EXPLORING PREHISTORIC POLAND

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FROM THE EARLY BRONZE AGE PASTORALISTS TO THE ROMAN PERIOD

EDITED BY:
MATEUSZ JAEGER, MACIEJ KACZMAREK, ANDRZEJ MICHAŁOWSKI



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Distinguished Colleagues, Dear Guests,



It is with great pleasure and honour that I welcome you to the XXI World Congress of the International Union of Prehistoric and Protohistoric Sciences (UISPP), held from August 31st to September 4th, 2026, at the Faculty of Archaeology at Adam Mickiewicz University in Poznań.

This year's Congress is of particular significance to us. Since the establishment of the Union more than ninety years ago, no World Congress has been held in Poland. The decision of the UISPP leadership to entrust the organisation of this prestigious gathering to Adam Mickiewicz University in Poznań and to the Polish archaeological community constitutes a great distinction and a mark of confidence. We accept this responsibility with profound gratitude and strong commitment.

Poznań – the first historical capital of Poland – is a city distinguished by its rich cultural and scholarly heritage. It was here that archaeology evolved from pioneering investigations conducted by dedicated enthusiasts into a modern academic discipline. A particularly prominent figure in this development was Professor Józef Kostrzewski, founder of the Poznań School of Archaeology and archaeological studies at the University of Poznań in 1919. His scholarly achievements and intellectual vision continue to inspire successive generations of researchers, and the Faculty of Archaeology at Adam Mickiewicz University remains today one of the leading centres of archaeological research and education in Poland.

I trust that this Congress will provide an exceptional forum for the exchange of knowledge and experience among scholars from across the world. It also offers an opportunity to reflect on the challenges facing contemporary archaeology, including the protection of cultural heritage, legal dimensions of archaeological research, and the role of archaeology in fostering public awareness and engagement with the past.

We are particularly pleased to welcome early-career researchers, doctoral candidates, and students, who will have the opportunity to participate in international scholarly dialogue and engage with best practices in interdisciplinary collaboration.

On the occasion of the XXI World Congress of the UISPP, we are pleased to present a unique scholarly publication: the two-volume work

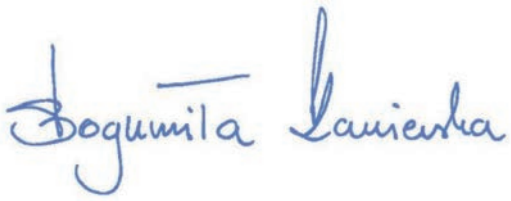
Exploring Prehistoric Poland, prepared specifically for this event by several dozen researchers representing the leading Polish academic and research institutions. Volume I – *Exploring Prehistoric Poland from Palaeolithic to Neolithic*, edited by Iwona Sobkowiak-Tabaka and Aldona Kurzawska, and Volume II – *Exploring Prehistoric Poland from the Early Bronze Age Pastoralists to the Roman Period*, edited by Andrzej Michałowski, Maciej Kaczmarek, and Mateusz Jaeger, provide a contemporary and accessible introduction to the current state of research on the pre- and protohistory of the land comprising modern-day Poland.

The publication combines concise syntheses of successive prehistoric periods with numerous case studies highlighting some of the most significant archaeological sites. Richly illustrated and authored by leading specialists, the two volumes not only offer a comprehensive overview of the latest achievements in prehistoric archaeology but also identify current research directions and emerging perspectives on Poland's earliest past. I am confident that this publication will serve as a valuable source of knowledge for Congress participants and for all those interested in the archaeology of Central Europe.

I wish you an inspiring and productive Congress, stimulating discussions, fruitful scholarly exchanges, and many new academic connections. May your stay in Poznań be both enjoyable and memorable. Let the XXI World Congress of the UISPP serve as a celebration of knowledge, international collaboration, and our shared passion for exploring and understanding the human past.

It is my great pleasure to welcome you to Adam Mickiewicz University in Poznań.

Bogumiła Kaniewska
/Rector of Adam Mickiewicz University/



PREFACE

It is our pleasure to present this two-volume publication prepared for the XXI World Congress of the International Union of Prehistoric and Protohistoric Sciences (UISPP), to be held in 2026 in Poznań, Poland, with the theme *Archaeology in Motion: Past Lessons, Future Responsibilities*. The Congress will bring together scholars from across the globe, creating a unique forum for the exchange of ideas, methods, and research results, while also encouraging reflection on archaeology's role in contemporary society and its responsibilities toward future generations.

The publication you hold in your hands was conceived as a contribution to this international dialogue. Its primary objective is to introduce readers from different countries and continents to the prehistoric past of the lands that constitute present-day Poland, whose archaeological record reflects a remarkable diversity of cultural traditions, environmental settings, and historical trajectories. At the same time, we highlight a selection of archaeological sites that can be regarded as representative landmarks in the study of the prehistory of this part of Europe.

It should be emphasised that the present work is not intended as a comprehensive or exhaustive account of prehistoric archaeology in Poland. Such an undertaking would require a far more extensive treatment than could be accommodated within the framework of this publication. Instead, our aim is to provide an informed and accessible overview of key periods, phenomena, and discoveries, offering international readers a broad outline of current knowledge and directing their attention to sites that have played a particularly important role in archaeological research. The chapters collected here, therefore, represent selected perspectives and examples rather than an all-encompassing synthesis.

The publication is divided into two complementary volumes.

Volume I, *Exploring Prehistoric Poland from Palaeolithic to Neolithic*, opens with a series of introductory chapters devoted to the history of archaeology in Poland, Polish archaeological research conducted worldwide, contemporary methodological reflections, environmental transformations during the Pleistocene and Early Holocene, and the distribution and significance of silica lithic resources. These contributions provide the broader historical, intellectual, and environmental context necessary for understanding prehistoric developments in the region.

The remainder of the first volume is organised chronologically and presents the Palaeolithic, Mesolithic, and Neolithic periods. Each section combines a synthetic overview of the current state of research with a series of detailed case studies devoted to selected archaeological sites. The sites discussed – including caves, open-air settlements, cemeteries, ritual landscapes, and other key localities – illustrate the diversity of human adaptation, technological innovation, social organisation, and cultural change from the earliest traces of human presence through the emergence of farming communities.

Volume II, *Exploring Prehistoric Poland: from Early Bronze Age Pastoralists to the Roman Period*, continues this narrative by examining the profound transformations that shaped societies from the Early Bronze Age through the Roman Iron Age. The volume begins with chapters devoted to the Early and Middle Bronze Age, emphasising the interplay between tradition and innovation, the development of metallurgy, and the emergence of increasingly complex social structures. Subsequent sections explore the Late Bronze Age and the beginnings of the Iron Age, followed by broader discussions of iron production and the cultural landscape of the Roman Iron Age in the Polish territories.

As in the first volume, synthesis chapters are complemented by numerous case studies presenting

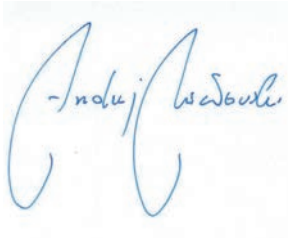
some of the most significant archaeological sites in the region. These include settlements, fortified sites, cemeteries, ritual deposits, metallurgical centres, and other locations that have fundamentally contributed to our understanding of prehistoric communities and their interactions within wider European networks. Together, they demonstrate the richness and diversity of archaeological heritage preserved within the lands of present-day Poland.

By bringing together contributions from specialists representing numerous Polish academic institutions and research centres, this publication reflects both the achievements of Polish archaeology and the vitality of contemporary research. We hope that it will serve as a useful introduction for participants of the XXI UISPP World Congress and for all readers interested in the prehistoric past of Central Europe.

Above all, we hope that the overview presented in these volumes will encourage further exploration of the archaeological record of Poland, stimulate new international collaborations, and contribute to the ongoing discussion about how the study of the past can inform our responsibilities toward the future.

Andrzej Michałowski

/Chairman of the Congress/



Iwona Sobkowiak-Tabaka

/General Secretary
of the Organising Committee/



EARLY AND MIDDLE BRONZE AGE





EXPLORING PREHISTORIC POLAND

FROM THE EARLY BRONZE AGE PASTORALISTS TO THE ROMAN PERIOD

EARLY BRONZE AGE

Mateusz Jaeger

Introduction: Diversity Rather than Uniform Transformation

The Early Bronze Age in Europe (2300–1600 BCE) was not a period characterized by homogeneous processes or by cultural and social changes unfolding at an even pace. The diversity of human communities – manifested in material culture, settlement forms, economic strategies, and funerary practices – that had defined particular regions during the Neolithic did not, as is self-evident, disappear with the onset of a new period. On the contrary, local traditions played a decisive role in shaping subsequent centuries, endowing the Early Bronze Age with a range of distinctive regional characteristics. The term "Early Bronze Age" therefore has primarily a chronological meaning. It denotes a relatively long period of several centuries during which individual communities followed their own, often markedly different, developmental trajectories.

In simplified terms, the Polish lands developed in divergent ways and at different rates within two broad zones. The first comprised the lowland areas, including Pomerania, Kuyavia, Greater Poland, and Silesia, while the second encompassed primarily Lesser Poland and the uplands of south-eastern Poland (Fig. 1). The specific character of these regions was formed during the Neolithic and remained visible in later prehistoric periods. In the third millennium BCE, the late groups of the Globular Amphora Culture, the Funnel Beaker Culture, the Corded Ware Culture, as well as communities of the so-called Forest Neolithic – groups producing pottery but still adhering predominantly to hunter-gatherer economic models – developed within these regions as a cultural substrate that would largely determine the directions of subsequent social development.

Bell Beaker communities, as in other parts of Europe, played a significant role in cultural transformations in the territory of modern Poland. During the prologue to the Bronze Age (2300–2000 BCE), they constituted one of the principal components of cultural transformation in the early phases of both the Únětice and the Mierzanowice Cultures (Kadrow, Machnik 1997; Czebreszuk 1998). The nature of their influence varied regionally. In western Poland, elements of the Bell Beaker package (Czebreszuk 2001) appear primarily as the result of contacts and the transfer of ideas within extensive exchange networks. In contrast, in Lesser Poland their presence is associated with actual migration of small groups from Moravia (Budziszewski, Włodarczak 2010).

A completely unique find is the Bell Beaker feature from Supraśl in north-eastern Poland, a region still dominated by settlement associated with the hunter-gatherer Neman culture. The feature contained fragments of pottery from eleven different vessels, with richly decorated examples predominating. The most important element of the deposit was a large pot-shaped beaker, alongside which heavily burnt human remains and halves of two amber disc beads were discovered. Surrounding these were isolated fragments of other vessels, as well as numerous stone and flint artefacts, including an arrow-shaft straightener, an adze, a fragment of a *Krummesser*, and inserts from a composite dagger. The quality of manufacture of some of these objects suggests a non-local origin (Manasterski et al. 2021).

At the beginning of the second millennium BCE, the areas under discussion thus constituted a mosaic of diverse settlement forms, funerary practices, and economic strategies, based to varying degrees on animal husbandry and cultivation. During the Early Bronze Age, alongside minor

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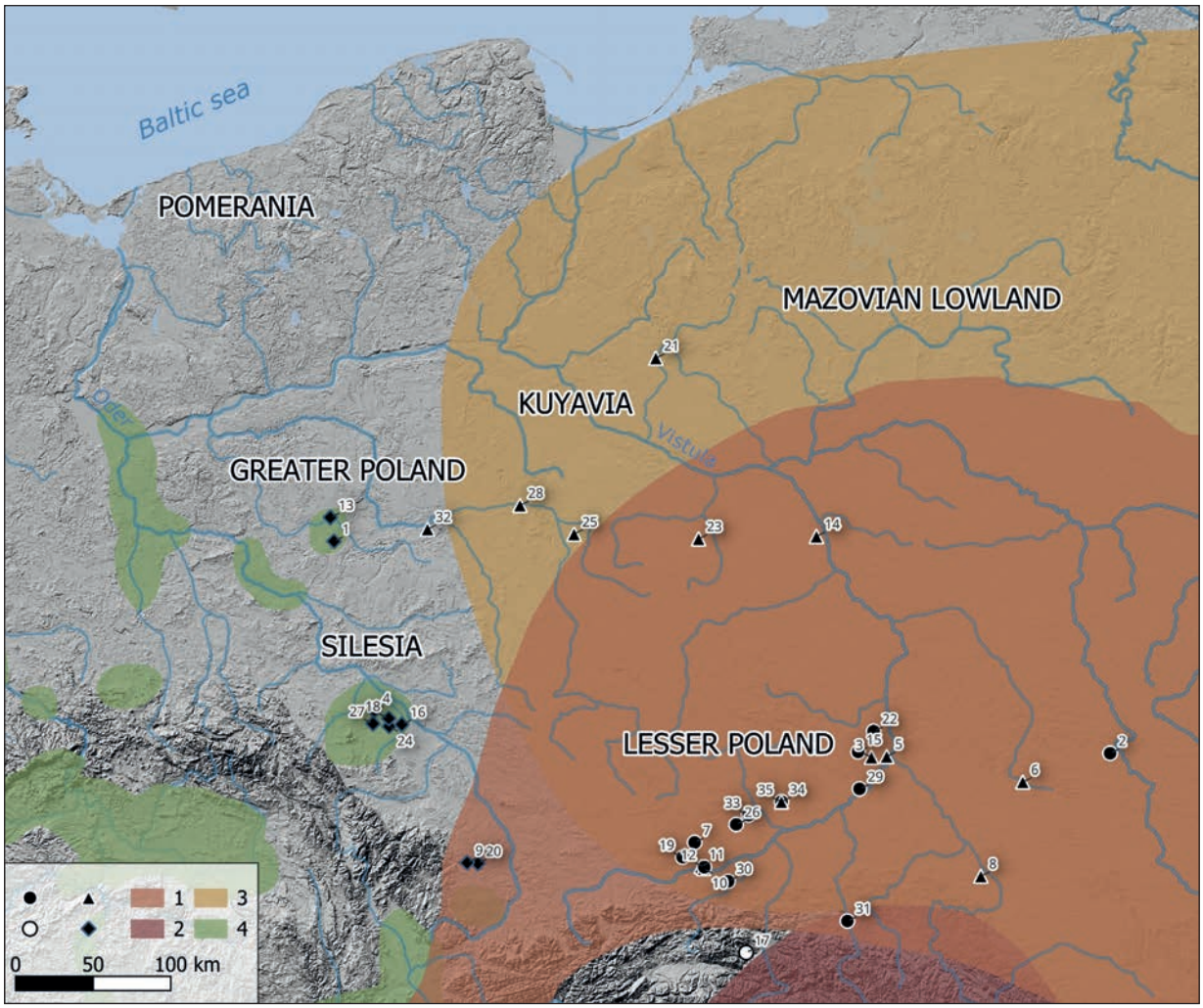


FIGURE 1. Map of the maximum extents of the most important archaeological cultures of the Early Bronze Age in Poland. 1 – Epi-Corded Ware Carpathian Cultural Circle (including the Mierzanowice culture); 2 – Otomani–Füzesabony culture; 3 – Trzciniec Cultural Circle; 4 – Únětice culture. Sites mentioned in the text: 1 – Bruszczewo, 2 – Czerniczyn, 3 – Dacharzów, 4 – Domasław, 5 – Dwikozy, 6 – Guciów, 7 – Iwanowice, 8 – Jarosław, 9 – Jędrychowice, 10 – Kraków Mogiła, 11 – Kraków Nowa Huta, 12 – Kraków Nowa Huta Kopiec Wandy, 13 – Łęki Małe, 14 – Łubna, 15 – Malice Kościelne, 16 – Marszowice, 17 – Maszkowice, 18 – Milejowice, 19 – Modlnica, 20 – Nowa Cerekwia, 21 – Okalewo, 22 – Ożarów, 23 – Polesie, 24 – Radłowice, 25 – Rożniatów Kolonia, 26 – Szarbia Zwierzyniecka, 27 – Szczepankowice, 28 – Szczepidło, 29 – Świniary Stare, 30 – Targowisko, 31 – Trzcinica, 32 – Wolica Nowa, 33 – Zagaje Stradowskie, 34 and 35 – Żerniki Górne; black circle – Mierzanowice culture; white circle – Otomani–Füzesabony culture; black triangle – Trzciniec Cultural Circle; black diamond – Únětice culture. After Kadrow 2001; Makarowicz 2010; Jaeger, Czebreszuk 2010

regional cultural groups, the most significant and dominant cultural models were the Únětice culture (in the lowland zone), the Mierzanowice culture (in the upland zone), the specific structure referred to as the Trzciniec Cultural Circle (hereafter TCC) – characterised by its long-term presence in both cultural–geographical zones – and the dynamically, though discontinuously, developing

Otomani-Füzesabony culture in the region of the Polish Carpathians (1750–1450 BCE) (Fig. 1).

The conventional boundary of 2300 BCE, commonly regarded as marking the beginning of the Early Bronze Age, did not bring about in Poland an abrupt or profound technological transformation in the form of widespread availability and acceptance of a new raw material – bronze. This circumstance does not distinguish the process of "entering a new age" in this region from that observed in other regions of Central Europe (Pare 2000). The appearance of metal, together with associated economic, cultural, and ritual phenomena, occurred gradually and at varying rates in different locations, depending on numerous factors – not only pragmatic and objective ones (such as the presence of communication routes or access to raw materials), but also cultural and subjective factors (including local traditions and the degree of readiness to adopt innovation).

As a consequence, during the first half of the second millennium BCE the territory of modern Poland did not constitute a unified cultural space, but rather a field of coexistence and confrontation between different adaptive strategies. These differences are evident in settlement organisation, funerary practices, and the ways in which individual communities engaged with exchange networks spanning Central Europe.

In this chapter, I propose to examine this diversity through the prism of three models of Early Bronze Age social development that emerged in the region under consideration. The first, represented by the Únětice culture (2200–1600 BCE) in the lowland zone, was associated with a relatively rapid and comprehensive adoption of new social and technological patterns, including the development of metallurgy, fortified settlement centres, and a differentiated social structure. The second model, visible in the Mierzanowice culture (2300–1650 BCE) of the upland zone, was more conservative in character and relied on a strong continuity of Late Eneolithic traditions, combined with the selective incorporation of new elements. The third model, associated with the TCC (1850/1800–1100/1050 BCE), constituted an alternative form of integrating diverse regional traditions into a flexible settlement and ritual system, the key distinguishing features of which were settlement micro-regions and long-used collective graves. In the following sections, these proposed models will be discussed with reference to settlement systems, funerary ideologies, and mechanisms of exchange.

This perspective makes it possible to view the Early Bronze Age in this part of Europe not as a uniform process of "entering the age of metal", but rather as a set of distinct responses to similar technological, economic, and social challenges.

Settlement Systems and Regional Organisation

The cultural and geographical regionalisation outlined in the introduction is clearly reflected in the known and documented forms of Early Bronze Age settlement. In the lowland zone, the largest body of evidence relates to settlement associated with the Únětice culture. It should be emphasised, however, that the current state of research into different types of Únětice settlements and regional settlement networks remains fragmentary.

Settlement of the Únětice culture was concentrated in the western part of the Polish lands, particularly in the regions of Greater Poland and Silesia (Fig. 1). In both areas, settlement networks developed in zones offering favourable environmental conditions – allowing for agro-pastoral subsistence – while at the same time being embedded within broader supra-regional networks of interaction.

Relatively well-investigated examples of fortified settlements are known from Greater Poland and Silesia, providing important information on building forms and domestic architecture. By contrast, far less is known about open settlements, which have so far been examined only on a limited scale, predominantly in the course of rescue excavations. These investigations have yielded basic categories of evidence, including economic features, storage pits, and architectural traces that are difficult to interpret, most often in the form of postholes. To date, no unequivocal remains of large residential buildings comparable to those known from the territory of present-day Czechia have been identified.

The most comprehensive data on the spatial organisation of fortified Únětice settlements come from the site at Bruszczewo, located on a peninsula originally surrounded by a lake (Czebreszuk, Müller 2015 eds; Müller, Czebreszuk, Jaeger, Kneisel 2015 eds; Niebieszczański et al. 2022; 2024). Despite extensive destruction caused by long-term ploughing, the recovered material allows for the reconstruction



FIGURE 2. Bruszczewo. Plan of the settlement with excavated elements of the inner layout and fortifications: 1 – ditch, 2 – palisades, 3, 4 – fascines, 5 – wooden wall, 6 – pits, 7 – excavated area, 8 – houses in wet area, 9 – probable course of EBA ditch. After Kneisel et al. 2008

of the basic characteristics of the settlement's built environment and defensive system. The site comprises two distinct zones: a 'mineral' zone (on dry land) and a peat zone, each providing different yet complementary sets of data (Fig. 2).

In the mineral zone, the remains of two semi-sunken buildings were identified. The first had a roughly square plan (c. 4 m per side) with rounded corners and a stone hearth; the absence of clearly identifiable postholes distinguishes it from classic post-built structures. It has been interpreted as a semi-sunken building with a log construction, although this interpretation cannot be confirmed unequivocally (Jaeger 2018). The second, better-preserved structure, with a semi-oval plan (c. 2.75 × 2.50 m), contained small postholes and a central



FIGURE 3. Bruszczewo. Reconstruction of building (feature no. 78). After Stróżyk 2015

concentration of stones, most likely representing a hearth or oven (Fig. 3). It yielded numerous fragments of daub bearing impressions of wattle and planks, indicating a post-built structure with clay-plastered wall infill (Jaeger 2018).

In addition to these features, numerous pits and postholes were recorded. These do not, however, form clear patterns that would allow the reconstruction of larger above-ground buildings. Unlike sites in Czechia or Germany, no regular alignments of posts or plans of hall-type or circular constructions have been identified. It may therefore be assumed that the settlement was primarily composed of small, partially sunken dwellings, while any above-ground structures were light in construction and poorly resistant to later erosion.

The peat zone is of particular significance at Bruszczewo, as anaerobic conditions enabled the preservation of wooden elements (Kneisel, Kroll 2010). Remains of at least four buildings were documented there, along with constructions associated with shoreline reinforcement. In some cases, it was possible to identify technical details (Fig. 4), such as wattle made of thick branches forming parts of wall structures.

A key source of information on building techniques is the extensive assemblage of daub, over 2,500 fragments in total, some of which derive from features securely dated to the Early Bronze Age. Analysis of the distribution of daub indicates a concentration in the central part of the settlement, where the highest density of stone and bone artefacts was also recorded. This may suggest the presence of a zone of intensive economic activity, possibly associated with workshops or with frequent rebuilding of domestic structures (Jaeger, Stróżyk 2015).

Within the peninsula, remains of a burnt gate were also discovered, and numerous fragments of daub point to the complex construction of this element (Jaeger 2018).

In comparison with other Únětice sites, Bruszczewo represents an exceptionally elaborate and long-lasting example of a fortified settlement, not only within Poland but also across the wider distribution area of the Únětice culture as a whole (Jaeger 2016).



FIGURE 4. Bruszczewo. Construction detail of hut no. 2 remains. After Kneisel et al. 2008

Alongside Bruszczewo, fortified settlements of the Únětice culture are also known from the Śląsk region, including Radłowice, Nowa Cerekwia, and Jędrychowice (Chochorowski 1985; Gedl 1985; Kunawicz-Kosińska 1985; Lasak, Furmanek 2008).

At Radłowice, the remains of semi-sunken buildings and above-ground post-built houses were identified, along with a series of pits and numerous postholes arranged in a manner suggesting an ordered spatial organisation. These buildings were small in size, and their walls were reinforced and sealed with clay, as evidenced by finds of daub bearing impressions of wooden structural elements (Lasak 1991; Jaeger 2018). At Nowa Cerekwia, two zones of probably different function were distinguished: one dominated by finds related to production and economic activities, and the other containing pits interpreted as remnants of domestic structures (Gedl 1985). At Jędrychowice, the evidence consists mainly of pits, although the authors of excavations conducted in the 1980s refer to the discovery of a large post-built house during pre-War investigations of this site. The form and dimensions of this building, however, were not described in detail (Kunawicz-Kosińska 1985).

A distinctive feature of Únětice settlements is the presence of burials within the domestic space. Such interments are known from Bruszczewo, Nowa Cerekwia, and Jędrychowice. Particularly noteworthy is a burial of a woman from Jędrychowice bearing traces of two severe blows to the head, providing tangible evidence for the presence of violence and potential conflict (Kneisel, Jaeger 2024).

The fortifications constructed around Únětice settlements display considerable diversity. The most elaborate defensive system was uncovered at Bruszczewo, where it comprised a large ditch – up to 20 m wide and 4.5 m deep – accompanied by rows of palisades (Fig. 5). On the inner side of the settlement, three palisade lines made of massive oak trunks were documented, their structures repeatedly repaired over a period exceeding two centuries (Fig. 6). In the zone of the original entrance to the settlement, remains of a burnt gate were discovered along one of the palisade lines, and numerous fragments of daub indicate a complex construction of this element. In the peat zone, anaerobic conditions preserved two lines of fascines and a massive wall (or separate wall segments) composed of beams set between pairs of posts (Fig. 7). Their function as fortifications or defensive



FIGURE 5. Bruszczewo. View of the ditch fill and the burnt remains of the gate structure and palisade. Photo by J. Kneisel

elements is not unequivocal. It may be assumed that, in addition to restricting access from the lakeside, these structures also served to protect the settlement's shoreline and adjacent buildings from water action during periods of rising lake levels (Niebieszczański et al. 2023) (Fig. 8).

Radłowice represents a different type of defensive arrangement – far less elaborate and probably, as in the peat zone at Bruszczewo, partly hydrotechnical in function. The discovered ditches and embankments were small, and their location in a wetland zone suggests that they may

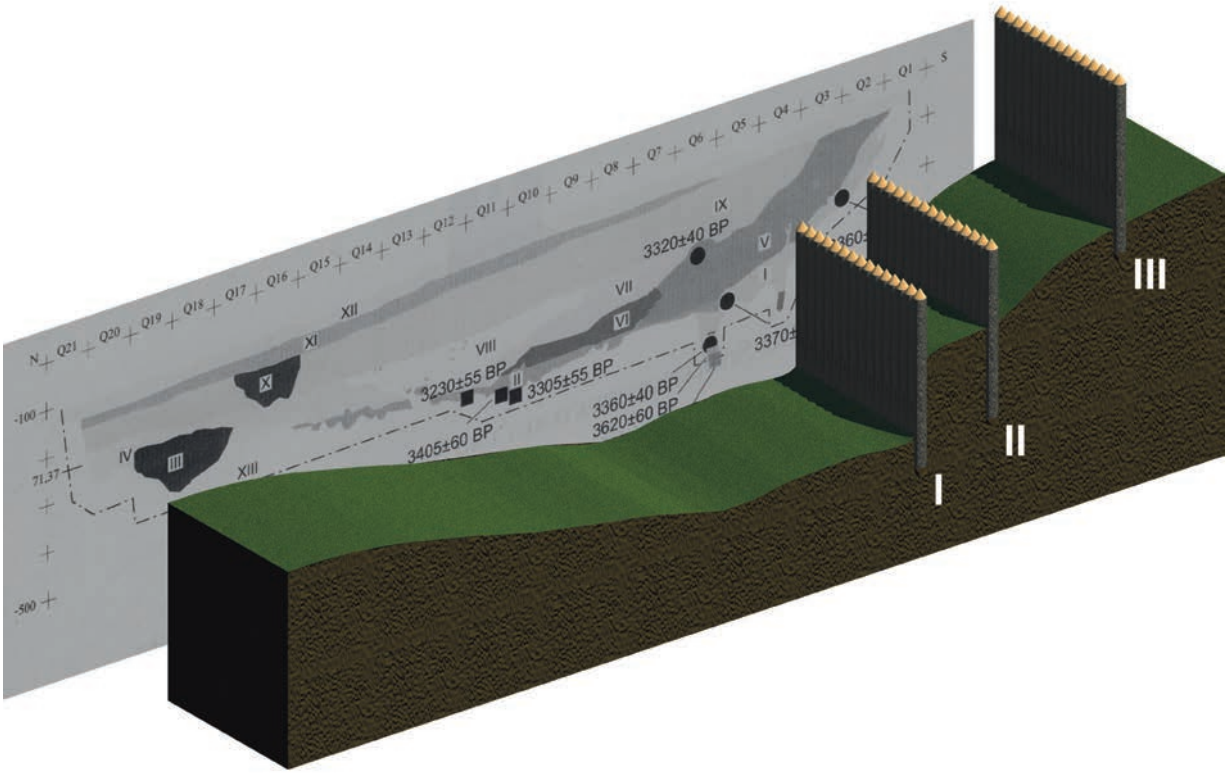


FIGURE 6. Bruszczewo. Reconstruction of three rows of palisades. After Stróżyk 2015



FIGURE 7. Bruszczewo, trench 30. Two fascines and remains of wooden wall. Photo by J. Kneisel

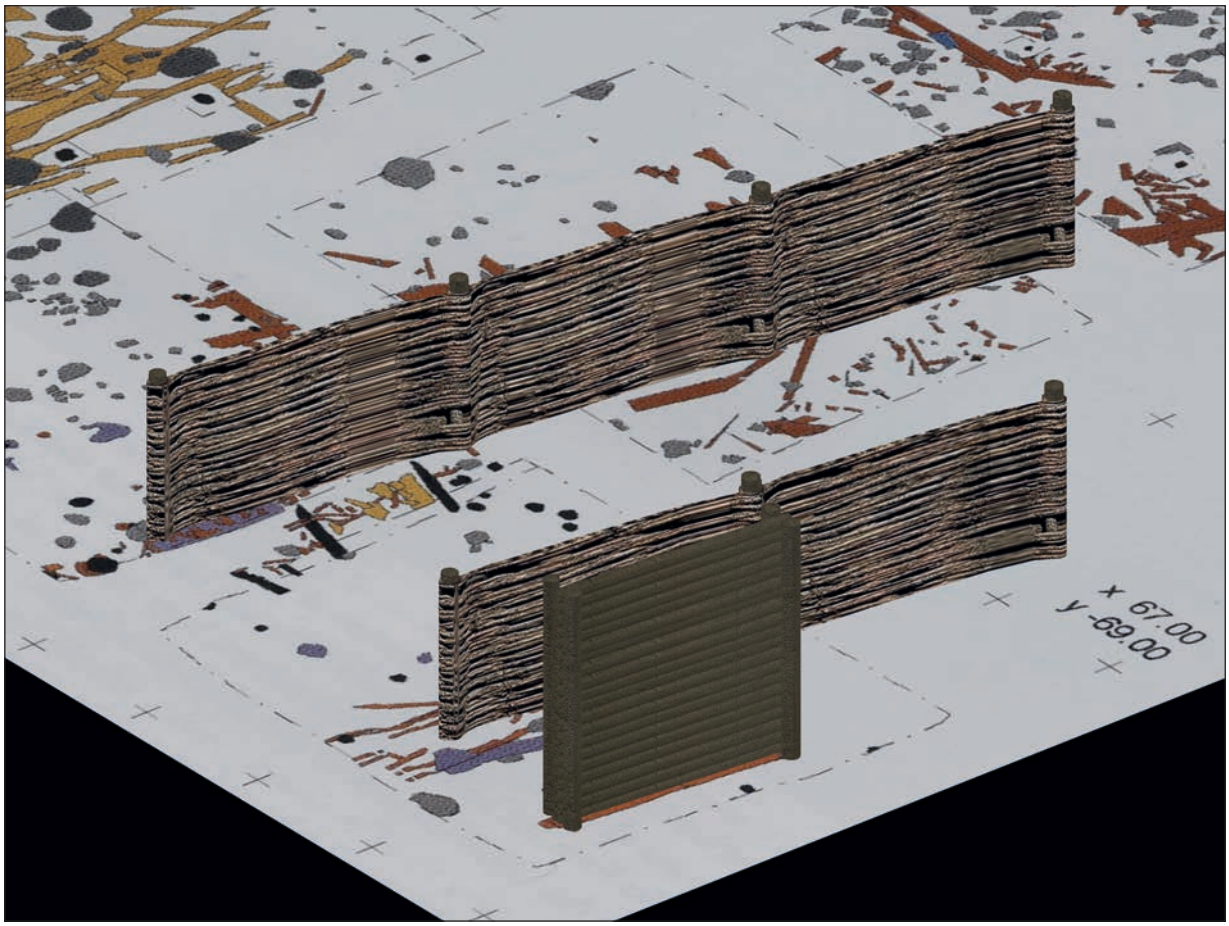


FIGURE 8. Bruszczewo, trench 30. Reconstruction of three lines of fortifications in the eastern peat part of the site. After Stróżyk 2015

have been partly responsible for drainage or water retention (Lasak 1991; Lasak, Furmanek 2008). At Nowa Cerekwia and Jędrychowice, the fortifications consisted of double ditch lines accompanied by post-built structures in the form of palisades (Chochorowski 1985).

The significance of fortified settlements in the Early Bronze Age extended beyond purely military aspects. On the one hand, the presence of massive defensive works indicates local tensions and a potential for conflict. On the other hand, owing to their location, these sites functioned as stable and long-lived centres of production and exchange. Metal artefacts have been recorded at all known sites, while evidence for local metallurgy has been confirmed at Bruszczewo and Jędrychowice (Jaeger, Czebreszuk, Müller, Kneisel 2015). Bruszczewo stands out as a regional metallurgical centre where bronze casting techniques that became widespread only during the Middle Bronze Age were already in use; gold was also processed there (Müller et al. 2023). In addition to metals, amber constituted a strategic raw material. Its presence reflects the integration of these centres into networks linking the Baltic zone, Bohemia – where the highest concentration of Baltic amber in Central Europe during the Early Bronze Age is found – and the Carpathian Basin (Kneisel, Müller 2011).

In the upland zone, above all within the region of Lesser Poland, stable settlement and a distinctive model of Early Bronze Age society are primarily associated with the Mierzanowice culture. This culture formed part of the epi-Corded Ware Carpathian cultural circle that emerged at the turn of the third and second millennia BCE (Kadrow, Machnik 1997). It constituted a specific cultural formation strongly rooted in the Late Neolithic tradition of the Corded Ware culture, encompassing south-eastern Poland

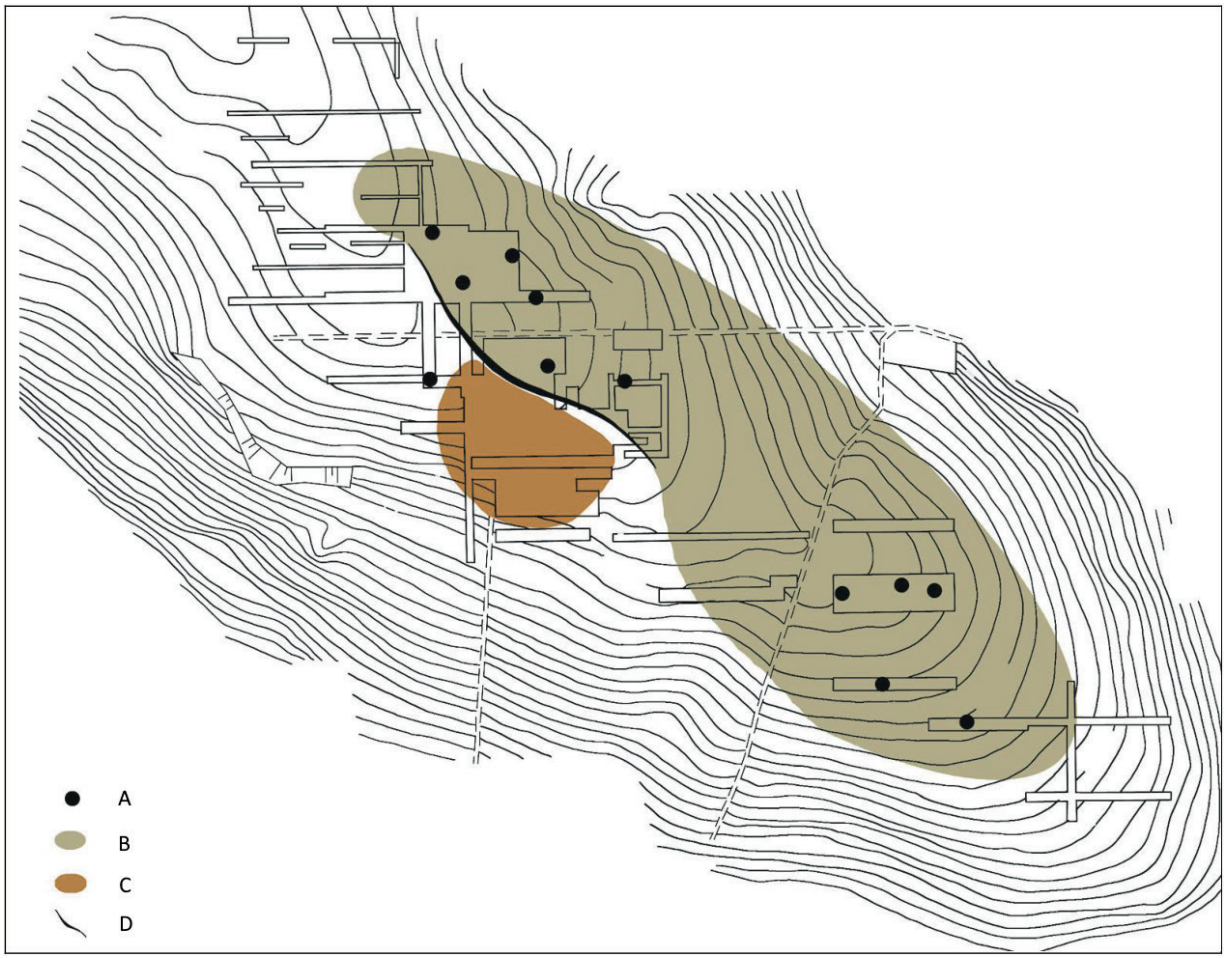


FIGURE 9. Iwanowice. Cemetery and settlement of Mierzanowice culture. 3rd building phase; a: trapezoidal pits, b: area of settlement, c: area of cemetery, d: central ditch. After Kadrow 1991

and adjacent regions of Slovakia (Fig. 1). Its development fostered an intensification of information exchange, increased human mobility, and the appearance of cultural elements on both sides of the Carpathians, which did not act as a barrier between the communities developing on either side of the mountain range.

Settlement processes in the upland zone have been recognised archaeologically in far greater detail than those in the regions of Greater Poland and Silesia in the western part of the country (Kadrow, Machnik 1997; Włodarczak 2017; Madej, Valde-Nowak 2020).

Mierzanowice culture settlement in the initial phase of the Bronze Age (c. 2300–2000 BCE) was characterised by a high diversity of forms and spatial strategies, resulting both from the environmental variability of Lesser Poland and from the internal heterogeneity of the communities inhabiting this region. Around 2300–2200 BCE, loess plateaux – which after intensive Neolithic exploitation had remained largely unoccupied for several centuries – were resettled. The return of settlement to this zone led to the re-establishment of networks of micro-regions organised around multi-season upland settlements, such as those identified in the vicinity of Iwanowice on the Dłubnia River. At the same time, settlements were also established in river valleys, at the foothills of uplands, in sandy areas, and in submontane zones, pointing to a wide spectrum of economic strategies employed by Mierzanowice communities (Włodarczak 2017).

The settlement type characteristic of the period and region consisted of a small number of autonomous farmsteads, accompanied by storage and

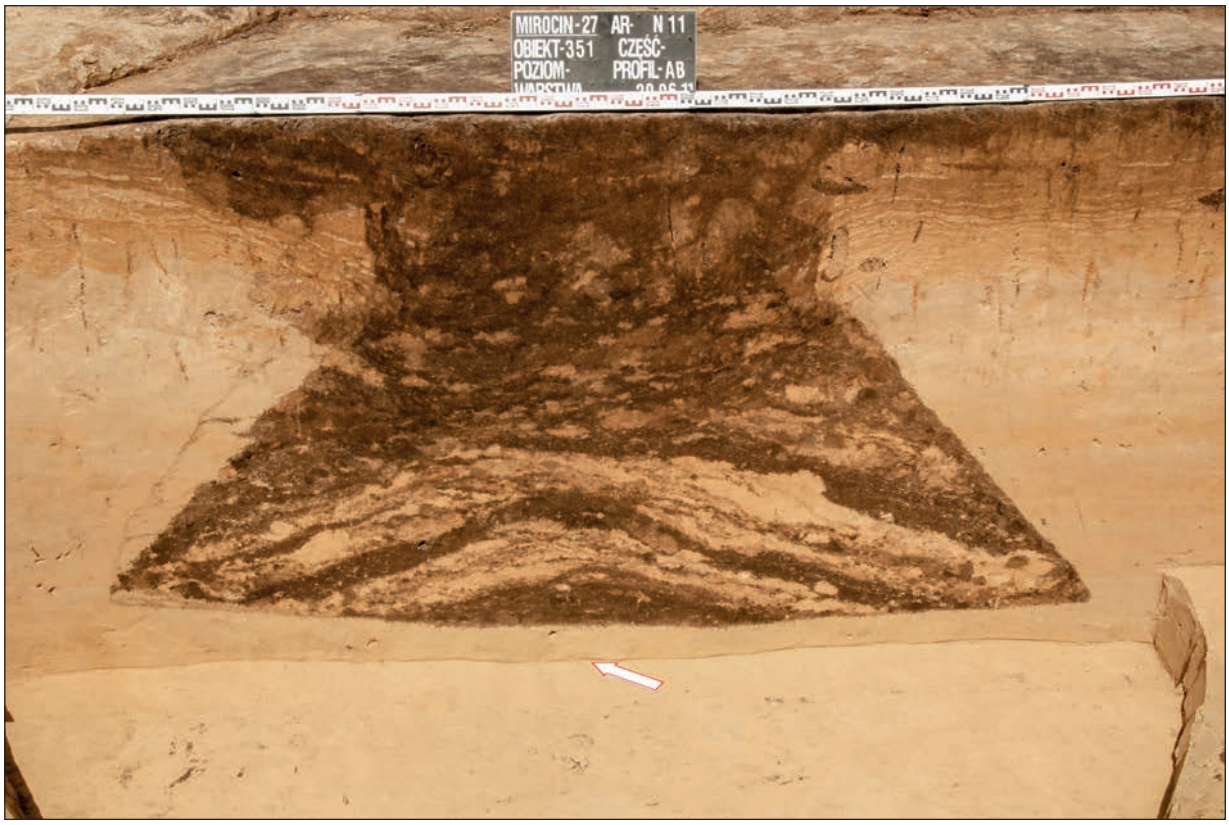


FIGURE 10. Mirocin. A trapezoidal pit characteristic of the Mierzanowice culture settlements. After Jarosz, Mazurek 2020

refuse pits and simple hearths. As a rule, clear remains of residential buildings are absent, and the dominant category of features comprises pits, often of a characteristic trapezoidal form. There is also a lack of distinct communal zones. This may indicate a limited scale of settlements and a relatively low degree of social integration within them, where the individual farmstead remained the basic unit of organisation.

An exceptional case, allowing for a more detailed insight into the spatial organisation and development of Mierzanowice settlements, is the site of Iwanowice-Babia Góra, one of the largest and longest-occupied settlements of this culture (Kadrow 1991) (Fig. 9). Covering an area of approximately 8 ha, the settlement was inhabited continuously for several centuries, making it possible to reconstruct successive phases of its development. Analysis of the distribution of different categories of settlement remains enabled the reconstruction of a layout composed of autonomous farmsteads, identifiable through the regular arrangement of associated economic features (trapezoidal-sectioned pits) accompanying dwellings (Fig. 10a, b). Initially, the settlement exhibited a compact and regular layout, with farmsteads evenly distributed around a central space. Over time, this arrangement became more dispersed, with farmsteads increasingly scattered, which may reflect both economic and demographic changes. Fluctuations in the number of active farmsteads point to periods of more intensive and weaker occupation, corresponding with broader regional trends, such as the growing importance of riverine settlement and changes in mobility strategies among Mierzanowice communities.

The Early Bronze Age settlement pattern of the Mierzanowice culture thus combines elements of stability and long-term continuity – particularly visible in upland settlements with prolonged occupation – with a high degree of adaptability, expressed in the simultaneous exploitation of diverse environments, from uplands to river valleys. This model reflects both the flexibility of economic

practices and the specific social structure of these communities, for whom the farmstead, rather than complex supra-household structures, constituted the fundamental unit of organisation.

During the developed phase of the Early Bronze Age (from the turn of the 18th and 17th centuries BCE), areas previously dominated by local Mierzanowice groups underwent significant cultural changes that permanently transformed the settlement landscape of Lesser Poland.

On the northern slopes of the Carpathians, in an area occupied by one of the late regional groups of the Mierzanowice culture (the Pleszów Group), a specific cultural shift occurred with the appearance of settlement associated with trans-Carpathian communities of the Otomani-Füzesabony culture. In other parts of the upland zone (western Lesser Poland), settlement of the Trzciniec culture began to develop. In both cases, the processes of change observed in the archaeological record are linked – at least in their early stages – to population movements and the physical presence of groups originating from outside Lesser Poland (Górski, Jarosz 2021).

The expansion of trans-Carpathian cultural patterns is clearly visible at the well-documented archaeological site of Trzcinica. Initially, during the period 2100–1650 BCE, the site comprised a unique fortified settlement associated with a local group (the Pleszów Group) of the Mierzanowice culture. In the subsequent period, between 1650 and 1350 BCE, the settlement – after substantial rebuilding – became inhabited by communities characterised by a new material culture fully conforming to trans-Carpathian models (Gancarski 1999; 2006).

The development of Otomani-Füzesabony settlement in the Polish Carpathians remains the subject of intensive research. To date, more than a dozen settlements have been identified, including fortified sites that can be unequivocally associated with this new cultural model (Gancarski 2002; Przybyła 2024 ed.). A site of particular importance is Zyndram's Hill (Góra Zyndrama) at Maszkowice. Its significance derives from a well-preserved and, in places, very thick stratigraphic sequence (up to 2 m), as well as from the presence of stone fortifications constructed already in the earliest phase of settlement, in the second half of the eighteenth century BCE. The settlement occupied the summit of a promontory overlooking the Dunajec River valley. Long-term excavations have uncovered approximately half of its surface area and identified eight phases of occupation, three of which belong to the transition between the Early and Middle Bronze Age (c. 1725–1500 BCE) (Przybyła 2024 ed.; Przybyła, in this volume).

The most spectacular element of the site is its stone fortifications: a massive perimeter wall with an original height of approximately 3 m, along with a partially preserved entrance zone containing the remains of a gate (Przybyła, in this volume). Built of large sandstone blocks laid without mortar, the structure combined defensive functions with a pronounced monumental aesthetic, although its placement on a loess substrate rendered it vulnerable to relatively rapid degradation. The interior of the settlement was occupied by houses with walls constructed in wattle technique, arranged along the line of the fortifications. Movable finds, including abundant pottery, animal bones and tools, indicate a complex spatial organisation and possible craft specialisation. Traces of a fire dating to the seventeenth century BCE may point to the violent destruction of the settlement.

Taken together, the evidence suggests that the Maszkowice settlement represents a case of colonisation on a greenfield site by a population arriving from areas south of the Carpathian arc. This interpretation is supported by the absence of earlier settlement in the region, clear stylistic links in material culture, and stone fortifications entirely alien to local tradition, which the excavator has associated with architectural models known from the Adriatic region (Przybyła 2016).

In virtually all of the areas discussed above with respect to Early Bronze Age settlement, influences of the cultural phenomenon known as the TCC (TCC) can be identified (Górski, Kadrow 1996; Makarowicz 2010; Górski, Jarosz 2021). The origins of the TCC can be traced to the Greater Poland-Kuyavia lowland. Its initial form was shaped both by local Neolithic traditions associated with the Globular Amphora Culture and by contemporaneous Únětice communities, as well as by post-Neolithic groups remaining outside the main trajectory of Early Bronze Age cultural transformations (the so-called Forest Neolithic groups). As a result of the interaction of these diverse factors, an alternative and eclectic cultural model emerged.

Settlement associated with the TCC is currently well recognised archaeologically, primarily

owing to extensive excavation campaigns conducted over the past three decades. On the basis of available data, particular attention is drawn to the considerable variability of settlement forms and the high degree of adaptation to diverse environmental conditions (Makarowicz 2010). TCC communities operated both in areas with favourable soil conditions, especially on loess uplands, exemplified by the multi-phase settlement at Kraków-Nowa Huta-Mogiła, and in environments less conducive to the development of stable settlement networks, such as sandy terrains and wetlands of the lowland zone. The latter are represented, among others, by the extensive settlement complex in Polesie, in the south-western part of the Mazovian Lowland (Makarowicz 2010; Górski, Makarowicz 2013).

Analysis of the spatial distribution of TCC sites indicates that, regardless of physiographic zone, settlement locations were preferentially chosen in river valleys and on floodplain terraces. Such settings were conducive both to economic activity and to communication within settlement micro-regions (Górski, Makarowicz 2013).

A characteristic feature of TCC settlement is its spatial organisation in the form of settlement micro-regions, comprising clusters of functionally differentiated loci (Makarowicz 2010). A classic example of such an arrangement is the Rożniatów Kolonia micro-region, where, alongside a stable settlement, campsites and short-term occupation points were also recorded. Another example is the Polesie micro-region, encompassing several small settlements, sepulchral zones, and a central space of ritual character (Górski, Makarowicz 2013). Both of these micro-regions are located in Central Poland. This diversity points to a multi-tiered settlement structure in which individual components fulfilled different yet complementary functions.

Within these micro-regions, clear variation in settlement forms can be observed in terms of duration of use. Alongside long-term settlement complexes, such as the Polesie site – where the cumulative span of settlement activity extended from c. 1700 to 1100/1050 BCE (Górski, Makarowicz, Wawrusiewicz 2011) – there existed settlements with shorter occupation histories, as well as multi-seasonal and seasonal sites (Górski, Makarowicz 2013) (Fig. 11). Importantly, even settlements described as stable were not always characterised by uninterrupted use of the same spatial location. At Polesie and at Kraków-Nowa Huta-Mogiła, relocations of habitation zones at intervals of several decades have been documented, resulting in the formation of clusters of successive settlement concentrations interpreted as consecutive phases of land use (Górski 2007). This type of settlement organization constituted a solution optimally adapted to local environmental conditions and resources, and had already been employed in the Middle Neolithic by communities of the Funnel Beaker Culture (Szmyt 2013, with further references).

In general terms, certain specific features can be identified that distinguish TCC settlement development in the lowland and upland zones. These differences primarily concern the dominant settlement models.

In upland areas, particularly within the loess zones of southern Poland, larger settlements are more frequently identified, in which several to a dozen farmsteads operated simultaneously. Examples include the already mentioned settlement at Kraków-Nowa Huta-Mogiła, where between 10 and 15 farmsteads functioned concurrently in individual phases of occupation, as well as the settlement at Jarosław, interpreted as a single-phase but spatially extensive settlement unit (Makarowicz 2010). This pattern is associated with more favourable conditions for agricultural production and greater stability of settlement networks, although even in this zone individual phases of occupation could be relatively short-lived (Górski, Makarowicz 2013).

In the lowland zone, smaller settlement units were more common, including individual farmsteads and short-term campsites, a pattern often interpreted as indicative of greater mobility among these communities (Makarowicz 2010). At such sites, small clusters of features interpreted as traces of short-term or seasonal occupation have been recorded. At the same time, research demonstrates that long-lived settlement complexes also functioned in lowland areas, as in the case of Polesie, where stability was achieved through a system of several small, mobile settlement units rather than through a single permanently occupied site.

In some instances, prolonged occupation was associated with a discernible rhythm of change in ceramic style, traditionally used as a key marker of distinct archaeological cultures. This process

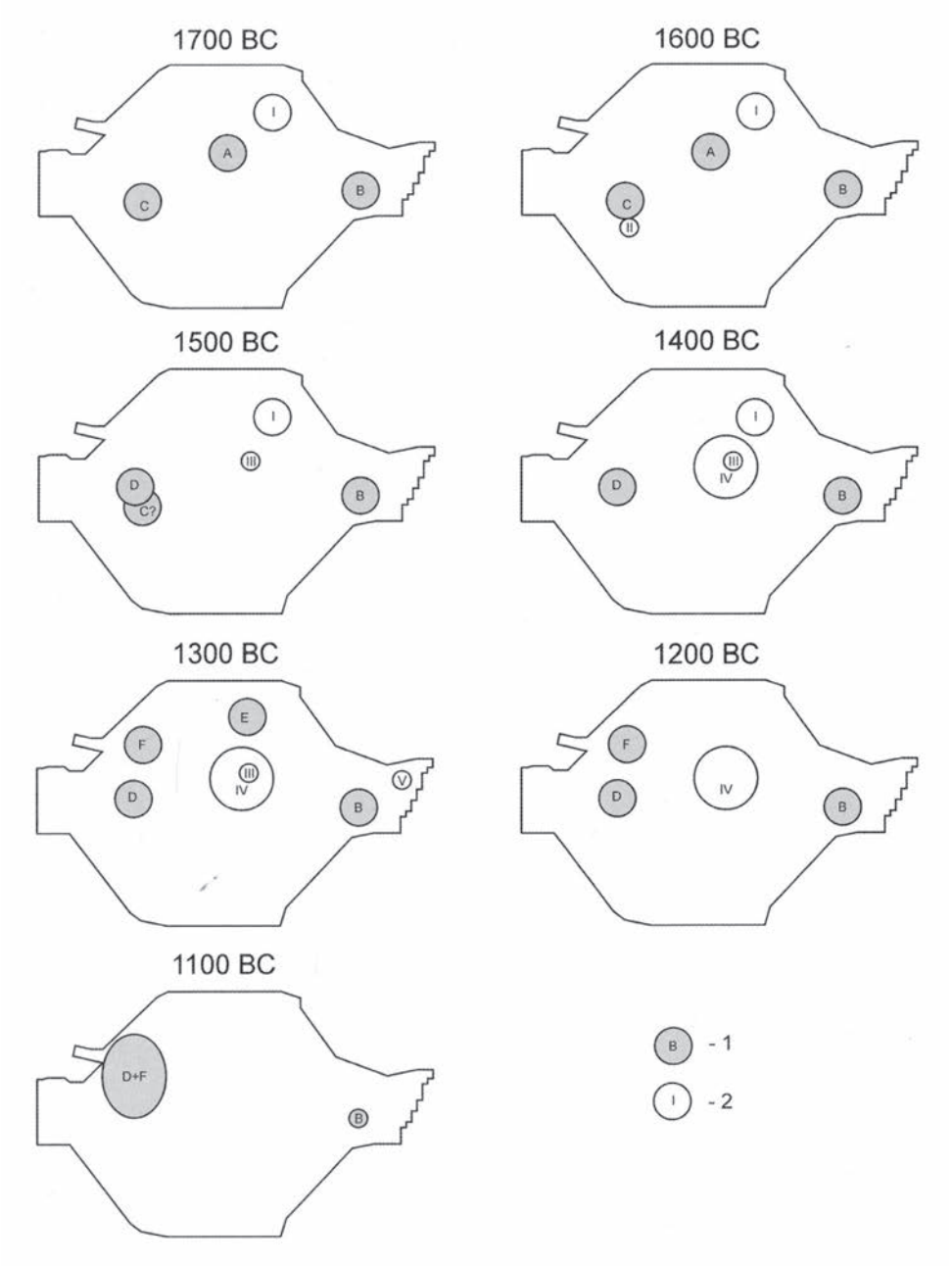


FIGURE 11. Polesie. Sequence of development and circulation of settlement at the TCC site. After Górski, Makarowicz 2013

has been well documented at the site of Szczepidło, where gradual transformations occurred from the original TCC elements, through the subsequently dominant Tumulus Culture in the development of the local community, and ultimately towards material culture associated with the early phase of the Lusatian Culture (Makarowicz 2016; in this volume).

Funerary Ideologies and Social Structure

The funerary practices of Early Bronze Age communities, much like the settlement patterns discussed above, display considerable regional variation. In broad terms, individual inhumation burials predominated; however, cremation, collective burials,

and, more rarely, interments in barrows also played a significant role in funerary ritual during the first half of the second millennium BCE.

In the lowland zone, burials associated with the Únětice Culture do not differ markedly from patterns known from other areas of its cultural ecumene. From the territory of modern Poland, the most substantial body of recent data comes from Lower Silesia, where extensive rescue excavations conducted over recent decades have revealed cemeteries characteristic of this region. Most commonly, these took the form of relatively small burial groups comprising between two and ten graves (e.g. Milejowice; Kopiasz 2004), although larger cemeteries with several dozen burials are also known (e.g. Domasław; Buchner 2012).

Únětice cemeteries most often consisted of regular inhumation necropolises, established on slight elevations in the terrain, frequently in close proximity to settlement zones. Grave pits were usually rectangular with rounded corners or oval in plan, varying in size and depth. A characteristic constructional feature was the use of stones placed along the edges of the pit, in the corners, or directly beside the deceased. Traces of wooden constructions, possibly serving as covers or simple coffins, were recorded only sporadically.

The deceased were interred in a contracted position, lying on their side, with the lower limbs clearly flexed and the arms bent (Fig. 12). Most commonly, the head was oriented towards the south and the face towards the east, although the orientation of grave pits shows a degree of variability and does not appear to have been governed by rigid rules. The age and sex structure of individuals buried in known cemeteries does not indicate the exclusion of any particular social groups from this funerary rite.

Grave goods were generally modest and consisted primarily of pottery. Most burials contained one to three vessels, less frequently larger assemblages, placed near the head, feet, or along the body of the deceased. Objects made of bronze occurred only sporadically and usually took the form of simple ornaments, while a substantial proportion of graves were entirely devoid of equipment. In some burials from earlier phases of the Únětice Culture (e.g. Marszowice), relatively numerous stone and flint artefacts have been recorded, clearly illustrating the gradual transition in material culture between Late Neolithic traditions and those of the Early Bronze Age.

Overall, Únětice funerary practice did not strongly emphasise the social status of the deceased through grave equipment. Grave offerings were generally poor and repetitive. Nevertheless, certain finds may suggest pronounced social differences and the existence of hierarchical structures. From the region of Greater Poland come burial discoveries that reveal markedly divergent treatments of individual community members after death. The burials from Bruszczewo and Łęki Małe derive from a relatively small area occupied by a local Únětice group, the so-called Kościan Group (Jaeger, Czebreszuk 2010).

At Bruszczewo itself, in the zone of the peninsula shore on which the fortified settlement was located, a single grave was discovered in the immediate vicinity of what had originally been residential buildings (Fig. 13). The body of a young man aged approximately 18–24 years was placed in a specific construction, probably originally in the form of a mat made of thin branches. In addition, the grave pit itself was reinforced with wooden elements. The grave goods consisted only of a fragment of a thick-walled ceramic vessel and two stone pounders. An element associated with the burial was also a deposit of hulled barley placed in a layer approximately 10–15 cm above the level of the interment.

Anthropological analysis of the skeleton revealed a series of degenerative changes, including those caused by the long-term repetition of the same activities, most likely involving carrying, lifting, and pulling heavy loads (Kneisel 2010). The individual buried in this grave probably did not hold a high social status. He performed physically demanding labour that led to specific pathologies and mobility impairment, and his burial was furnished almost exclusively with rudimentary stone tools (Jaeger 2012).

In stark contrast to the burial from Bruszczewo stands a group of barrow graves that, owing to their monumental and complex form as well as the richness of their grave goods, are traditionally referred to as "princely graves" (Fig. 14). Burials of this type are known from Central Germany (e.g. Leubingen and Helmsdorf) and from Silesia; however, only at Łęki Małe in Greater Poland is a group of several barrows forming a larger complex documented, comprising a distinctive monumental barrow cemetery (Fig. 15).

According to archival sources, the cemetery originally comprised at least fourteen barrows,



FIGURE 12. Milejowice. Example of a typical single grave of the Únětice culture. Archive of the Institute of Archaeology and Ethnology of the Polish Academy of Sciences, Wrocław. Photo by J. Kopiasz

nine of which were still visible in the mid-19th century. The four best-preserved mounds (Barrows I–IV) were excavated archaeologically. The barrows were arranged along a south-east–north-west axis on a clearly defined landscape feature, a ridge of an esker and adjacent outwash plain deposits (Fig. 15). Geomorphological and archaeological analyses indicate that this area was deliberately excluded from settlement during the Early Bronze Age and, with a high degree of probability, served exclusively funerary and ritual purposes. Radiocarbon and dendrochronological dating allow the construction and use of the cemetery to be placed between 2125–1775 BCE. This points to the durability of a hierarchical



FIGURE 13. Grave from Bruszczewo. Photo by J. Kneisel

social structure and the continuity of ruling elites within a regional settlement centre linked to the nearby fortified settlement at Bruszczewo (Czebreszuk et al. 2024).

The barrows contained inhumation burials located in their central parts, most often at the level of the natural subsoil or the original ground surface. In some cases (e.g. Barrow IV), accompanying burials arranged around the central grave were also identified. The results of anthropological and aDNA analyses indicate that individuals buried within a single barrow were biologically related, suggesting a kin-based, hereditary elite making use of this burial place and its distinctive funerary form (Czebreszuk et al. 2024).



FIGURE 14. Łęki Małe, barrow no. 1. Photo by M. Jaeger

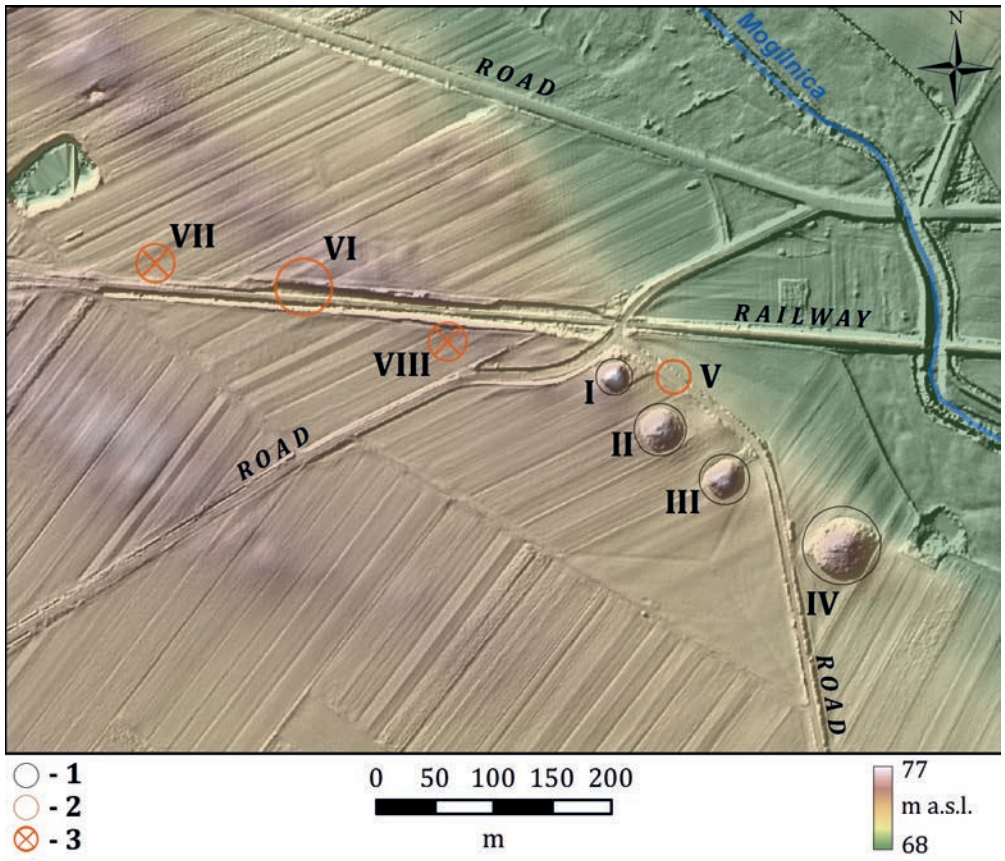


FIGURE 15. Łęki Małe. 1 – barrows excavated and then reconstructed; 2 – barrows partially preserved, 3 – barrows registered in the mid-twentieth century. After Czebreszuk et al. 2024



FIGURE 16. Łęki Małe, contents of grave A (barrow no 1): 1, 2, 5, 6, 12 – bronze; 7 – gold. After Kowiańska-Piaszykowa 2006

The key distinguishing feature of the cemetery at Łęki Małe is the exceptional richness of its grave goods, unequivocally indicating the high social status of the individuals interred there. Numerous metal artefacts made of bronze and gold were discovered in the graves, including ornaments as well as tools and weapons (Fig. 16). Particular attention is drawn to daggers and halberds, which should be interpreted as objects of status and prestige. Items made of amber also constituted an important component of the burial equipment. Their presence in the graves at Łęki Małe attests to the integration of local communities into long-distance exchange networks through which this raw material reached even the southernmost parts of the continent. The grave assemblages were supplemented by pottery

and deposits of animal remains (cattle and horses), interpreted as offerings of a ritual character.

In Lesser Poland, within the upland zone, the genesis of the funerary practices of the Mierzanowice Culture should be understood as a specific fusion of traits reflecting influences from the eastern Bell Beaker Group and local Late Eneolithic traditions of the Corded Ware Culture (Włodarczak 2017).

The earliest burials attributed to the initial phase of the Mierzanowice Culture (c. 2300–2200 BC) generally take the form of single graves or small clusters comprising a few grave pits. Their location clearly continues patterns known from the Late Eneolithic, as cemeteries were most often established in topographically prominent places, such as hilltops and plateaux, frequently in close proximity to older burial grounds. In some cases, Funnel Beaker megaliths and Corded Ware barrows were reused secondarily, with graves placed within or on the margins of these older structures. This phenomenon is well illustrated by the sites at Malice Kościelne and Zagaje Stradowskie, where Mierzanowice burials form successive sequences within a long tradition of mortuary activity, extending from the Middle Neolithic to the Early Bronze Age, focused on specific locations and monuments (Burchard 1998:151; Bargieł, Florek, Libera 2001).

During the same period, small clusters of graves arranged in close proximity to one another are also observed, analogous to those known from Corded Ware cemeteries. An example is provided by the burial assemblage from Targowisko. At the same time, arrangements inspired by the Bell Beaker tradition appear, involving the linear placement of graves along a north–south axis, particularly well documented at the cemetery in Modlnica. Only after approximately 2200 BC does a clear change in scale occur, manifested in the establishment of extensive, regularly organised flat cemeteries comprising dozens of burials. This model is representatively illustrated by the site at Żerniki Górne, where, alongside older dispersed graves, a younger, spatially ordered necropolis dated to the end of the third and the beginning of the second millennium BC is present (Kadrow, Machnik 1997; Włodarczak 2017).

In the Mierzanowice Culture, the construction of new barrows was abandoned, although such monuments continued to play an important role in funerary ritual, as evidenced by the continued reuse of older mounds as locations for secondary burials. The deceased were usually interred in simple grave pits, into which the body was placed directly and subsequently covered with soil.

The positioning of the deceased within graves displays considerable stability and a clear rooting in Late Eneolithic traditions (Włodarczak 2017). In the early phase of the Mierzanowice Culture, individuals were most often laid on their backs, with the head and upper limbs turned to one side; men were oriented to the right side and women to the left. The legs were flexed to varying degrees, and the arrangement of the arms followed a schematic pattern, with one upper limb bent at the elbow and directed towards the waist (Fig. 17). In the later phase, dating to approximately 2200–2000 BC, a gradual reduction in the degree of flexion of the lower limbs can be observed, along with an increasing number of burials in a lateral position, foreshadowing the model characteristic of the early phases of the Bronze Age.

Grave goods in the Mierzanowice Culture underwent significant chronological transformations and were clearly dependent on the sex and age of the deceased. In the earlier phase, an almost standard element of burial equipment was a single ceramic vessel, most commonly a cup decorated with zoned cord ornamentation, stylistically and formally referring to the traditions of the eastern Bell Beaker Group. Richer assemblages of grave goods occurred almost exclusively in the graves of adult males and included weapons and flint tools, such as arrowheads, stone axes, and, in the later period, bifacial flint daggers. An example is provided by the burials from the site at Czerniczyn (Hyrchała, Koman 2017), where bifacial daggers interpreted as prestige objects were discovered.

In the later phase of the Mierzanowice Culture, a gradual decline in the richness of grave goods can be observed. Burials lacking any offerings become increasingly common, and weaponry in male graves is most often limited to sets of arrowheads, as documented at the cemeteries of Świniary Stare and Żerniki Górne (Bąbel 2013). At the same time, the importance of metal ornaments increased, initially copper (Fig. 17) and subsequently also gold, a trend particularly evident in the richly furnished burials from Kraków-Nowa Huta-Mogiła. These tendencies indicate a gradual shift in emphasis from the display of status through weaponry towards symbolism associated with dress and ornamentation (Bąbel 2013; Włodarczak 2017).



FIGURE 17. Mirocin. Example of a typical single grave of the Mierzanowice culture. After Jarosz, Mazurek 2020

As noted above, in south-eastern Poland, in the region of the Beskid Mountains, settlement associated with the Otomani-Füzesabony Culture has been well documented, including long-lived fortified settlements (Gancarski 2006; Przybyła 2024 ed.). Despite this, to date neither cemeteries nor even individual burials that could be unequivocally attributed to this cultural unit have been identified in the region. This absence is striking, particularly in light of evidence from immediately adjacent areas, such as north-eastern Slovakia, where numerous cemeteries are known, often comprising dozens or even hundreds of graves (Olexa 2002; Jaeger et al. 2025).

The extensive and environmentally diverse area in which TCC communities developed over centuries – characterised by varied landscapes, ecological conditions, and the presence of post-Neolithic traditions – favoured the formation of a complex funerary rite incorporating numerous elements of local origin. This diversity does not indicate the absence of established norms, but rather reflects the operation of a flexible ritual model that allowed for regional variants in burial forms and practices. These included barrow cemeteries, flat graves, single and collective burials, as well as inhumation, cremation, and biritual forms.

Trzciniec cemeteries were usually located in topographically prominent settings, such as hilltops, upland ridges, floodplain promontories, or the edges of river valleys (Makarowicz 2010; Górski 2017). Such placement emphasised the symbolic character of sepulchral space and its separation from zones of everyday settlement activity. Examples of such locations are known, among others, from Wolica Nowa, Żerniki Górne, and Guciów.

One of the key features of TCC funerary practice is the simultaneous use of barrow and flat burials. Barrows, particularly widespread in the southern part of the cultural distribution, occurred both as isolated monuments and as extensive complexes comprising several dozen mounds, such as those documented at Guciów, Łubna, and Okalewo. Their construction was multi-stage and involved the ritual preparation of the ground (in some cases including traces of pre-barrow ploughing, as recorded

at Dacharzów and Okalewo), activities directly associated with the burial itself (hearths, deliberate breaking of vessels, votive deposits), and finally the erection of an earthen or stone-and-earth mound.

In the spatial organisation of TCC barrows, a clear relationship can be observed with barrow landscapes created by the Late Neolithic Corded Ware communities (Makarowicz 2025). The idea of the barrow did not emerge in the TCC as a result of direct interaction between these communities, which were separated by several dozen generations. Rather, it developed in reference to a landscape transformed during the third millennium BC and can be interpreted as an attempt to engage with an already existing monumental funerary tradition and to reinforce the symbolic significance of older Corded Ware barrows within the visible landscape.

In some cases, the barrow formed part of a complex sequence of ritual activities. The most striking example of both the long-term use and the degree of complexity of funerary practice in this context is the site of Żerniki Górne (Makarowicz et al. 2021). This cemetery-sanctuary was multi-phased in character and remained in use for approximately 140–310 years, corresponding to a maximum of several generations.

The earliest phase of activity at the site is associated with ritual practices, including the construction of stone circles, pits, and an extensive burnt layer in the central part of the necropolis. Only in subsequent stages was this space transformed into a collective cemetery, within which graves were gradually established. The construction of the barrow mound did not terminate the use of the site but rather structured the sepulchral space, defining a framework for the further development of the necropolis; after the mound had been raised, additional graves continued to be placed, including within the mound itself.

The chronological sequence indicates that the earliest burials were concentrated in the southern part of the cemetery, followed by its expansion towards the east and north-east. The youngest graves reappear in areas used earlier, indicating long-term memory of place and its repeated reactivation. The varying duration of use of individual graves, from only a few to almost two hundred years, and their partial contemporaneity suggest that the necropolis was used in parallel by different social groups, most likely of kin-based or lineage character (Makarowicz et al. 2021).

The forms of graves documented within the TCC are extremely diverse, ranging from simple pits to stone, wooden, and combined stone-and-wood constructions. Particularly characteristic are the so-called "funerary houses" identified, among other sites, at Dacharzów and Dwikozy (Florek, Taras 2003; Makarowicz 2010) (Fig. 18). In some graves, such as those at Żerniki Górne, the presence of wooden linings or coffins has been documented, pointing to differentiated social status among the buried individuals and to a high degree of formalisation of the funerary rite.

A particularly important distinguishing feature of TCC funerary practice is the substantial proportion of collective burials (Makarowicz 2010), often used over extended periods of time, which frequently involved the intentional rearrangement or disarticulation of earlier human remains. Collective graves most commonly contained inhumation burials, although cases of cremation are also known. In the former, a characteristic feature was the antithetical arrangement of the deceased, interred with their heads oriented towards the shorter sides of the grave pit and their feet directed towards its centre (Fig. 19). In graves containing larger numbers of individuals, the remains were arranged in layers within the designated burial space.

TCC collective graves display considerable morphological variability (Makarowicz 2010). Most commonly, they were rectangular with rounded corners or oval in plan, more rarely trapezoidal or rhomboidal. Their varying dimensions were probably adjusted to the intended number of interments and the anticipated duration of use. The burial space was created using stone, wooden, or combined stone-and-wood constructions. Some of the known collective graves may have taken the characteristic form of a "house of the dead", a structure with low, only partially raised walls and a roof most often supported by four posts (Makarowicz 2010).

Recent years of research on TCC collective burials have brought significant advances in the understanding of this phenomenon. In particular, the pool of radiocarbon dates has been substantially expanded, allowing more detailed inferences concerning the ritual practices associated with the burial of the dead in such structures (Makarowicz et al. 2021). In light of currently available long radiocarbon series, collective burials were practised throughout the entire duration of the TCC (approximately 400–640 years at 95.4% probability). The

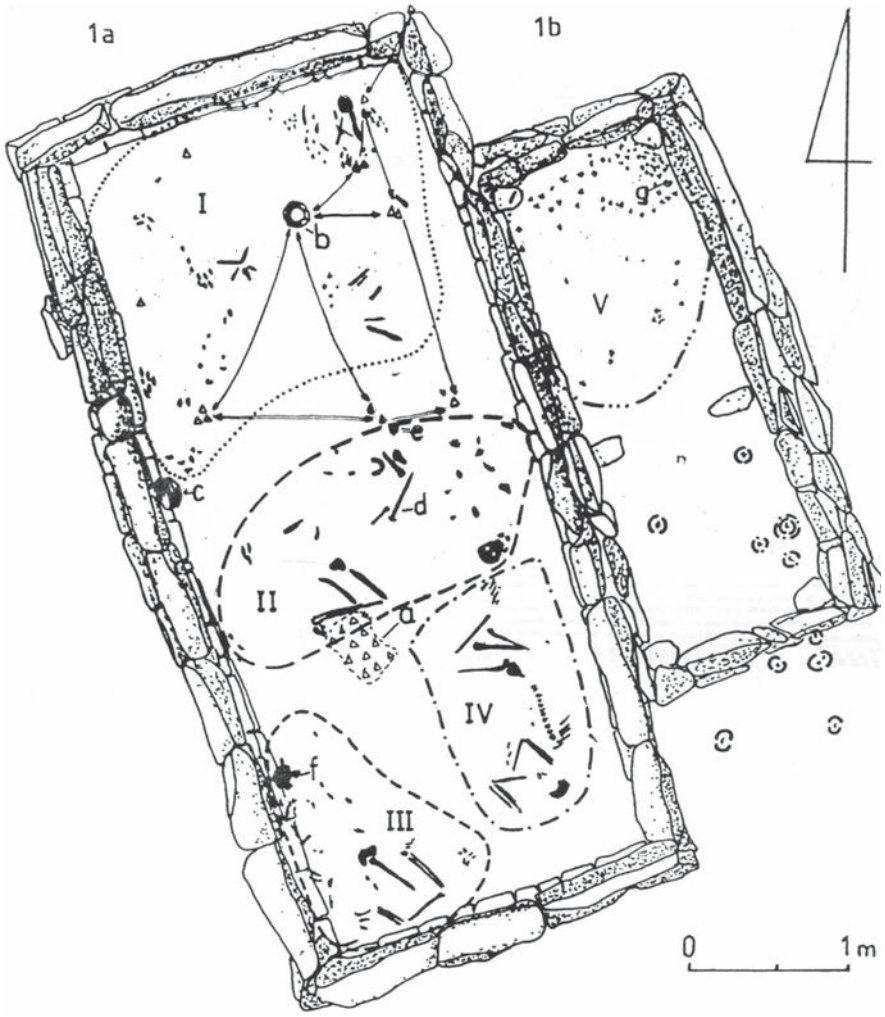


FIGURE 18. Dacharzów. Stone construction of a 'house of the dead' beneath a TCC barrow. After Florek, Taras 2003

length of use of individual burial structures varied considerably. In some cases, it amounted to approximately 140–310 years (95.4%), while in others individuals who died at different times were interred within a relatively short period, their remains having probably been curated in some form before final deposition in a shared grave.

The results of genetic analyses indicate that TCC collective burials were in many cases associated with genuine biological kinship. Within the same sepulchral structures and between neighbouring graves, first- and second-degree kinship relations have been identified, and in some assemblages it has been possible to reconstruct multi-generational family relationships. These findings suggest that collective graves functioned as long-used tombs of kin groups, and that their spatial organisation may have reflected the structure of familial and lineage relationships, as well as a patrilocal model of social organisation within individual groups (Chyleński et al. 2023).

The TCC burial rite is also characterised by marked ritual diversity in the treatment of the dead. Alongside inhumation burials, dominant in western Lesser Poland, cremation burials and biritual or transitional forms combining elements of both traditions are also frequently attested (Romaniszyn et al. 2021).

Noteworthy is also the presence of burials located within settlements (Górski, Makarowicz 2024). Men, women, and children were interred in pits, both in single and collective graves. Both cremation

and inhumation were practised. In the case of inhumation burials, remains preserved in anatomical articulation as well as disarticulated and incomplete skeletons are known.

The information presented above does not capture all the nuances associated with so complex a cultural sphere as funerary ritual. Nevertheless, a synthetic overview of the most significant phenomena allows certain broader trends to be identified. Regardless of regional differences, Early Bronze Age communities treated death and the rituals associated with it as a central element of culture. Burial served as a means of signalling social status and values important to a given community. In the dominant forms of individual inhumation burials, one can observe the continuation of an individualistic approach that emerged in funerary practice in this part of Europe with the Corded Ware Culture. The individual became the subject of ritual and ceremony, and grave equipment often signalled status and social position, particularly evident in cases such as the burial from Bruszczewo and the "princely graves" of Łęki Małe. Individualism, however, was not a universal value expressed through burial form. The numerous collective graves of the TCC, used over several generations, may be interpreted as a reference to Late Neolithic traditions in which family ties and kin groups constituted the basis of social organisation, clearly reflected in funerary ritual.

Agriculture, Animal Husbandry, and Environmental Adaptation

Analysis of archaeobotanical, archaeozoological, and palaeoecological data indicates that the Early Bronze Age societies operated within a productive economic system based on agriculture and animal husbandry. The proportions between these branches, the degree of their intensification, and strategies of environmental exploitation, however, exhibited significant regional and chronological variation.

