1857. Inside, there was an incompletely preserved reference number: (12) – ... (6) – С. П. Б. (S. P. B.). It has no shank, which would explain its presence on the site – like the other two, it must have been lost by its owner.

Two single-pin buckles with a movable bar made of steel were also found at the site. These buckles are typical of the Austro-Hungarian Army and used in many pieces of military equipment; they were originally painted black. The size of the rectangular frame, which is round in cross-section (and about 0.4 cm in diameter), is 2.8 × 2.3 cm (Schall 2014, 303). One of the buckles has no pin.

Parts of two ammunition knapsacks, M1888, of Austro-Hungarian provenance were also found (*Adjustierungsvorschrift*... 1911, 86-87; Hinterstoisser *et al.* 2006, 244-245; Ortner and Hinterstoisser 2013, 97-100). The first specimen was a lower, steel fitting attached to the edge of a knapsack, approximately 26 cm long, with a preserved portion of the left clasp, which was used to fasten the strap round the hips. The rivets to fasten it to the knapsack are made of copper. The fitting is bent in two places on the left, perhaps from heavy use. The adjustable hip-strap buckle, along with a fragment of steel wire protecting

Fig. 11. Personal items of soldiers. 1 – safety pin; 2-3 – Russian 1 kopeck coins; 4 – Austro-Hungarian 10 hellers coin. Photo by K. Grzyb, modified by K. Rosińska-Balik

Fig. 12. Elements of uniforms and military equipment. 1 – Austro-Hungarian button for an M1908 uniform; 2-3 – Russian M1857 buttons for a uniform; 4-5 – Austro-Hungarian single-pin buckles for equipment; 6-7 – Austro-Hungarian fittings for equipment. Photo by K. Grzyb, modified by K. Rosińska-Balik

it against spontaneous unscrewing, is preserved. The second fitting is of the same type and comes from a different ammunition knapsack. It has no adjustable buckle, but it is also bent outward on the left, probably also from use. An ammunition knapsack of this type could hold 80 rifle cartridges.

The pan from a steel Austro-Hungarian infantry mess kit, M1904, was found (*Adjustierungsvorschrift*… 1911, 89; Hinterstoisser *et al.* 2006, 250; Ortner and Hinterstoisser

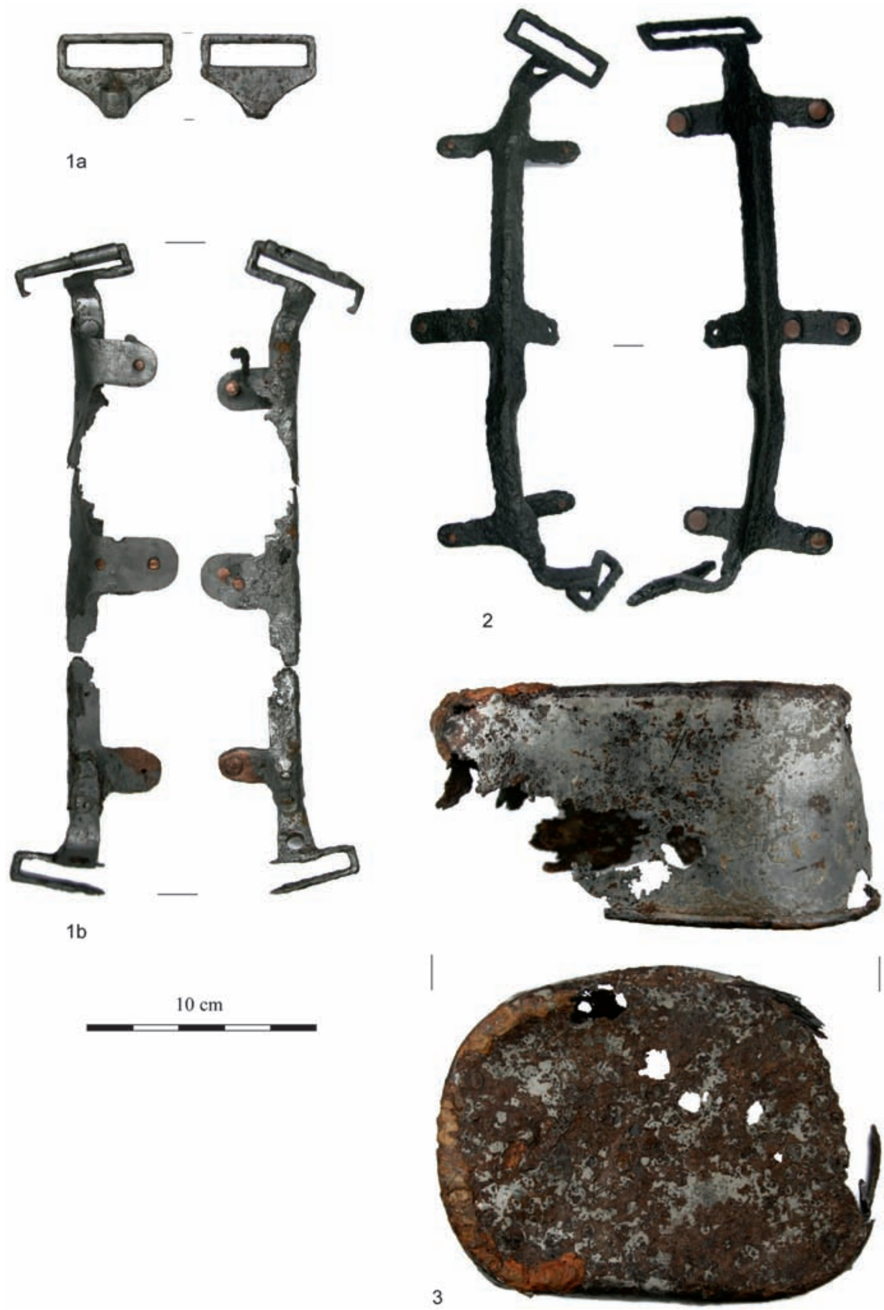


Fig. 13. Elements of uniforms and military equipment. 1a-2 – Austro-Hungarian fittings and adjustable buckle of two M1888 ammunition knapsacks; 3 – Austro-Hungarian pan of an M1904 infantry mess kit. Photo by K. Grzyb, modified by K. Rosińska-Balik

2013, 87; Schall 2014, 272). It was made of steel and has no folding handle. There are only three holes remaining of the rivets which fastened its handle. It is bent and without side hooks, with only two side-riveted fastening plates preserved. It is 7.5 cm high, 11 cm wide and 15 cm long.

In two different assemblages, four circular fittings were found – two in each of the assemblages. They were used for fastening the equipment, and were made of round, unclosed wire, about 0.2 cm thick, and were about 1.4 cm in diameter. In each of the assemblages, one of these circles were joined by means of copper soldering.

3. Weapons, small arms and artillery ammunition

Four pieces of firearms and their components, an ammunition crate, an ammunition box, cartridge clips, *en bloc* clips and cartridges, cartridge cases and bullets were discovered at the site. A piece of an artillery time fuse was also found.

The only piece associated with artillery is a part of the base of an aluminum time fuse for the M1902 Russian field cannon. It was designed for 76.2 mm shrapnel shells. It is torn, which was most likely caused by an impact of the fuse against a hard surface, because after activation, this time fuse would break the thread connecting it with the body of the shrapnel shell, and then it would fall in one piece on the ground (Fig. 14).

Firearms are represented by four rifles (Fig. 15). One of them is the Austro-Hungarian Mannlicher rifle, M1895, chambered in M1893 8 × 50 mm R ammunition (Krčma *et al.* 2016, 194; Ortner 2005, 114; Żuk 2016, 59). The rifle does not have a bolt, a trigger mechanism or a magazine case. It also lacks a butt plate and fittings, but two barrel bands are preserved. The sight leaf is set for the greatest distance, in the folded position. The barrel is deliberately bent to the left approximately 30 cm from the muzzle of the barrel. Many reference symbols are stamped on it. The number of the rifle, 1094 C, is stamped on the barrel and the receiver. At the bottom of the barrel, in the groove of the iron sight, the symbol B is stamped. The barrel is aligned with the receiver, and the symbol M is stamped next to the line indicating this alignment. At the bottom of the receiver, near the screw joining the magazine case, are the reference numbers 4 // 1 MT // 3. Thirty-eight to 40 cm along the barrel muzzle, there are

Fig. 14. 1 – Russian time fuse of 76.2 mm shrapnel shell for an M1902 field cannon. Photo by K. Grzyb

Fig. 15. Elements of the grate of the brick stove. 1-2 – Austro-Hungarian Mannlicher M1895 rifles; 3 – Russian Mosin M1891 rifle; 4 – Austro-Hungarian Steyr M1912 rifle; 5 – close-up view of the cartridge chamber of an Mannlicher M1895 rifle; 6 – close-up view of the cartridge chamber of an Mosin M1891 rifle; 7 – close-up view of the cartridge chamber of an Steyr M1912 rifle. Photo by K. Grzyb, modified by K. Rosińska-Balik

six notches on the upper side. At the top of the receiver are the symbols of the manufacturer and model – STEYR // M.95.

The second rifle of this design does not have the symbols of the manufacturer and model preserved. The rifle is devoid of the same elements as the above described one, but it also has two barrel bands preserved. The right side of the receiver, together with its rail, were broken out. The sight leaf is set to the shortest distance, and it is folded. The barrel is bent slightly downwards. The rifle number, stamped on the receiver, is 1826 M. At the bottom of the receiver, near the bolt connecting the magazine case, is the reference number 0.

The third rifle is a Russian Mosin M1891, model 1 (Żuk 2016, 92), which has been modernized. This modernization began in mid-1909 and consisted of replacing the iron sights with the Konovalov construction to adapt the settings to the new spitzer-bullet ammunition, introduced as M1908 (Chumak 2007, 20; Hýkel and Malimánek 1998, 247; Kisak 2016, 380; Orman and Orman 2015, 488; Wrobel 1999, 66). This rifle was chambered in 7.62 × 54 mm R ammunition, including both the M1891 and the M1908. The rifle has no bolt, trigger mechanism or magazine case (unscrewed). It has no butt plate or fittings. The sight leaf is set to the shortest distance, folded. The barrel is bent downwards approximately 25 cm from the barrel muzzle. The rifle number stamped on the cartridge chamber together with the manufacturer’s name is ИМПЕРАТОРСКIЙ // ТУЛЬСКIЙ // ОРУЖЕИНЫЙ ЗАВОДЬ // 1901 г. // N 23772 (IMPERATORSKIY // TULSKIY // ORUZHEINYI ZAVOD // 1901 g. // N 23772). The barrel is aligned with the receiver, and number 12 is stamped on the line indicating the alignment. On the left side of the angular receiver, the letter E is stamped, turned 90 degrees to the left.

The fourth rifle is a Steyr M1912, in its export version (Haładaj and Rozdżestwieński 2010, 31, Żuk 2016, 79). It was adapted for M1893 7 × 57 mm cartridges (Bussard 2017, 657; Ciemiński 2014, 96; Kisak 2016, 323; Labbett 1982, 30-31, Woodard 2011, 78). It was a rifle produced under German license at the Austro-Hungarian Steyr factory, intended for the Mexican market. After the outbreak of World War I, those had not been sent to the American continent were included in the armament of the Austro-Hungarian Army and were renamed 7 mm Infanterierepetiergewehr M1914 (Jung 2017, 34, 44). It was used as a weapon for the reserve force of the Austro-Hungarian Army, mainly Landsturm troops. It was from these troops that the soldiers defending the Kraków Fortress were recruited (Orman and Orman 2015, 40). The problem was the cartridge, unusual for the Austro-Hungarian Army, which made supplying and delivering the ammunition difficult. The rifle had its bolt, trigger mechanisms and magazine case removed (unscrewed). It has no butt plate or fittings. The sight leaf is set to the shortest distance, folded. The name of the recipient of the rifle is stamped on the cartridge chamber with the year of production – REPUBLICA MEXICANA // 19… The barrel is aligned with the receiver, and the number 05 is stamped on the alignment line. On the left side of the receiver, the number of the rifle and the name of the manufacturer are stamped: [burning grenade] “S”_E9081 [radiating circle]; WAFFENFABRIK STEYR // AUSTRIA. The rifle’s number is repeated on the cartridge chamber – [burning grenade] “S”_E9081. At the bottom of the cartridge chamber, the letter N is stamped.

Components of weapons are represented by two finds. The first of these is the butt plate of a Mannlicher M1895 rifle. It has a reference number, located about 1.5 cm below the top screw on its outer part, in the form of the letter K, which is about 0.3 cm high. This butt plate has both of its fastening screws preserved. The second specimen is the sight leaf of a Mosin M1891 rifle. Its preserved length from the beginning of the sight line is about 7.8 cm. The sight leaf was broken off at the hinge. The left side of the sight leaf is bent inwards (Fig. 16).

At the site, clustered by the stove of the dugout, 38 fragments of an ammunition can of Russian origin were discovered. They were transported in twos in a larger wooden crate. Each of the crates was used to hermetically pack cardboard boxes with ammunition, each containing 15 cartridges (in three cartridge clips). In total, this ammunition can contained 300 cartridges (Dąbrowski 2009, 19). It was intended for 7.62 × 54 mm R ammunition. It was made of zinc, and it had a cuboid shape with a height of approximately 8 cm. It had rectangular front walls, overlapping and soldered with lead, and was additionally reinforced on the inside with zinc plates. The lid was able to be separated along the solder of the frame. The lid of this specimen shows traces of much bending and breaking. Right next to it, a large amount of ammunition from the ammunition can was discovered – most often in packages in cardboard boxes, and with the ammunition in cartridge clips (Fig. 17).

Fig. 16. Components of weapons discovered at site.
1 – Austro-Hungarian butt plate of an Mannlicher M1895 rifle; 2 – Russian sight leaf of an Mosin M1891 rifle.
Photo by K. Grzyb, modified by K. Rosińska-Balik

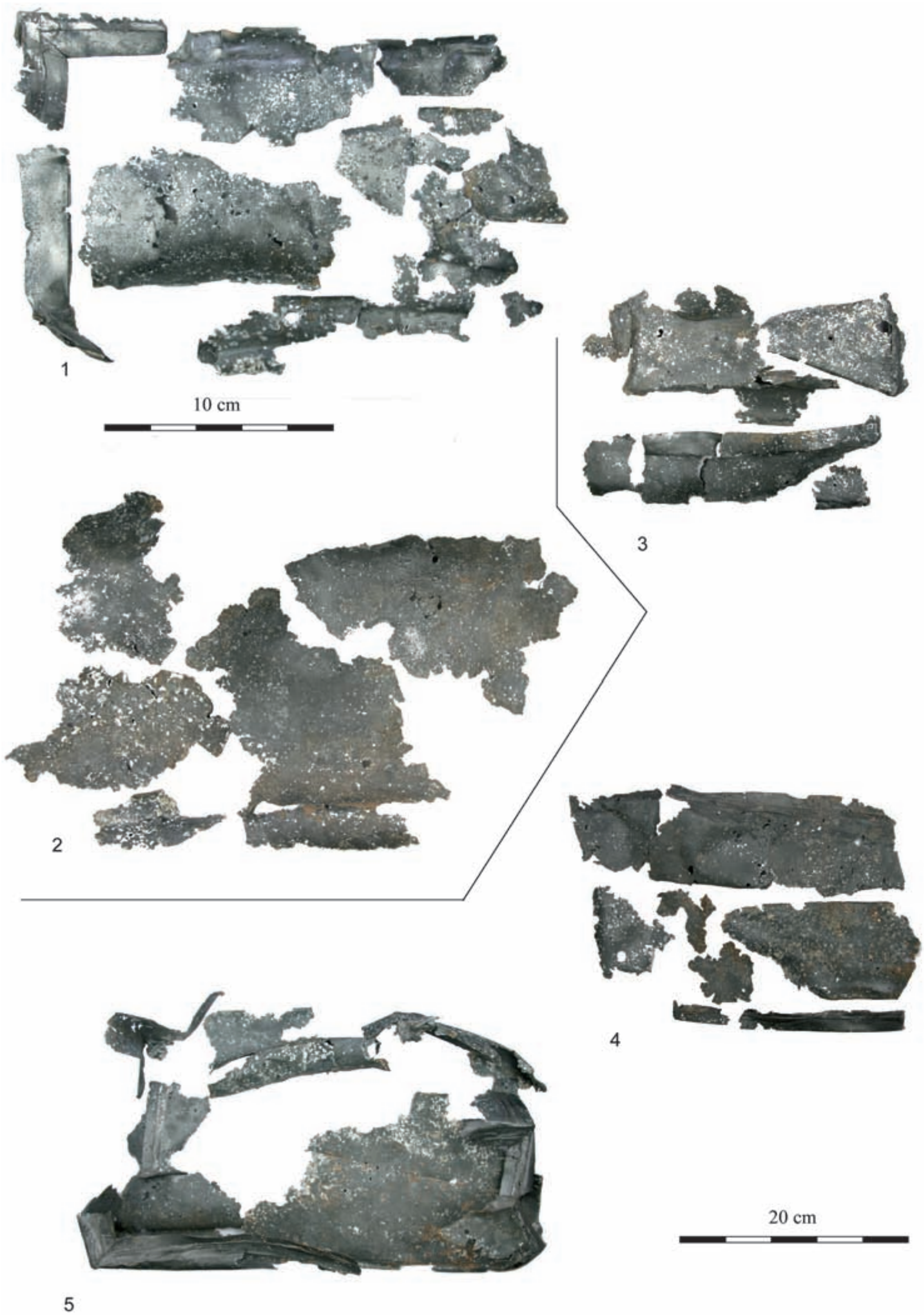


Fig. 17. 1-5 – Russian ammunition can for 7.62 × 54 mm R cartridges. Photo by K. Grzyb, modified by K. Rosińska-Balik

Fig. 18. Examples of ammunition discovered at site. 1 – Austro-Hungarian M1890 en bloc clip for M1893 8 × 50 mm R ammunition; 2 – Austro-Hungarian M1893 8 × 50 mm R ammunition; 3 – Russian M1891 7.62 × 54 mm R ammunition; 4 – Russian M1908 7.62 × 54 mm R ammunition; 5 – Austro-Hungarian M1893 7 × 57 mm ammunition; 6 – Russian M1908 7.62 × 54 mm R ammunition. Photo by K. Grzyb, modified by K. Rosińska-Balik

One empty M1890 en bloc clip for a Mannlicher M1895 was discovered, stamped with reference number W – Manfred Weiss, Budapest. It was designed to hold M1893 8 × 50 mm R ammunition of Austro-Hungarian provenance (Kisak 2016, 426; Mötz 1996, 386, 402). A second en bloc clip of this type was also found, in which there were five cartridges with reference numbers (12)-V (3)-14 (6)-W (9)-19, which means that their production took place in May 1914, at the Manfred Weiss factory in Budapest (Fig. 18).

Cartridge clips with cartridges of Russian provenance (with two types of ammunition) were also discovered. The first group contains cartridges with M1891 round-nose ammunition. They have headstamps as follows:

(12)-06 (3)-T (6)-III (9)-П (cartridge clip with five cartridges) – third trimester of 1906, Sankt-Peterburgskiy Patronnyi Zavod, brass supplier Torgovyi Dom F. G. fon Gilenshmidta, Tula (Dąbrowski 2009, 18);

(12)-П ТУЛЬСКІЙ З (6)-906 (cartridge clip with three cartridges and cartridge clip with one cartridge) – 1906, Tulskiy Patronnyi Zavod;

Illegible headstamps (two cartridge clips with three cartridges each).

Spitzer cartridges in cartridge clips of the newer type M1908, have headstamps as follows:

(12)-11 (3)-… (6)-III (9)-П (cartridge clip with five cartridges) – third trimester of 1911, Sankt-Peterburgskiy Patronnyi Zavod;

(12)-11 (3)-… (6)-… (9)-П (cartridge clip with two cartridges) – 1911, Sankt-Peterburgskiy Patronnyi Zavod;

(12)-913 (3)-K (6)-I (9)-Л (cartridge clip with four cartridges) – first trimester of 1913, Luganskiy Patronnyi Zavod, brass supplier Kolchuginskiy Zavod Tsvetnykh Metallov;

(12)-… (3)-K (6)-I (9)-… (cartridge clip with one cartridge) – first trimester, brass supplier Kolchuginskiy Zavod Tsvetnykh Metallov;

(12)-T (6)-13 (cartridge clip with four cartridges) – 1913, Tulskiy Patronnyi Zavod;

(12)-10 (6)-II (cartridge clip with five cartridges) – second trimester of 1910;

Illegible headstamps (cartridge clip with two cartridges and one with three cartridges).