In the case of the Únětice Culture, a particularly well-documented example of Early Bronze Age economy is provided by the repeatedly mentioned settlement at Bruszczewo. The results of macro-botanical analyses confirm the cultivation of several cereal species, including barley, emmer wheat, einkorn, and spelt. An important aspect of agricultural organisation was the separate cultivation of barley and wheat rather than the use of mixed crops (Karg, Bauer, Fingerhut 2004). Plant production was supplemented by gathering activities, including hazelnuts, fruits, and acorns, which in some contexts appear as components of the human diet (Kroll 2010).

Animal husbandry played an equally important role in the Únětice economy (Makowiecki, Drejer 2010). Archaeozoological analyses indicate a clear dominance of domesticated animals, among which cattle were of greatest importance, supplemented by pigs as well as sheep and goats. The age structure of the faunal remains suggests that animals were exploited not only as a source of meat but also for secondary products. Palynological records and palaeoecological data document the gradual opening of the landscape, intensive grazing, and eutrophication of the environment in the immediate surroundings of the settlement. This points to long-term and strong anthropogenic pressure, potentially leading to degradation of the local environment (Haas, Wahlmüller 2004; Diers 2010; Niebieszczański et al. 2024).

For the Mierzanowice Culture, a substantial body of detailed data is available from the settlement at Babia Góra-Iwanowice (Kadrow 1995). Archaeozoological analyses have shown that cattle formed the basis of animal husbandry, dominating both herd structure and the faunal assemblage, accounting for approximately 46% of all identifiable remains. Goats and sheep played a significant role, while pigs were of lesser importance (Makowicz-Poliszot 1992). Changes observed in successive phases of Mierzanowice cultural development indicate gradual transformations in herd structure, marked by an increasing importance of goats and sheep in the later phase, while cattle retained their dominant role in absolute numbers (Makowicz-Poliszot 1992). Animal husbandry was complemented by agriculture, confirmed by palaeobotanical analyses indicating the cultivation of emmer wheat and spelt, as well as the local character of plant production, evidenced by the presence of numerous arable weed species (Kadrow 1995.

A different and more varied economic picture emerges from analyses of data associated with the TCC. In this case, no single universal economic model can be identified, a consequence of the extensive spatial range of the TCC and the considerable diversity of environmental conditions. Two basic economic models have been distinguished: an agricultural model and a pastoral model (Górski,

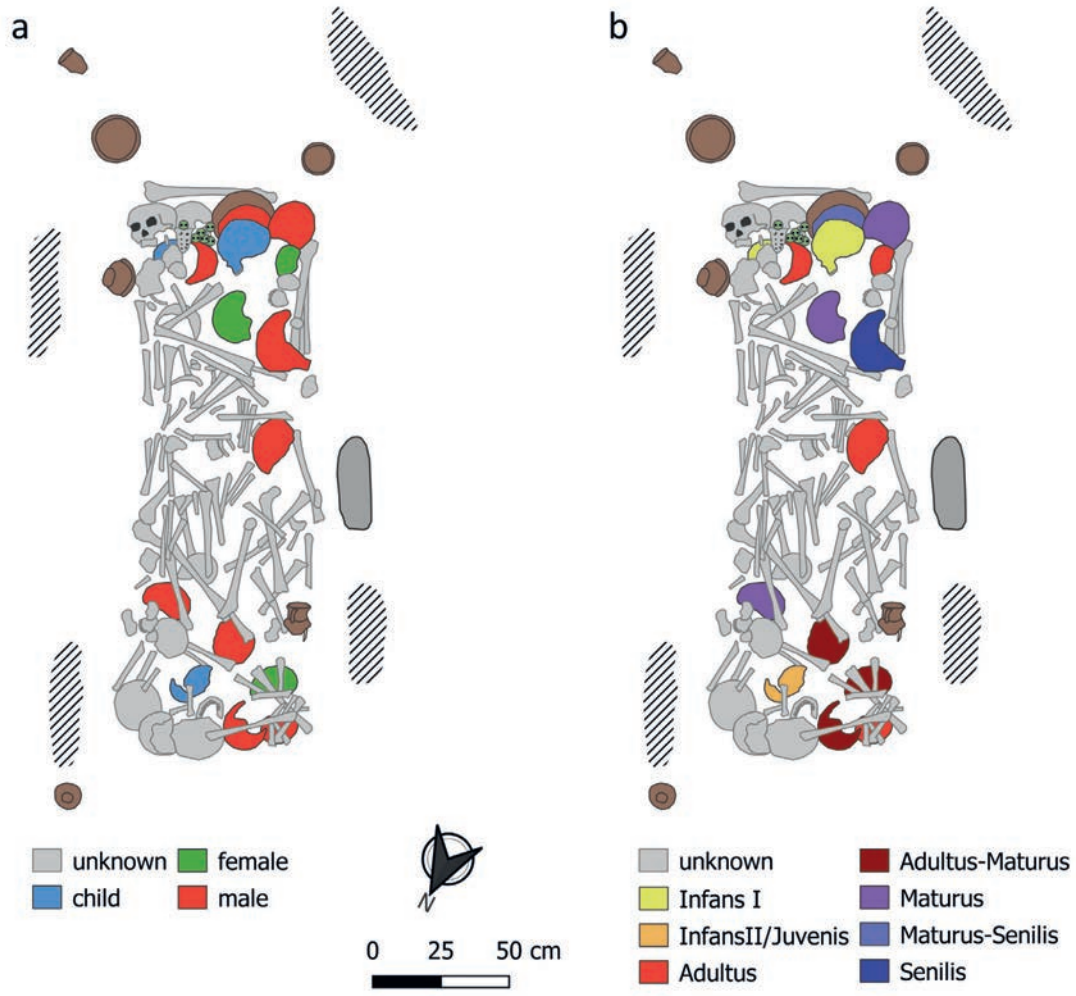


FIGURE 19. Wolica Nowa. Collective burial of TCC. Drawing by M. Stróżyk

Makarowicz 2013). The agricultural model developed primarily in upland areas, especially in loess zones, where fertile soils favoured intensive cereal cultivation and stable settlement. In such regions, a concentration of long-term occupation sites and the existence of local settlement micro-regions based on relatively stable spatial structures can be observed.

In lowland and sandy areas characterised by poorer conditions for agriculture, a pastoral economic model predominated. This model was based on the mobility of human groups and the seasonal exploitation of pastures. The settlement structure in these zones indicates a prevalence of short-term sites, interpreted as camps or temporary occupation points, reflecting the greater importance of animal husbandry and the more limited role of permanent plant production.

Regardless of the dominant model, the Trzciniec economy was characterised by an ability to integrate different forms of environmental exploitation, including gathering and hunting. This integration increased the flexibility of subsistence strategies and enhanced the resilience of communities to changing climatic conditions.

With regard to the Otomani-Füzesabony Culture, the most comprehensive information has been provided by the site of Maszkowice. The synthesis of archaeobotanical and archaeozoological data indicates a stable and well-balanced mixed subsistence economy in which cereal cultivation and animal husbandry formed mutually complementary pillars of livelihood (Przybyła et al. 2024; Wilczyński et al. 2024). Crop production focused mainly on hulled barley and hulled wheats, while

animal husbandry was dominated by cattle and pigs, supplemented by sheep and goats, with relatively stable proportions throughout the period of occupation. The predominance of consumption refuse and clear evidence for on-site slaughtering and carcass processing demonstrate the close integration of plant and animal production within the daily functioning of the settlement. The limited role of hunting and the absence of clear indicators of specialised surplus production suggest a largely self-sufficient economy oriented towards meeting local needs.

Within the wider Otomani-Füzesabony cultural framework, Maszkowice is distinctive in that this broadly shared economic model was implemented under peripheral, foothill conditions, favouring a conservative and balanced subsistence strategy rather than agricultural intensification. In contrast to some large lowland OFCC centres (Jaeger 2011; Przybyła et al. 2024), Maszkowice represents a fortified settlement of clear importance whose economic foundations remained locally oriented, stable, and well adapted to its specific environmental setting.

In the first half of the second millennium BC, Early Bronze Age communities functioned within diversified yet structurally comparable economic systems. Agriculture and animal husbandry constituted the foundation of these economies, but their mutual proportions, degrees of intensification, and organisational forms were shaped by local environmental conditions and long-term adaptive processes.

Bronze, Exchange, and Social Transformation: Three Models of Development

As noted in the introduction, when applied to the the territory of modern Poland, the term "Early Bronze Age" can be understood largely in a chronological sense. It was a period during which processes unfolded at varying rates, depending on environmental and cultural conditions. In some regions, a relatively rapid and comprehensive adoption of a new cultural model took place, largely associated with access to new raw materials and the emergence of new needs and demands. In others, acceptance of change and new phenomena proceeded more slowly or assumed a selective character, affecting only certain aspects of life.

In light of these observations, and with some degree of simplification, the region of modern Poland in the first half of the second millennium BC may be viewed as an area in which the archaeological record reveals three distinct models of Early Bronze Age social development.

The first model – here referred to as the *full* model – is associated with the development of the Únětice Culture in Silesia and Greater Poland. The second model, which may be described as *conservative*, characterises the development of the Mierzanowice Culture. The third, *alternative* model encompasses phenomena linked to the emergence and development of the TCC.

The Únětice Model – Full Adoption

At the end of the third millennium BC, the Únětice Culture appeared in Silesia and Greater Poland (Furmanek, Lasak 2013; Czebreszuk et al. 2024). In other parts of Poland, its early influences took the form of small enclaves (e.g. in Kuyavia, the so-called Dobre Group) or were manifested through the presence of specific bronze artefacts (Czebreszuk 2001). In Greater Poland, the twenty-second century BC saw the construction of the first barrow at Łęki Małe and the beginning of an approximately 350-year-long period of use of the cemetery (Czebreszuk et al. 2024). This clearly indicates the existence of a stable, well-established, and fully developed Únětice social model. During the same period, the strongly fortified settlement at Bruszczewo was founded; its duration of use also spans several centuries (Czebreszuk in this volume), and relatively numerous metal objects were deposited there (Jaeger et al. 2015; Stróżyk, in this volume).

The settlement at Bruszczewo has yielded extensive evidence for local metallurgy, knowledge of goldworking, and the use of amber (Czebreszuk, Kneisel, Müller 2010; Jaeger et al. 2015; Müller et al. 2023). Finds of a similar character are known from the barrows at Łęki Małe, where, alongside objects of distinctive form such as halberds and daggers, ornaments made of gold and amber were also discovered (Kowiańska-Piaszykowa 2006).

Somewhat later, in the nineteenth century BC, comparable power structures emerged in Silesia, understood as stable fortified settlements (e.g. Nowa Cerekwia and Jędrychowice) and elite burial forms (e.g. the barrow at Szczepankowice; Pokutta, Frei 2011).

In both regions, Únětice communities operated within extensive networks of interaction that supplied desired raw materials unavailable locally, such as gold and copper/bronze. Their importance and prosperity were (paradoxically) linked to their peripheral position in relation to the core areas of Únětice settlement in Central Germany and Bohemia. This is particularly evident in Greater Poland, where – unlike in Central Germany, with its short-lived episodes of power accumulation manifested by single "princely graves" (Meller 2019) – the construction of monumental barrow cemetery (Fig. 15) with complex structures and exceptionally rich grave goods constituted a long-term process (Czebreszuk 2001; Czebreszuk et al. 2024).

In the case of the fortified settlement at Bruszczewo, which formed part of a local power structure, archaeological evidence points to substantial potential for monopolising production, a central role in the distribution of bronze artefacts, and privileged access to metallurgical technologies (Jaeger, Czebreszuk 2010; Kneisel 2012). An equally important factor contributing to the prosperity of the local community was its position within a communication space linking the southern Baltic coast and sources of amber (succinite) with distant regions of Europe. I deliberately refrain here from using the term "amber route", as this concept implies permanent, clearly defined communication corridors that are difficult to reconcile with Early Bronze Age realities. The notion of a "communication space", understood as a set of interconnected areas within which numerous local contacts and exchange relationships operated, appears more appropriate. It was precisely the accumulation and overlapping of multiple local interactions that enabled the large-scale transfer of people, raw materials, and ideas, creating structures functionally similar to routes but lacking their linear and formalised character.

It was within the framework of such communication spaces that locally unavailable gold, copper/bronze, and Baltic amber reached the peripheral Únětice communities of Greater Poland. The latter was subsequently transferred further south to more distant regions (Czebreszuk 2011; Ernée 2012; Jaeger et al. 2023; 2024).

In summary, the full model of Early Bronze Age social development associated with the Únětice Culture was manifested in relatively rapid access to a new raw material, acceptance of bronze and its cultural associations, innovation, and local metallurgical production (bronze- and goldworking). Most crucial, however, were processes of social transformation and hierarchisation, reflected in markedly divergent funerary practices, as well as integration into extensive networks of interaction combined with the adoption of a role as a local centre of production, innovation, and exchange.

The Mierzanowice Model – Conservative Adaptation

In the region of Lesser Poland, the conservative model of Early Bronze Age social development can be explained by the strong influence of local Late Neolithic traditions. The Mierzanowice Culture developed as a specific amalgam of Bell Beaker phenomena and Corded Ware cultural elements (Kadrow 2001). The earlier perception of the Mierzanowice Culture as merely a terminal phase of the Corded Ware Culture was rightly rejected some time ago (Kadrow, Machnik 1997). Nevertheless, it is precisely within the post-Neolithic traditions of the third millennium BC that the origins of the characteristic features of Early Bronze Age communities in Lesser Poland should be sought.

The most crucial of these features is the complete absence not only of local bronze production, but even of bronze artefacts themselves in Lesser Poland, within the Mierzanowice settlement zone. In the material culture of Mierzanowice communities – both in their early stages and during the later period of regional differentiation into distinct local groups – bone, stone, shells, animal teeth, and boar tusks predominated as raw materials. Flint and faience were of particular importance.

Various types of flint were extracted on a very large scale from extensive mining fields comprising hundreds of shafts (e.g. Ożarów; Brzeziński, ed. 2020). This raw material was distributed over considerable distances and used not only for the production of everyday tools, but also for bifacial implements fulfilling prestige functions, such as *płoszcza* and axes (Libera 2001; Bargieł, Libera 2005).

Faience appeared in the late phase of the Mierzanowice Culture. In the form of beads, it constituted one of the characteristic elements of grave ornaments (Bąbel 2013). This material was also present in neighbouring regions, including

eastern Slovakia, from the very beginning of the development of the Otomani-Füzesabony Culture, sometimes occurring in ornaments comprising thousands of individual beads (Olexa 2003). Amber was also used in these regions, whereas it played virtually no role in the material culture of Mierzanowice communities. The few amber beads known derive only from the cemetery at Szarbia Zwierzyniecka and from a collective grave at the settlement of Iwanowice-Klin, both dated to the latest phase of the Mierzanowice Culture. Another find, likewise dated to the end of the third millennium BC, is a fragment of an amber pendant from Grave 11/63 at Kraków-Nowa Huta (Wanda Mound site) (Bukowski 2002).

It should be emphasised that the Mierzanowice Culture is primarily known from numerous and extensive cemeteries composed of individual inhumation graves (Bąbel 2013). The absence of amber finds therefore cannot be explained by post-depositional processes or by the specifics of funerary practice (e.g. cremation). Early Bronze Age Mierzanowice communities simply did not use or accept amber.

Metal artefacts of the Mierzanowice Culture form a highly specific and limited group of finds. To date, only two bronze flanged axes, a bronze chisel, and a few ornaments of the *Noppenringe* type are known (Kadrow, Machnik 1997; Bąbel 2013). Across the entire Mierzanowice settlement area, the practice of hoard deposition – so characteristic of the Únětice Culture and other neighbouring cultural zones – also played a marginal role (Blajer 1990). With regard to gold, only a few small ornaments from a total of three sites are known (Müller et al. 2023).

By contrast, copper was used relatively widely. The raw material most probably originated from Slovak or Volhynian deposits (Włodarczak 2017). Nevertheless, simple sheet and wire ornaments predominated, and the characteristic object of the Mierzanowice Culture became the so-called willow-leaf-shaped earring (Kadrow 2001). Notably, metal (bronze) pins – objects that constituted a common form of personal ornament in virtually all Early Bronze Age cultures contemporaneous with the Mierzanowice communities in Central Europe – are entirely absent from the Mierzanowice assemblages.

Material culture based on traditional raw materials is a characteristic feature of the entire epi-Corded Ware Carpathian cultural circle. What distinguishes the Mierzanowice Culture from other components of this broader phenomenon, however, is the absence of amber ornaments and, more importantly, the lack of bronze use and production until the very end of its existence. While in neighbouring areas of present-day Slovakia, local bronze production and stylistic development intensified during the second millennium BC, innovations related to metallurgy were never accepted in Lesser Poland.

It should be stressed that this represents a lack of acceptance of the new raw material rather than an absence of opportunities for its acquisition, use, or even production. Although no archaeological evidence indicates significant direct relations between Únětice and Mierzanowice settlement areas, these communities – particularly in the later stages of their development – remained within the broader sphere of trans-Carpathian influences. At the turn of the eighteenth and seventeenth centuries BC, communities of the Pleszów Group occupied areas directly adjacent to zones of northward expansion of the Otomani-Füzesabony Culture (Madej, Valde-Nowak 2020). Trans-Carpathian influences on Mierzanowice communities assumed various forms within this process, ranging from the acculturation postulated for the fortified settlement at Trzcinica (Gancarski 2006) to more subtle changes in ceramic style (Górski 2010).

Technology, finished products, and raw materials were therefore within reach of Mierzanowice communities. The reasons for their rejection must be sought in cultural factors (Jaeger, Stróżyk, Olexa 2023). Bronze, as understood in Early Bronze Age societies, was not merely a material. Its physical properties would have allowed for the production of virtually any everyday object, weapon, or ornament, limited only by the availability of metal, technical skills, and the artisan's inventiveness. Yet across all regions of Europe in which bronze metallurgy developed, the shaping and decoration of objects remained highly schematic and the range of products was strictly defined. These limitations did not stem from the material itself, but from cultural norms. The adoption of a new raw material necessarily entailed acceptance of its symbolic meanings and cultural contexts.

It is precisely here that the reasons for the absence of bronze artefacts and bronze metallurgy among Mierzanowice communities should

be sought. In its genesis (the proto-Mierzanowice phase), the culture exhibits a synthesis of traditional Corded Ware and Bell Beaker elements alongside an agricultural economy and settlement stability adapted to the new realities of the late third millennium BC. What remained unchanged, however, was adherence to pastoral symbolic traditions, expressed in funerary ritual and in the maintenance of gendered social and economic roles (Kadrow 2001).

The rejection of amber and bronze – raw materials that constituted stable elements of prestige contexts and markers of social hierarchisation in the Early Bronze Age – should therefore be interpreted as an expression of Mierzanowice traditionalism. The rejection of metallurgy, coupled with the long-term stability of the cultural model, allows for a deeper understanding of the nature of metal itself. In the first half of the second millennium BCE, bronze was not a resource determining development, stability, or prosperity. Its adoption, together with the associated economic and social mechanisms, represented one possible, but not the only, path available to Early Bronze Age communities.

The selective development model of the Mierzanowice Culture thus consisted in the synthesis of selected elements of the new era, largely confined to the sphere of subsistence economy and stable settlement, while symbolic, social, and ideological norms continued to derive from the post-Neolithic heritage of the region.

The Trzciniec Model – An Alternative Trajectory

The final mode of adaptation to Early Bronze Age cultural features is the alternative model associated with the development of the TCC (TCC).

The origins of the TCC should be sought in processes of cultural transformation occurring in the lowland areas of present-day Poland around 1850/1800 BC (Makarowicz 1998; 2010). These regions, together with the territory of Lesser Poland – where the TCC developed at a later stage – represent only part of the vast area encompassed by this phenomenon. The TCC constituted a unique, extremely extensive, and internally diverse cultural community of the Early (and Middle) Bronze Age. For several centuries, it integrated a wide range of local communities inhabiting large territories not only of present-day Poland, but also of Ukraine, Belarus, and Moldova (Kośko, Czebreszuk eds. 1998).

The TCC may be described as a long-lasting macro-structure operating within a broad network of interregional connections. It was not a homogeneous culture in the sense of a uniform set of traits, but rather a communicative community integrating diverse Late Neolithic and Early Bronze Age traditions. Its genesis and structure were based on a synthesis of elements originating from multiple centres of cultural innovation – both from the Carpathian zone and from the eastern European zone. As a result, a formation emerged that combined differing models of social organisation, economy, and ideology, while often preserving pronounced regional variants (Kośko, Czebreszuk eds. 1998; Górski 2007; Makarowicz 2010). Within this macro-structure functioned local settlement enclaves and "cultural groups" displaying their own specific characteristics, yet remaining embedded within a shared communicative system.

A key feature of the TCC was its high adaptive capacity, resulting in its polythetic character. Trzciniec communities were able to operate in a wide range of ecological zones, adjusting their subsistence strategies to local environmental conditions. This flexibility encompassed both productive activities (agriculture and animal husbandry) and settlement organisation. As a consequence, the TCC expanded across a vast territory, forming a relatively stable settlement structure that reached its maximum spatial extent during the classical phase.

At the same time, this community retained a strong rooting in Neolithic traditions, visible in its social structure and funerary practices. Processes of ideological and social change did not entail an abrupt rupture with earlier cultural heritage, but rather its reinterpretation and "naturalisation" under new conditions. The TCC thus exhibited continuity in fundamental principles of social organisation, while simultaneously remaining open to influences from the Early Bronze Age civilisation of Central Europe (Makarowicz 2010), as evidenced, for example, by relatively numerous imports of amber and metal objects made of bronze and gold.

Within the broader context of transformations characterising Central Europe during the Early Bronze Age, the TCC occupied a distinctive position. On the one hand, it may be interpreted as a cultural structure peripheral to the main

centres of innovation, functioning to some extent in the shadow of more dynamic southern cores. On the other hand, the TCC was an active participant in culture-forming processes, selectively processing and adapting impulses arriving from multiple directions.

Another characteristic feature of the TCC was its pronounced internal heterogeneity. Regional differences are evident in settlement organisation, funerary practices, and ceramic styles. This variability may partly reflect a social organisation structured around kin-based groups, each maintaining its own local traditions and distinct identity, as suggested by the prominent role of collective burials. The eventual disintegration of this macro-structure was not the result of a single crisis but rather the cumulative outcome of environmental, socio-economic, and cultural factors that gradually undermined its cohesion.

The unique flexibility and cultural receptiveness of the TCC, together with the absence of rigid norms governing virtually all spheres of life, underpinned the particular success of this alternative Early Bronze Age cultural model. Owing to its openness and high degree of syncretism, integrating local, Neolithic, and post-Neolithic traditions, the TCC was able to persist for nearly 800–900 years (Florek, Taras 2003; Górski, Makarowicz, Wawrusiewicz 2011).

Conclusion: Multiple Stable Pathways of Early Bronze Age Development in the Polish Lands

The Early Bronze Age in the territory of modern Poland cannot be adequately understood as a uniform process of cultural transformation driven by the adoption of bronze metallurgy or by the emergence of a single dominant social model. Rather, the archaeological record reveals a landscape of coexisting and structurally coherent cultural systems, each representing a distinct yet equally viable response to the challenges and opportunities of the early second millennium BC. These systems differed in their organisation of settlement, funerary rites, economic strategies, and degrees of engagement with long-distance exchange networks, but all demonstrated long-term stability and internal consistency.

The model associated with the Únětice Culture represents one such trajectory, characterised by the relatively rapid integration of metallurgy, the development of fortified centres, participation in supra-regional exchange networks, and the emergence of socially differentiated structures. However, this trajectory should not be treated as normative. In the upland regions, Mierzanowice Culture developed a markedly different model, rooted in the continuity of Late Neolithic/Eneolithic traditions and defined by the selective acceptance, or deliberate rejection, of key elements associated with the Early Bronze Age, including bronze itself. At the same time, the TCC constituted an alternative and highly flexible system, integrating diverse regional traditions within a broad communicative framework and maintaining long-term stability through adaptive settlement structures and collective forms of social organisation.

These trajectories should not be interpreted as stages within a single evolutionary sequence, nor as more or less "advanced" forms of social development. Instead, they represent parallel cultural configurations shaped by different historical backgrounds, environmental conditions, and social choices. The variability observed in the archaeological record reflects the existence of multiple pathways of development rather than a linear progression towards a shared endpoint.

Crucially, the adoption of bronze and related innovations was neither inevitable nor universally desired. Access to new materials and technologies did not in itself determine the direction of social change. Rather, their acceptance depended on culturally mediated choices embedded in existing systems of values, symbolic meanings, and social organisation. In this sense, bronze should be understood not merely as a technological innovation, but as part of a broader cultural package whose reception varied significantly across regions.

The persistence of diverse and stable social models throughout the Early Bronze Age underscores the importance of continuity alongside transformation. Many of the structural features observed in settlement organisation, subsistence strategies, and funerary ideology have clear roots in Neolithic traditions, demonstrating that long-term cultural inheritance remained a fundamental factor shaping social development. At the same time, these traditions were not passively maintained but actively reinterpreted and adapted to changing conditions.

From a broader perspective, the territories of modern Poland during the Early Bronze Age should be viewed not as a peripheral zone lagging behind a core of innovation, but as a dynamic arena in which different cultural logics operated simultaneously. The coexistence of multiple stable pathways highlights the flexibility and resilience of prehistoric societies and calls for a reconsideration of interpretative frameworks that privilege uniform models of development. Instead of a single narrative of transition, the Early Bronze Age emerges as a mosaic of interconnected yet distinct social worlds, each contributing to the complexity of prehistoric Europe.

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MIDDLE BRONZE AGE

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Introduction

In the first half of the 2nd millennium BCE, the diverse communities of the Early Bronze Age inhabiting the area of present-day Poland (Jaeger, in this volume) were united by one common feature: settlements as the axis of their world. The nature of these settlements was aligned with environmental conditions and corresponded to the adopted economic model. Despite certain regional differences, a relatively rich source base enables us to reconstruct Early Bronze Age economy, craftsmanship, production, and exchange of goods. This is primarily due to the numerous settlements known from this period, left behind by these stable and predominantly agrarian communities.

However, settlement-based societies underwent a marked transformation around 1600 BCE. In the regions of the Central European Lowlands, including the Oder and Warta river basins in western Poland, the previously existing settlement system and cultural model gradually collapsed as a result of a conjunction of environmental and cultural factors. While communities of the Trzciniec Cultural Circle (TCC) continued to develop in the central and especially southern parts of the country (notably in Lesser Poland), Silesia, Greater Poland, and several other enclaves, a new socio-economic model emerged, the Tumulus Culture being the archaeological manifestation of it.

This phenomenon should be placed in the broader context of transformations taking place across Central Europe in the mid-2nd millennium BCE, when new forms of social organisation and funerary practices associated with the construction of barrows appeared in many regions of the continent.

From crisis to transformation: the genesis of the Tumulus Culture

Early discussions on the origins of the Tumulus Culture were dominated by the concept of a rapid expansion of mobile, militarised pastoral-warrior groups. This process was thought to have led to the destruction of tells and fortified settlements in the Carpathian Basin, as well as to a fundamental reorganisation of existing settlement structures (Dzięgielewski, Przybyła, Gawlik 2010 and references therein). Such interpretations have since been abandoned. Evidence from absolute chronology and a more comprehensive archaeological understanding of tell settlements exclude the hypothesis of invasion, raids, and a uniform horizon of social disintegration in the first half of the 2nd millennium BCE (Dzięgielewski, Przybyła, Gawlik 2010; Jaeger et al. 2025).

In response to overly simplified migration-based models, increasing emphasis has been placed on internal processes occurring within communities of the late stages of the Early Bronze Age. At present, the differentiation of developmental trajectories in the 17th century BCE is considered crucial for understanding the genesis of the Tumulus Culture. During this period, in the northern peripheries of the Únětice ecumene, a pronounced collapse of settlement structures occurred, and in some regions even a hiatus in settlement has been observed (Kneisel 2012). This phenomenon contrasts with the situation in southern regions, where continuity of development (and even further intensification of settlement, primarily associated with the TCC) is evident (Górski 2007; Makarowicz 2010; Jaeger in this volume).

Thus, the structural crisis of Early Bronze Age communities represented an inherent element in the emergence of a new cultural phenomenon. It led to the gradual erosion of existing models

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of social and settlement organisation, independently of the appearance of new cultural groups, for which it created conditions conducive to development.

Contemporary interpretations reject the notion of a single, large-scale, and abrupt expansion. Instead, they allow for the possibility of limited migrations of small groups and the gradual diffusion of new ideological, social, and ritual patterns. Within this framework, the Tumulus Culture is interpreted not as the result of the arrival of a homogeneous "migration package", but rather as the outcome of transformations within a culturally diverse Central European milieu.

The formation of this new phenomenon (the Tumulus Culture) is currently dated to approximately 1600–1500 BCE (Müller, Lohrke 2009; Stróżyk 2019) and is interpreted as a prolonged, multi-generational process rather than a sudden event. In the broader European context, a significant role was played by the emergence of a new warrior ideology; its roots can be traced to the developed Bronze Age societies of the Carpathian Basin (Vandkilde 2014; Makarowicz 2017). These communities were characterised by strong centralisation, extensive systems of fortifications, advanced metallurgy, and wide-ranging long-distance contacts (Jaeger 2016). It was within this milieu that some of the earliest swords in Central Europe appeared, functioning as prestigious elements of warrior equipment. A new, individualised military elite also emerged, whose ideology, behavioural patterns, and lifestyle proved attractive to communities in Western and Northern Europe (Vandkilde 2014).

It should be emphasised, however, that the process of adopting these cultural models in the territories of present-day Poland was complex and resulted in numerous regional variations. Often, the new cultural model was manifested only through selected elements of material culture or funerary practices. Particularly noteworthy in this context is the relatively small amount of weaponry found in barrow burials, in contrast, for example, to the situation known from Scandinavia and northern Germany (Bunnefeld 2022; see below).

The most complete manifestation of this new phenomenon is the widespread adoption of barrow construction, together with associated funerary practices and new forms of spatial and territorial organisation. Following a period dominated by flat graves, barrows became a lasting feature of the Middle Bronze Age landscape, constituting a material expression of a new social order, a carrier of ideology, and a means of making territorial claims.

Regional context: Silesia and Wielkopolska

Although nearly a decade has passed since the last comprehensive synthesis of knowledge on the Tumulus Culture (Makarowicz 2017), the Silesia-Greater Poland borderland remains the archaeologically best-recognised area in this respect (Jaeger, Kneisel, Czebreszuk eds. 2023 and further references therein). The available source base continues to be clearly dominated by funerary materials, with an almost complete absence of unequivocally identified settlements. Apart from the unique example of a settlement with evidence of bronze metallurgy at Szczepidło (Makarowicz 2016; in this volume), and a short-lived site at Czeladź (Romaniszyn et al. 2023) – probably representing a form of seasonal camp – we lack detailed information on the organisation of settlement networks and specific aspects of Tumulus Culture communities' lifeways, particularly in the economic sphere (Fig. 1).

Based on the available general data, we may state that settlement associated with the Tumulus Culture was concentrated primarily in Upper Silesia, selected parts of Lower and Middle Silesia, Wielkopolska, and Kuyavia, extending as far as the interfluve of the upper Noteć and the middle Vistula. The area between the Warta and Prosna rivers is interpreted as a zone of cultural syncretism. Elements of the Tumulus tradition and the Trzciniec Cultural Circle (TCC) coexisted and intermingled there, as reflected in both ceramic and metal artefacts (Makarowicz, Muzolf, Romaniszyn 2023; Romaniszyn et al. 2023). In the western and northern regions, influences of the Nordic Bronze Age are also visible, they are particularly pronounced in the lower Oder basin (Loba 2006; Jaeger, Niebieszczański, Stróżyk 2019). In this context, Western Pomerania represents a distinctive area. Numerous Carpathian imports are attested there; on the other hand, the region functioned as a natural extension of cultural phenomena developing in southern Scandinavia and northern Germany (Bukowski 1998; Jeger 2010; Socha in this volume).

The presence of the Tumulus Culture was not uniform across regions. Several clusters can be distinguished, the largest of which encompassed the

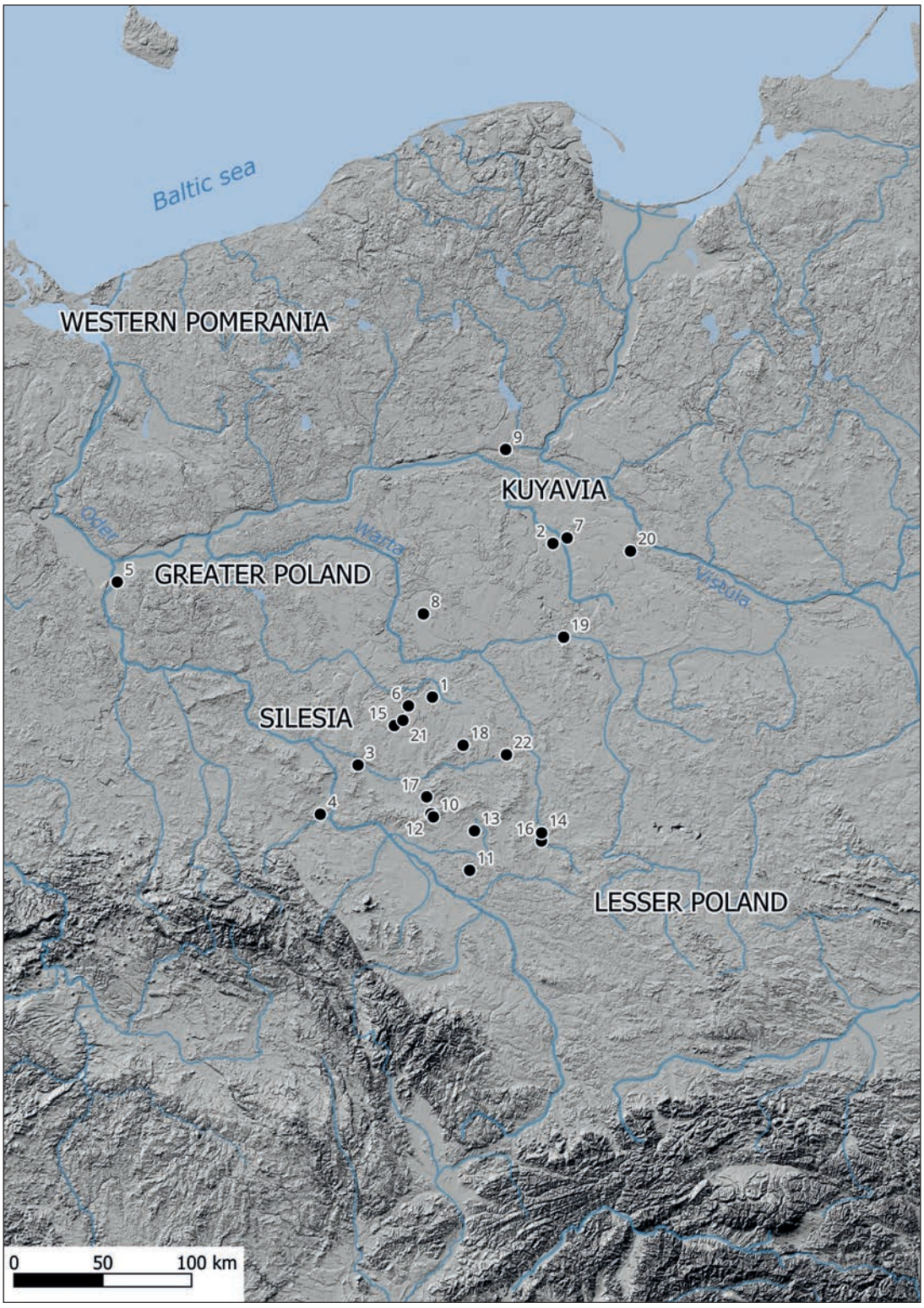




FIGURE 1. Distribution map of sites of the Tumulus Culture discussed in the text: 1 – Borek, 2 – Bożejewice, 3 – Czeladź (settlement), 4 – Gogołowice, 5 – Górzyca, 6 – Grabonóg, 7 – Karczyn, 8 – Kleszczewo, 9 – Kruszyniec, 10 – Ludgierzowice, 11 – Mikowice, 12 – Niedary, 13 – Obrót, 14 – Opatów, 15 – Pudliszki, 16 – Siemianice, 17 – Skoroszów, 18 – Smoszew, 19 – Szczepidło (settlement), 20 – Wolica Nowa, 21 – Wymysłowo, 22 – Wysocko Wielkie. After Stróżyk 2019, with the authors' additions

middle and lower Warta basin (Figs. 1, 2). The genesis of this local group was multi-phased. Following the crisis of Únětice settlement in 1700–1600 BCE (Kneisel 2012), partial depopulation occurred in the areas between the Oder and Warta rivers. Around 1600 BCE, small, mobile groups of Tumulus Culture populations began to arrive from Bohemia, Moravia, as well as from the regions of Brandenburg and Mecklenburg. These groups established their own necropolises in uninhabited or sparsely occupied areas, initially functioning on the peripheries of TCC settlement. Owing to the attractiveness of the new social model, they gradually assumed a dominant cultural role, leading to the disappearance of earlier local identities (Makarowicz 2017).

An important factor facilitating the development and north-eastward expansion of the Tumulus Culture was the amber trade (Bukowski 2002). Analyses of the distribution of amber artefacts in Poland during the second half of the 2nd millennium BCE indicate a shift of major exchange routes from the Vistula basin toward the Oder (Czebreszuk 2011; Serbe 2025). Spectral analyses further confirm the presence of Baltic amber (succinite) in Tumulus Culture burials south of the Carpathian Mountains in the period c. 1500–1400 BCE (Jaeger et al. 2023).

The barrow landscape and spatial organisation

As noted above, the bulk of our knowledge of the Tumulus Culture derives from ritual contexts, above all from barrow cemeteries and metal hoards, with an almost complete absence of identified settlements (Fig. 1). This character of the source base necessitates a shift in analytical focus – from reconstructing settlement and economic systems to examining the funerary landscape, defined as the primary arena of social, ritual, and symbolic practices. The number of barrow cemeteries (and individual barrows) suggests that they represented stable hubs of social life under conditions of a probable more mobile mode of existence than in earlier centuries, accompanied by a correspondingly modified economic model.

In the Silesian Lowland and the Greater Poland-Kuyavian Lowland, several hundred barrows have been recorded within a relatively confined, roughly quadrangular area defined by the valleys of the Oder, Warta, Vistula, and Prosna rivers (Jaeger, Pospieszny 2011; Czebreszuk et al. 2013; Cwaliński, Niebieszczański 2012; Stróżyk 2019; Jaeger, Kneisel, Czebreszuk, eds. 2023) (Fig. 2). This distribution allows barrows to be interpreted as durable spatial markers delineating the boundaries of the settlement ecumene and the territory exploited by Tumulus Culture communities.

It should be emphasised that the original number of cemeteries was likely much greater. As is well documented in historical sources, a substantial proportion of barrows has been destroyed following intensive agricultural activity combined with deforestation, as well as looting excavations. The best-preserved cemeteries and single barrows are those located in forest complexes, particularly in old oak and beech forests. Some of these sites were already subject to professional investigation in the early 20th century (Fig. 3). In recent years, the application of LiDAR in forested areas has enabled the identification of dozens of new barrow cemeteries and single barrows even within relatively small areas (Czebreszuk et al. 2013; Stróżyk 2019). Given the extent of landscape transformation over the past century, it may be assumed that these features represent only a fraction of what was once a far richer and more complex prehistoric landscape.

The placement of barrows and cemeteries followed recurring topographic patterns. Most known sites are situated on elevated terrain, particularly on watershed ridges between river systems. This preference for elevated locations facilitated the deliberate visual exposure of barrows within the landscape (Stróżyk 2019).

Within cemeteries, barrows were arranged either linearly or in clusters, typically subdivided into smaller groups of several to a dozen mounds. The largest necropolises originally comprised several dozen barrows. The extent of their destruction is well illustrated by the example of the Obrót cemetery, where the number of mounds decreased from approximately 60 in the early 19th century to only a dozen or so recorded in the 1920s and 1930s (Cwaliński 2023).

Cemeteries and single barrows formed a distinctive type of cultural landscape, which – due to its density of mounds – may be referred to as a "barrow landscape" (Makarowicz 2017) (Fig. 4). Visibility analyses indicate that some barrows occupied particularly prominent positions, functioning as landmarks and central elements structuring the spatial organisation of individual cemeteries. Their placement on slopes enhanced mutual visibility within a single necropolis, potentially reinforcing their symbolic and communicative functions (Stróżyk 2019).

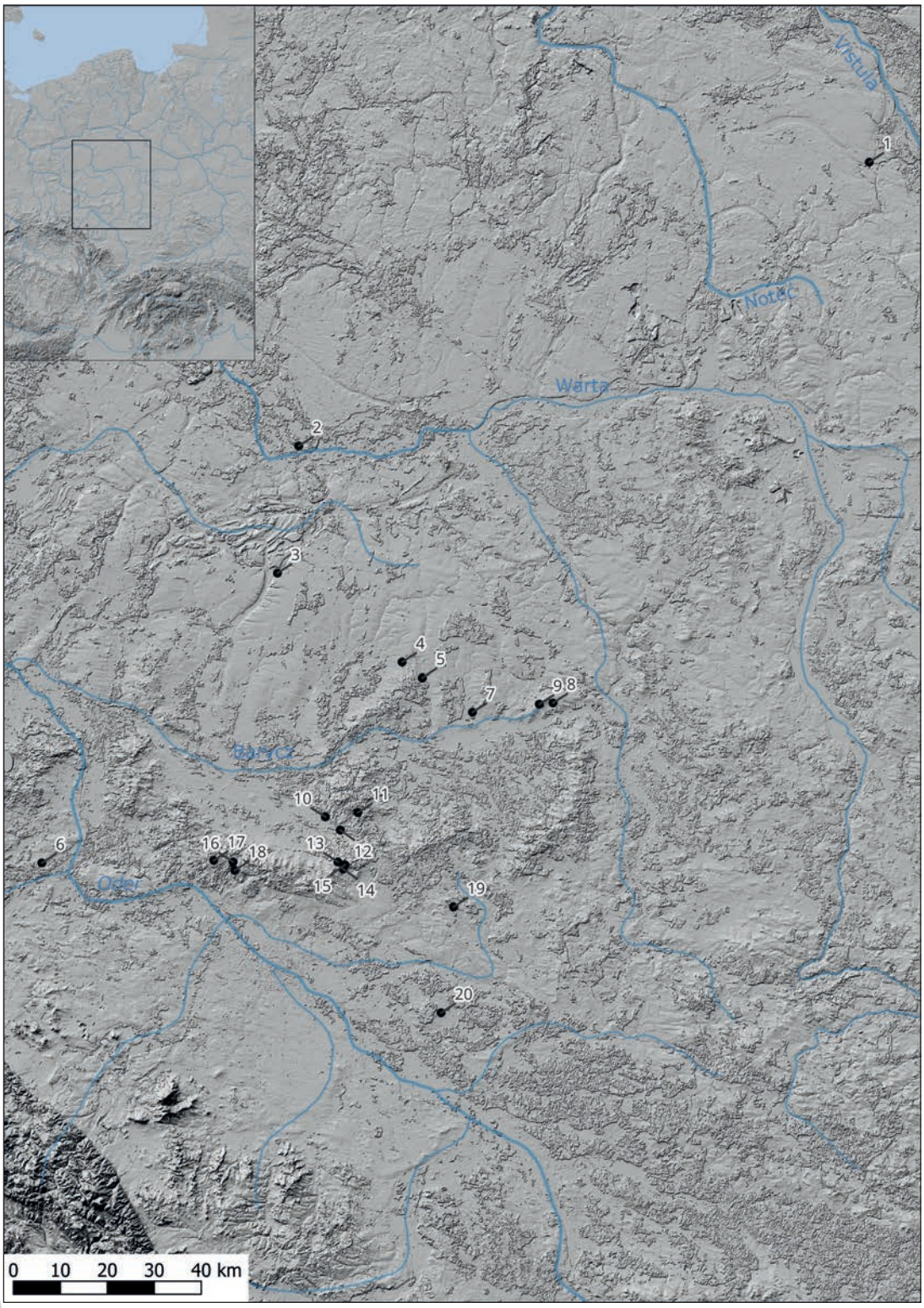


FIGURE 2. Barrow cemeteries and individual barrows clustered in the border area between Silesia and Greater Poland: 1 – Wolica Nowa, 2 – Dąbrowa, 3 – Grabonóg, 4 – Krotoszyn, 5 – Smoszew, 6 – Gogołowice, 7 – Gliśnica, 8 – Sadowie, 9 – Wysocko Wielkie, 10 – Skoroszów, 11 – Łazy Wielkie, 12 – Czeszów, 13 – Niedary, 14 – Ludgierzowice, 15 – Rościszowice, 16 – Siemianice, 17 – Wielka Lipa, 18 – Oborniki Śląskie, 19 – Obrót, 20 – Mikowice. After Stróżyk 2019





FIGURE 3. Archival photographs of barrows from the cemetery in Smoszew, investigated in the 1920s. Archive of the Archaeological Museum in Poznań

Barrows represented a material and visual presence of ancestors within the landscape, as well as loci of both individual and collective memory (Makarowicz 2025). In the absence of stable, long-term settlements, they may have served as focal points of social and religious life, around which communal activities were focused. The contents of the mounds: ceramic fragments, traces of hearths, and animal remains, indicate feasting and ritual ceremonies. At the same time, the location of some cemeteries near natural transport routes suggests their role as orientation points along long-distance exchange networks and as elements of symbolic control over space (Bourgeois 2013; Makarowicz et al. 2019).



FIGURE 4. Smoszew. Barrows preserved in the landscape of the modern forest. Photo by M. Jaeger

Barrow architecture

The architecture of Tumulus Culture barrows in the Silesia-Greater Poland borderland is characterised by considerable formal and structural diversity, which has been comprehensively analysed only recently (Cwaliński, Niebieszczański 2012; Cwaliński 2023). The vast majority of features had a circular plan. The preserved diameters of the mounds range from approximately 5.5 to 22 m, while their heights vary between 0.5 and 4 m (Fig. 5).

Barrows were constructed using earth, turf, stone, and wood, or combinations thereof. Exclusively earthen mounds are relatively rare. Within individual cemeteries, clear variation is observable both in the size of barrows and in the complexity of their construction, which may reflect differences in status or chronology.

The most commonly employed architectural elements were stone constructions (Fig. 6). Among the most characteristic are stone cores (conical or hemispherical) placed centrally in the lowest part of the mound and often covering a grave pit or chamber. Such structures have been identified in 35 excavated barrows, including those at Smoszew, Niedary, and Siemianice. Another very common feature consists of stone kerb circles, built of one or several rows of stones with a width ranging from 0.4 to nearly 2 m, known from Wolica Nowa, Wysocko Wielkie, Smoszew, and Gogołowice. These rings were sometimes discontinuous, with gaps interpreted as entrances to the central zone. Their function was both practical: stabilising the mound, and symbolic, demarcating the boundary between the sacred and the profane.

Less frequently, stone pavements were employed, which may have operated as ritual surfaces, covered grave pits, or served as places for depositing offerings and conducting feasting activities. Examples of such constructions are known from Obrót, Wolica Nowa, and Wysocko Wielkie, to mention a few. More rarely attested are internal stone rings and passage-like features leading from breaks in the



FIGURE 5. Krotoszyn Forest. Example of a barrow preserved within a commercially managed forest area. Photo by M. Jaeger

outer ring toward the centre of the barrow, as well as stone layers reinforcing the mound structure and stone burial chambers (Cwaliński 2023). Entirely unique stone constructions were documented in the barrow at Grabonóg, where the central core was connected to the outer ring by radial stone features (Kowiańska 1951).

Wooden elements are preserved much more rarely. These include, among others, so-called "houses of the dead" (*Totenhäuser*), known from Mikowice, Obrót, and Skoroszów; palisades surrounding the central part of the mound (e.g. Mikowice, Barrow 19); and coffins hollowed from tree trunks, discovered in Mikowice and Ludgierzowice. The example from Ludgierzowice – where an oak coffin containing an inhumation burial was placed within a deep pit – represents one of the best-documented constructions of this type in the region (Butent 1992).

The available data indicate that barrow architecture and the associated funerary landscape were the result of long-term and repetitive practices. At the same time, the considerable variability in the forms of barrow burials should be emphasized. This diversity reflects the flexibility of ritual practices, probably corresponding to the need to shape local identities and traditions within specific kinship-based social structures.

Flat graves and cemeteries without mounds: diversity of funerary practices

Flat-grave cemeteries represent an important, though significantly less well-recognised, component of the funerary practices of the Tumulus Culture. To date, more than forty sepulchral sites of this type have been recorded, comprising a total of approximately 130 graves; however, their original number remains difficult to estimate (Makarowicz 2017; Stróżyk 2019). On the one hand, some stray finds of metal objects may represent the remains of destroyed flat graves. On the other hand, some of the discovered graves are interpreted as remnants of burials whose original earthen mounds (barrows) have been levelled (Cwaliński 2023).



FIGURE 6. Smoszew. Barrow no. 15 during excavation. Well-preserved stone structures originally covered by an earthen mound are clearly visible. Photo by J. Kneisel

Most flat graves formed small cemeteries (possibly of a familial character) consisting of one to several burials. An exception is the extensive necropolis at Górzyca in the Lubusz region, where several dozen graves have been recorded, although research at this site continues (Socha in this volume). Other larger assemblages are known from Borek in Greater Poland (14 graves), Opatów in Silesia (8 graves), and Karczyn in Kuyavia (7 graves).

Flat grave cemeteries were typically located on slightly elevated terrain, on gentle valley slopes, edges, and promontories of river terraces, almost always in close proximity to watercourses. In terms of topographic location, they resemble barrow necropolises (Cwaliński, Niebieszczański 2012), although their form was, naturally, far less visible in the landscape. This suggests that they played a more modest role in the organisation of both settlement and symbolic space, their significance not relying on long-distance visibility or monumentality. The distribution of flat graves within the Silesia-Wielkopolska ecumene of the Tumulus Culture is notably broader than that of barrow cemeteries. These sites form clusters several kilometres apart and sometimes occur in direct proximity to barrow necropolises, as observed south of the Barycz valley (Makarowicz 2017).

From the early phases of the Tumulus Culture, diverse forms of flat-grave construction were employed, using earth, stone, and occasionally wood. The simplest burials consisted of oval or rectangular pits without reinforcing elements. The total number of such simple graves slightly exceeds that of graves with stone or wooden constructions, although these proportions are strongly influenced by the exceptional nature of the Górzyca necropolis, where all graves are stone-built (Socha, Sójkowska-Socha 2017; Socha, in this volume).

A distinctive feature of the Silesia-Greater Poland groups of the Tumulus Culture is the occurrence of double and multiple burials arranged in a "top and tail" configuration, previously encountered in Borek, Górzyca, Karczyn, and Bożejewice.

Particularly noteworthy is the collective Grave 13 at Borek, containing the remains of more than ten individuals arranged in pairs along the axis of the pit and furnished with metal artefacts characteristic of the later phases of the Tumulus Culture. This burial form is interpreted as reflecting the influence of the Trzciniec tradition, pointing to the complex nature of cultural interactions in the region under discussion. In light of latest research, it is also worth noting that in the Kuyavia region this burial practice was associated with individuals whose diet included millet, as identified through bio-archaeological analyses (Pospieszny et al. 2026).

Cremation and bi-ritual funerary practices

Cremation burials are significantly less frequent than inhumations. To date, a total of twelve sites have been identified, comprising 34 cremation graves. In the vast majority of cases, this funerary rite is associated with flat graves, although examples of cremation and bi-ritual burials beneath barrow mounds have also been identified (Cwaliński, Niebieszczański 2013) (Fig. 7).

In most instances, cremation graves contained the remains of a single individual. The placement of cremated remains in containers is relatively rare. In some cases, the bones may have been deposited in organic containers, as suggested by finds from Górzyca and Kruszyniec. Other graves contained several concentrations of burnt bones, as in Grave 3 at Kleszczewo. Only occasionally were cremated remains placed in ceramic vessels serving as urns; such examples are known from Kleszczewo, Pudliszki, and Wymysłowo. Compared with inhumation burials, cremation graves generally lack more complex architectural elements, including wooden or stone-built grave structures (Makarowicz 2017; Cwaliński 2023).

For a long time, cremation was regarded as a chronological marker, associated with the later phases of the Tumulus Culture. This view partly stemmed from the research tradition of Polish archaeology, in which the Tumulus Culture was originally interpreted as part of an evolutionary sequence leading to the emergence of the Lusatian Culture. This perspective was reflected, among other things, in the use of the term "pre-Lusatian Culture", implying its transitional character (Gedl 1975; Kaczmarek 2018). In light of current research, however, this interpretation must be considered unfounded (Cwaliński, Niebieszczański 2013). Increasing numbers of radiocarbon dates indicate the presence of cremation already in the earliest phases of the Tumulus Culture, i.e. around 1600/1550 BCE (Stróżyk 2019). This suggests that, from the outset, cremation represented one of the diagnostic forms of treating the dead within Tumulus Culture communities, rather than the result of a gradual evolution of funerary practices toward the cremation-dominated model characteristic of the Late Bronze Urnfield Culture.

The archaeological record also demonstrates the occurrence of bi-ritual funerary practices. Both cremation and inhumation are sometimes present within the same cemeteries and, in certain cases, even within individual graves (Makarowicz 2017; Cwaliński 2023).

Metal, deposition, and social communication

In the Silesia-Greater Poland borderland, the principal characteristic of the corpus of metal finds is the clear dominance of funerary contexts and hoards over artefacts derived from settlements. As noted above, particularly significant data on metallurgy have been provided by the unique settlement at Szczepidło, where a large, centrally located feature interpreted as a metallurgical workshop was discovered (Makarowicz 2016; in this volume).

The general distribution of metal finds associated with the Tumulus Culture in the region indicates their concentration in specific parts of the landscape, especially on upland zones and in the immediate vicinity of watercourses. This pattern underscores the importance of particular landscape features in structuring ritual practices involving metal.

With regard to the deposition of metal artefacts in graves, a clear distinction can be observed between barrow burials and flat graves. Despite their monumental form and prominent placement within the landscape, barrow graves are characterised by relatively modest grave goods, typically consisting of a small number of simple, usually undecorated bronze items (Fig. 8). In contrast, flat graves contain the majority of known metal artefacts, often richly decorated and typologically diverse (Staniuk 2023; Socha, in this volume).

Bronze objects, particularly ornaments, which dominate burial assemblages, operated as carriers of cultural meaning, embedded in everyday

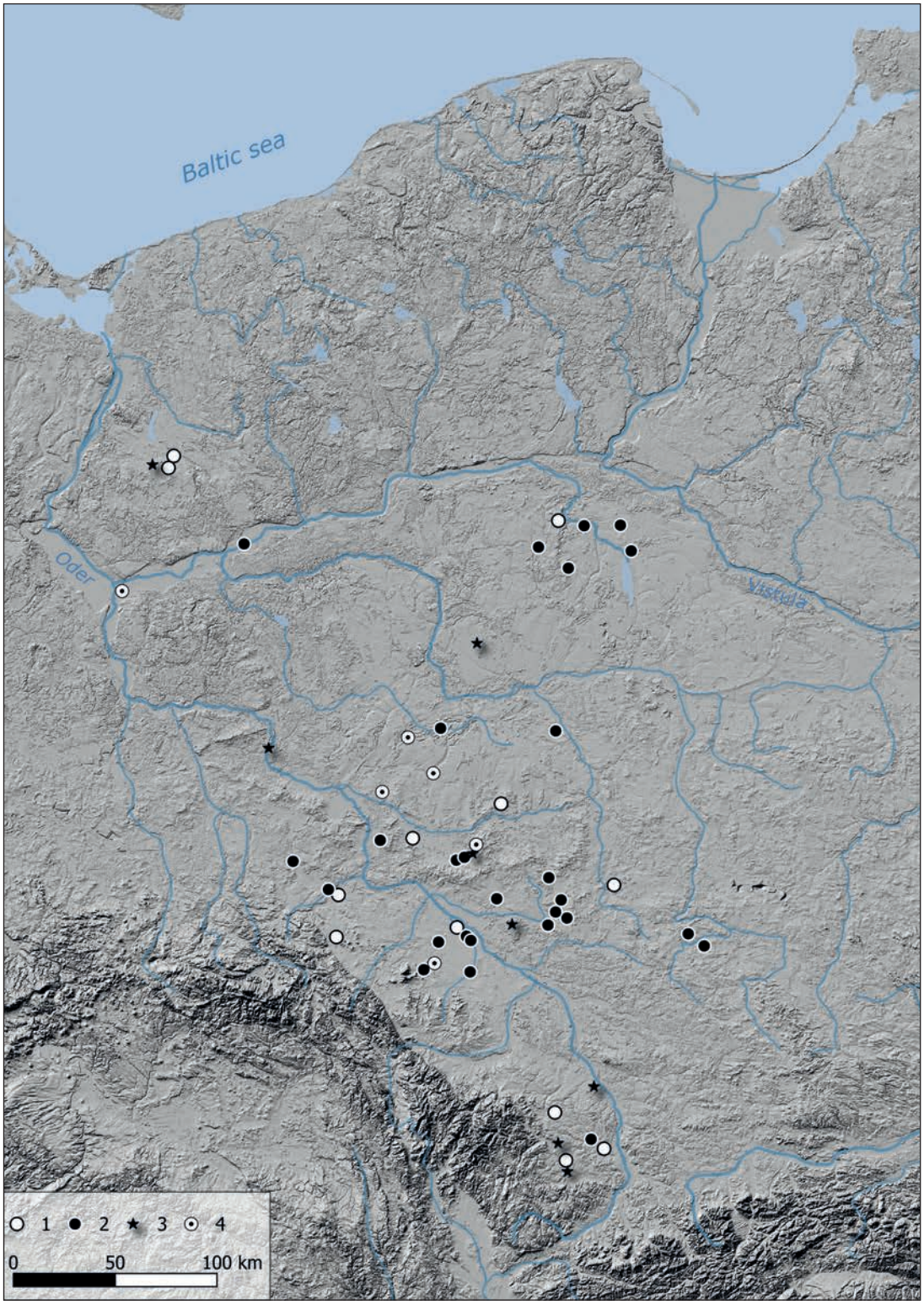


FIGURE 7. Distribution map of biritual cemeteries (white circle with dot), cremation cemeteries (black star), inhumation cemeteries (black circle), and presumed cemeteries of unspecified burial rite (white circle). After Stróżyk 2019

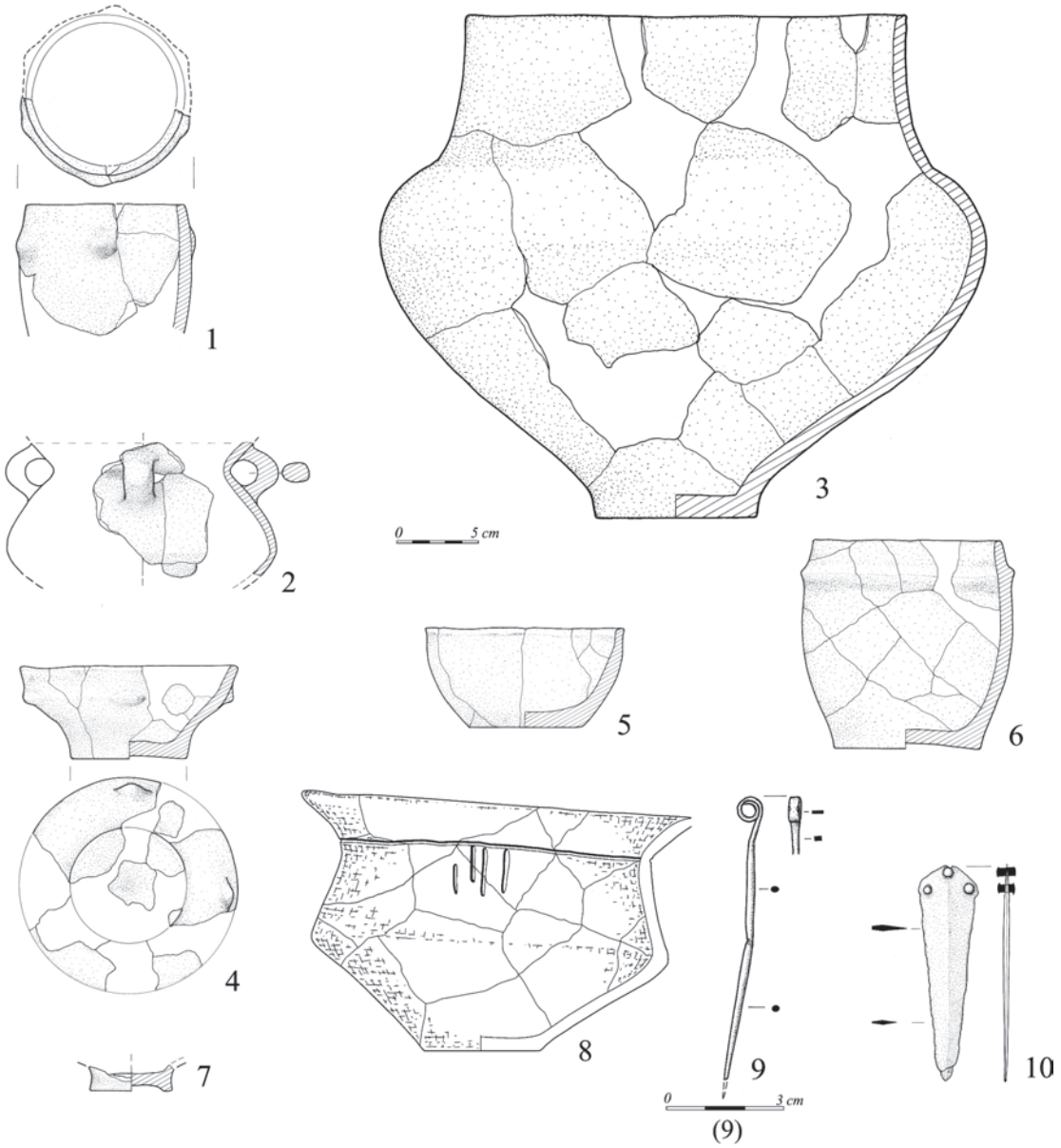


FIGURE 8. Smoszew. Archaeological finds recovered from barrows excavated in 1923–1924. Pottery: 1, 5, 6 – barrow no. 1; 3 – barrow no. 8; 2, 4, 7 – barrow no. 2; 8 – barrow no. 35. Bronze artefacts: 9 – pin from barrow no. 1; 10 – dagger from barrow no. 8. From the collection of the Archaeological Museum in Poznań

practices and subsequently transformed and codified within funerary rituals. Two complementary axes of identification can be discerned: one related to grave form (barrow vs. flat), and the other to categories of ornaments associated with the body (bracelets, rings, spirals) and with dress (pins). The separation of these categories in depositional contexts points to the existence of distinct yet interrelated areas of social practice (Staniuk 2023).

In hoards of metal artefacts, ornaments also predominate, accompanied by a near-total absence of pins (Blajer 1990; 2001). These hoards were typically deposited outside cemetery areas, suggesting a deliberate separation of these two distinct ritual practices (Staniuk 2023).

Analysis of the structure of the known assemblage of metal artefacts clearly demonstrates the predominance of ornaments: objects associated with the visual presentation of the individual, over other categories such as weapons and tools. This observation calls for caution in assuming the full adoption of a warrior ideology and identity characteristic of regions to the north (the Nordic zone) and south (the Carpathian Basin) of the Polish lands.

It appears that metal weaponry[1] did not represent a universal marker of social status among the Tumulus Culture communities under discussion. Isolated examples of daggers identified as grave goods in barrow burials are not accompanied by other artefacts that would indicate the elevated status of the individuals interred (Jaeger, Pospieszny 2011).

Taken together, the available evidence indicates that in the Middle Bronze Age of the Silesia-Wielkopolska borderland, bronze metallurgy was deeply embedded in both everyday and ritual social practices. Bronze was used not merely as a raw material or a simple indicator of wealth, but as a medium of communicating social differences (collective and individual alike, expressed through ornaments) and collective memory (expressed through hoards). The complex relationships between variations in burial forms, grave types, grave goods, and the deposition of hoards point to the existence of a multidimensional symbolic system in which materiality played a key role in reproducing the social order of the Tumulus Culture in this region (Staniuk 2023).

Marking the ritual landscape

Only in recent years have examples of engravings of the cup-mark type been identified in the territory of present-day Poland. In total, three boulders bearing such features are currently known, one of which can be directly associated with the Tumulus Culture (Jaeger, Niebieszczański, Stróżyk 2019). This specific stone was discovered within an extensive barrow cemetery at Smoszew (Fig. 9). The site formed part of a broader concentration of barrows within a forest complex (Las Krotoszyn), where a total of 118 mounds have been identified across an area of approximately 30 km^2 (Czebreszuk et al. 2013).

The barrows and cemeteries within the Krotoszyn Forest area were located in accordance with the topographic principles outlined above. Burial places formed a distinctive and deliberately constructed visual structure within the landscape (Stróżyk 2019), of which the cup-marked boulder at Smoszew represented an integral element.

The boulder itself is an irregular granite erratic. Its surface bears a total of 34 cup marks, distributed irregularly and not forming any clear geometric or compositional arrangement (Fig. 9). The stone was part of the original glacial moraine deposit and was not secondarily transported through human activity. Bronze Age communities thus utilised a natural rock already present in the landscape as an object of ritual activity, most likely associated with a nearby barrow. The cup marks should therefore be interpreted as the result of deliberate human intervention in a natural landscape feature, transforming it into an element of the funerary-ritual landscape.

Conclusion: the Tumulus Culture as a landscape-ritual system

The foregoing analysis of the genesis, distribution, sepulchral landscape, funerary practices, and metal-related and symbolic behaviours allows the Silesia-Greater Poland variant of the Tumulus Culture to be interpreted not as a simple outcome of migration nor as a homogeneous cultural unit, but rather as a dynamic social system grounded in complex relationships between ideology, materiality, and space.

The origins of this formation, embedded in the context of the Early Bronze Age crisis and the transformation of settlement structures, point to a long-term, multi-generational process in which limited migrations of small groups intertwined with the adoption of new ideological models. A key role was played by the appropriation and local reinterpretation of an elite warrior ethos, derived from the advanced Bronze Age societies of the Carpathian Basin, particularly the Otomani-Füzesabony cultural complex. However, in the north-eastern zone of the the distribution of the Tumulus Culture, this model was transformed and adapted to the realities of decentralised, kin-based communities

[1] It is worth noting that at the Tollense site in Mecklenburg-Vorpommern from the period under discussion, we know examples of wooden weapons whose interpretation as armament is confirmed by the context of their discovery at an archaeological site identified as a battlefield (Jantzen et al. 2011).

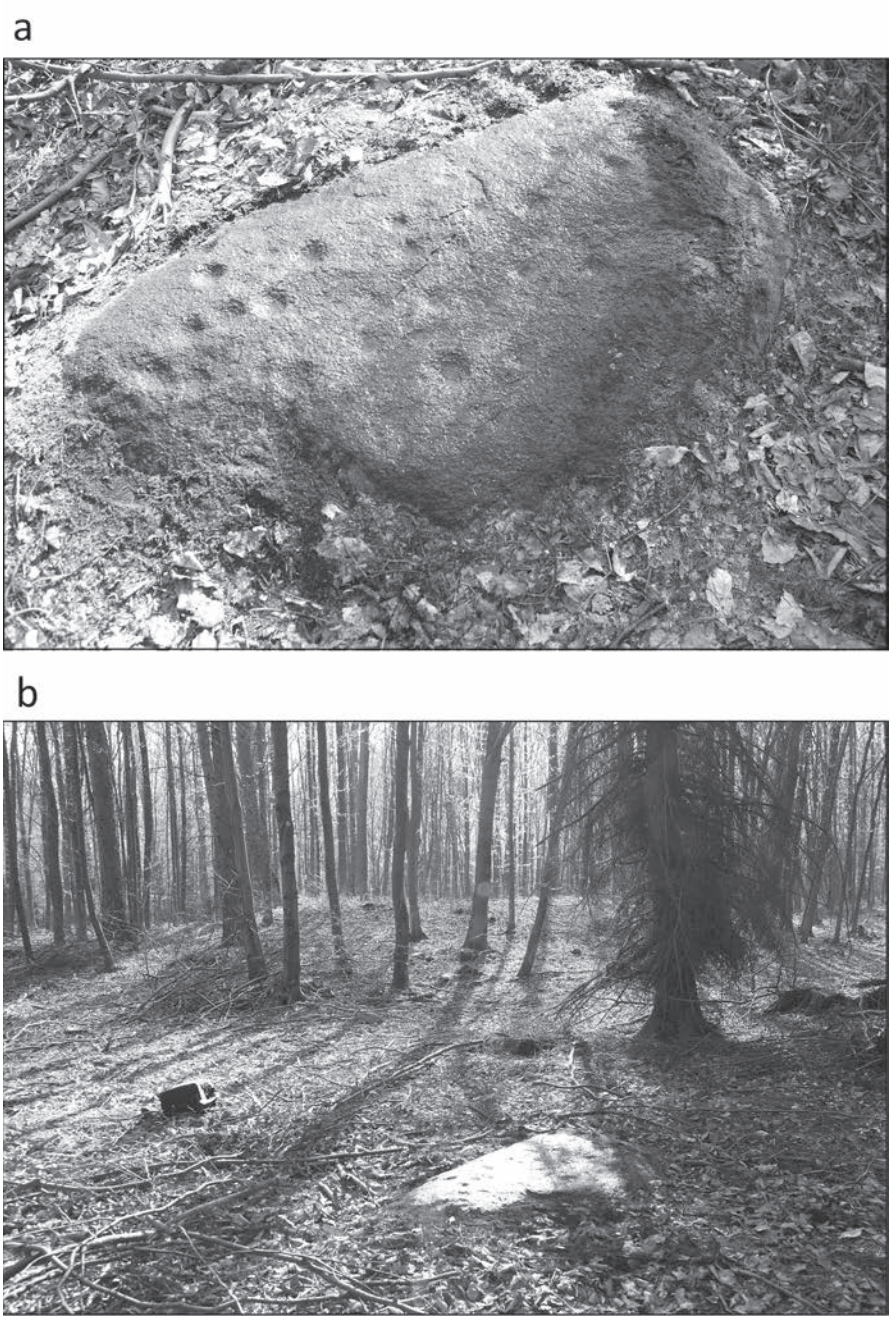


FIGURE 9. Cup-marked boulder from Smoszew: a – the boulder *in situ*; b – the boulder with cup marks and barrow no. 8. Photo by M. Stróżyk

operating under conditions of significantly lower settlement density.

Analysis of the distribution of barrow cemeteries and their relationship to topography permits the sepulchral landscape to be defined as the primary structure organising social space. Barrows were not merely burial places, but enduring reference points within the landscape, delineating the boundaries of the settlement ecumene, kin-based micro-territories, and axes of transport. Their placement, visibility, and association with elevated terrain indicate a deliberate construction of the

landscape as a medium of collective memory and group identity.

The diversity of burial forms: from monumental barrows to more modest flat grave cemeteries, does not reflect a simple hierarchical division, but rather a multi-layered system of communicating status and affiliation. The monumentality of barrow graves, combined with their relatively modest metal inventories, contrasts with the richness of assemblages in flat graves. This suggests that prestige was not encoded solely through the quantity of metal, but through a combination of burial form, spatial location, and the nature of ritual practice.

Grave goods and bronze hoards reveal the central role of metal as a medium of social communication. Bronze functioned less as an economic resource than as a means of articulating social relationships, individual and collective identities, and cultural norms. The predominance of ornaments over weapons and tools challenges interpretations emphasising exclusively the warrior character of elites, and instead highlights the importance of the visual presentation of the body, dress, and ornamentation in processes of social identification. Hoards deposited outside cemeteries further complement this picture, representing mechanisms for regulating intergroup relations and symbolically asserting control over space.

In this context, cup-marked stones (particularly the example from Smoszew) should be interpreted as elements of the same symbolic system. Their presence within the sepulchral landscape indicates that the ritual sphere of the Tumulus Culture extended beyond the grave itself, encompassing broader practices of permanently marking the landscape. The transfer of ideas and symbolic patterns from the Nordic cultural sphere, facilitated by long-distance contacts, attests to the active participation of Silesia-Wielkopolska Tumulus Culture communities in supra-regional networks of ideological exchange.

Taken together, the available evidence allows the Tumulus Culture in the Silesia – Greater Poland borderland to be interpreted as a coherent landscape-ritual system, in which sepulchral architecture, metallurgy, depositional practices, and symbolic forms of spatial marking jointly represented a multidimensional social order. This system was characterised both by a high degree of ritual formalisation and by considerable adaptive flexibility, enabling the integration of local traditions with supra-regional ideological patterns of the Middle Bronze Age.

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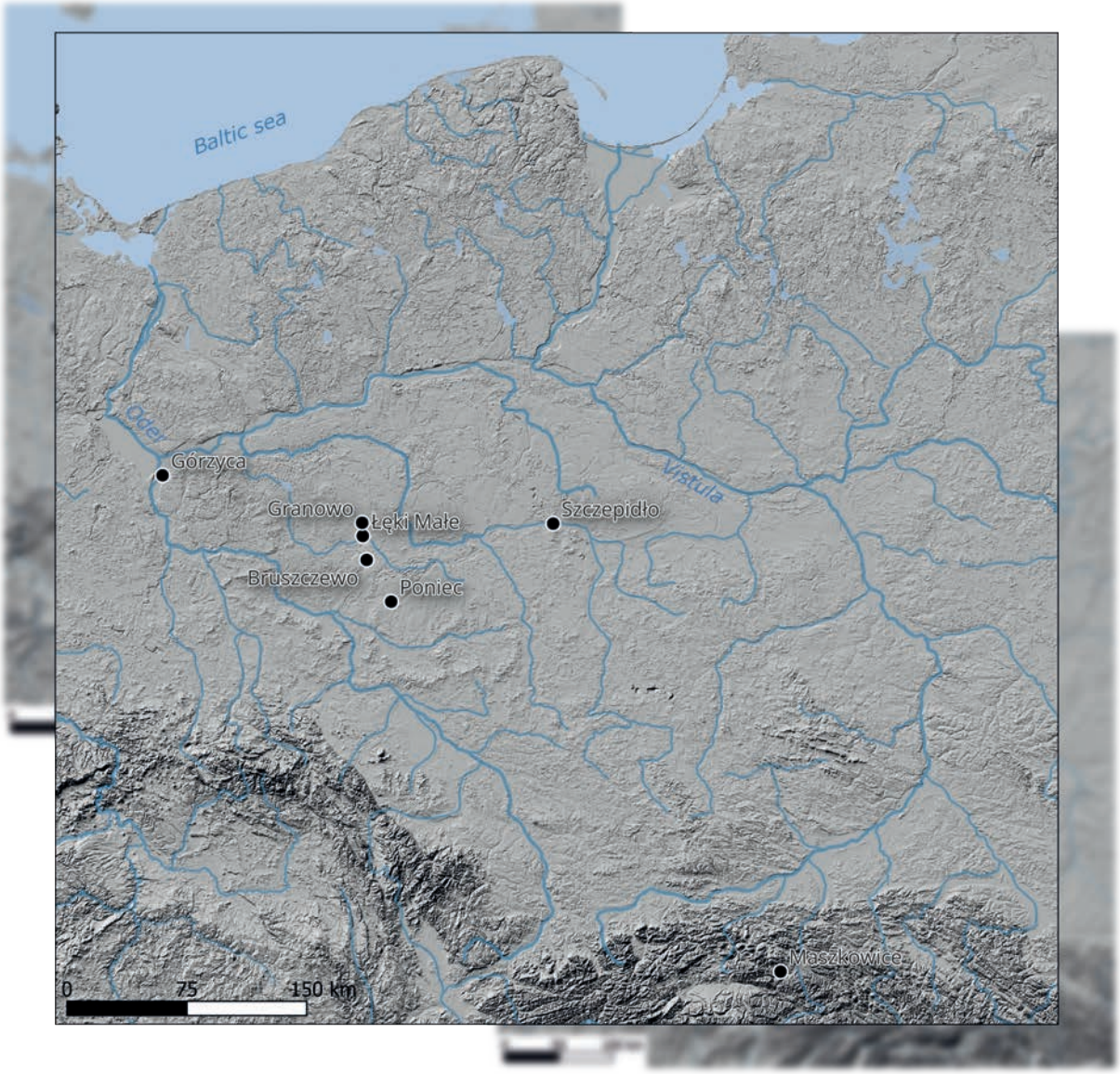
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LOCATION OF THE SELECTED EARLY AND MIDDLE BRONZE AGE SITES DESCRIBED IN THE FOLLOWING PAGES



BRUSZCZEWO, SITE 5 AND ŁĘKI MAŁE, SITE 12

Janusz Czebreszuk

In south-western Wielkopolska, there is a concentration of sites of the Únětice Culture (UC), referred to in literature on the subject as the Kościan Group. The area covers approximately 50 km (from N to S) × 20 km (from W to E) (Fig. 1). It has been the subject of many years of research, mainly as part of a project that has been ongoing since the late 20th century, conducted in Polish-German cooperation (selected most significant works: Czebreszuk, Müller (Eds). 2004; Kowiańska-Piaszykowa 2008; Müller, Czebreszuk, Kneisel (Eds.) 2010; Silska 2012; Czebreszuk, Müller (Eds.) 2015; Czebreszuk, Müller, Jaeger, Kneisel (Eds.) 2015; Müller et al. 2022; Czebreszuk et al. 2024; Czebreszuk, Szmyt 2025; Müller, Czebreszuk 2025). The mentioned concentration of finds is distinguished by their spectacular nature. They primarily consist of a fortified settlement at Bruszczewo and a barrow cemetery, known as the princely graves in Łęki Małe. Additionally, a cluster of bronze hoards was discovered (eg. Czempiń, Granowo, Nacław, Poniec, and Szczodrowo), scattered bronze finds, a probable barrow in Przysieka Polska (Schwenzer 2004), as well as many other settlements known from surface surveys (Szydłowski 2007). These data indicate a distinct regional community within the Únětice area. The extensive range of interdisciplinary research conducted makes it currently the best-studied regional community in the UC, and the knowledge gained can serve as an important tool for understanding the cultural significance of the Únětice world in the historical context of the Old Continent. Research has focused on two key sites (Czebreszuk 2013): Bruszczewo (Śmigiel commune, Kościan county, Site 5) and Łęki Małe (currently administratively categorized as Wilanowo, Site 12, Kamieniec commune, Grodzisk Wielkopolski county).

Bruszczewo is a fortified settlement, the only one known so far from the northern part of the UC ecumene (Fig. 2) (Jaeger, in this volume). It occupies a peninsula that extends into the valley of the Samica River. Five thousand years ago, this part of the valley was filled by a lake. The eastern section of the settlement, adjacent to the lake, exhibits characteristics of a peat site with very well-preserved artefacts made from organic materials. The fortifications consisted of a crescent-shaped ditch that separated the peninsula from the plateau. To this day, it measures up to 20 metres in width and up to 4 metres in depth. The interior of the ditch was reinforced with palisades. Three rows of palisades have been recorded, two of which were constructed earlier and were repaired multiple times. On the eastern (lakeside) side, there were fortifications consisting of two walls made of wattle, spaced about 2 metres apart. The space between them was filled with earth. Alongside these walls, closer to the lake's surface, there were other constructions, built with walls in the form of pairs of vertical posts, between which horizontal planks were inserted one above the other. These were segmental structures; they did not form a continuous wall. The architecturally diverse fortifications surrounded an area with a diameter of approximately 80 metres, which (judging by the large number of varied archaeological objects) was intensively used (Fig. 2). The residents of the settlement left behind relics of various activities (Müller, Kneisel 2010).

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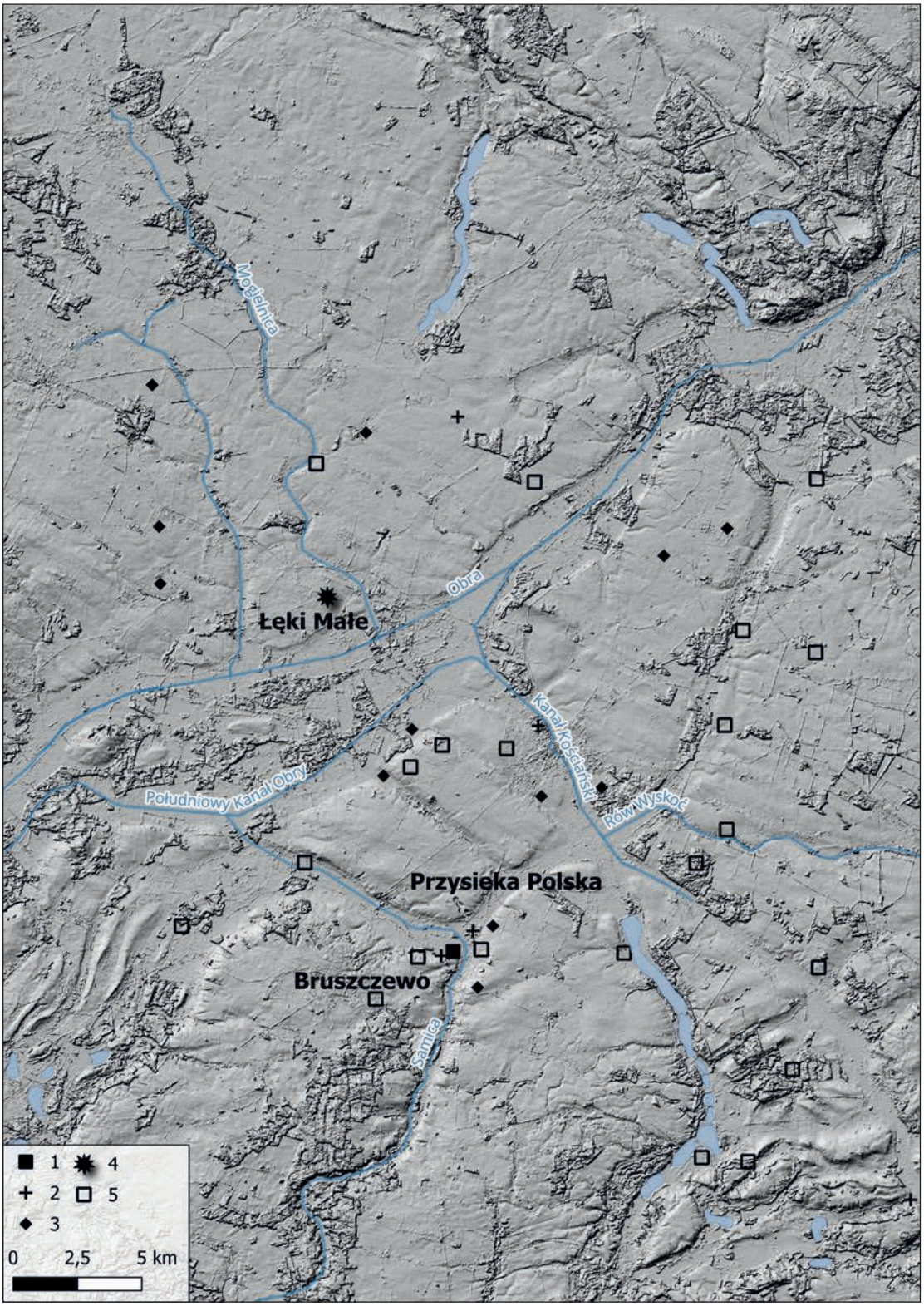


FIGURE 1. Dispersion of finds associated with the Kościan Group of the Únětice Culture. After Delgado-Raack et al. 2020. Legend: 1 – Fortified settlement; 2 – Grave; 3 – Hoard; 4 – Princely Barrow; 5 – Settlement



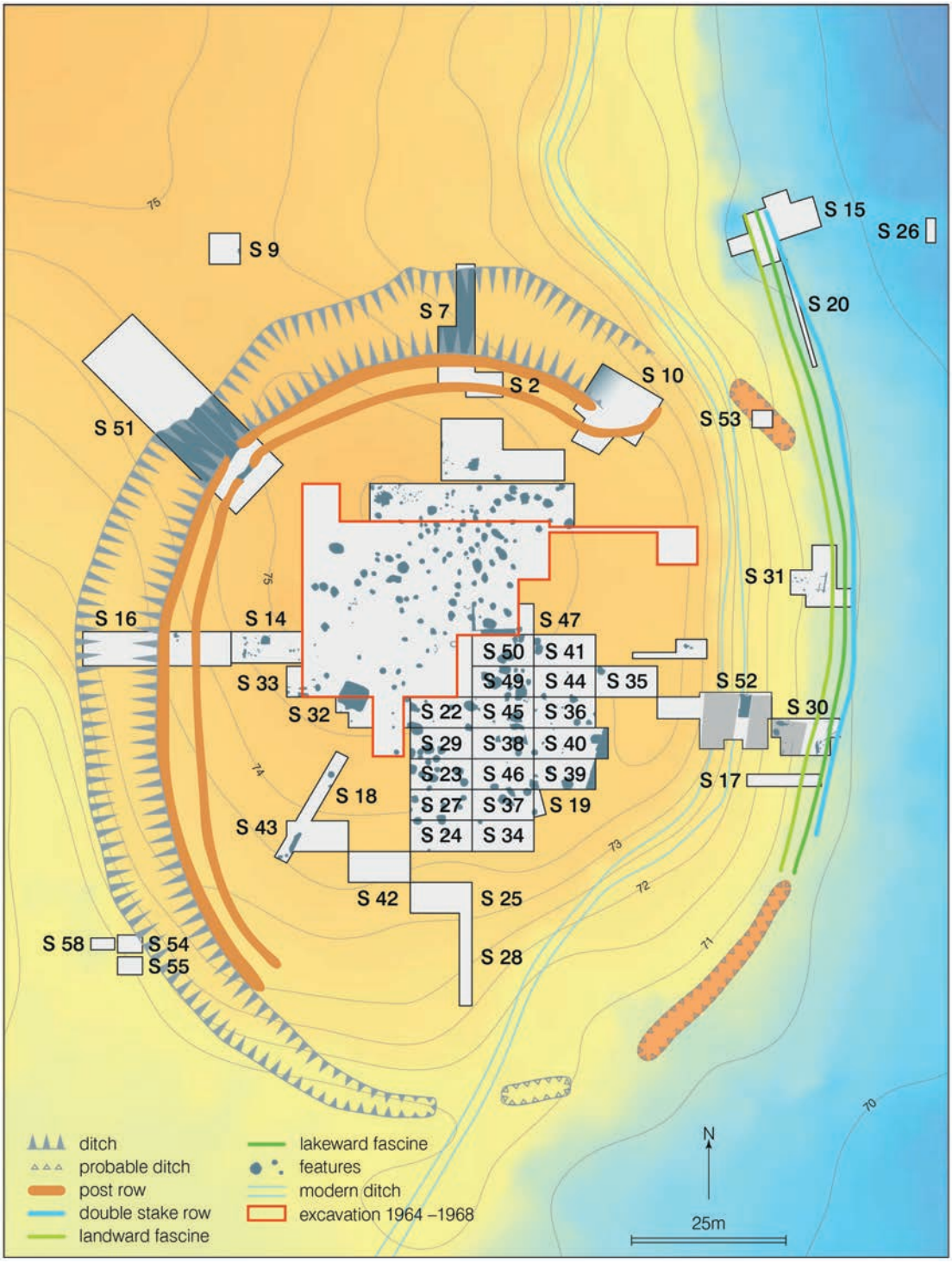


FIGURE 2. Plan of the settlement at Bruszczewo, Site 5. After Müller, Kneisel 2010

Bruszczewo hosted a bronze metallurgy workshop with artefacts recorded there including nozzles for bellows, crucibles, clay pads, a stone casting mould for bracelets, finished products in the form of daggers, axes, and ornaments at various stages of wear (including one dagger with a radically shortened blade due to repeated sharpening), as well as crushed metal fragments prepared for

melting and "teardrop risers" formed during the pouring of molten metal (Rassmann 2010; Czebreszuk 2021). More complex casting techniques were also employed, such as the cast-on method (Jaeger et al., 2015). Evidence suggests that the bronze workshop was a permanent feature of the settlement, as indicated by the presence of several types of copper used in Central Europe between 2100 and 1650 BCE (Rassmann 2010). The settlement also yielded the first evidence of gold processing in the Únětice Culture – and unique for all of contemporary Europe – in the form of a stone anvil bearing traces of this metal (Müller et al. 2022). The location was also a textile production hub, as indicated by textile impressions on the surfaces of vessels and tools associated with this craft, such as spindle whorls and wooden weaving tools.

Archaeological studies have reconstructed a rich array of plants used by the settlement's inhabitants (Kroll 2010). Barley and wheat were grown, along with legumes. Beyond peas and lentils, the finds from Bruszczewo include the earliest evidence of vetch in this part of Europe. Vegetables and other useful plants were also exploited (Kroll 2010). In Bruszczewo, the earliest tools for threshing and de-husking legumes were also identified (so-called Bruszczewo-type tools; cf. Osipowicz et al. 2024). Animals were likewise exploited in a variety of ways. Large herds of cattle and small ruminants were raised (each accounting for approximately 40% of the animal bones recorded at the settlement), along with pigs (about 20%) and horses (a few percent). Many wild animals were also exploited Including rare species such as beavers, wild cats, lynxes, and martens (Makowiecki 2015). The settlement's inhabitants produced a variety of artefacts from bone and antler (Kneisel 2010; Makowiecki 2015). Particularly remarkable is the abundance of objects made from organic materials, especially wood, including planks (shingles), wedges for splitting logs, and architectural elements crafted using sophisticated carpentry techniques (e.g. wooden "pegs" for joining different structural components), as well as fragments of wheel hubs that were mounted on the fixed axle of a vehicle (Kneisel, Kroll 2010).

It has been established that the fortified settlement at Bruszczewo was in use for a very long time. The earliest ^{14}C datings indicate that the main defensive structures (two palisades and a moat) were constructed no later than the turn of the 21st and 20th centuries BCE (Czebreszuk et al. 2015). Meanwhile, palynological data suggest that the settlement (probably of an open character) already existed in the 21st century BCE (Haas, Wahlmüller 2010, 66). Dendrochronological dating has established the construction period of the auxiliary fortifications in the eastern part of the site, and traces of the settlement's structures in that area. This evidence indicates that the settlement was expanded eastward between 1797 and 1779 BCE (Heußner, Ważny 2010). The destruction of the fortifications likely occurred during the 17th century BCE. However, a series of ^{14}C datings for settlement features on the hilltop indicate that occupation continued until the 16th century BCE (Czebreszuk et al. 2015).

This regular and intensive human activity led to significant environmental changes. In the immediate vicinity of the settlement (within a radius of 2–3 km), forested areas were drastically reduced (Haas, Wahlmüller 2010, 78), resulting in small, loosely scattered groves within the landscape (Haas, Wahlmüller 2010). Human activity, particularly intensive deforestation, crop cultivation, and the grazing of large herds of domestic animals, led to the destruction of the topsoil and accelerated erosion processes (Kroll, 2010, 270). Even more consequential were changes in the water composition of the lake adjacent to the settlement. The presence of algae, eggs of human and animal parasites, and spores of coprophilous fungi was also recorded at the site (Haas, Wahlmüller 2010, 78). As a result, it can be inferred with a high degree of probability that, at least during certain phases of the Early Bronze Age, the water in the lake was unsuitable for drinking and toxic to humans and animals alike.

Such a long-lasting, permanent (one might even say persistent) occupation of a single site is exceptional in the context of our knowledge of the European Early Bronze Age. Undoubtedly, it was the result of putting forward a multi-generational plan of economic, social, and likely political nature (Müller, Kneisel 2010). This plan may have been the work of well-organized and stable elites. The fact that Bruszczewo served as their place of residence is supported by the archaeological evidence outlined above. At the settlement, production was directed exclusively (gold-working) and primarily (the bronze workshop) toward the needs of these

elites. This is further supported by special finds, such as amber – discovered in a cultural layer dated to the 19th century BCE (Czebreszuk et al. 2010, 696) – and the exceptional find of a bronze razor (Czebreszuk 2021, 278), a sign of the practice of male personal hygiene, clearly reserved for the elite.

The above-mentioned evidence, indicating a complex (hierarchical) social structure among the inhabitants of Bruszczewo, is reinforced by data from the burial site at Łęki Małe. To date, this is the only so-called "princely" barrow burial place known in the UC (Kowiańska-Piaszykowa 2008). The site is located several kilometres north of Bruszczewo (Fig. 1). At least 14 barrows (recorded by archaeologists in the late 19th century) extended linearly along the edge of the Mogilnica River valley (Fig. 3). Five of them were excavated (Barrows I, II, III, IV, and VI). The largest, Barrow IV, measured 50 m in diameter and retained a height of 4 m (Kowiańska-Piaszykowa 2008).

All of the barrows featured a complex internal structure, consisting of wood (a "tent" made of solid oak beams), stone (an embankment tightly covering the wooden structure), and an outer earthen layer. They contained inhumation burials, placed in central tombs but also resulting from other ritual activities, and located in various stratigraphic positions within each barrow (Czebreszuk et al. 2024). Most of the burials mentioned (including those located outside the central tombs) were richly furnished with bronze objects (weapons, ornaments, and insignia of power, such as dagger-shaped sceptres), as well as gold and amber items, along with sets of high-quality ceramic vessels. Chronological studies, based on a long series of ^{14}C datings and stratigraphic data, indicate that the earliest barrow to be constructed was Barrow IV (the largest), around 2125 BCE (Czebreszuk et al. 2024). It is located at the south-eastern end of the barrow line, and the context, namely the absence of remains of other barrows to its south and east, indicates that the current topographic arrangement reflects the situation during the Bronze Age. The greatest damage occurred in the north-western part of the burial site, where the youngest barrows were most likely located. Of the excavated barrows, the latest to be constructed was Barrow III, dating to the period between 1900 and 1800 BCE (Czebreszuk et al. 2024). However, considering the observations presented above, this date cannot be regarded as a definitive endpoint for the use of the cemetery. Overall, burials at the necropolis took place over a period of at least 300 years.

The area served exclusively as a cemetery for deceased members of the elite (ruling class). At the same time, the considerable number of barrows arranged in a linear layout indicates the long-lasting tradition of this elite necropolis.

It is notable that the area of the Kościan Group of the UC forms a small enclave, which within the UC settlement ecumene was isolated from the nearest concentrations: Głogów and Wrocław, both located along the Oder River. Meanwhile, Kuyavia in the northeast hosted one of the most important cultural hubs of contemporary Europe (Czebreszuk 1996). The Kościan Group thus formed a spatial bridge between them. Its location along the route was probably decisive for the development of settlement and cultural structures within the Kościan Group of the UC, characterized primarily by stability on a scale of several centuries, evident at the (central) settlement and at the cemetery, where the remains of elite members were deposited (Czebreszuk 2013). This provides clear evidence for the existence of a stable ruling class there, likely of hereditary character, which organized a well-functioning community capable of constructing that spectacular site as the fortified settlement at Bruszczewo, and subsequently not only maintaining these fortifications in good condition but also improving them over several centuries.

The community at Bruszczewo can therefore be interpreted in terms of proto-state structures, featuring stable power institutions, an extensive network of supra-regional contacts, and diverse craft production (including elite-oriented goods) alongside a well-organized food economy (Müller, Kneisel 2010; Czebreszuk 2013). It lasted for at least 300 years, ending in the 17th century BCE (although traces of human activity were still there in the 16th century BCE). It should be emphasized, however, that this was not a local phenomenon limited to Wielkopolska. On the contrary, the community at Bruszczewo reveals a complex socio-political organization within the Únětice society, which in turn was part of a continent-wide exchange network. Bronze Age Europe was crisscrossed by long-distance contact routes (Kristiansen, Larsson 2005). This resulted in a spatial organization

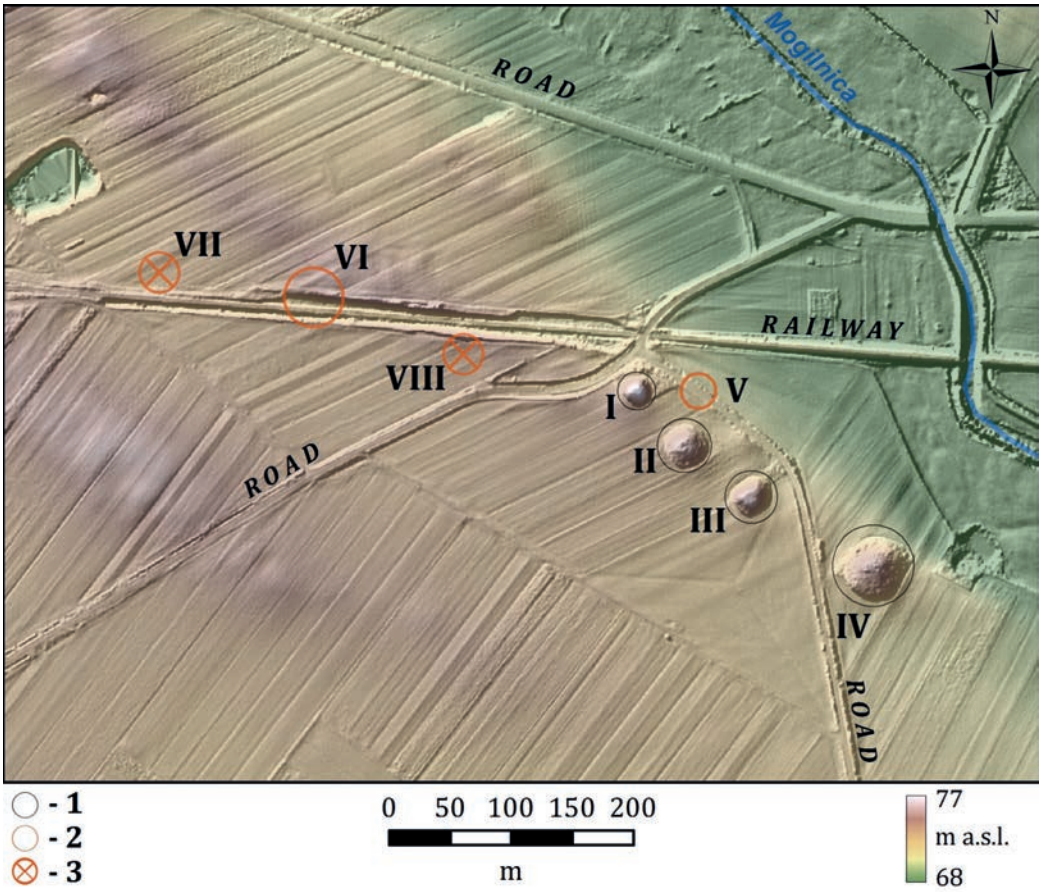


FIGURE 3. Plan of the "princely" barrow burial site at Łęki Małe (Wilanowo, Site 12). After Czebreszuk et al. 2024

of Bronze Age cultural structures that differed from the Neolithic. They were not only clustered (what traditional archaeology refers to as a culture or archaeological group) but also linear in character. This period marked the emergence of so-called "route-based" communities. Based on distribution maps of specific finds, it is possible to delineate in the territory of present-day Poland a corridor approximately 100 km wide, extending from the Moravian Gate northwards, through Lower Silesia, Wielkopolska, and Kuyavia, all the way to the mouth of the Vistula River (Fig. 4). It is defined by finds of amber, gold artefacts, and imported bronze objects originating from various distant regions of Europe, as well as spectacular features such as "princely" barrows and fortified settlements (Czebreszuk 2013).

This structure formed the northern (terminal) segment of a larger system, which can be referred to as the first "Amber Road" (Czebreszuk 2009). It ran from areas along the Gulf of Gdańsk, through Kuyavia, Wielkopolska, Silesia, and the Moravian Gate, across the Bohemian Basin and Moravia, and from there to the Middle Danube, reaching the Adriatic coast and continuing by sea to the western shores of the Peloponnese. Its course fluctuated during the 2nd millennium BCE, which became particularly evident after the collapse of the UC (the guarantor of long-term prosperity in Central Europe). In addition, a traditional coastal route (Fig. 4) also developed, linking the region along the lower Vistula through Pomerania and Mecklenburg with Jutland, and continuing along the North Sea coast to the British Isles and Atlantic Europe (Czebreszuk 2013; forthcoming).

In summary, the Kościan Group of the UC, located along the "Amber Road", functioned as an

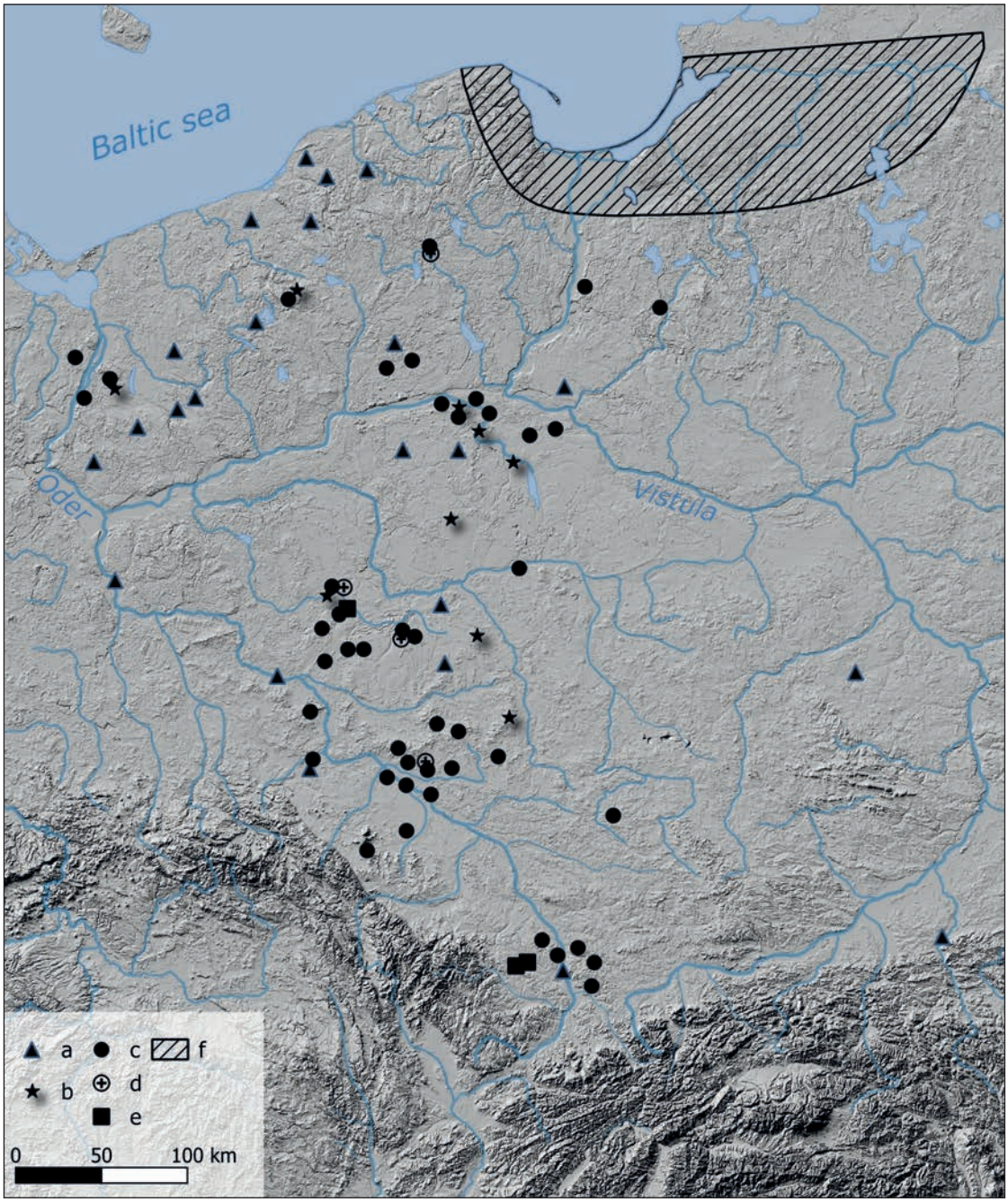


FIGURE 4. Dispersion of selected Early Bronze Age finds in the territory of present-day Poland. Their linear arrangement marks two routes converging at the mouth of the Vistula River. After Czebreszuk 2013

"Únětice gateway" from the northeast, toward the largest amber deposits known in contemporary Europe. Thanks to the highly developed route infrastructure, best exemplified by the proto-state Únětice community at Bruszczewo-Łęki Małe, amber spread westward (Czebreszuk forthcoming), particularly to the south. It was probably the same raw material that, in the form of diverse and extremely numerous artefacts, has been found in the earliest phases of Mycenaean Culture, particularly in the burials from both Shaft Grave Circles at Mycenae itself (Czebreszuk 2011).

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PONIEC AND GRANOWO

Mateusz Stróżyk

Bronze hoards represent the remains of social practices that formed an important component of the economic and ritual systems of Bronze Age societies (Earle, Kristiansen 2010). While some scholars interpret them as a form of wealth storage or even as primitive money, others are inclined to regard them primarily as votive deposits (Baudou 1960; Vandkilde 2005). From a spatial perspective, the phenomenon of metal hoard deposition assumed highly diverse forms across Europe. Likewise, the dynamics of these practices and the composition of the hoards display considerable variability, since alongside certain similarities between individual regions, a marked regional specificity is evident (Blitte 2021).

The text will focus on the area of present-day Central Poland – more specifically, on two cases from the localities of Poniec and Granowo. They belong to a distinct group of over-standard hoards (*Überausstattungen*) recorded in certain regions of Early Bronze Age Europe. Their characteristic feature is the presence of prestige objects: daggers and halberds (Hansen 2002).

Both analysed deposits were discovered in the late 19th century. Chronologically, the first was the hoard found around 1859 in the vicinity of the town of Poniec, during the construction of a drainage ditch in a marshy field (Erzepki 1893). It consisted of nearly 24 metal artefacts: a large flat axe, an ornamental disc, nine oval arm-rings, three daggers with hilts, two dagger blades, three arm-rings with spiral discs, two rings with spiral discs, and several dozen fragments of at least four cylindrical bracelets (Fig. 1).

Archival data indicate[1] that at least part of the hoard, mainly the ring-shaped ornaments, was discovered together with the base of a large clay vessel. The weapons, the axe, and the remarkable ornamental disc were most probably discovered together with the aforementioned artefacts or in their immediate vicinity; however, in the absence of unequivocal evidence, this can no longer be established with complete certainty. All metal objects were donated by Count Stanisław Mycielski to the collections of the Museum of the The Poznań Society for the Advancement of Arts and Sciences by around 1860. It remains unclear, however, whether this transfer was made on a single occasion or in several stages.

In the case of the Granowo hoard, it was discovered during ploughing in August 1885. The deposit was found on a small hill during agricultural work, buried relatively shallowly in the ground (Erzepki 1887). The objects had been placed within a compact area in an orderly arrangement, with the daggers laid in a row next to one another. Altogether, the hoard comprised 29 metal artefacts: two halberds, one halberd's blade, six daggers, two axes, six neck-rings with looped endings, five arm-rings, and seven bracelets (Fig. 2). The objects entered the collections of the Museum of the Poznań Society for the Advancement of Arts and Sciences in two stages. The first part was donated shortly after the discovery by the owner of the estate, Countess Cecylia Działyńska (a halberd, a halberd's blade, three daggers, and 13 ornaments). The other part entered the collection considerably later, around 1910, donated by the son of the estate leaseholder, Władysław Pluciński (a halberd, a dagger, an axe, and five ornaments).

The assemblage of metal objects from Poniec represents a highly heterogeneous and complex deposit of ornaments and weapons with a wide spatial distribution across Europe (Fig. 3). Alongside

[1] Source: MAP-A-folder 540 – Poniec.

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FIGURE 1. Composition of the bronze hoard from Poniec, from the collections of the Archaeological Museum in Poznań. Photo by P. Silska

relatively common and long-lasting forms, such as massive arm-rings with plain endings, there are also artefacts unique or extremely rare on a European scale. The first example is a large axe (weight 1,270 g) with slightly raised edges, which lacks close analogies and therefore possesses little chronological sensitivity (Szpunar 1987). The second example includes an ornamental disc made of so-called "white bronze". Artefacts of this type are spatially concentrated mainly within the territories of Poland and central and northern Germany, where they occur in hoards (Klein-Wesenberg, Marwedel, Tuchheim, Falkenwalde, Plauerhof, Phöben, Kumiałtowice, Hagen 1926; Gandert 1938; Hachmann 1957; Brunn 1959; Blajer 1990). On the basis of contextual material, the majority of known examples are generally dated to the Early Bronze Age (Hagen 1926; Gandert 1938; Hachmann 1957; Blajer 1990). It should be emphasised, however, that in many cases they are associated with forms that are not very distinctive and of limited chronological sensitivity. The massive hoard from the vessel at Falkenwalde is an altogether different story: in addition to metal artefacts typical of the Early Bronze Age, the assemblage also contained Malchiner-type daggers, generally dated to the transition between BrA2 and BrB1 (Gedl 1980; Wüstemann 1995; Terberger 2002; Weller 2020). Another chronological indicator of Poniec hoard is a Baltic-Cech type dagger, broadly dated to the BrA2 phase (Schwenzer 2004). Artefacts of this type occur mainly in Sweden, Denmark, northern and central Germany, Poland, and Bohemia (Weller 2020). A later dating for the Poniec assemblage is suggested by the presence of bracelets (probably of the Regelsbrunn type), which correspond to characteristic products of the Carpathian Basin dated to the BrA2/B1 phases (Rittershofer 1984). Furthermore, the hoard contained less diagnostic local variants of arm-rings with spiral discs, commonly dated to the BrB1–D period (Willvonseder 1937; Mozsolic 1967; Gedl 1975; Blajer 1999), as well as twisted wire ornaments ending with two spiral discs, directly comparable to examples from southern regions (Mozsolic 1967; Gedl 1975). Taking the above into account, the Poniec hoard should be placed within the transitional phase between BrA2 and BrB1.

Against the background of this diverse assemblage, the deposit from Granowo presents a considerably more coherent chronological and spatial structure (Fig. 4). The most diagnostic elements are the halberds and daggers. The types of halberds from Granowo are characterised either by a highly local distribution (the Wielkopolska type) or by a broader range (the Mecklenburg type), extending across southern Scandinavia, Germany, and Poland (Horn 2014). Their chronological range is generally assigned to the BrA1 phase and the beginning of BrA2 (Schuhmacher 2002; Horn 2014). The halberd's blade with its characteristic ornamentation, paralleled by artefacts



FIGURE 2. Composition of the bronze hoard from Granowo, from the collections of the Archaeological Museum in Poznań. After Czerniak 2008. Photo by M. Jórdeczka

from Brandenburg, Austria, and Czechia, also falls within the same chronological horizon (Bartík, Zachar 2017; Kaczmarek 2019). The daggers (Elbe-Wart, Oder-Elbe, South Pomeranian, and Baltic-Po types) may be dated to the BrA2 phase (Schwenzer 2004). Artefacts of these types are distributed across a vast area extending from northern Italy through Switzerland, Austria, Germany, and Czechia to Poland (Weller 2020). The remaining elements, namely the neck-rings, arm-rings, massive bracelets, and two axes, can be broadly dated to the Early Bronze Age. Consequently, the assemblage as a whole fits within the chronological framework of the BrA1 phase, with continuation into the beginning of BrA2.

The finds described above belong to the so-called mixed hoards, combining two categories of artefacts: weapons and ornaments. Deposits of this type represent a rare category within the archaeological record of Poland. For the periods BrA1–A2 and BrA2–B1 combined, hoards containing both weapons and ornaments account for only approximately 9% of all cases (Blajer 2001). Similarly, hoards discovered in vessels or other containers during this period are represented by only a small proportion, amounting to less than 10% (Blajer 2001; Michalak, Przechrzta 2020). The most numerous hoards of that time are single-category deposits, predominantly consisting of ring-shaped ornaments, in Poland (Blajer 2001) and in Central Europe alike (Kuijpers, Popa 2021). Importantly, in the case of hoards of rib-shaped (*Spangenbarren*) and so-called Ösenringe, the overwhelming majority of artefacts were manufactured from a consistent and standardised metal composition (Junk et al. 2001; Vandkilde 2005; Kuijpers, Popa 2021). This provided the basis for interpretations that such objects functioned as raw material ingots or even as a form of money (Vandkilde 2005; Kuijpers, Popa 2021). However, recent analyses suggest that this phenomenon may not have been limited solely to single-category hoards, but also extended to mixed deposits containing ring-shaped ornaments. In the case of the vessel hoard from Marcinowice, comprising ornaments and weapons, the ratio of copper to bronze artefacts

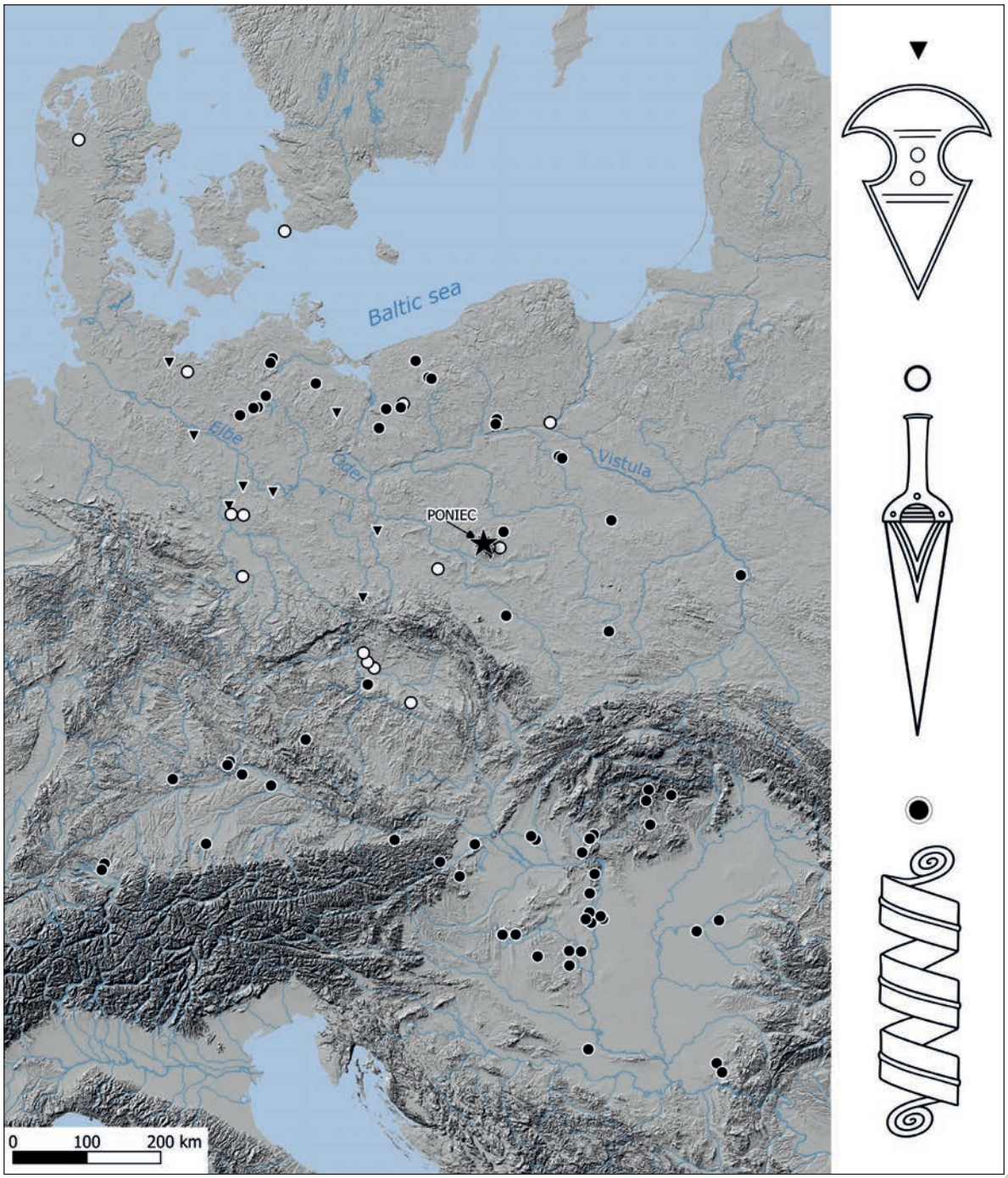


FIGURE 3. Distribution of chronologically diagnostic bronze finds related to the Poniec hoard in Central Europe

amounted to 90% and 10% respectively (Michalak, Przechrzta 2020). In this assemblage, the copper objects consisted primarily of Ösenringe with highly standardised alloy compositions. Another example is the hoard of ornaments and tools from Libochovany, where at least 30% of the artefacts (mainly small ornaments and axes) were made of copper, while 12% were manufactured from gold (Praumová et al. 2014; Chvojka et al. 2017). In this case, a high degree of compositional uniformity was also observed among the copper artefacts, despite the diversity of forms represented, ranging from axes

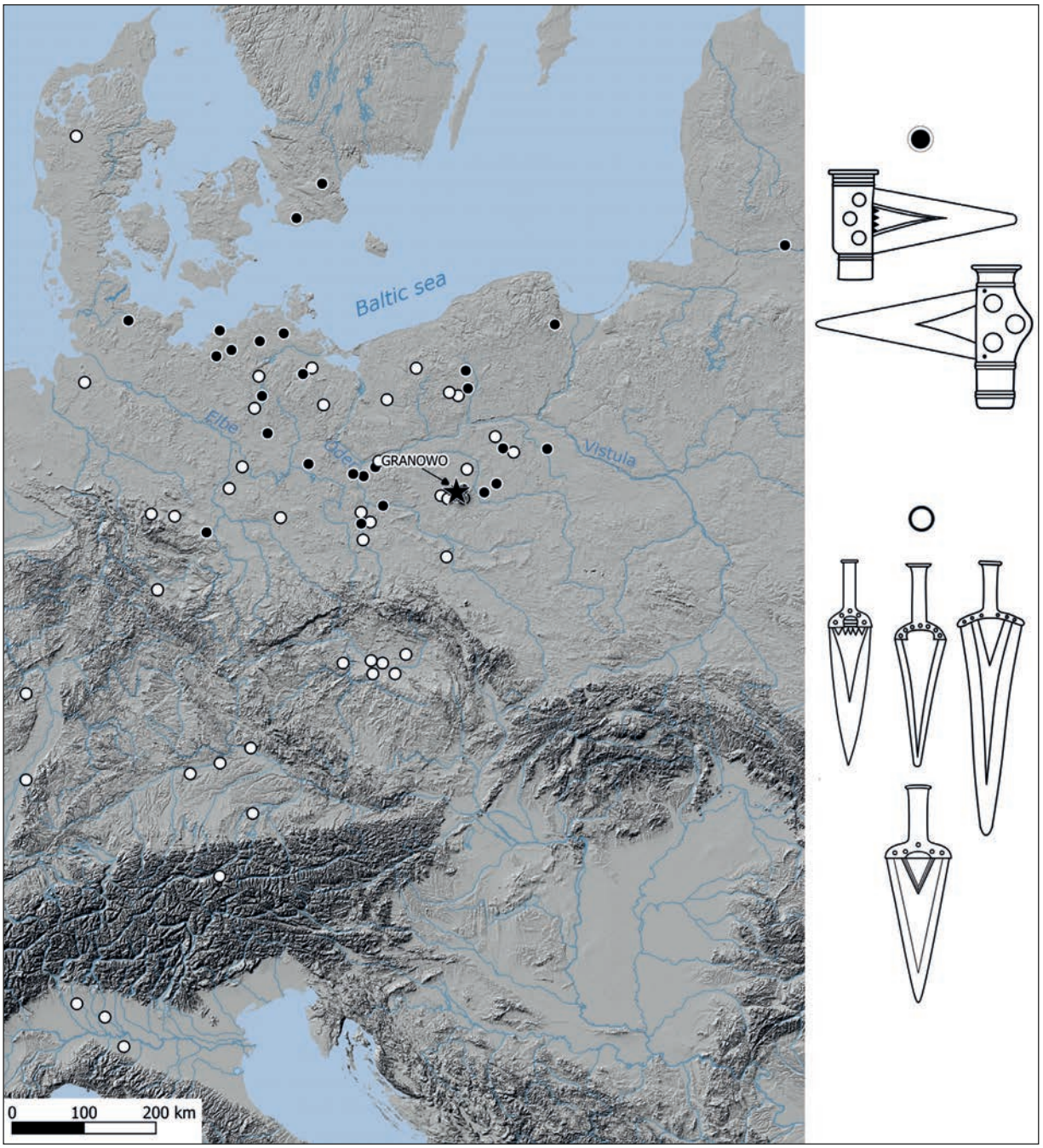


FIGURE 4. Distribution of chronologically diagnostic bronze finds related to the Granowo hoard in Central Europe

to rings (Chvojka et al. 2017). Although traditional interpretations have emphasised the role of ring-shaped ornaments as potential forms of "money", new data indicate that similar mechanisms may also have operated within deposits of more heterogeneous composition. Consequently, metallographic analyses expand our knowledge of the artefacts themselves; they also contribute to a better understanding of exchange mechanisms, the valuation of metal, and the functioning of hoards within Bronze Age societies.

In 2018, work commenced on the project entitled *The catalogue of the oldest metal objects from Wielkopolska*. The aim of the undertaking, carried

out by the Archaeological Museum in Poznań, was the preparation and publication of a catalogue (Szmyt, Silska, Stróżyk 2026) of metal artefacts dated from the Eneolithic to the Middle Bronze Age. In addition to the standard documentation of finds, one of the key elements of the research programme involved metallographic analyses, enabling the determination of the raw material composition and manufacturing technology of individual objects. Against this background, of special interest is the comparison of materials derived from the two cases discussed here (Szmyt, Silska, Stróżyk 2026). In the case of Poniec, a total of 21 artefacts were analysed, among which bronze objects prevail (50%), while copper artefacts also represent a significant proportion (36%); the remaining items were made of so-called white bronze (14%). The presence of a copper alloy with a high tin content, referred to as white bronze, is a relatively rare phenomenon in the context of hoards. At Poniec, this material occurs in the form of an ornamental disc. Comparable finds identified as white bronze (most probably on the basis of colour alone) have so far been recorded only exceptionally rarely (e.g. at Tuchheim, Kumiałtowice; cf. Brunn 1959; Blajer 1990). In this context, the recent discovery of the hoard from Komařice in the Czechia appears particularly significant. Of the 37 analysed artefacts, all were made from copper alloys with a high tin content ranging from 18% to 66% (Chvojka et al. 2017). The occurrence of white bronze at Poniec, although limited, points to the deliberate and probably prestigious use of a rare alloy which, in other regions, may have played a much greater technological and cultural role. This may indicate either an earlier stage of technological development or differing cultural traditions among the communities responsible for the deposition of the hoard. Nevertheless, the assemblage from Poniec does not display the typical characteristics of a raw-material hoard. The presence of finished artefacts together with the limited proportion of white bronze rather suggests a deposit of valuable, votive, or display-oriented character (Blitte 2021). Here, the rare alloy fulfilled a prestige function rather than serving as raw material. Furthermore, the broad distribution of Regelsbrunn-type bracelets, combined with the restricted and selective distribution of the discs and dagger, points to a more complex and multidirectional exchange network.

The material from Granowo, of which 20 artefacts were subjected to analysis, display a different structural composition. Copper objects predominate (60%), while bronzes represent 40% of the assemblage. In this case, the substantial proportion of copper artefacts might suggest the raw-material nature of the hoard. Nevertheless, the presence of finished objects argues more strongly for a deposit of valuable character, although not solely in an economic sense, but rather in a prestigious and votive dimension associated with the accumulation of goods of symbolic or social significance. The distribution of the types of artefacts that characterise this hoard points to local exchange and circulation networks extending primarily into the neighbouring regions to the west.

Both analysed hoards display a distinctly transitional character, combining features typical of two adjacent chronological phases. Their raw material composition and typological diversity indicate well-developed metallurgical practices, encompassing both the traditional use of well-known and widely employed copper and the application of more advanced alloys.

The Granowo hoard has a relatively homogeneous composition, suggesting an assemblage associated with a single cultural milieu and tradition. By contrast, the Poniec hoard exhibits greater heterogeneity, combining elements of both northern and southern traditions. It is possible that these differences are at least partly chronological in nature, while the Poniec deposit may additionally reflect processes of technological transmission between the Early and Middle Bronze Age.

The combination of artefacts of clearly prestigious character with objects associated with the safeguarding of raw material reserves suggests that the analysed deposits may simultaneously have fulfilled economic, symbolic, and representational functions. They thus reflect the complex social practices connected with the accumulation and deposition of metal in the Bronze Age.

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SZCZEPIDŁO, SITE 17

Przemysław Makarowicz

During the Bronze Age, copper-alloy artifacts are most frequently recovered from funerary contexts and hoards, appearing far less commonly within domestic settlements, where their presence is typically associated with everyday use. Of particular significance, however, are those rare settlements that yield evidence of metallurgical or casting workshops, characterized by indicators of the complete production cycle: finished goods and semi-finished products, manufacturing waste, crucibles, casting ladles, slag, and metalworking tools. A prominent example is the settlement at Szczepidło, Greater Poland region, representing a phenomenon of unparalleled importance in this part of Europe.

Spectacular relics from the Middle and Late Bronze Age were uncovered on an expansive dune situated within an alluvial terrace of the Warta River, specifically where the river course aligns along the line of latitude (Makarowicz, Garbacz-Klempka 2014; Makarowicz 2016). Geomorphologically, the site occupies a deflation basin positioned between two parabolic dunes. The settlement area encompassed roughly 3 hectares (Fig. 1). Chronological analysis, based on both the stylistic attributes of the ceramic assemblage and a comprehensive series of over 30 radiocarbon dates, indicates that the settlement was occupied intermittently for approximately 300 years (c. 1500–1200 BC). Research has delineated two primary phases of development, separated by a notable occupational hiatus spanning nearly a century (Makarowicz 2017). Cultural shifts within the material record – including components of the Trzciniec cultural circle, the dominant Tumulus Culture phase, and the early Lusatian Culture – appear to have transitioned gradually, suggesting continuity derived from the activity of successive generations of the same resident population (Makarowicz 2016; 2017).

The excavated area, covering 3,500 square metres, revealed at least a dozen distinct clusters of features (approximately 300 in total) and pottery concentrations (Fig. 2). These concentrations are interpreted as indicating the locations of discrete household units, comprising domestic dwellings and associated farmyards (Fig. 3). These units, in turn, formed larger functional areas of varying size and configuration (Makarowicz 2010; 2013; 2017). The material culture and absolute chronology suggest that the construction of all households was not strictly synchronous. Furthermore, geomagnetic surveys and surface artifact dispersion studies indicate that additional concentrations of features likely exist beyond the current limits of excavation. Consequently, during a single occupational phase, the settlement may have been inhabited by approximately a dozen family/residential groups, totaling between several dozen and one hundred individuals.

The hypothesis positing a permanent and sedentary nature for the settlement is strongly corroborated by the presence of substantial immovable features. The majority of these are identified as multi-level cellars or storage pits, characterized by trapezoidal or rectangular profiles (Fig. 4), providing evidence of long-term investment in infrastructure. Traces of intense human activity are ubiquitous across the site. Palaeobotanical and palaeozoological analyses confirm that the local economy was a mixed strategy based on animal husbandry and agriculture, with cereal cultivation being the predominant aspect. The inhabitants cultivated several key domesticates: common barley (*Hordeum vulgare*), broomcorn millet (*Panicum miliaceum*), common wheat (*Triticum aestivum*), emmer wheat (*Triticum dicoccon*), and unidentified wheat species (*Triticum sp.*). Domesticated animals

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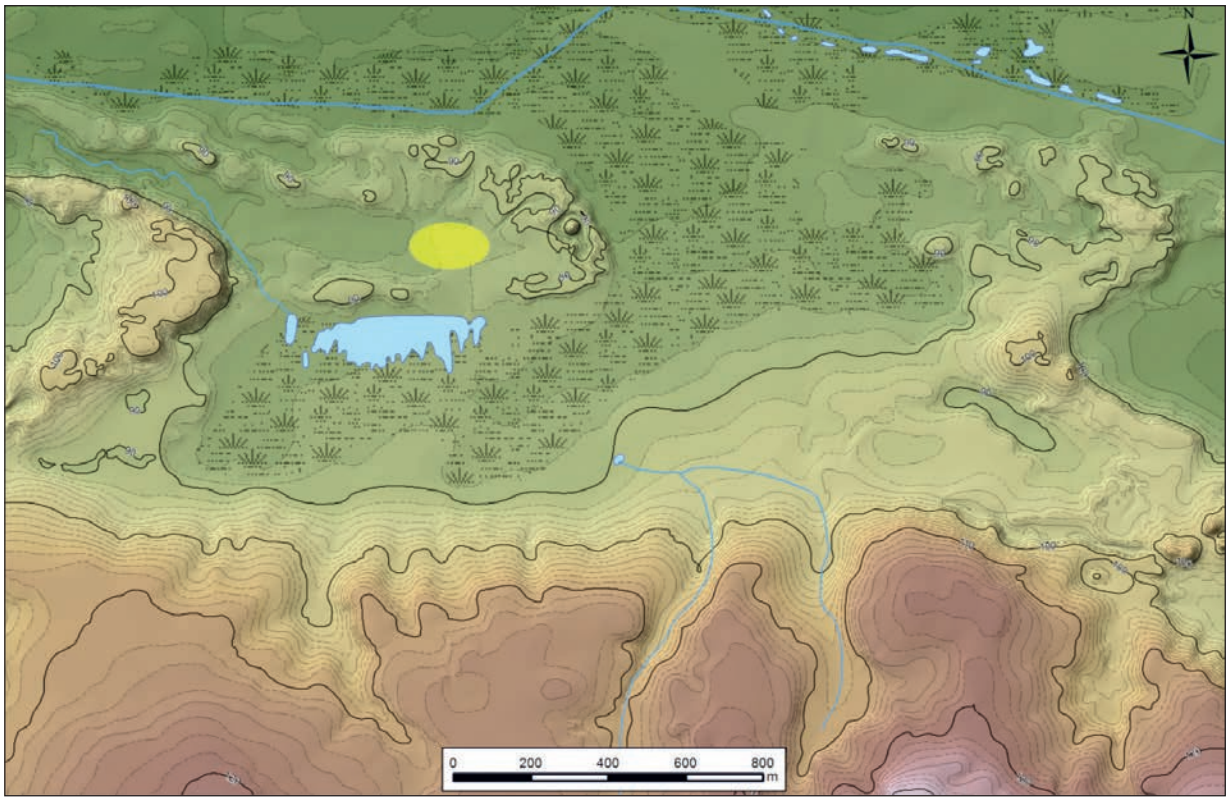


FIGURE 1. Position of the metallurgists' settlement in Szczepidło (ellipse) within a deflation basin of a parabolic dune

included cattle, pigs, sheep/goats, horses, and dogs (Makarowicz 2016; 2017).

The principal production zone of the settlement was located on a modest hillock situated at the geographic centre of the archaeologically investigated area, likely representing the original nucleus of the occupation. A bronze casting workshop discovered here is currently unparalleled anywhere in Central Europe. This production area yielded the largest and densest concentration of ceramic fragments, bronze items, lithic materials (stone and flint), metallurgical cinder, and scarce fragments of structural daub (Fig. 3 and Fig. 3:5).

The central feature was a semi-subterranean building identified as the casting workshop. A notable absence of post-holes complicates the definitive determination of the structure type and its original construction technique. The workshop structure possesses the shape of an irregular polygon, aligned along a NW–SE axis, measuring 13.2 m in length, 10.3 m in width, and reaching a maximum depth of 1.04 m (Fig. 2 – the largest feature in the center). Traces of combustion – including burnt organic matter, powdered charcoal, and fragments of burnt ceramics – were recorded at various stratigraphic levels. This evidence, alongside a significant assemblage of damaged bronze items, casting waste, sprues, cinder, fragments of hand-held ladles and crucibles, lumps of raw metal, stone chasing tools, and heat-altered stone, points indisputably to the intensive and long-term production of high-tin and tin-lead bronze. The lost-wax casting method was employed alongside the use of clay moulds (Makarowicz 2017; Fig. 4). The scale and nature of the finds indicate that the workshop was a permanent installation. It is hypothesized that the structure may have had an open or semi-open construction (e.g. low walls) designed to facilitate the safe dispersal of noxious fumes and gases generated during smelting and casting. The fill contained several hundred fragmented vessels (see Fig. 2).

A smaller, secondary cluster of features associated with metalworking was identified in the southern portion of the excavated area, distinct from the central workshop (Fig. 4: 6–9). The dark

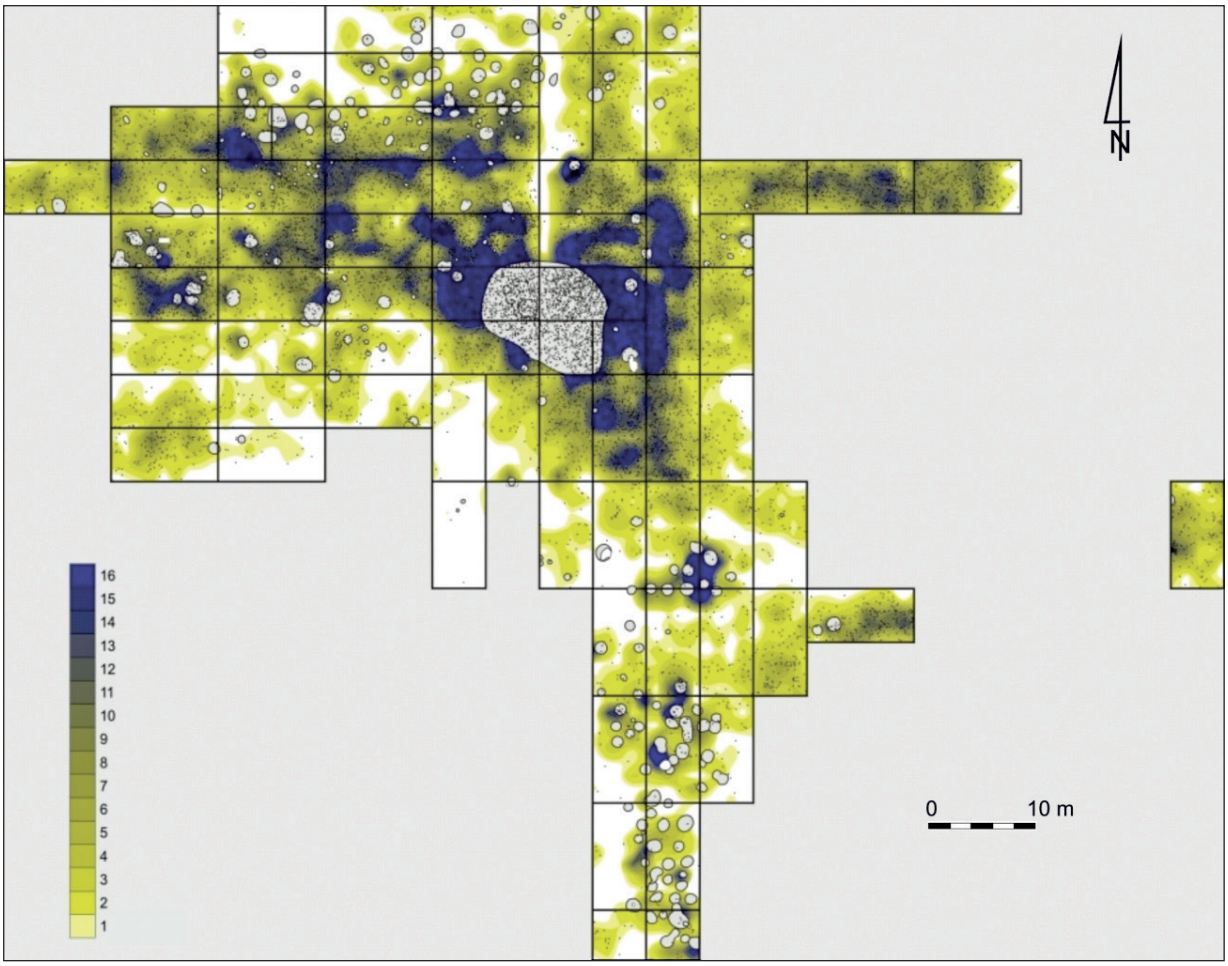


FIGURE 2. Szczepidło. Distribution of features and pottery within the excavation grid. Casting workshop in the central part. Scale illustrates the density of pottery fragments per m^2

colouration of their fill (dark brown or black), coupled with traces of charcoal and burning, suggests these ancillary areas were utilized for elements of the metal production process (Fig. 5). A small number of cinder lumps were recovered just beneath the topsoil horizon. Numerous metal lumps, fragmented metal items, and slag were retrieved from the area between the primary metallurgy workshop and this secondary cluster, primarily within the topsoil layer. However, their spatial allocation in the topsoil layer is a result of frequent displacement of surface levels through post-depositional processes (secondary distribution) (Makarowicz 2017, Fig. 4).

The bronze objects were subjected to detailed macroscopic examination and chemical analysis (X-ray fluorescence – XRF). Selected samples were additionally scanned using an electron microscope and energy-dispersive spectrometer (SEM-EDS) to determine their precise composition and microstructure. In all analyzed cases, copper was the dominant elemental component, with tin serving as the main intentional alloying agent. The smiths of Szczepidło primarily utilized copper sulfide ores. Lead was consistently present as a secondary, intentionally added ingredient (Garbacz, Makarowicz, Tokarski 2017). The metal assemblage is notably composed mostly of defective items – either mechanically damaged or miscast (e.g. misruns) – strongly suggesting they represented raw material intended for re-melting (Fig. 6). The typology includes arrowheads exhibiting clear casting defects or use-wear damage, e.g. broken rods and pins (Fig. 7). All artifacts were initially produced in casting moulds, and some underwent subsequent cold-working. The most heavily damaged pieces

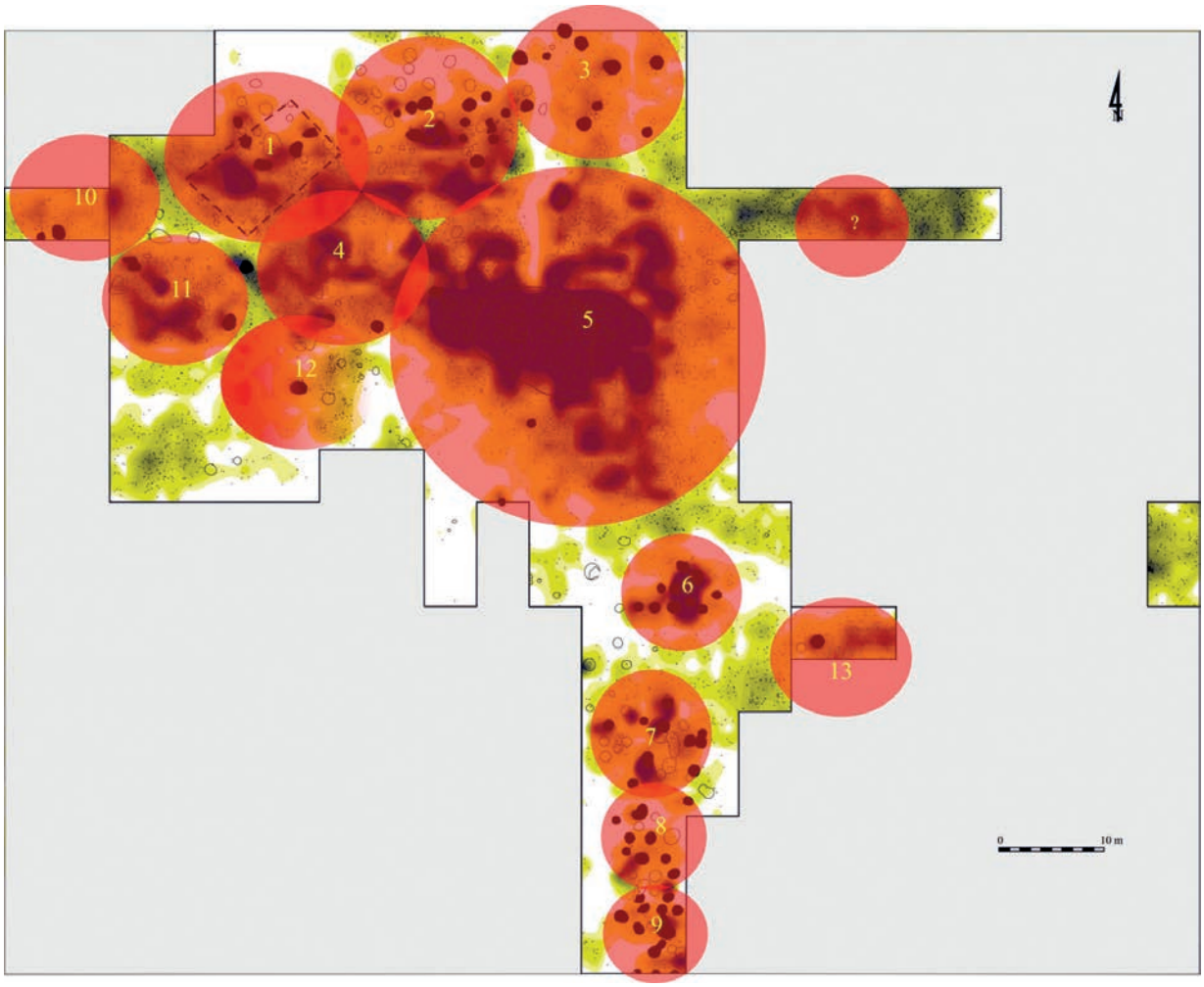


FIGURE 3. Approximate extent of homesteads (houses with courtyards) in Szczepidło (1–13). 5 – casting workshop area. 6–9 – area of features related to metallurgical production

retained remnants of decoration applied during the casting process, as well as traces of post-casting surface finishing.

Further robust corroboration for the hypothesis of localized production is provided by the presence of fragmented sprue structures. Specifically, funnel-shaped sprues with a clearly visible area of solidification, characteristic of metal cooling within an open mould form, were identified (Fig. 7:4).

A selection of crucibles was analyzed using a variety of advanced techniques, including optical, confocal, and scanning microscopy, defectoscopy, and X-ray spectroscopy at both macro- and micro-scales (XRF and SEM-EDS). The results conclusively confirm that the ceramic matrix of these vessels had direct contact with molten metal. This interaction resulted in metal particles penetrating the pores of the crucible walls; these walls were effectively "saturated with metal", exhibiting a higher-than-usual concentration of metallic elements (Garbacz-Klempka 2016; Makarowicz 2017). In specific instances, droplets of the alloy solidified *in situ* within the pores due to diffusion (Garbacz, Makarowicz, Tokarski 2017, Fig. 2).

The analyzed ceramic material was thus directly implicated in the melting and casting processes performed in the bronze-producing workshop (Fig. 8:4). The crucibles themselves were locally manufactured from clay heavily tempered with a significant amount of sand. This additive served to drain moisture, facilitate heat exchange, and enhance the fire-resistance properties of the vessels. Trace element analysis of the crucible walls



FIGURE 4. The Szczepidło site during fieldwork (top). Settlement features: storage pits (cellars), refuse pits, features related to metallurgy (bottom)

revealed minute amounts of copper and tin (the higher proportion of tin deposition is likely related to its density). Crucially, the chemical composition of the alloy droplets solidified on the crucibles closely matches the composition of the finished bronze items recovered from the site.

Two of the numerous stone chasing tools recovered deserve specific mention. Both function as small hammer/anvils. The first, made of sandstone, retains a largely natural shape, presenting a single work area on a quadrilateral plan and rectangular profile (Fig. 8:1). The second specimen, crafted from



FIGURE 5. Szczepidło. One of the features associated with metallurgy (furnace relic?), containing bronze scrap, slag, burnt stones, and burnt ceramics, including crucible fragments

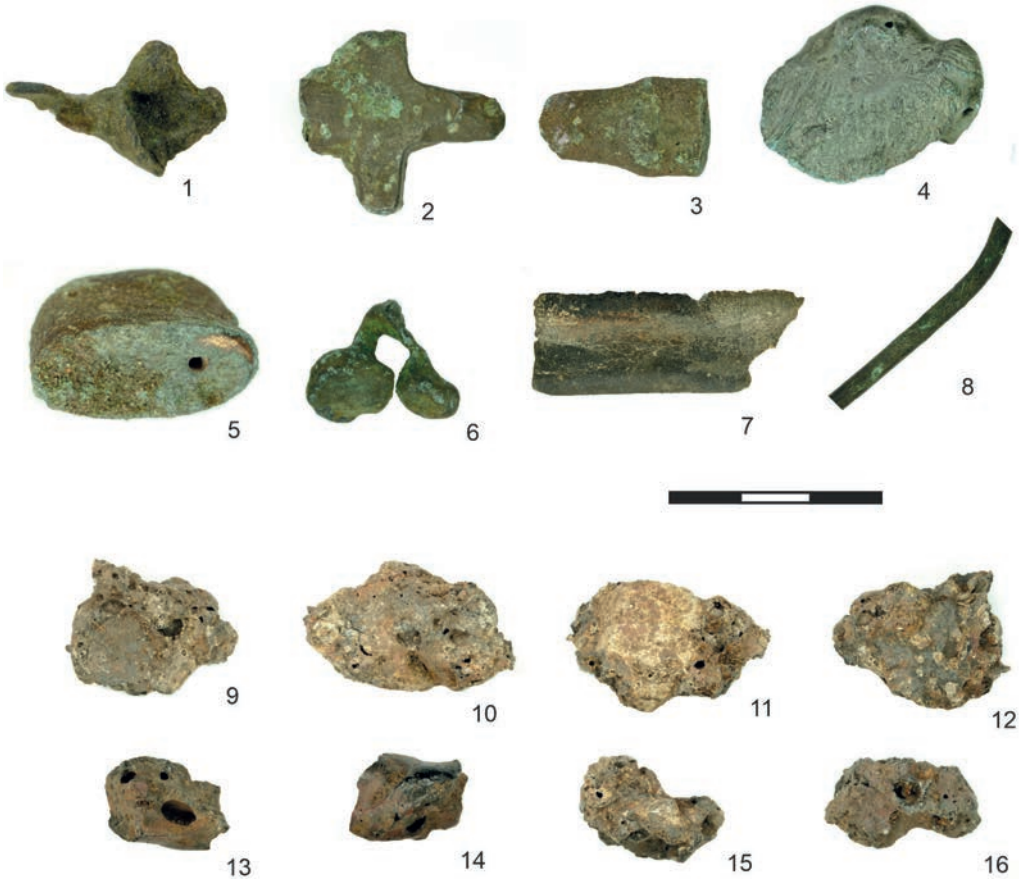


FIGURE 6. Szczepidło. 1–8 – preforms, bronze scrap, and casting sprues, 9–16 – bronze slag



FIGURE 7. Szczepidło. Finished but improperly cast bronze artifacts. 1–6 – arrowheads, 7–9 – pins for fastening garments

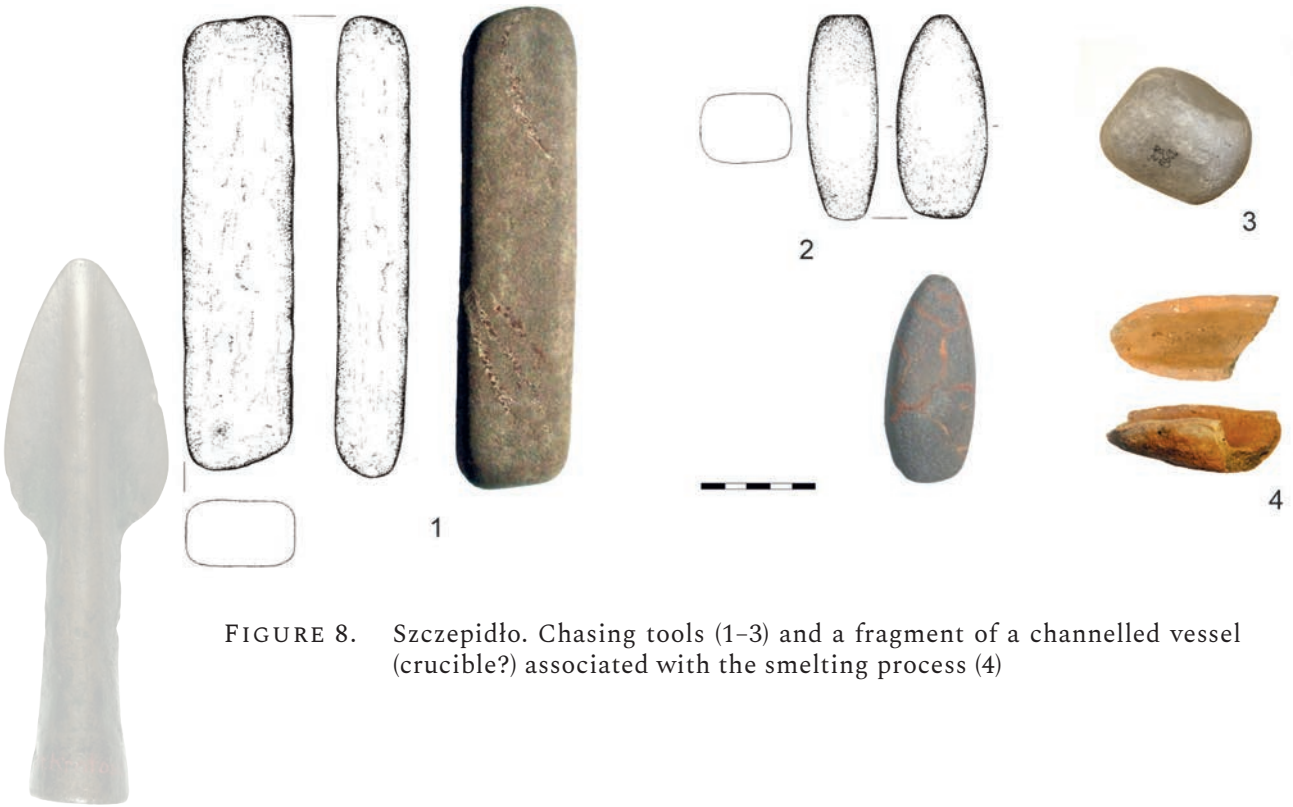


FIGURE 8. Szczepidło. Chasing tools (1–3) and a fragment of a channelled vessel (crucible?) associated with the smelting process (4)

diabase, underwent preliminary processing; its sides were polished to form a trapezoidal shape strongly resembling a half-finished axe (Fig. 8:2).

The totality of the analyzed material – comprising raw materials, crucible fragments, bronze scrap (including sprue structures), finished products in various states of preservation, specialized chasing tools, and metallurgical slag – indisputably indicates the discovery of an advanced casting workshop dating to the 2nd millennium BC (specifically c. 1330–1230 BC), a find that is considered unique in Central Europe (Harding 2000, 232f.; Pare 2000; Kuijpers 2008; Kienlin 2013; Garbacz-Klempka 2016). The co-occurrence of all these metallurgical workshop elements confirms that a complete production sequence was carried out onsite. While the precise size of the workshop or the total volume of output cannot be determined due to the state of preservation and the absence of a defined hearth or furnace structure, it is evident that production focused on small, high-precision objects, such as ornaments and arrowheads.

The objects were cast primarily from high-tin bronze, and rarely high-lead bronze, though the composition of some semi-finished products is highly atypical. No pure raw materials (copper or tin) have been found onsite. The single exception is lead, which may have a local origin (e.g. Silesia or the Kraków region), sourced from early exploited zinc/lead deposits containing a silver admixture (Garbacz-Klempka 2016). The high percentages of lead observed in some objects suggest intentional modification of the alloy composition within the local workshop to alter the technological properties of the final products.

The discovery of fragments of sprue structures snapped off from finished products – specifically the funnel-shaped main sprues formed in the mould runner – directly corroborates both onsite production and the specific composition of the locally produced casts. In the absence of stone moulds, the use of clay moulds is considered highly credible. This hypothesis is supported by the high quality of the finished products, which lack the characteristic seam lines typically formed when split stone moulds are utilized (although such seams could theoretically have been removed during finishing processes).

Finished products consistently exhibit traces of various post-casting techniques. The casts show evidence of hammering, grinding, and polishing, applied using various chasing tools to complete the technological process. These finishing stages served to remove defects and enhance the aesthetic and decorative quality of the object. The discovery of the Szczepidło workshop is of crucial importance for understanding the development of metallurgy within the Tumulus Culture communities of the Vistula and Odra river basins, providing essential data regarding Bronze Age bronze production technology (Garbacz-Klempka 2016; Makarowicz 2016; 2017). Furthermore, the source materials obtained from this stable and durable settlement effectively document the characteristic trajectory of taxonomic and cultural changes during the Middle and Late Bronze Age in this specific region of Poland.

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MASZKOWICE, ZYNDRAM'S HILL

Marcin S. Przybyła

The hillfort on Zyndram's Hill is a multi-phase site located in the Western Carpathians, within a widening of the Dunajec River valley known as the Łącko Basin. Two exceptional features distinguish this site from other prehistoric settlements in Poland: the presence of a well-preserved stratigraphic sequence, reaching a thickness of 1.5–2 m in some areas, and the remains of stone fortifications constructed during the earliest phase of occupation, in the 18th century BCE. It is also one of the few sites in Poland where substantial assemblages of artefacts associated with the Otomani-Füzesabony cultural complex (OFCC) have been discovered.

The settlement on Zyndram's Hill occupies the summit of a promontory rising approximately 50 m above the Dunajec River valley, where the river separates three mountain massifs: the Beskid Wyspowy, Beskid Sądecki, and the Gorce which reach elevations of around 1100–1200 m a.s.l. (Fig. 1). The site was studied between 1959 and 1975 (with interruptions), and again from 2010 to the present. Approximately 50% of its area has been exposed during archaeological excavations. Earlier excavations (1959–1975) focused on the central part of the promontory, where the cultural deposits are relatively thin and materials from the later phases of occupation, primarily the Early Iron Age, prevail in the assemblage. In contrast, the thick stratigraphic sequences along the eastern and northern edges of the summit plateau of the promontory (investigated mainly between 2010 and 2020) have resulted in the identification of eight construction phases at the site. Five of these phases (IV–VIII) date to the Early Iron Age and are preceded by a prolonged settlement hiatus. As this chapter concerns the beginnings of the Bronze Age, they will not be discussed here in detail (Fig. 2). By contrast, the first three phases date to the transition between the Early and Middle Bronze Age. Their chronology has been established with high precision through the integration of stratigraphic observations and an extensive series of radiocarbon determinations. The resulting chronological model was subsequently tested against the results of typochronological analysis. The outcomes of research conducted in the northern and eastern parts of the site were comprehensively published in a monograph issued in 2024.

The stone fortifications of the settlement at Maszkowice were first discovered in 2015, and subsequent fieldwork projects focused on their investigation in the following years. As a result, a 63-m-long section of the defensive structure has been uncovered (Fig. 3). On the basis of geophysical surveys, it can be assumed that their total length originally reached approximately 200 m, enclosing the settlement from the north and east. From the south and west, the slopes of the promontory are very steep; moreover, they may have been further steepened through stone extraction, thereby enhancing their natural defensive qualities.