Another group of artefacts are cartridges. Among them are M1893 8 × 50 mm R Austro-Hungarian rounds:

(12)-I (3)-13 (6)-GR (9)-19 (cartridge) – January 1913, Georg Roth, Wien;

(12)-… (3)-… (6)-… (9)-19 (cartridge) – 19…;

An interesting group of cartridges are those designed for the Steyr M1912 rifle discussed earlier. All of the following cartridges have traces or fragments of a cartridge clip.

(12)-H. (6)-1913 (one cartridge) – 1913, Hirtenberger Patronenfabrik, Hirtenberg (Conklin 2006, 140);

(12)-H (6)-1914 (one cartridge) – 1914, Hirtenberger Patronenfabrik, Hirtenberg (headstamp without a dot);

(12)-H. (6)-1914 (one cartridge) – 1914, Hirtenberger Patronenfabrik, Hirtenberg (different font from the one above);

Illegible headstamps (one cartridge).

M1891 7.62 × 54 mm R cartridges are represented by one artefact.

(12)-П ТУЛЬСКІЙ З (6)-... (one cartridge) – Tulskiy Patronnyi Zavod.

Most of this caliber of ammunition is of the M1908 type:

(12)-11 (3)-К (6)-III (9)-П (one cartridge) – third trimester of 1911, Sankt-Peterburgskiy Patronnyi Zavod, brass supplier Kolchuginskiy Zavod Tsvetnykh Metallov. It has traces of trampling (discovered at the bottom of the trench);

(12)-12 (3)-Р (6)-III (9)-П (five cartridges) – third trimester of 1912, Sankt-Peterburgskiy Patronnyi Zavod, brass supplier Zavod Rozenkranc, Sankt-Peterburg. Five cartridges were probably the contents of one cartridge clip;

(12)-12 (3)-Ф (6)-III (9)-П (one cartridge) – third trimester of 1912, Sankt-Peterburgskiy Patronnyi Zavod, brass supplier Zavod Obschestva Franko-russkikh Zavodov, Sankt-Peterburg;

(12)-13 (3)-Р (6)-III (9)-П (four cartridges) – third trimester of 1913, Sankt-Peterburgskiy Patronnyi Zavod, brass supplier Zavod Rozenkranc, Sankt-Peterburg. Four cartridges were probably the contents of one cartridge clip;

(12)-Л (6)-914 (one cartridge) – 1914, Luganskiy Patronnyi Zavod;

(12)-914 (3)-... (6)-... (9)-Л (one cartridge) – 1914, Luganskiy Patronnyi Zavod;

(12)-Т (6)-13 (one cartridge) – 1913, Tulskiy Patronnyi Zavod;

(12)-12 (6)-III (one cartridge) – third trimester of 1912.

All M1893 8 × 50 mm R cartridge cases were fired. They have headstamps as follows:

(12)-V (3)-14 (6)-W (9)-19 (two cartridge cases) – May 1914, Manfred Weiss, Budapest;

(12)-V (3)-13 (6)-H (9)-19 (one cartridge case) – May 1913, Hirtenberger Patronenfabrik, Hirtenberg;

(12)-VIII (3)-14 (6)-H. (9)-19 (one cartridge case) – August 1914, Hirtenberger Patronenfabrik, Hirtenberg;

(12)-I (3)-07 (6)-GR (9)-19 (one cartridge case) – January 1907, Georg Roth, Wien;

(12)-... (3)-07 (6)-GR (9)-19 (two cartridge cases) – 1907, Georg Roth, Wien;

(12)-I (3)-08 (6)-GR (9)-19 (three cartridge cases) – January 1908, Georg Roth, Wien;

(12)-I (3)-11 (6)-GR (9)-19 (one cartridge case) – January 1911, Georg Roth, Wien;

(12)-... (3)-11 (6)-GR (9)-19 (one cartridge case) – 1911, Georg Roth, Wien;

(12)-I (3)-14 (6)-GR (9)-19 (one cartridge case) – January 1914, Georg Roth, Wien;

(12)-I (3)-... (6)-GR (9)-19 (one cartridge case) – January, Georg Roth, Wien;

(12)-... (3)-... (6)-... (9)-19 (one cartridge case) – 19...

Also found were 12 unfired 7.62 × 54 mm R cartridge cases, whose headstamps are illegible, and thus it is impossible to indicate the ammunition model. There are clear indications that, for two of them, the bullet was broken apart (before the deposition), and another one additionally has traces that the neck was bent inwards into the cartridge case.

None of the M1891 7.62 × 54 mm R cartridge cases were fired.

(12)-П ТУЛЬСКIЙ З (6)-906 (four cartridge cases) – 1906, Tulskiy Patronnyi Zavod. In three cases, there are indications that the bullet was broken apart;

(12)-06 (3)-Т (6)-III (9)-П (three cartridge cases) – third trimester of 1906, Sankt-Peterburgskiy Patronnyi Zavod, brass supplier Torgovyi Dom F. G. fon Gillenshmidta, Tula;

(12)-B (6)-1906 (two cartridge cases) – 1906, Manfred Weiss, Budapest. In both cases, the bullet was broken apart, and the neck was bent inwards. They represent Austro-Hungarian production for the Russian Empire. One-hundred million cartridges were ordered by Russian Empire from this factory because of greater demand due to the war with the Empire of Japan;

None of the M1908 7.62 × 54 mm R cartridge cases were fired.

(12)-913 (3)-К (6)-... (9)-Л (one cartridge case) – 1913, Luganskiy Patronnyi Zavod, brass supplier Kolchuginskiy Zavod Tsvetnykh Metallov. There are traces that the bullet was broken apart;

(12)-914 (3)-К (6)-I (9)-Л (one cartridge case) – first trimester of 1914, Luganskij Patronnyi Zavod, brass supplier Kolchuginskiy Zavod Tsvetnykh Metallov;

(12)-Т (6)-... (three cartridge cases) – Tulskiy Patronnyi Zavod;

(12)-12 (6)-II (one cartridge case) – second trimester of 1912.

There are no unfired M1893 7 × 57 mm cartridge cases. The headstamps of three artefacts are as follows:

(12)-H (6)-1913 (one cartridge case) – 1913, Hirtenberger Patronenfabrik, Hirtenberg;

(12)-H. (6)-1913 (one cartridge case) – 1913, Hirtenberger Patronenfabrik, Hirtenberg. Has remains of the cartridge clip (it might be that the bullet was broken apart after deposition);

Illegible headstamps (one cartridge case).

All the bullets discovered at the site come from 7.62 × 54 mm R ammunition. Some of them are of the M1891 type. Within this type, we can distinguish eight bullets with traces of a double-spot neck crimp, seven of which come from dismantled ammunition (which must have happened before the features were filled in with soil), and one of which has traces of having been fired. Another type – with a three-spot crimp – is represented by three unfired specimens and an additional one for which it is not possible to determine whether it had left the barrel due to the degree of corrosion. The number of spot crimps depends on the manufacturer.

Fig. 19. Examples of bullets discovered at the site. 1 – Russian bullet of M1891 7.62 × 54 mm R ammunition; 2 – Russian bullet of M1908 7.62 × 54 mm R ammunition. Photo by K. Grzyb, modified by K. Rosińska-Balik

Bullets of the M1908 type did not have these spots – the crimp went around the groove. Eleven of them had not been fired; additionally, one of them has a fragment of the neck's cartridge case (which may have happened after deposition); one was fired; and, in another case it was not possible to determine whether it had left the barrel (Fig. 19).

4. Elements and equipment of field fortifications

The last category, related to field fortifications, is comprised of the following items: the dugout's door hinge, nails and a grate hook. Also, some pieces of the decayed wood from the construction of the trench were discovered (Fig. 20).

All of the six discovered nails are quadrangular in cross-section and appear to have been bent in half (in four cases) or bent in different directions (in two cases). They are made of steel and can be divided into two groups. The first consists of three nails with a cross-section of about 0.6 × 0.6 cm, and which are 17.8-18.3 cm long, including one whose full length is not preserved. The second group consists of three nails, 0.4 × 0.4 cm in cross-section and 7.8-12 cm long. They were probably used to join wooden elements of the field fortifications' supporting formwork.

The discovered hinge, approximately 16.5 cm long, was probably a fastening element of the dugout door and was attached to the door frame. The size of the plate attached to the wood is approximately 6.5 × 6.5 cm. The plate has three nail holes (two are drilled approximately 1 cm away from the corners, and one is in the middle, approximately 2.5 cm from a side edge). The diameter of the joint pin is about 1.1 cm, while its length is about 5 cm. The lower decorative element, crowned with a sphere about 1.5 cm in diameter, turns into a cone of about 2 cm in length, with a diameter of about 0.8 cm at the bottom and about 1.5 cm at the top, and with a groove in its upper part, which goes around the entire perimeter of the top, and is about 0.5 cm wide and 0.3 cm deep.

Related to the stove is a forged, S-shaped grate hook, folded over the ring. It is made of part of a Russian iron horse bit. The ring is round in cross-section; it is about 0.5 cm thick, and about 5 cm in diameter. The hook is approximately 6.8 cm long and 0.7 cm thick. The bend of the hook allowed for a rod, about 1.5 cm in diameter, to be suspended from it. The tip of the hook was rolled up and hammered in, for a length of approximately 1.2 cm. It is highly likely that it was used to hang a cooking pan, a pot or a cauldron over the fire.

ANALYSIS OF THE FINDS. DETERMINATION OF THE EVENTS AND THE ARMIES OCCUPYING THE FORTIFICATIONS

In the analyzed collection, there are finds which, to varying degrees, provide evidence for the genesis of the already explored field fortifications, and which are, in various ways, useful in reconstructing the events of November 1914. The finds that cannot be ascribed to any particular side of the conflict are as follows: a safety pin, nails, a hinge, a grate hook

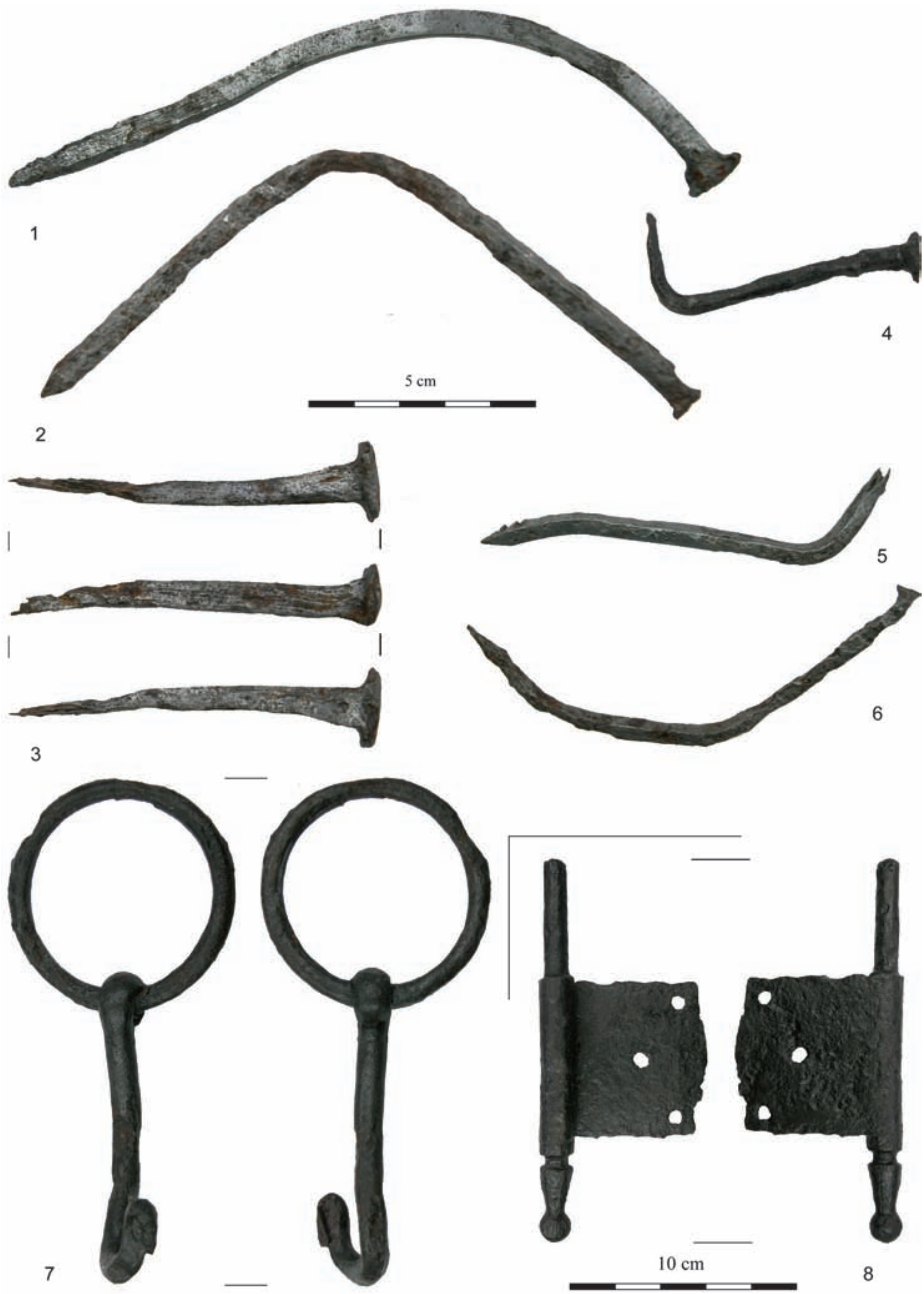


Fig. 20. Elements and equipment of field fortifications. 1-6 – nails of supporting formwork; 7 – grate hook; 8 – hinge of the dugout door. Photo by K. Grzyb, modified by K. Rosińska-Balik

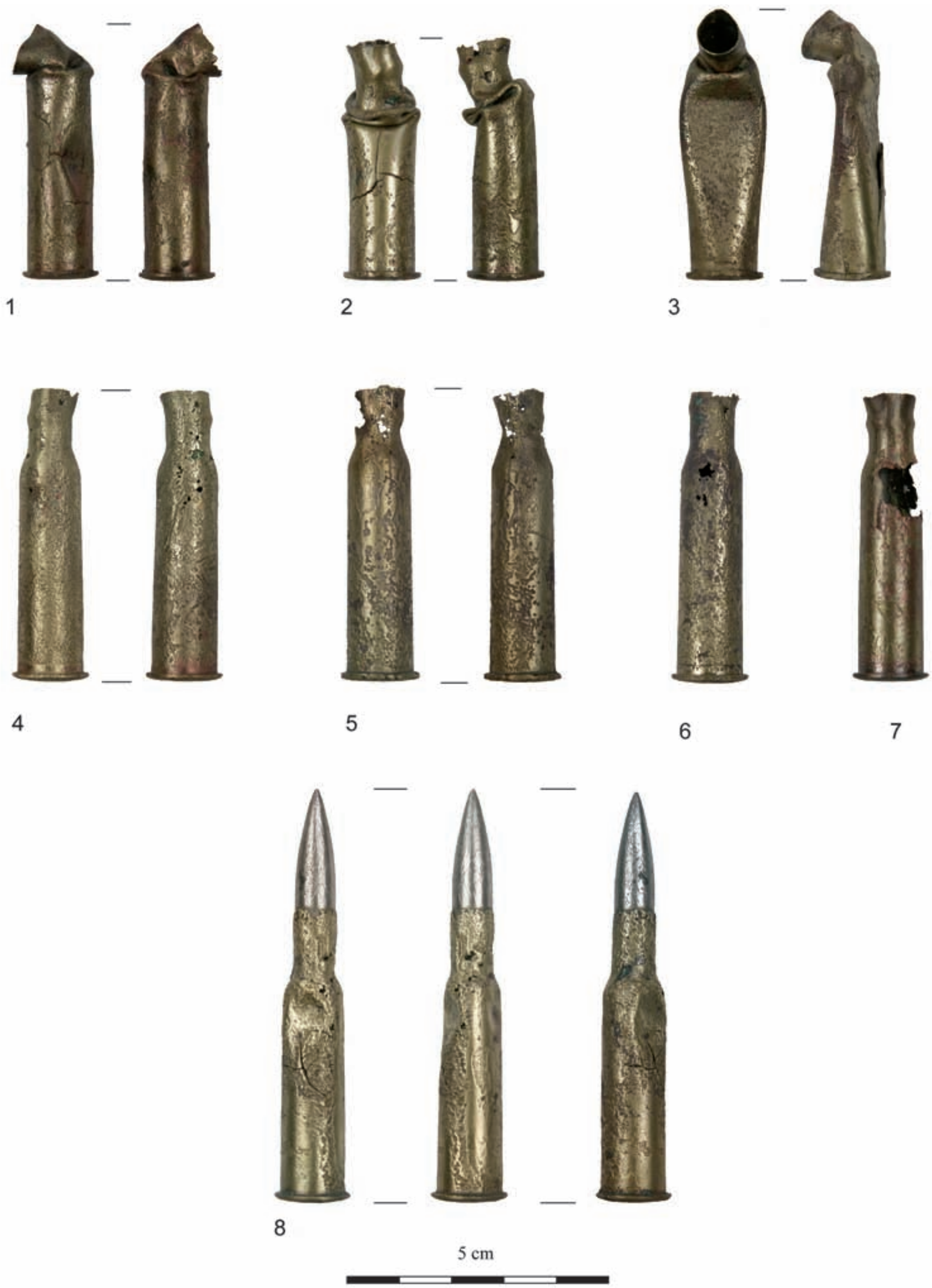


Fig. 21. Examples of cartridges with traces of damage. 1-7 – Russian 7.62 × 54 mm R cartridges with traces of intentionally broken apart bullets; 8 – Russian M1908 7.62 × 54 mm R cartridge with traces of trampling. Photo by K. Grzyb, modified by K. Rosińska-Balik

and the rifles used to make the grate. The rifles have defects, and their provenance, both Austro-Hungarian and Russian, cannot help us resolve the question of who made the grate from them. Most likely, they were collected from the battlefield during a break in fighting and considered unfit for further use in combat.

Some of the finds of known attribution demonstrate the presence of both armies at this site. On the one hand, this is very valuable information, because it shows the dynamics of the military operations and the capturing of each other's positions, along with the fact that there were soldiers from both sides of the conflict at the site. This group of finds includes both Russian and Austro-Hungarian small arms ammunition, components of the weapons of both sides, such as the Austro-Hungarian butt plate and the Russian sight leaf, two Russian coins and one Austro-Hungarian coin, and three buttons with broken shanks – one Austro-Hungarian and two Russian.

On the other hand, the finds suggesting a more intensive use of these fortifications by a specific army, as well as indicating the nature of the military operations are such finds as: a large amount of equipment of the Austro-Hungarian Army – the mess kit, the pieces of two knapsacks and the buckles, which must have been lost in the course of some sudden events, rather than during a period of passive stay at the site. Also, the presence of a fragment of the Russian time fuse suggests that this area was shelled by artillery. Significant is the fact that bullets had been broken apart, and their pieces were found, lying in large quantities next to the ammunition can, near the dugout's stove. This must have been done to obtain gunpowder to light a fire in the stove, which would not have been done using one's own ammunition, so it must have been done by Austro-Hungarian soldiers after they had taken over the ammunition abandoned by the Russians (Fig. 21). The analysis of the ammunition shows that there are no Russian cartridge cases, while the amount of Austro-Hungarian ones is large. This indicates a prolonged stay of the Russian Army in this place, and a violent and short one of the Austro-Hungarian Army, associated with their assault and the withdrawal of Russian troops from this line. The presence of two fired Russian bullets – even though it is not a representative sample like a Russian time fuse – could be a confirmation of this. In the collection, there is no bullets of ammunition intended for the Austro-Hungarian Mannlicher rifle.

The form of the trenches constructed at the site suggests Russian attribution. The location of the site with developed fortifications is closely related to the strategic use of the natural features of the terrain, and to the distance separating it from the forts of the Kraków Fortress. The location of the site on a slope with southern exposure, towards Kraków and the east, with parallel lines of shooting trenches pointing towards the town of Goszcza, indicates the direction of the planned attack and the direction of the enemy's expected presence. The berms of the trenches and shooting positions were facing in these directions, which further confirms the Russian character of the fortifications.

After the mobilization was announced, the vegetation in the forefield of the forts was cleared to increase the visibility of the advancing troops. Probably, these forts were visible to the Russian Army from the hill because, for example, the theoretical visibility of a single house in the terrain is 8.5 km, while that of a windmill – 10.5 km (Środulska-Wielgus 2002, 135). The forts of the Fortified Area of the Kraków Fortress took part in the battles fought nearby (fort 49 "Krzesławice" and fort 49 1/4 "Grębałów"). They defended the northern approach to the Fortress, *i.e.*, in the direction where the site under discussion is located. The distance between the site and Fort 49 "Krzesławice" was about 10 km, ensuring the safe stay of soldiers in this place, which was beyond the range of the Fortress artillery. The range of the cannons in these forts did not reach such a distance; it was only possible to shell the forefield of the site. The armament of the heaviest guns of the main artillery fort, 49 "Krzesławice", *i.e.*, six 15 cm M1861 cannons, could only reach a distance of 6200 m (shrapnel shells) – 6400 m (artillery grenades; Ortner 2007, 251).

The presence of nails and decayed wood suggests that the fortifications were supported with formwork. In the case of the dugout, the hinge provides indirect evidence that it had a door. Also, the analysis of the depth of these features suggests that the dugout's roof was elevated above the ground. Worth noting is the *ad hoc* manufacture of some of the bricks used for the construction of the stove from the available clay. Of interest is the discovery of the Steyr M1912 and the ammunition to go with it, which were export commodities to Mexico. This proves that the reserve force, *e.g.*, Landsturm, who were the crew of the Kraków Fortress and who made raids on the Russian positions, participated in the fights as well. Equally interesting is the discovery of two cartridge cases for the Russian Mosin rifle, made in 1906 in the Austro-Hungarian Monarchy at the Manfred Weiss factory in Budapest, ordered in connection with the war between the Russian Empire and the Empire of Japan, and used after the outbreak of World War I against Austria-Hungary.

The above conclusions are confirmed by historical sources. Most likely, the construction of these positions had already begun in the initial phase of the Russian offensive, *i.e.*, from November 14, 1914. The information about the capture of Goszcza indicates that the Austro-Hungarian Army possibly carried it out on November 17, 1914. It pushed back the Russian Army and continued its attack towards Słomniki. The finds of Austro-Hungarian origin discovered in the Russian field fortifications are related to this episode.

The analyzed results of the excavations are a good example of the archaeological verification of historical sources. Such results may often enrich the information provided in the literature. Modern battlefields yield large amounts of archaeological finds, which often carry important information that is easier to interpret than materials from older epochs. There is still a real need to develop the research methodology for such specific types of sites, where interdisciplinarity could satisfy, at least, some of the expectations placed on research (Karasiewicz and Wrzosek 2019; Niebylski 2018; 2020; Sabaciński 2015; Zalewska 2019; Zalewska *et al.* 2019).

References

Adjustierungsvorschrift… 1911. *Adjustierungsvorschrift für das k. u. k. Heer 1910/1911*. Wien: Verlag Militaria.

Bator J. 2005. *Wojna galicyjska*. Kraków: Wydawnictwo Libron.

Bussard M. 2017. *Ammo Encyclopedia For all Rimfire and Centerfire Cartridges, plus Shotshells*. Minneapolis: Blue Book Publications.

Chumak R. N. 2007. *Russkiy 7,62-mm vintovochnyi patron. Istoriya i evolutsiya*. Sankt-Peterburg: Atlant.

Ciemiński J. 2014. *Znakowanie łusek wojskowej amunicji strzeleckiej wybranych krajów europejskich* (= *Archeologia Wojenna Extra* 1). Gdów: Instytut Wydawniczy Archeologia Militaris.

Conklin Ch. 2016. *Military cartridge headstamps. Collector's guide. Code book*. Westminster: Heritage Books.

Dąbrowski J. 2009. *Carskie trzy linie. Rosyjski 3” nabój karabinowy (7,62 x 54R) w latach 1891-1917*. Warszawa: Self-published.

Dąbrowski J. 2015. *Wielka wojna 1914-1918. Tom. I*. Oświęcim: Napoleon V.

Elterlein S. 2016. *Taktyka szturmowa armii austro-węgierskiej i niemieckiej w I wojnie światowej*. Oświęcim: Napoleon V.

Haładaj K. and Rozdżestwieński P. 2010. *Karabiny i karabinki Mauser 98 w Wojsku Polskim w latach 1918-1939*. Warszawa: Wydawnictwo ZP.

Hinterstoisser H., Ortner Ch. M. and Schmidl E. A. 2006. *The Austrian Mountain Troops. History, Uniforms and Equipment of the Austrian Mountain Troops from 1906 to 1918*. Wien: Verlag Militaria.

Horstenau G. E. 1932. *Österreich-Ungarns letzter Krieg 1914-1918*. Wien: Verlag der Militärwiss. Mitteilungen.

Hýkel J. and Malimánek V. 1998. *Náboje do ručních palnych zbraní*. Praha: Naše vojsko.

Jung P. 2017. *Armia austro-węgierska w I wojnie światowej (1). 1914-1916* (= *Men-at-Arms* 392). Oświęcim: Napoleon V.

Karasiewicz K. and Wrzosek J. 2019. Amunicja strzelecka z badań archeologicznych pozostałości frontu nad Rawką i Bzurą (1914-1915). Próba analizy. In A. I. Zalewska (ed.), *Archeologiczne przywracanie pamięci o wielkiej wojnie w rejonie Rawki i Bzury (1914-1915)*. Warszawa: Instytut Archeologii i Etnologii PAN, 261-275.

Kisak P. F. 2016. *A comprehansive guide to rifle ammunition vol. 2 of 2*. Virginia: Diamond Publications.

Krčma V., Hýkel J. and Neshyba P. 2016. *Atlas nábojů do ručních palnych zbraní*. Praha: Naše vojsko.

Labbett P. 1982. *Encyclopedie mondiale des munitions modernes*. Paris: Pygmalion.

Mötz J. 1996. *Österreichische militärpatronen. Band 2*. Wien: Verlagsbuchhandlung Stöhr.

Niebylski J. 2018. Fenomen zamka skałkowego. Skałki ze wzgórza wawelskiego odbiciem wytwórczości skałkarskiej monarchii austriackiej. *Krzysztofory. Zeszyty Naukowe Muzeum Historycznego Miasta Krakowa* 36, 57-74.

Niebylski J. 2020. Wielka Wojna na nadwiślańskim przedpolu Twierdzy Kraków. In K. Tunia (ed.), *Kartki z dziejów igołomskiego powiśla*. Igołomia, Pękowice: Wydawnictwo i Pracownia Archeologiczna Profil-Archeo, 251-272.

Niedziółka K. 2016. The prospect of digitalization of Polish Archaeological Record on an example of materials from the turn of Bronze and Iron Age from area of Pomeranian Voivodeship (Northern Poland). *Sprawozdania Archeologiczne* 68, 121-144.

Orman K. and Orman P. 2015. *Wielka Wojna na Jurze. Działania i cmentarze wojenne z roku 1914 na Wyżynie Krakowsko-Wieluńskiej i terenach przyległych*. Kraków: Wydawnictwo Libron.

Ortner C. M. 2005. *Storm Troops. Austro-Hungarian Assault Units and Commandos in the First World War. Tactics, Organisation, Uniforms and Equipment*. Wien: Verlag Militaria.

Ortner C. M. 2007. *The Austro-Hungarian Artillery from 1867 to 1918. Technology, Organization and Tactics*. Wien: Verlag Militaria.

Ortner C. M. and Hinterstoisser H. 2013. *The Austro-Hungarian Army in the First World War – Uniforms and Equipment – from 1914 to 1918. Band 2*. Wien: Verlag Militaria.

Pałosz J. 2012. *Śmiercią złączeni. O cmentarzach z I wojny światowej na terenach Królestwa Polskiego administrowanych przez Austro-Węgry*. Kraków: Wydawnictwo Libron.

Przybyła M., Podsiadło M. and Stefański D. 2019. Prehistoric defensive structures in the Szreniawa valley. *Sprawozdania Archeologiczne* 71, 303-339.

Sabaciński M. 2015. Relikty archeologiczne Wielkiej Wojny. Znikające dziedzictwo, poza nawiasem nauki i konserwatorstwa. *Ochrona Zabytków* 68, 131-140.

Sbornik… 1915. *Sbornik opisaniy predmetov i materialov zagotovlaemykh Intendantstvom dlia dovolstviya voysk*. Petrograd: Tipografiya Shtaba voysk Gvardii i Petrogradskago Voennago Okruga.

Schall M. 2014. *Der Zauber der Montur. Katalog des k.u.k. Armee-Ausstatters Max Schall in Wien, 1914/1915. Kommentierte Neuauflage*. Wien: Verlag Militaria.

Środulska-Wielgus J. 2002. Zadrzewienia maskujące Twierdzy Kraków jako element tworzenia współczesnego krajobrazu miasta. In J. Bogdanowski and M. Holewiński (eds), *Zamki. Miasta warowne. Ogrody. Relacje historycznych założeń fortyfikacyjnych oraz terenów zielonych w miastach zabytkowych*. Kraków: Komisja Architektury i Urbanistyki PAN O/Kraków, Samodzielna Katedra Teorii Architektury Krajobrazu i Kompozycji Ogrodowej Wydziału Architektury PK, 127-146.

Woodard T. W. 2011. *Shooter's bible. Guide to cartridges*. New York: Skyhorse Publishing.

Wrobel K.-H. 1999. *Drei Linien. Die Gewehre Mosin-Nagant*. Schwäbisch Hall: Journal-Verlag Schwend GmbH.

Zalewska A. I. (ed.) 2019. *Archeologiczne przywracanie pamięci o wielkiej wojnie w rejonie Rawki i Bzury (1914-1915)*. Warszawa: Instytut Archeologii i Etnologii PAN.

Zalewska A. I., Czarnecki J. and Kiarszys G. 2019. *Krajobraz Wielkiej Wojny. Front nad Rawką i Bzurą (1914-1915) w świetle teledetekcji archeologicznej i źródeł historycznych*. Warszawa: Fundacja Przydrożne Lekcje Historii.

Żuk A. B. 2016. *Karabiny, karabinki i pistolety maszynowe. Encyklopedia długiej broni wojskowej XX wieku*. Warszawa: Fundacja Historia i Kultura, Bellona.

SPRAWOZDANIA ARCHEOLOGICZNE 72/2, 2020
PL ISSN 0081-3834
DOI: 10.23858/SA/72.2020.2.2167

D I S C U S S I O N S A N D P O L E M I C S

Denys Grechko[1]

CHRONOLOGICAL SCHEMES OF THE LATE HALLSTATT PERIOD (HaD) IN CENTRAL EUROPE: NEW OPPORTUNITIES FOR THE SYNCHRONIZATION AND REFINEMENT OF DATES

ABSTRACT

Grechko D. 2020. Chronological schemes of the Late Hallstatt period (HaD) in Central Europe: new opportunities for the synchronization and refinement of dates. *Sprawozdania Archeologiczne* 72/2, 585-605.

Unification of regional chronological schemes is one of the key issues in Early Iron Age archaeology. The main markers of the Late Hallstatt period are Scythian arrowheads and antique imports. Biconical glass beads, produced at the Yahorlyk settlement (in the first third of the VIth century BC), were found in the Eastern European Forest-Steppe and in the area of the Tarnobrzeg Lusatian Culture. This period is synchronised with the HaD1 of Central Europe, phase III/1 of the TLC and the late group of burials of the second phase of the Kelermes period. Its final phase is associated with the so-called "Scythian invasions" in Central Europe, which led to the decline of the Chotyniec agglomeration, West-Podolian and East-Podolian groups. A few TLC complexes of the Grodzisko Dolne, site 22, can be dated somewhat later, to the middle or second half of the VIth century BC (HaD2). Also, at this time, the Pomeranian population appeared in the south-eastern area of the Lusatian tribes and a new culture model (post Lusatian-Pomeranian stage) arose.

Keywords: Central Europe, Tarnobrzeg Lusatian Culture, East European Forest-Steppe groups, biconical glass beads, Late Hallstatt period, chronology
Received: 24.06.2020; Revised: 10.08.2020; Accepted: 11.11.2020

1 Institute of Archaeology of National Academy of Sciences of Ukraine, Geroiv Stalingrada 12, 04210 Kyiv, Ukraine; ukrspadshina@ukr.net; https://orcid.org/0000-0003-3613-795X

INTRODUCTION

The combination of regional chronological schemes into a single transregional chronology is one of the key issues in studies of the European Iron Age. Separate finds and entire complexes of the Early Scythian material culture in the middle of the VII – the middle of VI century BC are known throughout the wide territory of Northern Eurasia, in the areas of distribution of various cultural entities, which gives certain opportunities for the synchronization of local chronological schemes.

Based on dates obtained for complexes with glass beads, this paper deals with the chronological correlation of complexes dating to the Early Scythian time of the south of Eastern Europe and the Tarnobrzeg Lusatian Culture (TLC). All information about the finds of biconical glass beads on the territory of Europe in the Late Hallstatt period was collected. To clarify their dating, complexes that contained reliable chronological indicators (first of all, antique amphorae) were selected. Burials of the Eastern European Forest-Steppe can be attributed to the second phase of the Kelermes period (first third of the VI century BC). Comparison of these complexes to the materials from the TLC revealed the difference in their dating. Transferring the "Scythian" dates to the Lusatian complexes made possible the clarification of their dating within the period III/1 TLK. The linking of other data (arrowheads, pins, nail-shaped earrings) enabled the synchronization of the chronological schemes of Eastern and Central Europe in the Late Hallstatt period (HaD).

Recently, Sylwester Czopek developed the chronology and periodization of the TLC, which were successfully synchronized with the Hallstatt chronology and the Cimmerian and Scythian horizons (Czopek *et al.* 2018, 128). In recent years, data (from Modlnica, Grzęska *etc.*), which help to clarify the dating of both individual complexes of the TLC (phase III/1) and the settlements of the Chotyniec agglomeration, have emerged.

A prominent place in archaeological research has been rightfully occupied by radiocarbon dating. It should be noted that for the Hallstatt period, its use does not always give a positive result. Sylwester Czopek has already pointed out the incorrect radiocarbon dating of the lower part of the rampart at the Chotyniec hillfort (date calibration clearly indicated the IX century BC) and the fact that two broad dates (2680±40 BP, 2470±50 BP) from the Hrushovychi settlement were the results of the alignment of the calibration curve during the Central European Early Iron Age – the so-called Hallstatt gap (*ca.* 800-400 BC; Czopek *et al.* 2018, 197). Therefore, archaeological data and its methods should occupy a more central – and perhaps the foremost – position in the dating of complexes from this time.

The aim of this work is to search for opportunities to correlate the complexes dating to the Early Scythian time in the south of Eastern and Central Europe and the TLC, as a kind of "bridge" for synchronizing the chronological scheme of "Scythian" antiquities and Hallstatt period.

BICONICAL GLASS BEADS AS CHRONOLOGICAL MARKERS

Nowadays, the most accurate way to date the complexes of the Early Iron Age is via ancient Greek imports. A significant amount of such imports (pottery and adornments) began to spread among the nomads and settled tribes of the European Forest-Steppe from the end of the VII to the first third of the VI century BC, in connection with the intensification of Greek activity at the Berezan settlement and the work of craftsmen of the Yahorlyk settlement. In the course of working with the complexes, I drew attention to the biconical glass beads of various colours and shades that were found in burials and cultural layers – of both the cultural groups of the Dnieper and Dniester Forest-Steppes, and in the distribution area of the TLC in south-eastern Poland.

Polish specialists also drew attention to these imported products (Czopek 2011, 116, 129; Purowski 2012; 2015). The biconical glass beads of light green and honey colours were classified by Sylwester Czopek as type B (Czopek 2011, 116, 129), and by Tomasz Purowski as type I.VI (Purowski 2015, 225). Tomasz Purowski collected all the data about complexes with glass beads of this type: Modlnica, Dobkowice, Gorzyce, Grodzisko Dolne,

Fig. 1. Cultural groups and biconical glass beads from the sites of Central and Eastern Europe of the late Hallstatt period (HaD1). 1 – Solodka; 2 – Vovkivtsi; 3 – Poltava; 4 – Repiakhuvata Mohyla; 5 – Grzęska; 6 – Modlnica; 7 – Yahorlyk; 8 – Bilsk (Skorobir); 9 – Trynka; 10 – Spasivka; 11 – Wicina; 12 – Dobkowice; 13 – Gorzyce; 14 – Jasionka; 15 – Kępno; 16 – Kosin; 17 – Lubnice; 18 – Sokolniki; 19 – Trzęsówka; 20 – Zabłotce; 21 – Shutnivtsi; 22 – Sokolets; 23 – Zozulyntsi. I – West–Podolian group; II – East–Podolian group; III – Kyiv-Cherkasy group; IV – Vorskla group

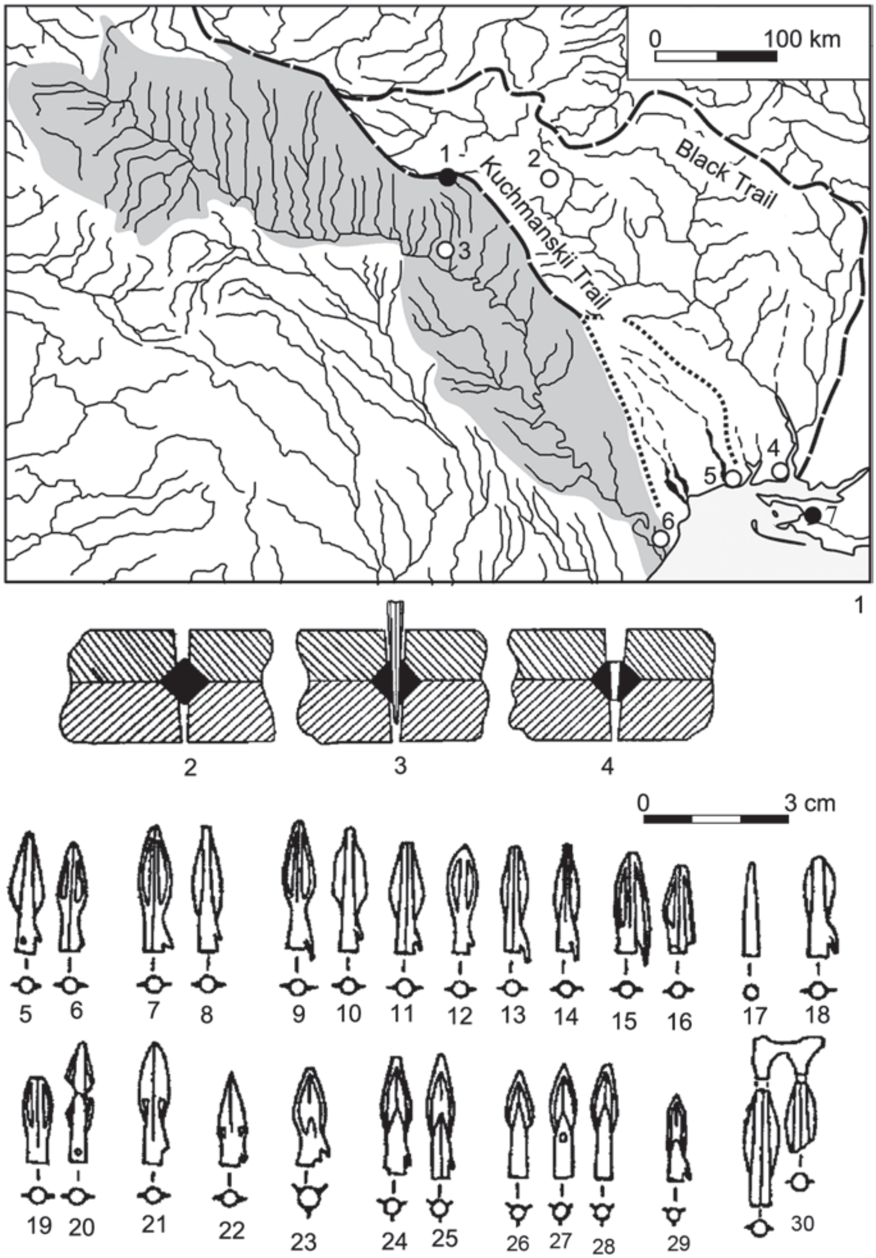


Fig. 2. Land routes and materials of the Yahoryk settlement. 1 – ancient roads of the interfleuve of the Dniester and Southern Bug rivers: (1 – Severynivka hillfort; 2 – Nemyriv; 3 – Hryhorivka hillfort; 4 – Olbia; 5 – Berezan; 6 – Nikonion; 7 – Yahorlyk; Boltryk *et al*. 2015); 2-4 – a probable method of making beads at the Yahorlyk settlement by pressing (Ostroverkhov 1978); 5-30 – arrowheads from the Yahorlyk settlement (Ostroverkhov 1981)

Gręska, Jasionka, Kosin, Sokolniki, Trzęsówka, Zabłotce, Wicina, Kępno, and Łubnice (Fig. 7: 3; Purowski 2015, 5, 226). In addition, analyses of the chemical composition of these items were also carried out (Samek *et al*. 2007; Purowski *et al*. 2015, 239-254).