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The circuit wall was constructed without mortar from locally available sandstone. The structure

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FIGURE 1. The landscape of the Łącko Basin with the location of the archaeological site. Photo by M.S. Przybyła

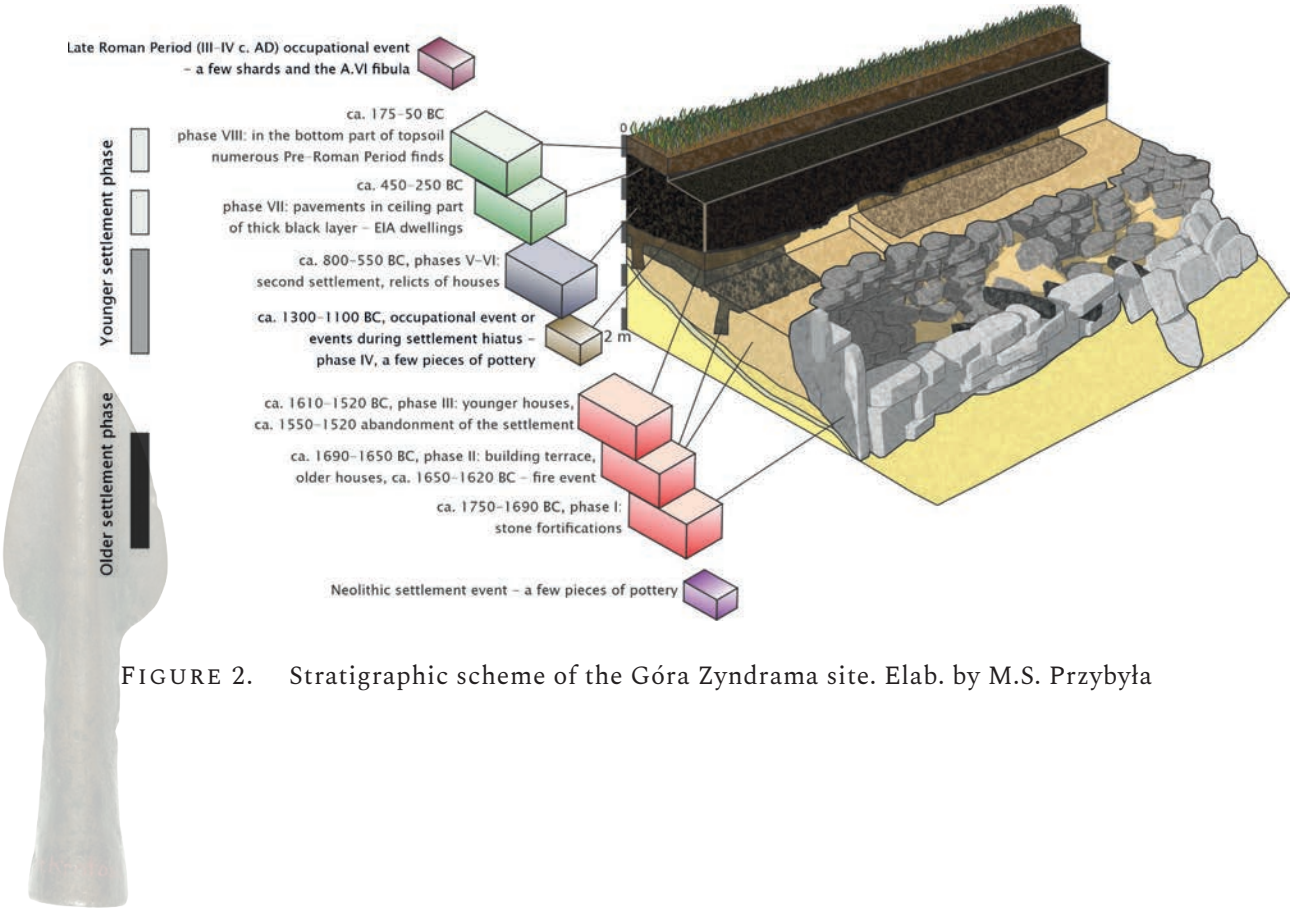


FIGURE 2. Stratigraphic scheme of the Góra Zyndrama site. Elab. by M.S. Przybyła

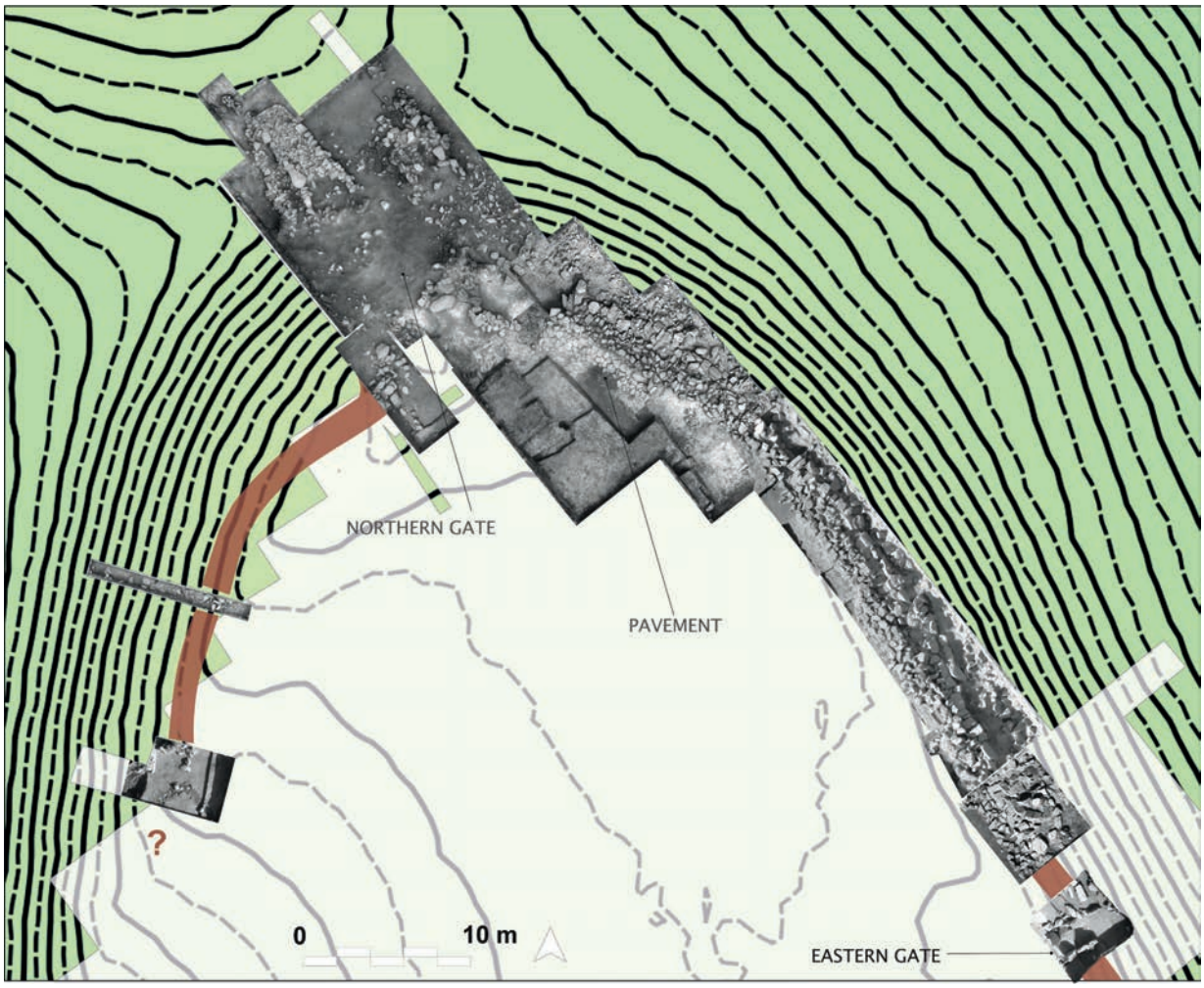


FIGURE 3. Photogrammetric record of the fortification remains uncovered between 2015 and 2018. Elab. by M.S. Przybyła

measured approximately 2 m in thickness at the base, and (bearing in mind the extent of the rubble in the areas of debris that have been fully investigated) its original height may be estimated at around 3 m. In several sections of the preserved remains, three to four lower courses of stones have survived, reaching up to 1 m in height. In most areas, however, only two courses remain in situ. While the core of the wall appears to have been built of irregular material of varying size, both the inner and outer faces were constructed from carefully selected, regular sandstone blocks (Fig. 4). Special attention is drawn to the outer face of the wall, which (probably only in its lower courses) was constructed from large blocks (approximately 1 m in length), usually weighing 200–300 kg and in some cases exceeding 500 kg. A serious structural weakness, which led to the partial collapse of the fortification already around 100 years following its construction, was the foundation on unstable loess subsoil. Excavations revealed several different solutions intended to stabilize the structure, including concentrations of cobbles placed beneath the heaviest stones and long slabs bonding the outer and inner faces of the wall. However, a tendency was also observed to employ the largest stone blocks in ways that emphasized their size, even at the expense of the structure's stability. This suggests that monumental aesthetics represented one of the guiding principles underlying the structure.

A sense of grandeur is also evident in the main entrance to the settlement (the northern gate). It was located on a natural saddle connecting the prominent tip of the promontory with its base and



FIGURE 4. Stone wall during excavation in 2018. Photo by M.S. Przybyła

consisted of two massive walls (over 3 m thick) running parallel to each other and perpendicular to the perimeter wall. Within the fortifications, a carefully constructed pathway of selected thin sandstone slabs led to the gate. The entire complex, occupied an area of several ares. It was largely dismantled already during the Iron Age, when the remains of the gate were probably used to construct the facing of a timber–earth–stone rampart. Later, its destruction was completed through early modern stone extraction for construction purposes, particularly intensive in this part of the site. The side (eastern) gate, located about 50 m from the northern gate, has survived in a much better condition. It takes the form of a narrow (1.6 m) passage through the wall, extended inward into the settlement with the help of a low transverse wall, and decorated with six stone slabs arranged antithetically.

The basis for chronological determination of the Maszkowice fortifications lies in their earliest position within the stratigraphic sequence and their relationships with later layers, documented at several points. In the second phase of the Early Bronze Age settlement, the wall began to function as a retaining structure for an extensive construction terrace, and certain architectural elements (the eastern gate and the pathway at the northern gate) were then buried beneath a thick layer of clay. Buildings dating to the 17th century BCE were raised on this layer. Within the eastern gate, occupational layers from the period of its use have been preserved, providing radiocarbon dates (3410 ± 40, 3447 ± 32, 3370 ± 35 BP), which indicate a time range between the 19th and 17th centuries BCE. Considering numerous detailed observations, the most probable construction date for this structure can be placed in the second half of the 18th century BCE.

Apart from the stone fortifications, the only traces of buildings from the earliest phase of the Early Bronze Age settlement (c. 1725–1690 BCE) are fragments of daub redeposited of the eastern gate as well as within the clay terrace. Houses from this

period must have been completely destroyed during the levelling of the terrain at the beginning of the second construction phase (c. 1690–1610 BCE). Buildings from this latter phase, as well as from the subsequent third phase (c. 1610–1500 BCE), consisted of a single row of houses located along the fortifications, with a large open space left in the centre of the plateau. Following excavations in the north-eastern sector of the site, seven temporally distinct packages of contexts have been identified, representing the destruction of houses. Due to later disturbances, all of these were preserved only fragmentarily. Only in the trench excavated from 2021 onward, in the southern part of the site, were the plans of three additional houses documented, including one complete structure. The buildings had a rectangular plan, ranging from 35 to 55 m^2, and were built using wattle-and-daub techniques. Individual fragments of daub preserve decorative elements and probably originate from door frames or hearths.

The majority of the artefacts associated with the Early Bronze Age settlement derive from the building deposits. In the fully analyzed north-eastern sector of the site, this assemblage comprises nearly 4,000 animal bones, over 10,000 ceramic shards, and several hundred artefacts made from other raw materials. Planigraphic analysis demonstrated that both post-consumption animal remains and various functional categories of artefacts exhibit a tendency to cluster. These patterns are evident not only in the remains of individual buildings (e.g. concentrations of bones and kitchen ceramics) but also in the material found between them. This applies, among other things, to remains of metalworking, antler pre-forms, and artefacts associated with textile production and leatherworking. These observations may indicate the presence of craft specialization. All buildings from the second phase also show clear evidence of destruction by fire, which can be dated to the second half of the 17th century BCE. It is possible that this episode is connected with the collection of flint arrowheads found along the fortification line. This is suggested by observations made during recent excavation seasons, including an arrowhead discovered within the burnt remains of a house wall and another arrowhead that was partially fire-damaged.

Stylistically, the entire ceramic assemblage from the settlement on Góra Zyndrama represents the Otomani-Füzesabony Cultural Complex (OFCC). A certain correlation can be observed between the construction phases (as defined stratigraphically) and changes in decorative patterns. In the earliest contexts (such as the eastern gate), vessels from the beginning of the older classical phase of the OFCC are present, and some even display stylistic features documented in its pre-classical phase. In the remains of buildings from the second phase, ceramics of the older classical phase dominate, with a minority of vessels from the younger classical phase. Finally, in the third phase, ceramics of the younger classical phase prevail, alongside vessels exhibiting stylistic features of the post-classical/late phase of the OFCC in varying proportions.

The establishment of the settlement on Zyndram's Hill is a case that can plausibly be explained by colonization. Although no biological material (burials) has been preserved, several sets of observations support this interpretation. Firstly, surveys and palynological analysis indicate that the entire Łącko Basin was uninhabited during the period preceding the foundation of the settlement. At the site itself, apart from evidence from the Early Neolithic, no traces of settlement activity have been detected prior to the construction of the stone fortifications. The fortress on Zyndram's Hill also functioned as an isolated settlement point during the Early Bronze Age, in contrast to the neighbouring Nowy Sącz Basin, where more numerous remains of settlements associated with epi-corded cultural circle (Merzanowice Culture) are known. Secondly, the entire assemblage of artefacts is stylistically linked to south-eastern Europe. In the ceramics, there is no evidence of cultural hybridization with the local epi-corded settlement tradition, while the small-anthropomorphic figurines find their closest parallels in the Balkans. Moreover, the ceramic style produced by the residents of Zyndram's Hill evolved over the 200 years of the settlement's existence in accordance with trends observed at the OFCC sites along the Upper Tisza. Thirdly, the migration of a human group from the south provides the only plausible explanation for the presence, among the charred botanical remains at the site, of grass grains of the genus *Aegilops* (which may have grown locally as ephemeral plants) and the beetle *Aptinus bombarda*. These organisms occur naturally in southern Europe. Fourthly, and finally, the exceptional and ephemeral phenomenon of stone defensive architecture in this part of Europe has

close analogies in a series of early stone fortifications along the Adriatic coast. These examples have identical or only slightly earlier dates than the Maszkowice settlement and are collectively classified as proto-cyclopean architecture. The similarities concern the masonry technique, the scale of the structures and the building material used, the layout of the gates, as well as details like the presence of transverse walls projecting from the perimeter wall or the use of orthostats.

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GÓRZYCA, SITE 20

Krzysztof Socha

The bi-ritual cemetery at Górzyca (Słubice County, Lubusz Voivodeship) is the largest archaeologically investigated necropolis to date associated with the Silesia-Wielkopolska Group of the Tumulus Culture featuring flat graves (i.e. without barrows). By 2010, a total of 37 graves had been examined, including 35 inhumation burials and two cremations in pits (Socha, Sójkowska-Socha 2014; 2017; Kaczmarek, Sobucki 2019).[1] The cemetery was discovered in 2008 during rescue excavations conducted ahead of a construction project and was investigated until 2010. In 2021, archaeological research was resumed in connection with planned further development. From the outset, excavations have been directed continuously by Krzysztof Socha and Julianna Sójkowska-Socha of the Fortress Kostrzyn Museum. The research has been financed by private investors, the municipal authorities of Górzyca, the Kostrzyn museum, and the researchers themselves.

Site 20 at Górzyca (AZP 50–06/17) is of a multi-period nature. Evidence has been recorded for settlements and cemeteries associated with twelve cultural and chronological horizons, ranging from the Stone Age, through the Tumulus Culture and the Lusatian Culture of the Bronze Age and Early Iron Age, the Roman Period, the Middle Ages, and up to the modern era (Socha, Sójkowska-Socha 2014).

From a physical-geographical perspective, the site lies within the Lubusz Oder Gap, a mesoregion located in western Poland and eastern Germany, forming the westernmost part of the Lubusz (Brandenburg–Lubusz) Lakeland (Macias, Bródka, Kubacka 2021, 173). The site occupies a small elevation with a slight western exposure (3–4 m), rising to approx. 21 m above sea level and situated approximately 0.8 km from the river.

The Górzyca cemetery is located on the lowest flood terrace of the Oder River, at the point where the river valley reaches its narrowest point, almost directly adjacent – on the eastern side – to the edge of the morainic upland. The necropolis was established on sandy-gravel deposits formed through fluvial activity of the Oder. In addition, the surface is characterised by a substantial accumulation of pebbles and boulders, predominantly crystalline rocks and flints. These geological and geo-morphological conditions may have facilitated the settlement of the Tumulus Culture population at this point. The narrowing of the valley would have enabled relatively easy crossing of the river, while the abundance of stones provided building material for grave constructions with stone settings and pavements. The numerous flints, most likely of Baltic origin, represented an excellent local raw material for the production of tools and projectile points. Meanwhile, the brown glacial clays of the Vistulian glaciation present on the upland surface may have served as a resource for ceramic production (Radaszewski, Skolasińska 2017, 34, 35).

Until recently, only a few cemeteries and isolated graves attributed to the Tumulus Culture population had been known from the Middle Oder region. These were concentrated primarily in the southern part of this area, while from its northern sector only a single cemetery at Lipki Wielkie had been recorded (Staniewicz 2008). The newly discovered bi-ritual cemetery at Górzyca therefore significantly increases the number of known

[1] A detailed study of the results of archaeological research, along with numerous specialised analyses, was published in a monograph of the burial site released in 2017 in Kostrzyn nad Odrą titled *Górzyca. Biritual burial ground of the burial mound culture along the middle Odra River. Interdisciplinary studies*, edited by Krzysztof Socha and Julianna Sójkowska-Socha.

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necropolises associated with this cultural unit in the region.

Burial practices observed at the site display considerable variability. Quite possibly, some graves with stone pavements were originally covered by earthen mounds. However, no direct evidence of such structures was identified during excavation. Only the planigraphic arrangement of the burial features and the absence of other features in their immediate vicinity may suggest that this space was once occupied by a mound. In the absence of conclusive evidence, it was only flat graves that were identified in the field (Sójkowska-Socha, Socha 2017, 311).

In addition to graves with stone pavements, burials featuring supplementary wooden elements were also recorded (Graves 4, 9, 12, 14, 15, and 23). This is indicated by documented postholes, which probably supported a structure, possibly forming a roof over the grave or reinforcing its walls. Particularly noteworthy is Grave 23. Within its rectangular grave pit, traces of posts were recorded in the rounded corners. Between them, two narrow elongated features with a basin-shaped cross-section were identified, possibly indicating the presence of beams. It cannot be excluded that a ground structure resembling a so-called "house of the dead" was erected above the grave (cf. for example Gedl 1975, 91; Lasak 2001, 300; Staniewicz 2008, 13–14; Makarowicz 2010, 233–239).

Among the recorded features, inhumation burials predominate. These were typically enclosed within stone settings and covered with stone pavements consisting of up to three layers. The stone settings were generally rectangular with rounded corners, measuring from 1.5 to 3.5 m in length and from 0.6 to 2.4 m in width, while the depth of the graves ranged from 0.2 to 1.0 m (Socha, Sójkowska-Socha 2017, 47–85). Most burials were oriented, with slight deviations, along a northeast–southwest axis. Three graves were aligned east–west. One grave stands out in particular due to its markedly different orientation, being aligned along a southeast–northwest axis (Sójkowska-Socha, Socha 2017, 315, 316).

Unfavourable depositional conditions, combined with intensifying taphonomic processes, resulted in the very poor preservation of the skeletal remains. In only 18 features were smaller or larger fragments of long bones recovered, together with minor pieces of cranial bones and tooth crowns (sometimes limited to enamel fragments) (Wrzesińska 2017, 326). Anthropological analysis established that the examined graves contained a total of 19 inhumation burials and 2 cremations. These remains consisted primarily of bone fragments deriving from older children, juveniles, adults, and mature individuals. Sex determination was possible in only seven cases, all of whom were identified as male (Wrzesińska 2017, 327).

Due to the poor state of preservation, little can be said about the positioning of the body. In several instances, however, negative impressions of bodies were identified within the grave pits. These suggest that, in most cases, the deceased were interred in a flexed (embryonic) position on the right side (Sójkowska-Socha, Socha 2017, 316). In at least one case (Grave 19), the individual appears to have been laid in an extended position. Most graves contained single burials, although exceptions were noted: three graves yielded remains of more than one individual (Wrzesińska 2017, 327). These observations indicate that the funerary practices of the Tumulus Culture population at Górzyca were varied and do not conform to a single, uniform pattern.

Graves 14 and 15 (Fig. 1) are exceptional in terms of their form. The two burials shared a common internal stone setting measuring 3.5 m in length and 2.3 m in width. Postholes recorded around the graves indicate that the original extent of the structure reached 4.15 m. Within each burial chamber, single bone fragments and bronze ornaments were recovered (Sójkowska-Socha, Socha 2017, 313–315).

One of the most spectacular features at the cemetery was Grave 9 (Fig. 2a). It was characterised by a particularly substantial stone construction, comprising three layers of stone paving and a surrounding stone setting, and was additionally encircled by postholes. Beneath the pavement, a richly furnished burial – most likely of a male individual identified as *Juvenis* (>14 years) – was discovered. The grave goods included a sword, two pins with looped heads, a northern German-type axe (Kłodzisko type, variant B), a ceramic vessel, a bronze bead of the *salta leone* type, a set of flint arrowheads together with their pre-forms, and a bronze re-toucher (Socha, Sójkowska-Socha 2017, 59–63).

Undoubtedly, the most remarkable artefact from this assemblage is the sword (Fig. 2b). It was discovered on the right side of the deceased, with the hilt most likely positioned at the level of the shoulder.

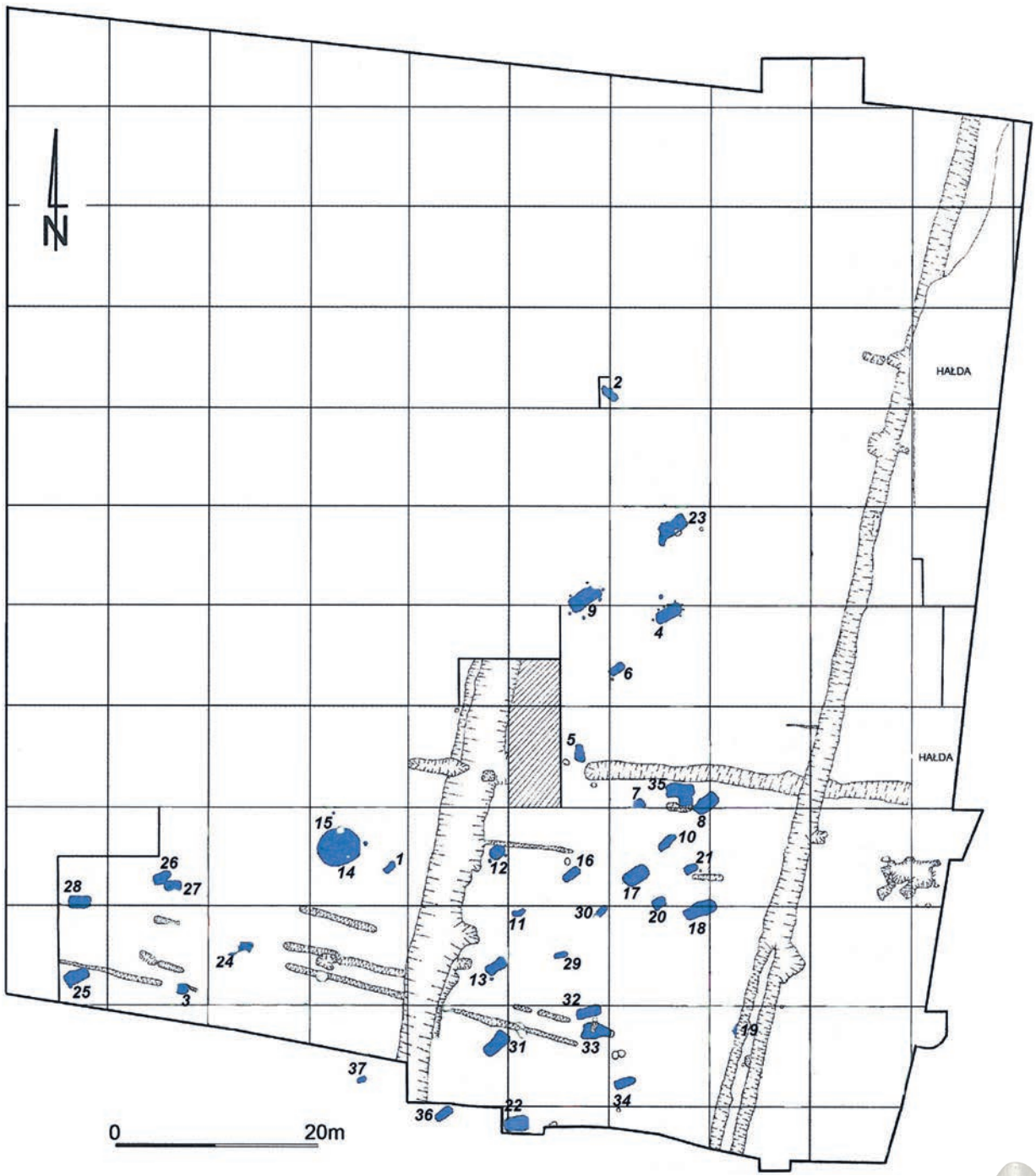


FIGURE 1. Plan of the features related to the bi-ritual cemetery of the Tumulus Culture population. Elab. by K. Socha

This is a short sword of the so-called *Griffangelschwert* type (with a tang for the hilt), measuring 50.05 cm in length and weighing 0.36 kg. A ring resembling a double crown is attached to the tang. Above it, the terminal of the hilt takes the form of a flat, elliptical plate. Both elements originally secured the organic hilt coverings, presumably made of wood, bone, or antler (Bugaj 2017, 161–168). Along the entire length of the blade, probable mineralised remains of the scabbard were recorded, including its structural components in the form of wooden fittings (Stępnik 2017, 179–180). Approximately



FIGURE 2. Górzyca, Site 20, Słubice County, Lubusz Voivodeship. Example of grave architecture in the cemetery (stone structure and clear traces of postholes). Double grave no. 14 and 15. Photo by K. Socha

5 cm from the tip of the blade, the chape of the scabbard was identified, formed as a spirally coiled bronze wire (Bugaj 2017, 161–162).

According to M. Bugaj, the absence of close analogies to the Górzyca sword complicates attempts to determine both its place of manufacture and its precise chronological position. In terms of provenance, the weapon may represent either an import from Denmark or eastern Germany, or a local product of the Oder region, the latter possibility appearing more likely (Bugaj 2017, 176). With regard to chronology, the safest approach is to date the artefact broadly to Periods II–III of the Bronze Age; however, a narrower dating to the second half of Period II (BrC) and the first half of Period III (BrD) seems plausible (Bugaj 2017, 176). It must be emphasised, however, that these conclusions based on relative chronology do not fully correspond with the available radiocarbon (^{14}C) dating results (cf. Makarowicz 2017; Socha 2017).

The short sword from Górzyca represents a unique artefact. Although it shows affinities with the Nordic *Griffangelschwerter*, a survey of the literature has not yielded clearly analogous examples. Among Bronze Age swords from present-day Poland, the Górzyca specimen is exceptional in many respects and of considerable value. It belongs to the small group of swords discovered in controlled archaeological excavations and is one of the few that can be securely associated with the Tumulus Culture. At the same time, it is the earliest known *Griffangelschwert* identified within the present borders of Poland (Bugaj 2017, 173–176).

Another highly noteworthy find from the Górzyca cemetery is a necklace composed of



FIGURE 3. Górzyca, Site 20, Słubice County, Lubusz Voivodeship. Grave 9: a – burial equipment of a warrior in situ. Photo by K. Socha; b – bronze sword with a spike – 1. obverse, 2. reverse. After Bugaj 2017, fig. 2. Photo by P. Kobek

nine disc-shaped pendants equipped with spikes (Fig. 3). Between the individual discs were placed spiral bronze beads of the *salta leone* type, which worked as separators preventing the discs from sliding inward. The entire assemblage was most likely strung on a cord or leather thong tied at the back of the neck (Socha 2017, 152). Disc pendants with spikes originate from the Carpathian Basin, from where they spread among various groups of the Tumulus Culture (Blajer 1990; 1999; Fischl et al. 2013). The Górzyca specimen is the only known necklace of this type composed of as many as nine discs discovered in Poland. The necklace was accompanied by two pins with spiral-disc heads. Together, these elements formed a distinctive ornamental set adorning the upper chest of the deceased. This assemblage was further



FIGURE 4. Górzyca, Site 20, Słubice County, Lubusz Voivodeship. Necklace composed of nine discs with a spike. Photo by R. Dubik

complemented by three finger rings and an ornament – possibly for the head or a headdress – made of thin bronze sheet rolled into a conical shape and provided with two perforations for attachment (Socha 2017, 152–154).

In addition to inhumation, cremation was also practised at Site 20 in Górzyca. Two cremation burials were recorded; however, only one of them yielded rich grave goods. Grave 5, as it is designated, was marked on the surface by a vertically set stone, probably serving as a stele. At the top of the grave pit, a layer of burning residues and fragments of calcined human bones were identified. Within this layer, grave goods were uncovered, including a burnt and deformed collar necklace, as well as a blue glass bead. Profile excavation revealed that the grave was furnished with a stone setting. In addition to the aforementioned items, the burial contained a pair of decorated bracelets (forming an ornamental set together with the necklace), two spindle-shaped pins, a deformed head of a disc-headed pin, a burnt axe, an eyelet pin, and small fragments of calcined bronze ornaments. At the bottom of the feature, a ceramic vessel (a two-handled vase) was also discovered (Sójkowska-Socha, Socha 2017, 320–322).

Analysis of the recovered artefacts clearly indicates that the grave furnishings of the Tumulus Culture population at the Górzyca cemeteries were exceptionally rich. From the 37 excavated features, a total of 111 bronze objects or their fragments were documented and recovered, along with 10 vessels (complete or largely preserved), as well as isolated ceramic fragments, a blue glass bead, 16 flint arrowheads, and pre-forms for their production. Among the bronze artefacts identified were: a sword with hilt fittings and a scabbard chape, seven daggers, four axes, 27 pins, 15 bracelets, two necklaces, five small rivets from dagger sheaths, 13 finger rings or other small ring-shaped ornaments, a bronze retoucher, three head ornaments, spiral beads of the *salta leone* type, and 26 melted objects of indeterminate function (Socha, Sójkowska-Socha 2017, 47–142).

Based on the forms and stylistic characteristics of the bronze artefacts recovered from the graves, the Górzyca necropolis can be broadly dated to Period II and the beginning of Period III of the Bronze Age (i.e. Phases BB–BD). The majority of the graves were constructed during the early and classical phases of the Tumulus Culture, corresponding to Phases BB2–BC1 (Socha 2017c, 350). This relative chronology is refined by the absolute dating.

A total of 17 samples from the Górzyca necropolis were analysed at the Poznań Radiocarbon Laboratory. The results (Makarowicz 2017b, 353–362) indicate that the cemetery was established between 1576 and 1456 BC (95.4% probability), while its use ceased between 1436 and 1322 BC (95.4% probability). According to Przemysław Makarowicz, the distribution of the radiocarbon determinations indicate that (taking into account the results at 95.4% probability), the duration of use of the necropolis by the Tumulus Culture population ranged from somewhere between 32 and 233 years, with the most probable bracket of burial activity falling between 66 and 158 years (68.2% probability). On these grounds, it may therefore be concluded that the cemetery was used for no less than 66 years and no more than 158 years.

The Górzyca necropolis probably served as a burial ground for several generations of families forming one or more lineages. The diversity of grave constructions, as well as the number and richness of grave goods, supports the hypothesis of social differentiation and a hierarchical structure among the groups interred there. The presence of a sword, dagger blades, and flint arrowheads deposited in the graves may indicate a martial role for at least some of the individuals buried. This would corroborate the interpretation that the Tumulus Culture communities were warrior-pastoral in nature (cf. Makarowicz 2017a, 155–157). Taking these factors into account, it may be suggested that the community at Górzyca consisted of a mobile group of warriors and their families (Kristiansen, Larson 2005). Favourable conditions, such as the narrowing of the Oder River valley and access to raw materials at the site, would have enabled control over river communication routes linking north and south. This, in turn, may explain the presence of a wide range of ornaments, tools, and weapons of diverse provenance.

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LATE BRONZE AGE AND EARLY IRON AGE





EXPLORING PREHISTORIC POLAND

FROM THE EARLY BRONZE AGE PASTORALISTS TO THE ROMAN PERIOD

LATE BRONZE AGE AND EARLY IRON AGE[1]

Maciej Kaczmarek

Introduction

At the turn of the 14th and 13th centuries BCE, a new cultural model began to take shape in Europe, which for several centuries encompassed much of the continent. Its most significant manifestation was the widespread practice of cremating the dead and placing their ashes in ceramic vessels (urns) in multi-generational burial sites – urnfields. During this time, the composition and size of grave assemblages changed significantly. The rich metal equipment was replaced by numerous sets of clay vessels, serving both as cinerary urns and as so-called "side dishes", which contained, among other things, consumable offerings for the deceased. Bronze items, now less numerous and not as attractive as those that characterised earlier burials, were usually restricted to being parts of clothing, sometimes showing signs of melting, indicating their presence on the funerary pyre. Sometimes, the burned remains of the deceased, along with the remnants of the pyre, were directly poured into a small pit (non-urn burial) or placed in a perishable container made from organic material.

It is believed that the rite of cremation became widespread in Europe following interactions from the eastern part of the Mediterranean. The cremation ritual certainly represented an element of solar beliefs and rituals, in which fire was a tool of purification, and the Sun, personifying divinity, symbolized fire itself, as well as the source of warmth that creates and renews life. A person could achieve a divine dimension in the world of the dead, where a bird, symbolizing his/her posthumous journey toward the Sun, probably served as a representation. Such depictions, along with solar symbolism, became extremely popular in the Late Bronze Age. Furthermore, the prevalence of ornithomorphic representations on ceramics and metal vessels, along with clay models of carts featuring bird figurines, indicates the presence of an Apollonian variant of the sun-god cult, which could have been symbolized by the solar barge (*Vogel-Sonnen-Barke*), chariot, or cart with a bird harness.

Behind the form of the burial ritual, in which the body of the deceased was burnt on a pyre, while less attention was paid to grave goods and architecture, there may have been an attractive ideology that facilitated its rapid spread throughout much of Europe. The proliferation of the new, urn-based, cultural model and all that was associated with them, was largely evolutionary in nature, accompanied by a gradual adaptation of new patterns and cultural behaviours. In many areas, these processes were probably accompanied by population movements triggered by political unrest (Chochorowski 2005, 395–397). Sometimes, this new ('Urnfield') cultural model appeared suddenly, without signs of changes in the local environment. In the the Oder River basin area (western region of Poland), a gradual change in funeral rituals started at the end of the Middle Bronze Age (BrC/BrD), at a time when the Tumulus Culture and its surrounding regions saw a growing number of cremation burials (Kaczmarek 2002, 291–292; 2013; Ignaczak 2002). In the eastern region, cremation of the dead started somewhat later (BrD/HaA1–HaA1), most likely influenced by transformations

[1] Following the tradition established in Central European archaeology, I apply a three-tier division of the Bronze Age into: Early (BrA), Middle (BrB–BrC/BrD), and Late (BrD–HaB3) periods (see Kaczmarek 2012a, 16–25).

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in the local Trzciniec cultural environment and simultaneously by migration movements, evident, for example, in Małopolska.

The several centuries of stable development of the Urnfields, sometimes overly depicted as a prehistoric idyll, gradually collapsed by the end of the 10th century BCE. The processes that, at the end of the Bronze Age (HaB2/HaB3–HaB3), led to a settlement and cultural crisis among the groups inhabiting the eastern part of the Carpathian Basin (the Gáva Culture and the Kyjatice Culture), and (to a lesser extent) the cultural environment in the Middle Danube basin (Middle-Danube Urnfield Culture), resulted in a profound change in the cultural landscape and the emergence of a new quality, namely the Eastern Hallstatt Culture (Chochorowski 2005, 474 ff.). The characteristic feature of the emerging settlement networks was the presence of large fortified settlements, accompanied by burial mounds and flat burial sites. Cremation ceased to be the dominant form of burial ritual. An influx began of nomadic elements from the direction of the steppe regions of the Black Sea, first in the form of the so-called Cimmerian expansion, and shortly thereafter, the infiltration of Scythian hordes (Bukowski 1970; 1976; Chochorowski 1993; Metzner-Nebelsick 2002). Elements of Mediterranean Culture began to enter Central Europe in significant numbers, particularly from the Italian Villanovan Culture, and also – from Hellenic centres, especially in the Balkans – which had come into closer contact with the "barbarian" world during the major Greek colonization of the 8th century BCE. It was the presence and, to some extent, the cultural pressure of the Greeks settled in Sicily and the southern part of the Apennine Peninsula that shaped the Etruscan civilization (formed in the 7th century BCE). This, in turn, had a significant impact on the cultural phenomena in northern Italy but also in the adjacent areas of the Eastern Alpine zone (Zamboni et al. 2020). From there, the transformed Mediterranean patterns in the form of the Hallstatt Culture had a significant influence on the south-western and western parts of Poland, where communities in the Oder River basin of the Lusatian Urnfields community continued their development.

From the beginning of the Bronze Age to the Younger Pre-Roman Period (approximately 2150–400/350 BCE), the highlights of cultural development in Poland exhibited a constant and clear interdependence with processes that were occurring in areas located to the south of the Carpathians and Sudetes, and further in the Balkans and the Aegean-Anatolian region. Thanks to these connections, based on the mutual exchange of goods and raw materials, elements of material and spiritual culture reached the Oder and Vistula river basins, which significantly influenced the cultural landscape, economic structure, and social fabric of the local populations. Regional population movements characterized by infiltration, also played a considerable role in these processes. As a consequence of the constant influx of external impulses, there emerged two distinctly different cultural zones, western and eastern, in the southern part of the Oder and Vistula river basins. Their development was largely dependent on connections with neighbouring production and cultural centres. The boundary between these zones ran approximately from Kuyavia through central Poland to the Moravian Gate (Bukowski 1983).

In the Early Bronze Age, the crystallization of the two-zone division of Poland was a consequence of the influences of two main cultural-production hubs: the Únětice Culture (western Poland) and the Transylvanian Cultures (eastern Poland). This division was maintained into the Middle Bronze Age, when the lands in the Oder and Vistula river basins fell under the influence of two distinct cultural traditions, largely inherited from the Early Bronze Age order: the Tumulus Culture and the Trzciniec Culture (see the previous chapter).

From the Late Bronze Age, around the 13th century BCE, two additional, clearly defined cultural zones emerged: the north-western zone (Pomerania), which maintained close contacts with the Nordic Culture and was part of the broader south-western Baltic cultural zone, and the north-eastern zone (Warmia-Masuria), distinctly gravitating towards the eastern Baltic cultural zone but also partially connected with Eastern Pomerania (Fig. 1). From the beginning of the 2nd millennium BCE to the mid-1st millennium BCE (until the Early Iron Age), the division of Poland outlined above intensified or was slightly reduced, but the prehistoric populations settled here never underwent a process of complete cultural unification (Fig. 2).

The communities inhabiting Silesia, Lubusz Land, Wielkopolska, parts of Kuyavia, and western Małopolska formed the core territorial zone

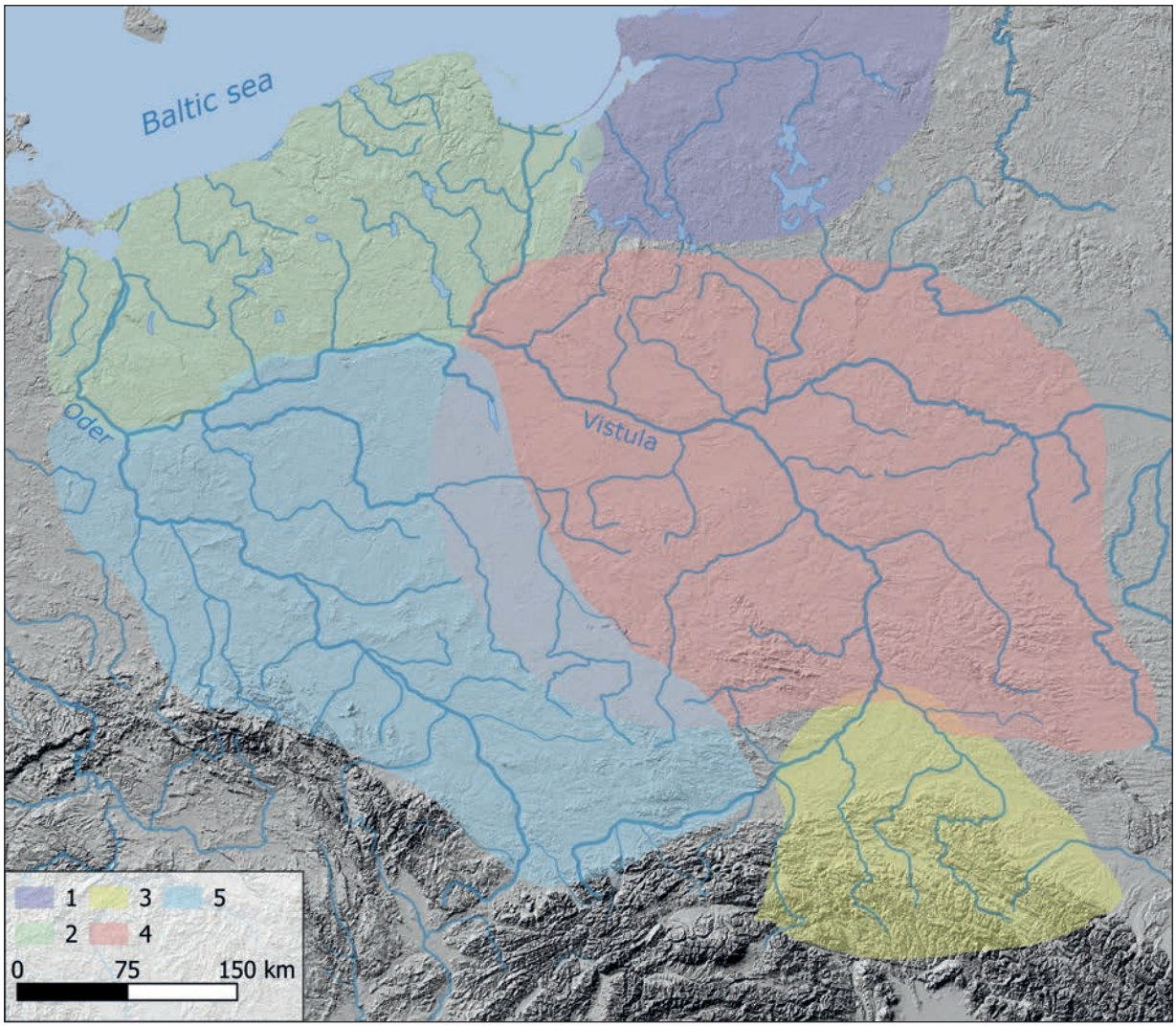


FIGURE 1. The most important territorial units in the Late Bronze Age – generalized approach. 1 – Eastern Baltic Zone Late Bronze Age; 2 – Pomeranian Late Bronze Age culture; 3 – Tarnobrzeg Lusatian culture; 4 – The Eastern Zone of Lusatian Urnfields; 5 – The Odra Zone of Lusatian Urnfields

of the **western zone**, also known as the **Oder basin zone** – most strongly inspired by cultural groups from the basin of the Middle Danube until the end of the Early Iron Age. In the Early Bronze Age, the presence of settlement and intense influences of metallurgy from the Únětice Culture played a fundamental role. In the Middle Bronze Age, the Tumulus Culture (Pre-Lusatian Culture) and connections with the milieu of the Věteřov-Mad'arovce culture were significant, while in the Late Bronze Age, there was a strong bond with the Central Danubian Urnfield groups. The dawn of the Iron Age brought a rapprochement with the eastern Alpine zone, particularly noticeable in Silesia, as well as the infiltration of influences from northern Italy (Bukowski 1983, 27–33; Kaczmarek 2012a, 366 ff.).

The eastern zone, encompassing central Poland, Mazovia, Podlasie, eastern Małopolska, and Outer Subcarpathia, is characterized by a relatively long-lasting tradition of the Trzciniec Culture, extending into the Late Bronze Age. Based on this foundation, a culture resembling the Urnfield type was formed, albeit somewhat later than in the Oder basin zone. The eastern zone of the Lusatian Urnfields was influenced by Eastern Carpathian

interactions, often referred to as Transylvanian influences, associated with cultural groups inhabiting present-day eastern Slovakia and northern Hungary. From the Middle Bronze Age, in the interfluve of the Warta and Prosna rivers and in Kuyavia, cultural elements from the western (Oder basin) and eastern zones mixed, leading to the creation of a distinctive cultural border zone of syncretic nature. Initially, this process concerned elements of the Trzciniec and Tumulus Cultures, and later elements of the Urnfields, which seemingly represented a homogeneous cultural environment referred to as the Lusatian Culture (or Lusatian Urnfields) (Bukowski 1983, 33–48, ryc. 3; Ignaczak 2002). The differences and complex nature of these areas are also clearly visible in the Early Iron Age, particularly in the extent of burial sites of the Pomeranian Culture (Figs. 1, 2).

Despite the significant cultural diversity of the areas in the basins of the Oder and Vistula rivers in the Late Bronze Age and Early Iron Age (the second half of the 2nd millennium BCE), a concept developed in Polish prehistoric archaeology, suggesting that the archaeological remnants known as the Lusatian Culture represented communities of an ancient 'Proto-Slavic' population, which would have meant that modern Poland was the original ancestral homeland of the Slavs. For decades this notion exerted a powerful influence on Polish prehistoric archaeology that shaped – and in many respects constrained – the interpretation of cultural processes in the Late Bronze and Early Iron Age of the Oder and Vistula basins. Let's take a brief look at this important issue in the study of the prehistory of Poland.

The issue of 'the Proto-Slavs' and the Lusatian Culture in Polish archaeological research

The Lusatian Culture, increasingly referred to by researchers as the Lusatian Urnfields, held particular significance for the eminent Poznan archaeologist Józef Kostrzewski, and through his authority also for Polish prehistory, as a taxon attributed with the longest duration and the widest territorial extent. Above all, this significance stems from its alleged connection to the origins on Polish soil of the Proto-Slavs. It was precisely due to the idea of identifying the populations of the Lusatian Culture with this group that research on this period of Poland's prehistory became one of the main – if not the most important – areas in the extensive scholarly activity and vast publication output of the leading figure of Polish archaeology. Józef Kostrzewski developed and widely disseminated this idea in his works, granting the presumed Proto-Slavic creators of the Lusatian Culture the status of ancestors of the Early Medieval Lechitic tribes. On this foundation, and in accordance with the methodological principles of the then-dominant cultural-historical school, the concept of a homogeneous archaeological culture was developed, one that, while exhibiting significant regional differences, was extended in duration to nearly an entire millennium (c. 1250–400/350 BCE) and delineated to cover approximately the entire territory that under the early Piast rulers was to become Poland (Fig. 1). This culture was explicitly treated as a product of the Proto-Slavic population (Kaczmarek, Minta-Tworzowska 2012; Kaczmarek 2017b, 265–269).

The views, opinions, and hypotheses of scholars, even if they pertain to past reality, are often significantly influenced by the contemporary socio-political conditions in which they are formulated. This influence is as evident as it is fully understandable in the written work of Józef Kostrzewski, who was born in 1885 in Poland under the partitions of Russia, Prussia and Austria. The patriotic atmosphere of his family home, located in Wielkopolska, the heart of the Piast-era state; the sweeping Germanization of the western regions of what is now Poland, institutionally sanctioned by the Prussian authorities; medical studies interrupted due to independence activities; strong involvement in social movements and secret self-education societies; a deep love of native history, literature, and folk culture – all of these shaped the scholarly approach and personality of the leading figure of Polish archaeology. His distinctive profile was further shaped by prehistoric studies under Gustaf Kossinna, undertaken between 1910 and 1914. The time spent in Berlin studying with Kossinna was a crucial stage for Kostrzewski, significantly impacting his scholarly path. On the one hand, the German prehistorian was an excellent lecturer and a distinguished expert in archaeological materials; on the other, he was an uncompromising Germanophile, displaying a near-zealous fervour in this regard. The education received from Kossinna shaped the research attitude of the Poznań archaeologist and significantly

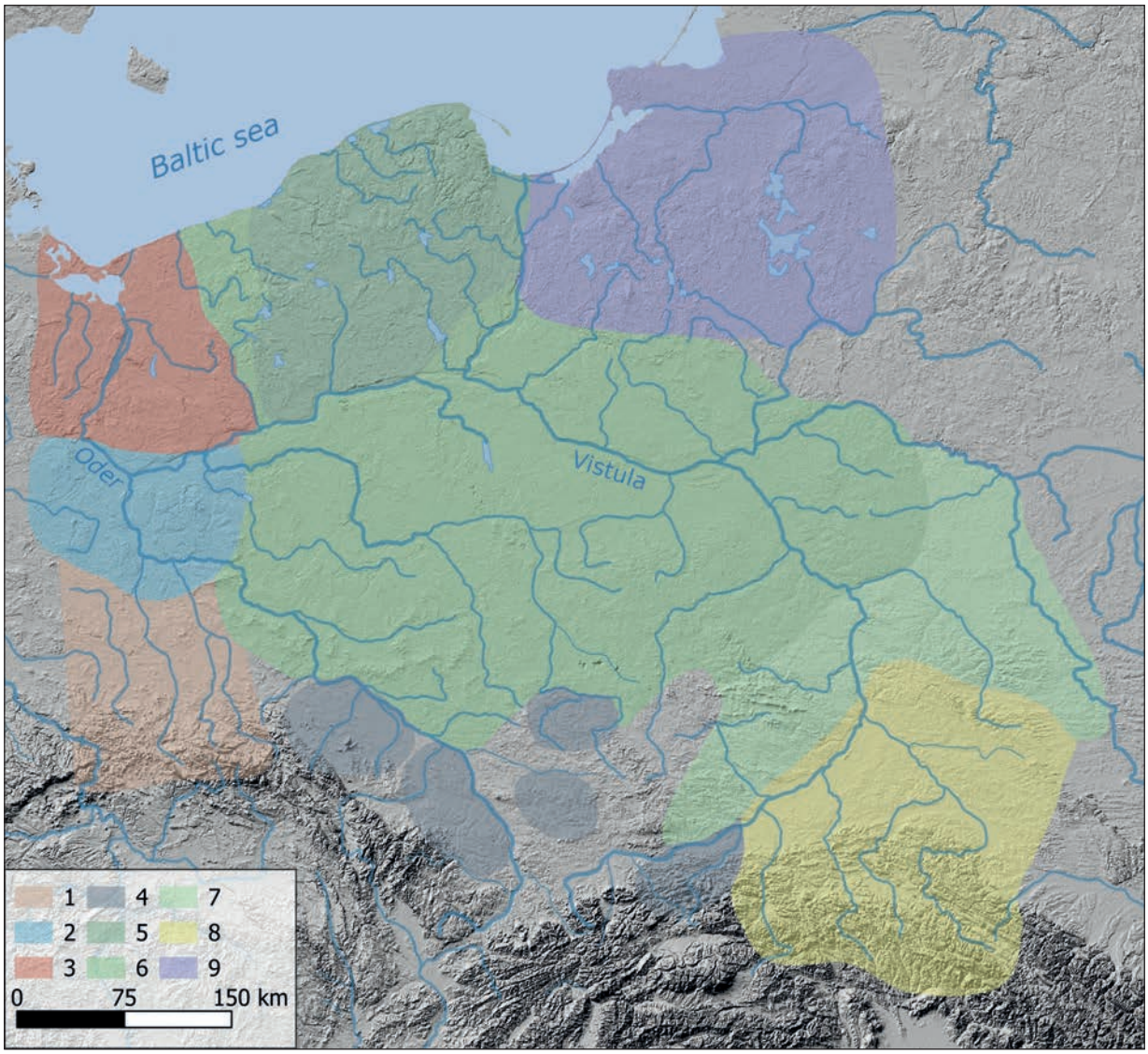


FIGURE 2. The most important territorial units in the Early Iron Age – generalized approach. 1 – Białowice Group (Billendorfer Gruppe); 2 – Górzyca Group (Göritzer Gruppe); 3 – Jastorf culture; 4 – Lusatian Urnfields; 5–7 – Pomeranian culture; 8 – Tarnobrzeg Lusatian culture; 9 – West Balt Barrow culture

influenced the paradigm he adopted for studying the distant past of Poland.

Shortly after his return to Poland, Kostrzewski authored an ethnocentric concept of the Lusatian Culture, characterized by emotionally charged dogma, fully shaped according to the methodological assumptions of cultural-historical archaeology of the late 19th and early 20th centuries. This concept encompassed three sub-models: cultural evolutionism, diffusionism, and the "Kossinnism" that drew from both. The main interpretive tool of Kossinnism was the "settlement-archaeological method". This posited that the distinct territorial ranges of archaeological cultures allow for their legitimate identification with areas inhabited by specific ethnic communities. Thus, the processes of cultural changes in prehistory, observed as a whole or only in the form of certain elements, could be linked (according to Gustaf Kossinna) to changes in ethnic groups occurring as a result of migration. The newly formed cultural model represented a result of sub- and super-stratum cultures, typically taking the form of dominance by allochthonous elements. Following these concepts, the

assumption of identifying the ranges of archaeological cultures with the ranges of specific *ethnoses* gained acceptance. However, there was also the possibility of deviations from this principle, leading to an attempt to present the relationships between archaeological cultures in a diachronic context, differing from Kossinna's approach.

While not rejecting Kossinna's migrationism, Kostrzewski assumed the possibility of cultural changes occurring without changes in the ethnic group. According to this assumption, in his concept of the continuity of settlement in Poland, lasting from the mid-2nd millennium BCE to the Early Middle Ages, he viewed successive archaeological cultures as subsequent developmental stages of the same ethnic community – the Proto-Slavs and Slavs. The foundation of such an ethnocentric construction was the identification of a series of selectively chosen archaeological, anthropological, linguistic, and paleobotanical indicators to support this claim. Although their significance cannot be unequivocally dismissed, it is difficult today to consider any of these arguments as prevailing in favour of the proposed autochthonism of the Slavs in the Oder and Vistula river basins.

The idea of assigning the ethnic attribute of Proto-Slavic identity to the carriers of Lusatian Culture became the guiding thought of Józef Kostrzewski's scholarly activity and the Poznań archaeological school he established. It essentially formed the foundation of the entire concept of the ethnogenesis of the Slavs in the Oder and Vistula river basins promulgated by that school. This concept was outlined in Kostrzewski's early publications, released during his studies in Berlin under Gustaf Kossinna. And although this was not an original idea of the Polish archaeologist (since Czech researchers had already proposed such a thesis in the early 20th century) it was Kostrzewski who gave it its fullest form, creating a vision of the Lusatian Culture as the foundation of Proto-Slavdom, persisting continuously – albeit in the form of various archaeological cultures – from the Late Bronze Age until the formation of the early Piast state.

Starting from 1914, in successive syntheses of prehistory of Wielkopolska and Poland, as well as in popular science publications, Józef Kostrzewski consistently presented his concept of cultural and settlement continuity in Polish territories, initially in the form of suggestions and later as a firm imperative. In this way, a rather static image of the Polish Late Bronze Age and Early Iron Age was established for decades, with the dominant Lusatian Culture fitted into the schematic framework of Montelius's seriation, genetically alienated from the contemporary complex of Urnfields Cultures and the prehistoric reality of the second half of the 2nd millennium and the first half of the 1st millennium BCE. The preservation of an apparent uniformity stretching over nearly a millennium and territorially defined as a single cultural unit (despite the starkly visible differences in ceramic styles, levels of metallurgical production, dynamics of cultural changes, character of settlement, and economy, as well as differing orientations of exchange contacts) was supported by the delineation of numerous regional groups based on criteria never explicitly defined but presented in a declarative manner.

The concept of the ethnocentric, Proto-Slavic nature of the Lusatian Culture, formulated in the 1930s, propagated and vigorously defended by Józef Kostrzewski and most of his students, underpinned a one-dimensional perception of the cultural processes occurring in the Oder and Vistula river basins from the Late Bronze Age to the decline of the Early Iron Age for over half a century. The strength of this ethnocentric cultural model, embedded in the concept of the autochthonism of the Slavs in the Oder and Vistula river basins, has been so deeply rooted in tradition, with all its positive and negative implications, that successive generations of Polish archaeologists have yet to deconstruct it unequivocally, clinging to the ethnically associated label of the Lusatian Culture (Kaczmarek, Minta-Tworzowska 2012). By adopting the term "Lusatian Urnfields", we move away from the ethnocentric vision of the cultural processes that took place in Poland between the 13th and 5th/4th centuries BCE (Gediga 1983; 1993).

In the Early Iron Age, an extremely important and emblematic element of the cultural landscape of prehistoric Poland is the Pomeranian Culture (sometimes also referred to as the Eastern Pomeranian Culture) (Łuka 1968; 1971; Malinowski 1969; van dem Boom 1981; Czopek 1992; Kaczmarek 1999; Dzięgielewski 2010; 2017a; Trybała-Zawiślak 2019; Kaczyński 2025). Often, due to the similarity of the mass ceramic material, it is treated as a continuation of the Lusatian Urnfields, both chronologically and spatially extended. The issue

of the relationship between these two groups encompasses a whole spectrum of topics often discussed in Polish archaeological literature. It is enough to say that during Józef Kostrzewski's academic career, the creators of the Pomeranian Culture were attributed to various ethnic groups, which further fuelled the debate centred on the origins of Proto-Slavdom.

It is commonly accepted that the Pomeranian Culture developed in Eastern Pomerania at the turn of the Bronze and Iron Ages, from where a rapid spread of the entire cultural package (primarily in terms of its funeral rites), occurred across a significant portion of Poland. In the existing literature on the subject, the expansion of the Pomeranian Culture has been explained either through typical migrationism, characterized by the political conquest of the indigenous population of the Lusatian Culture (Lusatian Urnfields) by newcomers from Gdansk Pomerania, or through the diffusion of "Pomeranian" cultural elements, whose adoption was seen as a manifestation of changes occurring in the realm of beliefs. The hypothesis suggesting a political (military) nature for the spread of Pomeranian Culture should be regarded as flawed. While not excluding certain population movements, the scale of which is difficult to assess, we can assume that the emergence of Pomeranian Culture in Poland in the Early Iron Age was probably a gradual transformation of earlier social structures associated with the Lusatian Urnfields. Issues concerning the origins and spatial expansion of the Pomeranian Culture also appeared in an attempt to conceptually explain the phenomenon of the decline of Hallstatt fortifications in Poland, for which an idealized ecological model was applied. According to this concept, the abandonment of these sites in north-eastern Wielkopolska, caused by deteriorating climatic conditions at the turn of the sub-Boreal and sub-Atlantic periods (around 850–700/650 BCE), along with the resulting decline in the fertility of the exploited environment, could have triggered the necessity for agricultural changes but also transformations in the structure of social organization. The result would have been a significant de-concentration of contemporary settlement, with the abandonment of previously inhabited but over-exploited areas, and the cultivation of new, less intensively farmed upland spaces. Consequently, large territorial communities focused around defensive settlements could have transformed into small kin groups that began to make use of short-lived settlements and interred the dead in small burial sites featuring the so-called 'family' box graves, typical of the Pomeranian Culture. In the new phase of funeral practices, changes in the size of the burial sites and the construction of graves were accompanied by a different approach to handling cremated human remains (specifically prepared sepulchral ceramics) and the grave goods (Henneberg, Ostoja-Zagórski 1980). Despite the strong appeal of this hypothesis, it does not supply a full explanation for the reasons behind the mass adoption of cultural patterns previously established in Eastern Pomerania, such as face urns or box grave constructions, or the mechanisms of the spread of the Pomeranian Culture in areas devoid of developed settlement systems from the early phase of the Hallstatt Period (HaC).

Cultural transformation in the later phase of the Hallstatt Period (HaD), specifically the replacement of the Lusatian Culture by the Pomeranian Culture over a large area of modern Poland, remains largely unexplained. The similarity of ceramic material, or even the continuation of pottery traditions – particularly evident in their technological aspects – has led some researchers to use the rather unfortunate term *Lusatian-Pomeranian cycle*, borrowed from Stone Age archaeology, to describe the cultural situation between the late 14th and the early 4th century BCE. There is much evidence to suggest that at the turn of the early and late phases of the Hallstatt Period (HaC/HaD), significant environmental changes occurred. They led to alterations in settlement patterns (including the abandonment of defensive settlements) and affected the less accessible layers of religious beliefs, revealed through new forms of funeral practices (Dzięgielewski 2012; 2017a).

Settlement

The insufficient state of our knowledge of settlements and settlement structures from the Late Bronze Age and Early Iron Age in Poland certainly parallels similar situations in various other European countries. The degree of research on open settlements is decidedly lower, as they have attracted much less interest among archaeologists compared to defensive settlements, which emerged at the end of the Bronze Age and are particularly prominent in the cultural landscape, although not

in all areas of the Oder and Vistula river basins (Michalski 1983; Kaczmarek 2012b). In the last three decades, thanks to numerous rescue and extensive excavations conducted ahead of major road and construction investments, it has been possible to study several dozen large settlement sites in Poland on a larger scale, of which at least a few are of exceptional cognitive value. Among the known forms of settlement that existed in Poland during the Late Bronze Age and Early Iron Age, two main groups can be distinguished:

- permanent settlements of a long-term nature, characterized by the presence of above-ground wooden structures with post-and-beam or log-frame construction, a concentration of pits with various purposes, buildings in the form of sunken-floor huts/semi-sunken floor huts, and also the presence of a substantial cultural layer rich in artefacts and refuse. Within the remnants of these long-term inhabited settlements, traces of production activities (foundries, pottery workshops, weaving studios, and workshops for processing bone, antler, stone, etc.) have been recorded;
- seasonal settlements and camps, lacking more permanent forms of above-ground structures. Their spaces are often filled with sunken-floor huts/semi-sunken floor huts with shed roofs, as well as various types of pits and fire places. Seasonal settlements are characterized by a thin cultural layer or even absence thereof, and they often contain relatively poor and undiversified archaeological material. Occasionally, production workshops, such as metallurgical workshops, can be identified within these sites.

Determining the size and duration of use of average settlements established by the Lusatian communities of urnfields and the Pomeranian Culture is quite difficult, especially considering that contemporary agriculture rapidly depleted the fields, necessitating the periodic relocation of settlements. It is estimated that settlements with above-ground structures and no signs of reconstruction had an occupancy duration of about 25 years, which was related to the durability of the materials used for building. There were significantly fewer settlements used for a longer period. Seasonal settlements and camps were inhabited for even shorter durations, typically occupied for several months each year. The rotational nature of settlement meant that typically after a few decades, communities would return to previously inhabited ecological niches, but not to the exact same spot, rather to its vicinity. This is evidenced by the multi-generational urnfields that served as a sort of *axis mundi* for the communities of the Late Bronze Age and Early Iron Age, around which residential, economic, and exploration zones were spread. Undoubtedly, necropolises were located within a short distance from the regularly relocated settlements, allowing for the burial of the deceased. It can be assumed that the permanent settlements of the Lusatian Urnfields communities and the Pomeranian Culture typically consisted of a dozen to several dozen households, clustered around an open area or arranged in a dispersed layout (Bukowski 1979). The spatial planning of settlements surrounded by defensive structures differed significantly, a topic I will return to later.

Both open settlements and fortified sites in Late Bronze Age and Early Iron Age Poland included residential buildings and utility structures, built at the level of the contemporary ground surface or partially sunken (such as pit-houses and pits of various functions). Two basic carpentry techniques were used in the construction of dwellings: the post-and-beam method – either with mortise-and-tenon joints or by connecting posts with horizontal wall planks – and the log-frame method; sometimes both techniques were employed in the construction of a single building. The roof structure rested on vertical posts which supported a horizontal beam, providing a base for the roof rafters. The roof structures were covered with thatch made from straw and reeds. There are recorded instances of solidifying floors with clay tamping or wooden beams, but evidence for such practices is generally not common. The most frequently constructed dwellings were one- or two-room houses and they were occasionally equipped with cellars, as indicated by the pits found within them; very exceptionally, they featured arcaded spaces (Michalski 1963, 137–149; Dąbrowski 2009, 157–159, fig. 66). The construction of houses in the fortified settlements, as shown by the example of Biskupin (Kaczmarek, in this volume), differed from those found in open settlements.

The site at Milejowice 19 (Wrocław District, Lower Silesian Voivodeship) is a good example of an open settlement from the transition between the Bronze and Iron Ages (V EB–HaC), excavated

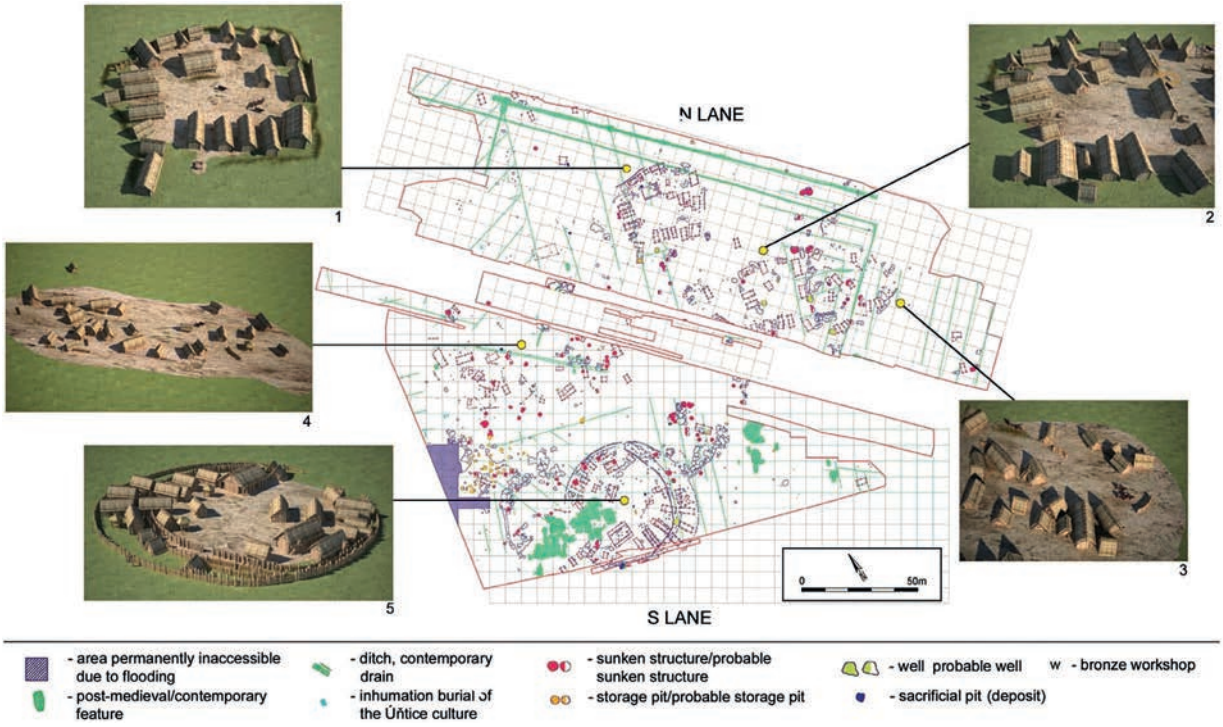


FIGURE 3. Milejowice Site 19, Wrocław District, Dolnośląskie Voivodeship. Site plan along with the reconstructed buildings: 1 – Complex 1/N; 2 – Complex 2/N; 3 – Complex 3/N; 4 – Complexes 1/S-2/S; 5 – Complex 3/S. After Markiewicz 2019

in 1999–2002 in connection with the construction of the A4 motorway (Fig. 3). On an extensive area of over 737 ares, approximately 2,700 archaeological features were revealed, representing the remains of a spatially organized open settlement of the Lusatian Urnfields communities. Remains of above-ground post-and-beam wooden structures, semi-subterranean buildings, and utility pits were recorded, as well as five wells, four of which had preserved linings. In one of the wells, two vessels were discovered, including one with fragments of string still in its handle. Two distinct quadrilateral complexes of a densely built-up area were identified, centred around open spaces (main squares), along with the outline of a third, less discernible complex. Additionally, peripheral areas exhibited scattered remains of various pits and postholes, occasionally forming recognizable outlines of above-ground structures. A remarkable find is the relics of a palisade fence identified within the fourth distinctive complex of a densely built-up area at the Milejowice 19 settlement. Similar structures were also encountered during extensive archaeological research at the nearby site of Stary Śleszów 17 (Wrocław District, Lower Silesia) (Bugaj, Kopiasz 2006; 2008; Markiewicz 2018; 2019).

The most regular of the mentioned complexes at the Milejowice settlement, with a square-like outline, was organized around an empty square in the north-western part of the site. This area contained a concentration of remains from over 25 various above-ground structures. These were predominantly single-room constructions with a rectangular outline, based on a module defined by 8 to 10 main posts (sometimes, additional posts were incorporated into the peripheral walls). These structures covered areas ranging from twenty to slightly over thirty m^2, serving residential purposes, rarely featuring arcaded spaces or extensions. In addition to the residential buildings, the Milejowice 19 settlement revealed remains of smaller structures with utility functions, serving as workshops, stables, or granaries. There were two distinctly larger buildings. One of them, measuring 75 m^2 in area and showing signs of a foundation, contained an unusually high concentration of artefacts, including pestles for grinding, which may indicate a notably utility (communal) nature of this

building (Fig. 4). The wooden walls of the buildings were presumably constructed using the mortise-and-tenon technique, possibly in combination with log-frame construction, particularly in cases where corner posts were absent. In addition to the above-ground structures, the entire settlement also contained remains of sunken buildings (semi-subterranean), characterized by one to four posts set in shallow, flat-bottomed pits that were rectangular or oval in shape. These structures probably served both residential and utility functions.

On two edges of the north-western part of the Milejowice 19 settlement (the densely built-up complex), traces of shallow ditches were identified, extending several dozen metres and originally running parallel to the walls of the post buildings. These were probably remnants of a palisade fence, which was also distinctly detected in the south-western part of the settlement, within the fourth notable complex of a densely built-up area (Fig. 3). The nature of the remains of the structures surrounding the relics of several residential and utility buildings can be considered unique within the entire range of Lusatian Urnfields and even Central Europe. The post-constructed fences consisted of one ring in the west and three to four in the eastern part of the site, creating a perimeter of approximately 260 metres and enclosing an area of about 55 ares. Within the designated area, aside from the buildings, two votive deposits have also been revealed, consisting of several vessels and animal bones, and a well. According to the researchers, this part of the Milejowice 19 settlement was intentionally separated from the rest of the structures, not for defensive reasons, but due to the exceptional social and economic status of its inhabitants (Bugaj, Kopiasz 2006, 199–202).

It is possible that ritual ceremonies were also conducted there by some members of the group residing in this distinguished part of the settlement. The chronology of the use of this area, as well as the others, established through dendrochronological dating obtained from oak timbers of the well (641–639 BCE; 611 BCE) and ceramics from cultural horizons, clearly indicates a temporal uniformity of this site and the entire settlement. We can assume that it was primarily used during the Hallstatt C period. Consequently, the palisade fencing surrounding some of the buildings in the designated area of the settlement may be a derivative of the social changes occurring in certain Lusatian Urnfields communities in the Early Iron Age (Bugaj, Kopiasz 2006, 198; 2008, 110–113). Probably influenced by interactions from the Hallstatt sphere, a local privileged class may have emerged, adopting practices from the Hallstatt aristocracy. In an effort to emphasize their exceptional social status, they territorialized their residence, similarly differentiating burial sites and forms. A case in point is the rich warrior grave goods discovered a quarter of a century ago in a burial in Łazy (Wołów District, Lower Silesia), which most closely resembles the opulent burials known from the Hallstatt milieu (Madera 2002).

Just like in the rest of Central Europe, at the end of the Late Bronze Age and in the Early Iron Age, fortified settlements represented an extremely important and characteristic element of the cultural and settlement landscape in Poland. The prevailing view in the Polish archaeological literature is that the concept of building fortified settlements originated from the southern regions (Subcarpathian, Danubian, and pre-Alpine) and gradually spread northward. No fortified settlements have been revealed so far in the eastern zone of Poland; however, recent discoveries in Chotyniec in Outer Subcarpathia, within the Tarnobrzeg Lusatian Culture (which I will revisit) indicate a significant cognitive potential of the yet unexplored settlement sites in that area (Czopek 2019; 2020; Trybała-Zawiślak 2019).

The first fortified-type structures appeared in Poland at the end of the Bronze Age, while their most spectacular development – particularly evident in north-eastern Wielkopolska (in the Pałuki region) – dates to the period from the mid-8th century BCE. Dendrochronological dating series obtained from the best-studied, emblematic settlement in Biskupin (Żnin District, Kuyavia-Pomerania) (Kaczmarek, in this volume) document the period of construction activity of its inhabitants from 750 to 708 BCE. Radiocarbon and dendrochronological dating of the nearby settlement in Sobiejuchy (Żnin District, Kuyavia-Pomerania), the largest in Pałuki (approximately 6 ha), indicate that the most likely period for the felling of the majority of the trees used in the construction of the fortification should be around 750 BCE (Harding *et al.* 2004, 173–180; Harding, Rączkowski 2009, 389–393, 394–403). Similarly, the dating of wood samples obtained from the well-known settlement of the Billendorfer Group



FIGURE 4. Milejowice 19, Wrocław District, Dolnośląskie Voivodeship. Visualization of Complex 1/N: 1 – southern frontage; 2 – northwest part, view of Building 12a/12b. After Markiewicz 2019

in Wicin (Żary District, Lubusz Land) allowed for the establishment of the date for the beginning of the construction of this site at 754 BCE, and the completion of all building activities at 737/736 BCE (Kałagate 2013). Considering the chronology of other sites, it can be confidently assumed that the time of construction and use of most fortified settlements in the Oder region of the Lusatian Urnfields Culture occurred in the second half of the 8th century BCE (Harding, Rączkowski 2009, 394–403; Kaczmarek, Szczurek 2015, 265–267).

Unfortunately, the state of knowledge regarding the internal structures of the "Lusatian" fortified settlements remains far from satisfactory. The only exception is Biskupin, 75% of which has been studied making it the best-studied site within the entire range of the Lusatian Urnfields Culture (Kaczmarek, in this volume), revealing a planned and simultaneously maximal interior layout throughout all phases of its functioning. In light of the current findings, the size and nature of the dwellings uncovered in the fortified settlements, as well as the assemblages of movable finds revealed within them, do not indicate greater social differentiation among their inhabitants. The dwellings of the earlier phase had an area of 70–90 m^2, while those from the later phase ranged from 36–57 m^2, maintaining almost identical layouts. The process of forming Hallstatt fortified settlements in various regions of Poland has yet to be explained; it can only be presumed that there was some common impulse, perhaps in the form of political unrest, that prompted communities previously living in open settlements to build such structures (Niesiołowska-Wędzka 1974; 1989).

A discovery in recent years that is completely unique in Poland is the fortified settlement in Chotyniec (Jarosław District, Outer Subcarpathia), attributed to the forest-steppe zone of the Scythian Culture. This is suggested by the size of the site itself (30 ha) along with a system of smaller related settlements, the presence of a sacrificial site within the settlement (an important ritual location), the characteristics of the material culture (metal products, primarily military items, and pottery with eastern technological and stylistic features), as well as numerous Greek imports in the form of amphorae and their fragments (Czopek 2019; 2020). The model of social organization in Chotyniec was probably distinct from the local one, with a marked role for an upper class, as suggested by the consumption of wine and the associated rituals (Czopek, in this volume).

The situation is different in the north-eastern part of Poland (Warmia and Masuria), which, in the 1st millennium BCE, was part of the broader south-eastern Baltic area. Here, three basic forms of settlements can be distinguished: upland, lowland, and water-based. The majority consists of water-based and upland settlements, located in areas with evident defensive advantages, further reinforced by artificial fortifications (Hoffmann 2000, 49–54, 57–61).

Upland settlements were located on highly prominent terrain features (moraine hills, isolated mounds, peninsulas, or promontories) in relation to the lakes, rivers, or marshes at their base. Their defensive character was achieved naturally through their location or by the construction of artificial fortifications. Lowland settlements were located within geomorphological forms with low or minimal exposure (slightly elevated peninsulas, promontories, hummocks, dunes, and lower terraces of river and lake valleys). These settlements can also be divided into open sites and those with natural defensive advantages (Hoffmann 2000, 54–57).

Water-based settlements are the best-studied category of sites in the south-eastern Baltic area during the 1st millennium BCE and represent the most spectacular form of habitation in that region, associated with the population of the West Balt Barrow Culture. They were situated on small natural islands with low exposure in relation to the water surface, near the shore, or on wooden platform structures, further reinforced with vertically and diagonally driven stakes. The vast majority of water-based settlements were built on artificial islands, or platform structures, located in shallow bays of lakes, many of which later underwent eutrophication or were drained. These settlements were constructed almost exclusively in the lake district, from the Iława Lake District to the Suwałki Lake District, with a clear concentration in the Ełk Lake District and a smaller presence in the Land of Great Masurian Lakes (Antoniewicz 1964; Hoffmann 2000, 57–61; Gackowski 2015).

Settlements located on artificial islands were typically built on rectangular platforms with an area of 2–5 ares, though a few occupied up to 12 or even 15 ares. These platforms housed 5–6 residential buildings and sometimes enclosures for livestock,

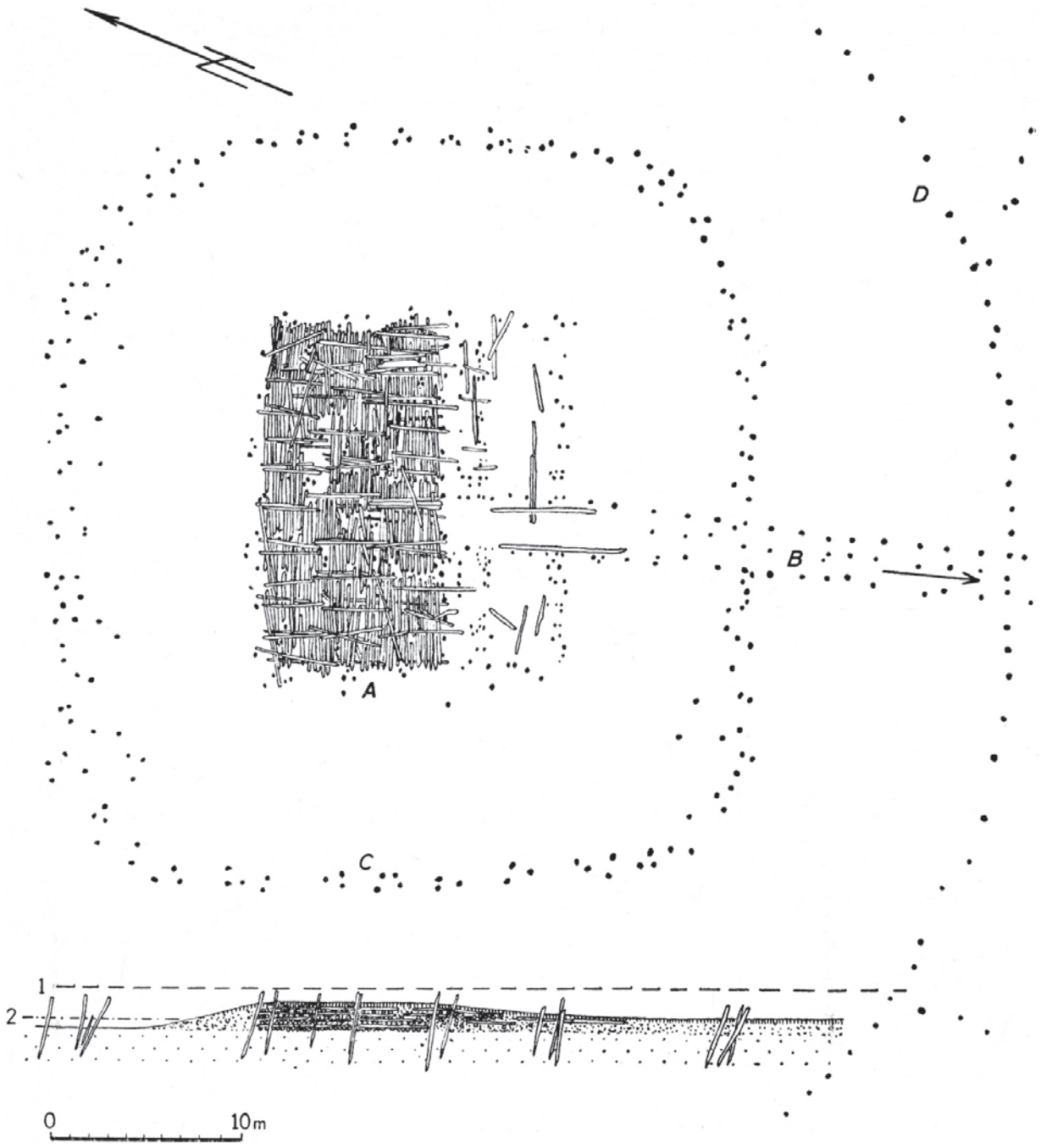


FIGURE 5. Orzysz, Pisz District, Warmińsko-Mazurskie Voivodeship (present Skomack Wielki, Site 1). Plan of the lake dwelling on the Orzysz lake. A – grid platform with traces of houses; B – posts of a bridge leading to the lakeshore; C – palisade fortifications. After Heydeck 1909

surrounded by one or two rows of palisade and breakwater structures. Occasionally, an additional palisade with sharpened stakes was added on the side facing the bridge. A good example is the only fully investigated water-based settlement, located in a shallow bay, a few dozen metres from the southern shore of Lake Orzysz (Pisz District, Warmia-Masuria) (Fig. 5). The structural layout there consisted of a platform of slightly over 150 m^2, constructed from nine layers of alternating oak,

birch, and pine logs resting on the lakebed. This was reinforced with stakes and stabilized with gravel and sand above the framework. To the longer side of the platform facing the land, a wooden pier, six metres wide, was attached, connected to the shore by a bridge nearly sixty metres long and almost two metres wide. The artificial island, formed from wooden logs, was surrounded by a circular palisade, ten metres away, composed of three rows of stakes. The more massive section of the palisade facing the open lake probably also served as a breakwater. Additionally, the settlement was defended on the landward side by a single-row palisade built right on the shore. The discovered remains of hearths and grinding stones suggest the presence of five dwellings, each with a maximum area of 20 m^2. Furthermore, the revealed cattle droppings indicate the existence of an enclosure for livestock (Hoffmann 1999, 113–114).