Polish leading experts have dated such beads to the late part of the HaD period (Purowski 2012, 308, 330) or from the late part of HaD – the beginning of La Tène (LtA, phase III/2 TLK), corresponding to the second half of the VI – the first half of the V century BC. It should be noted that this group of complexes is chronologically homogeneous (Czopek 2011, 130-131; Czopek *et al*. 2016, 88). Similar dating of nail-shaped earrings, which often made up a single set with beads, places them earlier (Gręska, burial No. 54 – Fig. 7: 1; Czopek *et al*. 2016, 88). Interestingly, Tomasz Purowski (Purowski 2015, 225-226) and Sylwester Czopek did not pay attention to the presence of similar beads at the Yahorlyk settlement and in well-dated burials of the Eastern European Forest-Steppe, which will be discussed in this article. Tomasz Purowski believes that the beads were made in the Northern Black Sea Region and entered the Odra and Vistula interfluve through south-eastern Poland at the end of the Hallstatt period (Purowski 2015, 227). A team of authors of research dedicated to glass beads of the TLC connects the appearance of such beads with an oriental influence, which is called "Scythization" (Samek *et al*. 2007, 106).

An appeal to well-known complexes allows us to clarify the dating of this category of antique imports and, with their help, to attempt to synchronize chronological schemes – the Early Scythian and the TLC.

The location of the production of these beads is not in doubt among the majority of researchers – the Yahorlyk settlement in the bay of the same name in the Black Sea (Fig. 1: 7), between the Kinburn spit and the Yahorlytskyi Uhol Peninsula (Ostroverkhov 1978; Ilinskaya *et al*. 1980, 49; Shramko 2017, 375). Traces of glass melting (crucibles and cones filled with glass, and defective beads), as well as traces of the production of bronze products (arrowheads, adornments, *etc*.) were revealed in this settlement (Fig. 2: 2-30; Ostroverkhov 1978, 41-42; 1981, 26-30). Analysis of the ceramic collection of this site allowed A.V. Buyskikh to attribute its functioning to the first third of the VI century BC, and to suppose that it functioned, in fact, within the life of one generation of colonists. According to researchers, the site is in use from the first quarter of the VI century BC, but it does not survive even until the middle of the century (Buyskikh and Buyskikh 2010, 24-26).

There are two more funerary complexes of the Dnieper Forest-Steppe that we know of, which, based on finds of ancient Greek vessels together with the beads under question, confirm the dating of the production and usage of these adornments in the chronological framework of the Yahorlyk settlement.

The first such complex is the standard one for the chronology of Early Scythian material culture – the inlet burial of the Repiakhuvata Mohyla in the Dnieper right-bank Forest-Steppe (Ilinskaya *et al*. 1980). The find of the Miletus amphora and the Ionian jug in the complex, together with the beads, enable us to attribute this complex to the first two decades of the VI century BC (Fig. 3; see discussion: Grechko 2012).

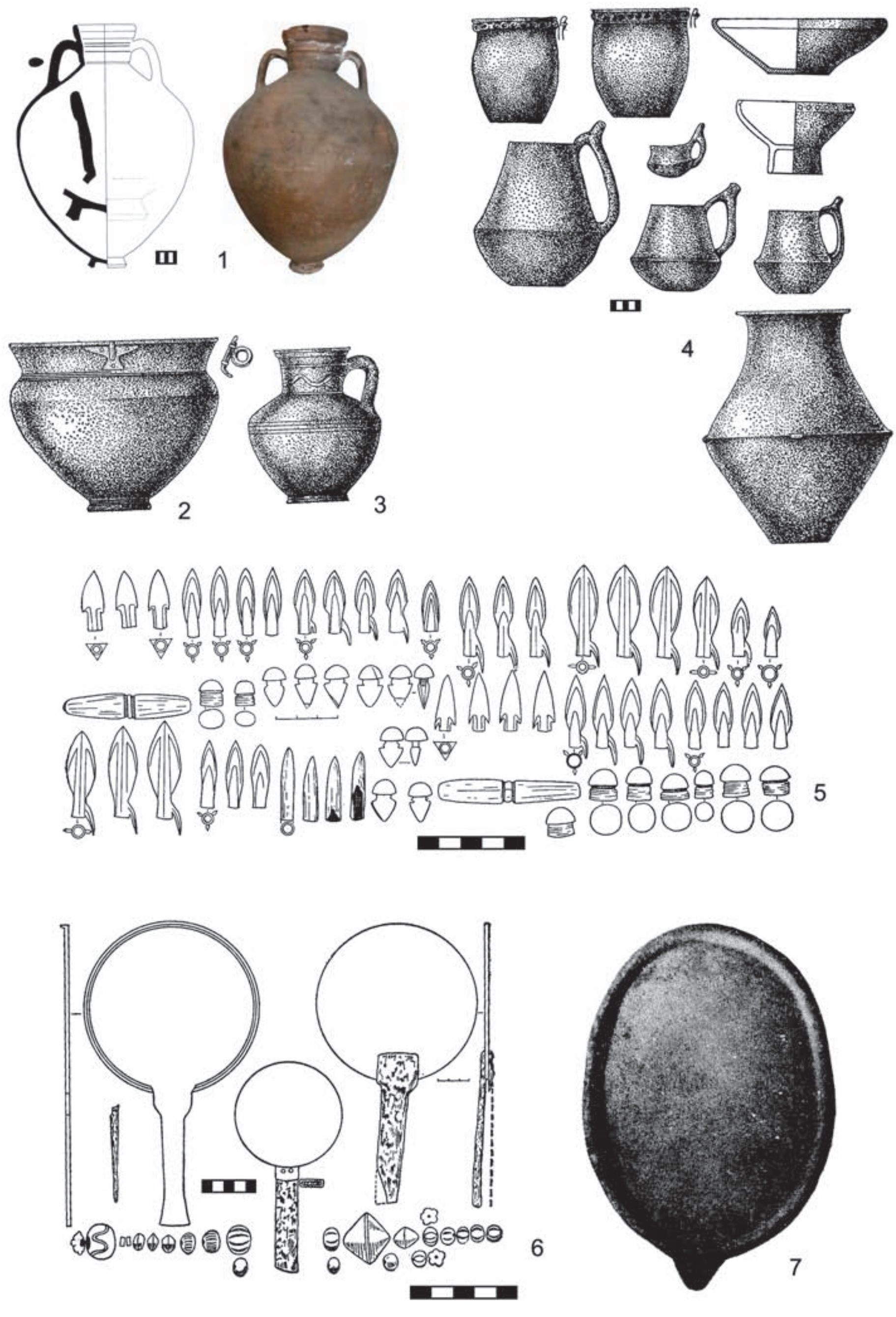


Fig. 3. Inventory of the inlet burial of Repiakhuvata Mohyla (Ilinskaya *et al.* 1980; Daragan 2010)

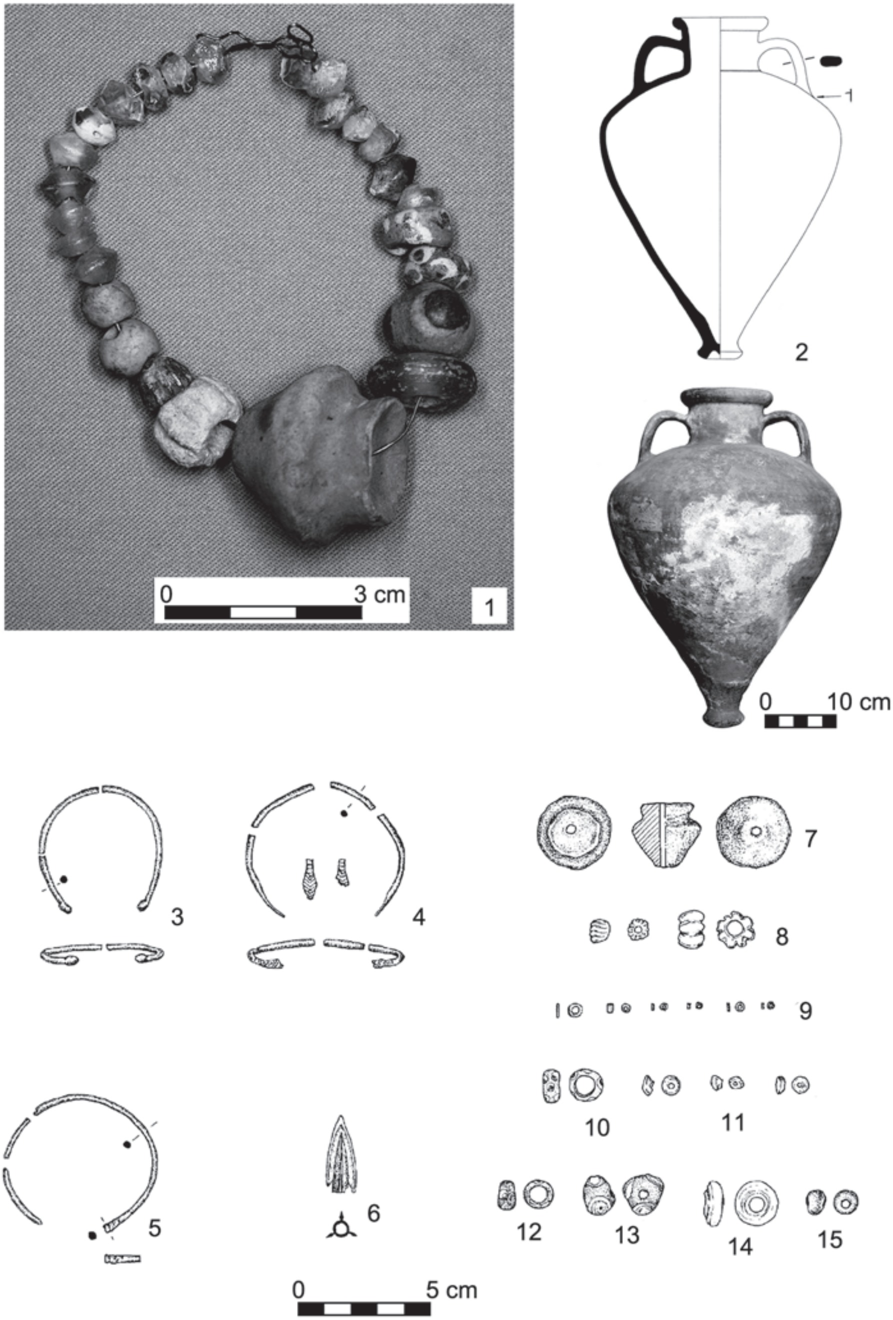


Fig. 4. Finds from mound No. 5 near Vovkivtsi village in the Sula River region (Lomtadze and Firsov 2012)

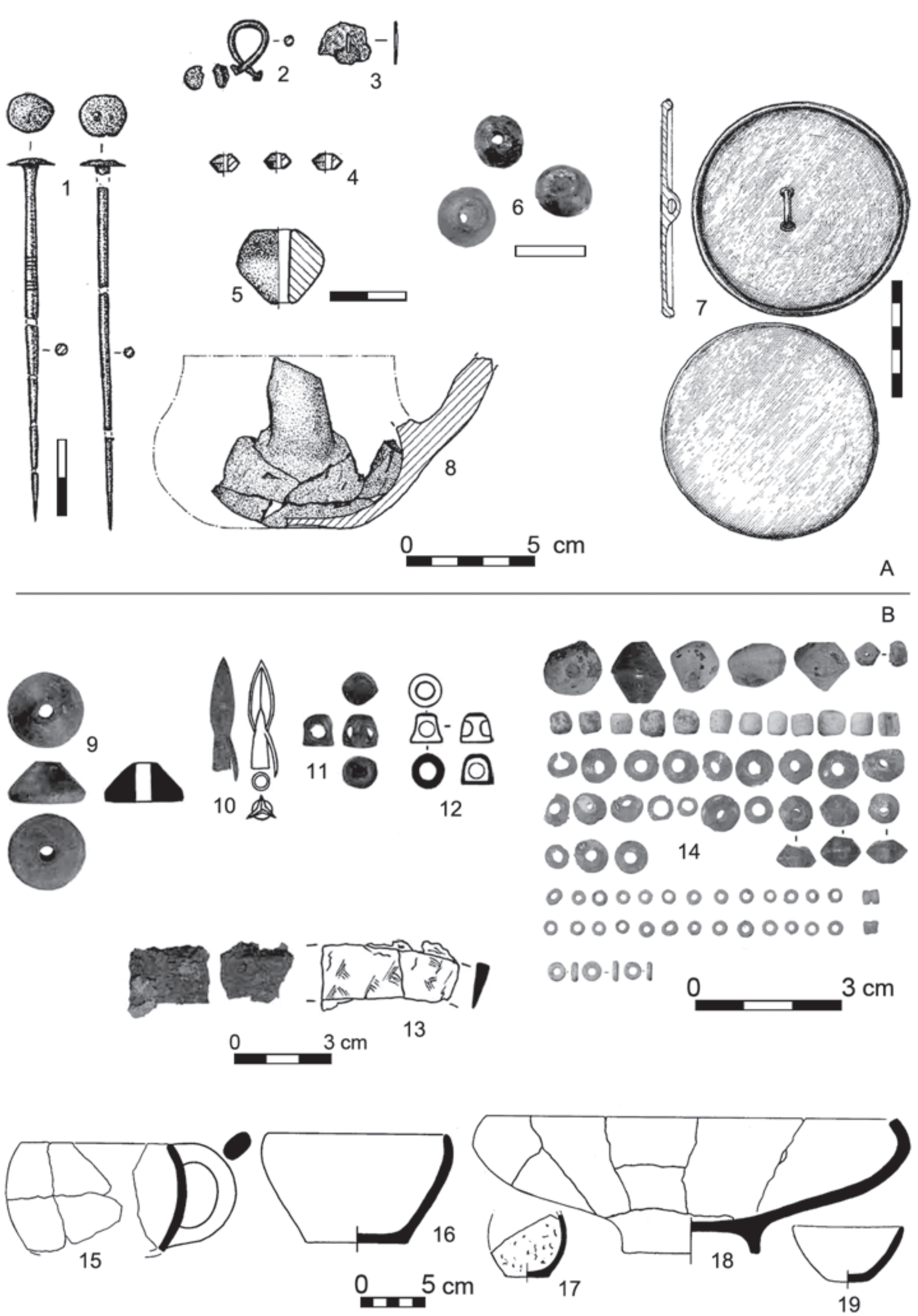


Fig. 5. Inventory of burial No. 1 in Poltava (1) and the burial in barrow No. 1/2016 in Skorobir (Bilsk) site (Suprunenko 2016; Shramko 2017)

In the burial mound near Vovkivtsi village in the Sula River basin (Dnieper left-bank forest-steppe; Fig. 1: 2), along with a set of adornments (biconical beads, bracelets, *etc.*), the archaic Samos amphora of the first quarter (third?) of the VI century BC was revealed (Fig. 4; Lomtadze and Firsov 2012, 281-297). In addition, similar beads were found in the Sula River basin in mound No. 2 near Vovkivtsi village, and in mound No. 2 in the Solodka locality (Ilinskaya 1968, Pl. 12: 27-28, 34: 11).

This dating does not contradict the complex of barrow No. 1/2016, investigated in the Skorobir locality in Bilsk, which was also dated by Iryna Shramko to the first quarter of the VI century BC (Fig. 5: B; Shramko 2017, 378).

One of the most archaic complexes with biconical glass beads could be burial No. 1 in Poltava, on the right bank of the Vorskla River (Fig. 5: A), which was accompanied by a bronze mirror with a central handle, pins and nail-shaped earrings (Fig. 9: A; Suprunenko 2016, 264, fig. 6). On the other hand, the discovery of the beads, which were made at the Yahorlyk settlement, suggests the usage of similar mirrors in the first quarter of the VI century BC, as researchers have already noted (Shramko 2017, 375). In general, mirrors are often older than the age of the burial, which may indicate their continued usage. As an example, one could mention Aksai-I, burial mound No. 10/1. Mirrors with a broken central handle, as well as so-called “Olbian-type” were found in the burial. Researchers justifiably consider the mirrors to be older than the burial itself (V c. BC; Shilov and Ochir-Goriaeva 1997, 132, 151). It is worth adding, in my opinion, that the mirrors themselves are clearly asynchronous.

Another vector of synchronization is provided by the complex of barrow No. 5 near Spasivka village on the Middle Dniester River (Mogilov 2016). In the burial, among the inventory biconical beads, a bronze arrowhead of the transitional period – analogies: Debastopolchany (Szabó *et al.* 2014), Smolenice-Molpir (Hellmuth 2006) – and a horn cylinder with geometric ornaments (Fig. 6: 5; Mogilov *et al.* 2016, 220, fig. 13) were found. The closest analogy to this cylinder is an item from mound No. VI of the Trinka necropolis (Trinka-Drumul Fetestilor), where similar biconical beads were discovered (Fig. 6: 3). This burial ground was left by a mixed population, which was influenced by the Western Podolian and Podolian-Moldavian cultural groups. Researchers date the necropolis from the middle of the VII – the first quarter of the VI century BC (Levitsky and Kashuba 2009, 257-263). Findings of beads help to clarify the dating of these complexes, placing them specifically in the first quarter (third?) of the VI century BC.

The complexes with biconical beads from burials of the TLC (Fig. 7: 1-2) were attributed by specialists to the period III/1 (HaD) – the beginning of LtA (second half of the VI – the first half of the V c. BC; Czopek *et al.* 2016, 88). Burials were accompanied by nail-shaped earrings, pins with loop-shaped heads and earrings of the “Kłyżów type” (Modlnica, 5, feature 927; Dzięgielewski 2015, 91, fig. 62, b, c, d). It should be noted that unlike pins, fibulae were not actually used by the TLC tribes (Gedl 2004).

An interesting parallel is mound complex No. 3 near Teklivka village on the Middle Dniester River, where both types of earrings were found together (Fig. 7: 4; Gutsal *et al.* 2011).

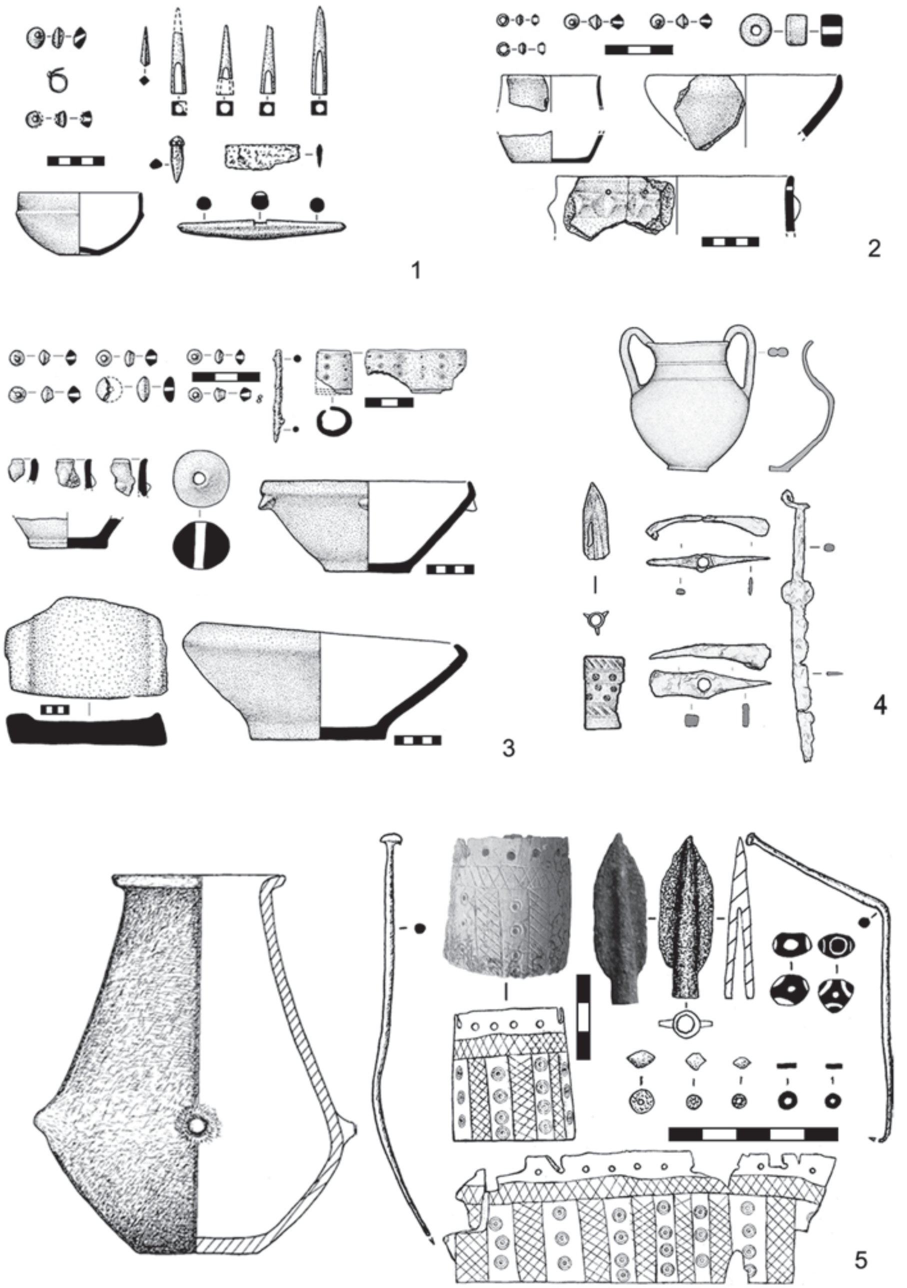


Fig. 6. Materials from the burials of the Late Hallstatt period of the Dniester River region and the Danube basin. 1 – Trynka, barrow No. I; 2 – Trynka, barrow No. II; 3 – Trynka, barrow No. VI; 4 – Bátmonostor-Szurdok; 5 – Spasivka, barrow No. 8 (Levitsky and Kashuba 2009; Mogilov 2016; Gyucha *et al.* 2015)

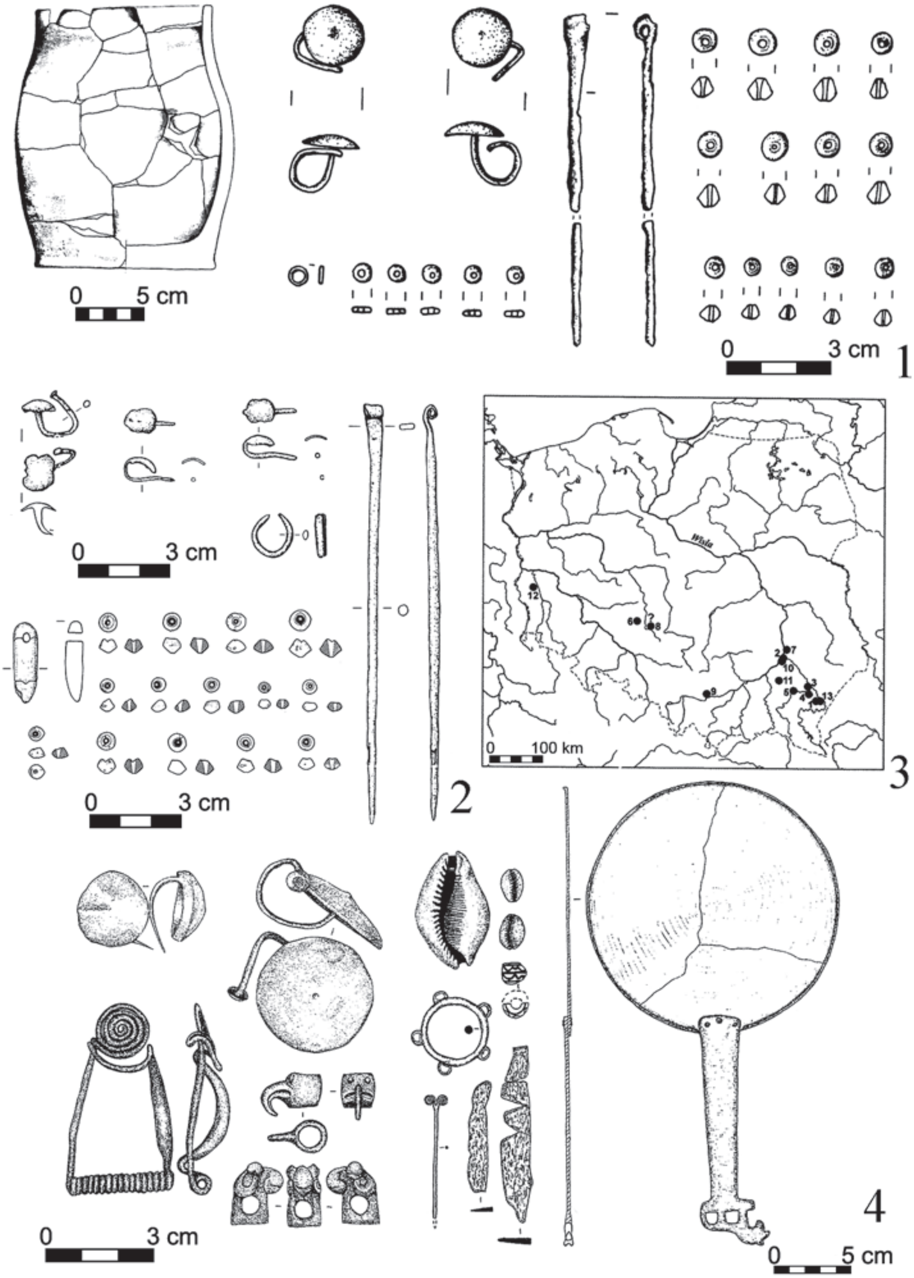


Fig. 7. Complexes of the Lusatian culture with biconical glass beads, and the materials from burial mound No. 3 near Teklivka in the Dniester River basin (4; Gutsal *et al*. 2011). 1 – Grzęska, burial No. 54 (Czopek *et al*. 2016); 2 – Modlnica, site No. 5, burial No. 927 (Dzięgielewski 2015); 3 – biconical beads in the Vistula-Oder interfluve (Purowski 2015)

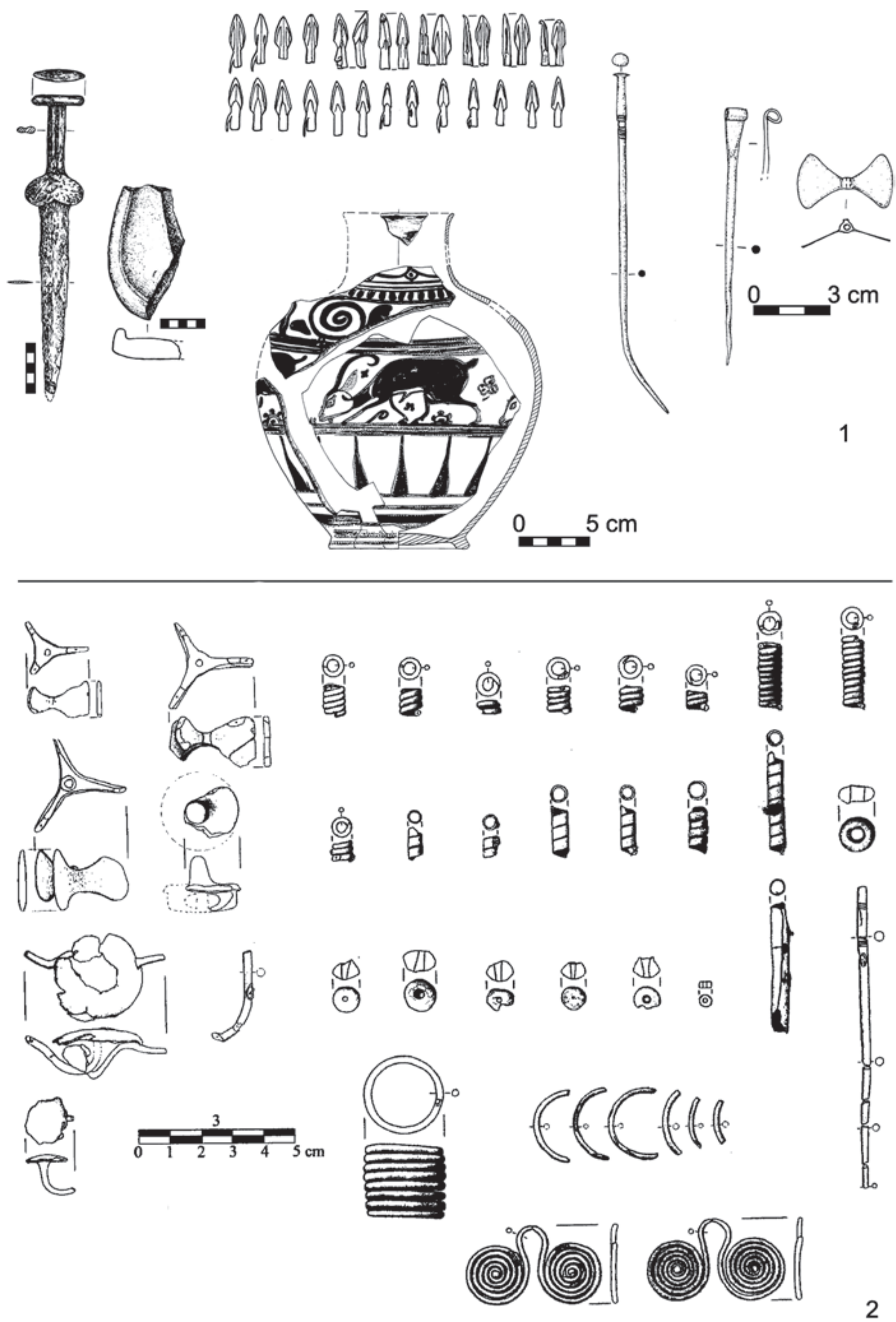


Fig. 8. Materials from the destruction layers of the Trakhtemyriv hillfort (1; Fialko and Boltryk 2003) and the complex of finds from Zabłotce (2; Bajda-Wesołowska *et al.* 2014)

J. Kowalski-Bilokrylyy considers them ("Kłyżów type") to be imitations of gold items of the late VII – the early VI century BC, represented in the Western Podolian group (Teklivka, mound No. 3; Dolyniany; Kowalski-Bilokrylyy 2014, 63). S. Czopek also suggests the eastern origin of these items (Czopek 1996). An important find *vis-à-vis* dating is a bronze, harp-shaped fibula (Gutsal *et al.* 2011), found in the Teklivka complex. Similar fasteners are typical for the Eastern Hallstatt and are well-known at the complexes of periods HaC-D of the Lusatian culture (Gedl 2004, 87-88).

In the Zabłotce complex, along with biconical beads, nail-shaped earrings and three triple-bladed products similar to propellers were found (Fig. 8: 2; Bajda-Wesołowska *et al.* 2014). It is worth mentioning an important find of a similar product in the moat of the Trakhtemyriv hill-fort, along with arrowheads and a Wild-Goat-style "B" oenochoe (Northern Ionia, Klazomenai?; Fig. 8: 1), which experts dated back to the second decade of the VI century BC (Fialko and Boltryk 2003, 42, 59-61). This analogy does not contradict the dating of this layer (horizon) of monument, in which biconical glass beads were found, to the first quarter (third?) of the VI century BC.

One of the benchmarks can be the date of the destruction of the Wicina fortified settlement, which is the westernmost location in which biconical glass beads have been found (Purowski 2015, 226, fig. 5). According to dendrochronology, it is now determined to be sometime after 571 BC (the time of the last repair of wooden defensive structures – Krąpiec and Szychowska-Krapiec 2013, 373-374). Recently, Jan Chochorowski, based on the totality of the data, placed the destruction of the fortification no later than 560 BC (570/560 BC; Khokhorovsky 2019, 229). This dating of the final functioning of the settlement does not contradict the fact that biconical glass beads were used in the first third of the VI century BC.

These ancient Greek items could have penetrated so far west via the traditional path along the Dniester River and the northern slopes of the Carpathians. Interestingly, this route could have been used by nomads during a campaign in Central Europe around the middle of the VI century BC (Fialko and Boltryk 2003, 88, fig. 32). Two daggers from Silesia could be related to the nomad campaign (Legnica and Łubnice; Bukowski 1977; Baron and Miazga 2013).

VARIANT OF CHRONOLOGICAL SCHEMES SYNCHRONIZATION

The horizon of "biconical glass beads" / HaD1 / The second phase of the Kelermes period / III/1 (time of peaceful co-existence and exchange). To synchronize the chronological horizons of different groups of the Lusatian population, fibulae are of great importance. For example, harp-shaped fibulae are typical for the Kietrz V period (from HaC – the beginning of HaD; Gedl 1979, fig. 5). Similar fibulae are found in mound No. 3 near Teklivka village on the Middle Dniester River (Fig. 7: 4; Gutsal *et al.* 2011), which belongs to

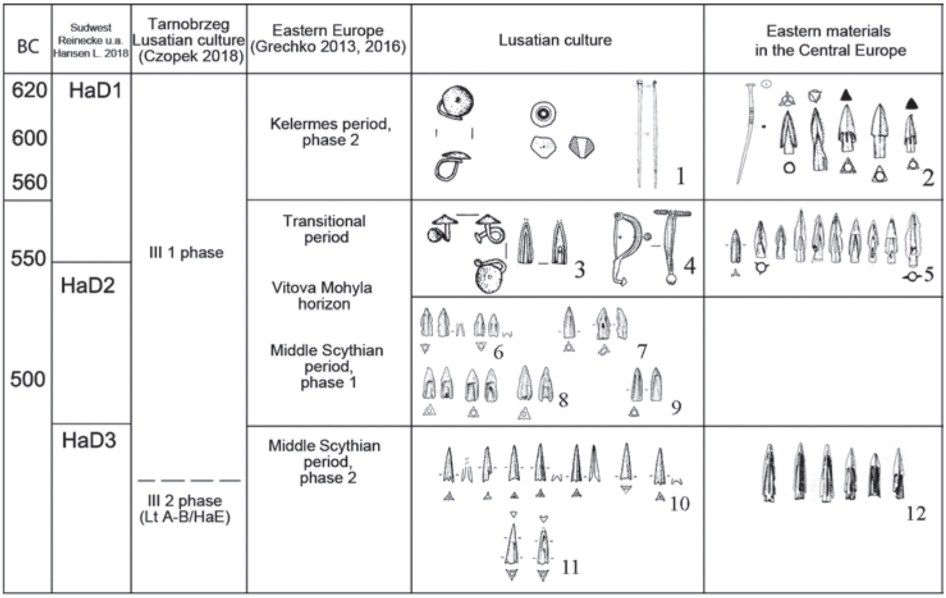


Fig. 9. The variant of the chronological schemes synchronization of Central and Eastern Europe.
1 – Grzęska, burial No. 54; 2 – Chotyniec; 3 – Grodzisko Dolne, site No. 22; 4-5 – Wicina; 6 – Trójczyce (burial No. 102); 7 – Ulanov-Zwolaki; 8 – Łagiewniki (burial No. 7/59); 9 – Obojna–Zaosie (burial No. 10); 10 – Kłodnica; 11 – Kosin (burial No. 8/1925); 12 – Býčí Skála Cave
(Bukowski 1977; Czopek 2007; Czopek *et al.* 2016; Czopek 2019; Gedl 2004; 2014)

the second Kelermes period (the last two decades of the VII – the first quarter (third?) of the VI c. BC; Grechko 2013). A mirror with a side handle indicates that this complex cannot be dated earlier than the end of the VII – the beginning of the VI century BC; however, it allows for the possibility of its synchronism with the inlet burial of the Repiakhuvata Mohyla. It allows us to speak confidently about the usage of harp-shaped fibulae at the beginning of the VI century BC (6th period, according to H. Parzinger). This complex, due to the nail-shaped earrings and an earring of the "Kłyżów type" (Teklivka, mound No. 3 – Fig. 7: 4), can be synchronized with the early part of phase III/1 for the TLC and the complexes of the Transylvanian group of monuments. Complexes with the biconical glass beads belong to this horizon, which can be synchronized with the HaD1 period (Fig. 9: 1). The Chotyniec agglomeration of monuments, which was founded by the immigrants from the Eastern European Forest-Steppe, existed and actively operated in the contact zone with the TLC at that time (Fig. 9: 2; Czopek 2019). One of its functions could have been to establish contacts and facilitate exchange with the tribes of the Lusatian culture.

Horizon of destabilization in Central and Eastern Europe – "Scythian invasions" and Vekerzug influences (raids?). The early group can be synchronized with the destruction of ancient cities in Central Europe, and is characterized by arrowheads of the types that were found at Smolenice-Molpir (Hellmuth 2006). At the Wicina fortified settlement, which was destroyed around 570/560 BC, several crossbow-shaped fibulae (Fig. 9: 4-5) were found that were previously attributed to the HaD3 period (Gedl 2004). Despite a significant number of finds of crossbow fibulae (variant Wicina after M. Gedl) in the burials of the Lusatian and Pomeranian cultures (Gedl 2004), the lack of reliable chronological indicators makes them difficult to date. For example, radiocarbon dating of the burial 1801 Kietrz burial ground did not meet expectations (274±90 BC; Chochorowski 2007, 127).

New dating of the Wicina destruction allows us to date the earliest use of this type of fastener to the end of the HaD1 period. This can be established thanks to the updated dates of the West Hallstatt periodization (Egg and Kramer 2016) and the critically reviewed chronology and periodization of M. Trachsel (HaD2: 595-565 BC; HaD3: 570-530 BC; Trachsel 2004, 318), which was completed by Hansen and Leif (2008, 233-234). Also, these fibulae are already typical for the Kietrz VIa (HaD) horizon, according to M. Gedl (Gedl 1979, fig. 5).

The late group of complexes of this horizon is associated with the completion of campaigns and the formation of the Vekerzug culture, with its characteristic armaments and bridles. Some of the fortifications in Central Europe, mainly in Moravia, which is adjacent to the main area of the Vekerzug culture, bear traces of the military activity of this culture (Krzepice, Jaroměřice).

Complexes of the TLC of this time can be distinguished by the presence of arrowheads in the burials typical for the Vekerzug culture (Gedl 2014, 57-58). This pertains to the following burials: Obojna-Zaosie (burial No. 10 – Fig. 9: 9), Trójczyce (burial No. 102; Fig. 9: 6), Ulanów -Zwolaki (Fig. 9: 7), and Łagiewniki (burial No. 7/59; Fig. 9: 8). These burials can be synchronized with the Vitova Mohyla horizon and the first phase of the Middle Scythian Period, according to D.S. Grechko (Grechko 2016a; 2016b). Whereas the arrowheads of the transitional period, from the destruction layers of Wicina and other fortifications, belong to the initial phase of this horizon.