Material culture – ceramics

Hand-formed pottery makes up the richest collection of archaeological sources from the Polish Late Bronze Age and Early Iron Age. Great importance was placed on the quality of craftsmanship, as well as the significant morphological and ornamental diversity of vessels used between the 13th and 5th centuries BCE. The relatively high degree of repetition of certain forms and decorations of vessels in the cultural assemblages of local groups is often interpreted as evidence of women's dominance in pottery during that time. Women, who changed their places of residence as part of marital exchanges, could have significantly contributed to the process of stylistic unification of ceramics over large areas. Clearly, the shapes and ornamentation of ceramic vessels were also transmitted through other means, such as the transportation of goods for exchange or as ritual items (Mogielnicka-Urban 1984). The relative similarity of the types of vessels used over wide areas even prompted some researchers to attempt to define a "Lusatian ceramic style" that would connect the regional groups of the Lusatian Urnfields while still acknowledging their distinctiveness (Dąbrowski 1980). Characterizing, even briefly, the extraordinarily rich array of forms and ornamentation of vessels produced during the nearly thousand-year period of the communities of the Polish Late Bronze Age and Early Iron Age far exceeds the scope of the brief overview of this section of prehistory. At this point, we will focus for a moment on the exceptional products of contemporary pottery, which can undoubtedly be considered luxury ceramics from the Hallstatt Period – decorated through painting, inlay, blackening, and polishing.

The production of clay vessels was a complex technological process, beginning with the selection of suitable raw materials and their processing to obtain pottery mass, followed by shaping, decorating, and finishing (drying and firing), all the way to achieving a product with the desired stylistic and functional features. In the case of painted ceramics, the technological process was similar, but it had to be supplemented with painted decorations. This required additional knowledge about the colouring substances used to make the paints, as well as the transformations occurring in the course of firing (Łaciak, Stoksik 2010).

Both the forms and construction techniques of Early Iron Age vessels decorated with painting did not differ significantly from those commonly used for unpainted ceramics (such as shaping from a single piece of clay, coiling, or using slabs), although there were forms very rarely found among unpainted vessels (small bowls and dippers), and these were very thin-walled (2–4 mm), which gave painted ceramics a luxurious quality. This thinness was certainly difficult to achieve when manually shaping a challenging, fast-drying, and unstable kaolin material. Hence the scholars' suggestions about the possibility of using a movable base to obtain the final shape and to smooth a vessel formed earlier from coils/strips, as well as the use of wooden or ceramic moulds in which more elaborate forms of painted vessels were pressed.

In the painted ceramics from the Early Iron Age in the Oder region, a red, cream, or yellow background was used for the painted geometric ornamentation. Red, obtained from ochre, limonite, or hematite was the most frequent colour used for the coatings. Vessels were typically covered with red paint entirely, both inside and outside, although usually applied on the exterior. Red was also used to paint certain parts of the vessels: the necks or sculpted knobs. This colour, often combined with black, was also employed for painted ornamental motifs on a distinctly coloured background (cream or yellow). The light colour of the background in painted ceramics was achieved in two ways: either by utilizing the natural properties

of the clay raw material (kaolin-type clay) from which the vessels were made, along with the oxidizing atmosphere of their firing, or by applying a thin layer of cream or yellow slip onto the previously shaped vessel (Łaciak 2017).

Decorative motifs on vessels with red, cream, or yellow backgrounds were created using black, white, and red paint. It is common to find cream-coloured vessels devoid of any painted ornamentation, as well as examples where painted decorative motifs coexist with incised patterns and artistic elements. Similarly to the forms, the ornamental motifs of the painted ceramics from the Early Iron Age in the Oder region have their counterparts in the decoration of unpainted vessels, derived either from local pottery traditions or influenced by the Hallstatt Culture. Stylistic references to local Late Bronze Age ceramics occur in various combinations that link incised motifs, such as vertical and diagonal lines, with red vertical (rectangles), diagonal (diamonds) bands, as well as triangles, motifs of hatched triangles, and trapezoids. However, most of the painted motifs, such as triskelions, hourglasses, "ladders", or zigzag ribbons, represent entirely new decorative styles that emerged only in the Early Iron Age and had no counterparts in earlier techniques of Late Bronze Age ceramic decoration. Painted anthropomorphic and zoomorphic motifs, as well as meanders and spiral ribbons, are very rare in the decorative elements of the painted ceramics from the Oder region. In contrast, these motifs are quite common within the Hallstatt Culture (Gediga *et al.* 2017) (Figs. 6, 7).

It is assumed that the process of developing painted ceramics in the Early Iron Age in Poland followed a similar trajectory to that in other parts of Europe. Everywhere, it emerged from local pottery traditions, within which old decorative motifs were transformed into painted ones (previously made using different techniques) while simultaneously introducing entirely new painted patterns (Łaciak 2017). This process was strongly inspired by Mediterranean regions, which at that time affected not only barbarian pottery. In the Oder region of the Lusatian Urnfields, the echoes of Hallstatt Culture and influences from northern Italy are most prominently reflected, representing areas subjected to the strongest cultural impacts from Greek colonies.

Inlaid ceramics represent the second category of luxury products in the Early Iron Age pottery of the Lusatian Urnfields communities (Fig. 8). This type of decoration mostly appeared on vessels with a black, shiny surface, although this was not a rule. In Poland, the largest concentration of incrusted ceramic finds is located in southern Wielkopolska – along the middle Warta and the middle and lower Prosna rivers, and it only partially overlaps with the area of painted ceramics. So far, there has been no record of the simultaneous use of both techniques on a single vessel, which is a rather common method of decorating ceramics in the Hallstatt Culture. The geometric ornament, featuring a characteristic collection of threads, predominantly includes hatched triangles, zigzags, and festoons, and was executed on a lightly dried vessel using the deep incising technique with a sharp bone tool. After firing, the grooves drawn in this way were filled with a white inlay paste (as recent studies have shown, prepared on the basis of thermally processed bone meal), and the vessel was then subjected to finishing treatments, that is, smoothing and polishing of the outer surface. The deep, glossy black of their surface – considered by some researchers to imitate the appearance of metal vessels – was achieved thanks to great skill and advanced technological knowledge. The process involved smoking, oiling, and firing under reducing conditions, followed by intense polishing of the black surface (Kaczmarek 2017a, 98–100). Recent experimental studies have shown that the best results were achieved by applying powdered graphite to the semi-plastic surface of the vessel just before firing. The high intensity of the gloss was primarily related to the uniform distribution of the mineral flakes in the clay matrix and their proper orientation. Effective control of the atmosphere in the pottery kiln was also crucial – lack of oxygen prevented the combustion of graphite. Only some of the Early Iron Age incrusted vessels from had surfaces blackened using graphite, the presence of which can be determined exclusively through the use of a scanning electron microscope (Łaciak, Stoksik 2010, 120–122; Łaciak *et al.* 2019).

Material culture – metals

The advanced level of bronze metallurgy is one of the markers of cultural development in Poland between the 13th and 4th centuries BCE. Although its beginnings date back at least five centuries before that, it was only in the Late Bronze Age that

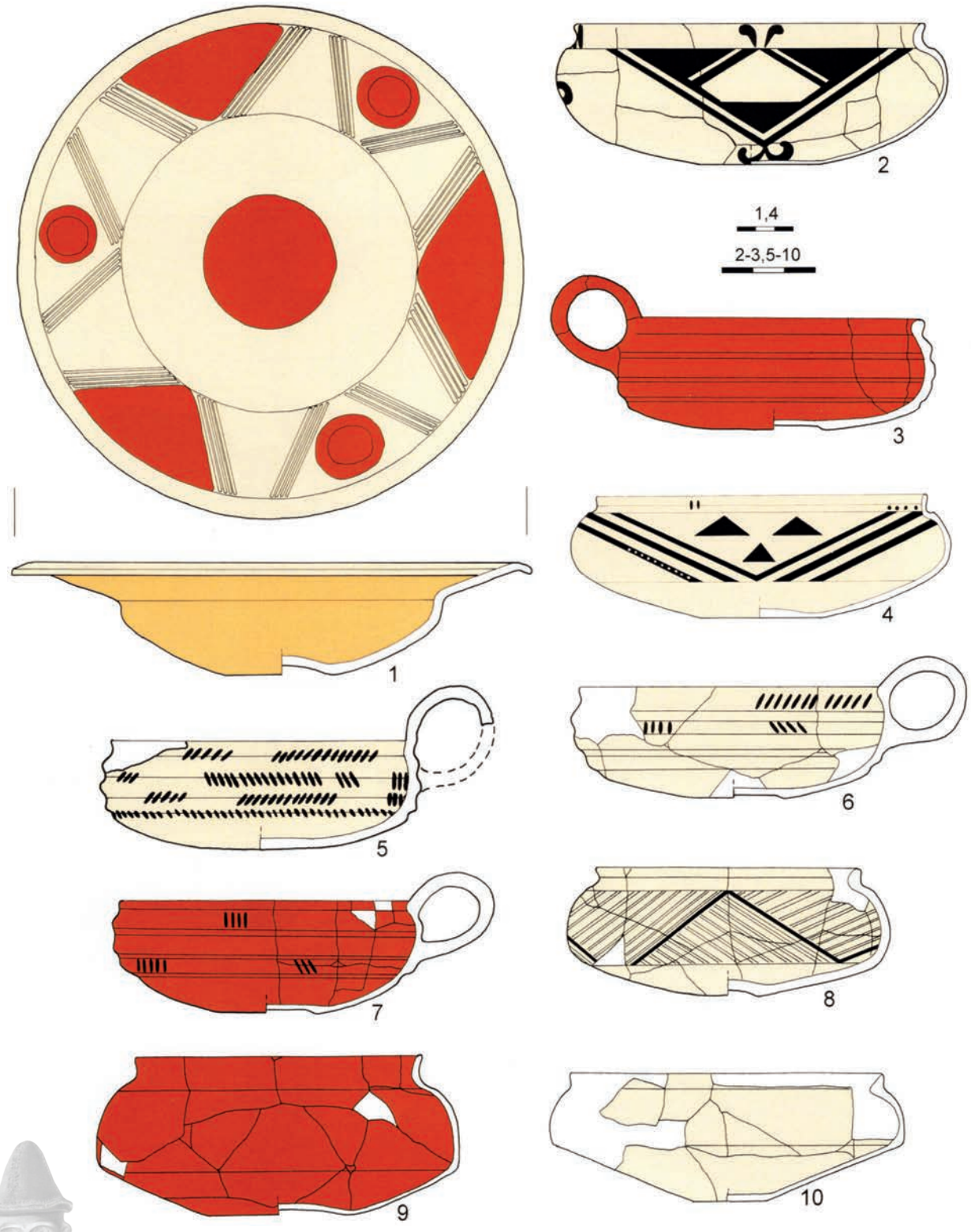


FIGURE 6. Domasław, Wrocław District, Dolnośląskie Voivodeship, Site 10/11/12. The Hallstatt Period painted pottery (selected vessels from grave assemblages). After Gediga, Łaciak, Łydżba-Kopczyńska, Markiewicz 2017



FIGURE 7. Nadziejewo, Środa Wielkopolska District, Wielkopolskie Voivodeship, Site 1. The Hallstatt Period painted pottery discovered in the cemetery. After Kaczmarek 2017



FIGURE 8. Nadziejewo, Środa Wielkopolska District, Wielkopolskie Voivodeship, Site 1. The Hallstatt Period inlaid vessels discovered in the cemetery. After Kaczmarek 2017

objects made from copper alloys gained greater popularity in most areas in the basins of the Oder and Vistula rivers. However, noticeable differences still existed in this regard between the Oder region and Pomerania and the other regions. At this time, iron metallurgy was still in its initial phase, burdened with all the technological weaknesses that resulted in a poor degree of preservation of early products made from the new metal.

Almost simultaneously with the crystallization of the early Lusatian cultural-settlement structures in the Oder basin, an exceptionally vibrant hub of bronze metallurgy emerged here, continuing the established traditions of the Únětice (from BrA2) and Tumulus Culture (BrB–BrC/BrD) workshops. From HaA2/HaB1, a wide range of bronze items began to be produced on a large scale, used throughout the Oder basin. These items were partly modelled on southern, Subcarpathian, and Danubian products, while also exemplifying local inventions and tastes. The rich and highly standardized assortment of bronzes produced in the Oder metallurgical hub consists not only of local products characteristic of the broadly defined Silesia-Wielkopolska-Lubusz zone, but also of items with a supra-regional character, replicated over a wider area, including the interfluvial region between the central Elbe and Warta rivers. A case in point is the ring ornaments, commonly found in early Lusatian hoards (HaA1–HaA2), which were deposited in sets forming ensembles of Drehna and Droszków type decorations (Kaczmarek 2019, 396–399, fig. 13, 14) (Fig. 9). In other regions of Poland, hoards of bronze items were also buried at that time, containing homogeneous typological sets of ring ornaments (assemblages of Kutno-Raszew and Karbowizna type) (Blajer 1999, 121–124; 2001, 277–279).

In the next phase (HaB1), the structure of the contents of Polish metalwork hoards is fundamentally very similar. However, unlike the previous period, mixed assemblages dominatel, typically including ornaments, tools, and weapons, or combinations of ornaments and tools. A novelty during this phase is the appearance of imported bronze vessels, which were added to sets consisting of local products and other peripheral items. In the Oder region, one of the most impressive finds is the hoard from Poznań-Wielka Starołęka, Site 4 (Wielkopolska). Deposited in a clay vessel, the assemblage of 47 bronze items included imports from the Danubian region (Fuchsstadt and Spišská Belá type dippers, a bracelet, a diadem, and a spiral gold ring) as well as metal items characteristic of the bronze workshops located in the interfluvial region between the central Elbe and the Warta. This includes ornaments classified as part of the aforementioned Poznań-Wehrhain ensemble and massive Plauerhagen type fibulae (Kaczmarek 2019, 399, 402, fig. 14, 17, 20) (Fig. 10).

Evidence of the long-distance trade connections maintained by the communities of the Oder region of the Lusatian Urnfields is reflected in the adoption of the custom of depositing imported bronze vessels, items of significant value, as well as those of ritual and prestige significance. In addition to the above-mentioned deposit from Poznań-Wielka Starołęka, this group of finds also includes large luxury bronze vessels from deposits discovered in Unia (Września District, Wielkopolska), Choryń (Kościan District, Wielkopolska), as well as a Jenišovice-Kirkendrup type dipper from cremation grave (No. 1) at the burial site in Przyborów (Nowa Sól District, Lubusz Voivodeship) (Kaczmarek 2019, 402, fig. 18).

The final phase of the Late Bronze Age (HaB2–HaB3), marking the beginning of the cultural peak in the Oder region of the Lusatian Urnfields, also brought about an intensification of bronze production. During this time, there was further diversification in the range of metal items produced, along with an increasing use of bronze for utilitarian and symbolic purpose. A significant reflection of these processes was the evident increase in the number of deposited hoards of metal items. Their composition does not diverge markedly from the trends observed during this period across the entire Oder and Vistula river basins, although certain local variations are noticeable everywhere. In contrast to the clear dominance of ornaments in deposits from other regions of Poland, the Oder region shows a distinct prevalence of assemblages composed of tools, primarily socketed axes and sickles with knobs. Next in frequency are hoards of personal ornaments, consisting mostly of necklaces and bangles – less often spiral-shaped bracelets, fibulae, and decorative discs. Comparable in number are assemblages with a mixed inventory of ornaments and tools, while deposits with more varied contents (ornaments, tools, and weapons, or tools and weapons only) occur at a much lower frequency. Importantly, there are no "pure" hoards of weapons in this context. The most common component

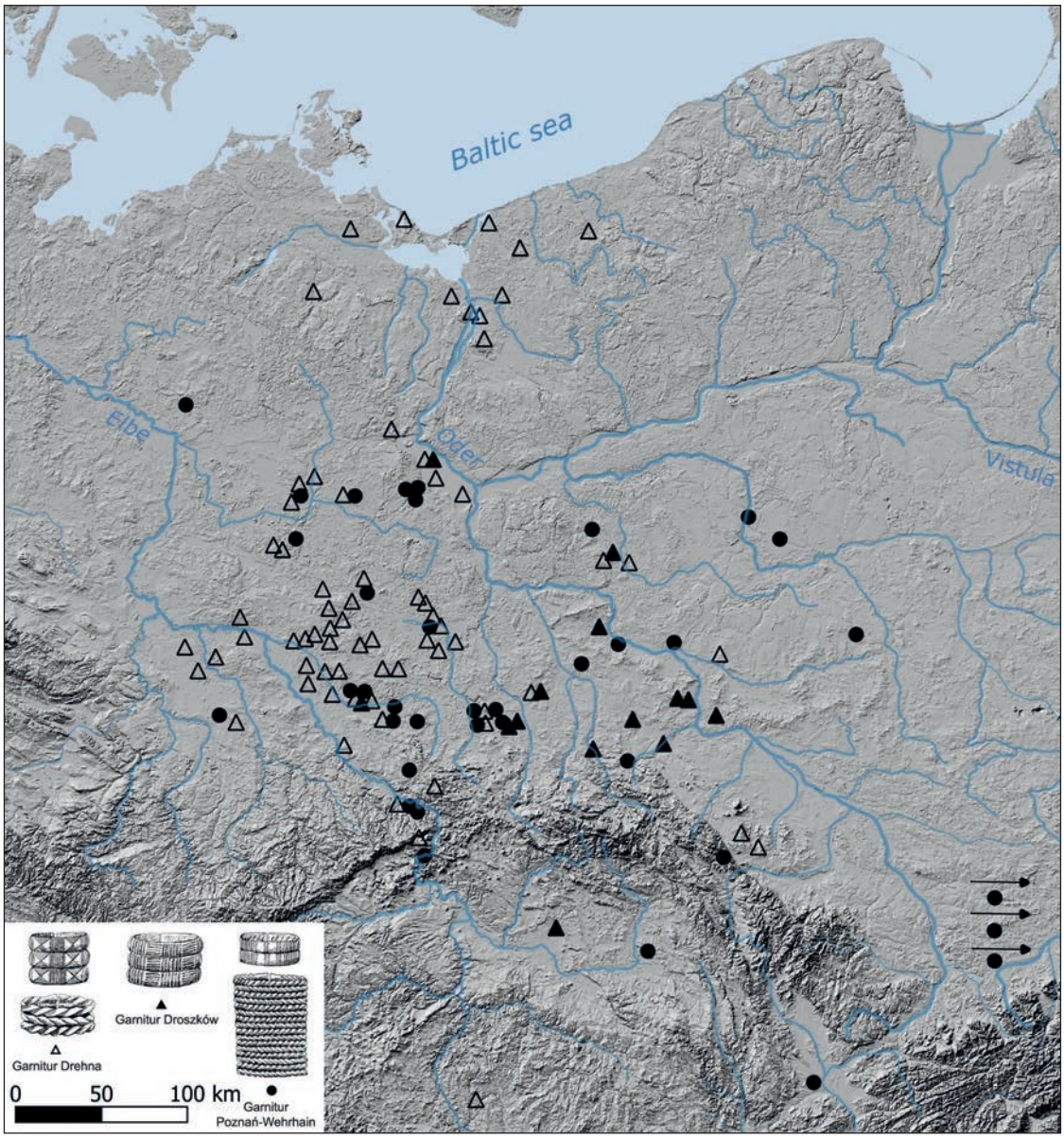


FIGURE 9. Distribution of ornament sets of the Drehna, Droszków and Poznań-Wehrhain types. After Kaczmarek 2012

of Late Bronze Age hoards in the Oder region are socketed axes, which also prevail among assemblages with a homogeneous structure (Kaczmarek 2019, 402–405, fig. 19).

At the end of the Bronze Age, most metal items known from grave assemblages and hoards of the western zone of the Lusatian Urnfields were produced in local workshops of the Oder metallurgical hub, which was clearly specialized in the mass production of certain types of tools, ornaments, and toiletry items (Kaczmarek 2012a, 344–349; 2019, 405–409, fig. 19, 21; Garbacz-Klempka 2018; Baron *et al.* 2019) (Fig. 11). This is evidenced by the high frequency and advanced standardization of the produced bronzes but also by the discoveries of moulds for their casting. Noteworthy are the durable forms made of clay, stone, or metal, intended for creating repetitive patterns or for making wax models. Most of the discovered examples were used for casting socketed axes and sickles with knobs. Among the findings made in recent years, two moulds for casting axes were revealed in the hoard from

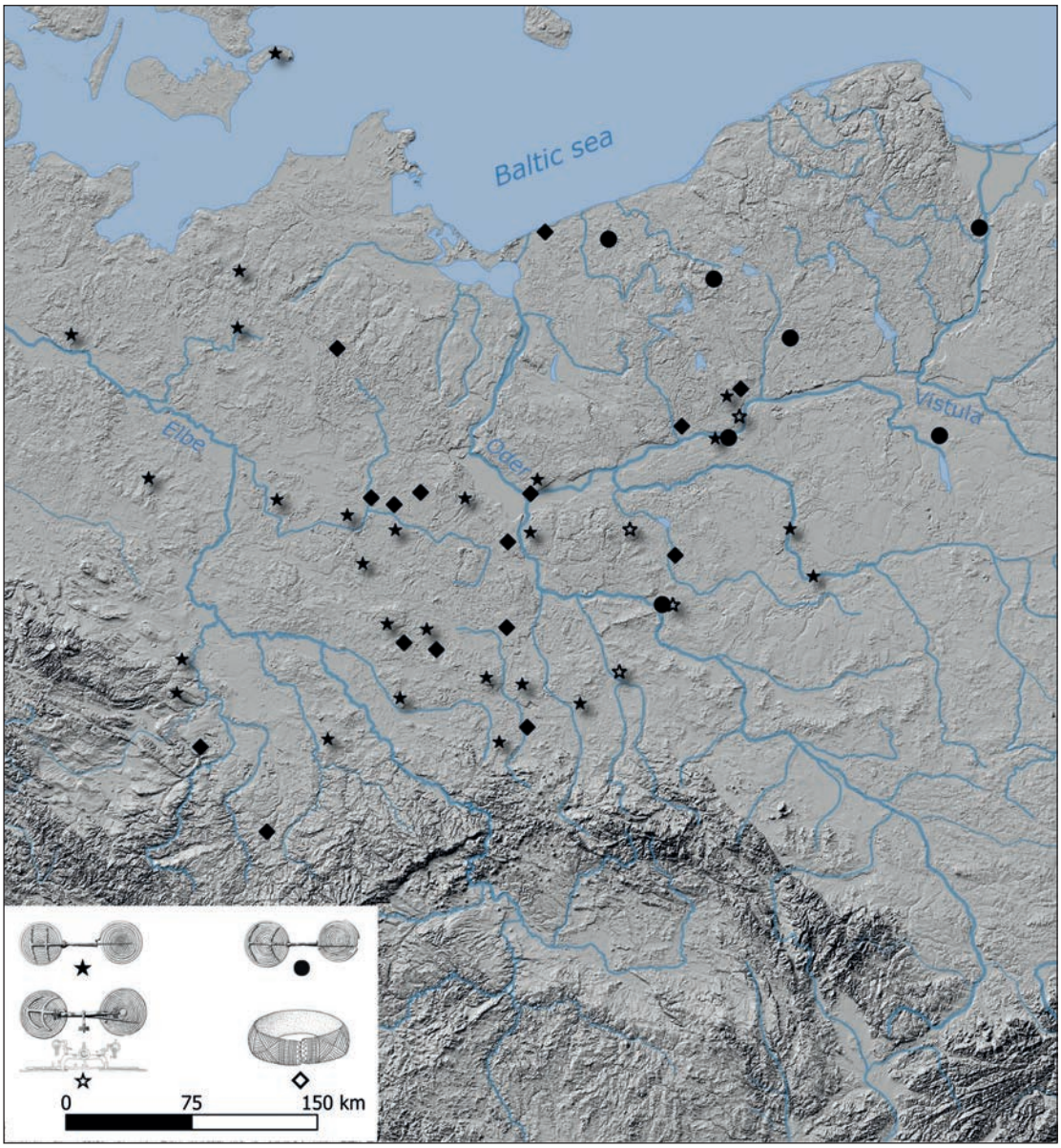


FIGURE 10. Distribution of brooches of the Plauerhagen and Rosko types, and of bracelets of the Zbąszyń type. After Kaczmarek 2012

Rosko, located in the Czarnków-Trzcianka District in Wielkopolska, deposited within the ancient valley of the Noteć River, where three other deposits had previously been uncovered (Machajewski, Maciejewski 2006; Maciejewski 2016, 121–126). Additionally, a bronze plate with a convex model of a sickle from the deposit found in Nowe Kramsko (Zielona Góra District, Lubusz Voivodeship) intended for almost serial production of clay casting moulds for sickles (Orlicka-Jasnoch 2019, 27–28, 62, pl. 13: 17; Nowak 2019).

The dynamic development of the Oder metallurgical hub at the end of the Bronze Age is reflected in the high frequency of hoards buried in the ground but also in the rich assortment of cast bronzes and the noticeable standardization of mass-produced items. Alongside pottery, bronze metallurgy was one of the most important areas of production for the populations inhabiting the areas of the middle Oder basin in the late 2nd and the early 1st millennium BCE. Despite this, it was certainly practiced by a small circle of specialized initiates.

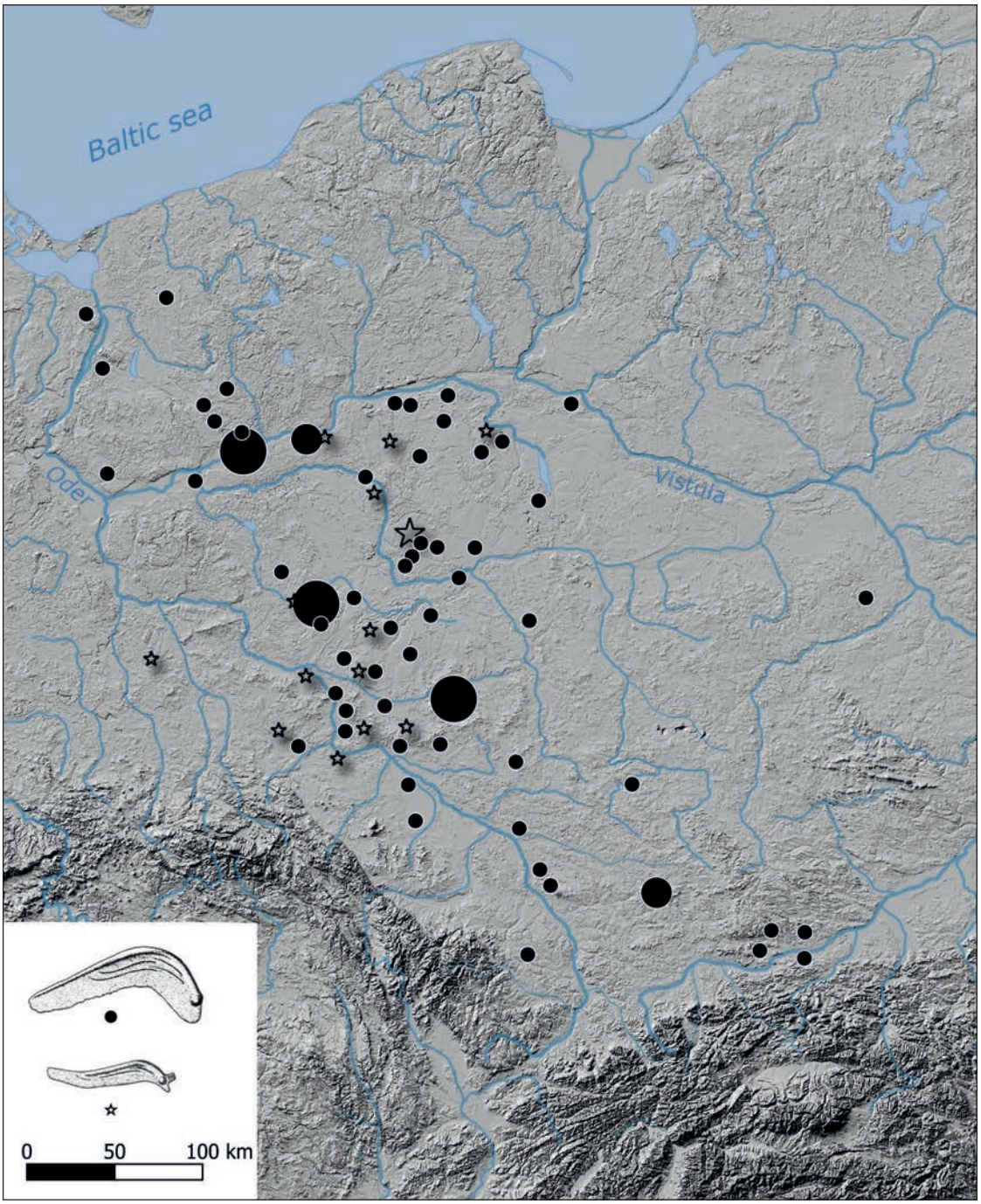


FIGURE 11A. Distribution of bronze objects typical of the Oder metallurgical centre in HaB2–HaB3. Lusatian type sickles with knobs and miniature sickles. After Kaczmarek 2012

Among the rich hoards dated to the end of the Bronze Age and the beginning of the Iron Age (HaB2–HaB3/HaC), items produced in the Oder metallurgical hub are rather modestly represented, while products of Pomeranian or Nordic origin prevail. Noteworthy is the deposit discovered in the late 19th century in Radolinek (Czarnków-Trzcianka District, Wielkopolska). The contents of this assemblage included, among other items, a cloak clasp (*Mantelschließen*) adorned with symbolic figurative ornamentation, depicting two nearly identical scenes reversed in relation to each other by 180°

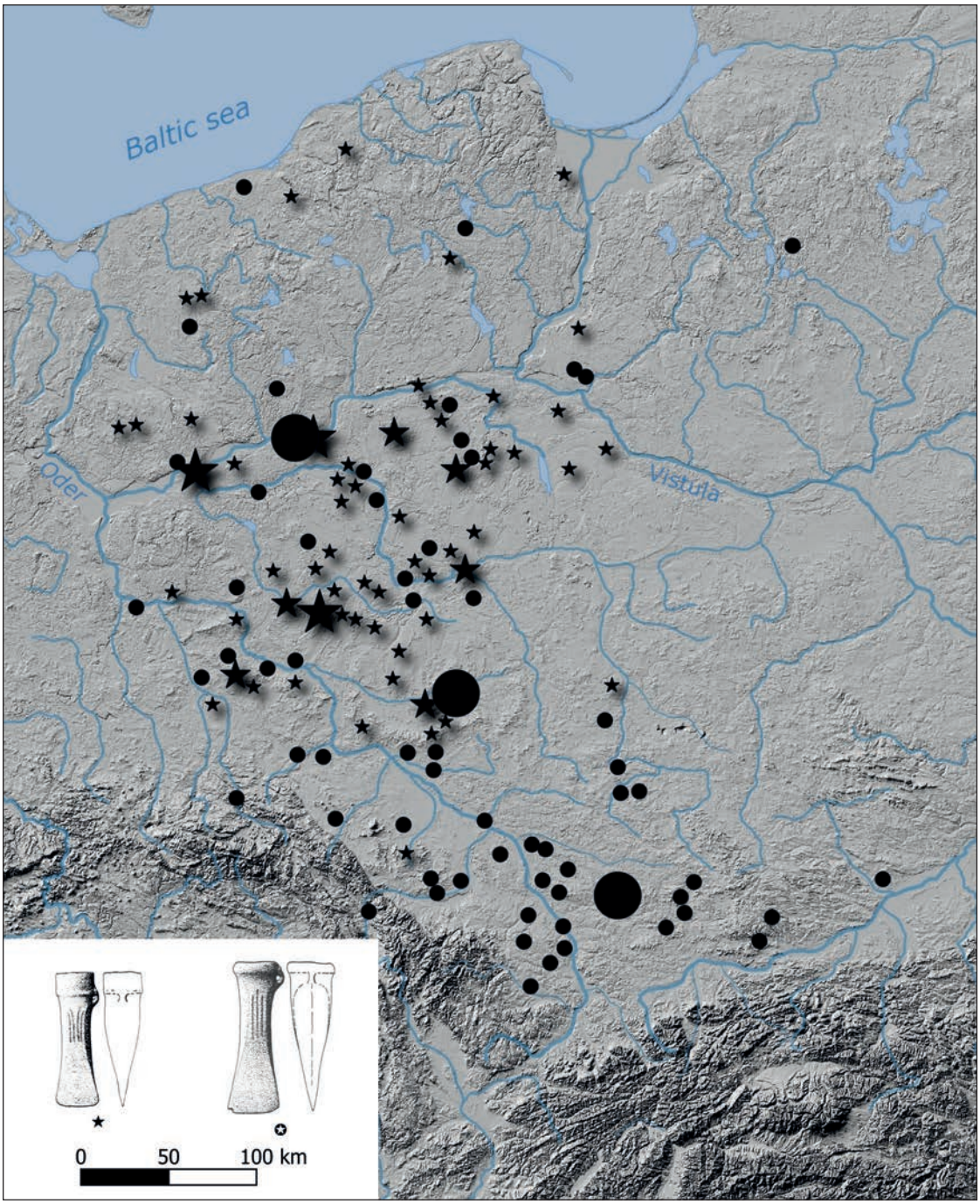


FIGURE 11B. Distribution of bronze objects typical of the Oder metallurgical centre in HaB2–HaB3. Socketed axes of the Czarków and Przedmieście types. After Kaczmarek 2012

and separated by a row of embossed knobs. They consist of symmetrically arranged depictions featuring a stylized boat (*Vogelbarke*) with a human figure in an *orans* position. Above it and on the sides are solar discs with rays ending in stylized bird heads – either of a mute swan or a great crested grebe, species characteristic of Northern Europe (Hänsel 1997) (Fig. 12). The representation on the buckle from Radolinek is an adaptation of the Nordic motif of a boat with a bow and stern ending in a bird's head, rooted in the tradition of the Late Bronze Age and more widely known in the



FIGURE 12. Radolinek, Czarnków-Trzcianka District, Wielkopolskie Voivodeship – dress clasp (Mantelschliessen) of Wierzchowo type. Collections of the Neues Museum in Berlin (as fmr. Floth). Photo by M. Kaczmarek

prehistoric world as the *Vogel-Sonnen-Barke* motif. The Radolinek clasp, like several other items from this hoard, should be regarded as a product of Pomeranian bronze workshops, whose activity – both in terms of the diversity of bronzes they produced, often unattested outside this region, and their sheer volume – was unparalleled across the whole area of Poland. The best source for studying this issue is provided by hoards of metal objects, which in the Bronze Age were most frequently deposited precisely in Pomerania (Bukowski 1998, 342–343; Kaczmarek 2012a, 314–316, 358).

At least since the Middle Bronze Age (BrB2–BrD), the Pomeranian zone stands out significantly in this regard. There are noticeable typological differences as well as variations in the treatment of certain categories of bronze products, particularly in the way they were deposited as hoards. Almost from the beginning of the 2nd millennium BCE, Nordic bronzes or stylistically-related specimens began to flow into this region, along with imports from Transcarpathia (although to a much lesser extent) (Bukowski 1998, 126 ff.). It is in Pomerania that the progressive impoverishment of burial equipment becomes particularly evident during the Late Bronze Age, coinciding with the introduction of cremation burial rites. From this point on, graves (also from other parts of Poland) typically contained small metal objects, most often pins, which are rarely found in hoards or may not appear at all (Gackowski 2012; Janiak 2014; Kaczmarek 2015). In contrast, a significant portion of Pomeranian hoards probably served as substitute offerings for grave gifts, sometimes taking the form of what is referred to as self-equipment (*Selbstausstattung*) according to the terminology proposed by H.-J. Hundt (Hundt 1955).

The end of the Bronze Age (HaB2–HaB3) marked a quantitative and qualitative increase in bronze products throughout the Oder and Vistula river basins, especially in Pomerania. The contents of hoards from this chronological interval become the most diverse, offering an almost complete survey of the material culture of the time. The ritual nature of Pomeranian hoards, the most numerous in Poland, appears to be beyond doubt. The presence of horse remains and harness ornaments indicates a remarkable increase in the role of this

animal not only in material culture but also in social and spiritual spheres. Moreover, some of the Late Bronze Age assemblages uncovered in Pomerania, in addition to weapons and horse harness elements – which appear only sporadically in other regions – also include distinctive sets of ornaments and garment components that together form clearly recognizable ensembles (Bukowski 1998, 250–348). It is therefore possible that some Pomeranian deposits, like similar hoards from the south-western Baltic zone, represent the material remains of ritual ceremonies in which horse processions played a significant role. Recent discoveries in Pomerania seem to strongly confirm this concept. The same applies to deposits that included luxury items (impressive bronze vessels), where the total number of deposited objects clearly deviates from the average identified in assemblages from earlier periods and from the poverty of grave furnishings, which provides grounds for considerations about the presence and functioning of social elites (Kaczmarek, Szczurek, Krzysiak 2021; Szczurek, Kaczmarek 2022, 153–159) (Kaczmarek, Szczurek, in this volume).

The beginnings of the Early Iron Age in many respects continued the hoard-depositing customs that characterized the end of the Bronze Age. The situation changed in the younger phase of the Hallstatt Period (HaD), when Hallstatt influences had become negligible. Once again the practice of depositing metal objects in the ground became relatively common. Moreover, deposits began to appear increasingly in the eastern regions of Poland, where they had previously been very rare. The uncovered assemblages are attributed to the people of the Lusatian Urnfields, the Pomeranian Culture, and the West Balt Barrow Culture. Hoard contents show a return of ornament sets, possibly linked to the need to display local differences and to locally-operating metalworking workshops. Some assemblages, especially those from the middle Oder basin, may echo the political unrest of the 6th century BCE, commonly associated with Scythian raids (Wicina, Żary District, Lubusz Land; Witaszkowo, Krosno Odrzańskie District, Lubusz Land).The noticeable absence of weapons and the limited presence of tools in Late Hallstatt deposits from Poland can be linked to the spread of the Pomeranian Culture and, shortly thereafter, the influences of the La Tène Culture that emerged from Hallstatt traditions. These processes were accompanied by the spread of a new metal – iron, which, although it did not completely replace bronze, greatly reduced bronze's economic (and consequently social and ritual) significance. As a result, this led to the gradual disappearance of the practice of depositing metal objects in the ground and in bodies of water (Blajer 2001, 289–298, 309–310).

Material culture – amber

Artefacts of amber, a fossil resin (succinite) found mainly on the Baltic coast have always attracted attention, leading to its role in the prehistory of Poland being greatly exaggerated (among other things by the construction of the concept of the "Amber Road"). This material enjoyed varying levels of interest among the communities inhabiting the Oder and Vistula river basins in the second half of the 2nd millennium and the first half of the 1st millennium BCE. In the Late Bronze Age, it mainly appeared on Polish sites in the form of single beads (multi-element necklaces are rare) and a few pendants, almost exclusively in grave assemblages. Amber objects have not been found within settlements (potential workshops) or in hoards dated between BrD and HaB3, which indicates a significant decline in the popularity of this resin compared with the situation in the Early and Middle Bronze Age (Bukowski 1990; 1999; 2002, 72 ff.).

Conversely, the beginning of the Iron Age marked a noticeable increase in interest in amber among the communities of the Lusatian Urnfields in Lower Silesia, the Lubusz Land, Wielkopolska, Kuyavia and the Chełmno region. Amber occurs mainly in the goods accompanying cremation burials, but also in the contents of a few metal hoards and within fortified settlements and open villages. Most often these are single beads, relatively rarely pendants. Amber necklaces have been recorded in only a dozen or so cases, most often at exceptionally well-furnished burial sites that differ from other contemporary necropolises (e.g. Gorszewice, Szamotuły District, Wielkopolska; Domasław, Wrocław District, Lower Silesia).

A clear concentration of amber finds is noticeable around the Gulf of Gdansk and along the Curonian Spit toward Samland. In Eastern Pomerania, the presence of succinite became distinctly visible from the early phase of the Pomeranian Culture, with three deposits of amber raw material associated with it found within settlements (Rotmanka, Gdansk District, Pomerania; Juszkowo, Gdansk District,



FIGURE 13. Nadziejewo, Środa Wielkopolska District, Wielkopolskie Voivodeship, Site 1. Glass beads discovered in the cemetery. After Kaczmarek 2017

Pomerania, Site 3; Pruszcz Gdański, Gdańsk District, Pomerania) (Fudziński, Ślusarska 2017). In the classical phase of the Pomeranian Culture, whose emblematic marker is face urns, amber beads became their common attribute, forming on these sepulchral vessels elaborate arrangements of pendants (together with imported glass beads and locally made clay beads) and less often necklaces. This custom was no longer practiced after the Pomeranian Culture spread into areas south of the Noteć river and into the basins of the Warta and the middle Vistula (Bukowski 2002, 108–111, fig. 88, 91, map IV).

An almost complete absence of amber finds characterizes the entire eastern part of modern Poland; in Warmia and Masuria, where the West Balt Barrow Culture crystallized in the Early Iron Age, a clear increase in interest in amber did not begin in this region until the turn of the eras (Hoffmann 2000, 155; Bukowski 2002, 111).

Material culture – glass products

From sites dated to the Late Bronze Age and Early Iron Age in Poland, several thousand objects made of glass-like materials are known. The lion's share of this assemblage consists of beads, although glass elements have also been recorded on the head of a bronze pin (Biernatki, Poznań District, Wielkopolska), on the bow of a bronze fibula (Gorszewice, Szamotuły District, Wielkopolska), and as a pendant with a glass amulet (Wicina, Żary District, Lubusz Land).

Already from the end of the Middle Bronze Age, and especially in the early Late Bronze Age (BrD–HaA1/HaA2), numerous beads made of high-magnesium glass reached the areas in the Oder and Vistula river basins, mostly produced in Mesopotamia and, less often, in Egypt. Single "faience" products from Egyptian workshops or from Mycenaean Greece appeared less frequently. A little later (HaA2–HaB2) many beads of "mixed-alkali" glass (probably manufactured in northern Italy) arrived via the Moravian Gate or across the territory of present-day eastern Germany (Purowski 2012).

In HaC and the beginnings of HaD in Poland, mainly in Silesia and Wielkopolska, objects made of "glassy faience", an intermediate material between faience and true glass, composed of both glass (25–75%) and unmelted crystalline inclusions (mainly grains of quartz) occur very frequently. The vast majority of these are beads (Fig. 13), less often other categories of decorative objects, such as the artefacts mentioned earlier from Gorszewice and Biernatki. The bead decorating the bow of the bronze clasp from Gorszewice was most likely made in the late 8th or the early 7th century BCE in the area of present-day Bologna. Similarly, the rest of the known "glassy faience" products from Poland were produced in northern Italy and/or Slovenia–Croatia and then reached Silesia and Wielkopolska via long-distance exchange routes. In a similar way, true glass products arrived, except that these came from the eastern Mediterranean regions: the Levant, Mesopotamia, or Egypt (Purowski 2024).

Most beads dated to HaD and the Older Pre-Roman Period were made of "true glass", which was melted in Mesopotamia or Syro Palestine and then transported to various European secondary workshops. Products from northern Italian and/or Slovenian-Croatian workshops reached the area of modern Poland most frequently (Silesia, Wielkopolska, Lubusz Land), occasionally accompanied by items from the northern Black Sea region (Outer Subcarpathia, eastern Małopolska) (Purowski 2012; 2024).

Material culture – expressions of art

The artistic activity of the communities inhabiting Poland in the Late Bronze Age and Early Iron Age focused primarily on ceramics. This is reflected in a very large variety of forms and rich vessel ornamentation, including the use of figural motifs, as well as in excellent mastery of advanced production techniques (Mogielnicka-Urban 1984; Łaciak 2017; Gediga *et al.* 2017). Although special interest in clay as a material dates back to the early Late Bronze Age (e.g. the knobbed-ceramics style), the fullest development of pottery and figurative sculpture occurred only at the end of the Bronze Age and during the Hallstatt Period. Moreover, this took place almost exclusively in the Oder-region zone of the Lusatian Urnfields, whereas among populations of the Pomeranian Culture (who, in the Early Iron Age, produced emblematic face-urns and house-shaped urns) it was concentrated primarily in Eastern Pomerania (Kwapiński M. 1999; Kwapiński A. 2007; Kneisel 2012).

The image of a bird was perhaps the most popular motif in the figurative art of the Urnfield Culture complex in Central Europe, also widespread in the



FIGURE 14. Międzyrzecz, District loco, Lubuskie Voivodeship. Ornithomorphic figurine. After Indycka 2012

Hallstatt milieu (*Hallstattvogel*). Schematic depictions of birds often appeared in the workmanship of the populations of the Lusatian Urnfields as well. Besides figurines or ornithomorphic vessels, depictions of birds also occurred as supplementary decorative elements on other objects (pendants, fibulae, model wagons, bronze and clay vessels). The emergence and use of bird imagery in figurative representations in Poland is attributed to long-term, bidirectional influences from the South. Probably strong East Alpine and Italian impulses intensified the custom of producing this type of figurative sculpture in the Late Bronze Age and the Early Iron Age. The vast majority of such finds come from Lower Silesia and Wielkopolska (Gediga 1970, 40–60, 140–150, 190–198) (Fig. 14).

A separate group of products reflecting artistic activity in the Late Bronze Age in Poland consists of vessels decorated with figurative incised motifs. Most contain loose, schematic depictions of animal figures, but there are also examples of representations arranged in scenes of a narrative nature. In this context, vessels from Łazy (Wołów District, Lower Silesia) and Sobiejuchy (Żnin District, Kuyavia Pomerania) are noteworthy. On the first of these one can distinguish schematically rendered figures: a human with a bow, horse riders, two riders on stags (?), and stags. The figurative depiction from Łazy, although it is probably an illustration of a hunting scene, has no clear beginning or end to its narrative (Fig. 15). By contrast, the incised decoration on the vessel from Sobiejuchy depicts three different scenes whose mutual relationship and subject are difficult to determine (a war procession or ritual procession), showing warriors on horseback, foot shield-bearers, and a four-wheeled wagon (Gediga 1970, 108–139, 206–229).

A sensational discovery of recent years, on a European scale for Early Iron Age archaeology, is the four-wheeled wagon forming part of the richly furnished grave (4270) from Domasław (Wrocław District, Lower Silesia) (Józefowska, in this volume). The cult function of such objects, also known in another form from the Oder-region Lusatian Urnfields and accompanied by bird figurines (Brzeźniak, Stargard District, West Pomerania; Pierstnica, Milicz District, Lower Silesia), is connected with solar symbolism, as indicated by the triskelion ornamentation on the wagon's body (Gediga 1970, 146–150, figs. 54, 55). The find from Domasław may possibly be linked to influences from the Mediterranean civilizations, particularly ancient

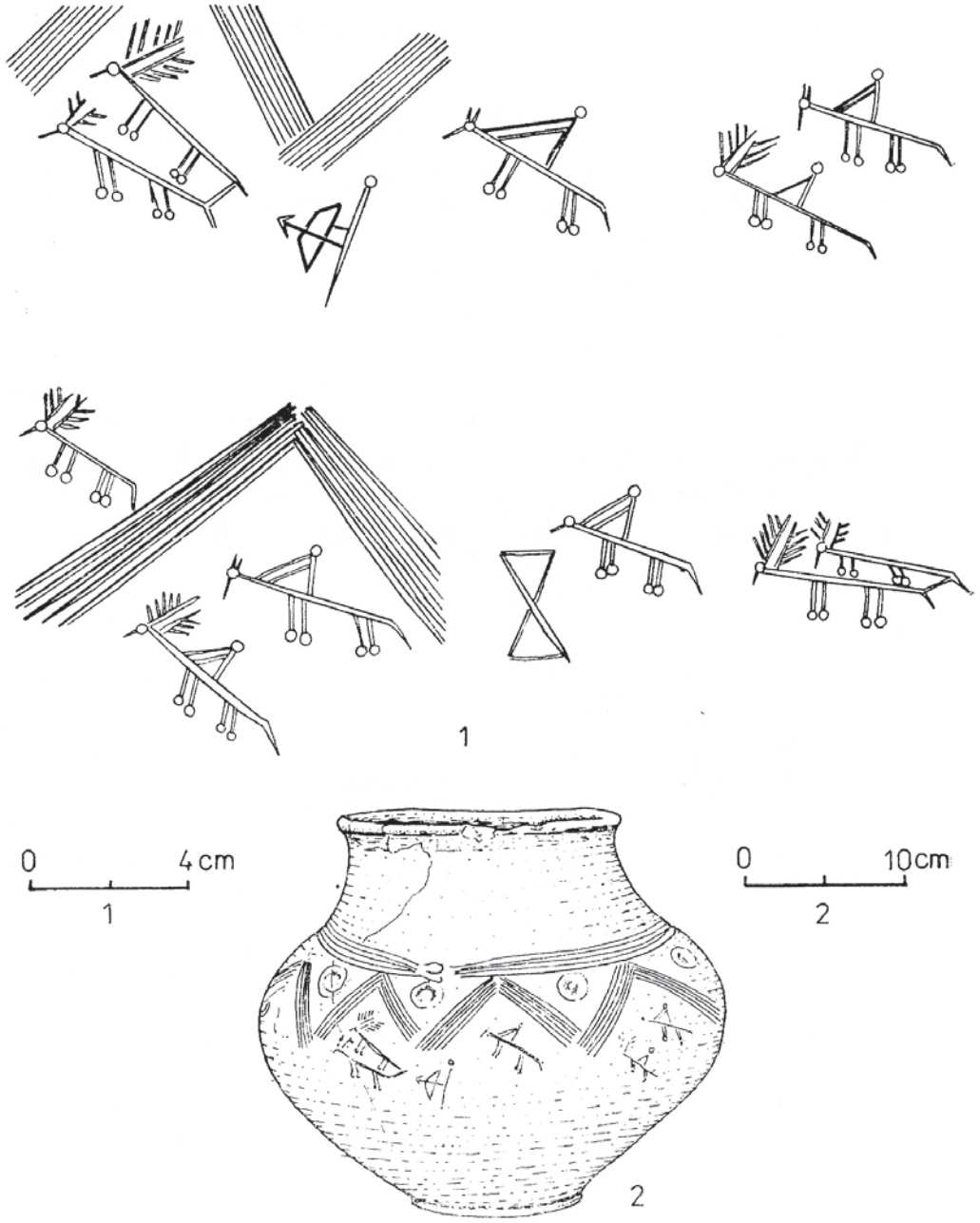


FIGURE 15. Łazy, Wołów District, Dolnośląskie Voivodeship – figurative representations on ceramics. After Gedl 1991

Greece, with its custom of transporting the deceased hero or leader on a wagon to his place of rest. A wagon or its elements appear in exceptional so-called princely graves of the Hallstatt milieu (e.g. Hochdorf and Hochmichele in Baden Württemberg, Germany; Vix, Bourgogne, Franche Comté, France). It is possible that the wagon model from Domasław represents a miniaturized version of that very symbolism (Gediga 2012).

The funerary rite

Despite the considerable wealth and diversity of finds, it is the cemeteries (predominantly flat cemeteries and urnfields) that represent the primary category of archaeological sources for understanding the history of communities inhabiting Poland in the Late Bronze Age and the Early Iron Age. That "funerary nature of knowledge" is not – as is well

known – an exception only for the aforementioned stretch of prehistory, nor for the part of Central Europe discussed here. Even so, it would be difficult to estimate precisely the size of the substantial catalogue of sepulchral sites attributed to the populations inhabiting Poland between the 13th and 4th centuries BCE, which now numbers roughly seven thousand entries. Unfortunately, the proportion of burial sites excavated in their entirety, or to a large extent, where horizontal stratigraphy can be observed, is relatively small. Most are necropolises identified only in fragments, mainly through rescue excavations, yet spatially extensive enough that the archaeological materials recovered from them represent substantial collections of evidence suitable for multifaceted analyses (e.g. Malinowski 1962; 1969; Gedl 1964; 1966; Kaczmarek 2013).

Urn graves, one of the indicators of the affiliation of "Lusatian" groups with the broad Urnfield Culture complex, decidedly predominate over other burial forms in sites from the Polish Late Bronze Age and Early Iron Age. On almost all of these cemeteries single urns prevail, with a constant, though secondary, presence of graves containing two or more urns, usually served by vase-shaped vessels, which on some sites (especially in Pomerania) were covered with bowls turned upside down. However, a single urn often contains the cremated remains of several individuals, so the number of urns in a grave does not always reflect the number of people buried there. The combinations of deceased of different sexes and ages are so varied that it is difficult to discern any strict rule (e.g. Kaczmarek 2002, 248–254; Szczurek 2021/I, 338–347). We can only assume (and this assumption cannot be verified in cremation graves) that the buried were connected by blood ties. Their most likely manifestation are the box graves of the Pomeranian Culture, with urns added successively, as discussed later in this chapter.

A constant element of the necropolises of the Lusatian Urnfields populations throughout the Late Bronze Age and into the end of the Hallstatt Period and the beginnings of the Older Pre-Roman Period are graves containing unurned burials. However, they usually do not dominate and represent only a supplement to the prevailing burials placed in ceramic urns. Burial pits filled directly with cremated bones occur across almost the entire area occupied by the Lusatian Urnfields populations; however, a noticeable concentration of them is visible especially in the Late Bronze Age between the upper Warta and the Oder (Malinowski 1962, 36–40).

Burial sites with flat graves (without barrow mounds) were the most common form of burial space across most of Poland between the 13th and the end of the 5th centuries BCE, though they were not everywhere fully dominant throughout that period. Among flat graves, which presumably must have been marked on the surface in some way (since we only rarely encounter cases where later features were dug into earlier ones), the following can be distinguished: graves without stone structures, enclosed graves (including box graves), bell graves, stacked graves, and graves without trace of burial (symbolic) (Malinowski 1962; 1969; Łuka 1968; 1971).

Enclosed graves are features established on stone paving, covered with stone paving, placed in a stone box (cist), or lined with a more or less regular arrangement of stones (Fig. 16). On almost all burial sites of the Lusatian Urnfields populations, the Pomeranian Culture, or the West Balt Barrow Culture (from BrC/BrD to the Older Pre-Roman Period) graves furnished with various stone constructions coexist with features that lack them entirely. Differences between individual necropolises are mainly quantitative, and to some extent spatial: enclosed graves, with varying intensity, are concentrated primarily in the western zone of the Lusatian Urnfields area (western Małopolska, Silesia, Wielkopolska, Lubusz Land) and in Pomerania. A steady, though somewhat smaller, proportion of them have been identified in Warmia and Masuria. Only in the Hallstatt Period is there a marked increase in the number of graves reinforced with stone constructions at burial sites located in the interfluve of the upper and middle Warta and Oder. Enclosed graves also occur throughout the Pomeranian Culture, but they are not very numerous and usually appear alongside other grave types: box graves, bell graves, and graves without stone constructions (Malinowski 1962, 19–36; 1969, 17–41; Czopek 1992, 25–30; 110–119; Hoffmann 2000, 27–31; Gackowski 2012).

A distinctive form are box (cist) graves, which, especially in the Pomeranian Culture, assume the particularly spectacular form of so-called 'family graves', sometimes containing several dozen urns, among which are also examples bearing depictions of faces (Fig. 17a). Stone boxes as places for deposits, known in the prehistory of Central Europe from

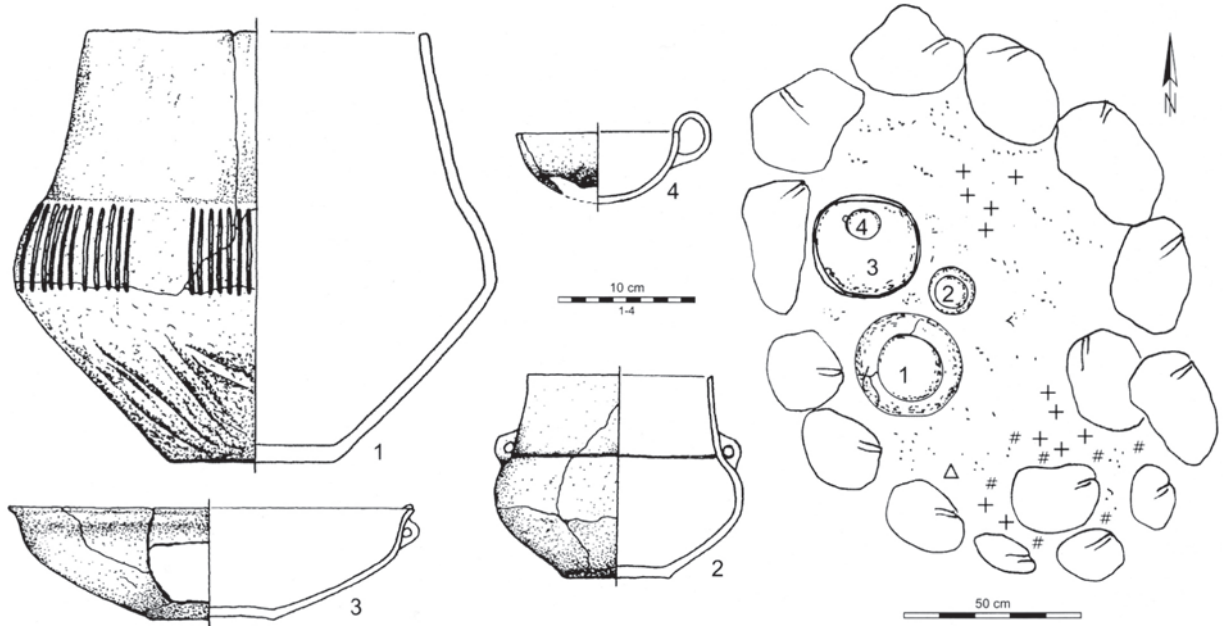


FIGURE 16. Brzezie, Pleszew District, Wielkopolskie Voivodeship, Site 29, Grave 350 – an example of an unurned burial in a oval stone setting. After Szczurek 2021

the Neolithic to the Pre-Roman Period, appeared in Pomerania in the early Late Bronze Age, and thereafter often occurred within barrow mounds in both the eastern and western parts of that region. Box graves, constructed from flat stone slabs, often specially worked, represent the dominant form of funerary architecture among the Pomeranian Culture population, built throughout its entire duration. They are generally characterized by exceptionally careful construction, visible both in the selection of suitable raw material and in its efficient use. The stone boxes of the Pomeranian Culture population had, in plan, the shape of a square, rectangle, trapezoid, rhombus, hexagon, triangle, polygon, or cross, showing no significant formal standardization at any of the burial sites identified so far (Łuka 1968, 46–56; Malinowski 1969, 132–133; Adamik 2015).

Earlier scholarship often emphasized the similarity of certain elements of the funerary rites of the Pomeranian Culture population to the contemporary House Urns Culture (*Hausurnenkultur*) of the Elbe region, where box graves also occurred throughout the Early Iron Age and likewise have their origin in the Late Bronze Age (*Saalemündungsgruppe*). In central Germany, however, larger elongated box graves were initially built that could accommodate a larger number of urn burials; with the onset of the Iron Age their size was significantly reduced to structures intended for no more than three urns. Among Pomeranian communities the process ran in reverse – at first there were relatively small stone boxes, which over time took the form of increasingly larger, expanded multi-chamber constructions for several, a dozen, or even several dozen burials (Fig. 18).

Box graves also occur in burial sites of the West Balt Barrow Culture, and their presence is usually explained as influence coming from across the lower Vistula, from the Pomeranian Culture milieu (Waluś 1995). Other elements of the Pomeranian funerary rite also penetrated the northwestern zone of the West Balt Barrow Culture, including, among other things, the spectacular face urns (Fig. 17b). It cannot be ruled out that the idea of building stone boxes for cremation burials, in Pomerania and in the West Balt zone alike, was adopted from the Lower Elbe cultural area or from the Nordic milieu, as was the inspiration – as much evidence suggests – for making the aforementioned face urns and also house urns (Malinowski 1979, 98–106; Kneisel 2012, 477–481, Abb. 300).

Cloche graves, in which the burial and its equipment are covered by an inverted large vessel (a 'cloche'), serving as a lid, should basically be treated as sealed, since in such cases the inverted

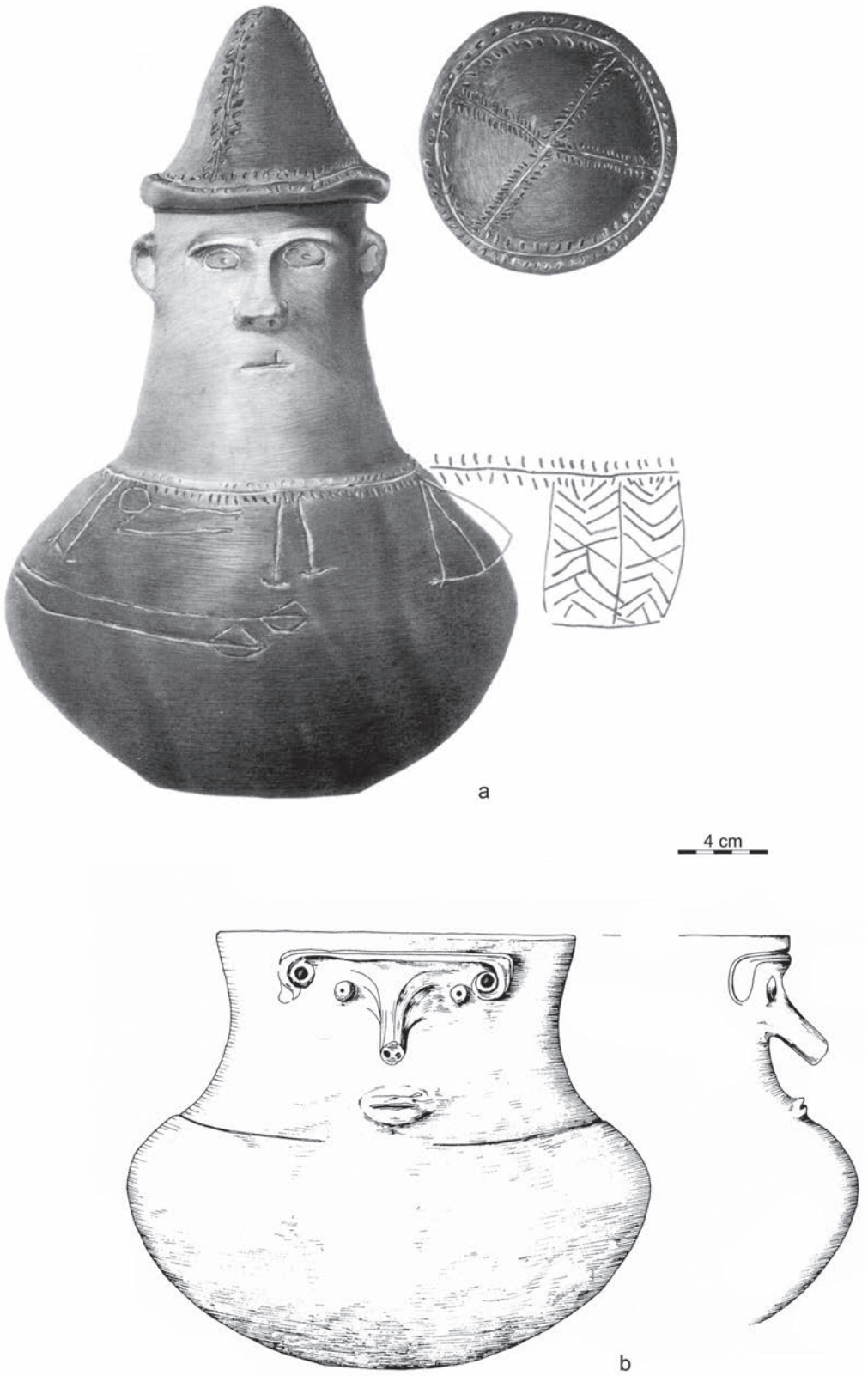


FIGURE 17. Examples of face urns of the Pomeranian Culture and the West Balt Barrow Culture: a – Karczemki, Wejherowo District, Pomorskie Voivodeship, Site 2; b – Piórkowo, Braniewo District, Warmińsko-Mazurskie Voivodeship, Site 1. After Kwapiński 1999 and Waluś 1995

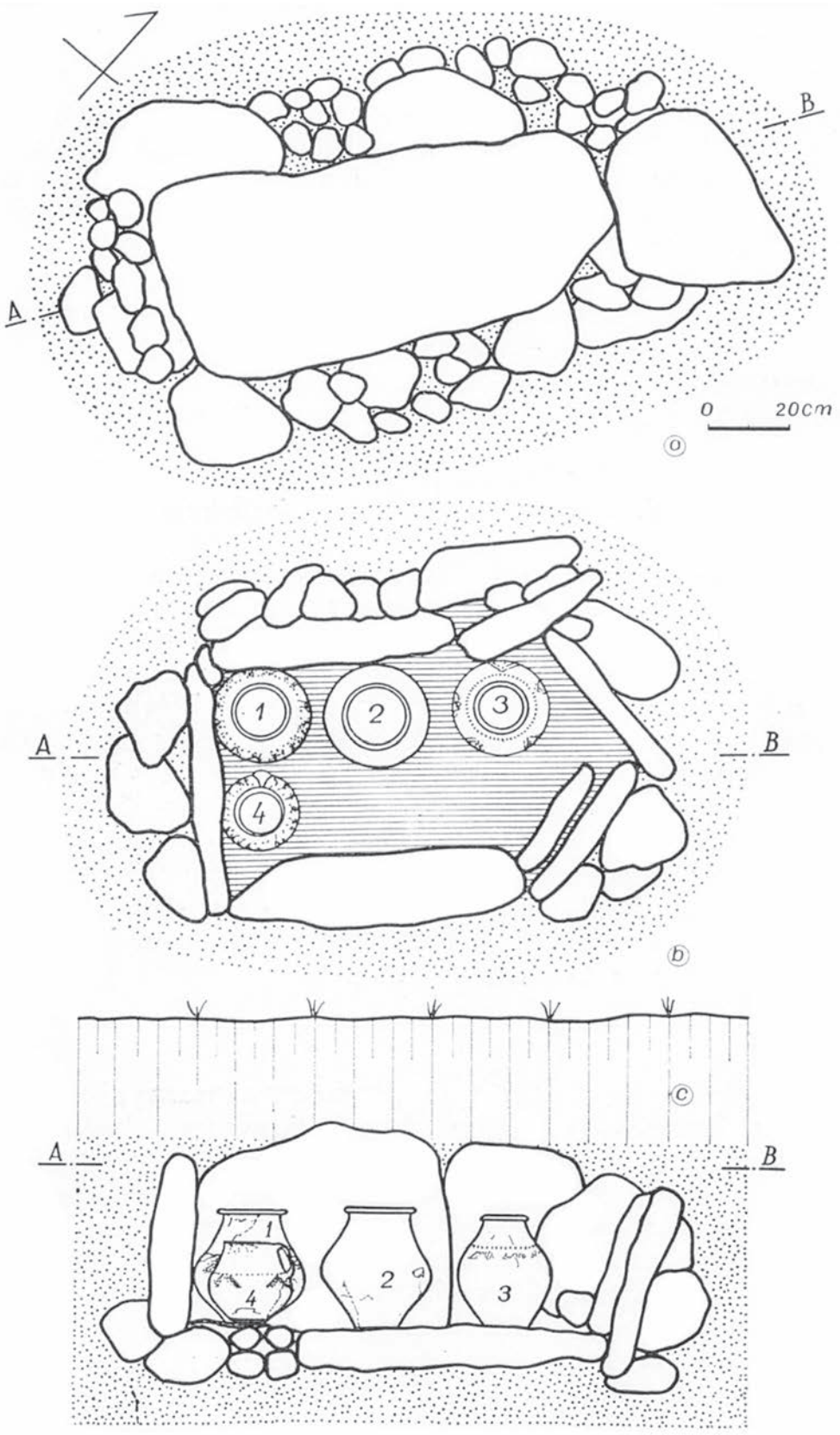


FIGURE 18. Nowa Wiśniewka, Złotów District, Wielkopolskie Voivodeship, Site 1, Grave 3 – an example of „a family" box grave of the Pomeranian Culture KP. After Skrzypek 1978



vessel offers special protection. This type of feature in Late Bronze Age burial sites of the Lusatian Urnfields is rare, whereas their peak popularity falls in the Early Iron Age. At that time their range of occurrence was very extensive, covering almost the whole of Poland, except for the western and southern outskirts and the northeastern part, where such graves appear only sporadically (Malinowski 1986; Kaczyński 2022, 56 ff.; Drzewicz 2024).

A separate issue concerns the identification by some scholars of a distinct taxonomic unit (the Cloche Grave Culture) based on the occurrence of "pure" cloche-cover burial sites, that is, cemeteries dominated by this specific grave form and at the same time lacking features of the funerary rite characteristic of the Pomeranian Culture. Such necropolises cluster along the Vistula, roughly along the stretch from the mouth of the Drwęca river in the north to the mouth of the Nida in the south (Kaczyński 2025/1, 20–27, fig. 1) (Fig. 2).

Barrow grave fields from the Late Bronze Age and Early Iron Age are currently known only from certain regions of modern Poland, which probably does not reflect their original range. Rather, it is a consequence of increasing anthropogenic environmental pressure, which intensified in the mid-19th century with the introduction of new agricultural techniques. Undoubtedly in Pomerania during the 2nd and the first half of the 1st millennium BCE, barrow graves were a permanent element of the cultural landscape. The exceptional nature of Pomeranian barrow burial sites – in terms of grave architecture, burial equipment, and horizontal stratigraphy – places these sites among monuments of fundamental importance for understanding the cultural nature of this region in the Late Bronze Age and the beginnings of the Iron Age (Janiak 2014). The necropolises at Siemirowice (Lębork District, Pomerania) and Dolice (Stargard District, West Pomerania) can currently be regarded as the best-studied sites for the eastern and western parts of Pomerania, respectively (Szymańska 1977; Szymańska-Bukowska 2023; Kaczmarek 2015).

Stone cists in Pomeranian barrows, usually situated approximately in the centre of the area delineated by the stone ring, were carefully constructed from specially selected large glacial erratic boulders, which allowed for the creation of walls, floors, and covers composed of segments as wide as possible. These structures contained either urned or unurned cremation burials. Outside Pomerania, where the presence of stone cists (either sunk into the ground or set on the contemporary surface) has been recorded at least since BrD–HaA1, such constructions occur rather incidentally. In the West Balt Barrow Culture they became a fairly common form of grave architecture, but only in the Early Iron Age (Hoffmann 2000, 31–42). It is now difficult to determine whether the custom of building stone cists in Pomeranian barrows had a local origin (perhaps reaching back to a megalithic tradition) or was adopted from the Nordic areas and the lower Elbe region.

At Dolice in Western Pomerania (Stargard District), some of the barrows containing stone cists also included additional burials deposited in other locations within the mound. Occasionally these accompanied empty stone cists that contained no skeletal remains. The presence of small fragments of human bone recorded in the deposits of stones and earth of these barrows indicates that cremation remains were scattered there during the construction of the mounds. This phenomenon has also been observed at other Pomeranian burial sites, including those dating to the Early Iron Age. Most likely this custom is also connected with the presence of small clusters of pottery resulting from intentionally broken vessels (Kaczmarek, in this volume).

Barrows with a stone ring and a stone-and-earth or earth mound, containing burial chambers in the form of a rectangular cist built from split stone slabs or boulders, most often located in the south-western or southern part of the barrow, represent the most numerous category of graves among the people of the West Balt Barrow Culture. They occur throughout the entire south-eastern Baltic littoral in the Early Iron Age, with a marked concentration in western Masuria and on the Sambian Peninsula. A single cist (occasionally two cists within one barrow) contained from several to several dozen urns. Grave vessels were often placed in layers one atop another or separated by stone paving (Okulicz 1970, 65 ff.; Hoffmann 2000, 33 ff.).

With the emergence of the Urnfield Cultures, i.e. from the Late Bronze Age, earlier standards of grave goods changed: in the western zone of Poland they were associated with the barrow ritual, while in the eastern zone they predominantly followed the Trzciniec model. The number of ceramic vessels placed in graves began to increase markedly, whereas more substantial metal objects

chiefly ended up in hoards. Only small bronze ornaments: pins, rings, spirals, less often bracelets appear in limited numbers, and sporadically sickles, small axes, knives, or spear-javelin points. The number of accessory vessels and the frequency of bronzes placed in graves vary significantly from one region of Poland to another. In the Oder basin zone of the Lusatian Urnfields, the grave goods were decidedly richer (especially in bronzes) than in the eastern zone. A more frequent occurrence of graves with richer metal contents began in the Early Hallstatt Period. It should be emphasized, however, that truly richly furnished graves were an absolute exception in the Late Bronze Age in Poland, and, compared with the neighbouring areas (e.g. the Nordic milieu), they were decidedly less splendid. An example of such an assemblage is a Late Bronze Age (IV EB) barrow from the village of Banie in Gryfice County, West Pomerania (Eggers 1936) (Fig. 19).

The grave goods in barrow and flat burial sites of Pomerania clearly differ from those in the rest of Poland, especially from the pottery-rich graves of the nearby Oder basin zone of the Lusatian Urnfields. Most often single urns – almost always covered with an inverted bowl, and sometimes placed on another bowl – are accompanied by no more than one or two accessory vessels. Metals in grave goods, as in other regions, are rare, which contrasts with the extremely rich and varied hoards from this region. This is especially striking on barrow burial sites, with impressve carefully executed funerary architecture (e.g. Szymańska 1977; Szymańska-Bukowska 2023) (Kaczmarek, in this volume).

The standard of grave goods in cremation burials in Poland changed markedly at the beginning of the Iron Age. Although the basic canon of the funerary rite was preserved – urned cremation graves continued to dominate burial assemblages – clear social and economic differentiation among the deceased became apparent from this point onward. This differentiation is particularly evident in the burial sites of the Oder River zone of the Lusatian Urnfields, where it is reflected both in grave constructions and in the furnishings of the burials. It reflected the emergence of contemporary social elites who sought to demonstrate their above-average status also through atypical burial practices. This can be observed at burial sites in Domasław (Wrocław District, Lower Silesia) (Józefowska, in this volume), Kietrz (Głubczyce District, Opole Region), Łazy (Wołów District, Lower Silesia), Świbie (Gliwice District, Silesia) and Gorszewice (Szamotuły District, Wielkopolska) (Gedl 1991, 112–117; Gediga, Józefowska 2019, 177–199, fig. 264, 266). It is not only in these necropolises that a significant number of graves stand out at that time due to their construction (e.g. chamber graves in Silesia from around the 8th century BCE) and their grave goods (imported objects). This process can be interpreted as a secondary effect of the mechanism that Wolfgang Kimmig called "Mediterranization", involving the influx of influences from Mediterranean civilizations (especially ancient Greece) into the Hallstatt circle communities, and through them into the south-western reaches of Poland. Once the Hallstatt social elites reached a certain level of socioeconomic and cultural development, they began to adopt civilisational gains from the regions south of the Alps, above all elite customs and the associated luxury items that enhanced prestige. From the Hallstatt milieu, they were transmitted further north. With the influx of luxury goods from the Hallstatt milieu and northern Italy, new ideas rooted in the world of Mediterranean civilizations were disseminated, and these gradually changed the consciousness of the populations they reached (Kimmig 1983, 71 ff.). This, in turn, was reflected, among other things, in funerary rites. But this also concerned the growing demand for locally made luxury items, such as Silesian painted pottery (Figs. 6, 7), which went primarily into richly furnished graves attributed to the contemporary elites in Silesia, Wielkopolska, and neighbouring Lusatia (Łaciak 2017). In such contexts in the Oder-bank zone of the Lusatian Urnfields, pottery predominates – mainly drinking vessels and disc-shaped plates forming consumption sets that probably, to some extent, refer to the analogous sets from the "princely" Hallstatt burials. These, in turn, were imitations of vessel services for imagined or described funerary libations, known from Etruscan tombs and modelled on accounts of Greek heroes. Among the groups of luxury and prestige items encountered in exceptionally well-furnished "Lusatian" graves of the Early Iron Age is also jewellery made of bronze and of iron, which was gaining increasing popularity at the time. These items were often imported directly from the Hallstatt milieu. A sign of prestige and



FIGURE 19. Banie, Gryfino District, Zachodniopomorskie Voivodeship. The grave goods from princely burial dated to HaB1. After Kowalski, Kozłowska-Skoczka 2012

luxury was also the placing in graves of weapons, above all swords, which earlier in Poland were practically only found in hoards. Swords in richly furnished graves from Silesia and Wielkopolska strongly indicate the formation of local layers of "aristocracy", similarly to those in the Hallstatt world, where they were a direct borrowing of customs practiced in Mediterranean civilizations (Gediga, Hensel, Józefowska 2018).

A peculiar phenomenon in funerary practice in the Polish Late Bronze Age and Early Iron Age (going beyond the established norm of cremation dominance) is the occurrence of bi-ritual burial sites. Their distribution is limited to Upper Silesia and directly adjacent areas, though inhumation burials also occur in the Subcarpathian region within the Tarnobrzeg Lusatian Culture (Bachórz-Chodorówka, Rzeszów District, Outer Subcarpathia; Grodzisko Dolne, Leżajsk District, Subcarpathia), also in east Wielkopolska and Kuyavia (Czerniak, Mogilno District, Kuyavia-Pomerania; Lachmirowice, Inowrocław District, Kuyavia-Pomerania; Radojewice, Inowrocław District, Kuyavia-Pomerania) (Szamałek 1995; 2009, 137–138).

Inhumation graves sporadically appeared in the Lusatian Urnfields already in the early Late Bronze Age (BrC/BrD–HaB1), individually and in the context of contemporary cremation necropolises. The largest concentrations of such burials are known from the southern part of central Poland (the interfluve of the upper Oder and upper Warta). From the end of the Bronze Age (HaB3–HaB3/HaC) up to the Older Pre-Roman Period, inhumation was the common practice for burying the dead in Upper Silesia and neighbouring areas, especially in the zone marked by the locations of today's cities: Częstochowa, Katowice and Opole, as well as in the adjacent western part of Małopolska (Gedl 1964; 1966). This is an area where inhumation graves did not appear in the early Late Bronze Age, although some of the local burial sites (e.g. Zbrojewsko, Kłobuck District, Silesia) had already been in use (Gedl 2002). It is therefore hard to see continuity of a tradition reaching back to the burial-mound period, nor can this custom be linked to influences from the Hallstatt milieu, which formed somewhat later. Therefore, inhumation there was a completely new phenomenon.