A fragment of an arrowhead from the settlement of Ninovychi should also be mentioned. It can be dated from the end of the VI – the first half of the V century BC (Czopek *et al.* 2018, 289, fig. 9.35.2). However, it cannot be ruled out that it belongs to the type with the outer socket of the previous horizon. Fragments of handmade pots can be more confidently correlated with Chotyniec materials than with Grodzisko Dolne, site No. 22.

In general, it is worth noting the small number of monuments, compared with the previous horizon, and the poverty of materials in this horizon in the TLC area (late group of phase III/1). Almost all arrowheads were found in burials of the Lusatian culture, which may indicate other reasons for their appearance in this region than in Moravia (in settlements and hillforts with traces of military operations).

This horizon includes materials from the TLC at Grodzisko Dolne, site 22 (Czopek 2007). The shape of the nail-shaped earrings changes, and their flap acquires a triangular sectional shape (Fig. 9: 3). Similar changes in these adornments are also recorded for products of the transitional period of the south of Eastern Europe (the second – the beginning of the third quarter of the VI c. BC). The ceramic complex of this monument differs from the Chotyniec agglomeration (Chotyniec, Hrushovychi settlement): there is practically no applied strips in vessels ornamentation, cauldron-shaped pots dominate, almost all the pots have a rusty outer surface (about 56% (Czopek 2007, 183, tab. 9), and bowls with pin holes and applied strips are rare, like this type of cooking ware in general (Czopek 2007, Tabl. 14, 15, 20, 38: 2). Differences in the ceramic complexes, of course, are not only chronological, but also ethnic in nature, since Grodzisko Dolne, site No. 22, belongs to the TLC, unlike Chotyniec. Although, in burial Nos. 37 and 51 of the TLC necropolis at Grzęska, the pots typical for the Chotyniec agglomeration were found (Czopek *et al.* 2016, 36, fig. 2.23, 4, 6; 44, fig. 2.32, 3). Summing up, according to the dating of amphorae, arrowheads and pins (Fig. 9: 2; Czopek 2019, 127-130), the population of the Chotyniec agglomeration left no later than the end of the first third of the VI century BC.

Thus, the horizon following the destruction of sites in the Eastern Hallstatt region (Smolenice-Molpir, *etc.*) and sites of the Lusatian culture (Wicina) is rightfully synchronized with the end of the periods HaD1-HaD2 (the so-called “Scythian invasions” horizon), and can be dated between 570/560-520/510 BC (transitional period and the horizon of the Vitova Mohyla, according to D. Grechko 2016a). Glass biconical beads and nail-shaped earrings with lenticular shields are no longer present in this period. This horizon marked the minimization of contacts of the remaining population of the TLC with the more eastern regions of the Forest-Steppe, and the movement of the main vector of ethno-cultural interaction to the north, towards the tribes of the Pomeranian culture.

A crisis in the environment of the Lusatian culture tribes and the actual population decline at this time can be assumed – particularly in the area of the TLC. In general, the weakening of the demographic potential and the decline in the material culture of the Late Lusatian tribes should be noted, which could have been caused by invasions of nomads from the east around the middle of the VI century BC, among other factors (Dzięgielewski 2016, 20). One of the reasons for the “Pomeranian expansion” could be the cessation of the active usage of the Amber Road as a result of the “Scythian invasions” and the formation of the Vekerzug culture, since all of this interrupted the exchange of metal with the Lusatian tribes of Silesia (Dzięgielewski 2016, 30).

In this regard, the appearance of early complexes of the Pomeranian culture in the region, such as Zastavne (Pavliv *et al.* 2010), which can be attributed to Karczemki (IIB1) = HaD) phase (Dzięgielewski 2017, 300), is worth mentioning. Karol Dzięgielewski believes that the penetration of the Pomeranian population into the Vistula River basin had its own particularities. It was small groups (individual cyst burials) that initially spread into this region – groups that were eventually assimilated (Dzięgielewski 2016, 32). Using a comprehensive approach and taking all of the above into account, we can say that the Pomeranian population had already begun to penetrate into the south-eastern area of the Lusatian tribes by the second half of the VI century BC, and the formation of a new cultural model was underway (post Lusatian-Pomeranian stage: Dzięgielewski 2016, 32).

The horizon of sporadic contacts with the Scythians of the Northern Black Sea region. Well-dated materials of eastern origin, *e.g.*, arrowheads and horse bridle parts, such as the Chilik-Dere type from Býčí skála Cave (Fig. 9: 12; Simion 2000; Bukowski 1977), from the end of the VI – the first half of the V century BC (HaD3, the final part of phase III/1 TLC) are rare in the TLC area, and are mainly represented by random finds (Hrebenne, Kłodnica – Fig. 9: 10, Kosin, burial No. 8/1925 – Fig. 9: 11; Gedl 2014, 57). This horizon is characterized by the completion of the formation of Scythia in the Northern Black Sea region, which for two centuries will be a kind of shield for Central Europe against invasions from the East. Increasingly from this time, the history of the tribes of the southern part of Eastern Europe will be associated with the dominance of different groups of Iranian-speaking nomads (Scythians and Sarmatians), while Western and Central Europe will be under the increasing influence of the Celts.

CONCLUDING REMARKS

1. Biconical glass beads, which were produced at the Yahorlyk settlement in the Northern Black Sea region in the first third of the VI century BC, mark the chronological horizon of the complexes synchronous to the HaD1 period of Central Europe, phase III/1 of the TLC and the late group of burials of the second phase of the Kelermes period.

2. The final stage of this horizon is associated with the destabilization of the military-political situation in the region (the so-called "Scythian invasions"). The activity of nomads, in combination with other factors, could have led to the abandonment of the sites of the Chotyniec agglomeration, as well as those of the Western Podolian and Eastern Podolian groups. Significant changes in the system of the tribes' settlement of Central and Eastern Europe, along with changes in material culture, confirm the opinion of researchers that the time around the middle of VI century BC was the boundary between the HaD1 and HaD2 periods. The role of nomadic invasions from the East in the transformation of the ethnic and cultural map of Central Europe was probably more significant than previously thought.

3. A few TLC complexes of the Grodzisko Dolne, site 22 type can be dated between the middle and the second half of the VI century BC (HaD2). This time marked the beginning of the penetration of Pomeranian populations into the south-eastern area of the Lusatian tribes, and the formation of a new culture model (post Lusatian-Pomeranian stage, after Karol Dzięgielewski).

4. The presented work only outlined several possibilities for highlighting individual periods in the phase III/1 of the TLC, which is a task for future fundamental research of Polish and Ukrainian specialists.

References

Bajda-Wesołowska A., Bochnak T. and Hozer M. 2014. Bogaty grób kobiecy z wczesnej epoki żelaza odkryty w miejscowości Zabłotce, pow. Jarosławski, stan. 27. *Materiały i Sprawozdania Rzeszowskiego Ośrodka Archeologicznego* 35, 105-125.

Baron J. and Miazga B. 2013. Scythian akinakes or medieval kidney-dagger? Archaeometric study of a recent find from Legnica (South-Western Poland). *Archäologisches Korrespondenzblatt* 43(3), 335-343.

Boltryk Yu. V., Horbanenko S. A., Kubliy M. V., Serheyeva M. S. and Yanish Ye. Yu. 2015. Severynivske horodysche skifskoho chasu: biohospodarskyy aspekt doslidzhen. *Arkheolohiya i davnia istoria Ukrayiny* 4(17), 155-192.

Bukowski Z. 1977. *The Scythian influence in the area of Lusatian culture*. Wrocław, Warszawa, Kraków, Gdańsk: Zakład Narodowy im. Ossolińskich.

Buyskikh S. B. and Buyskikh A. V. 2010. K khronologii arkhaicheskikh poseleniy khory Olvii Pontiyskoy. *Bosporskiye issledovaniya* 24, 3-64.

Chochorowski J. 2007. Metodyczne i metodologiczne problemy datowania radiowęglowego pozostałości kremacji z grobów ciałopalnych kultury łużyckiej (na przykładzie materiałów z cmentarzyska w Kietrzu). In J. Chochorowski (ed.), *Studia nad epoką brązu i wczesną epoką żelaza. Księga poświęcona Profesorowi Markowi Gedlowi na pięćdziesięciolecie pracy w Uniwersytecie Jagiellońskim*. Kraków: Uniwersytet Jagielloński, 103-138.

Czopek S. 1996. Kolczyki typu Kłyżów. Przyczynek do poznania schyłkowej fazy grupy tarnobrzeskiej. In J. Chochorowski (ed.), *Problemy epoki brązu i wczesnej epoki* żelaza *w Europie Środkowej. Księga jubileuszowa poswięcona Markowi Gedlowi w sześćdziesiątą rocznicę urodzin i czterdziestolecie pracy w Uniwersytecie Jagiellońskim*. Kraków: Uniwersytet Jagielloński, 163-173.

Czopek S. 2007. *Grodzisko Dolne, stan. 22 – od paleolitycznych łowców do wczesnośredniowiecznych Słowian. Część I. Od epoki kamienia do wczesnej epoki żelaza*. Rzeszów: Uniwersytet Rzeszowski.

Czopek S. 2011. Zwischen der Chronologie und Funktion. Horizont(?) der Gräber mit Glasperlen auf den Gräberfeldern der späten Phase der Tarnobrzeg – Lausitzer Kultur. *Sprawozdania Archeologiczne* 63, 115-134.

Czopek S. 2019. Enklawa scytyjskiego kręgu kulturowego w południowo-wschodniej Polsce. *Przegląd Archeologiczny* 67, 119-148.

Czopek S., Ligoda J., Podgórska-Czopek J. and Rogóż J. 2016. *Cmentarzysko tarnobrzeskiej kultury łużyckiej* z *wczesnej epoki żelaza* w *Grzęsce, pow. Przeworski*. Rzeszów: Instytut Archeologii UR.

Chopek S., Trybala-Zavislyak K., Voytseshchuk N., Osaulchuk O., Bobak D., Hembitsa P., Yatsyshyn A., Pasterkevich V., Pavliv D., Petehyrych V., Poltovich-Bobak M. and Vatsnik A. 2018. *Kulturno-poselenski zminy v baseyni richky Vyshnya v epokhu bronzy i za doby rannoho zaliza v konteksti zmin doistorychnoyi i rannoseredniovichnoyi oykumeny*. Rzeszów: Instytut Archeologii UR.

Daragan M. N. 2010. O datirovke amfory iz pogrebeniya № 2 Repyakhovatoy Mogily. *Antichnyi mir i arkheologiya* 14, 175-202.

Dzięgielewski K. 2015. Zespół osadniczy z późnej epoki brązu i wczesnej epoki żelaza w Modlnicy. In K. Dzięgielewski, M. Dzięgielewska and A. Sztyber (eds), *Modlnica, stan. 5. Od późnej epoki brązu po czasy średniowiecza* (*Via Archaeologica. Źródła z badań wykopaliskowych na trasie autostrady A4 w Małopolsce*). Kraków: Krakowski Zespół do Badań Autostrad, Wydawnictwo Profil-Archeo, 9-196.

Dzięgielewski K. 2016. Societies of the younger segment of the early Iron Age in Poland (500-250 BC). In P. Urbańczyk (ed.), *The Past Societies. Polish lands from the first evidence of human presence to the early Middle Ages*. Volume 4: 500 BC – 500 AD. Warszawa: Instytut Archeologii i Etnologii PAN.

Dzięgielewski K. 2017. Late Bronze and Early Iron Age communities in the northern part of the Polish Lowland (1000-500 BC). In P. Urbańczyk (ed.), *The Past Societies. Polish lands from the first evidence of human presence to the early Middle Ages*. Volume 3: 2000-500 BC. Warszawa: Instytut Archeologii i Etnologii PAN.

Fialko O. Ye. and Boltryk Yu. V. 2003. *Napad skifiv na Trakhtemirivske gorodysche*. Kyiv: Korvin Press.

Gedl M. 1979. Stufengliederung und Chronologie des Gräberfeldes der Lausitzer Kultur in Kietrz (= *Prace Archeologiczne* 27). Kraków: Państwowe Wydawnictwo Naukowe.

Gedl M. 2004. Die Fibeln in Polen (= *Prähistorische Bronzefunde* 14/10). Stuttgart: Franz Steiner Verlag.

Gedl M 2014. Die Pfeilspitzen in Polen. (= *Prähistorische Bronzefunde* 5/6). Stuttgart: Franz Steiner Verlag.

Grechko D. S. 2012. O vozmozhnykh «prosvetakh» v «temnoye» vremya (VI v. do n. e.) skifskoy istorii. *Stratum plus* 3/2012, 75-106.

Grechko D. S. 2013. O pamyatnikakh kimmeriytsev i "ranneskifskoy" kul'ture. *Stratum plus* 3, 133-154.

Grechko D. S. 2016a. Ot Arkhaicheskoy Skifii k Klassicheskoy. *Arkheologiya i davnia istoriya Ukrayiny* 2(19), 33-60.

Grechko D. S. 2016b. Klassicheskaya Skifiya: nachalo (posledniye desyatiletiya VI – pervaya chetvert V v. do n. e.). *Revista arheologică* 12(1-2), 145-168.

Gutsal A. F., Gutsal V. A. and Mogilov A. D. 2011. Kurgan №3 u s. Teklivka na Srednem Dnestre. In V. D. Berezutskiy (ed.), *Vostochnoevropeyskie drevnosti skifskoy epokhi: sbornik nauchnykh trudov*. Voronezh: Nauchnaya kniga, 97-109.

Hansen L. 2008. *Die Goldfunde und Trachtbeigaben des späthallstattzeitlichen Fürstengrabes von Eberdingen-Hochdorf (Kr. Ludwigsburg)*. Dissertation, Christian-Albrechts Universität zu Kiel.

Hellmuth A. 2006. *Untersuchungen zu den sogenannten skythischen Pfeilspitzen aus der befestigten Höhensiedlung von Smolenice-Molpír* (= *Universitätsforschungen zur prähistorischen Archälogie* 128). Bonn: Rudolf Habelt GmbH.

Ilinskaya V. A. 1968. *Skify Dneprovskogo Lesostepnogo Levoberezhia (kurgany Posulya)*. Kyiv: Naukova dumka.

Ilinskaya V. A., Mozolevskiy B. N. and Terenozhkin A. I. 1980. Kurgany VI v. do n. e. u s. Matusov. In A. I. Terenozhkin (ed.), *Skifiya i Kavkaz*. Kyiv: Naukova dumka, 31-64.

Khokhorovsky Y. A. 2019. Na dalekykh okrainakh antichnogo mira: giperboreytsy Tsentralnoy Evropy. *Arkheolohiya i davnia istoriya Ukrayiny* 2(31), 197-254.

Kowalski-Bilokrylyy J. 2014. Pochodzenie kolczyków typu Kłyżów. *Materiały i Sprawozdania Rzeszowskiego Ośrodka Archeologicznego* 35, 59-64.

Krąpiec M. and Szychowska-Krapiec E. 2013. Analiza dendrochronologiczna drewna z badań grodziska w Wicinie w latach 2008-2012. In: A. Jaszewska and S. Kałagate (eds), *Wicina. Badania archeologiczne w latach 2008-2012 oraz skarb przedmiotów pochodzących z Wiciny*. Zielona Góra: Fundacja Archeologiczna, 371-417.

Levitskiy O. G. and Kashuba M. T. 2009 O kulturnykh traditsiyakh v pogrebalnoy obryadnosti naseleniya, prozhivayushchego na zapadnykh rubezhakh arkhaicheskoy Skifii (istochniki, problematika). *Arkheolohiya i davnia istoriya Ukrayiny*, 250-267.

Lomtadze G. A. and Firsov K. B. 2012. Kompleks ranneskifskogo vremeni iz kurgana u sela Volkovtsy v Posulye (po materialam iz sobraniya GIM). In: D.V. Zhuravlev and K.B. Firsov (eds.), *Evraziya v skifo-sarmatskoye vremia. Pamyati Iriny Ivanovny Guschinoy*. Moskva: GIM, 281-298.

Mogilov O. D., Gutsal A. F. and Gutsal V. A. 2016. Kurgan z kamyanim valom na Zakhidnomu Podilli. *Arkheologiya i davnia ístoriya Ukraini* 2(19), 212-230.

Ostroverkhov A. S. 1978. Antychna sklorobna maysternia na Yagorlytskomu poselenni. *Arkheolohiya* 25, 41-49.

Ostroverkhov A. S. 1981. Obrobka kolorovykh metaliv na antychnykh poselenniakh. *Arkheolohiya* 36, 26-37.

Pavliv D., Mylian T. and Osaulchuk O. 2010. Unikalne pokhovannia pomorskoyi kultury poblyzu s. Zastavne na Lvivschyni. *Materialy i doslidzhennia z arkheolohiyi Prykarpattia i Volyni* 14, 258-272.

Purowski T. 2012. *Wyroby szklane* w *kulturze łużyckiej* w *międzyrzeczu Noteci* i *środkowej Odry. Studium archeologiczno-technologiczne*. Warszawa: Instytut Archeologii i Etnologii PAN.

Purowski T. 2015, Paciorki szklane z cmentarzyska z wczesnej epoki żelaza w Modlnicy. In K. Dzięgielewski, M. Dzięgielewska and A. Sztyber (eds), *Modlnica, stan. 5 Od późnej epoki brązu po czasy średniowiecza* (= *Via Archaeologica. Źródła z badań wykopaliskowych na trasie autostrady A4 w Małopolsce*). Kraków: Krakowski Zespół do Badań Autostrad, Wydawnictwo Profil-Archeo, 219-238.

Samek L., Karwowski M., Czopek S., Ostachowicz J. and Stegowski Z. 2007. Analysis of Glass Beads from the Graves of the Tarnobrzeg Lusatian Culture in Jasionka and Grodzisko Dolne Employing the X-ray Fluorescense Method. *Analecta Archaeologica Ressoviensia* 2, 101-118.

Shramko I. B. 2017. Novyi pohrebalnyi kompleks ranneskifskogo vremeni v mogilnike Skorobor. *Arkheolohiya i davnia istoriya Ukrayiny* 2(23), 368-380.

Shylov V. P. and Ochir-Goriaeva M. A. 1997. Kurgany skifskoy epokhi iz mogilnikov Aksenovskyi-1-II. *Materialy i issledovaniya po arkheologii Rossii* 1, 127-152.

Simion G. 2000. Tombes tumulaires de la nécropole de Celic-Déré. Tombes tumulaires de l'Âge du Fer dans le Sud-Est de l'Europe. In G. Simon, V. Lungu (eds), *Actes du II Colloque International d'Archéologie Funéraire*. Tulcea: Institut de Recherches Eco-Museologiques de Tulcea, 69-82.

Suprunenko O. B. 2016. Hruntovi nekropoli lisostepovoho naselennia skifskoyi doby u Dniprovskomu Livoberezhzhi. *Arkheolohiya i davnia istoriya Ukrayiny* 2(19), 257-269.

Szabó G. V., Czajlik Z. and Reményi L. 2014. Traces of an Iron Age armed conflict. New topographical results from the research into Verebce-bérc at Dédestapolcsány I. *Hungarian archaeology E-journal* 2014 (Winter), 1-7.

Trachsel M. 2004. Untersuchungen zur relative und absoluten Chronologie der Hallstattzeit (= *Universitätsforschungen zur prähistorischen Archäologie* 104). Bonn: Dr. Rudolf Habelt.

SPRAWOZDANIA ARCHEOLOGICZNE 72/2, 2020 PL
ISSN 0081-3834
DOI: 10.23858/SA/72.2020.2.2265

REVIEWS AND SHORT REVIEW NOTES

Joanna Wawrzeniuk[1]

(Review) Andrzej Bronisław Pankalla, Konrad Kazimierz Kośnik, *Indygeniczna psychologia Słowian. Wprowadzenie do realnej nauki*. Kraków 2018: Universitas, 216 pp.

In 2018, a new book appeared on the scientific publications market. Written by Andrzej Bronisław Pankalla and Konrad Kazimierz Kośnik – specialists in the history of psychological thought, cultural psychology, and the psychology of religion – the book was titled 'Indygeniczna psychologia Słowian. Wprowadzenie do realnej nauki o duszy', which translates to 'Slavic Indigenous Psychology. Introduction to the Real Science of the Soul'.