The Upper Silesia-Małopolska bi-ritual necropolises, numbering from several dozen to several hundred graves, have mostly been only partially investigated, although in a few cases a large part of their burial area has been identified. Among the better excavated and simultaneously studied sites are: Przeczyce (Będzin District, Silesia; 727 burials) (Szydłowska 1968; 1972), Świbie (Gliwice District, Silesia; 420 burials) (Michnik 2022; Michnik, Dzięgielewski 2022), Będzin-Łagisza (Silesia; 286

burials) (Galasińska-Hrebendowa 1989), Strzelce Opolskie-Adamowice (Opole Region; 98 burials) (Hufnagel 1941; Gedl 1966, 31–32), Danków (Kłobuck District, Silesia; 71 burials) (Gedl 1966, 8–9), Gliwice-Łabędy Przyszówka (Silesia; 59 burials) (Dobrzańska-Szydłowska, Gedl 1962), Zbrojewsko (Kłobuck District, Silesia; 45 burials) (Gedl 2002), Częstochowa-Raków (Silesia; 44 burials) (Dzięgielewski, in this volume), Gogolin-Strzebniów (Krapkowice District, Opole Area; 38 burials) (Tomczak, Szczepanek, Jarosz 2021), Szymiszów (Strzelce Opolskie District, Opole Area; 20 burials) (Gedl 1966, 33–35), and Opole-Groszowice (Opole Area; 4 burials) (Purowski, in this volume).

At the burial sites mentioned above, inhumation graves, arranged in rows oriented east–west, occurred alongside cremation burials, though they did not form separate clusters. The bi-ritual burial sites were dedicated to entire local communities, not only to outstanding individuals. The deceased who were not cremated were buried in a supine position, with the head oriented to the north or south and the arms straight alongside the body or, much less often, placed on it. Inhumation graves were generally better furnished than cremation burials. Grave offerings consisted of pottery vessels and small metal objects, and items made of bone or antler, though much less frequently. No significant quantitative differences were observed between the grave goods of female and male burials. Although the skeletal remains in many inhumation graves had completely decomposed, these burials still made it possible to reconstruct how clothing and body ornaments were worn by populations in the Upper Silesian-Małopolska zone of the Lusatian Urnfields. Based on the artefacts uncovered, reconstructions were made of characteristic multi-part diadems composed of various bronze and lead buttons attached to a frontal band made of sheep wool or leather, fastened at the back. Pendants in the form of single or multicoiled rings of wire or strip were attached to such bands at the temples, and triangular or binocular-shaped pendants placed on them (numerous examples come from grave assemblages discovered at the Gliwice-Łabędy Przyszówka and Będzin-Łagisza cemeteries). Interestingly, anthropological analyses of skeletons from graves whose furnishings included such diadems or their components have not provided a definitive answer as to whether they were worn exclusively by women, as some of these burials have been identified as male. It therefore cannot be ruled out that these ornaments were worn by representatives of both sexes (Szydłowska 1963).

Fragments of textiles recovered from inhumation graves at several bi-ritual burial sites (Świba, Łabędy-Przyszówka, Szymiszów), preserved on the skulls (among other reasons, thanks to the preservative properties of corroding bronze items there) are not only remnants of the aforementioned frontal bands (components of diadems) but also suggest the possibility that the deceased were covered with a large scarf or wrapped in a shroud shortly before burial. Remains of clothing made of sheep's wool were also found, to which deer or roe deer hair had been added in order to protect the fabric from excessive moisture. The preserved textile fragments indicate the use of fabrics of varying thickness – sometimes very delicate and thin, made from carefully prepared yarn, but also thick and heavy textiles. Traces of dyeing have also been recorded (Słomska-Bolonek, Antosik 2022).

Older literature on the subject suggested that the inhumation burials, isolated within the environment of the Lusatian Urnfields, might testify to the presence of migrant populations of Illyrian origin (Malinowski 1975). The basis for such hypotheses was the evidence from Grave 89 at Przeczyce (Będzin District, Silesia), where the body of a 60 year old man was placed together with a musical instrument called a pan flute or syrinx, made of nine bone pipes of varying lengths, accompanied by pottery, bronze ornaments, and several amulets made of bone and mammal canine teeth (Fig. 20). The instrument from Przeczyce is one of very few such finds from the Bronze Age and Early Iron Age discovered north of the Alps, known from depictions on bronze situlae from present day Slovenia (Magdalenska gora; Vače) and northern Italy (Bologna Certosa; Providence; Montebelluna) and Austria (Dürrnberg/Kranzbichl), dated to the 6th and 5th centuries BCE. The presence of pan pipes in Upper Silesia should be interpreted as one of the manifestations of the so-called Hallstattization process – the incorporation of the Oder river Lusatian Urnfields zone into the sphere of influence of the East Hallstatt Culture, affecting both material culture and spiritual life (beliefs, customs) from HaB3/HaC to the end of HaC (Gediga 2013).

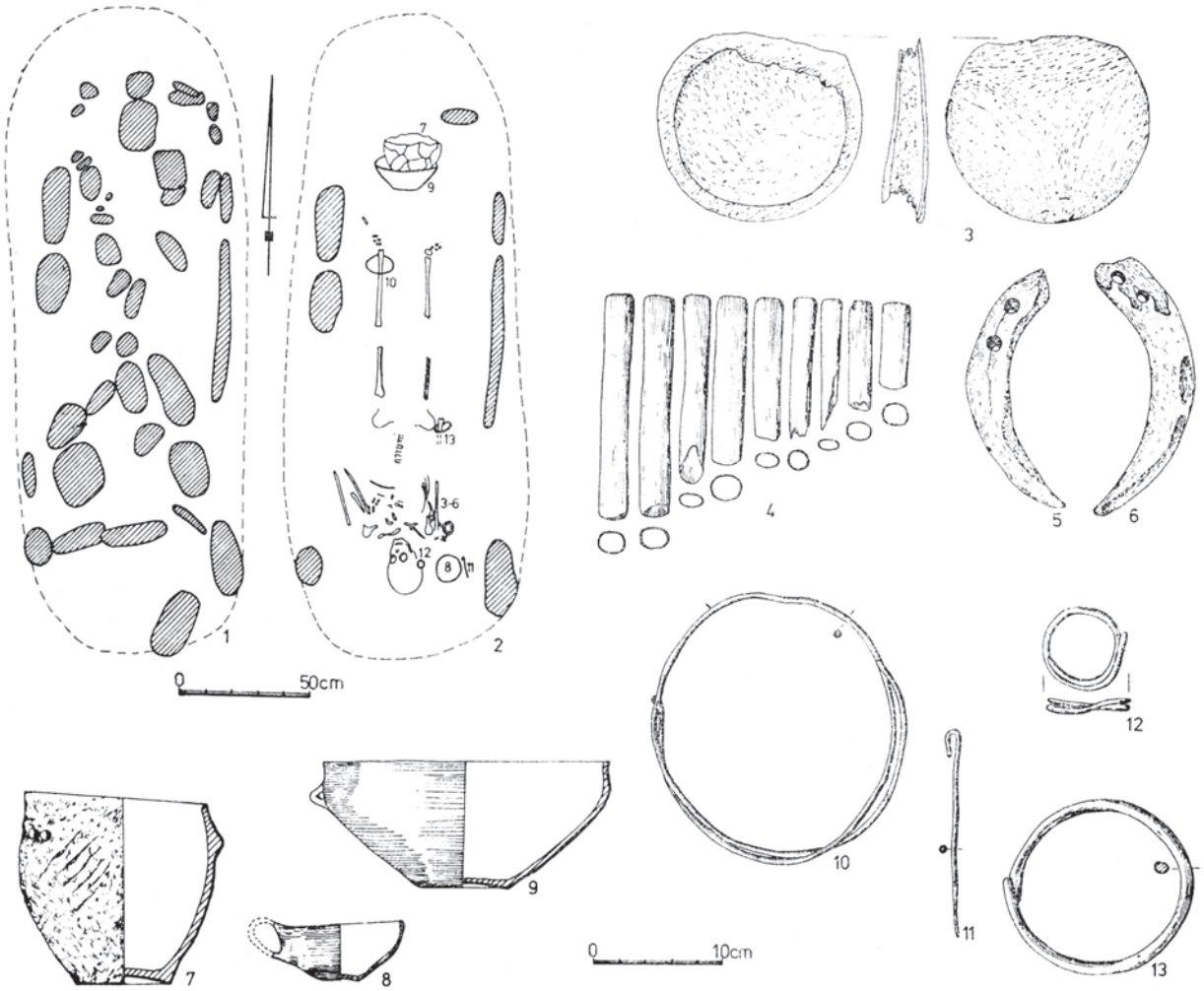


FIGURE 20. Przeczyce, Będzin District, Śląskie Voivodeship, Grave 89. The grave goods with a panpipe. After Szydłowska 1968

Conclusion

The formerly mentioned zone division of the area of modern Poland in the Late Bronze Age and Early Iron Age was a consequence of differences in the dynamics and course of cultural processes and phenomena that took place between the 13th and 4th centuries BCE. Some of these processes were long-term and evolutionary (e.g. the slow development of agriculture and the resulting stabilization of settlement), while others were relatively rapid and did not continue further (e.g. the construction of fortified settlements); yet others initially appeared in this period but only reached full development in the next era (e.g. iron metallurgy). Territorial differentiation constitutes a strong argument for rejecting the long-standing concept of a single Lusatian Culture of exceptionally broad chronological and spatial extent, which – if not explicitly, then at least implicitly – has been identified with the Proto-Slavs. In the Oder and Vistula river basins for the chronological interval discussed here, we have archaeological evidence indicating the existence of at least four different cultural zones, characterized by differing levels of development, tempos of change, and directions of external influences coming from milieus with a higher degree of civilisational advancement. The cultural homogenization of the region of modern Poland emphasized in older literature for this prehistoric period should rather be seen as a manifestation of integration on a broader Central European scale, within the large complex of Urnfield Cultures, and not as a single culture unifying the population

across a territory resembling the borders of the early Piast state. Therefore today a more appropriate term for the cultural phenomena occurring in the Late Bronze Age, especially in the western (Upper Oder) zone of Poland, seems to be the *Lusatian Urnfields*.

One of the more significant phenomena that began in the Late Bronze Age was the spread of cremation, which then prevailed in the region of Poland uninterrupted for over two thousand years, until the introduction of Christianity. Locally occurring inhumation graves (and only as part of practiced bi-ritualism) were merely exceptions that confirmed the rule of widespread cremation.

Bronze metallurgy played an extremely important role in shaping the cultural character of Poland from the Early Bronze Age onward. Undoubtedly throughout the Bronze Age, and especially in its later phase, the Upper Oder route was the most important conduit in this respect: along it raw materials and finished products – as well as other elements, some imperceptible in the archaeological record – reached Silesia, Lubusz Land, Wielkopolska, and Pomerania. For Pomerania, influences from the Nordic sphere and the entire south-western Baltic littoral, of which this region was a part, were of special importance. It is difficult to downplay the poorly studied Oder-Elbe interactions here, which began already in the Early Bronze Age and are also evident in the Late Bronze Age through similar sets of ornaments appearing in hoards, as well as in the early Iron Age through the spread of elaborate face and house urns. In Outer Subcarpathia and eastern Małopolska, the influences, and sometimes even the physical presence, of representatives of the Transcarpathian cultures (Noua, Gáva) are clearly visible, followed by those associated with the Scythian environment.

In the Late Bronze Age and the Early Iron Age, a process of intensive cultural integration began in the region of Poland, yet within the above-mentioned clearly-delineated zonal division. This process continued throughout the Younger Pre-Roman Period and the Roman Influence period, culminating in a relative socio-political unification of the state of the early Piast rulers (10th–11th centuries). It is difficult today to determine whether it was consistently built by the same demographic substrate, enriched over nearly two millennia by the influx of foreign populations, while also diminished by numerous demographic disasters. Complete population changes in the settlement of many areas, as history shows, are an extremely rare phenomenon. For not all of the local population ever leave, leaving empty spaces for newcomers from outside. Similarly, invaders rarely succeed in completely exterminating a conquered population, which, for economic reasons, would in any case be entirely impractical. Contrary to the suggestions of earlier researchers who insisted on the Proto-Slavic nature of the lands lying in the Oder and Vistula river basins as early as the 2nd millennium BCE, as well as those misled by the vague statements of ancient sources who would like to see Germanic tribes here at the end of antiquity, archaeology lacks the instruments to make a decisive statement on this matter. Palaeogenetics, as recent studies of the physical remains of the Piast rulers best illustrate, also fails to provide a clear answer in this regard. Perhaps the answer to this question is not needed at all.

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zmian społeczno-kulturowych)/Transformations of the funeral rite in the Bronze Age and Early Iron Age in the light of analysis of sources from the cemetery in Domasław, Wrocław District, and necropoles of the near region (problems of socio-cultural changes). Wrocław: Instytut Archeologii i Etnologii PAN/Wydawnictwo i Pracownia Archeologiczna Profil-Archeo.

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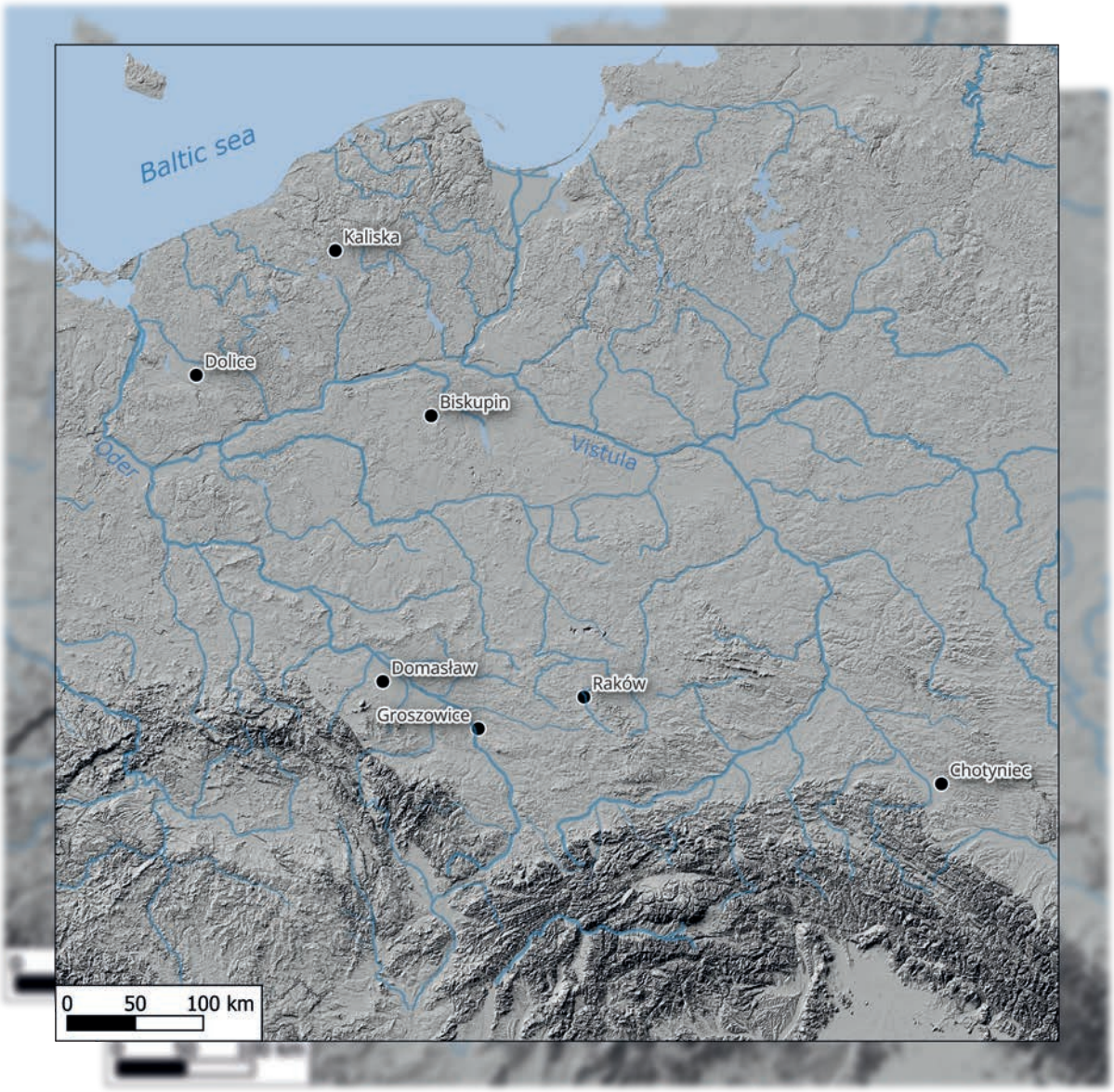
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LOCATION OF THE SELECTED LATE BRONZE AGE AND EARLY IRON AGE SITES DESCRIBED IN THE FOLLOWING PAGES



DOLICE, SITE 40

Maciej Kaczmarek

Dolice, a village and the seat of a commune in the Stargard district of Zachodniopomorskie Province, is situated on the Pyrzyce-Stargard Plain which spreads around Lake Miedwie, reaching beyond the Ina valley to the east. The barrow cemetery was founded outside the present–day village of Dolice, in a land covered with dense old forest of beech and oak. It was established on a gentle slope of a moraine hill, covering an area of approx. 1.5 hectares. Within a 400 m long stretch of land oriented along the NW–SE axis approximately 80 barrows were recorded, ranging from 3 to 25 m in diameter (Fig. 1).

Archaeological excavations carried out in the Dolice region within the framework of a broader research programme of the former Department of Archaeology of the Oder River Basin of the Institute of History of Material Culture of the Polish Academy of Sciences (currently: Centre for Medieval Archaeology of Baltic States in the Institute of Archaeology and Ethnology of the Polish Academy of Sciences in Szczecin) lasted for nearly one and a half decades (1976–1989). The aim of the program led by Stefan Wesołowski (1927–1995) was to examine the cultural and settlement landscape of the Pyrzyce-Stargard Plain in the Late Bronze Age and Early Iron Age. The expedition focused its work primarily on the exploration of the barrow cemetery at Dolice Site 40, and also carried out brief excavations (1976–78) at the nearby barrow cemetery Dolice Site 30 and a settlement at Dolice Site 45.

Between 1979 and 1989, the main effort of the archaeological expedition in the Dolice region focused on the exploration of the north-western part of a vast necropolis at Dolice 40. The excavations encompassed two basic sectors in the mentioned part of the site. The first sector, in the north–western corner of the necropolis and covering 600 m, yielded six earth and stone mounds accompanied by 61 flat burials, most of them in circular stone settings and covered with stone pavements (Fig. 2). In the second sector, which according to S. Wesołowski's account covered 800 m^2, one of the largest barrows in the entire cemetery (Barrow VII) was found, another one explored only in small part (Barrow VIII), and two flat burials.

Along with the earth-and-stone construction, a trait common to all the Dolice barrows was the presence of a stone circle (usually in the form of a single row of stones, only in one case a double row) delineating the circular or nearly circular bases of the mounds. The circles were built of outstandingly large stones, sometimes laid in two or even three layers, additionally reinforced with small pebbles from the outer side. These kerbs had diameters ranging from 4.50 to more than 10 m. Taking the constructional elements of the base and interior as the criteria of division, the barrows investigated at Dolice 40 can be divided into two basic morphological groups (Fig. 2):

- barrows with a single or double stone circle and the main burial placed in a stone box. These constitute the majority of the excavated mounds;
- barrows with a single circle and a stone core, centrally placed, within which the main, urnless burial was placed.

Apart from the main burials, in some of the barrows additional burials were also uncovered, along with other pits of undetermined function, non-funerary clusters of pottery, a hearth, and a possible stone stela.

Stone boxes, always situated in or near the centre of a barrow, were neatly built from large erratic boulders, carefully chosen to enable long sections

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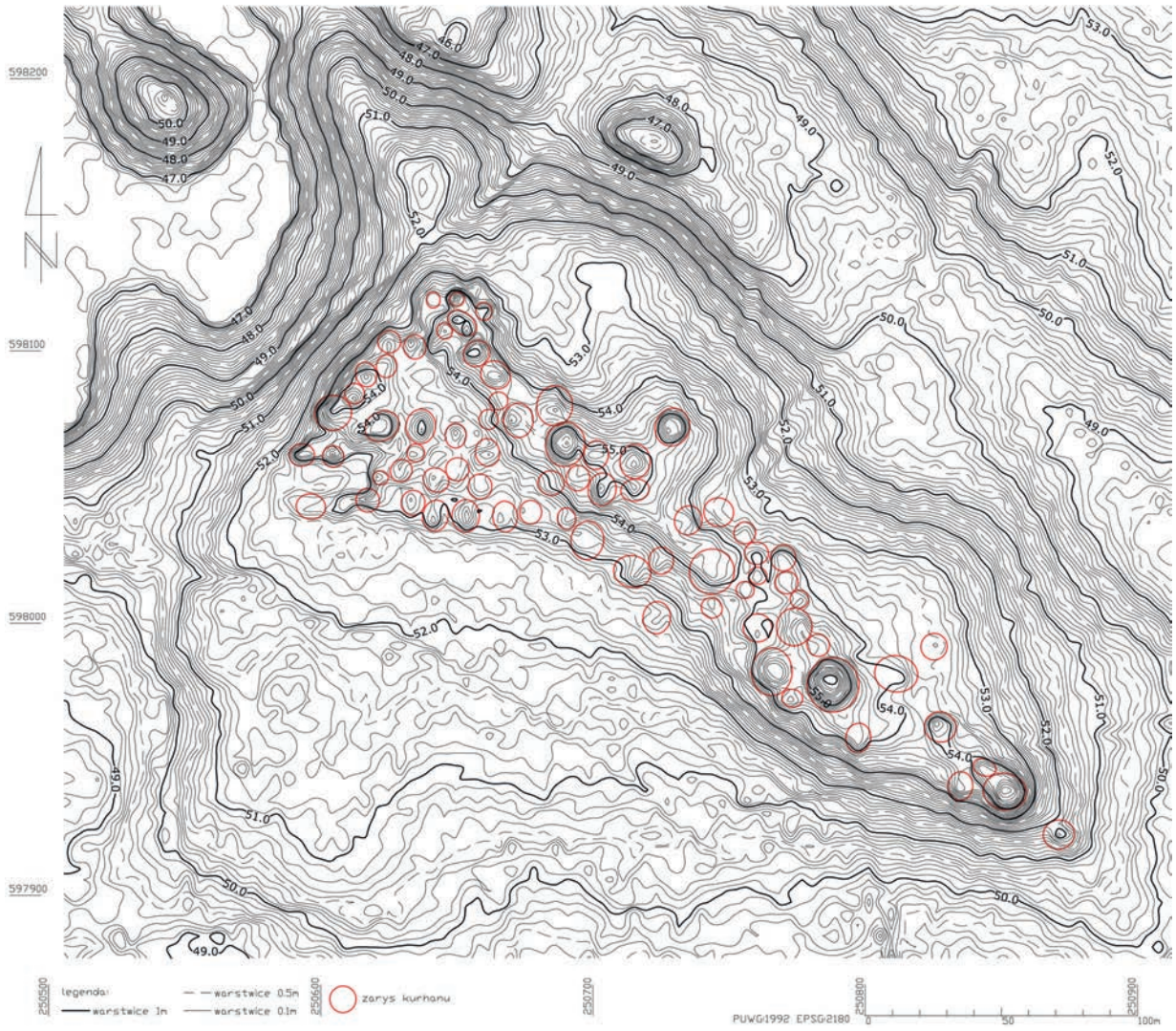


FIGURE 1. Dolice, Stargard District, Site 40. Digital topographic plan of the barrow cemetery. After Kaczmarek 2015

of walls, floors, and covers to be built. Always erected at the same level as the circles, the boxes were oriented along the south–north or east–west axis and were always reinforced with smaller stones on the sides and from above. The shorter sides of the boxes ranged from 40 to 145 cm, while the longer were from 40 to 225 cm. Most of the stone boxes from Dolice 40 held urnless burials without the addition of pyre remains. Only in one case was there a double urn burial, in two levels, accompanied by loosely scattered remains of the pyre and tiny fragments of charred bones (Barrow I).

Barrows V and VI revealed a specific manner of depositing urnless burials by scattering the remains of cremation over a stone pavement (centrally placed within a barrow) and protecting them by covering them with subsequent layers of pavement. It is not a completely unknown custom, as such behaviour was also recorded in other Late Bronze Age cemeteries in Western Pomerania, and was observed in flat graves, as well.

Some of the barrows with stone boxes also held additional burials situated in other places. In Barrow IV, tiny cremated bones mixed with fragments of a bowl were discovered within a charcoal-saturated deposit outside the box and under the pavement. The field documentation mentions the presence of tiny fragments of human bones in the layers of earth-and-stone mounds, which suggests they could have been scattered during

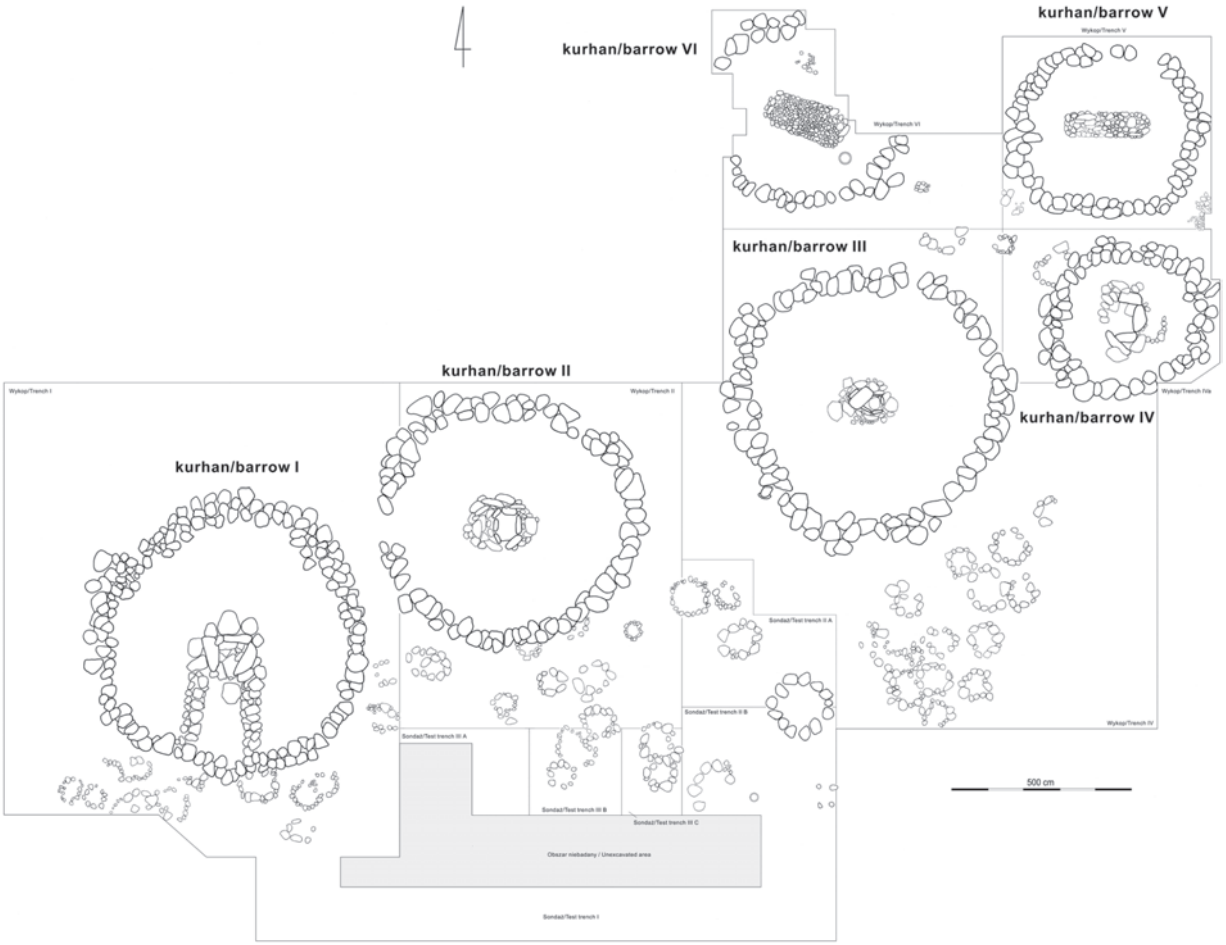


FIGURE 2. Dolice, Stargard District, Site 40. General plan of Sector I (except for Barrow VII) of the explored part of the barrow cemetery – the third exploration level. After Kaczmarek 2015

barrow construction. This phenomenon was also noted in other cemeteries in Pomerania, both contemporary to Dolice and later, of Early Iron Age date. Most likely the custom of spreading the cremation remains is also connected with the discovery of small clusters of potsherds originating from broken vessels.

A total of 63 certain or probable flat graves were recorded, including both urn burials and urnless cremations, almost always protected by stone constructions (usually circular settings), and covered with stone pavements.

The very modest equipment of burials situated both in the barrows and in flat graves is striking. One may state without risking exaggeration that this makes a startling contrast to the splendid and time-consuming construction of sepulchral features, barrows in particular. A huge majority of the large collection of the discovered pottery was found in highly fragmented form (Fig. 3). Most of these vessels were probably deliberately broken during funeral rituals, and the broken fragments were scattered over a large area. Analogical observations were made on other barrow cemeteries in Pomerania, where the small number of accompanying vessels placed in graves is also a typical element of burial customs rather than an exception. The exploration of nine barrows and 63 flat graves from both cemeteries has brought the discovery of only two bronze artefacts. They were both discovered in Barrow III in the larger necropolis, namely a roll-headed pin, and a tutulus (Fig. 4).

The cemetery at Dolice 40 belongs to a relatively small group of cemeteries in Pomerania in which flat graves occurred in the area between the barrows. The vast majority of these flat graves

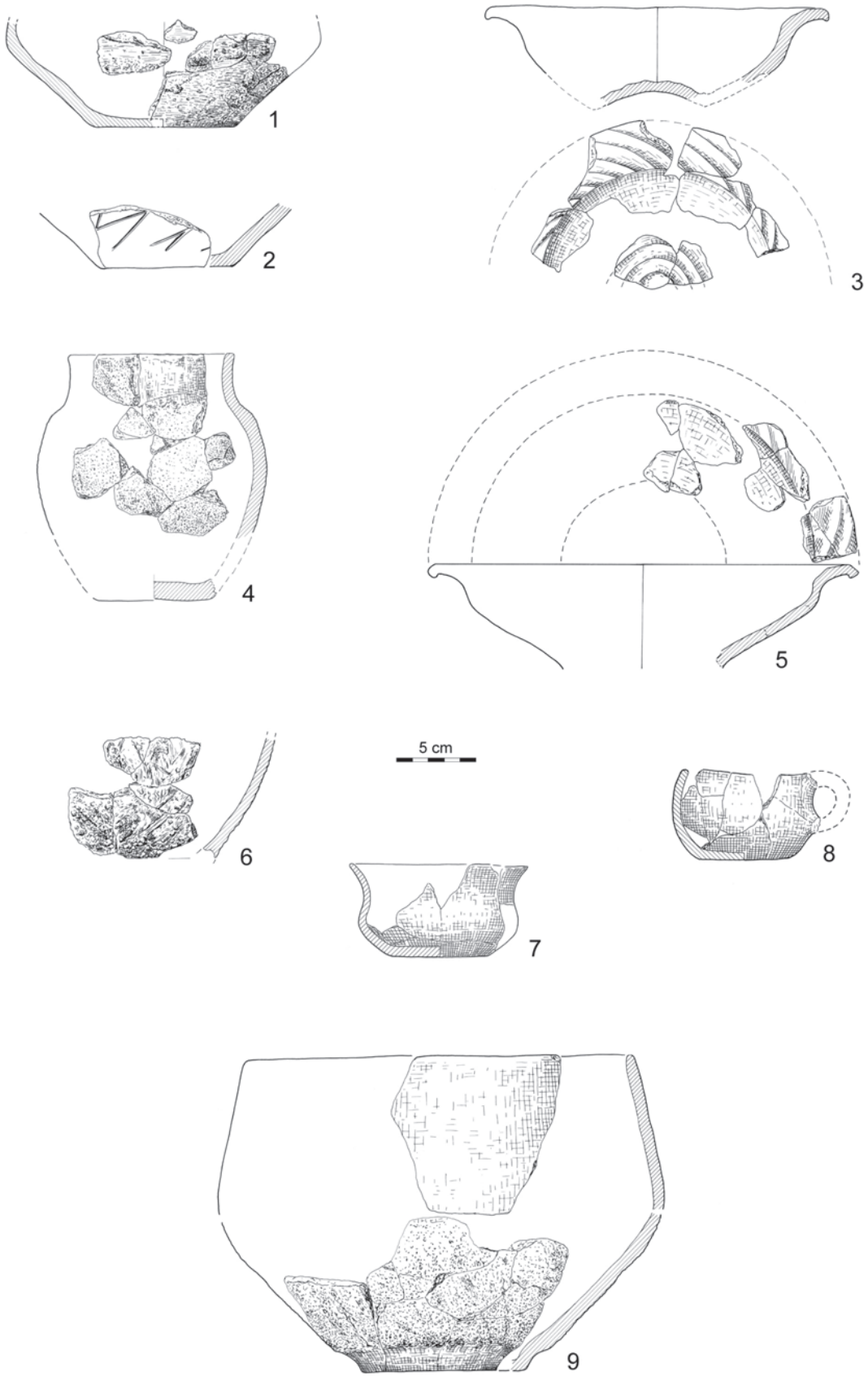


FIGURE 3. Dolice, Stargard District, Site 40. Grave 59 – example of ceramic inventory. After Kaczmarek 2015

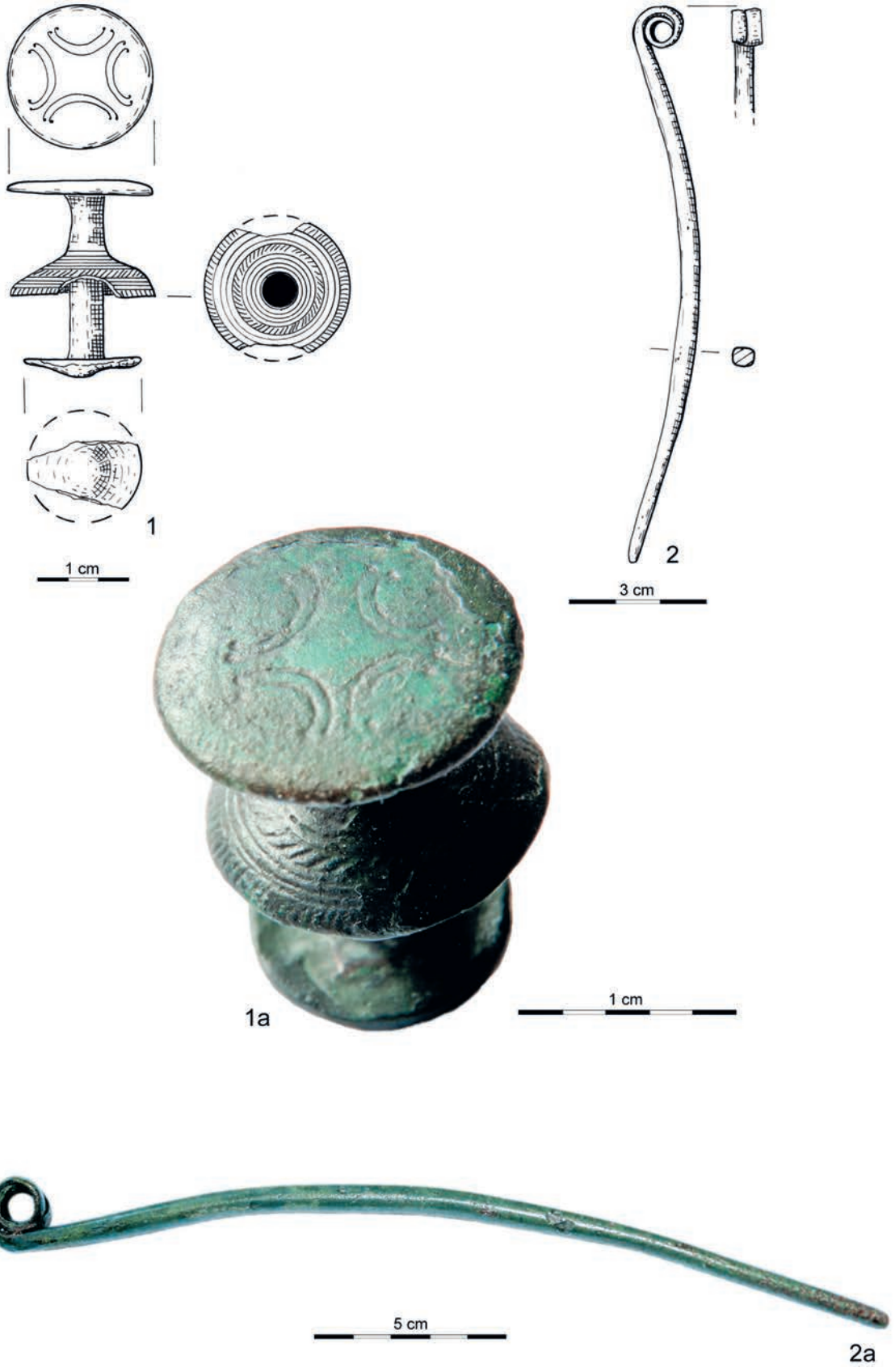


FIGURE 4. Dolice, Stargard District, Site 40. Barrow III – metal artefacts from the burial chamber. After Kaczmarek 2015



FIGURE 5. Dolice, Stargard District, Site 40. Examples of bowls discovered in the barrow cemeteries at Dolice (sites 30 and 40). After Kaczmarek 2015

were protected by stone constructions in the form of a pavement covering the burial and a circular or oval ring (circle). An urn covered with a bowl and placed on a stone support or a bowl, sometimes with a single accompanying vessel inside, is a standard form of a flat grave in Pomerania from that period, and was also the most frequent form at Dolice. Poor grave goods fully correspond with those recorded in barrow burials and the phenomenon can be seen as a kind of sign of the times in respect of funeral rites practiced during the Late Bronze Age, also outside the discussed region.

The cemetery at Dolice 40 has been archaeologically investigated only to a very limited degree, not exceeding 10% of the estimated total number of barrows; as for the number of flat graves even a rough approximation is not feasible. Therefore, the results concerning only the dating of the explored features can obviously not pass as a determination of complete chronological frameworks for the cemetery. Only two bronze artefacts and a relatively large but highly fragmented collection of pottery can be used for the needs of chronological analysis. The bronze roll-headed pin from Barrow III, is an artefact completely useless from the point of view of chronological determinations. The bronze tutulus discovered together with the pin represents a local, Pomeranian adaptation

of Nordic forms, dated to the Bronze Age Period IV (Fig. 4). Any more detailed chronological discussion must therefore rely on the stylistically relatively homogenous collection of ceramic vessels retrieved from barrows and flat graves. The typological analysis revealed several elements which allow linking most of the explored features with the Bronze Age Period IV. From the compact group of relatively contemporary sepulchral features flat grave No. 59 stands out as the only one for which the homogeneity of grave inventory is open to question. The inventory included fragments of decorative Kopanice plates (Fig. 3: 3, 5), considered to be typical of the Bronze Age Period V. Given the location of this assemblage within the cemetery, the possibility cannot be excluded that it marks the beginning of another, younger zone of burials, dated to the Bronze Age Period V and possibly also later, spreading to the east of the line marked by Barrows IV and V.

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KALISKA I AND KALISKA II – THE LATE BRONZE AGE METAL HOARDS FROM POMERANIA

Maciej Kaczmarek, Grzegorz Szczurek

Kaliska near Biały Bór (Biały Bór Commune, Szczecinek District, Zachodniopomorskie Province) is a small village in central Pomerania, situated on the border of hilly ground moraines of Pojezierze Szczecineckie, and high moraine hills of Pojezierze Bytowskie, highest part of the West Pomeranian Lakeland. In the spring of 2017 on agricultural land belonging to that village work was proceeding on an agricultural plot in the village of Kaliska to remove a boulder, which for years had been an obstacle to crops, from a field. The boulder was embedded almost entirely in the ground, protruding above the surface by about 20 cm. Prior to its extraction, the ground around the stone was carefully dug out to make it easier to remove the boulder with heavy equipment and transport it to the nearest field edge. During this work, an assemblage of bronze objects consisting predominantly of pieces of horse harness and weaponry was spotted lying just below the stone (hoard Kaliska II). The stone has a natural depression at its base, and we suppose it was in this area, located in the ground on the east or southeast side, that the set of artefacts found partly under the boulder was inserted. The objects were neatly arranged in a compact bundle and, which may seem unlikely, the finder mentioned fairly well-preserved remains of a leather bag in which the entire metal inventory was allegedly packed. Fragments of leather straps adhering to the phalerae lend some credence to this account, so it should not be considered merely in terms of adding colour to the story of the circumstances of the discovery. Some of the items, especially the 'small bowls' (phalerae), were attached to a sizeable leather harness. The state of preservation of the organic objects was highly satisfactory and allowed such a suggestive assessment of their original function – these were massive leather straps more than 100 mm wide (the breast strap of the harness?), and – particularly compelling to a Polish audience – the whole thing was described as looking like the very richly decorated horse harnesses used in "Goral carts" (the carts of Highlanders in the Polish mountains). The hoard uncovered during the removal of the boulder was carefully packed and requisitioned by the then tenant of the field, also a resident of Kaliska.

After the initial discovery of hoard Kaliska II made during the removal of the boulder from the field, amateur artefact hunters from the nearby town of Miastko turned up in the same place. They attempted a further search using a metal detector and excavated the second hoard – Kaliska I. It is highly probable that these two hoards were deposited in one place, possibly one above the other (Fig. 1). The set of metal products deposited in a large bronze vessel, most probably found near the bottom of the documented trench, is referred to as the Kaliska I hoard (Figs. 2, 3). The deposit located stratigraphically higher, directly under the erratic boulder, is known as Kaliska II (Fig. 5).

Both hoards were excavated in an unmethodical manner, in flagrant disregard of the law, and were

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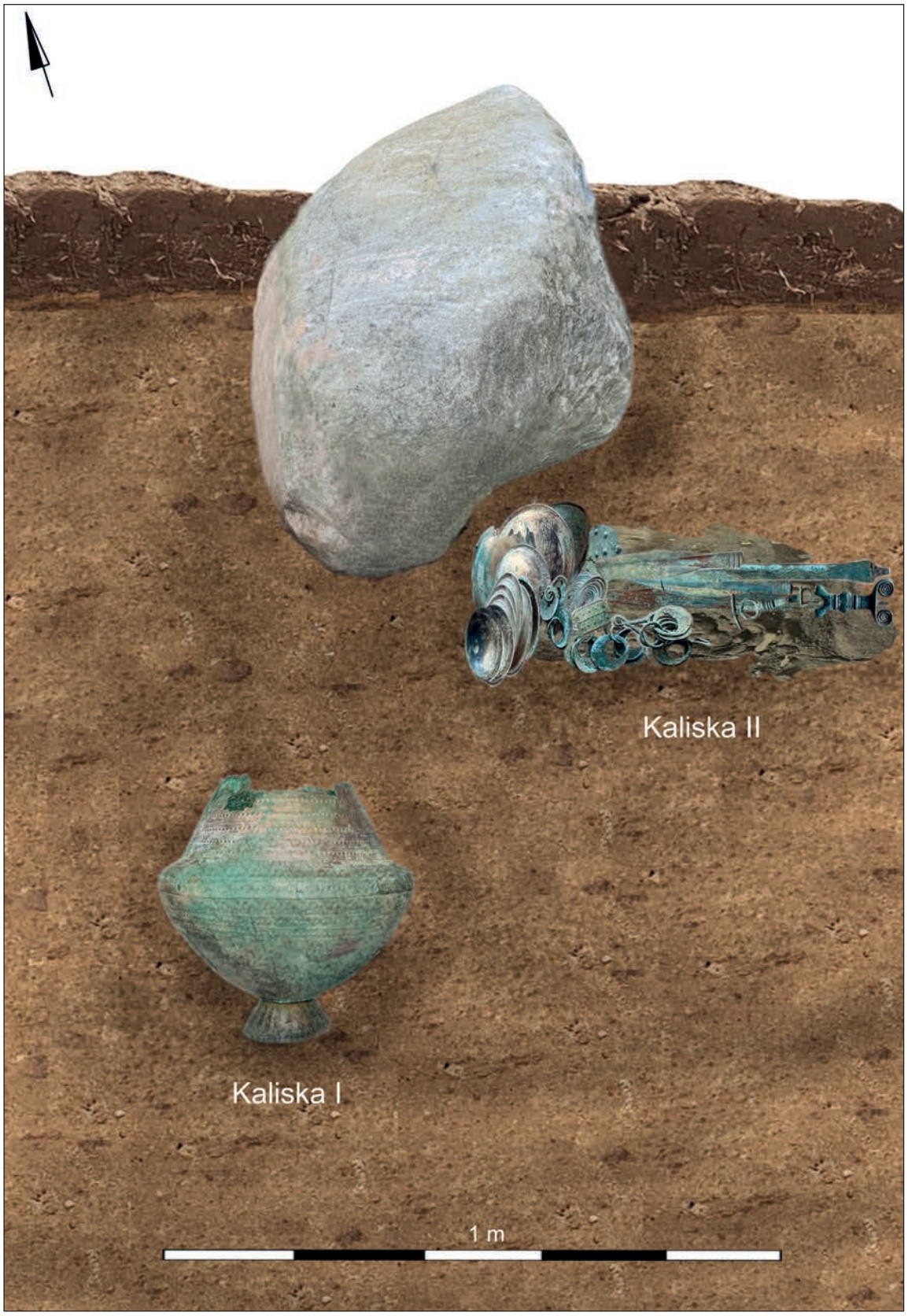


FIGURE 1. Kaliska, Szczecinek District, Zachodniopomorskie Province, Site 37. Presumed stratigraphic arrangement of the Kaliska I and Kaliska II hoards (western profile)



FIGURE 2. Kaliska, Szczecinek District, Zachodniopomorskie Province, Site 37. Bronze vessels from the Kaliska I hoard: 1–3 – the Hängebecken type; 4 – amphora referring to the Gevelinghausen–Veio–Seddin type



FIGURE 3. Kaliska, Szczecinek District, Zachodniopomorskie Province, Site 37. Collar made of sickle-shaped rings

subsequently illegally kept by the finders. These dire circumstances determine the available corpus of sources, which has certainly been deprived of a whole set of organic items associated mainly with horse harness and many remains of straps used for binding smaller objects, as well as wooden products, which may be ornaments.

The catalogue of artefacts forming the Kaliska I hoards numbers 124 items, and they are mostly various bronze items, from vessels made by the forging and casting technique, to impressive collars and kidney bracelets, to miniature buttons. Their state of preservation after conservation treatments is in the vast majority good or very good. The objects from organic materials have, however, survived fragmentarily, but this is due to the specific character of these materials (leather strap; spirally formed straps; ornament made from *Euonymus* [Spindle tree] wood).



FIGURE 4. Kaliska, Szczecinek District, Zachodniopomorskie Province, Site 37. Plattenfibel with horseshoe motifs from the Kaliska I hoard

The inventory of the Kaliska II hoard consists of more than 108 items. In it, metal objects related to horse harness prevail, especially decorative discs known as phalerae (the largest assemblage of these products so far discovered in Poland), jingle plates, decorative plates and rings (Fig. 6). Apart from these, the deposit included metal vessels, elements of dress clasps, two swords (one with a tang for the hilt and one with an antenna pommel – Fig. 7) and scabbard fittings, forming a functional whole with elements fastening the scabbard to the belt, javelin or spear heads, as well as a blade fragment of another specimen, inconspicuous fragments of bronze ribbon and the ribbon forms with a wooden rod (*Fraxinus* sp.). In addition to the amazing collection of bronze objects, the Kaliska II assemblage also



FIGURE 5. Kaliska, Szczecinek District, Zachodniopomorskie Province, Site 37. Inventory of the Kaliska II hoard

provided a set of leatherwork which, considering the scarcity of discoveries to date, certainly deserves to be called impressive – fragments of leather phalera mounts and relics of a leather scabbard.

The Kaliska I and Kaliska II deposits contains no obviously archaic elements and at the same time they show a significant chronological homogeneity of all the components which indicate chronology. This provides solid grounds for placing these assemblages within Bronze Age Period V. The fact that some of the bronze artefacts possibly continue into the following period allows us to assume, with a certain degree of caution, that the hoards was more likely buried in the second half of Period V, correlated with the HaB3 phase or even possibly at the turn of the HaB3/HaC. The few fragments of organic artefacts revealed among the metal objects provided a unique opportunity to determine the absolute chronology of the Kaliska assemblages. Twelve samples of both hoards, comprising fragments of leather and wooden objects, were sent to the Poznań Radiocarbon Laboratory.

The results of the Bayesian modelling procedure carried out, which fully meets the statistical consistency criteria, allow us to conclude that the deposition of the Kaliska I assemblage most probably occurred between 800–730 BCE (set at a confidence level of 68.3%, rounded up to 10 years) and the time of deposition of the Kaliska II assemblage should be located around 790–720 BCE. The radiocarbon dating obtained by Bayesian modelling corresponds with the relative chronology of the two Kaliska deposits proposed on the basis of the typological-chronological study.

The Kaliska I hoard should undoubtedly be considered absolutely unique in the context of analogous Late Bronze Age finds known from Pomerania, both with regard to the nature and size of the inventory. With over 120 metal objects contained in a large, impressive bronze-sheet vessel referring to the exclusive *Gevelinghausen–Veio–Seddintype* (Fig. 2: 4) this deposit ranks among the most impressive archaeological discoveries in Poland. The most spectacular among the metal elements of the Kaliska deposit are three Nordic cast vessels of the *Hängebecken type* (Fig. 2: 1–3). There were also four exceptionally beautiful collars made of sickle-shaped rings, one of them featuring representations of orants and a sun barge (*Vogel-Sonnen-Barke*) (Fig. 3); six rings made of from crescent-shaped collars of *Middle Pomeranian type*; another collar, sloping and longitudinally ribbed; thirteen typologically diversified necklaces (among them several *Wendelringe* and an imported closed necklace with ornamental oval plates); forty-three bracelets, including seven outstanding kidney bracelets; five Nordic *Plattenfibeln* (Fig. 4); three dress clasps of *the Wierzchowo type* and nine of *the Radolinek type*; and five phalerae. One must not overlook the phenomenal organic artefacts, in the form of fragments of leather and an ornament made of Euonymus wood, which are unique in this type of find.

In terms of the number of horse tack items, the Kaliska II hoard can only be compared to the outstanding assemblage from Ückeritz on Usedom, discovered in 1975. The composition of the Kaliska II deposit and the numbers of particular harness elements (which could be grouped into utilitarian sets) suggest it contained harness sets dedicated to three two-horse teams, the same as in the Ückeritz hoard.

The assemblages containing elements of horse tack together with female jewellery and, much less frequently, militaria and bronze vessels represent a particular type of Late Bronze Age hoard from the Southwest Baltic zone and southern Scandinavia. The two hoards from Kaliska, deposited in one place and in a tiered arrangement, should most likely be seen as a complementary and functional whole and interpreted accordingly. Kaliska I is definitely dominated by dress items: necklaces, collars, brooches, clasps, bracelets, and a diadem. These are accompanied by hanging vessels, single objects related to horse harness, and special-purpose items, all placed in a magnificent bronze amphora referring to the Gevelinghausen–Veio–Seddin type. The Kaliska II assemblage, meanwhile, is mainly comprised of lavish sets of horse harnesses, militaria, and a few dress clasps and bronze bowls.

Male attributes in the Kaliska II hoard are limited to only two swords and four javelin/spear heads. Similar conclusions regarding the distribution of female and male attributes in assemblages containing horse harness items also emerge from the observation of Scandinavian materials, confirming the evident semantic association between women and two-horse harness in the Late Bronze Age. A distinct concentration of such mixed assemblages dated to the Late Bronze Age is evident in Middle Pomerania (including the hoards from Wierzchowo, Komorze, and Kaliska,

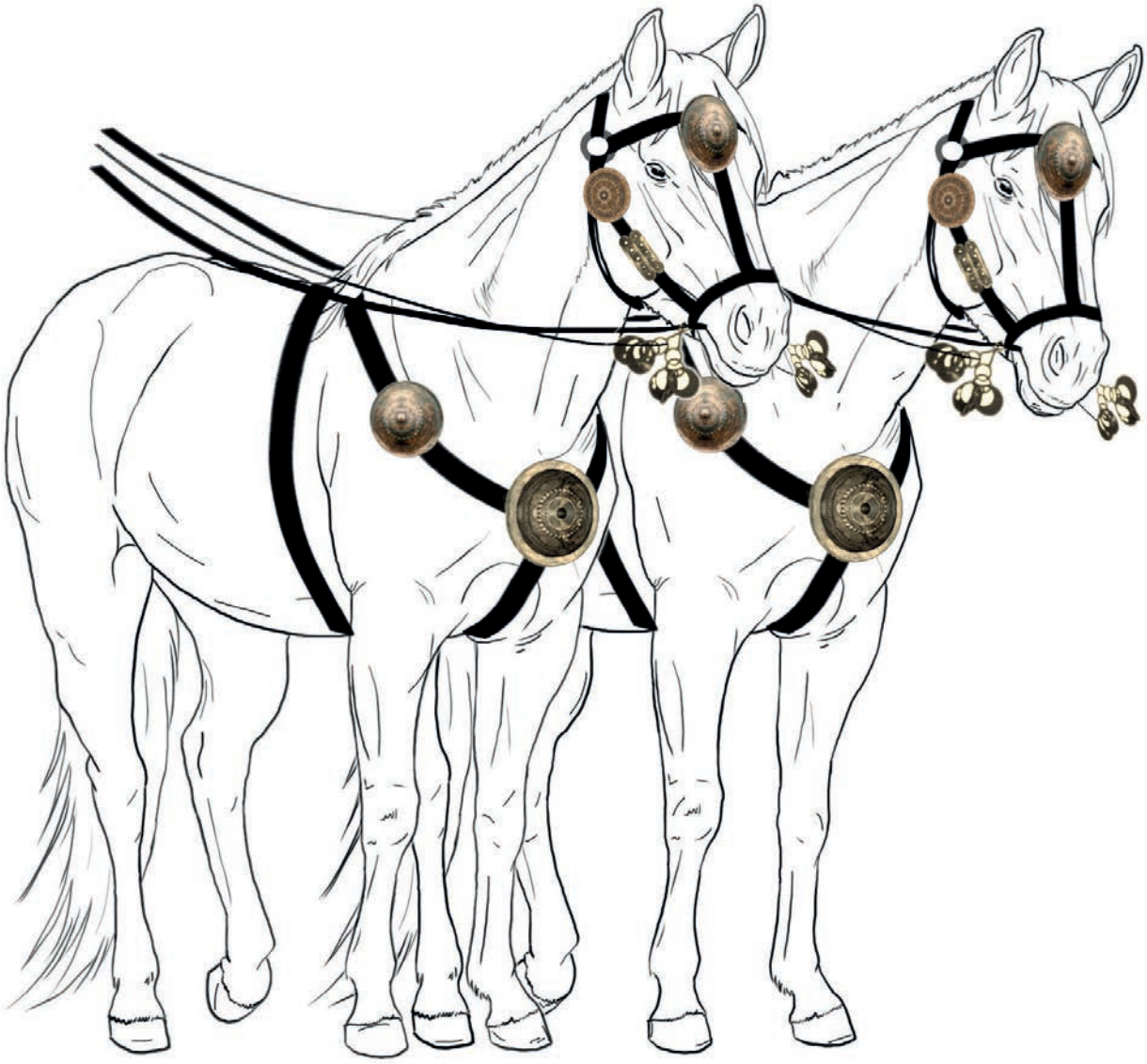


FIGURE 6. Kaliska, Szczecinek District, Zachodniopomorskie Province, Site 37. Proposed reconstruction of the arrangement of horse harness elements

all in Szczecinek District, Zachodniopomorskie Province), which reflects certain trends in the local cultural milieu. Linking such a particular composition of deposits with ceremonial processions with two-horse carts, in which women may have acted as priestesses, seems well-grounded in the sources. In this view, the rich sets of female jewellery and ceremonial horse harnesses from Kaliska should be seen as furnishings of a liturgical nature. The sets of fine ornaments may have been elements of the costume of female worship specialists, with the harness items belonging to ceremonial two-horse carts. The number of ornaments included in each hoard indicates that at least several people took part in the ceremonial activities. Such ceremonial processions have been immortalised in Scandinavian rock art, in all probability a record of the rituals of the time. An association with these rituals could be found in the inventories of more than 60 hoards known from the South-West Baltic zone and southern Scandinavia, including both Kaliska deposits.

The exceptional richness of both Kaliska hoards invites speculation about the special character of the place where they were deposited. Worship and processions may have taken



FIGURE 7. Kaliska, Szczecinek District, Zachodniopomorskie Province, Site 37. Sword with slightly tapering tang (1) and sword with an antenna pommel (2)

place in a unique space of central importance, at least in some cases. The position of Middle Pomerania at the end of the Bronze Age looks extremely interesting. Combined with the highly probable presence of a defensive settlement, the concentration of hoards, which contain imported objects along with clearly local ones, representing a style specific only to this area, suggests the existence of a regional centre, one important on the cultural map of the South-West Baltic zone and an important point on the long-distance exchange route. Perhaps such a site would be a centre of power as well as an important centre of ritual and worship, as indicated by the hoards from Kaliska and the presumed sacral character of the site of their discovery.

The results of provenance studies of nine phalerae from the Kaliska II hoard also indicate the role of the Pomeranian region in the metal exchange networks in the Bronze Age in Northern Europe. Pb isotopic and chemical data, supported by archaeological and typological information, were compared with patterns of movement and consumption of metal products in the region. The results suggest the metal used in making the domes of the phalerae could have been sourced from copper mines in Great Orme, Cornwall, the Italian Alps and South Tyrol. This indicates that the region of northern Poland was involved in a metal trading network that connected much of Europe in the 8th century BCE, providing further evidence for interconnections between Pomerania and the Nordic zone in the North European Bronze Age. It seems therefore quite possible that the bronze was traded to northwest Poland from Scandinavia. Another possibility is that the trading routes that powered the flow of metal to Northern Europe had an offshoot through the Baltic coast of Pomerania. It likewise seems possible that the same area of northwestern Poland may have operated as one of the pick-up zones for metal (work) going north to the Nordic Bronze Age region.

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OPOLE-GROSZOWICE, SITE 110

Tomasz Purowski

The bi-ritual cemetery in Opole-Groszowice, attributed to the so-called Upper Silesian-Małopolska Group of the Lusatian Culture, is located on the right bank of the Oder River, within the Silesian Lowland. The necropolis, dated from the HaA1 phase (around 1200 BCE) to the HaC2–HaD1 phase (approximately 720–600 BCE), was used for about 500–600 years. The oldest discovered item is a bronze pin representing the so-called Mostkovice variant, while the youngest objects include numerous clay vessels, iron weapons, and ornaments made of metal, amber, and glass. The graves were typically shallow, at a depth of about 20–40 cm from the ground surface, and less frequently deeper – at a level of about 50–70 cm.

The first excavation work at the burial site in Groszowice was conducted 100 years ago. Unfortunately, both museum archives and literature on the subject lack detailed information about the results of these studies. The site was rediscovered in the second half of the 20th century. Due to the destruction of archaeological features, rescue excavations were carried out here, led by Danuta Woźniak from the Museum of Opole Silesia in Opole. Over six seasons, she discovered 154 graves of the Lusatian Culture population. She published the materials from the research conducted in 1962–1964 and 1966 in the 20th century, while those from 1967 and 1969 were compiled by an interdisciplinary team in 2024 (Woźniak 1966; Purowski 2024).

The finds and osteological material discovered during the last two excavation seasons were thoroughly analyzed. Bio-archaeological studies were conducted on bone material from 33 burials (32 cremations and one inhumation). All ornaments made from copper alloys were subjected to traceological analyses, while the chemical composition of bronze was determined using X-ray fluorescence for 22 items. Additionally, 11 amber beads and one glass bead were analyzed using ICP-MS, and the tree species from which the remains were revealed in four graves were identified. The obtained research results allowed for the digital reconstruction of selected artefacts.

The grave field in Opole-Groszowice represents a mixed form of burial rites. In the 1960s, 142 cremation graves (92%) and 12 skeletal graves (8%) were discovered.

Cremation graves can be divided into the more numerous urn graves (Fig. 1A-B) and the rarer pit graves (without urns) (Fig. 1C). In most groups, remains of stone settings were found. The grave goods of the deceased mainly consisted of ceramics. Metal items appeared in 20 cremation graves (14% of all such objects). In total, 25 bronze items and 11 iron items were found among them. In several graves, remains of charred wood were discovered, which can be interpreted as remnants of the cremation pyre. The analysis indicates that the Scots pine (*Pinus sylvestris*) or the oak (*Quercus sp.*) were used in the cremation process.

In the urn graves, a single urn was typically found; the exception is Feature 39, which contained two vessels filled with cremated bones. In some urns, the remains of two individuals (an adult and a child) were present (Features 113 and 117). The urns, most often pots and jars, were typically covered from above with inverted bowls, ladles, or ring-shaped plates. They were frequently accompanied by small clay (accessory) vessels. In 13 urn graves, metal objects were found; in one grave, a single amber bead was present, and in another, a clay rattle.

Non-urn graves can be divided into two categories: those in which the concentration of cremated

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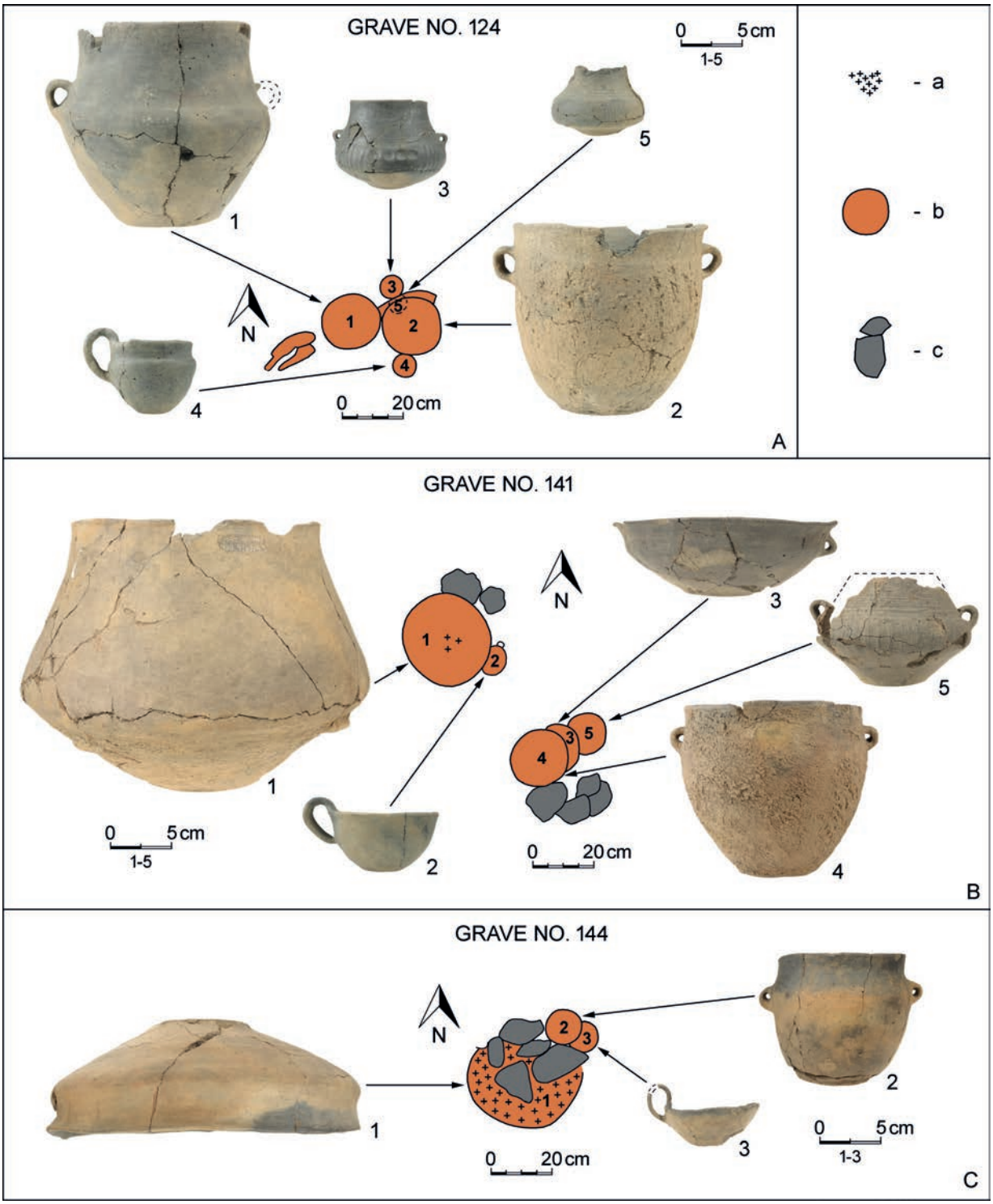


FIGURE 1. Opole-Groszowice. Cremation graves: urned (A–B) and non-urned (C): a – cremated bones; b – ceramics; c – stones

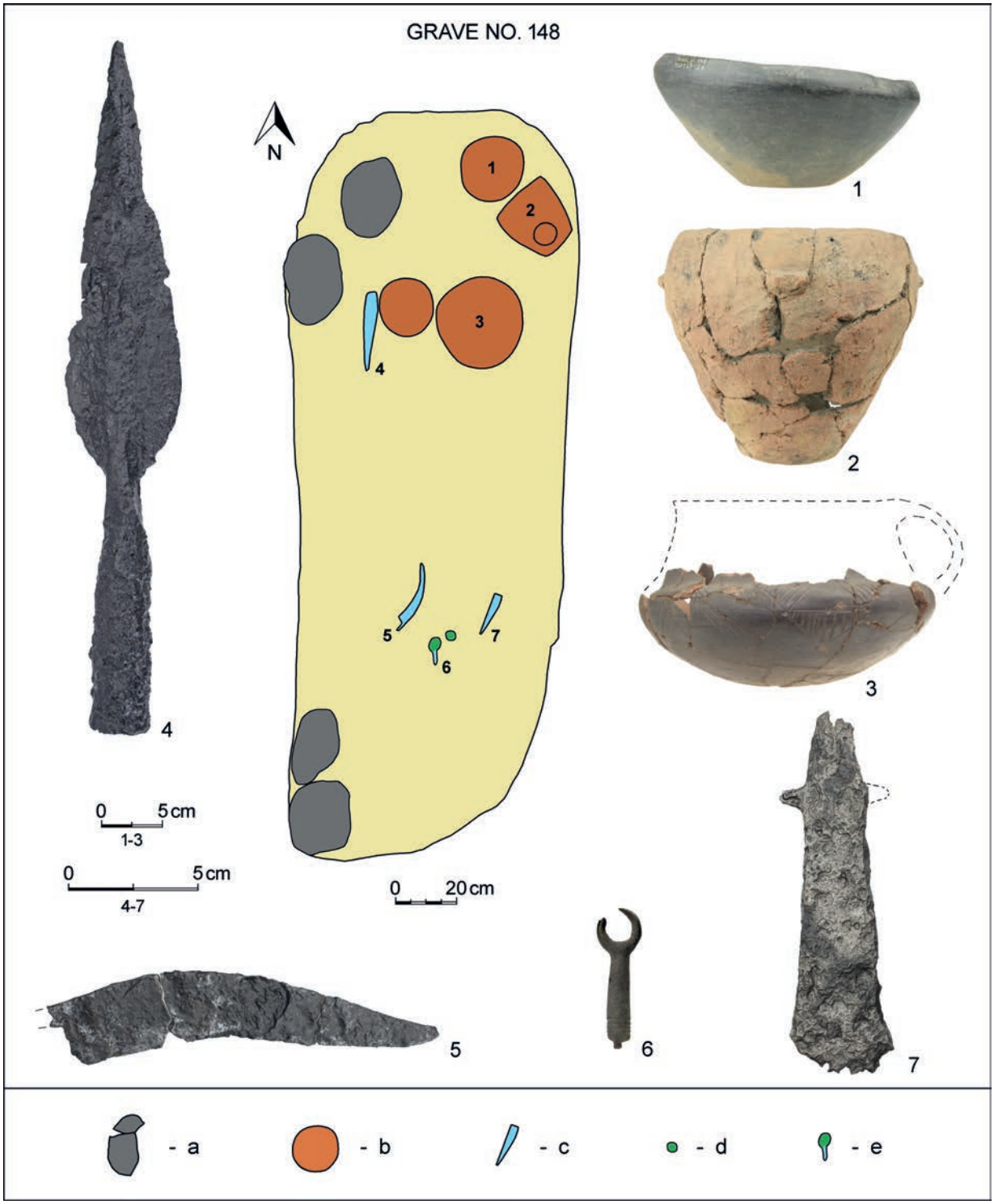


FIGURE 2. Opole-Groszowice. Inhumation Grave 148: a – stones; b – ceramics; c – iron objects; d – bronze ring; e – bi-metal object. 1–3 – vessels; 4 – spearhead; 5 – knife; 6 – object of unknown function; 7 – axe



FIGURE 3. Opole-Groszowice. Inhumation Grave 149: a – stones; b – ceramics; c – iron object; d – bronze objects; e – amber or glass objects. 1–3 – vessels; 4–5, 8 – necklaces; 6 – glass bead; 7, 12 – amber beads; 9–10 – pins; 11 – needle; 13 – knife; 14 – bracelet; 15–16 – greaves



FIGURE 4. Opole-Groszowice. Inhumation, Grave 154. Artefacts discovered with the deceased (A) and a digital reconstruction of the grave (B). 1–3 – ceramic vessels; 4 – bronze buttons (diadem); 5 – bronze necklace; 6 – bi-metal pin; 7 – bronze pin

bones was left uncovered by any durable container, and those in which it was covered with an inverted clay bowl (more rarely, a ladle) (Fig. 1C). The deceased buried in non-urn graves were equipped with both clay accessory vessels and metal objects (two cases).

In the inhumation graves discovered at Opole-Groszowice, the deceased were placed in elongated, oval, or rectangular pits of varying sizes (Fig. 2–3), oriented along a north–south axis, with the head facing north. The burial pits were often lined with stones and sometimes covered with paving. As evidenced by the discovery of wood fragments in Grave 154, oak planks were placed beneath the bodies of the deceased (Fig. 4B). In the discussed graves, metal items were primarily discovered (Figs. 2: 4–7; 3: 4–5, 8–11, 13–16; 4: 4–7) together with clay vessels (Figs. 2: 1–3; 3: 1–3; 4: 1–3), less frequently amber (Figs. 3: 7, 12) and glass beads (Figs. 3: 6).

Compared to most other bi-ritual cemeteries of the Upper Silesia-Małopolska Group, the Opole-Groszowice burial site is distinguished by: 1) a predominance of cremation graves over inhumations, and among the cremations, a dominance of urn burials over pit burials; 2) the orientation of the deceased in skeletal graves, with their heads facing north; 3) the opulent grave goods associated with some individuals buried by inhumation; 4) the presence of rare objects made of metal (e.g. bimetallic items or an iron arrowhead), clay, amber, or glass.

The location of the Opole-Groszowice cemetery in the immediate vicinity of the Oder River is anything but accidental. While it is related to beliefs, it also offers a convenient settlement setting (remains of several settlements were discovered not far from the necropolis). The proximity of a large river, located on the so-called Amber Road during the Early Iron Age, facilitated regional and long-distance contacts for the local population. While the former can be observed, for example, in ceramics almost throughout the entire use of the necropolis (in the form of analogies to types of vessels and ornamental threads widespread in the Silesian Group of the Lusatian Culture), the latter gain significance in the Early Iron Age.

Some items revealed at the discussed necropolis indicate that products made hundreds of kilometres away from Upper Silesia reached this area. One example is a glass bead (Fig. 3: 6) shaped from materials melted in the Eastern Mediterranean region. Most likely, amber beads were also imported from the south, especially those distinguished by their original shape or additional horizontal perforation (Fig. 3: 7). Formal analogies are known from the Czech Republic, Moravia, Italy, and Slovenia. It is therefore likely that in Opole-Groszowice we are dealing with "re-export" of amber: the raw material collected along the Baltic Sea (succinite) was brought to areas located south of the Sudetes, where beads were made in local workshops, and then the finished products reached present-day southern Poland.

The metal objects were most likely created in a "Lusatian" environment, but in some cases, outside the area occupied by the Upper Silesian-Małopolska Group of the Lusatian Culture. The iron tools (e.g. knives, a small axe) were probably made in Lower Silesia or Wielkopolska (Figs. 2: 5, 7; 3: 13), accompanied by bi-metallic items (Figs. 2: 6; 4: 6), whereas some of the twisted bronze necklaces were probably produced in Kuyavia (Fig. 3: 4).

In the Early Iron Age, an increase in the wealth of some individuals buried at the Opole-Groszowice cemetery can be observed. The emergence of local elites is indicated by the exceptionally rich grave goods accompanying certain individuals interred in the inhumation graves. The so-called "warrior's grave" (Fig. 2) equipped, among other items, with a javelin or spear, a knife, and an axe, may support the hypothesis that the population buried in this necropolis controlled a trade route running along the Oder River in the vicinity of present-day Opole.

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CZĘSTOCHOWA-RAKÓW, SITE 4

Karol Dzięgielewski

Site 4 is a bi-ritual grave field from the Early Iron Age, located in Raków, a left-bank district of Częstochowa in southern Poland, along the upper Warta River. In the context of physical-geographical regionalization, this area represents the mesoregion of the Częstochowa Upland within the Silesian-Kraków Upland, commonly referred to as the Polish Jurassic Highland. The necropolis, located on a relatively flat floodplain terrace of the Warta River, about 500 metres from its contemporary bed, is situated at the intersection of Aleja Pokoju and Skwer Junaków. Salvage excavations were conducted at the discovery site, and part of the area (approximately 100 square metres) was left for exhibition purposes, enclosed by an existing exhibition pavilion – the only one in Poland and Europe showcasing in situ relics of the Lusatian Culture necropolis (Fig. 1). Among the total of 85 burials, 44 are inhumations, 25 are cremations, and the remaining ones could not be determined due to their fragmentary state of preservation. Some graves were destroyed when a housing estate was built in the 1950s, while a certain number are likely still buried under the road embankment of Aleja Pokoju. The original size of the cemetery is difficult to assess due to the contemporary context (dense urban development); however, it can be estimated at no less than 500 square metres and around 200–300 graves. All documented graves can be dated to the Early Iron Age, specifically its older part (Hallstatt C–D1; approximately 750–600 BCE).

Due to the emergency nature of the original excavations, the stratigraphy of the site has not been fully documented or described in detail in publications across the entire area; it is only known that the grave floors (most often single or multi-layered stone pavements, sometimes with vessels) appeared shallowly beneath the humus layer and subsoil (sometimes as close as 20 cm from the surface). The bottoms of the grave pits were found at depths ranging from 45 to 95 cm, beneath pavements of limestone and erratic granite. Cremated bones or unburned bodies were spread on the floors, along with vessels and other grave goods. The burial pits were excavated into sandy layers of an ancient dune.

Even before WWI, farmers would find and report archaeological artefacts from the grave field to the Tsarist police. Mentions of discoveries of skeletons and bronze items date back to 1927 and 1952. In January 1955, during road construction in the Raków housing estate, a number of graves were discovered and partially destroyed. As a result, leading conservator Adam Krauss from Kraków conducted salvage excavations, documenting 11 graves. In 1960–61, research was continued by Włodzimierz Błaszczyk from the Museum in Częstochowa. He discovered an additional 69 graves and began implementing the idea of preserving part of the site for posterity as an on-site archaeological reserve. The first version of the pavilion was constructed between 1960 and 1965. The exhibition of the graves was accompanied by an exhibition dedicated to the Urnfield Cultures, particularly the local variant of the Lusatian Culture. In 2001, the pavilion and exhibitions were renovated and modernized. The work was accompanied by further salvage excavations, which led to the discovery of five additional graves beneath the new entrance hall. In its existing form, the pavilion was opened in 2004 as a branch of the Częstochowa Museum along with a new exhibition and educational facilities.

Due to the discovery of two bracelets made of meteoric iron in the 1960s, in 2022 all iron artefacts from the grave field and surrounding necropolises underwent screening for metal origin

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FIGURE 1. Fragment of a preserved in situ bi-ritual grave field of the Urnfield Culture from the Early Iron Age in Częstochowa-Raków. Photo courtesy of Częstochowa Museum

as part of a Polish-French research project. This led to the identification of three additional objects made from extraterrestrial material.

Rescue excavations carried out in the 1950s, under conditions of non-existent legal regulations for the protection of archaeological heritage, were markedly interventionist in nature, and the exploration was chaotic and ad hoc. However, the research conducted in 1960–1961 boasted a high standard and quality of documentation. For example, not all sites investigated in Poland at that time were accompanied by routine photographic documentation of every feature. The excavation of part of the cemetery was also conducted with the aim of leaving the levels of the grave pit bottoms in situ (after consolidation).

It is also noteworthy that by the time the first pavilion was opened in 1965, an extensive monographic report of the site had been published, including summaries in several languages, representing a high scholarly standard and an interdisciplinary approach that was exceptional for its time. In terms of archaeometric scope, this publication was on a par with monographs of flagship excavations in the country, such as those conducted at the Lusatian Culture stronghold in Biskupin. In this volume, the detailed archaeological presentation of the sources was accompanied by anthropological, odontological, and archaeozoological analyses, as well as petrographic analysis of the ceramics and metallographic analysis of the iron objects. Thanks to the latter analysis – an invasive study of metallographic structure and hardness based on polished sections, carried out by Jerzy Zimny – it was possible to identify the types of iron used, including, for the first time in Poland, the demonstration that two objects were made of meteoritic iron. The meteoritic origin of the bracelets from Graves 1 and 62 was confirmed in the course of later analyses. Archaeometric studies carried out in 2022 were non-invasive in nature (pXRF, X-ray tomography) or made use of previously existing cross-sections of the artefacts (SEM-EDS).

The grave field at Częstochowa-Raków was not excavated in its entirety; however, thanks to its complete publication (including graves discovered in 2001, already introduced into scholarly circulation), it provides a wealth of important data for understanding burial customs and the condition of the prehistoric community on the borderland of Silesia and Małopolska in the early centuries of the 1st millennium BCE. It belongs to the group of bi-ritual necropolises, known in several dozen examples, classified within the so-called Upper Silesia-Małopolska Group (a local variant of the Lusatian Culture). In contrast to the uniform cremation rite typical of the Urnfield Cultures and practiced by the entire population, in this group the majority of the population followed an inhumation rite (Fig. 2, Grave 1). A resurgence of this method of burying the dead has been identified in Silesia and Małopolska (in the belt from Częstochowa to Kraków) at the end of the Late Bronze Age (HaB), as evidenced by the largest necropolises, numbering around 1,000 graves in Zbrojewsko, Przeczyce, and Danków. At some of these cemeteries, spatial structuring can be observed that most likely reflects the practice of inhumation and cremation by separate kin groups (or lineages), with "outsiders" marrying into a specific group retaining their own burial rite. The persistence of these customs is documented well into the Early Iron Age (HaC–HaD1: Gliwice-Łabędy, Świbie). The Częstochowa-Raków necropolis, however, has been investigated on too limited a scale to fully document such relationships. Other regularities are nonetheless evident: a row-based arrangement of graves, the orientation of grave pits along a north–south axis, the positioning of bodies with the head to the south, the placement of sets of vessels near the legs of the deceased, and similar manifestations of specific and widely accepted cultural norms of the regional community. A distinctive feature of the Raków necropolis is the complete absence of urn burials so typical of Urnfield Cultures: all cremation burials took the form of pit graves, and the shape of their pits and, in some cases, the arrangement of vessels imitated inhumation graves (Fig. 2, Grave 4).

The grave goods from the Częstochowa-Raków site were fairly diverse yet repetitive. In addition to the characteristically simple pottery (ovoid pots with concave bases), most of the deceased were furnished with iron objects and items made of copper alloys, primarily ornaments (bracelets, necklaces, pins, knobbed diadems, pendants; Fig. 3: 1), and, less frequently, tools and weapons (knives, sickles, arrowheads, and spearheads). These were typically small-sized forms, made in the local style (bronzes) or showing similarities to types of adornments and tools typical of the Oder River zone in the Early Iron Age. Compared to the region located a bit further west, around Gliwice, a certain isolation of the local community is noticeable. There is an absence of Silesian painted pottery, eastern Hallstatt metal imports, and necklaces made of glass or amber beads. The community's access to the Oder–Warta section of the Amber Road must have been limited. However, it would be false to say that there was absolutely no access to imported goods. Bronze was available (which may have partly come from secondary circulation) and so was iron, which local blacksmiths used to produce items in locally accepted forms. In this context, a certain group of iron objects stands out: circular ornaments serving as bracelets or anklets, from Graves 1, 11, 62, and 71. These are unassuming, undecorated rings made of high-nickel iron (averaging several percent Ni according to pXRF and EDS). These were always single items in the graves. The deceased equipped with them were placed in both inhumation and cremation graves (Grave 62). It is equally impossible to identify a specific social group (in terms of gender or age) that used this particular material. On the other hand, it seems unlikely that iron in a form other than bloomery iron was used in an uninformed way. We should rather consider the possibility that in the area of present-day Częstochowa, a small atectite was found – a rather rare type of iron meteorite with a high nickel content (perhaps even its fall was watched?). This material was then used to produce the aforementioned ornaments. They certainly had a different valuation at the time, as they were assessed not only with view to the visual similarity to other iron ornaments (in this regard, they adhered to cultural norms). Some of the rings may have been made with an addition of terrestrial iron (Grave 11), which could have influenced their visual qualities through a layering effect. Due to the high nickel content in all examined objects, along with the rare occurrence of atectite, it can be assumed that all items were made from a single meteorite, or more precisely, from a single fall. Considering the absence of other

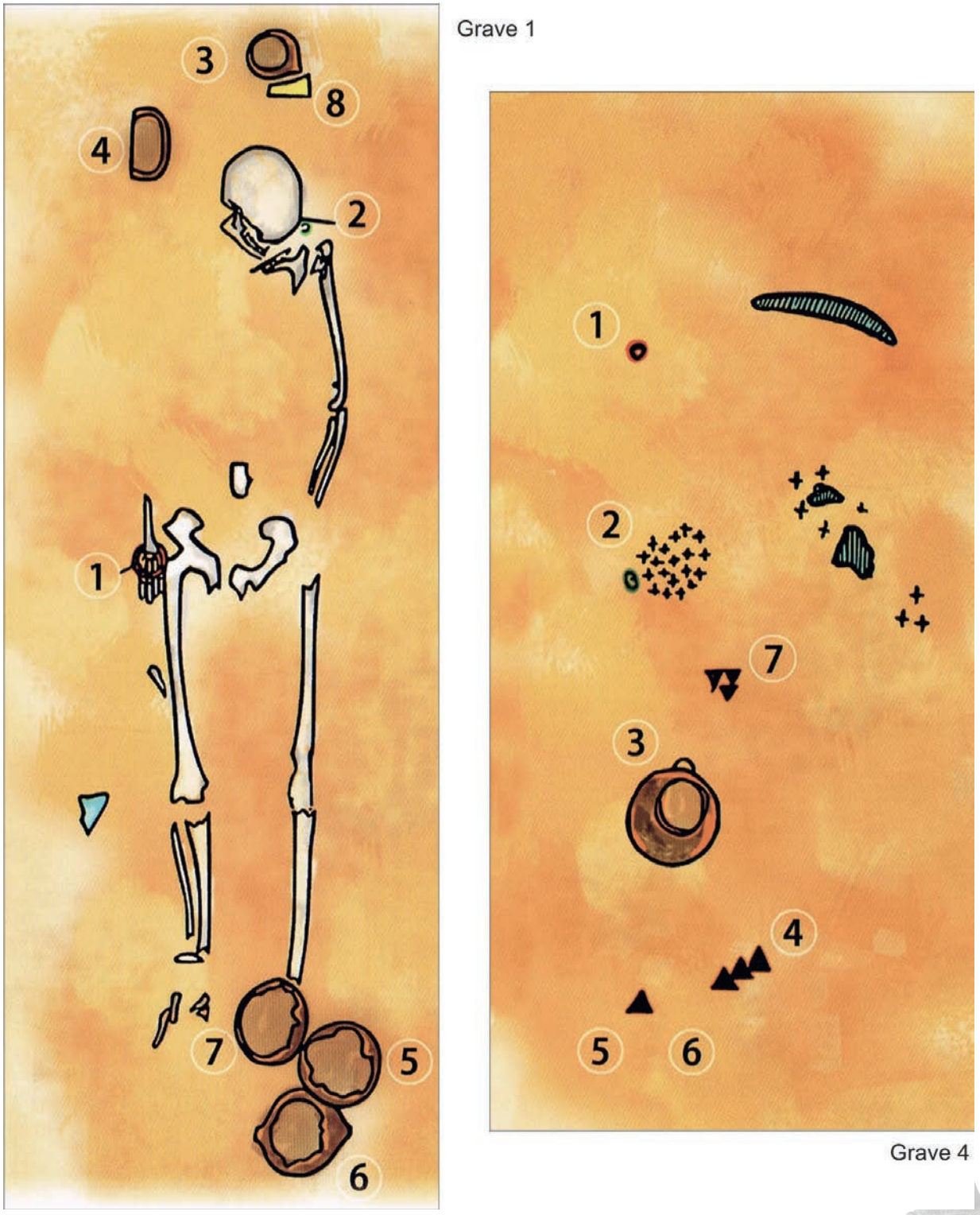


FIGURE 2. Examples of an inhumation grave (No. 1) and a cremation pit-grave (No. 4) from Częstochowa-Raków, Site 4. The numbers in circles refer to furnishings of the graves. Note bracelet (No. 1) in Grave 1, made of meteoritic iron. Drawings as provided by Kosiński, Wieczorek-Szmal, Bielińska 2014



FIGURE 3. Selected metal artefacts from the Early Iron Age grave field in Częstochowa-Raków: a bronze pendant, Grave 8 (1), meteoritic iron bracelets from graves 1 (2) and 71 (3). Photographs as provided by Kosiński, Wieczorek-Szmal, Bielińska 2014 (1) and Jambon et al. 2025 (2–3), https://www.muzeumczestochowa.pl/wystawy/wystawy-stale/rezerwat-archeologiczny

imported items in Raków, the hypothesis of these objects or the meteorite being brought from distant lands can be rather dismissed. The hypothesis of the local distribution range of products made from locally sourced meteorite iron is supported by the discovery of another item (the shaft of a pin) at a neighbouring, contemporaneous burial site in Częstochowa-Mirów. What is more, the fact that other sites in Silesia and Małopolska (with a sample currently encompassing several hundred analyses) have not revealed the presence of iron other than bloomery iron further reinforces this conclusion. Thus, this would be the oldest evidence of the use of locally sourced iron on Polish lands. While not derived from ores, it does not represent an import. Local iron production from ores is documented in Polish territories only in the last two centuries BCE.

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BISKUPIN, SITE 4

Maciej Kaczmarek

The fortified settlement of the Lusatian Urnfields community in Biskupin is the most emblematic archaeological site in Polish territory (Fig. 1). It spans over a two-hectare peninsula jutting into the waters of the glacial Biskupin Lake, an element of a chain of water bodies fed by the Gąsawka River (a left tributary of the Noteć River). A characteristic feature of the Biskupin settlement is its regular and compact layout, indicating the builders' aim to streamline the use of the occupied area (Fig. 2).

The fortified settlement from the Early Iron Age in Biskupin was originally established on an island, separated from the mainland by a narrow, shallow isthmus of Biskupin Lake on the southern side. The settlement is distinguished by three settlement phases, with the first two encompassing the period of the stronghold's operation during the early Iron Age, while the last phase pertains to a small open settlement that emerged on its ruins. In the later phase, after reconstruction, the stronghold had a slightly smaller area. It is estimated that the Biskupin fortified settlement could have been inhabited by 1,000 to 1,200 people at its peak.

Dendrochronological studies have shown that the wood used for its construction was cut down between 750 and 708 BCE, with the highest intensity of activities related to raw material procurement occurring from 739 to 736 BCE. The decline of the Lusatian Urnfields community settlement at this site is marked by a hoard of iron objects functionally related to the open settlement that emerged on the ruins of the fortified settlement from the later phase, dating from the late HaC or the transition between HaC and HaD, specifically from the late 7th century or, at the latest, from the first half of the 6th century BCE. Within the relatively short period of operation of the Biskupin stronghold, three directly successive phases can be distinguished, marked by changes in the structure of the buildings.

The stronghold was accessed through a gate measuring 9 metres wide and 8 metres long, secured by double-leaved oak doors. Its interior was constructed according to a planned and thoughtful architectural concept, characteristic of other similar features located in the vicinity of Biskupin (including Izdebno, Sobiejuchy, and Smuszewo) that share a similar setting in areas rich in water bodies, utilizing the fortified advantages of the terrain. The settlement boasted a compact layout where emphasis was placed on maximizing the use of occupied space. The main transport artery of the settlement was a circular street, 417 metres long, running along the inner side of the rampart and connecting 11 transverse streets, each 2.5 to 2.8 metres wide, along which houses were arranged in rows (Fig. 3). A small open area (a small square) was left only in the vicinity of the gate. It may have served as a gathering place or a marketplace. The Biskupin houses were characterized by similar construction solutions, comparable sizes, and a repetitive interior layout module. It is estimated that the residential buildings, arranged in rows connected by gable walls, numbered between 100 and 105. The houses had similar areas (approximately 72 to 86 m^2) and interior layouts. The entrances of all the houses were oriented facing south and consisted of an entrance hall about 2 metres wide, a main living chamber with a fireplace slightly off to the side, and a smaller side room that probably served as a sleeping area. The residential buildings were constructed using a post-and-plank technique, while the gabled roofs were built with a combination of post-and-plank construction. The floors of the houses, like the streets

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FIGURE 1. Biskupin, Żnin District, Kujawsko-Pomorskie Voivodeship, Site 4. View of the reconstruction of the fortified settlement in the winter of 2013. Photo by M. Kaczmarek

in the settlement, were paved with beams usually laid on joists (Fig. 4, 5).

The rampart surrounding the Biskupin settlement consisted of three rows of interconnected boxes made from oak beams in a horizontal log construction, reinforced with vertical posts and filled with earth and stones. It measured 463 metres in length and probably reached a height of up to 6 metres (Fig. 6). The fortifications of the Biskupin stronghold were surrounded on the outer side by a breakwater composed of rows of logs driven diagonally into the lake bed. The section of the fortifications most exposed to the lake's waves, located in the northwest, was protected against erosion by a so-called ice floe breaker, consisting of individual logs also driven diagonally into the lake bed, positioned at a certain distance from the breakwater. Access to the interior of the stronghold was provided by a wooden causeway connecting the settlement to the mainland. Overall, the fortifications occupied about one-third of the area of the fortified settlement in Biskupin.

Starting in the early Iron Age, unfavourable climatic changes led to a gradual rise in the water level of Lake Biskupin. This period coincided with the operation of the stronghold from the latest phase, built on the ruins of the older fortified settlement. The layout of the streets and houses referenced the design of the older phase of the stronghold. However, its internal area was reduced due to the reconstruction of the rampart on the inner side of the older rampart's debris. The area of the houses also decreased, and there could have been fewer residential buildings than in the older phase.

Discovered in some areas above the layers of the younger settlement were remains of separate small rectangular structures that formed an open settlement, representing the final stage of habitation in the area of the former fortified settlement during the early Iron Age.



FIGURE 2. Biskupin, Żnin District, Kujawsko-Pomorskie Voivodeship, Site 4. General aerial view of the excavation field in 1936. Collection of Narodowe Archiwum Cyfrowe, reference code: 3/1/0/10/995, public domain



FIGURE 3. Biskupin, Żnin District, Kujawsko-Pomorskie Voivodeship, Site 4. View of the ring road in 1936. Collection of Narodowe Archiwum Cyfrowe, reference code: 3/1/0/10/995/3, public domain

It was estimated that the construction of the fortified settlement in Biskupin required between 6,000 and 8,000 cubic metres of wood, primarily oak and spruce, but also birch (especially in the younger phase).

In 1933, the water level in Lake Biskupin lowered and revealed fragments of wooden relics from the stronghold's construction. From 1934 to 1939, comprehensive archaeological research was conducted by Józef Kostrzewski and Zdzisław Adam Rajewski from the Prehistoric Institute of the University of Poznań and the Prehistoric Department of the Wielkopolska Museum in Poznań. The nature of the settlement located in a marshy area, with excellently preserved organic remains, necessitated collaboration with researchers from complementary sciences, primarily natural scientists, present in Biskupin almost since the very beginning of the excavations. The area surveyed during the pre-War explorations covers approximately 100 ares.



FIGURE 4. Biskupin, Żnin District, Kujawsko-Pomorskie Voivodeship, Site 4. Aerial view of the hats structure during the 1936 excavation. Collection of Narodowe Archiwum Cyfrowe, reference code: 3/1/0/10/995/2, public domain

The excavations at that time focused on the northern, central, and eastern parts of the settlement. In the southern section of the site, the work was limited to examining a narrow strip along the ramparts. Overall, during the excavation work at Site 4 in Biskupin, an area of about 169 ares was uncovered.

During the Nazi occupation, from 1940 to 1943, excavation work at Site 4 in Biskupin was conducted by the *SS-Ahnenerbe* organization under the direction of Hans Schleiff. This work was supported by various authorities of the Third Reich, including the Reich Commissioner for the Strengthening of German Nationality.

In the post-War period, starting in 1946, the excavation work in Biskupin was initially led again by Józef Kostrzewski and Zdzisław Adam Rajewski, as part of the Institute for Research on Ancient Slavic Antiquities at Poznań University. From 1951 to 1953, the oversight of the research was taken over by the Management of Research on the Origins of the Polish State, and subsequently by the Institute of History of Material Culture of the Polish Academy of Sciences (PAN). At the initiative of Zdzisław Rajewski, from 1951 to 1956 and in 1960, Archaeological Training Camps for archaeology students were held in Biskupin under the auspices of the State Archaeological Museum in Warsaw, the Institute of Prehistory at Poznań University, and the Department of Prehistoric Archaeology at the Jagiellonian University. Since 1956, the museum that was established to host the collected materials from the excavations in Biskupin became a branch of the State Archaeological Museum in Warsaw, of which Zdzisław Adam Rajewski had been the director for eight years.

In the 1960s, the idea of excavating additional areas of the Biskupin peninsula was gradually abandoned. Ultimately, the excavation work on the

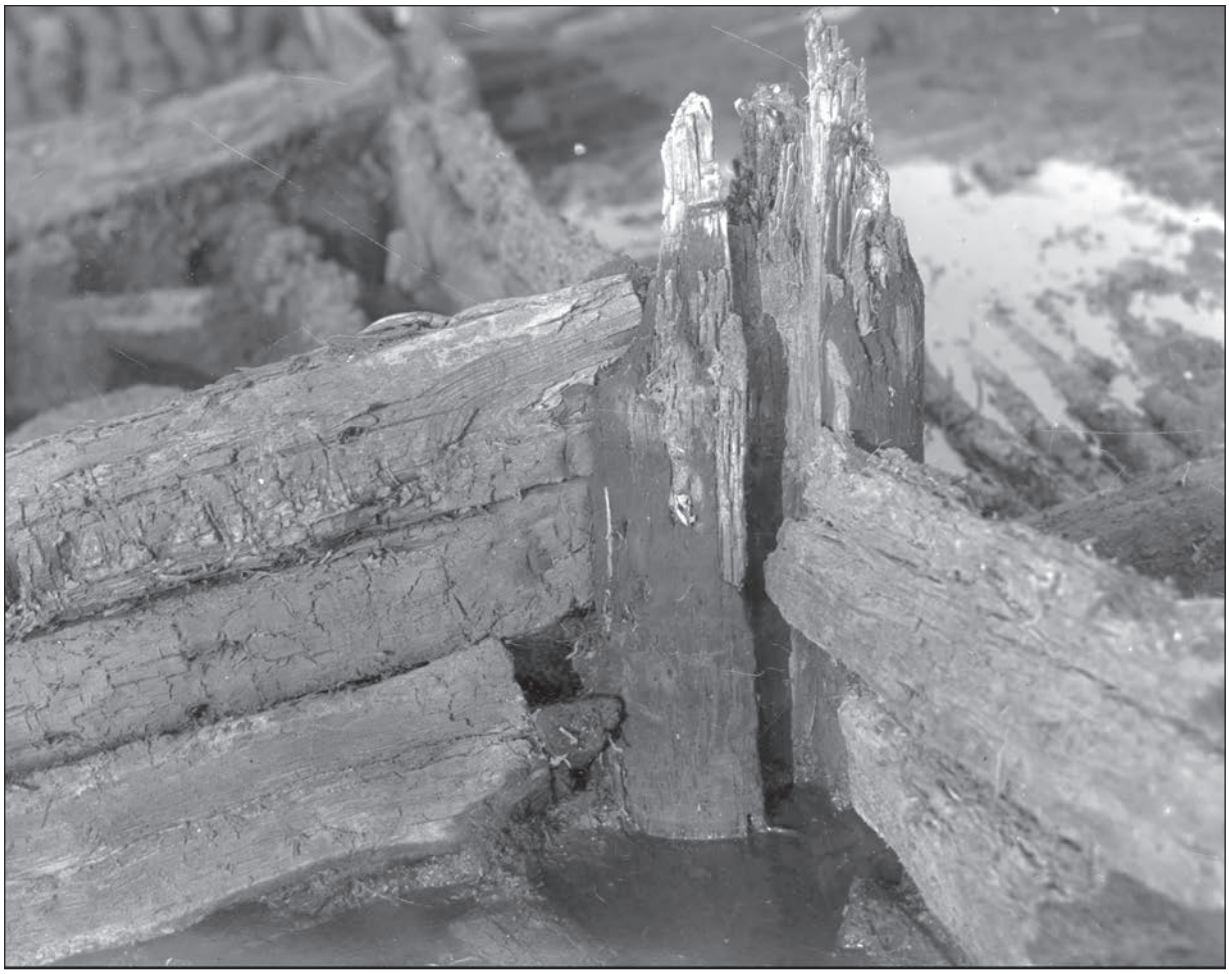


FIGURE 5. Biskupin, Żnin District, Kujawsko-Pomorskie Voivodeship, Site 4. A view of the hut's structure during the 1936 excavation. Collection of Narodowe Archiwum Cyfrowe, reference code: 3/1/0/10/995/6, public domain

fortified settlement of the Lusatian Urnfields population in Biskupin was concluded in 1974.

Several decades of excavation work at Site 4 in Biskupin revealed approximately 75% of the peninsula's surface. However, some areas were only examined within the early medieval layer, while the underlying layers and structures from the early Iron Age remain largely unexplored across the entire excavation area.

After the first research season at Site 4 in Biskupin, a grid system was established in 1935, which also partially encompassed the breakwater concealed in the waters of Lake Biskupin. The delineated boundaries of 363 ares corresponded to the longitudinal and transverse axes of the peninsula, approximately aligned with the north-south and east-west directions. Subsequent modifications were solely updates to the numbering of the extended excavation grid in some areas. During the pre-War research, two reference points were used for measurements, but they were removed by the Germans during the occupation. In the post-War years, a new benchmark(s) was/were utilized, although it is unclear whether they were part of the state geodetic network. A proper benchmark was only set in 1972.

At Site 4 in Biskupin, six stratigraphic layers have been distinguished (from top to bottom):

- I – turf with mixed archaeological material from the Early Iron Age and the Early Middle Ages;
- II – humus, in the eastern and central parts of the site dominated by Early Medieval finds, and in the western part by material from the Early Iron Age;



FIGURE 6. Biskupin, Żnin District, Kujawsko-Pomorskie Voivodeship, Site 4. View of the rampart structure during the 1936 excavation. Collection of Narodowe Archiwum Cyfrowe, reference code: 3/1/0/10/995/4, public domain

- III – alluvial layer, containing material from the Early Iron Age and the Early Middle Ages;
- IV – clayey layer with remains of the "Lusatian" fortified settlement from the younger phase;
- V – locally disappearing, sandy silt separating the level of the fortified settlement from the younger phase from that of the older phase;
- VI – dark brown humus in which remains of the fortified settlement from the older phase were discovered.

During excavation, the turf and the modern humus layer beneath it was removed using shovels, whereas the deeper cultural layers were investigated with smaller tools. In selected areas, Layer II was excavated in mechanical spits 5–10 cm thick, with the aim of observing the presence of stratification dating to the Roman period. This did not yield the expected results, as the archaeological material from the mechanically distinguished spits proved to be chronologically and culturally mixed. A similar method of excavating Layers II and III was also applied in the post-War period.

The target depth of excavation of the cultural layers depended on the state of preservation of the wooden remains of the settlement structures. Where more densely concentrated remains of the younger fortified settlement were encountered (Layers III and IV), further excavation was discontinued. In areas with a lower density of wooden constructions, however, exposure of the more deeply founded remains of the fortified settlement from the older phase was continued. Consequently, the drawn documentation does not always depict the remains of all occupation levels related to the Early Iron Age settlement. This documentation, produced with great attention to detail at a scale of 1:10, was photographed in 1939, resulting in tenfold reductions (1:100) on the photographs, which in many cases (following the severe losses of the War) now represent the only surviving record of the pre-War plans of the structures uncovered at that time.

The photographic documentation from the investigations of the fortified settlement at Biskupin reflects the extraordinary range of technical possibilities employed during the exploration of the archaeological site before World War II. Of particular note are photographs taken from above ground level using a specially constructed ladder, images obtained with the use of balloons from which a camera was suspended, as well as photographs taken from military aircraft. As a result, it was possible to produce documentation from heights ranging from 10 to 3,000 metres (Fig. 2, 4). The first attempts at using multicolour photography were also undertaken, beginning as early as in 1936.

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DOMASŁAW/CHRZANÓW

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The Domasław cemetery, located in the village of Domasław (municipality of Kobierzyce, Wrocław district, Lower Silesia), approximately 20 km south-west of Wrocław, is one of the largest and most significant cremation burial grounds of the Urnfield Culture and the Early Iron Age in Central Europe. The site is situated on the Wrocław Plain, on a post-glacial plateau within the watershed of the Ślęza and Bystrzyca rivers; the elevation is bounded to the north and south by small valleys of streams–tributaries of the Ślęza. The necropolis lies on a subtle topographic rise overlooking short, dry valleys draining NE; this micro-relief, together with wetter patches toward the south, structured visibility and the practical choice of burial zones. Mt. Ślęża frames the regional horizon; within the cemetery, rectangular grave pits are consistently oriented NW – SE, a fixed axis established early and maintained across later phases. The cemetery belongs to a wider settlement micro-region on the Wrocław Plain, where soil quality and easy overland communication encouraged continuity of occupation.

The cemetery begins in the earliest phase of the Lusatian Culture (Period III Bronze Age in the Montelius/Kostrzewski system; BrD–HaA1 in Reinecke's southern scheme, c. 1300/1250 BCE, with possible Tumulus/early Urnfield roots around 1350–1300 BCE). Activity intensifies through Periods IV–V (HaA2–HaB3) and continues into the Early Iron Age (HaC–HaD1), ending around the mid-6th century BCE. A small number of later assemblages (HaD3 and La Tène A–B period) show that the locale retained mnemonic weight after the principal mortuary horizon had closed. Relative dating is secured by ceramic form and surface technology: the sequence runs from "knob-style" vessels (sharply profiled vases and spherical cups with cylindrical or conical necks, jugs including miniature forms, and sharply profiled bowls), through HaB2/HaB3 graphitised wares with expanded decorative zones, and culminates in the Early Iron Age with Hallstatt-derived shapes (conical-neck vases with funnel rims, flanged-rim bowls) accompanied by a clear rise of painted decoration, alongside graphitised and finely burnished finishes. This typological arc aligns with radiocarbon determinations anchoring the late Bronze/early Iron Age transition and with chronological indicators borne by selected imports in the Hallstatt horizon (e.g. swords, bronze bowls, harp-shaped fibulae and pin types). The result is a coherent phasing in which the cemetery's Early Iron Age peak falls within HaC–early HaD1.

Rescue excavations registered more than 2,500 features over c. 3 ha, including 2,006 graves and about 400 pottery deposits (many symbolic or secondary). Through time, the cemetery expanded from west to east. In the first phase, the south-western sector preserves a compact cluster centred on (it is supposed) burial mounds arranged in several rows along a NW–SE line, around which other graves were placed; isolated HaA1/HaA2 graves occur to the north and east of this first-phase area. In HaA2–HaB3, deposition intensified into a dense concentration in the central and north-eastern belts; a ditched grave (HaA2) and indications that large barrows delimited the cemetery's expanding northern edge mark this stage.

A hiatus separates the Bronze Age horizon from the Early Iron Age: in the eastern and south-eastern parts, burials are almost exclusively Hallstatt, densely arranged, with chamber graves interspersed among features without internal constructions. Ditched enclosures occur in the western and central zones (ditches were noted around 26 chamber graves; in total 29 funerary ditched enclosures

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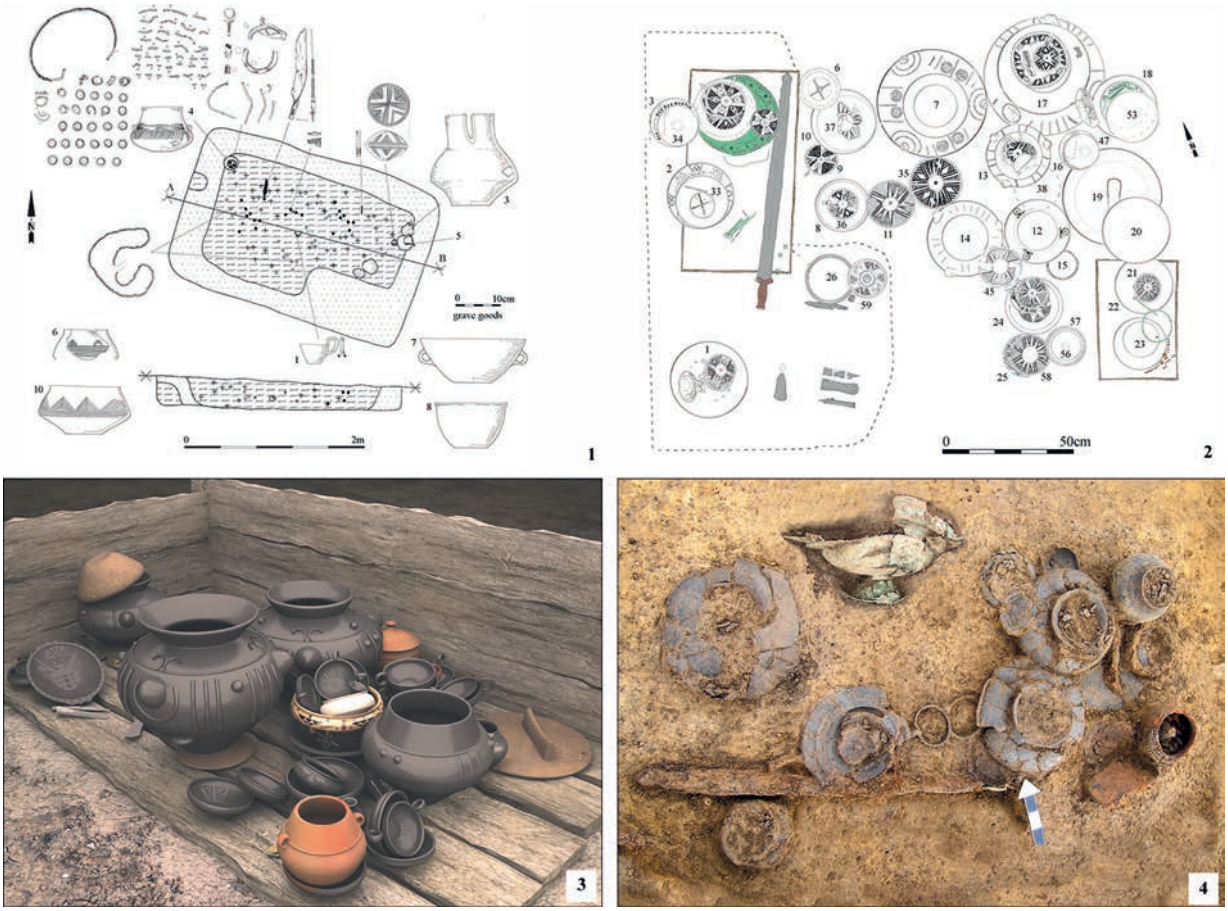


FIGURE 1. Graves: 1. B50; 2. 390; 3. 4270; 4. 8905. Archives of the IAE PAS. Visualisation by M. Markiewicz

were documented). The marshy central–southern strip functioned as a natural limit that functioned across phases.

Superpositions are exceptional, graves were kept apart in plan, implying persistent surface marking (mounds, posts, stone settings). Large empty circular spaces (7–16 m in diameter) around some burial pits support the existence of barrows, mainly in Period III, but also in Period IV–V and in the Hallstatt period. In this context, it cannot be stated unequivocally that any first-phase barrows continued the Tumulus-culture tradition. Cremation is the only funerary rite; no pyre remains were identified within the excavated area (probably located in the unexcavated northern zone or the hiatus belt with a thick black layer rich in HaB–HaC pottery).

Wooden constructions occurred throughout the sequence. In the Bronze Age, these features include log-coffin-like hollows and chests; through the Early Iron Age, purpose-built chambers become the dominant internal architecture. Stones were frequently used as covers, linings, packing, or external markers, though not as stone-cist constructions. In the Hallstatt horizon, at least twenty-six chamber graves are encircled by circular ditches – on average about 4.5 m in diameter, with the largest approaching 9 m – forming the largest cluster of such funerary ditches north of the Carpathians and Sudetes. Post settings – sometimes arranged as short alignments or quadrangles – indicate light superstructures and intentional ground-level visibility. These elements, combined with the internal choreography of deposits (e.g. paired large vases, stacks of cups in multiples, and eastern disc-plate/moon-idol zones), underscore the communicative role of graves as public monuments integrated with daily pathways across the necropolis.

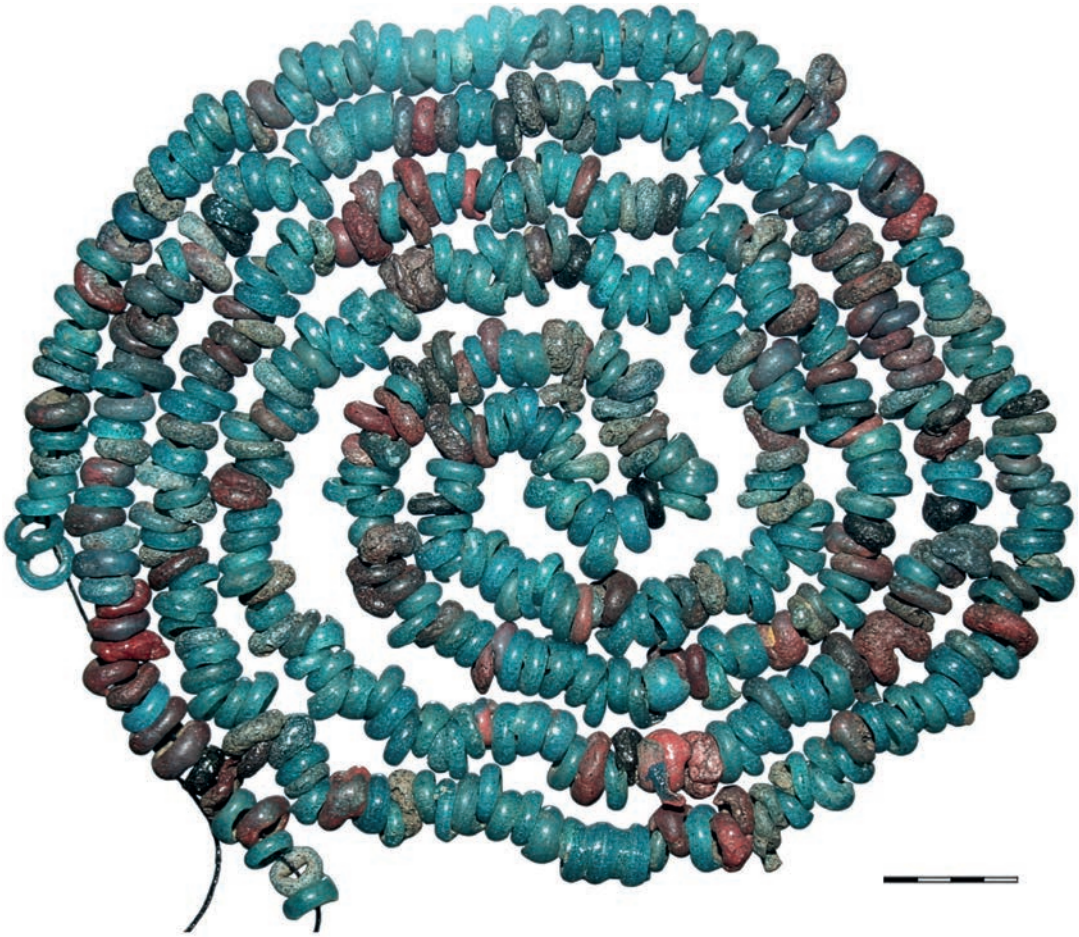


FIGURE 2. Glass beads, Grave B50. Photo by T. Purowski

The site was first excavated by German archaeologists in 1929, when 20 graves that had been identified during construction works were explored. They dated from Bronze Age IV–V. Modern large-scale investigations of the site were undertaken as part of the A4 motorway project (commissioned by the General Directorate for National Roads and Motorways). Fieldwork was conducted July 2006–September 2008 by teams of the Institute of Archaeology and Ethnology, Polish Academy of Sciences (IAE PAS) in Wrocław and Kraków, under the supervision of Bogusław Gediga and Sławomir Kadrow. Over an area of about 3 ha, archaeologists recorded > 2500 features related to the vast Urnfield cemetery; part of the northern edge remained outside the investment corridor and thus unexcavated, implying further extent of the burial ground.

Open-area excavation was combined with full planigraphic and stratigraphic recording. Grave pits and internal wooden constructions – identified by regular outlines, diagnostic sections/profiles, and collapse layers from decayed planks –together with ceramic deposits and concentrations of burnt bone, were documented, alongside other features including unclassified pits, circular ditches, and postholes. The analytical programme comprised: osteological analysis of cremated human bone (total weights, MNI, age at death, sex where assessable); zooarchaeological identification and quantification of animal-bone admixtures and artefacts; metallurgical and compositional studies of metal artefacts; GC – MS analysis of organic residues from selected vessels; radiocarbon dating of diagnostic contexts; lithic/raw-material study of stone artefacts and fittings; and examination of macrobotanical remains from grave fills and vessels. Mineralised corrosion layers on metal preserved textile fragments, while impressions and residues documented bark, leather, and wicker elements. The



FIGURE 3. Ceramic cult wagon, Grave 4270. Photo by I. Dolata-Daszkiewicz

preservation of textiles on metal indicates deliberate placement and careful packing.

Across the 2,006 graves, urned burial predominates (1,334 cases), alongside 342 unurned and 210 mixed deposits; 120 graves remain unclassified. There are about 400 discrete pottery deposits. Multiple-individual cremations occur, and the wide range of bone weights indicates selection practices consistent with *pars pro toto*. Burnt animal bones accompany up to roughly one in ten Bronze Age graves and around one in three Hallstatt graves, especially where inner constructions are present, suggesting formalised food offerings or pyre debris integrated into the ritual.

The architecture of the graves changed over the course of the cemetery's use. BrC/BrD–HaA1. Graves were set in NW–SE rows and dug as large rectangular pits. In around 15% of cases, the body was placed in a hollowed log "coffin" or a plank-lined insert; roughly 30% of the pits exceeded 7 m^2, with cuts 0.16–0.40 m deep and internal structures up to 1.2 m wide and 0.6–2.96 m long. Stones are frequent – as covers, linings or markers, with reused quern stones noted – while the layout and ringed empty zones indicate mounds above many graves.

HaA2–HaB3. Pits become smaller and more standardised; about 15% contained wooden chests of laths or half-logs (occupying areas of 1–4 m^2, pit depths 0.10–0.75 m). Stones remain common, either loose, aligned along walls or as partial covers, and empty annular spaces around roughly one fifth of graves point to reduced barrow marking. This phase also brings a clear increase in pottery-only deposits around graves.

HaC–HaD1. The Early Iron Age sees the apogee of built constructions: at least 291 chambers (≈36%) were set in oval/circular pits of 2.1–5 m^2 (locally to 13 m^2) and 0.51–1.36 m deep (max. ~2 m). Interiors are rectilinear (up to 1.5 × 2.3 m). Stones occur in about one third of chambers (in pits, on lids, or as cobble skirts); occasional full stone covers are present. Pottery deposits appear in about one third of chambers, while urns placed in ceilings or outside chests occur in roughly one sixth – a practice introduced in the late BrA and more frequent later. Select elite graves have circular ditches (around 26 chamber graves; ~29 funerary enclosures in total)



FIGURE 4. Ceramic zoomorphic rhyton, Grave 8892. Photo by I. Dolata-Daszkiewicz

and post settings, enhancing visibility at ground level.

Ceramic repertoires exhibit change from knobbed vases and sharply profiled bowls to HaB2/HaB3 graphitised surfaces and plaited-triangle motifs, culminating in Hallstatt-derived forms: conical-neck vases with funnel rims, flanged-rim bowls and fine cups. Painted and graphitised decoration develops complex linear, solar and triskelion themes. Within chambers, pairs of large vases, stacks of cups/scoops in multiples (3–6–9–12), flanged bowls and lidded pots – often to the east – compose a banquet grammar that staged a funerary feast.

Textiles survive in 62 burials as corrosion impressions on metal, including plain weaves and 2/2 twills. Headbands and belts, together with bark covers, leather components and wicker baskets, represent the soft furnishings of graves and the packaging of the cremation. Some urns were wrapped in textiles, underlining the care invested in treatment of remains. Organic materials also served as containers for bronze vessels in elite assemblages.

The Early Iron Age horizon produces iron tools and weapons, bronze vessels, horse gear, toiletry kits, harp-shaped fibulae, swan-neck pins, bracelets with stamped ends, disc plates and moon-shaped idols. About 40% of urned non-chamber graves contain non-vessel goods, whereas the most exclusive classes – horse gear, toiletry sets, amber ornaments – concentrate in chambers. Swords are documented in eight chamber graves. Large ribbed bronze bowls accompany swords in Graves 390 and 8905, evoking Central European 'weapon + drinking equipment' sets. A ceramic cult wagon (Grave 4270), zoomorphic rhyta and funnel vessels are outstanding highlights. Artefacts cluster in the western chamber sector; disc plates are more common in the eastern part, often supporting moon-idols.

Some of the graves were furnished with exceptionally rich grave goods, suggesting the elite status of the individuals buried there. Bronze Age infant grave B50 contained at least 730 glass beads (plus fragments), a bronze knife and punch, a large double-conical rattle, a gold wire ring and melted gold, plus a deposit of more than fifty beads and numerous bronze ornaments (29 rings, a twisted necklace, pin/bracelet fragments, c. 90 salta-leone beads). The assemblage evidences early access



FIGURE 5. Swords and fittings, Graves: 1. 7429; 2. 3754; 3. 7391; 4. 8905; 5. 5996; 6. 8956; 7. 390. Photo by A. Józefowska

to southern prestige goods and the emergence of a local elite well before the Iron Age.

Hallstatt chamber graves 390 and 8905 yielded swords in association with large ribbed bronze bowls, articulating a banquet-cum-weaponry grammar widely shared across the Hallstatt world. Grave 4270, with a ceramic cult wagon, illustrates the theatricality of deposition and the linkage between procession, mobility and feasting.

About 15% of Bronze Age graves already belong to a leading stratum marked by architecture, surface signalling and equipment, including early imports. In the Hallstatt period, long-distance ties intensify. Elites at Domasław retain cremation while adopting and localising the lavish funerary feast style. Weaponry, drinkware and display ceramics integrate with chambered monuments and ditched enclosures. The introduction of iron coexists with high-status bronzework. The high proportion of import-bearing burials and the scale of architectural investment indicate sustained access to supra-regional networks and support the

idea of a north-eastern Hallstatt province with a Silesian pivot.

Domasław establishes a long and internally varied sequence of urnfield mortuary practice in Lower Silesia; documents the local re-composition of Hallstatt elite display in a cremation-only context; and provides an exceptionally rich record of organic materials and spatial grammars that illuminate how communities choreographed farewells and communicated rank, identity and connectivity across generations.

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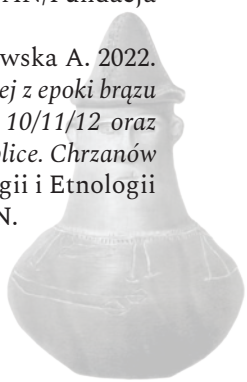
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CHOTYNIEC, SITE 1

Sylwester Czopek

Site 1 in Chotyniec is a hillfort known since the 19th century, marked on Austrian maps as an extensive archaeological feature with encircling ramparts, referred to as "Horodysko". Later cartographic records show the gradual destruction of the complex, continuing into the early 21st century. The Chotyniec hillfort is located approximately 8 km from the present-day state border between Poland and Ukraine and occupies the area of a promontory-like rise covering several square kilometres, standing out distinctly amid wetlands and clearly low-lying terrain. The site covers an area of 30 hectares and represents the westernmost hillfort, a Scythian stronghold from the Early Iron Age, within the Eastern European forest-steppe zone. Its cultural affiliation with the Scythian Culture has been confirmed by numerous, well-dated artefacts (Scythian military equipment, ornaments, and characteristic pottery) originating from closed assemblages, such as an ash-hill and dwellings of the yurt type. A very large series of radiocarbon determinations has been obtained from the site, allowing the Chotyniec hillfort (established on virgin ground) to be dated to the late 7th and early 6th centuries BCE. Research to date indicates a relatively short period of occupation of the settlement, lasting no more than 2 to 3 generations. This has also been confirmed by stratigraphic observations.

The Chotyniec hillfort should be regarded as the central point of a broader ecumene, defined as the "Chotyniec agglomeration". In its immediate vicinity, at distances ranging from several dozen metres to one or two kilometres, open settlements from the Scythian Culture have been identified. Following research on the sites, it is possible to trace clear differences between the assemblages of artefacts recovered from the hillfort and those from the open settlements. This may indicate the existence of a form of local hierarchy where the hillfort played a very important role. We are therefore dealing with a distinctive phenomenon: a compact enclave of the Scythian world, defending access to Scythia from the west.

Prior to 2016, the site had not been excavated, the interest of archaeologists being sporadic and very superficial. The site had been regarded a hillfort from the early Middle Ages or even one dating to a later period. Only detailed surface surveys and preliminary test excavations confirmed the assumption that it is a large hillfort from the Early Iron Age. The explorations were not easy, as the site's state of preservation clearly indicated extensive destruction across its entire area. This was most clearly reflected in the ramparts, destroyed along nearly three quarters of their total circuit. The destruction was caused by intensive agricultural activity in the second half of the 20th century. As this activity continues (although to a somewhat lesser extent), it significantly hampers archaeological research. Work carried out to date (2016–2023) has made it possible to investigate only 0.73 hectares of the site's total area of 30 hectares. In view of the results obtained so far, the excavations are expected to be continued, focusing primarily on the southern part of the hillfort's interior.

The excavation-based investigation of such an extensive and heavily damaged site required special care, in the area of the ramparts and in the spaces between them. Of key importance for further work was the preparation of a detailed topographic plan and the establishment of a uniform grid system, according to which all excavation trenches were positioned. This was followed by comprehensive geophysical surveys covering the entire area

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FIGURE 1. Chotyniec, Jarosław District, Podkarpackie Voivodeship, Site 1 – photograph of the settlement taken from a drone, before the research began. Visible damage to the ramparts



FIGURE 2. Chotyniec, Jarosław District, Podkarpackie Voivodeship, Site 1 – ash-hill in the process of exploration



FIGURE 3. Chotyniec, Jarosław District, Podkarpackie Voivodeship, Site 1 – reconstructed amphora from Kalzomenai

of the hillfort, as well as the adjacent surroundings. Ground-penetrating radar, magnetometry, and conductivity measurements were employed, along with aerial photography and laser scanning. Excavation documentation was produced using traditional methods and consisted of drawings and photographs, taken from ground level and with the use of a drone in order to obtain wide-angle views and digital photogrammetric plans.

The basic methods of exploration involved removing successive mechanical layers, and where possible and justified, cultural layers or parts of them. The

specifics of the site necessitated the use of detailed procedures, not employed before. This particularly applied to the ash-hill, examined in its entirety, as well as the destroyed ramparts. The meticulous exploration and detailed documentation of all artefacts have resulted in a functional image of all parts and layers of the ash-hill. On the other hand, the almost completely destroyed ramparts were documented only in their basal sections. The diverse archaeological material provided opportunities to collect numerous samples for specialized analyses: archaeozoological, archaeobotanical, chemical, archaeometric, geological, and soil studies.

The results of the latest research should be considered highly satisfactory, as the entire circuit of the ramparts and their constructions have been identified, and selected features from the northern, most exploited part of the settlement have been examined. The settlement stretched over an area of 30 hectares when considering the central, highest part of the ramparts. However, if the external base of the fortifications is taken into account, approximately 2 hectares should be added. The circumference of the ramparts measured 2 km, with a base width of 12 to 18 m and a height of 3 to 4 m.

The construction of the earthworks is very interesting. The most important element is the circular, central ditch, with a width ranging from 0.35 to 1.1 m, in which the components of the wooden palisade were set. The structure of the ramparts was homogeneous, consisting of earthen mounds. Traces of wooden posts that formed the remnants of the outer palisade on the ramparts have also been identified. Three gate passages have been discovered on the northern and western sides, with a width of 1–2 m. Beyond the line of the ramparts, there was a ditch (currently preserved only in remnants) about 4 m wide, located 14.5 m from the outer base of the ramparts. Its course is symmetrical in relation to the ramparts.

The most spectacular feature of the Chotyniec settlement is the ash-hill located in the northern part of the settlement area. It was examined in its entirety using all available research and documentation methods. The function of this object is unequivocal. It is associated with the broadly defined sphere of the sacred. This is evidenced by the structure itself, clear signs of use, and the content of the layers, rich in numerous and unique artefacts, including small fragments of human bones.

The ash-hill originally took the form of a specially prepared mound measuring 25 × 20 m and approximately 2 m high (the upper sections were destroyed by ploughing, as were other sectors of the inter-mound surface). The layers of the ash-hill, saturated with ash and fragments of wood, indicate repeated use of the area. It is possible to distinguish spaces filled in after the rituals, upon which additional layers were built. Among the identified features, a clay-stone oven, the entrance to the central part of the ash-hill and the remains of regular log arrangements deserve special mention. The entire site was surrounded by an earthen embankment: 85,000 turves were identified, with a total weight of about 3 tons. Inside the structure, numerous remnants of conducted rituals were identified: post-consumption fragments of wild and domesticated animal bones, as well as the most spectacular finds in the form of imported Greek amphorae used for transporting wine and shattered in situ (335 fragments). Some of them have been successfully reconstructed, including a large, red-brown and painted amphora from Klazomenai and a smaller, grey vessel from Lesbos. Smaller rim fragments may also indicate vessels from Chios and Samos. It is highly probable that this set of amphorae came from more than one shipment. Herodotus' *Histories* include a mention of wine consumption during cyclical celebrations, which corresponds to the wine amphorae but also to the ritual site itself.

The significance of the Chotyniec hillfort must have been considerable, as evidenced by other artefacts from the ash-hill: numerous fragments of pottery, spindle whorls, arrowheads (including projectile points that are bifacial, trifacial, triangular, and quadrangular), bronze and iron pins, bronze necklaces and small ornaments, a collar made of faience and bronze beads, glass beads, a whetstone, and two fragments of destroyed gold artefacts.

Noteworthy are also the ground structures, circular in plan, with flat bottoms and a centrally located support pillar (holding up a yurt-like structure) as well as numerous ceramic artefacts in the fill. Their internal structures were very similar to each other, as was the nature of the fillings, which was distinctly different from the ash-hill. In the forest-steppe zone, these types of structures are associated with Scythian communities. Other ground features include medium-sized sunken pits of irregular shapes and flat bottoms, with

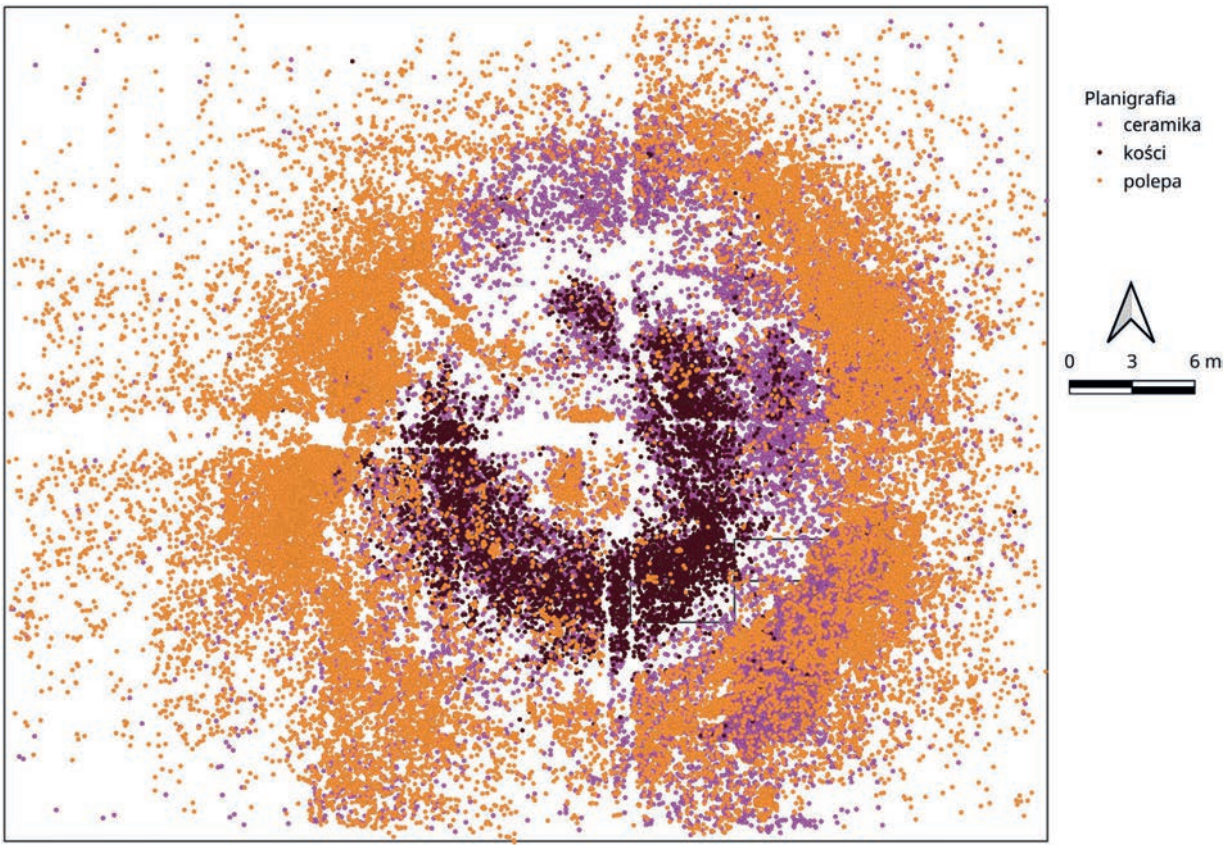


FIGURE 4. Chotyniec, Jarosław District, Podkarpackie Voivodeship, Site 1 – planigraphy of the ash-hill indicating the locations of ceramics, bones, and wattle-and-clay structure

a distinctly lower content of artefacts, which can be interpreted as utility features.

The structures that comprise a double post construction (19.5 × 13 m and 17.5 × 14 m), separated by an almost empty space of 18 m, were an exceptional find. Radiocarbon dating clearly indicates an Early Iron Age date, but more precision was not possible due to the wide range of the flattened calibration curve. In the absence of elements that could be attributed to residential structures, a hypothesis was formed that these constructions are remnants of two post buildings used for storing winter fodder for horses.

The Chotyniec hillfort, along with its surroundings, can be regarded a cultural phenomenon, whose presence in this part of Central Europe is considered a very important archaeological site. It has attracted the interest of researchers into the eastern realms of the Scythian world but also in the surrounding settlement structures of the Lusatian Culture, located in the immediate vicinity. Following another phase of field research, a need may arise to reassess the cultural situation in south-eastern Poland, as well as in Podolia and Volhynia during the Early Iron Age, specifically in the 7th to 6th centuries BCE.

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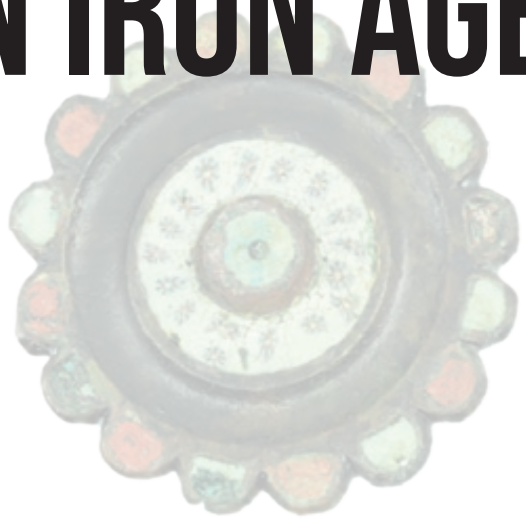
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PRE-ROMAN AND ROMAN IRON AGE





EXPLORING PREHISTORIC POLAND

FROM THE EARLY BRONZE AGE PASTORALISTS TO THE ROMAN PERIOD

IRON METALLURGY – OUTLINE OF THE ISSUE

Szymon Orzechowski

The reception of iron in present-day Poland

Like much of Central Europe, present-day Poland was not among the regions in which the foundations of iron metallurgy were originally developed. This fact contributed to the relatively late development of this manufacturing sector in the region. The stage of the emergence of indigenous metallurgy based on the smelting of local ores was preceded by a long period of iron usage, initially in the form of finished products imported from the south and west of Europe, and later as semi-finished iron brought from the areas of the Hallstatt Culture, where the first metallurgical hubs emerged in the mid-8th century BCE in the Alpine region and Transylvania.

The oldest objects made of iron or bronze with iron elements, appeared in the Oder and Vistula river basins as early as in the fifth period of the Early Bronze Age or at the end of the Ha B phase, and are attributed to the Lusatian Culture.The new metal first reached Central and Upper Silesia as well as western Wielkopolska. Among the individual items of this type were bronze swords with iron inlays (e.g. Gamów), iron knives with bronze handles, and iron pins (Bukowski 1982a, 352–356). It was not until the 7th century BCE that larger numbers of iron objects began to appear. These were usually small items: bracelets, pins, and rings. Iron weapons and tools, known mainly from burial sites and hoards, became more common only at the turn of the 7th to 6th centuries BCE.

The number and variety of iron objects clearly increased during the Ha C period. Apart from the western zone of the Lusatian Culture, they were also increasingly popular in Western and Central Pomerania. These were primarily ornaments: fibulae (eyeglass-shaped, harp-shaped, and Certosa types), bracelets, greaves, necklaces, various types of pins, and rings. Tools were much rarer, including socketed axes, chisels, sickles, more frequently knives, and only sporadically weapons.

Most of these finds originate from burial sites, and in different regions (Bukowski 1982a, 383), the share of iron objects in the total number of metal artefacts during the Ha C period ranges from 26% (Częstochowa-Raków) to 72% (Dębowiec). This may indicate quite varied availability of the new metal or regional burial customs. The share of iron objects in bi-metallic hoards from this period was even smaller. While bracelets and anklets represent 34% of the deposited items, only 8% of them were made of iron. Iron axes make up only 3% of the 20% of all axes found in large deposits of this type (Blajer 2001, 289).

A significant increase in the number of various types of iron tools and weapons occurred only during the Ha C-D period. It witnessed the appearance of flat tubular axes, knives, and spearheads. Their presence in the western part of the Lusatian Culture is still associated with Eastern Hallstatt influences. There were also strong interactions from the south (Illyrian areas and Italy), from where flat socketed axes with lateral projections and bronze ocular fibulae with iron elements reached Silesia (Bukowski 1982b, 317). Notably, until the end of the Hallstatt Period, the eastern regions of the Lusatian Culture were almost completely devoid of iron products and hoards containing the new metal.

A larger number of iron objects appeared only in the assemblages of the Pomeranian and Cloche Grave Cultures (Czopek 1992, 123). A particularly marked shift in the proportion of bronze to iron objects occurred at this time in Silesia, although in the early La Tène Period, there was a noticeable

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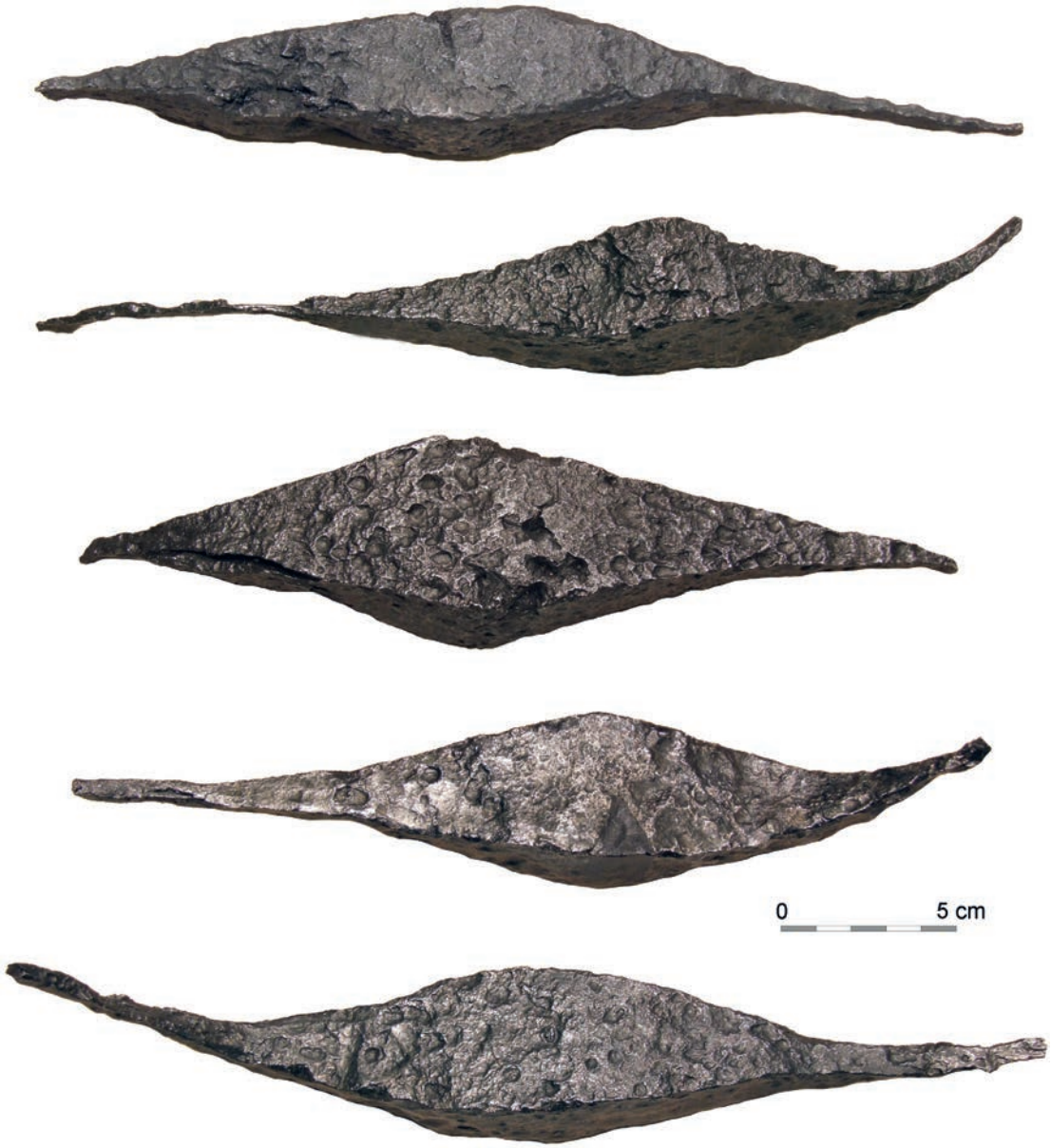


FIGURE 1. Witów, Koszyce commune, Lesser Poland Voivodeship. Bipyramidal ingots – a random find at a multicultural site. Photo by A. Wrona

decrease in the number of iron objects in this region compared with the preceding period (see Lehnhardt 2019, section 3.1.3). It was only in later periods that iron became more common and began to replace bronze. A similar situation occurred in Eastern Pomerania, where iron objects became more frequent in Pomeranian Culture burials only during the Ha D period. These items were concentrated around Gdansk and Słupsk, and their production continued to rely largely on imported raw material (Bukowski 2005, 55–56).

A notable example of the gradually growing popularity of iron objects, especially weapons and tools, is the burial site in Kietrz. In the Ha A2 period, the share of this category of artefacts was only 1.6%, only to increase to 11.3% by Ha C. This trend was maintained in the subsequent period (Ha D3–Lt B) (Mierzwiński 2008, 39).

However, there is an increasing suggestion to shift the chronology of the widespread reception of iron in present-day Poland, previously associated with Ha D, to an earlier time (Dzięgielewski

et al. 2020, 229, 232). It has been noted that almost all well-dated hoards containing only iron artefacts come from the Ha C period (Ha C2). Thus, the belief that iron objects (perhaps only outside of Silesia) could have appeared there only in the later phase of the Hallstatt Period is now being questioned. The rare occurrence of hoards containing only items made from this metal during the Ha D period may indicate that by then, iron had no longer been an attractive novelty and played the role of a commonly used raw material in the economy.

By the end of this period, a significant portion of iron objects may have already been produced locally from semi-finished iron imported from the areas of the Hallstatt Culture in the form of so-called bipyramidal ingots (Fig. 1). Currently, approximately 20 such objects are known in present-day Poland (Maszkowice, Biskupin, Wicina, Witów, Porąbka, Oświęcim, Przybysław) (Orzechowski 2025, 135–137). All are dated to the Ha D/LT A period. Metallurgical analyses conducted on the ingots from Biskupin, Maszkowice, and Witów clearly indicate their foreign origin, although initially, the latter were considered local products.

Did the beginnings of local iron metallurgy date back to the Hallstatt Period?

Despite the steady increase in the number of iron objects in successive periods, at least until the end of the Hallstatt and also during the Early La Tène Periods, there is no convincing evidence in the region under discussion for the smelting of iron from local ores (Bukowski 1982b, 319; Orzechowski 2013, 159–162; Lehnhardt 2019, 360). Even in Silesia, parts of Wielkopolska, and probably also Kuyavia (areas strongly influenced by the Hallstatt Culture in the Early Iron Age), no traces of such activities have been confirmed, contrary to earlier suggestions (cf. Gediga 2007, 123–125).

Nevertheless, the view that indigenous iron metallurgy already existed in present-day Poland during the Hallstatt Period still persists. This hypothesis (particularly popular toward the end of the 20th century) was based on the concept of the so-called "Świętokrzyskie metal", developed and promoted by Jerzy Piaskowski, a well-known metallurgist and historian of technology (1963; 1984). He assumed that metal produced in a specific region, relying on the same raw materials as well as similar techniques and technologies, should display a comparable chemical composition, a specific microstructure, and even characteristic forms of finished products. The reference point for distinguishing individual metallurgical centres was to be the metal produced in the Świętokrzyskie Mountains, where the largest metallurgical complex of Barbarian Europe operated. Put simply, iron produced in this region was thought to be characterised by a low phosphorus content (0.02–0.04%), uneven carburisation (up to 0.3% C), and technological processes limited to hot forging and heat treatment, without intentional carburisation or forge-welding of iron and steel. Among the hundreds of artefacts identified as "Świętokrzyskie products" were materials dated from the Hallstatt to the Roman Periods, which, according to the cited researcher, indicated a continuous development of metallurgy in this region from the Early Iron Age until the end of antiquity.

This assumption, however, contradicts the results of archaeological research, which point to a considerably later origin of the Świętokrzyskie metallurgical centre and, indirectly, to a later chronology for the beginning of indigenous iron production in other regions of present-day Poland as well. Although the suggested method of metal identification ultimately proved insufficient, the considerable achievements of its creator should not be overlooked: following his work, hundreds of chemical analyses were carried out, significantly expanding our knowledge of the properties of the metal produced at the time and of the technological processes employed.

Despite the passage of time and significant advances in research, finds of slag at Early Iron Age (Hallstatt Period) sites remain extremely rare, and their association with features and cultural layers of this period is generally uncertain. In the context of Lusatian Culture material, only a few (and poorly documented) examples of slag recovered from secondary deposits can be cited (Rybno 1, Opole-Wójtowa Wieś 72, or the fortified settlement at Wicina [?]). These may represent evidence of post-reduction stages of the metallurgical process, related to the refining and smithing of imported semi-processed iron. Moreover, no technical installations for smelting or smithing have been identified, and blacksmithing tools from this period are exceedingly rare (e.g. a hammer from Wicina).

The furnace finds from Kozów in Silesia and Kozy Wielka on the Silesia-Wielkopolska border, previously cited in older literature and dated to the Hallstatt Period, also fail to withstand critical scrutiny (Kostrzewski 1953–1954, 33).

We are likewise unable to identify finds of slag or furnaces securely dated to the period of the Pomeranian and Cloche Grave complex. In Silesia, only a single site from this period is known, Pobiel Site 1. While a greater number of such examples can be indicated at sites in the Świętokrzyskie Mountains (Czajęcice 22, Grzegorzowice 80, Pękosławice 2, Pokrzywnica 3, Sosnówka 18), all of them have also yielded Przeworsk Culture materials (Orzechowski 2007, 54).

The influence of the Celts on the development of iron metallurgy in present-day Poland

Drawing on ancient traditions that portray the Celts as disseminators of technical knowledge in iron metallurgy across the regions they settled, this view was also widely accepted with regard to present-day Poland (cf. Woźniak 1982, 455–457; Andrzejowski 2010, 60). Such a possibility is suggested not only by the physical presence of Celtic populations during the LT B1–C2/D periods (primarily in Lower and Upper Silesia, the Kraków region, the Sącz and Żywiec Basins, and along the Upper San), but also their direct contacts with representatives of the Przeworsk Culture during the second and third settlement phases of the Tyniec Group (Poleska 2006, 257, 260), and probably also in Lower Silesia (Czerska 1983, 58; Dąbrowska 1988, 110–111).

Meanwhile, as in the Hallstatt Period, material attributed to iron metallurgy remain scarce and continue to be ambiguous. In the Kraków region, such finds occur at nearly all excavated settlements of the Tyniec Group, yet their nature is difficult to determine (cf. Poleska 2006, 203). In Silesia, traces of metallurgical activity are recorded only in certain areas, mainly on the Głubczyce Plateau, in the basins of the Psina and Troja rivers (Sułków E, Nowa Cerekwia 4), and along the upper course of the Oder (Roszowicki Las 25, 28; Łany 24). Around Wrocław, slag has been recorded (Madera 2002, 62, Map 1) only along the upper Żurawka River at two sites (Kurządkowice 1 and Jędrzychowice 9). No such finds have yet been recorded at Púchov Culture sites in the Sącz and Żywiec Basins, while along the San River only indeterminate slag has been noted at the site of Lipnik 3.

Equally symptomatic is the absence of metallurgical features that could be securely associated with iron-smelting furnaces. The attempt to link a group of 15 features clustered around two pits (Features 3 and 11) at Sułków, Site E, with this stage of the metallurgical process remains unconvincing (Czerska 1972, 9–10, 20–21). The slag collected at the site, characterised by its typical bowl-shaped form (the so-called bowl-shaped slag) is more likely to derive from post-reduction stages of the process, associated with the refining and smithing of semi-processed iron.

Similar doubts surround the interpretation of a presumed furnace at Kraków-Wyciąże 5, where two hearths were discovered within a sunken-featured structure (Feature 421), one of them attributed to a supposed furnace pit (?) (Buratyński 1953, 111–113, f. 11). Deficiencies (and even distortions) in the documentation, together with a profile of the alleged furnace that closely resembles features from Igołomia, call for considerable caution in interpreting this find (Fig. 2). In this case as well, the form of the slag, resembling so-called bowl-shaped slag, points rather to post-reduction stages of the metallurgical process. Indeterminate slag has also been recorded at other sites, including Krzesławice and Podłęże.

Notably, there is no clear evidence of continuity in this branch of production in later periods in areas previously occupied by the Celts. In the early phases of the Przeworsk Culture – even in the Kraków region, where a relatively long phase of coexistence between the two cultures is assumed – iron production was neither resumed nor further developed. The furnaces from Igołomia and traces of metallurgy from the surrounding area are dated only to phase B2 of the Early Roman Period (Dobrzańska 1990, 14, 15, 81). Moreover, outside this region there is no confirmation of the presence of a workshop so clearly reflecting Late La Tène traditions associated with the Celtic model of production. Even if Celtic smelting furnaces existed in present-day Poland (which is certainly plausible) the scale of this production could not have been large and did not influence the development of indigenous metallurgy, which only progressed owing to the Germanic peoples. The question of the transfer of the idea of the pit furnace from Celtic smiths

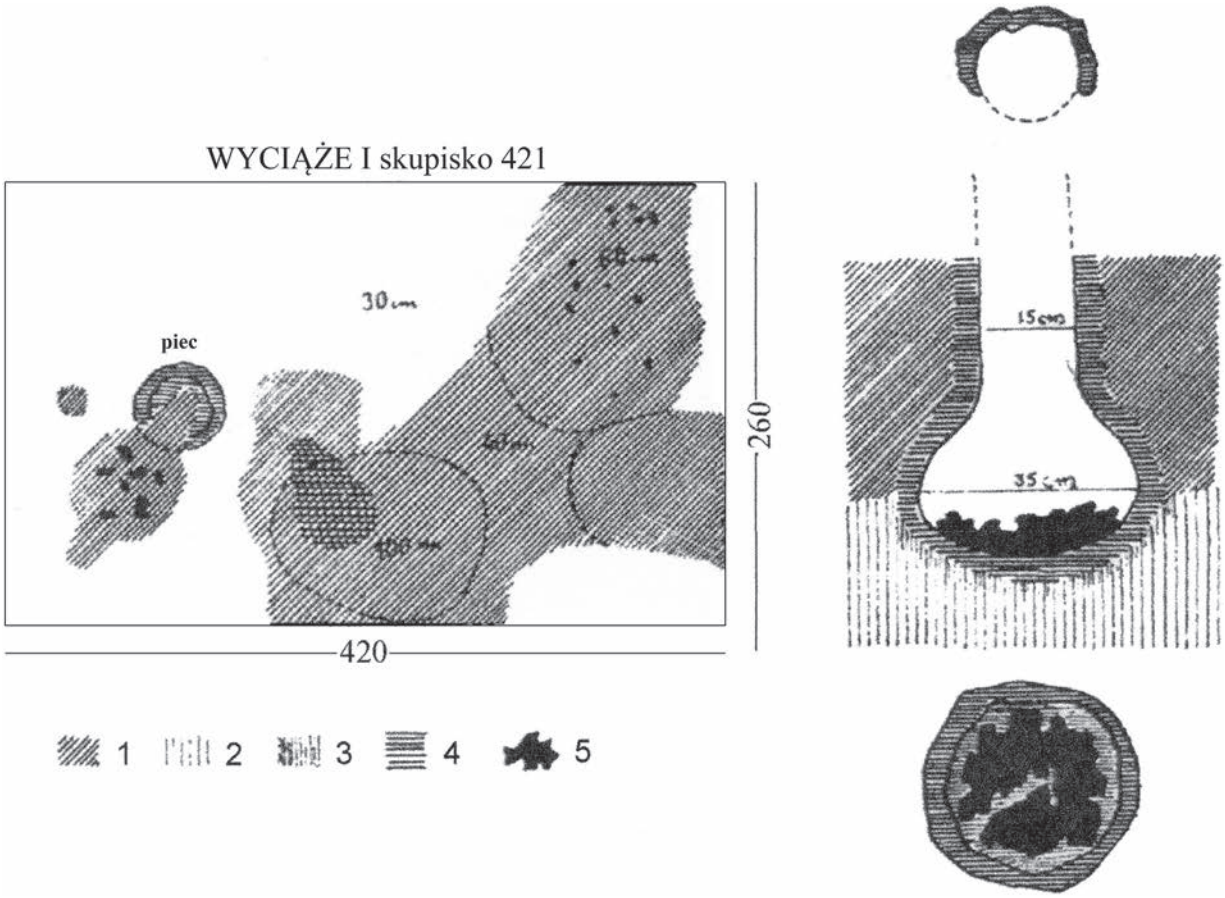


FIGURE 2. Kraków Wyciąże, Lesser Poland Voivodeship. Feature – cluster 421 with a presumed smelting furnace. After Buratyński 1953. Prepared by the author 1 – humus, 2 – loess, 3 – burnt loess, 4 – potting mix, 5 – slag

to the Germans remains open; if this transfer did occur, the residents of the Celtic enclaves located in present-day Poland probably did not play a decisive role in this regard.

Given the lack of evidence for a direct connection between metallurgy in present-day Poland and the Celts settled there, researchers began to explore other possible pathways for the transmission of these technologies. While still acknowledging Celtic influence in this regard, attention was drawn to Romanized cultural units that may have acted as intermediaries. The Jastorf Culture route appeared to be the most plausible. With regard to Pomerania, such connections were suggested by R. Wołagiewicz (1970, 63–64), and for Masovia by A. Niewęgłowski (1986, 211) and, above all, S. Woyda (2002, 139, note 75), who explicitly supported the possibility that iron metallurgy was introduced to this region from the Elbe basin and Jutland. This view appears to be supported by more recent research, which confirms the presence of stable settlements of this culture in many regions of present-day Poland (Grygiel 2015, 127–130, 153).

It is difficult to determine whether the Jastorf element (particularly in Masovia) played any role in the transfer of metallurgical techniques and technologies. Only at two settlements with evidence of metallurgical activity in the form of slag (Biskupice 1 and Izdebno Kościelne 1) can a period of coexistence between the two cultural units be assumed. The problem is that these settlements also existed during the Roman Period, and in Biskupice the scale of production at that time was enormous. However, the latest research conducted at Zaborów, where bloomery furnaces of presumably earlier chronology have been uncovered, may provide new insights on this issue.

More data on slag finds (and even features associated with metallurgical processes) are available from the settlement sites of the Gubin Group of the Jastorf Culture. These are known mainly from the Lower Lusatian cluster, whereas in the Lower Silesian cluster slag has been recorded at only two sites (Madera 2011, 46). At Sękowice 8, a bloomery furnace (Feature 109) and a group of six hearths described as "bloomery hearths" were reportedly discovered (Lewczuk 2008, 89, 93, 100). While the parameters and character of the slag from Feature 109 correspond to the remains of a slag-pit furnace, the other structures should rather be interpreted as auxiliary features related to an indeterminate stage of the metallurgical process.

Even greater controversy surrounds the interpretation of the second site, identified as a presumed bloomery furnace at Jazów 3 (Feature 11). Within a large pit approximately 40 cm deep, a slag concentration measuring 40–45 cm in diameter has been documented. Its classification remains disputed. Some scholars argue that it corresponds to the Gera-Tinz type, characterized by a furnace pit, whereas others point to similarities with the Tuklaty type, which features a shaft constructed within the floor and wall of the workshop (Madera 2011, 48). The presence of Roman Period material in this area further complicates the interpretation.

A comparison of these findings with metallurgical features identified at Jastorf Culture settlements along the Havel in Brandenburg – an area from which the population that probably settled the Oder region (the so-called Lower Lusatian cluster) probably originated – reveals fundamental differences in smelting techniques between the two regions. The recently identified Glienick-type furnaces differ markedly in construction from those known from the area of modern Poland. They were reusable installations, consisting of a furnace pit set on solid stone foundations, above which conical clay shafts were erected (Brumlich 2020, 127–128). After the smelt was completed, the slag was removed through an opening located opposite the furnace pit. These furnaces operated from the 4th to the 1st centuries BCE, and it was precisely this type of installation on which local iron production was based. How, then, can the absence of such technical solutions in the settlement areas of both clusters of the Gubin Group be explained? It is important to note that in regions occupied by Jastorf settlement in the lower Elbe basin, as well as in Jutland and Schleswig-Holstein, slag-pit furnaces emerged relatively late and only came into widespread use during the Roman Period (Jouttijärvi, Voss 2011, 55).

For the time being, therefore, there are no grounds to assume that it was the population of the Jastorf Culture that brought the knowledge of iron smelting to present-day Poland and disseminated it within the local milieu. Potential links between Masovia and the Oder-region areas in the field of metallurgy also appear inherently unlikely. Jastorf settlement in the Polish Lowlands shows no clear contacts with other groups of this culture, namely the Gubin and Oder-region groups, but instead was distinctly oriented toward Jutland (Grygiel 2015, 152). It would also be difficult to assume a transfer of these technologies directly from the Gubin Group to the Oder-region territories of the Przeworsk Culture (cf. Lehnhardt 2019, 360). The decline of both settlement clusters of the Jastorf Culture during Phase A2 of the Younger Pre-Roman Period coincided with the collapse of Przeworsk settlement in Lower Silesia, which certainly did not create favourable conditions for the dissemination of these skills.

According to some researchers, the population inhabiting present-day Poland remained dependent for a long time on the import of raw materials and iron objects from outside. Especially in Silesia, during Phases A1–A3 of the Younger Pre-Roman Period, the basic bulk of iron may have been imported. The existence of a well-functioning supra-regional exchange network along the Amber Road, as well as the availability of high-quality La Tène iron products, were factors that inhibited the development of local iron production. It seems that it was only the cultural changes associated with the collapse of the Celtic world and the disintegration of supra-regional trade cooperation that compelled an interest in establishing indigenous iron production (cf. Lehnhardt 2020, 164, 167).

If, in the case of Silesia itself (given the proposed chronology of settlement changes and its close proximity to the Celtic zone), such an assumption might be cautiously accepted, then for other, more distant regions it is decidedly less plausible. In view of the very dynamic development of particular settlement areas and the widespread use of iron in funerary rituals, relying on the import of this raw material would have been extremely difficult.