My attention was drawn to the publication because it represents perhaps the first attempt to analyze Slavic beliefs from the point of view of psychology. There is no position regarding the psychology of the Slavs, understood as psychic knowledge hidden in myths, rituals, customs, and religion. There are also no books about the Slavic soul perceived through the prism of centuries of cultural influences and from different points of view. Finally, there are no publications that present broadly defined local knowledge based on the scientific experience and senses of Slavic authors who are, to put it colloquially, feeling the climate.

The book by Pankalla and Kośnik was therefore intended to begin to fill this gap. In addition, the content presented in it was to be an attempt to penetrate the mentality of both the Slavic individual and the Slavic society operating on the border of two belief systems, pagan and Christian. In this work, indigenousness is understood as a kind of primary pattern of human behaviour and traits. The authors, presenting the assumptions of indigenous psychology (Kim *et al*. 2006; Boski 2010), emphasize the localness – the nativeness of such science, the inclusion of many theses and contexts, the multitude of research approaches from the subject's perspective, communication between dialogue and objectivity, and the use of methodologies from humanities and social sciences. Post-structuralism and critical theory form the methodological foundation for the indigenous position in this publication. In post-structuralism, discourse plays a fundamental role in the

1 Institute of Archaeology, Cardinal Stefan Wyszyński University in Warsaw, Wóycickiego 1/3, building 23, 01-938 Warszawa, Poland; j.wawrzeniuk@uksw.edu.pl; https://orcid.org/0000-0002-2157-3559

process of creating knowledge, just like in discovering connections between various spheres of life (such as colloquial knowledge, practices, and rituals) at its various levels. On the other hand, in critical theory, reflection and self-reflection are intentional and seen 'as factors and the result of a dialectical relationship between participants of the research situation and other elements that make up the world of life of the subjects participating in the procedure' (Czerapaniak-Walczak 2010, 322; Pilarska 2015, 223-224).

The authors also believe that 'a man in the science of himself, and thus a psychologist, is forced to solve and see epistemological dilemmas regarding the study of an object that by definition cannot be external to itself, he examines a representative of the human race'. They note that psychology is dominated by an objectivistic perspective and a way of research closer to natural sciences than to humanities, thus lacking analyses of the role of man and the effects of his activities on culture (p. 13).

The publication consists of four basic chapters and begins with reflections on the specifics of the research area – *i.e.*, Slavdom and the psychological analysis of the Slavs – and discusses their interrelationship. Next, the theoretical-epistemological assumptions, which helped to understand and show the structure of Slavic psychology, are presented. The fourth part discusses the relationship between Slavic mythology, contemporary Poles, and the system of neopagan beliefs. The book also contains two annexes: Slavic studies (containing a list of selected gods of the Slavic religion and the geographical division of the Slavdom area) and psychology (with people important to cultural and cultural-historical psychology, as well as a dictionary). The work ends with a list of publications and an index of people.

The publication, according to the authors, was to be a reconstruction, or rather an attempt to reconstruct the ancient (native) psychology of the Slavs, and, on the other hand, a reflection on the modern version of Slavic mythology or beliefs. The authors dedicate the publication primarily to psychologists, as well as to representatives of other social and humanistic sciences, 'who, in their attempts to understand man, focus on his cultural localness in order to find specific, material correlates of observable non-universalistic behaviour' (p. 20). In addition, it is hoped that non-specialists dealing with broadly understood Slavic beliefs may find some kind of inspiration in it.

The book was meant to be impartial and not encourage the promotion of any theories – neither Christian correctness nor the pagan creation myth – which the authors managed to achieve.

The introduction shows that the publication can also be useful for archaeologists involved in reconstructing the religion of pre-Christian Slavs. In the first chapter of the publication, the authors, thinking about the psychology of the Slavs, search for its origins. Discussed here are the characteristics of ancient Slavic beliefs and, in principle, difficulties in their reconstruction due to the lack of sufficient data. At the same time, the authors say, this point of view is not entirely correct or complete, because it is dominated by researchers representing the non-Slavic point of view through Western European science (p. 25).

Slavic culture and beliefs were also affected by foreign cultural elements. The Middle Ages combined the cultural structures of the pagan or barbaric world with elements of Mediterranean heritage and Christian ideology. In the source literature, it was often emphasized that the shape of the Slavic world was influenced by neighbouring peoples and Christianization. Missionaries arriving in Slavic lands represented the spirit and the mind of a different, non-Slavic nature. For example, Saints Cyril and Methodius were Greeks, educated in the spirit of Byzantine culture. The establishment of the parish network in the 13th-14th centuries in Poland was preceded by the construction of monasteries and episcopal palaces; there were many people of non-Slavic origin among the monks and priests.

The incompleteness of information from written sources and the lack of indigenous pre-Christian writing sources makes it difficult to reconstruct the way of thinking of the ancient Slavs in a more credible way. Some traces of this mentality can be found in certain proverbs and culinary delights. However, the authors do not elaborate on this topic.

A lot of attention in the publication is paid to the cult of trees as a typically Slavic manifestation of beliefs. However, it was also present among other Indo-European peoples. In addition, this phenomenon of nature did not function separately in ancient rituals. Many ritual behaviours in connection with the worship of stones or waters or fire have also been preserved. Even the night of the summer solstice (Kupala Night), called Saint John's Eve in other parts of the Slavic lands, combined wood/tree magic with fire and water magic. It should be emphasized that, according to available written records, the element of water also played a huge role in beliefs and ceremonial activities. Records of Belarusian folklore demonstrate how elaborate these rituals could be (*e.g.* Dučyc and Klimkovič 2011: 76-89; L'obač and Valodzina 2016). Admittedly, the influence of Christianity contributed to the fact that *water gained miraculous power*, but in Slavic ceremonies, one can distinguish a number of rituals in which this element played an important role. Water had a healing, cleansing, and magical function. In Belarus, even nowadays a ritual is performed in some regions to invoke rain during droughts. This ritual is always attended by women who, standing in a circle, dance and sing or hit the ground with sticks held in hands and invoke the rain to fall (Dučyc and Klimkovič 2011, 76-89).

In the chapter on the psycho-cultural definition of Slavs, the authors wonder whether the processes of shaping Slavic ethnic identity were related to the awakening of national consciousness in the Romantic era. From that moment on, Slavic identity was to be defined by shared beliefs and myths, and 'the perception of reality (including psychological phenomena and self-perception) systematized in Slavic cognitive systems and the resulting specificity of psychological functioning, manifesting in the structure (features) of personality and characteristically Slavic (*e.g.* ritual) behaviours that distinguish them from other ethnic groups' (p. 45).

So, in the end, what can psychology say about the Slavs? The authors, citing the research of Geert Hofstede (2007, 33), point out that values are a more permanent element of culture than practice. Developing persistence and saving now in order to reap benefits in the future are considered to be certain constant cultural values in Slavic countries. In addition, the Slavs are persistent and systematic in pursuing their goals, and, on the other hand, restrained – that is, respecting the norms and rules of the community. These rather interesting observations are not elaborated on further in the book. It is a great pity, since an analysis of texts regarding the beliefs and political history of the early Slavs could expand the issues of mentality- indigenousness.

In cultural psychology, attention is paid to aspects, shared by members of a specific community and determining their ways of thinking and behaviour, such as religion, myths, rituals, language, and customs (p. 67), as well as material products of culture. A newly made clay pot revealed the manufacturer's perception and the cultural norms they shared. The indicated elements also constituted the psychological structure of the past community. Potential is visible in such cultural psychology, as it reaches 'the subjective psychological life of man embedded in the social context' (p. 69). Its aspiration was to be 'the science of the soul', which is omitted in classical psychology. Along with the practice of the second, critical (based on natural sciences) branch of psychology – which determines the conditions of the subject of scientific cognition (the cultural context of science) – a new, indigenous, psychology arises that describes phenomena in the Slavic context, the mental constructions of men, their motives of action and personalities. However, in order for the descriptions to be as complete as possible, indigenous psychology should be analysed and described by a Slav, but in such a way that the researcher listens to local knowledge, leaving their own knowledge aside. Culture is multi-threaded and has many meanings that cannot be ignored when writing observations. 'In the kingdom of the blind who are not as blind as we think, the one-eyed is not a king but an observer' (Geertz 2005, 65-66). But where do we get local knowledge from if there are no more respondents?

In the next chapter, the authors develop their views on how to practice the indigenous psychology of the Slavs. Its main element is treating the religion or beliefs that have been recognized so far, and above all the Slavic pantheon, as a starting point for learning about the human mental structure. In the widely discussed polytheism, the dominant factor was the faith in gods and demons, even if one of these deities stood out among the others, such as Swarożyc for Western Slavs or Perun for Eastern Slavs. The community felt associated with their deity. Various sacrifices, including blood sacrifices, were made to it and, in return, they expected its favour. It was believed that bad omens brought bad crops and war defeats. The blame for this state of affairs was put on the higher power to whom an offering had been made. It happened then that offerings were addressed to a deity of a foreign tribe or community. It was believed that since the opponent had won, his god was stronger and more important, and therefore it is worth relying on its protection. The progress of Christianization missions in Slavic lands was also explained in this way. In the presented descriptions of higher powers, however, the authors carelessly mingled the bestiaries without providing the sources of origin of the described combinations of Slavic demons and gods.

Penkalla and Kośnik also believe that myths provide information about community mentality. Myths have always accompanied people, but sometimes it is difficult to recreate a full picture of mind or beliefs with only a part of them. According to the authors, the prehistory of psychology will help in the analysis of the myths of ancient tribal societies. Myths and mythology provide the basis for further interpretation, and the starting point is to determine the archetype of the myth. This allows researchers to establish priorities of beliefs and cultural systems. Carl Gustav Jung (1993), Lucien Levy-Bruhl (1992), and Joseph Campbell (1997) saw the legitimacy of this way of reaching the magical-mythical thinking of ancient societies, although Mircea Eliade discounted the use of psychology for researching myths (Eliade 1992, 169; Korczak 2016, 364). The psychology of myth links the presence of archetypes with the belief structure of a given culture. Next, the myth should be associated with a phantasm, the task of which is to show how to create one's own identity, and thus indicates the features of the psyche of an examined individual or society. Using the so-called Connotational Analysis, Ernest Boesch (1991; 2001) provides the description and significance of the myth-phantasm relationship. 'This method ... focuses on connotations that are contrasted with denotations (meanings shared by the social group, ... superficial features of culture)' (p. 97). On the other hand, connotations concern individuals and communities and their internal, often unconscious, needs. Analysis of these phenomena within psychology may allow for the study of not only psychological and physiological processes but also symbolic ones (understood as the mythical identity of the individual: myths and phantasms). The authors of the reviewed book would want to use this method to analyse the strictly Slavic myth, but they basically end their considerations at theory.

In the publication, a lot of space is devoted to the essence of indigenous psychology, namely the soul; it is perceived threefold as the self, life, and spectre. The analysis was based on the work of Aleksander Gieysztor (2006), along with the ethnographic compendium of Kazimierz Moszyński's knowledge (2010), and the publication of ethnologist of religion Andrzej Szyjewski (2010). Unfortunately, the authors did not explain, in a general way, the scope of the analysed publications, which use different research and methodological techniques. The cognitively valuable works of Stanisław Urbańczyk (1991), Jerzy Gąssowski (1995), Bogusław Gediga (1996), and Piotr Kowalski (1998) were not included, while others were discussed rather cursorily. An interesting article by Edyta Dziduch (2012) about the Slavic soul in the linguistic and cultural context was also omitted. The issue of the soul is analysed in four different layers of meaning: as a symbol of life and energy, goodness, reason, mind, and finally as a symbol of man. These types of meanings, visible in the beliefs of various Slavic nations, are a set of different pre-Christian, folk, and Christian traditions (Koncewicz-Dziduch 2012, 185).

Further considerations related to the afterlife – for example, its description, a discussion of the road to the afterlife, and the interaction between the living and the dead – are presented based on available Slavic studies. Here, too, one could have objections to the publications selected for analysis. Neither the works of Stanisław Bylina (*e.g.* 1992) nor of Joanna Wawrzeniuk (2007), in which visions of the afterlife and how it could be reached are shown through the prism of archaeological, historical, and ethnographic sources, were referred to.

However, perhaps the most interesting aspect is the psychological explanation of the *demonological manifestations of the soul*. Despite incomplete and diverse records (some psychopathological-mental disorders that are equivalent to mental diseases as listed in the DSM-V and ICD-10 can be pointed out), the authors claim that such manifestations had a special relationship with believing in vampires and other harmful demons as well as the measures that were taken to fight them. This is a very original and at the same time typical mechanism of juxtaposing actions and counter-actions – a kind specific psychotherapy.

Penkalla and Kośnik draw attention to Kazimierz Moszyński's (2010) sets of elementary mental processes (2010) and analyze them to determine the most basic ones (p. 123 et seq.). They have distinguished four general Slavic 'feelings' of taste ('sweet', 'salty', 'bitter', 'sour'), as well as visual ones – basic colours ('light', 'dark', 'white', 'gray', 'black' or 'red'), auditory tones – 'fine' ('high') and 'thick' ('low'), and numerous terms for 'murmurs', 'scratching', 'trickling', 'gurgling', or 'rattling'. The sense of fragrance is the most popular one in the Slavic world. The most common terms are 'to smell' and 'to stink'. Subsequently, affective processes and feelings associated with them were built on opposing emotions, *e.g.* 'nice', 'anger', 'regret'. The next category was cognitive processes, i.e. 'reason' and 'memory'.

According to the authors of the reviewed publication, the preserved habits from pre-Christian Slavic beliefs reveal many customs in which the manifestations of society's old way of thinking can be discovered. These include the taming of *rodzanice* [rozhanitsy], first haircut, *werewolf* ritual, Kupala Night, swaćba [wedding], funeral, and *dziady* [Forefathers' Eve]. These customs are still considered to be rites of passage at various stages of development; they allow the reconstruction of developmental stages by which the Slavs understood the process of changes in the functioning of man from birth to death. The estimated human age was determined for each of the above stages. It was noted that there was no distinct ritual for the period between the parenting stage and death, as if the Slavs did not attach much attention to this point, which was explained by the lack of a clear boundary between human vocational-economic activity and its cessation. This is a very interesting part of the work; however, in my opinion, it was treated a bit briefly (p. 137-144). Too little space was also devoted to the analysis of Slavic personality, which would be manifested in giving a name that defined human traits and referred to one's skills, specifics of character, strength, and power (p. 145-152). This interesting analysis, however, required a broader approach for other types of names (not only personal but also geographical) to be included (*e.g.* Rzetelska-Feleszko et al. 2002).

The book, as I pointed out above, has some shortcomings, resulting from poorly recognized source literature regarding Slavic archaeology, beliefs, and folklore. Some subjects would need to be developed and supplemented, which would increase the value of the presented discourse. The content of the annexes, which does not match the content of the publication, has not been fully thought out either. However, this publication is worth reaching for, because it presents new opportunities to study the habits and beliefs of ancient Slavs based on psychological analyses extracted on the basis of the available source material. The indigenous approach gives an opportunity to look more broadly at the culture of the group, taking into account the multiplicity of cultural themes, including the cognitive structure, and thus observing the behaviour of the 'own-foreign' kind. Therefore, it is a pioneering work, although it requires supplementation.

References

Boesch E. 1991. *Symbolic Action Theory and Cultural Psychology*. Berlin-New York: Springer-Verlag.

Boesch E. 2001. Symbolic Action Theory in Cultural Psychology. *Culture and Psychology* 4, 479-483.

Boski P. 2010. *Kulturowe ramy zachowań społecznych. Podręcznik psychologii międzykulturowej*. Warszawa: Wydawnictwo Naukowe PWN.

Bylina S. 1992. *Słowiańskie zaświaty. Wizje kar pośmiertnych w Polsce średniowiecznej*. Warszawa: Instytut Historii PAN.

Campbell J. 1997. *Bohater o tysiącu twarzy*. Kraków: Zakład Wydawniczy Nomos.

Czerepaniak-Walczak M. 2011. Badanie w działaniu. In S. Palka (ed.), *Podstawy metodologii badań w pedagogice*. Gdańsk: Gdańskie Wydawnictwo Psychologiczne, 319-337.

Dučyc L. and Klimkovič I. 2011. *Sakralnaja Geografija Belarusi*. Minsk: Literatura i Mastactva.

Eliade M. 1992. *Próba labiryntu. Rozmowy z Claude-Henri Rocquetem*. Warszawa: Wydawnictwo Sen.

Gąssowski J. 1995. Schyłkowe pogaństwo na ziemiach polskich w świetle odkryć archeologicznych. *Światowit* 40, 43-52.

Gediga B. 1992. Chrystianizacja i utrzymywanie się przedchrześcijańskich praktyk kultowych na Śląsku. In Z. Kurnatowska (ed.), *Słowiańszczyzna w Europie średniowiecznej. Księga pamiątkowa dla Lecha Leciejewicza, vol. 1: Plemiona i wczesne państwa*. Wrocław: Instytut Archeologii i Etnologii PAN, 159-167.

Geertz C. 2005. *Wiedza lokalna. Dalsze eseje z zakresu antropologii interpretatywnej*. Kraków: Wydawnictwo UJ.

Hofstede G. and Hofstede G. J. 2006. *Kultury i organizacje. Zaprogramowanie umysłu*. Warszawa: Polskie Wydawnictwo Ekonomiczne.

Gieysztor A. 2006. *Mitologia Słowian*. Warszawa: Wydawnictwa Uniwersytetu Warszawskiego.

Jung C. G. 1993. *Archetypy i symbole. Pisma wybrane*. Warszawa: Czytelnik.

Kim U., Yang K. S. and Hwnag K. K. 2006. *Contributions to Indigemous and Cultural Psychology. Understanding People in Context*. New York: Springer, 3-25.

Koncewicz-Dziduch E. 2012. O słowiańskiej duszy w wierzeniach, kulturze, języku na przykładzie frazeologizmów sztokawszczyzny literackiej. *Studia z Filologii Polskiej i Słowiańskiej 47,* 181-192.

Korczak A. 2016. Mircea Eliade i pojęcie archetypu. *IDEA-Studia nad strukturą i rozwojem pojęć filozoficznych* 27(2), 357-374.

Kowalski P. 1998. *Leksykon. Znaki świata – omen, przesąd,* znaczenie. Warszawa: Wydawnictwo PWN.

Levy-Bruhl L. 1992. Czynności *umysłowe w społeczeństwach pierwotnych*. Warszawa: Wydawnictwo Naukowe PWN.

L'obač U. and Valodzina T. 2016. *Sviatyia krynicy Belarusi*. Minsk: Belaruskaja navuka.

Moszyński K. 2010 (1934). *Kultura ludowa Słowian, cz. 2. Kultura duchowa*. Warszawa: Grafika.

Pilarska J. 2015. Perspektywa indygeniczna w badaniach środowisk zróżnicowanych kulturowo – ku metodologicznej wrażliwości kulturowej. *Pogranicze. Studia Społeczne* 25, 222-233.

Rzetelska-Feleszko E., Cieślikowa A. and Duma J. (eds) 2002. *Słowiańska onomastyka: encyklopedia* 1. Warszawa: Towarzystwo Naukowe Warszawskie.

Szyjewski A. 2010. *Religia Słowian*. Kraków: WAM.

Urbańczyk S. 1991. *Dawni Słowianie. Wiara i kult*. Wrocław, Warszawa. Kraków: Zakład Narodowy im. Ossolińskich, Polska Akademia Nauk, Komitet Słowianoznawstwa.

Wawrzeniuk J. 2007. Słowiańskie „mosty" w zaświaty. In W. Dzieduszycki and J. Wrzesiński (eds), *Środowisko pośmiertne człowieka. Funeralia Lednickie. Spotkanie 9*. Poznań: Stowarzyszenie Naukowe Archeologów Polskich, Oddział w Poznaniu, 45-58.

SPRAWOZDANIA ARCHEOLOGICZNE 72/2, 2020 PL
ISSN 0081-3834
DOI: 10.23858/SA/72.2020.2.2302

Halina Taras[1]

(Review) Katarzyna Trybała-Zawiślak, *Wczesna epoka żelaza na terenie Polski południowo-wschodniej – dynamika zmian i relacje kulturowe* (*The Early Iron Age in south-eastern Poland – dynamics of changes and cultural relations*). Rzeszów 2019: Wydawnictwo Uniwersytetu Rzeszowskiego. ISBN 978-83-7996-726-1. 402 pp.

The intensification of archaeological fieldwork over the last two decades, especially of broad-scale rescue excavations due to large roadway and industrial construction projects, has resulted in the appearance of a huge number of new archaeological sources, even spectacular ones. They often challenge the previous perception of various prehistoric cultural phenomena, forcing the verification of older materials and the redevelopment of summaries. The monograph presented here, entitled *The Early Iron Age in south-eastern Poland – dynamics of changes and cultural relations,* was announced in 2019, and is an example of a fresh look at the picture of settlement and cultural conditions in southeastern Poland, inspired by recent discoveries and research. It organizes and summarizes previously unknown or only briefly mentioned (*e.g*. Czopek *et al*. 2013; 2015; 2017; Czopek and Trybała-Zawiślak 2015; Trybała-Zawiślak 2016) results from rescue research, as well as from single or group research projects, conducted in Poland and in the borderland areas of Ukraine.

The author was guided by the idea of re-evaluating the practice, in older literature, of unambiguously attributing all source materials from southeastern Poland, dated back to the younger stages of the Bronze Age, exclusively to the Tarnobrzeg Lusatian culture. More recent studies reveal that the situation in the Early Iron Age, as well as in the Late Bronze Age, was more complex (Czopek 2008). One of the key factors constituting the basis for a re-evaluation of the nature of the changes at the beginning of the Iron Age in southeastern Poland was the identification of an enclave of Scythian settlement around the site in Chotyniec, excavated for several years by the Rzeszów archaeological centre (Czopek *et al*. 2017; *cf*. Czopek 2019).

1 Institute of Archaeology, Maria Curie-Skłodowska University in Lublin, 4 M. Curie-Skłodowska sq., 20-031 Lublin, Poland, e-mail: halina.taras@poczta.umcs.lublin.pl; https://orcid.org/0000-0002-8143-0090

The layout of the lengthy book (over 400 pages) is logical, though slightly unconventional. The proposed order accurately reflects the cultural diversity – in both the chronological and territorial aspects – implied by the internal changes of the Tarnobrzeg Lusatian culture, as well as (mainly) the influences of neighbourly relations, including cultural and ethnic diffusion.

The presented reconstruction of the settlement and cultural situations is based on a representative collection of sources from southeastern Poland, including recently discovered sources, as well as older, verified ones. Some of these materials, previously unpublished, are documented by catalogues included in the recently published, comprehensive monograph, entitled: *Przemiany kulturowo-osadnicze w dorzeczu rzeki Wiszni w epoce brązu i we wczesnej epoce żelaza w kontekście zmian prahistorycznej i wczesnośredniowiecznej ekumeny* [*Cultural and settlement changes in the Wisznia river basin in the Bronze Age and the Early Iron Age in the context of the prehistoric and Early Medieval ecumene transformation*] (Czopek *et al*. 2018).

The monograph consists of nine chapters, the first of which covers introductory issues (range of the study, the state of research), while subsequent chapters present sequences of changes in the local cultural environment in chronological order. The second chapter highlights the end of the Bronze Age, *i.e*. the starting point for further studies. The author refers to the issue of the persistence of settlement – continuity or the lack thereof – at the turn of the Bronze and Iron Ages, using the example of settlements and cemeteries of the Tarnobrzeg Lusatian culture, which is attributed to the chronological stage covering the end of phase II and the beginning of phase III. At the same time, she draws attention to the difficulties in differentiation of the materials, and sometimes also in determining their cultural affiliation. Recalling the findings on the relationship between the local "Lusatian" community and the Upper Silesian-Małopolska group, she also cites new data to support them. The nature and chronological aspects of these cross-border contacts are considered, including the possibility that the migration of individuals or small groups may have been a natural means for the spread of "alien" (though, in this case, not so culturally distant) features.

Influences from the so-called "Thracian Hallstatt" environment on the southeastern edge of the Tarnobrzeg Lusatian culture were similarly studied. New evidence of the relationship of this unit with the Holihrady culture was provided by the aforementioned research in the Wisznia river basin.

The last line of considerations in the second chapter refers to the Carpathian zone, the distinctiveness of which was already noted almost a quarter of a century ago (Gedl 1998), and where the presence of stylistic elements analogous to those from south of the mountain range has been documented. More recent analyses resulted in the differentiation of particular local communities, ranging from the Warzyce type, through the "Late Bronze/ Early Iron" Siedliska type communities to the Niepla type dated back to Late Hallstatt Period (Czopek and Poradyło 2008). The latter are presented and discussedin a more detailed manner further in the book. The nature of the sources, internally quite heterogeneous, and originating mainly from settlements, did not allow the author to formulate satisfactory conclusions – she maintained moderation in the interpretative sphere, and the final conclusions are appropriately balanced. For instance, due to the absence of noteworthy distinctive features, it is difficult to precisely date the materials originating from the East Carpathian zone. K. Trybała-Zawiślak suggests a change in the methodological approach to working on the sources from this area, *i.e.* abandoning the synthetic approach in favour of regional studies.

Studies on the chronology of the Tarnobrzeg Lusatian culture proved to be fundamental to understanding the range and nature of the changes at the beginning of the Iron Age. Other cultural phenomena and zones defined in southeastern Poland are referred in the book to this most meaningful formation. The key chronological issue is the dating of the second phase of the Tarnobrzeg Lusatian culture, as well as the indication of its features (Chapter 3). Difficulties in this area have already been pointed out in the Polish archaeological literature, and the deliberations were largely related to the dating of the San stylistics (*cf*. Moskwa 1976; Czopek 2001; Ormian 2005; Gawlik and Przybyła 2005). K. Trybała-Zawiślak revisited older views and verified them in relation to the current source base. By comparing the burial complexes from the most distinct cemeteries, as well as contrasting them with the settlement ceramics, she was able to correct the chronology of the San stylistics (especially the classic version), emphasizing the leading role of this complex as a "regional and chronological identifier", which is indirectly helpful in the dating of foreign cultural elements. The lack of coherence of the local "urnfield" cultural foundation, which becomes more and more visible at this stage of knowledge, is the starting point for the considerations in the following chapters, which are more closely related to the beginnings of the Iron Age, as mentioned in the title. They refer successively to the third, late phase of the Tarnobrzeg Lusatian culture (Chapter 4), foreign cultural influences from the South-East (Chapter 5), the distinctiveness of the Carpathian zone (Chapter 6), the local Scythian settlement (Chapter 7) and the Pomeranian culture (Chapter 8).

The fourth chapter: *Zmiany związane z III fazą tarnobrzeskiej kultury łużyckiej* [*Changes related to the third phase of the Tarnobrzeg Lusatian culture*] is extremely important for understanding the cultural processes in this part of Poland in the Early Iron Age. Using a solid foundation of data, in the form of well-studied cemeteries and settlements (either fully excavated or at an advanced stage of recognition), the author used standard analytical and statistical techniques to outline a coherent and logical picture of the changes observed on many levels – in production and the ritual sphere, spatial organization within settlements and cemeteries, demographics, *etc.* – pointing to plausible causes. The narration is conducted with the chronological discipline. At the same time, the issue of the compatibility of dates obtained using various physical and chemical methods, as well as the comparison of the obtained results with conventional "archaeological" relative dating was raised.

Undoubtedly, the concepts contained in Chapter Seven, which concern the initial reconstruction of the size of the Scythian settlement enclave and range of its influences, as well as its chronology and connections, are of pioneering nature. Searching for an answer to the question about the cultural affiliation of the settlement in Chotyniec, Jarosław district, various possibilities were outlined, including the proposition that the Chotyniec agglomeration could be identified with the Neuri people, given the fact that it is an independent structure located to the far northwest within the forest-steppe variant of the Scythian culture (the historical role of the Scythians in Central Europe was recently thoroughly investigated by Jan Chochorowski – *e.g.* Chochorowski 2014). This interesting concept, however, must be verified in the course of further research, including field excavations of the settlement and other sites, which will be continued in the coming years. The author does not avoid difficult questions, although the suggested "answers", at the present stage of knowledge, necessarily fulfil the role of research hypotheses or postulates. This also applies to the remaining chapters in which, by dealing with the archaeological data, she proposes a different perspective on, for example, the possible penetration of the "Tarnobrzeg" environment by small groups of stamped pottery cultural circle, Chernyj Les or Thracian cultures – much like the case of the Scythian culture – as well as the range and role of the Pomeranian culture settlement in southeastern Poland. Sources reveal that it played an important role in the context of the late stage of the Tarnobrzeg Lusatian culture settlement (artefacts of a mixed nature and, consequently, acculturation processes – *cf.* Czopek 2014). What is new it is the identification of the relationship between the Pomeranian and Jastorf cultures in this area, manifested by the presence of heterogeneous materials.

The last, summarizing chapter clearly reveals the entire palette of settlement and cultural diversity, as well as the functional principles of the Early Iron Age community at the southeastern edge of modern Poland. The dynamics and causes of change in the functioning of particular cultural units in environmental and historical terms were described here. This summary effectively impresses upon the reader the strength of the work, synthesizing a variety of issues that had previously been revealed only in fragments – whether in the field of material production, ritual structure, and especially the organization of contemporaneous societies and their mutual relations. The monograph, describing various cause-and-effect relations, presents a multicoloured and constantly-changing fragment of the prehistoric reality on the borderland – in both the geographical and cultural sense – of Central and Eastern Europe.

The book has been properly illustrated; colour maps, tables, charts, photographs and excellent-quality drawings of artefacts correspond well with the text. However, one could have reservations about the formal side of the narrative – the style of expression is uneven, it is occasionally repetitive, and descriptions are sometimes overly-complicated. These shortcomings do not obscure the final value of the monograph, which is a completely original work, and in many respects innovative. In an interesting and coherent manner, it presents the complexity of the processes that took place between the eighth and fourth/third centuries BC, at the fringes of the "urnfield" world and its interactions with neighbours.

Acknowledgements
Grateful thanks to Tomasz Myśliwiec for translation of the text.

References

Chochorowski J. 2014. Scytowie a Europa Środkowa – historyczna interpretacja archeologicznej rzeczywistości. *Materiały i Sprawozdania Rzeszowskiego Ośrodka Archeologicznego* 35, 9-58.

Czopek S. 2001. *Pysznica pow. Stalowa Wola, stanowisko 1 – cmentarzysko ciałopalne z przełomu epok brązu i żelaza*. Rzeszów: Wydawnictwo Uniwersytetu Rzeszowskiego.

Czopek S. 2008. Uwagi o sytuacji kulturowej we wczesnej epoce żelaza na terenie południowo-wschodniej Polski. In M. Mogielnicka-Urban (ed.)*, Opera ex aere. Studia z epoki brązu i wczesnej epoki żelaza dedykowane profesorowi Janowi Dąbrowskiemu przez przyjaciół, uczniów i kolegów z okazji siedemdziesięciolecia* urodzin. Warszawa: Instytut Archeologii i Etnologii PAN.

Czopek S. 2014. *Stanowisko 158 w Jarosławiu, woj. podkarpackie. Cz. II. Osadnictwo od starszej epoki brązu do okresu rzymskiego* (= *Via Archaeologica Ressoviensia IV*). Rzeszów: Fundacja Rzeszowskiego Ośrodka Archeologicznego.

Czopek S. 2019. Enklawa scytyjskiego kręgu kulturowego w południowo-wschodniej Polsce. *Przegląd Archeologiczny* 67, 119-148.

Czopek S., Kusiak J. and Trybała-Zawiślak 2013. Thermoluminescent Dating of the Late Bronze and Early Iron Age pottery on sites in Kłyżów and Jarosław (SE Poland). *Geochronometria* 40, 113-125.

Czopek S., Pawliw D., Trybała-Zawiślak K. and Wojcieszczuk N. 2015. New discoveries of arrowheads of Scythian type from Polish-Ukrainian borderland (San, Bug and Upper Dniester drainage basin). *Acta Archaeologica Carpathica* 50, 191-216.

Czopek S. and Poradyło W. 2008. *Warzyce, pow. Jasło, stan. 17 – osada z epoki brązu i wczesnej epoki żelaza* (= *Collectio Archaeologica Ressoviensis* 10). Rzeszów: Fundacja Rzeszowskiego Ośrodka Archeologicznego.

Czopek S. and Trybała-Zawiślak K. 2015. Early Iron Age in south-eastern Poland. In S. Wefers, M. Karwowski, J. Fries-Knoblach, P. Traebsche, and P. C. Ramsl (eds), *Waffen – Gewalt – Krieg. Internarionalen Tagung der AG Eisenzeit und des Instytut Archeologii Uniwersytery Rzeszowskiego, Rzeszów 19-22. September 2012* (= *Beitäge zur Ur- und Frühgeschichte Mitteleuropas* 79). Langenweißbach: Beier and Beran, 285-301.

Czopek S., Trybała-Zawiślak K., Tokarczyk T., Ocadryga-Tokarczyk E., Burghardt M., Adamik-Proksa J. and Rajpold W. 2017. Pierwsze sprawozdanie z weryfikacyjnych badań na grodzisku z wczesnej epoki żelaza w Chotyńcu. *Materiały i Sprawozdania Rzeszowskiego Ośrodka Archeologicznego* 38, 291-305.

Czopek S., Trybała-Zawiślak K., Wojceszczuk N., Osalczuk O., Bobak D., Gębica P., Jacyszyn A., Pasterkiewicz W., Pawliw D., Petehyrycz W., Połtowicz-Bobak M. and Wacnik A. 2018. *Przemiany kulturowo-osadnicze w dorzeczu rzeki Wiszni w epoce brązu i we wczesnej epoce żelaza w kontekście zmian prahistorycznej i wczesnośredniowiecznej ekumeny*. Rzeszów: Wydawnictwo Uniwersytetu Rzeszowskiego.

Gawlik A. and Przybyła M. S. 2005. Początki wczesnej epoki żelaza w Kotlinie Sandomierskiej. In M. Kuraś (ed.), *Archeologia Kotliny Sandomierskiej* (= *Rocznik Muzeum Regionalnego w Stalowej Woli* 4). Stalowa Wola, 313-352.

Gedl M. 1998. *Młodsza epoka brązu we wschodniej części polskich Karpat*. Kraków: Wydawnictwo Uniwersytetu Jagiellońskiego.

Moskwa K. 1976. *Kultura łużycka w południowo-wschodniej Polsce*. Rzeszów: Wydawnictwo Muzeum Okręgowego w Rzeszowie.

Ormian K. 2005. Stylistyka nadsańska ceramiki tarnobrzeskiej kultury łużyckiej – zarys problematyki. In M. Kuraś (ed.), *Archeologia Kotliny Sandomierskiej*. Stalowa Wola, 291-312. *Rocznik Muzeum Regionalnego w Stalowej Woli* 4.

Trybała-Zawiślak K. 2016. Obiekt ze „scyto-tracką” ceramiką toczoną z osady tarnobrzeskiej kultury łużyckiej w Dębinie, pow. łańcucki. *Materiały i Sprawozdania Rzeszowskiego Ośrodka Archeologicznego* 37, 309-317.

Information for Contributors

Manuscripts are accepted for review with the understanding that the same work has not been published, that it is not under consideration for publication elsewhere, and that its submission has been approved by all of the authors and by the institution where the work was carried out. Articles and any other material published in ***Sprawozdania Archeologiczne*** represent the opinions of the author(s) and should not be construed to reflect the opinions of the Editor and the Publisher.

Sprawozdania Archeologiczne is interested in: (1) all research questions and results of field survey, in all periods in Poland, Central and South-Eastern Europe, (2) all types of archaeological method, whether survey, excavation or analysis, (3) matters of interest to the archaeology profession and its interaction with society (4) book reviews, as well as discussions, criticism and chronicle of archaeological events.

Submission

Please, submit separate text and graphics files. Our preferred text format is Microsoft Word. If submitting your manuscript as a Word file DO NOT embed figures and tables in the text. Figures should be submitted as separate high-quality JPG or TIFF files. Resolutions must be 300 dpi or higher and image dimensions should be 125 mm (width) x 170 mm (height).

The title page should contain: author's name, author's affiliation, the article title. An abstract in English is to be provided, no longer than 150 words, accompanied by a list of 5-6 key words.

Submitted text should be written in English or German.

All submissions are considered by the Editor in the first instance. Suitable papers are peer-reviewed.

Proofs

Authors will receive a proof of their article as a PDF file. Please note that only typographical or factual errors may be corrected at proof stage.

References

References should be listed alphabetically at the end of the paper and referred to in the text by the author's surname, date of publication and page number, *e.g.* (Blake 1998, 59), or (Kruk, Milisauskas 1983, 259). Where there are three or more authors, only the first author's name is given in the text, followed by *et al.*, *e.g.* (Sofer *et al.* 2000, 814). Full numbers for pages and dates should be used, *e.g.* 35-37, 123-135. Footnotes should be avoided.

In order to save editorial time, please use the following template for the list of references to articles submitted to ***Sprawozdania Archeologiczne***.

Journal articles

Bogucki P. 1993. Animal traction and household economies in Neolithic Europe. *Antiquity* 67(256), 492-503.

Kruk J. and Milisauskas S. 1983. Chronologia absolutna osadnictwa neolitycznego z Bronocic, woj. kieleckie. *Archeologia Polski* 28(2), 257-320.

Single-author/editor books

Czerniak L. 1980. *Rozwój społeczeństw kultury późnej ceramiki wstęgowej na Kujawach*. Poznań: Wydawnictwo Naukowe UAM.

Hodder I. (ed.) 1991. *Archaeological theory in Europe. The last three decades.* London: Routledge.

Zych R. 2008. *Kultura pucharów lejkowatych w Polsce południowo-wschodniej* (= *Collectio Archaeologica Ressoviensis* 7). Rzeszów: Instytut Archeologii UR.

Multiple author/editor books

Kristiansen K. and Larsson T. B. 2005. *The Rise of Bronze Age Society. Travels, Transmissions and Transformations.* Cambridge: Cambridge University Press.

Czebreszuk J. and Müller J. (eds) 2004. *Ausgrabungen und Forschungen in einer prähistorischen Siedlungskammer Großpolens* 1. *Forschungsstand. Erste Ergebnisse. Das östliche Feuchtbodenareal* (= *Studien zur Archäologie in Ostmitteleuropa* 2). Poznań, Kiel, Rahden (Westf.): UAM w Poznaniu, CAU zu Kiel.

Contribution to a book

Iwaniszewski S. 2006. Megalityczny obrządek pogrzebowy i neolityczny krajobraz w mikroregionie stryczowickim na Wyżynie Sandomiersko-Opatowskiej. In J. Libera and K. Tunia (eds), *Idea megalityczna w obrządku pogrzebowym kultury pucharów lejkowatych.* Lublin, Kraków: Instytut Archeologii UMCS, Instytut Archeologii i Etnologii PAN, 259-269.

Kulczycka-Leciejewiczowa A. 2006. Kultura ceramiki wstęgowej kłutej w południowej Polsce. In M. Kaczanowska (ed.), *Dziedzictwo cywilizacji naddunajskich: Małopolska na przełomie epoki kamienia i miedzi* (= *Biblioteka Muzeum Archeologicznego w Krakowie* 1). Kraków: Muzeum Archeologiczne, 9-21.

In the case of subsequent works by the same author in the list of references, the name is repeated in all cases and followed by the date of publication.

Gediga B. 2007. Problemy obrazu kultury wczesnej epoki żelaza na Śląsku w świetle nowych badań terenowych. *Śląskie Sprawozdania Archeologiczne* 49, 123-146.

Gediga B. 2010. Śląsk – regionalna prowincja kultury halsztackiej. In B. Gediga and W. Piotrowski (eds), *Rola głównych centrów kulturowych w kształtowaniu oblicza kulturowego Europy Środkowej we wczesnych okresach epoki żelaza* (= *Biskupińskie Prace Archeologiczne* 8; *PAN O/Wrocław. Prace Komisji Archeologicznej* 18). Biskupin, Wrocław: Muzeum Archeologiczne w Biskupinie, Komisja Archeologiczna PAN O/Wrocław, 187-218.