Local iron production – a chronological study

This raises the question of when indigenous iron production appeared in present-day Poland and from where the relevant knowledge was derived. Indicating a single direction for the transfer of iron-production techniques and technology, and identifying the precise place where this occurred, is impossible. The bearers of these skills were individual craftsmen equipped with appropriate practical experience and the necessary knowledge, which (at least initially) was not generally accessible. We therefore assume that the dissemination of the new technologies did not take place as a single act of transmission from outside. Rather, it was a gradual process which probably followed a different course in different regions, and possibly also had diverse sources of origin. The only constant element was the type of metallurgical installation in which iron was smelted. This was the free-standing, single-use slag-pit furnace, and its appearance in present-day Poland is the key to identifying the time and place of the adoption of the new production technique and technology (Orzechowski 2025, 91–93).

The beginnings of iron production based on the smelting of local ores can be identified and documented only in the Younger Pre-Roman Period, mainly within the territory of the Przeworsk Culture. At least two possible directions of technological transfer and practical know-how may be considered, and (as already emphasized) these should not be linked to Celtic or Jastorf settlement enclaves in present-day Poland. It seems more probable that these technical innovations were adopted directly from Bohemia and Moravia, where workshops equipped with single-use slag-pit furnaces had been in operation already in the 2nd–1st centuries BCE (e.g. at Mšec and Sudice). Independently, the diffusion of new skills may also have involved Germanic populations inhabiting the Elbe basin and the Jutland Peninsula. The expansion of the Przeworsk Culture into the Saale basin and onto the Jutland Peninsula during the Younger Pre-Roman Period led to direct contacts with the Germanic peoples living in these areas, and it was they who may have transmitted the secrets of iron smelting to the Przeworsk migrants (Lehnhardt 2019, 367).

The lack of a sufficient number of reliable radiocarbon dates for bloomery furnaces makes it impossible to precisely determine the onset of this phenomenon, but the available data indicate a middle or late phase of the Younger Pre-Roman Period (Orzechowski 2013, 174–177; Lehnhardt 2020, 155). One point seems clear: the metallurgical technique was not adopted simultaneously across the entire territory of present-day Poland and did not lead to a sudden or widespread increase in production. The new craft probably developed gradually, initially supplementing only the import of raw materials and finished products from the south and west.

In principle, only in regions where larger concentrations of metallurgical sites emerged is it possible to trace the dynamics of this craft's development. In most other areas, the fragmented nature of production, its occasional character, and the long duration of settlement sites within which metallurgical workshops operated make it impossible to draw conclusions about the chronology of the phenomena described.

In the Świętokrzyskie Mountains, only a few metallurgical sites can be linked to the Younger Pre-Roman Period (e.g. Jeleniów [unnumbered site], Ostrowiec Świętokrzyski – Częstocice 14, Łysa Góra 9, Gardzienice 1, Pękosławice 1). Similarly, in Silesia, only some of the furnaces from the site at Psary 1 and from the Polwica–Skrzypnik complex may have been in operation in the time in question. The collapse of settlement at the turn of Phases A2 and A3 of the Younger Pre-Roman Period, followed by its renewed development toward the end of the Early Roman Period, suggests a relatively late development of iron production in this region (cf. Pazda 1980, 39 ff.).

Relatively the best-documented early metallurgical activity comes from Western Masovia. Most probably as early as in the second half of the 2nd century BCE, the first metallurgical settlements were established on the Błonie Plain (Biskupice 5, Brwinów 11, Falenty 19, Kanie 13, Milanówek-Falęcin 14, and Reguły 14). According to S. Woyda, a developed iron industry existed here at the end of Phase A1, and most likely in Phase A2 of the Younger Pre-Roman Period. This is confirmed by radiocarbon analyses carried out on 11 metallurgical furnaces from this region, seven of which indicate dates corresponding to the end of the Younger Pre-Roman Period

or the beginning of the Early Roman Period (cf. Janiszewski 2018, 389, table 3).

A marked increase in production within the Przeworsk Culture occurred only in the Early Roman Period. Most of the production settlements in Masovia continued their activity at that time. In Lower Silesia, as well as in much of Upper Silesia, new settlement clusters emerged only toward the end of Phase B1 and in Phase B2, which was probably accompanied by the development of local iron production. It is generally assumed that the bulk of production in this region falls in the Younger and Late Roman Periods (Phases C1–C2). In the Świętokrzyskie Mountains, it was not until the younger stage of the Roman Period (Phase B2) that settlement developed to a degree sufficient to initiate large-scale metallurgical production. Its apogee, however, occurred at the turn of the Early and Younger Roman Periods, as evidenced by organized furnace fields grouping hundreds of bloomery furnaces (Orzechowski 2007, 44).

It is much more difficult to trace the development of iron production in other regions of present-day Poland. For example, in Kuyavia, after the initiation of this activity in the Late La Tène Period and its development in the Early Roman Period, production was centralized and intensified probably in the 3rd century, mainly in the area of Sędzin, Krusza Zamkowa, and Inowrocław (Cofta-Broniewska 1979, 85–86). Evidence of iron production dated to the end of the Early Roman Period as well as to the Younger and Late Roman Periods has been recorded along the upper Warta River, south of Wieluń, and (somewhat earlier) along the Prosna River in the vicinity of Zadowice (Siciński 2011, 64, 66). Most of the metallurgical sites of the Luboszyce Culture in Lower Lusatia, near Żary (Królów 2, Bogumiłów 8, Drozdów 4, and Rościce 9), also date to the Younger and Late Roman Periods. They are a part of a large settlement cluster of this culture located west of the Oder River (Stachowiak 2010). Little is known about the chronology of metallurgical sites in Pomerania and the Lake District regions. The few identified sites in this area (e.g. Goślinowo and Głuszyno) are dated broadly from the Early Roman period to Phase C2 of the Younger Roman Period (Machajewski 2003, 232–234).

While the development of iron production in regions where it occurred in a dispersed form continued steadily into the Roman Period, the opposite process can be observed in the large metallurgical centres, where production was gradually reduced. The earliest signs of the collapse of mass production are visible in Masovia. At least some of the large metallurgical settlements (Kanie 13, Milanówek-Falęcin 14, Pruszków 14, Reguły 16) ceased operation as early as the mid-2nd century CE. The largest settlement-production complexes, such as Biskupice 5, Brwinów 11, and Falenty Duże 4, probably survived until the early 3rd century, but by that time the scale of production had decreased disproportionately (Woyda 2002, 122–123). It may also be assumed that in the Świętokrzyskie Mountains the organized furnace fields disappeared already in Phase C2, after which production declined to a regional level. The metallurgical centres of Silesia probably operated the longest. Most of them began to cease activity only in the second half of the 4th century, although about 30% of the sites discovered so far can still be associated with Phase D. The Brzeg metallurgical region operated the longest, continuing even until the disappearance of the Przeworsk Culture in the 5th century (Pazda 1994, 169–170).

The extensive model of iron production – production regions

The distribution of metallurgical production traces in present-day Poland indicates a highly uneven development of this branch of craft activity across the region and, above all, its non-uniform nature. However, this picture may be distorted, since outside the major centres of mass production, no systematic inventory surveys have yet been undertaken that would allow to determine the real scale of this activity in other areas. This has led to the mistaken belief that specialized metallurgical centres were responsible for the bulk of production, especially in the manufacture of weapons and tools, which required metal of higher quality. Meanwhile, year by year, more evidence is emerging for a fairly widespread knowledge of smelting techniques and technology, as demonstrated by the growing number of metallurgical sites recorded in various regions of the country. However, not all slag finds should be associated with the reduction (smelting) stage itself, and a considerable portion of them may represent the so-called post-reduction phase of the metallurgical process. It should also be remembered that in present-day Poland the bloomery method

continued to be used until the early 17th century, when the first blast furnaces appeared. This creates an additional risk of chronological misclassification of such materials. Given the still limited state of research on this category of sources, such errors are highly probable.

Even a cursory analysis of the distribution of larger concentrations of metallurgical sites in present-day Poland indicates that the populations of specific cultural units engaged in this craft to very different extents. Given the widespread availability of bog iron ores (the principal raw material for this production) environmental conditions were not the decisive factor in undertaking such activity. Rather, it was more difficult-to-reconstruct social, economic, cultural, and even political factors that may have been in play. The dominance of iron production within the Przeworsk Culture is frequently emphasized, especially with regard to the metallurgical centres located within its territory, which were believed to have not only supplied raw material for tools and weapons for their own communities but also for other cultural units. This view prevailed in relation to Wielbark metallurgy, and above all to the areas inhabited by communities of the West Balt Barrow Culture in north-eastern Poland, where for a long time no traces of local iron production were recorded. This interpretation seemed to be supported even by ancient written sources, particularly the account of Tacitus concerning the Aesti (*Germania*, 45), which was taken as evidence that they were culturally and technologically backward and primitive.

As already mentioned, the vast majority of iron production sites in present-day Poland are located in areas occupied by the population of the Przeworsk Culture. Apart from the two enormous metallurgical regions operating in the Świętokrzyskie Mountains and in Masovia, at least a dozen smaller production regions of varying size can be identified, occurring mainly in the central and north-western settlement zone of this culture. This activity developed most extensively in Silesia and in Wielkopolska (Fig. 3).

Metallurgical sites in Silesia occur most densely within the Oder proglacial valley and along its main tributaries, forming a belt approximately 300 km long and between 10 and 60 km wide. Of nearly 1,250 slag sites recorded in this region, more than half have been attributed to the prehistoric period (Madera 2002, 61, map 2 – insert). They have been grouped into 12 metallurgical regions, which (particularly in Lower Silesia) do not always correspond to known settlement clusters. A better correlation has been noted in Upper Silesia, where the main settlement zones largely coincide with concentrations of metallurgical sites (Fig. 4).

The scale of production in the individual regions naturally varied, and only in a few of them could it have reached larger proportions. This was probably the case in the following regions: the Lower Barycz–Oder region (Psary 1, Tarchalice 1); the Bystrzyca–Oława region (Polwica 4–5, Skrzypnik 8, Lizawice 3, Domasław 10–12, Płoski 3); the Strzelce–Opole region (Opole-Malina 114, Dobrzeń Mały 8, Daniec 4), and the Brzeg region (Buszyce 9, Dobrzeń Wielki 2). Only the latter may have played a significant role in iron production within this area. In the other regions, although the number of sites may appear considerable, the size of the furnace fields indicates a primarily local nature of activity.

Also in Wielkopolska, several local regions can be identified with a significant scale of production. Ongoing verification studies confirm that, compared to the state of research in the 1980s, the number of slag finds in this area has more than doubled: from around 80 to over 200 sites. These sites are concentrated in the southern and eastern parts of the region, mainly along the upper Warta River (Przywóz 1a, Toporów, Skrzynno 3, Strobin 3, 3a) and south of Kalisz along the Prosna River (Kalisz-Lis, Kalisz-Tyniec, Rosoczyce, Piwonice 1). They also occur, though less frequently, in the Gniezno Lake District and in the area where the Prosna flows into the Warta (Dzierznica, Sługocinek 1). A distinct concentration of sites is also visible on the western margins of the Leszno Lake District (Bruszczewo, Boszkowo, Czacz), which may have been connected with the Lower Barycz–Oder region in Silesia. At Czacz Site 14 427 furnaces were recorded, and this is the first metallurgical site in this zone whose production may have extended beyond the local market.

The situation in Kuyavia is difficult to assess unequivocally; its role as a major iron-production region has probably been overstated. This view was based largely on theoretical assumptions arising from the presence of rich deposits of bog iron ore and a large settlement cluster located along an important trade route. Several local metallurgical regions have been distinguished, among which

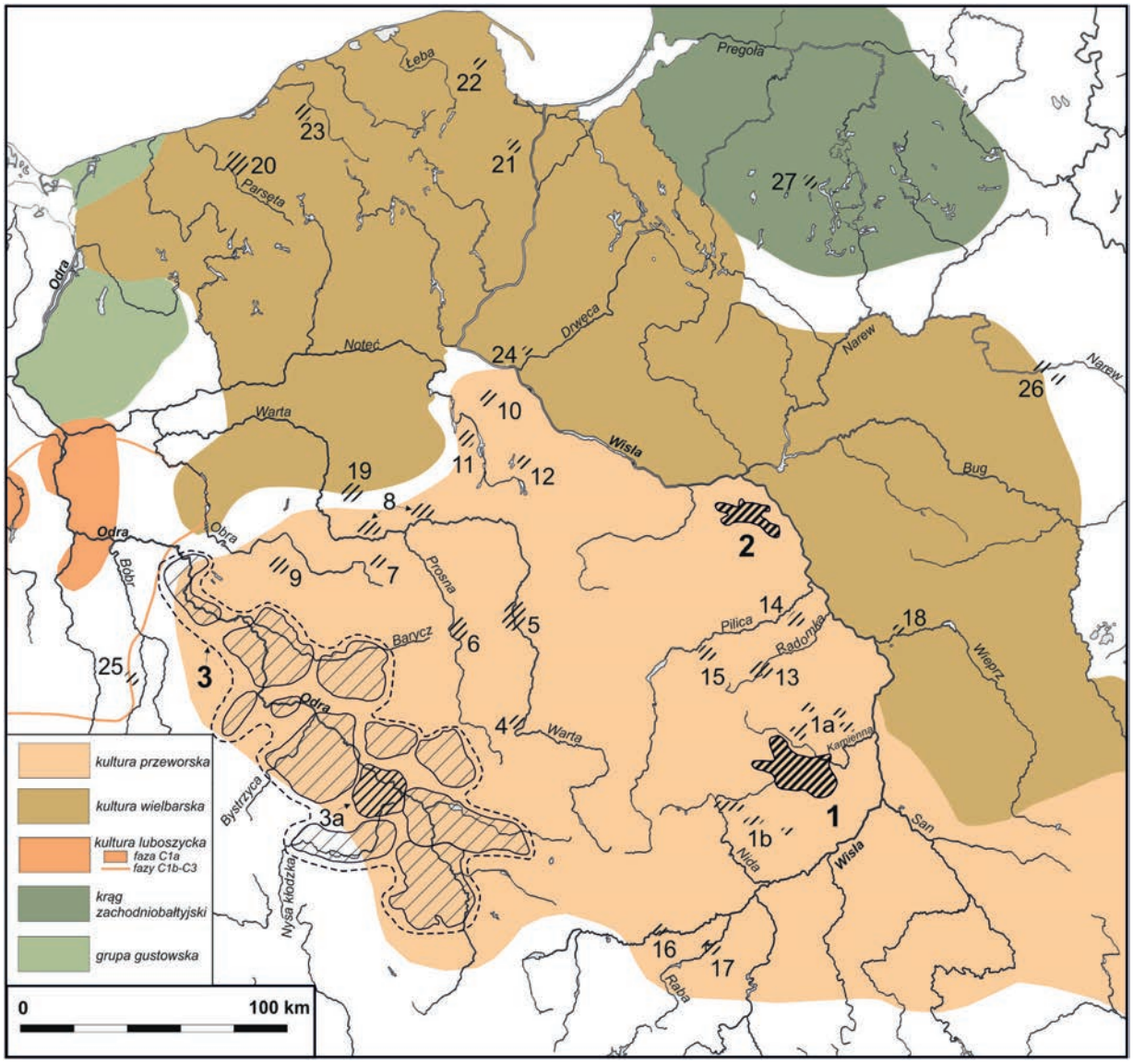


FIGURE 3. Metallurgical centers (1–3) and smaller production regions in Poland in antiquity (4–25). After Orzechowski 2015

the Bachorza–Parchanie–Tążyna region (Sędzin, Nowy Dwór, Dąbrowa Biskupia) has been regarded the most important. Others have been dispersed across various parts of Kuyavia, mainly along the upper Noteć River (cf. Cofta-Broniewska 1979, 84–85). However, the number of identified sites is small (around 20), and the largest furnace field investigated so far, at Zgłowiączka, contains only 11 furnaces.

Single traces of bloomery production also occur in the interfluve of the Vistula and Pilica rivers, but they are known primarily from surface surveys. Bloomery furnaces have so far been recorded at only a few sites, for example at Wólka Domaniowska 6 (Lechowicz, Olędzki 2008, 238–239). They are concentrated mainly in the upper and middle course of the Radomka River (Brudnów, Domaniów, Gulin) and along the middle and lower Pilica (Brzeście, Dziarnów, Wyśmierzyce). This region, situated between the Świętokrzyskie and Masovian metallurgical centres, requires more detailed investigation, which may yield interesting findings concerning possible contacts between these two specialized iron-producing regions.

It remains to mention two metallurgical regions regarded as potential enclaves of the Świętokrzyskie

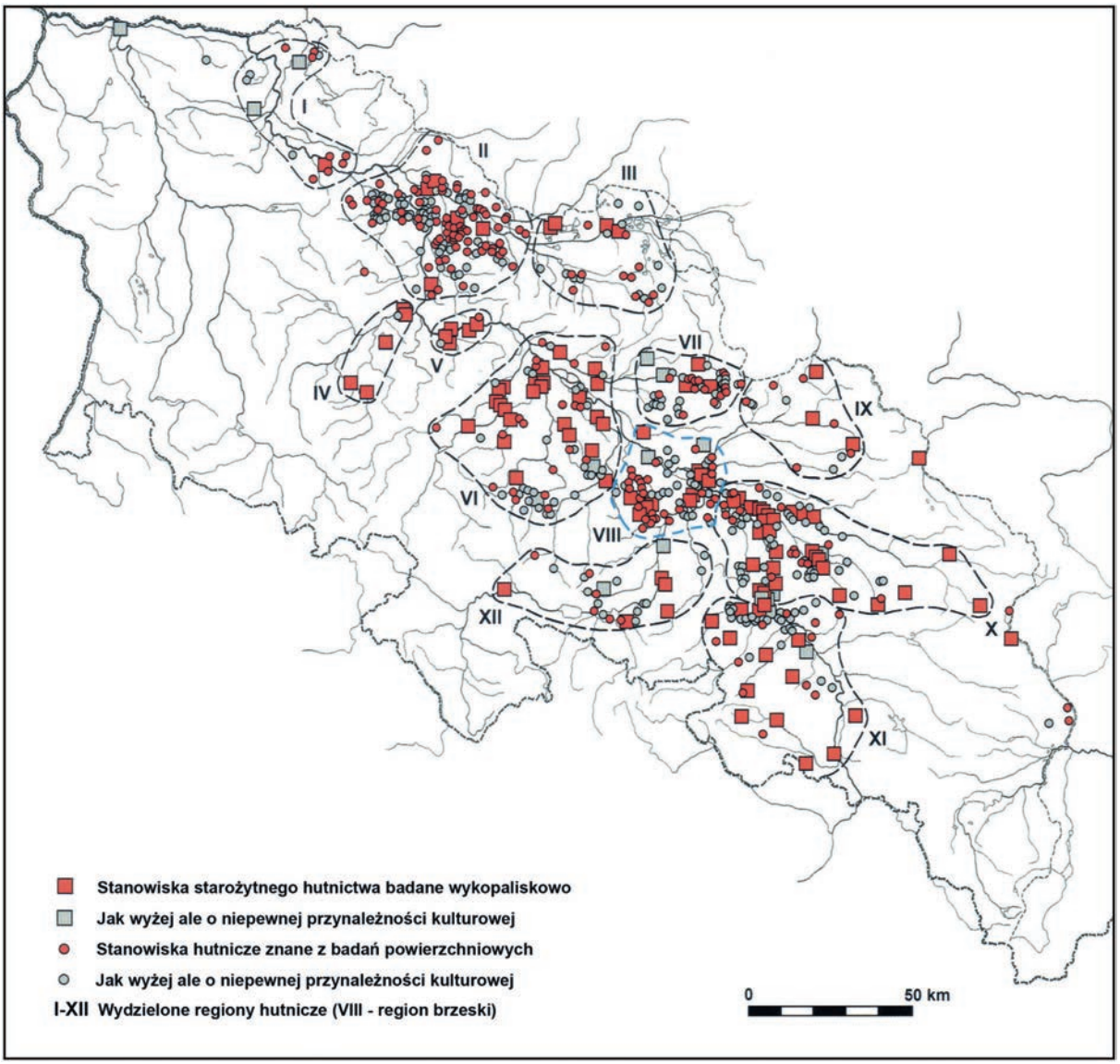


FIGURE 4. Metallurgical regions in Silesia (Przeworsk Culture). After Madera 2020

metallurgical centre. The first encompasses the areas along the upper and middle course of the Iłżanka River (Mirzec 1, Seredzice 2, Seredzice-Kolonia 1) and along its left-bank tributary, the Modrzejowica. A somewhat smaller metallurgical microregion has also been identified along the Krępianka River (Jawor Solecki 1), east of Lipsko. A fairly large group of sites (approximately 60) has also been discovered in the Ponidzie region, within the lower and middle basin of the Czarna Nida (Przychodni 2006, 116–121). The connection of these areas with the Świętokrzyskie centre may be indicated by the presence in the region (for example, at the southern sites of Bilcza 8 and Mosty 12, and at the northern sites of Jawor Solecki 1, Osiny 1, and Seredzice 2) of organized furnace fields reminiscent of those so characteristic of the Świętokrzyskie Mountains.

The fascination with the large metallurgical regions of the Przeworsk Culture, which were attributed a decisive role in supplying iron to the whole region of what is now Poland, has largely overshadowed the significantly more modest evidence of such activity within other cultural units. Although in the areas of the Oksywie and later Wielbark Cultures only a few, previously little-known zones associated with iron production

have been identified, and the number of sites where remains of smelting furnaces have been recorded remains small (around 30 sites), more recent discoveries have bulked out the picture. Until recently, it was assumed that these areas were dependent on the import of semi-raw iron from the south. The concept of the so-called Świętokrzyskie metal, which posited a significant contribution of iron from the Świętokrzyskie Mountains to this part of Poland, effectively reduced local ironworking to a marginal and occasional activity. However, increasingly frequent discoveries of new metallurgical sites indicate a high degree of self-sufficiency in these regions. These sites are primarily located in the Przeworsk-Wielbark border zone, in the area between the confluence of the Noteć and Warta rivers, stretching from Piła to Poznań (Goślinowo, Imielno, Kukulin, Poznań-Sołacz, Stroszki).

However, it is not possible to determine the precise cultural affiliation of these finds. This primarily concerns the Przeworsk-Wielbark border zone in northern Wielkopolska, but also the Oksywie–Wielbark interactions in Pomerania. The overlapping settlement patterns, or even the cohabitation of Wielbark and Oksywie populations (and in northern Wielkopolska, also Przeworsk groups) make it impossible to assign the production workshops to a specific chronological horizon. Researchers face such difficulties at sites including Imielno 17, Goślinowo 3, Rumia 3, Wielki Wełcz 10, and Łosino 15. On the Vistula's left bank, metallurgical sites from the late Younger Pre-Roman Period and Early Roman Period are associated with both the Oksywie and Wielbark Cultures (Orzechowski, Telążka 2024, 276–278).

Larger concentrations of metallurgical sites have also been identified in Pomerania, along the Parsęta River (Karlino, Konikowo, Rogowo) and the Słupia River (Łosino, Widzino), as well as further east in Kashubia (Gościcino, Rumia-Zagórze, Siemirowice), and in the western part of the Vistula Vens (Klonówka, Stanisławie). In the Chełmno Lakeland, the largest complex of furnace sites in this part of the Polish lands operated at Rogowo 23, comprising over 500 furnaces (Bokiniec 2016). The absence of Oksywie Culture materials at the site allows the entire production to be confidently associated with the WielbarkCulture. Much smaller clusters of metallurgical features were recorded at sites within this zone in the locality of Szynych.

Traces of metallurgical production are also found on the northern edge of the Pomeranian Lakeland. In this region too, large furnace fields have been recorded, comprising a total of more than 150 furnaces (Sobieradz). However, their cultural affiliation is not clear, as they are located in the borderland area of the Gustow Group.

In the older literature, finds of bloomery furnaces along the upper Narew River in Podlasie, discovered during investigations of Rostocki-type barrows (Kotłówka, Kutowa, Jasionowa Dolina), were also associated with the Wielbark Culture. Today, it is assumed that they were rather connected with the Hatched Pottery Culture or with the so-called post-Zarubinets Groups (Orzechowski 2012, 298, 299). It cannot be ruled out that they had some connection with similar activity identified along the Pulwa River (Klukowicze) in the middle course of the Bug River.

The concentration of metallurgical sites within the area of the Luboszyce Culture is also worth mentioning, conventionally referred to as the Żary region (Stachowiak 2010). It forms part of a large metallurgical region located on the border between Upper and Lower Lusatia (Wetzel 1996; Spazier 2007). It is believed that the areas in the interfluve of the Lusatian Neisse and the Bóbr Rivers, where large furnace fields have recently been investigated (Bogumiłów 8, Drozdów 4, and Królów 2), mark the south-eastern boundary of this region of metallurgical production.

The recent discoveries of bloomery furnaces in the Masurian Lakeland, previously regarded as an area devoid of evidence for this type of activity, came as a surprise. These finds comprise a group of nearly ten sites located mainly in the eastern part of the settlement area of the West Balt Barrow Culture. Partially excavated sites at Tałty Site 2 and Czerwony Dwór Site 21 indicate the presence of local iron production employing highly original construction solutions in bloomery furnaces, unparalleled in other regions of the country (Szymański, Orzechowski 2021, 14, 15).

In summary, it should be stated that the skill of iron smelting was not represented to the same degree across the entire area under analysis. Production was concentrated primarily in central Poland, with a decidedly smaller scale of this activity in the south and north. The line of the Vistula River clearly delineates two zones: a western one with well-developed metallurgy and an eastern

one, where only sparse traces have so far been identified. The principal producers of iron were undoubtedly the population of the Przeworsk Culture, whereas representatives of other cultures and cultural groups did not display significant activity in this field. However, this does not mean that local metallurgy did not exist there; it simply never achieved the same level of specialization and scale of production as that of the Przeworsk Culture.

Bloomery furnaces used in the area of modern Poland in antiquity

From the Late La Tène Period through the Migration Period, across vast areas of Central and Northern Europe, the basic metallurgical installation used by the tribes inhabiting the territories of so-called *Germania libera* was the slag-pit shaft furnace (Bielenin 1973, 90; Pleiner 2006, 138). These structures display considerable variation in terms of their dimensions, the locations in which they operated, and even their durability, expressed in the number of smelts that could be carried out. This group includes both multiple-use and single-use furnaces, features built into the walls of sunken workshops or simply set into their floors, as well as the most common type: free-standing furnaces. The latter variant, defined as a single-use shaft furnace of the slag-pit type, was the primary (if not the only) type of metallurgical installation used since the very beginning of iron-smelting technology in the region of modern Poland. Especially during the Roman Period, it was responsible for virtually the entire iron production in this region.

As already emphasized, little is known about the beginnings of the use of this type of installation in Poland. Their presence has not so far been confirmed for the Hallstatt Period, and the radiocarbon dating of Furnace 41 from Milanówek in Masovia, determined as 6th century BCE, has been unequivocally questioned (Woyda 1981, 96). The origins of such furnaces in this territory should therefore be linked only with the Przeworsk Culture, although connections with the Gubin Group of the Jastorf Culture (Jazów, Sękowice) have also been suggested. This interpretation, however, raises justified doubts (Orzechowski 2020, 217).

The earliest radiocarbon dates obtained for this type of feature point to the end of the 3rd century BCE (Furnace 2 from Ostrowiec Świętokrzyski [Częstocice]). In this case, however, the margin of error is very wide, ranging between 300 BCE and 160 BCE (F. Pazdur 1990, 103, table 1). Large error ranges also apply to dates from Furnace 23 from Biskupice (180 BCE – AD 70), as well as to the Silesian furnaces from the Polwica-Skrzypnik complex, where after calibration of six samples they were placed within the combined range of 200 BCE– AD 130 (Madera 2008, 195).

The cessation of the use of these technical solutions at the close of antiquity is as unclear as their beginnings. Pit-type furnaces survived until the end of the Przeworsk Culture, although it is impossible to identify well-documented examples of this type from the early phase of the Migration Period (phase D). It is also uncertain whether the furnaces dated to this period from Przylesie Dolne and Buszyce in Silesia, operating within the so-called Brzeg metallurgical region, represent a modified form of the slag-pit furnace or represent installations of a different construction and operating principle (Pazda 2002, 226; Orzechowski 2013, 131–135). One thing seems fairly certain: in their classical form, these furnaces did not survive in present-day Poland into the early phases of the Early Middle Ages, and the incoming Slavic populations did not incorporate them into their technological repertoire.

In light of current research, the examples frequently cited (especially in older literature) of other variants of bloomery furnaces in the region under discussion should be regarded as isolated cases and, in large part, of limited reliability. This group of features includes the purported dome-shaped furnace from Mechlin in Wielkopolska, as well as the Silesian furnaces from Dobrzeń Mały, Przylesie Dolne, and Buszyce (Orzechowski 2013, 132–141). In turn, the features from Kąty Wrocławskie, Miechowice Oławskie, Stoszyce, and Sośnica, as well as from Igołomia near Kraków and Warkocz in Silesia, should be regarded (with high probability) as various variants of the slag-pit-furnace. Essentially, only Feature 19 from Dobrzeń Mały Site 8 can be classified without significant reservations as a free-standing dome-shaped furnace with a pit of the Burgenland type (Tomczak 1979, 172–174) (Fig. 5). This would have been a furnace intended for multiple smelts, where slag was removed only after the completion of the process through a special opening accessible from the furnace pit.

Greater doubts surround the construction and mode of operation of the feature from Mechlin, described as a multi-use dome-shaped furnace

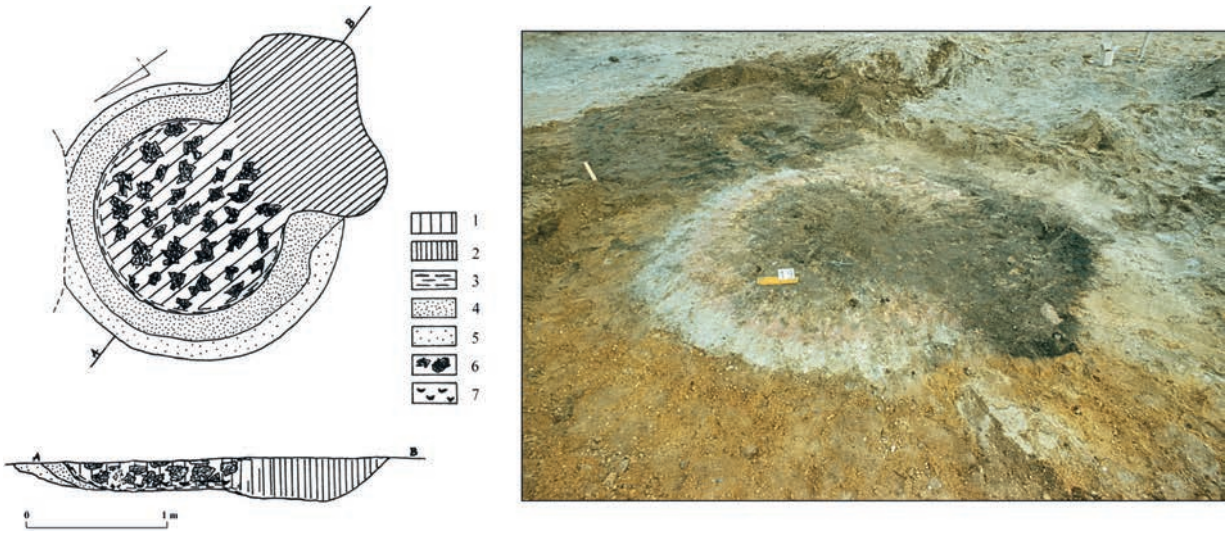


FIGURE 5. Dobrzeń Mały, Dobrzeń Wielki commune, Opole Voivodeship, Site 8. Plan and profile of furnace no. 19. After Tomczak 1979, 172, fig. 4, and a photograph of the object at the site level. Photo by K. Bielenin

(Pleiner 2000, 170). Even if such furnaces did operate in this part of Europe during the Roman Period, they were already secondary forms and no longer played a significant role. In present-day Poland, no clear analogue for this type of installation has been found.

One of the variants of slag-pit furnaces consisted of multi-use installations built into the walls of sunken workshops (Orzechowski 2014). In present-day Poland, they occurred at only two sites: the above-mentioned Igołomia and Warkocz (Fig. 6). Their construction is reminiscent of similar features from Czech territory (Cýně, Ořech, Lovosice), although they represent a late horizon of their use. The complex at Igołomia is dated to phase B2 of the Roman Period. The chronology of the furnaces from Warkocz may be analogous, although the Middle La Tène Period was initially also considered. The similarity of the Late La Tène features to those from the Roman Period is so striking that they must have been directly adopted by Germanic settlers during the colonization of Celtic territories north of the Danube (Pleiner 2000, 54).

Finally, there are the furnaces from Przylesie Dolne and Buszyce, classified as surface-level, single-use installations (Pazda 2002, 222). Although they were slightly sunk into the ground, their discoverer argued that they could not be considered slag-pit furnaces. Considering the capacity of the shaft, the potential pit would have been too small to accommodate such a large amount of slag. The placement of the furnace in shallow pits was probably intended to provide better stability for the massive structure, whose external diameter reached up to 150 cm. Due to the poor state of preservation of these features, their construction and operating principles remain an open question. However, it cannot be ruled out that they represent a local variant of furnaces with very large, shallow pit structures.

Recently, in the Masuria region (Czerwony Dwór and Tałty), a new variant of the slag-pit furnace was discovered (Szymański, Orzechowski 2021). These furnaces were accompanied by additional pits, which functioned as independent structural elements forming a single functional unit with the main pit (Fig. 7). These auxiliary pits were generally smaller and shallower than the main pit and differed fundamentally in the nature of their fill and colouration. No traces of high-temperature operation or slag removal have been found, which may indicate that their role was limited to controlling and supporting the smelting process. For example, they could have been used to provide additional airflow or to mechanically intervene in the draft of the main pit.

The furnaces with auxiliary pits from Czerwony Dwór and Tałty are, so far, the only well-documented examples of this type in present-day Poland. Similar solutions are known from sites

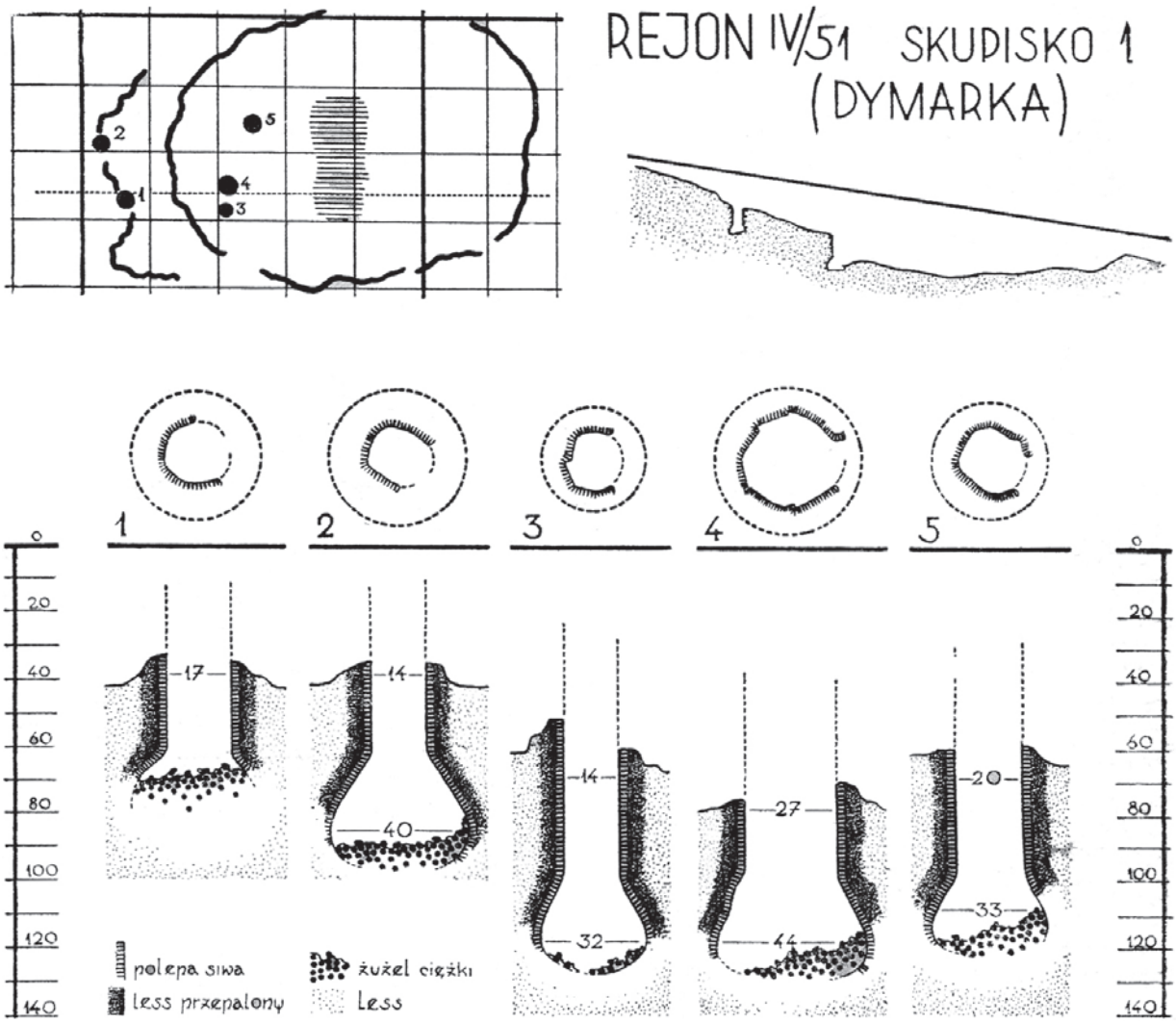


FIGURE 6. Igołomia, loco commune, Lesser Poland Voivodeship, Site 1. Plans and profiles of furnaces from cluster no. 1. After Reyman 1952

such as Prague-Podbaba Site VII in the Czech Republic and Hatten-Streekermoor in Lower Saxony (cf. Pleiner 1958, 156–158, fig. 38, 160; Hayen 1968, 167). It remains unclear how this technical solution (unknown in neighbouring cultures) such as the Wielbark and Przeworsk Cultures, appeared in Masuria. Until their chronology is clarified and further discoveries of this type are made, we must be content with these observations.

The overwhelming majority of installations used for iron smelting in the region of modern Poland were free-standing slag-pit shaft furnaces intended for single use (Fig. 8). Their structural and dimensional uniformity is remarkable. The diameter of a typical pit ranges between 30–50 cm, most commonly 35–40 cm. Naturally, smaller examples do occur, not exceeding 30 cm, as well as very large ones, over 80 cm. Similarly, their depth generally did not exceed 50 cm, although the largest pits could be set much deeper. The smallest furnaces, found mainly in the Świętokrzyskie Mountains and classified as the Kunów type, measured around 25 cm, while the largest examples, known from Silesia, often exceeded 100 cm in diameter (Tarchalice, Brzeg Dolny).

We must bear in mind that researchers often significantly overestimate the dimensions of at least some pit furnaces. A common practice is to include the zone of burnt soil around the pit, and sometimes even the layer formed by the washing



FIGURE 7. Tałty, Mikołajki commune, Warmian-Masurian Voivodeship. Furnaces nos. 657 and 658 with characteristic auxiliary pits during excavation. Photos by A. Mackiewicz, W. Kaczyński

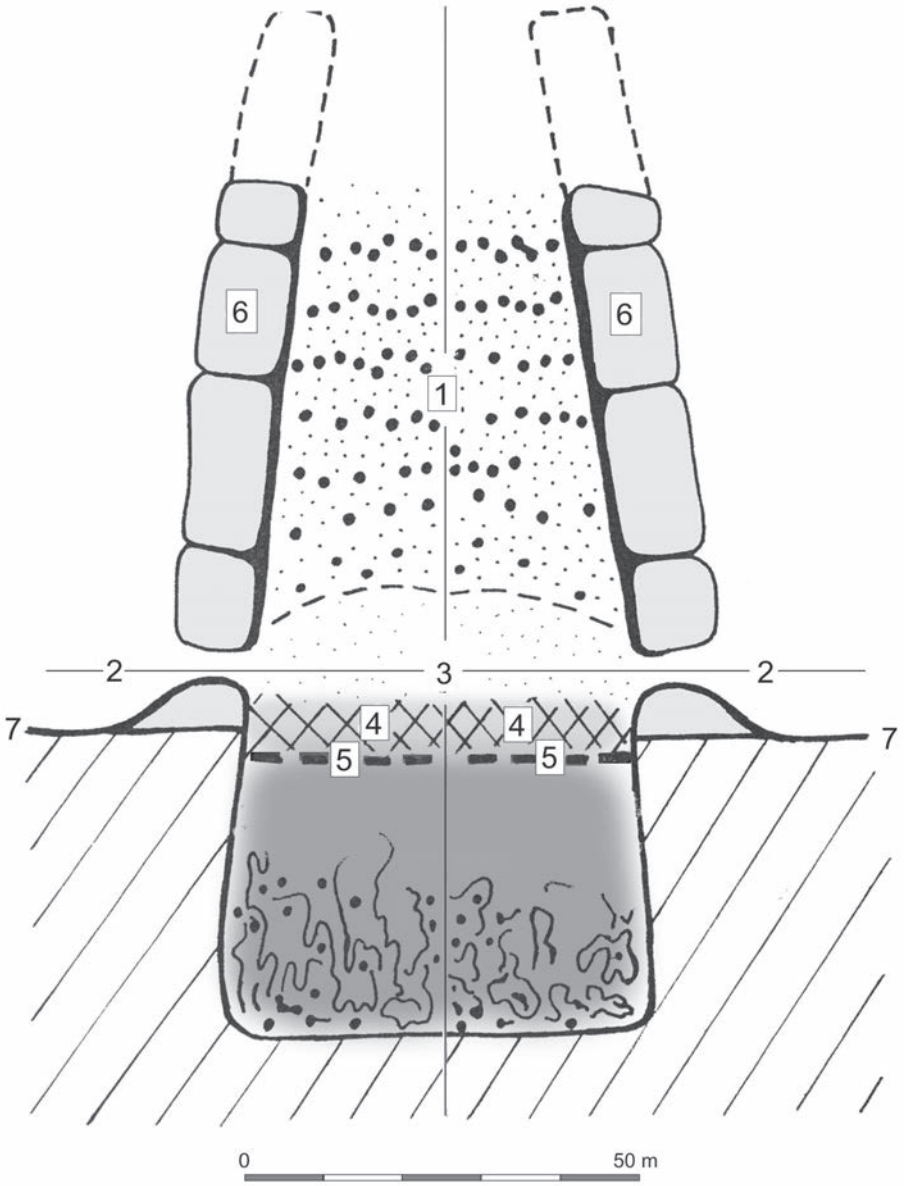


FIGURE 8. Theoretical model of a bloomery slag-pit furnace, according to Bielenin 2006. 1. Charcoal (coarse fractions), ore (fine fractions). 2. Blowhole. 3. Reduction zone. 4. Iron shale formation zone. 5. Solidification surface of the upper part of the slag block. 6. Furnace shaft. 7. Ground surface

out of charcoal dust, as an integral part of the pit. For example, at the Rogowo site, where over 500 bloomery furnaces were discovered, as many as 11 size categories of pits were distinguished, ranging from 30 cm to over 130 cm in diameter. The largest of these may in fact have been two adjacent furnaces whose fills "merged" and were mistakenly interpreted as a single feature (cf. Bokiniec 2016, 16).

Some differences, however, are visible in the shapes of the pit furnaces, particularly in their vertical cross-section, while in plan they are generally circular, less often oval. The most common forms were bowl-shaped, cylindrical, or truncated cone-shaped. Balloon-shaped or cone-shaped forms with a cylindrical shaft were rare (Bielenin 1983, 48, abb. 2).



FIGURE 9. Wykus, Wąchock commune, Świętokrzyskie Voivodeship, Site 1. Slag blocks with characteristic lateral extensions in the form of irregular outflows. Photo by S. Orzechowski

A particularly interesting group of features consists of pits with a characteristic, often irregular widening of the upper part. They are found in many metallurgical regions, and the most well-known examples are undoubtedly the furnaces from Tarchalice in Silesia, shaped like a mushroom. However, this is not (as was previously thought) an intentional widening of the upper sections of the pit, but rather the result of the slag mass reacting with the surrounding, most often sandy, substrate. The largest slag flows probably formed on the side where the air blast was introduced. Their natural origin is also indicated by their asymmetrical and irregular shapes, as well as the absence of lining at this level of the pit walls, which remains well preserved at the lower levels (Fig. 9).

Some researchers look for chronological indications in the size of the furnaces. Over the course of several centuries, they probably underwent minor modifications, generally limited to changes in dimensions and which only exceptionally affected constructional features. It is assumed that furnaces with a diameter of 25–32 cm, classified as the Kunów type, represent the earlier phases of metallurgy, while the largest ones (especially those with the so-called very large pit, over 80 cm in diameter) are relatively later. This pattern, with respect to oversized pits, is most clearly visible in Silesia and Masovia. However, it would be a mistake to assume that all furnaces with small pits are relatively older than those of typical or large size. In the Świętokrzyskie Mountains, particularly at so-called unstructured sites, many examples can be identified within a single complex where furnaces of widely varying, often extreme sizes co-occur (Pokrzywnica 1, Pokrzywnica 3 [Wymysłów], Ostrowiec Świętokrzyski [Częstocice] 14, Marcinków 1, Rudki 3, Skały 2). Also within the Polwica-Skrzypnik metallurgical complex, alongside very large furnaces, there are those with a distinctly smaller diameter. A carbon dating to the Younger Pre-Roman Period was obtained for Furnace 242, which has a very large basin (Madera 2008, 194, 195).

A structural element that can indirectly indicate the chronology of the discussed structures is the pit channels. Especially in the metallurgical settlements of Masovia, the large number of furnaces equipped with such pits may prove helpful in the chronological stratification of these groups. Furnaces with pit channels are associated with an older

chronological horizon and account for nearly 70% of all such features. In subsequent periods, their number clearly decreased, falling at the end of the activity of the Masovian hub to just a few percent (Woyda 2002, 131). A similar tendency to simplify the construction of furnaces from the younger Pre-Roman Period to the Late Roman Period is also observed in the Świętokrzyskie Mountains.

Despite the discovery of relics from thousands of slag-pit furnaces, knowledge about the construction and operation of these devices still raises many controversies. Especially the above-ground part, called the shaft, which was almost completely destroyed during the extraction of the raw material, is difficult to reconstruct definitively. Referring to the few preserved fragments of this casing and elements embedded in the walls of the sunken workshops (Igołomia), as well as the so-called portable shafts (Scharmbeck), we are able to at least partially attempt their reconstruction.

The shafts were made from various types of clay and silt rock, which, after being mixed with water, provided an excellent material for making a suitably stable and durable structure. It cannot be ruled out that in some, especially larger furnaces, where the walls of the basins were additionally reinforced with stones (Dobrzeń Mały, Psary), the structure of the shaft could have had a similar design and was a natural continuation of its underground part. However, in the vast majority of cases, these were clay shafts, reinforced only with mineral and organic additives, or, as in the case of Tarchalice and Domaszków in Silesia, with wooden stakes. Although their traces are primarily visible at the level of the basin, they may have extended into the above-ground part of the furnace, creating a lattice structure for the shaft.This solution can be considered a kind of workshop signature, distinguishing a specific group of producers (Madera 2023, 128, 129). The thickness of the shaft casing is generally small, ranging from a few to over 20 cm. The highest values were found at the base of the furnace, while the smallest were at its upper edge.

The height of the above-ground part of the furnace also raises many controversies. K. Bielenin (1973, 62) differentiated the height of the shaft and related it to the size of the basin, approximately 50 cm for small basins and about 100 cm for typical basins. However, if natural blowing was used, the given values would be too small for the process to occur effectively. In Masovia, S. Woyda (2002, 135) reconstructed the height of the shaft at around 150 cm. The furnaces with the so-called very large pits-found in Silesia (e.g. Bielice, Brzeg Dolny, Dobrzeń Mały, Tarchalice) must have been similarly tall or even taller. The same holds true for the smelting structures with a not entirely defined construction discovered in Buszyce and Przylesie Dolne (Pazda 2002, 226).

The main air supply system was located in the shaft section of the furnace. The so-called air blast remains the subject of various analyses and ongoing debate (Bielenin 1973, 63–70; Woyda 2002, 134, 135; Orzechowski 2007, 197–209; 2013, 121–130). Most researchers allow for the use of natural ventilation in the free-standing slag-pit furnaces. This is indicated by the absence, at bloomery sites, of elements commonly associated with bellows, such as various types of tuyères enabling the connection of this device to the furnace. The typical tuyères discovered so far at Brwinów and Pokrzywnica occur in contexts related to post-reduction phases of the metallurgical process (Woyda 2002, 137; Orzechowski 2006, 49–54). Much more frequently, simple air inlets made directly in the shaft wall are encountered. Depending on their shape and diameter, air could enter the furnace either through pressure differences (in the case of small-diameter openings) or, in the case of larger, funnel-shaped openings, by harnessing natural drafts and concentrating their energy. In the Świętokrzyskie Mountains, most furnace fields are situated on uplands with exposures corresponding to the directions of the most active winds (Orzechowski 2007, 202–205).

The aforementioned pit channels, which directed air to the lower part of the furnace, support the basic air-supply system. In our view, however, their use should not be regarded as a manifestation of technological progress; rather, it resulted from certain limitations and a lack of skill on the part of the smelters. The abandonment (or at least restriction) of such solutions during the peak period of metallurgical development in present-day Poland indicates that these problems were eventually overcome by simplifying the construction of the pit furnace (Orzechowski 2011, 51–52).

It cannot, of course, be ruled out that an artificial air blast was also used in the bloomery process at that time. During the many hours required for a smelt, bellows were probably an essential and commonly used device, assisting the smelters

at crucial stages of the process or during changes in weather conditions. Nevertheless, the bloomery process (requiring a long-term, steady, and continuous supply of air) was fundamentally based on natural draft.

Production organisation – bloomery workshops (slag-pit furnace clusters)

The use of single-use furnaces led to the emergence of a new type of bloomery workshop, previously unknown. It was no longer limited to a single furnace (or at most a few furnaces with accompanying auxiliary features) but could comprise even several hundred such installations. The difficulty of establishing the chronological sequence of individual features means that we do not know how such workshops were organized, nor whether a specific group of furnaces represents a single episode of intensive metallurgical activity carried out over a relatively short time, or whether it developed gradually as a result of low-intensity work conducted over a longer span of time.

Metallurgical activity was usually carried out within settlements, in small groups consisting of several (more rarely a dozen or several dozen) furnaces. The concentration of the entire production cycle, from the acquisition of raw materials to the manufacture of the finished product, in a single location was a very rare phenomenon. More often, the individual stages were carried out independently, sometimes at considerable distances from one another. The preparation of charge materials (ore and charcoal) was typically conducted in the areas where these resources were obtained. Depending on their distance from the settlement zone, they either formed part of the infrastructure of metallurgical workshops or operated entirely independently of them.

In Polish literature, two terms are used to describe the organization of bloomery workshops. They were introduced by K. Bielenin (1992, 89–129); he distinguished in this way two types of furnace fields associated with two production trends in the Świętokrzyskie metallurgy. Outside this region, however, the adopted classification does not always correspond to its original assumptions and may be misleading. Where it is difficult to discern any clear pattern in the organization of production space, a workshop is referred to as an "unorganized" slag-pit furnace cluster. If the arrangement of features is regular and displays a certain organizational concept, it is described as a "organized" slag-pit furnace cluster.

However, even within a seemingly chaotic layouts of features, attempts at spatial organization can often be discerned. Examples include furnaces arranged in a linear way, consisting of several features (e.g. Tarchalice 1), as well as L-shaped clusters, as observed at the furnace fields in Bielice 1 and Dobrzeń Mały 8 (Domański 1972, fig. 3 insert; Pawłowski 1979, 194, fig. 1; Holz et al. 1994, 238, fig. 3). The layout and number of furnaces in these particular groupings (four in each case) are identical at both sites.

At a larger scale of production, even within the same site, it was common practice to group furnaces into clusters of varying size (furnace clusters) usually quite clearly separated from one another. The distance between them ranged from a few to several dozen metres. This was the case at the above-mentioned Tarchalice site, where one smaller and two larger furnace clusters were recorded, as well as at Psary, with eight such concentrations. A similar arrangement has also been confirmed by excavation at the site of Pokrzywnica 1 in the Świętokrzyskie Mountains. It would be much more difficult to delineate the boundaries of such clusters at Polwica 4, 5, and Skrzypnik 8. Particularly at Polwica 5, the furnaces occur in less compact arrangements, and only in its western part do they form a distinct, large cluster composed of about 30 features (Berduła, Dobrakowski 2002, 102, fig. 2). Metallurgical features discovered at Rogowo 23 in the Chełmno Lakeland were also grouped into several large and many smaller clusters, together comprising over 500 furnaces (Bokiniec 2016, 15–16). The largest of these included nearly 150 furnaces (sector C), while there were also several smaller clusters of about 50 features each (sector A). Some of the furnaces did not form clear groupings and occurred in a dispersed pattern (sectors B, C, and D) (Bokiniec 2016, CD plate, fig. 7:8).

As many as 17 potential clusters, containing from a few to several dozen furnaces, have also been identified at the site in Czacz 14 in Wielkopolska (Tyszler, Nierychlewska 2019, 43–45). Although many of them may result from random arrangements and subjective assessments by researchers, there is no doubt that a clear tendency to group furnaces into clusters operating over relatively small areas existed here as well.

The grouping of furnaces into clusters is most likely a result of the production activity of a specific group of producers carried out over a defined period. The cessation of work in one location and the commencement in another may indicate a longer break in production or a new producer. The duration of such a cluster's operation, as well as breaks in production, could relate to a single season or time of year, but also to a much longer period. It can also be assumed that individual clusters arose from the simultaneous work of several teams operating within specific workshops, although this is less likely. Given the lack of possibility to chronologically separate the individual stages of this activity, the conclusions presented remain hypothetical.

A most distinctive form of organizing production space, practically not found outside the Świętokrzyskie Mountains, were the so-called structured slag-pit clusters. Occasionally, though not entirely appropriately, this term is also applied to Masovian metallurgical settlements or to Luboszyce Culture sites in Lusatia, although there the regularity takes on a completely different form (Woyda 2002, 122, 124–128; Stachowiak 2010, 18–19, fig. 2). Analogies were sought for the Świętokrzyskieslag-pit clusters in Lower and Upper Lusatia, for example at Merzdorf and Wolkenberg, as well as in the Bohemian basin near Humań (Bielenin 1999, 23–24). Even if some similarities exist, these sites only superficially resemble the Świętokrzyskie arrangements.

The system used in the Świętokrzyskie Mountains is characterized by a high degree of regularity and repeatability, with furnaces most often grouped into two longitudinal, parallel clusters called "sequences". They are separated by a more or less distinct narrow, empty strip of land referred to as a "path". Each line consists of rows containing 2 to 5 furnaces (Fig. 10). The most common arrangements are so-called two-line layouts, grouping four furnaces per row, conventionally designated as the '2 × 4 Type'. Much less frequently recorded are single-line furnace fields (Rudki Site 1 – 1 × 4; Łomno Site 11 – 1 × 3), three-line layouts (Jawor Solecki Site 1 – 3 × 2; Pokrzywnica Site 1 – 3 × 3 × 2), or, exceptionally, four-line complexes (Sarnia Zwola Site 1 – 4 × 4). These are generally very large metallurgical workshops, with an average of nearly 90 furnaces per site (Bielenin 1992, 191). However, even larger sites occur, where the number of furnaces exceeds 200 (Świętomarz – 231; Mirocice Site 4 – approximately 220).

In some regions, a specific model of work organization can be observed repeatedly. A case in point is the group of sites in the Skały area, where six out of eight examined slag-pit clusters followed the same 1 × 3 layout (Orzechowski 2013, 149–151). This may indicate the existence of local traditions in the application of particular work organization models at slag-pit clusters. The vast majority of structured furnace fields were established outside settlement boundaries, although a few documented examples show that large clusters of slag-pits could also form at the outskirts of settlements (e.g. Pokrzywnica 1, Skały 1). Based on published plans of slag-pit clusters, one might get the impression that this type of workshop occurs individually. In fact, they much more often form groups of several to even several dozen workshops, referred to as multi- slag-pit clusters. Such groupings account for nearly 35% of the almost four thousand metallurgical sites recorded under the AZP program in the Świętokrzyskie Mountains (Orzechowski, Wichman 2006, 82, table 2). The absence of ceramic finds at the vast majority of these sites indicates that they were used exclusively for production purposes.

Original approaches to organizing production space also emerged in Masovia, referred to there as Type 1 sites (Woyda 2002, 122). These were often extensive settlement-production complexes covering several hectares, grouping from several hundred up to even several thousand furnaces. The largest is considered to be the settlement at Milanówek-Falęcin Site 14, where over 15,000 furnaces may have operated (883 have been discovered). Type 1 sites probably grouped several thousand furnaces, a case in point being Biskupice 5, where 3,689 furnaces have been discovered, or Brwinów 11, with 1,370 furnaces. At other sites, several hundred furnaces have been recorded, e.g. Reguły Site 14 – 353; Rusiec Site 34 – 244; Kotowice Site 19 – 130; Raszyn Site 5 – 104; Kanie Site 13 – 114 (Woyda 2005, 132–134, table 1). These large sites were connected in ways not fully understood with the much smaller 'Type 2' sites (covering a few to several dozen ares), considered as locations for occasional metallurgical activity, undertaken seasonally by the inhabitants of the main settlements (Woyda 2002, 122).

A distinctive feature of the Masovian production settlements is the strongly elongated shape of the

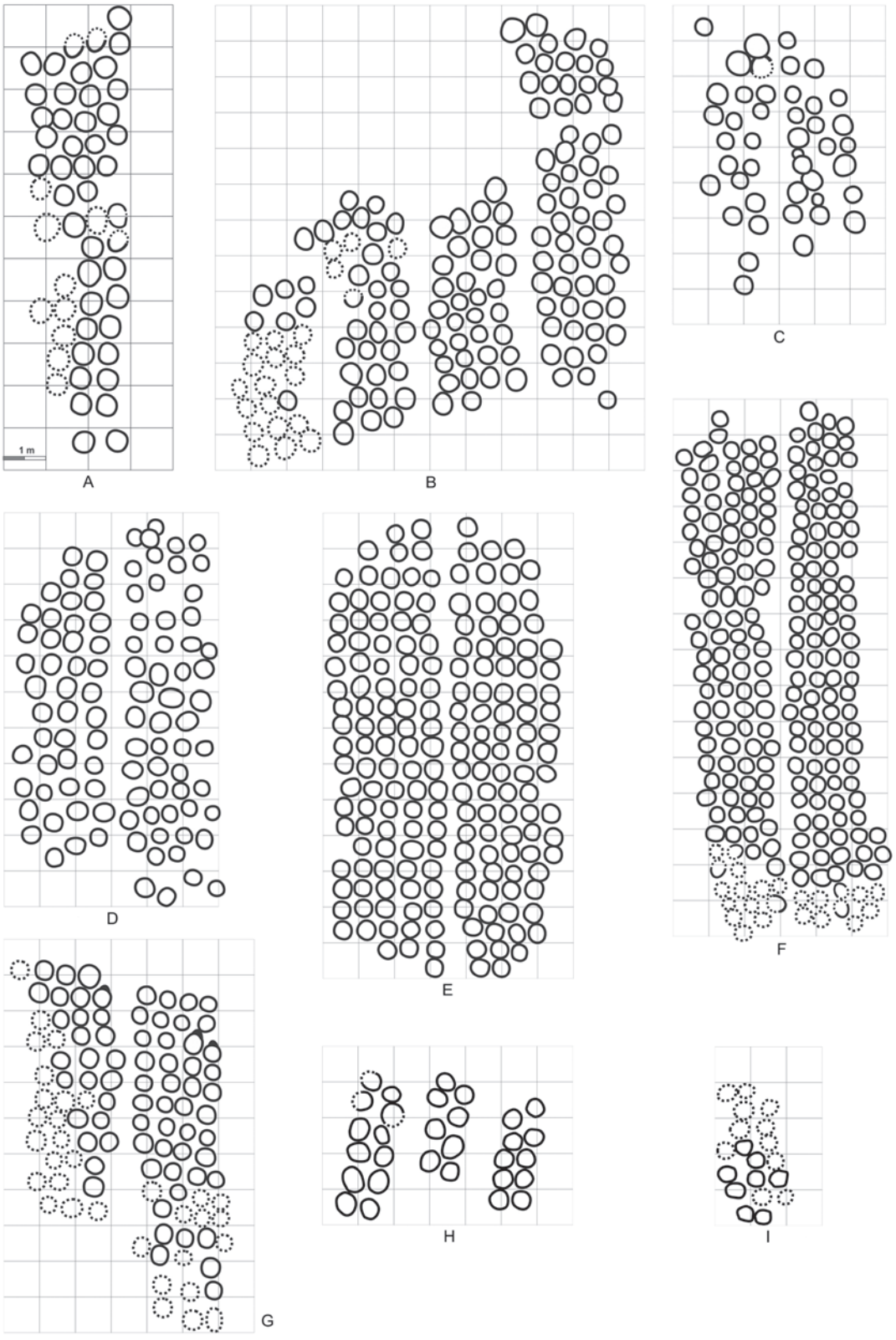


FIGURE 10. Plans of various types of "organized" slag-pit furnace clusters from the Świętokrzyskie Mountains. After Bielenin 1992. A. Nowa Słupia 1; B. Sarnia Zwola 1; C. Seredzice 2; D. Nowa Słupia 6; E. Nieczulice 1; F. Świętomarz 1; G. Nowa Słupia 11; H. Jawor Solecki 1; I. Skały 2

slag-pit clusters, as well as the presence of long, regular lines defining their boundaries. The placement of furnaces along precisely laid-out straight lines, often exceeding 200 metres in length, is exceptional and indicates adherence to previously unknown rules for organizing metallurgical production space. Such sharp boundaries have been observed at sites in Biskupice, Milanówek-Falęcin, Brwinów, Pęcice, and Parzniew. At Milanówek-Falęcin, the production zone – probably consisting of several thousand furnaces – was laid out along a straight line oriented north–south, approximately 300 metres long and 15–25 metres wide (Woyda 2002, 128, figs. 6, 7 insert). A similar situation was observed at the settlement in Biskupice 5, where three, perhaps even four, furnace clusters formed more or less distinct linear arrangements. The largest of these, the northern cluster, about 200 metres in length, cuts across the residential zone.

We do not know what determined the emergence of these specific layouts. The currently available picture is the result of several centuries of production, during which individual elements may have been created at different times and could have formed arrangements departing from the original arrangements. Attempts to find a rational explanation for this distinctive phenomenon, such as interpreting the linear arrangements as barriers or screens directing air currents to support draft, or as communication routes metalled by slag, lack any archaeological evidence (Tomczak 2007, 178–180). In the long lines of furnaces, S. Woyda (2005, 141–142) sees the existence of a boundary of taboo – designated exclusively for metallurgical production – along which the best conditions for smelting prevailed, sanctioned by certain rituals and beliefs. Although these lines were sometimes interrupted, as was the case in the southern furnace complex at Biskupice, their very existence testifies to the distinctiveness of Masovian metallurgy. The abandonment of respect for previously established boundaries, observed at some sites, may have resulted from longer interruptions in metallurgical activity, which could have led to changes in the perception and organization of production space.

Centres of specialized metallurgy in the Przeworsk Culture

In the Roman Period, two models of iron production developed in present-day Poland. The first was oriented toward meeting the local needs of individual settlements or larger settlement clusters, while the other focused on commercial production of iron for external markets. Both approaches coexisted, complementing and interacting with each other. Centres of specialized metallurgy emerged in only a few regions and represent one of the most striking cultural phenomena in the area of modern Poland in late antiquity.

Large settlement-production complexes are not an isolated phenomenon in Poland, although most metallurgical sites consist of small, dispersed workshops scattered across different regions. The latest research has confirmed that larger concentrations of furnaces located on the outskirts of settlements also occur in Silesia (e.g. Polwica-Skrzypnik, Psary 1, Tarchalice 1), in Wielkopolska (Czacz 14), and on the Chełmno Lakeland (Rogowo 23). Nowhere, however, did the scale and nature of production attain the level of originality as was the case in the Świętokrzyskie Mountains and Western Masovia, both regions recognized as centres of specialized metallurgy. Silesia (perhaps with the exception of the Brzeg region) did not meet the quantitative, and more importantly, qualitative criteria required for this type of production model. Specialized metallurgy in these regions was organized through many independent production zones associated with distinct socio-economic entities, whereas the metallurgical enterprises in Masovia and the Świętokrzyskie region represented large-scale logistical undertakings, most likely operated by autonomous territorial units over extended periods and conducted according to strictly defined patterns of labour organization.

In the Świętokrzyskie Mountains, in the area between the Łysogóry range and the Kamienna River, approximately 600,000–650,000 bloomery furnaces were in operation, with the total regional production capacity estimated at around 9,000–10,800 tons of iron (Orzechowski, Wichman 2006, 87–88). This large-scale production was dispersed across more than 800 km^2, with the densest concentrations of slag deposits occurring in the northern and central parts of the production zone: on the slopes of the Łysogóry, Jeleniowskie, and Bostowskie ranges, as well as in the catchment areas of the Pokrzywianka and Świślina rivers (Fig. 11). Recent research indicates that the settlement hinterland supporting this metallurgical activity extended beyond the immediate zone of furnace sites, reaching

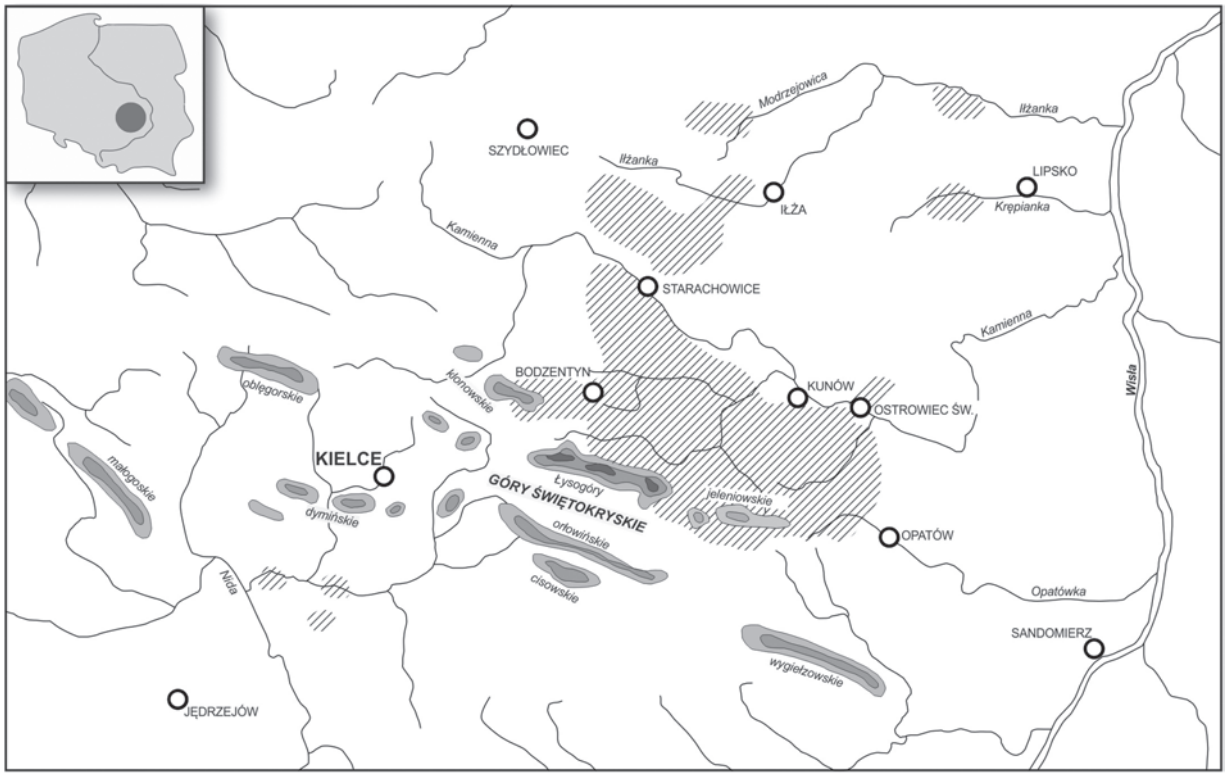


FIGURE 11. The main area of the Świętokrzyskie metallurgical center and its northern exclaves. After Orzechowski 2013

eastward to the Vistula River, northward to the Kamienna River, and southward to the Czarna River. This area, covering more than 2,400 km^2 and surrounded on all sides by belts of settlement voids or zones of sparse habitation, may have functioned at the time as an autonomous territorial unit (comparable to the *pagus* or *civitas* entities mentioned by Tacitus).

The second major concentration of settlement-production sites, known as the Masovian metallurgical centre, was located on the Błońska Plain and covered an area of approximately 300 km^2 (Fig. 12). In the case of Masovia, assuming between 120,000 and 150,000 furnaces, iron production is estimated at 1,080–1,800 tons. The metallurgical zone comprises around 240 sites ('Type I' – 125; 'Type II' – 113), situated along the upper and middle reaches of the Utrata River and its tributaries: the Rokitnica, Zimna Woda, Korytnica, Żbikówka, and Raszynka.

In this case as well, the metallurgical zones were surrounded by belts of settlement voids, with access only from the west via the Utrata River leading to the upper and middle Bzura, where settlements developed that are now considered a potential extensive population and resource hinterland (Woźniak 2022, 225, 228). Further west, along the Ner and middle Warta rivers, a large macroregion existed (referred to as the Central Polish settlement cluster) into which part of the production from Masovian metallurgical sites may have been distributed.

Specialized metallurgy may also be identified in the so-called Brzeg metallurgical district. Located on the border between Lower and Upper Silesia, in the interfluve of the Oder, Oława, and Nysa Kłodzka rivers, this relatively well-defined settlement mesoregion covers approximately 300 km^2 and includes nearly 115 Przeworsk Culture sites (Pazda 1994, 149–150) (Fig. 4, VIII). A large part of these sites have yielded evidence of intensive metallurgical production which, together with traditional components of the settlement network, formed so-called "nest" systems. Fourteen such groupings have been identified, each composed of two, and more rarely three or even four, closely situated sites. These may represent a metallurgical workshop located outside a settlement (e.g.

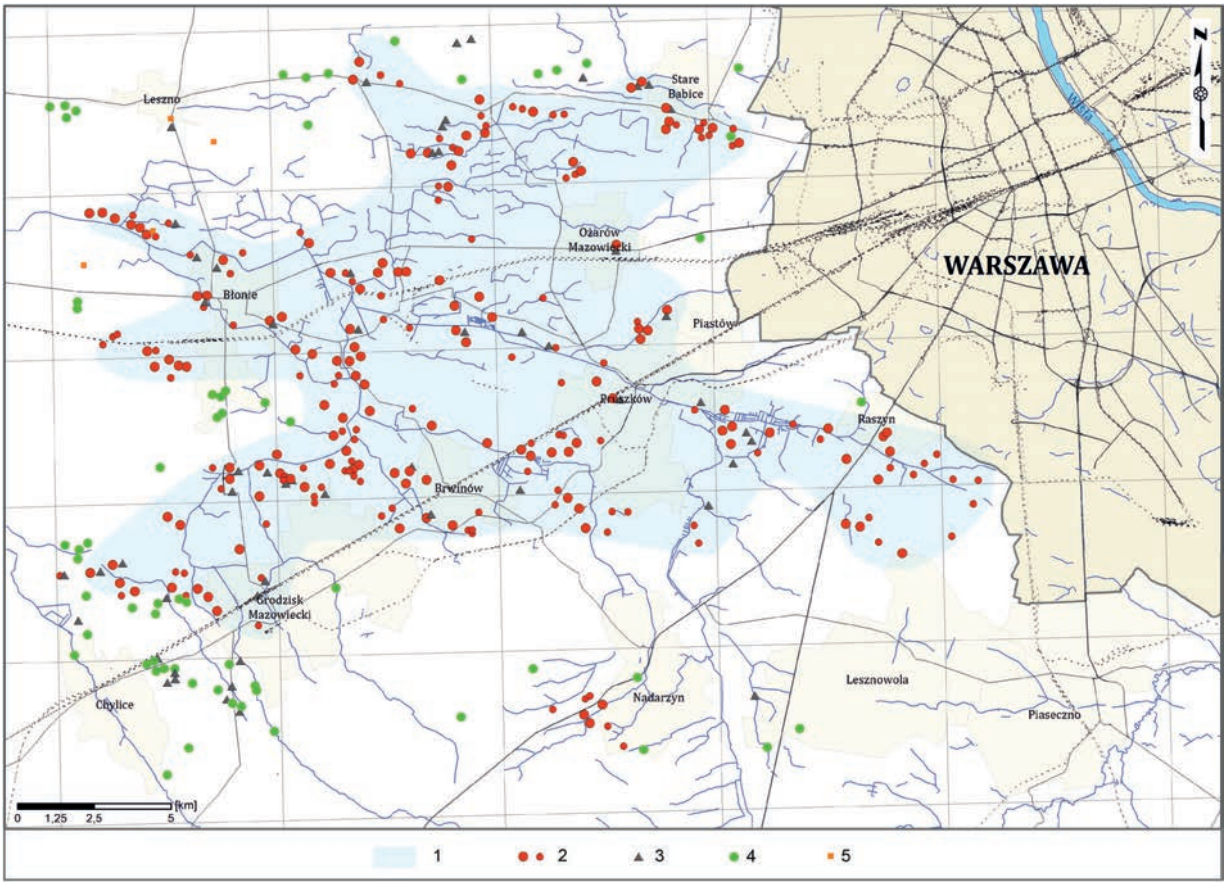


FIGURE 12. The Masovian metallurgical center. After Woyda 2002, map insert, with modifications. 1 – area of occurrence of metallurgical sites, 2 – small and large metallurgical sites (type I and II), 3 – cemeteries, 4 – other settlement points, 5 – coin finds

Buszyce 9 and Przylesie Dolne 6), a smithing/forging workshop associated with elements of a typical settlement, or a site combining all these functions (e.g. Młodoszowice 1). It is assumed that the Brzeg metallurgical district operated as a raw-material hinterland for the Bystrzyca-Oława settlement cluster, regarded as one of the larger tribal territories in this region (Pazda 2002, 171–172).

The phenomenon of commercial iron production in the Przeworsk Culture lay not only in the enormous scale of metallurgical activity, but above all in the application of specific forms of labour organisation unknown in other regions. In the Świętokrzyskie Mountains, these took the form of systematically arranged furnace clusters; in Masovia, long boundary-aligned rows of furnace clusters; and in the Brzeg district, integrated cluster systems of sites. The implementation of such organisational models across areas covering hundreds of square kilometres (and sustained over several generations) attests to the existence of strong organisational cohesion and a centralized system of supervision over production (Orzechowski 2018).

It is assumed that the activity of the large metallurgical centres was linked to autonomous territorial organizations that coordinated and controlled these operations. This is the only explanation how, in a predominantly subsistence-based economy, such vast logistical enterprises could function, requiring the participation of large, well-organized groups of people who had to be temporarily withdrawn from everyday agricultural and pastoral activities. It is noteworthy that the Przeworsk metallurgical centres operated for nearly the entire duration of this cultural unit, altering only their geographic focus and systems of labour organization. The process began in Western Masovia, where large-scale production was already

initiated in the Late Pre-Roman Period. After its decline in the mid-second century CE, at the transition from the Early to the Late Roman Period, the Świętokrzyskie Mountains assumed the role of the principal iron-producing region. In the Late Roman Period, the centre of gravity shifted once more, this time to the Brzeg district in Silesia.

Summary

The beginnings of indigenous metallurgy in present-day Poland are difficult to define precisely. This skill was probably not part of a broadly accessible or commonly practiced body of knowledge; rather, it appears to have been introduced in the form of a ready-made set of techniques and production technologies. The stage of smelting iron from local ores was preceded by a long period of its use, initially as finished imported goods, and later through the smithing/ reworking of semi-finished iron imported from the Hallstatt and the La Tène Cultures.

There is no clear evidence for a direct transfer of these technologies from Celtic communities or from representatives of the La Tène-influenced cultures inhabiting present-day Poland in the late first millennium BCE. It appears that only toward the close of the Late Pre-Roman Period did the population of the Przeworsk Culture adopt iron-smelting skills from related Germanic groups, independently and from several directions, namely from the territories of Bohemia, the Elbe basin, and southern Jutland. The new craft did not spread evenly across present-day Poland. Despite relatively easy access to raw materials (primarily bog iron ores, with the exception of the Świętokrzyskie Mountains) some regions never developed self-sufficient production. The Vistula River roughly delineates two zones: a western zone characterized by well-developed metallurgy and an eastern zone where such activity was considerably more limited. This division also corresponds to the broader cultural situation in the region. The clear leader of metallurgical production was the Przeworsk Culture, although this does not mean that other cultural units did not engage in iron production on their own scale. Recent research points to the existence of metallurgical production also within the Wielbark Culture and even in the milieu of the West Balt Barrow Culture, previously regarded as lacking evidence of such activity. The distinctiveness of Przeworsk metallurgy, however, lies in the initiation of large-scale production in several regions, namely the Świętokrzyskie Mountains, Western Masovia, and the so-called Brzeg district in Silesia. Only there did metallurgy clearly separate itself from the framework of a subsistence economy and develop on the basis of its own systems of labour organization. In this way, two independent, yet undoubtedly interconnected production streams emerged, oriented toward different markets. Small, dispersed workshops scattered across various regions supplied local needs, while the major metallurgical centres directed their output toward a broader external clientele.

Given the scale of production, the technical and technological uniformity of the smelting installations is striking. With only isolated exceptions, production relied on a single type of furnace: the free-standing slag-pit shaft furnace. In its classical form, this mass-used structure was not adopted by the incoming Slavic settlers. It disappeared in the early phases of the Early Middle Ages, and its decline marked the end of large-scale iron production in present-day Poland at the close of antiquity.

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PRE-ROMAN AND ROMAN IRON AGE

Andrzej Michałowski

In the Shadow of the World of the Celts

The interior of the European continent around the turn of the 6th and 5th centuries BCE became the arena of extremely dynamic changes. The Celtic communities emerging from the Hallstatt Culture initiated a revolution by overthrowing the dominance of the Hallstatt elites, particularly those settled in the pre-Alpine zone. A new quality associated with the rise of a new social group (warriors) emerged on the northern fringes of the former Hallstatt milieu in the area of the Marne, Moselle and Vltava rivers (Cunliffe 2011, 355). Their world was based on the negation of Hallstatt patterns and on the adoption of a certain model of identification, which, despite everything, drew from that rejected past. This became clearly visible in the burials of the tribes entering this new civilisational sphere. Its material manifestation became the La Tène Culture, named after the eponymous site located in present-day Switzerland (Kruta, 2010, 25).

Europe entered a period of domination by the Celtic civilization, which for nearly five centuries enforced cultural patterns and models from the shores of the Atlantic Ocean to the Black Sea and from the far reaches of Albion to the Apennine Peninsula (Haywood 2001). The Celtic peoples were also known beyond their immediate European ecumenism, primarily fighting in the armies of the ancient world as mercenaries.

In the areas of present-day Poland, as well as in most of the Baltic zone, these events seemed rather distant. Groups that emerged at the end of the Hallstatt period developed here and dominated the earlier phases of the Iron Age, which is referred to as the La Tène period in the region. This was the Jastorf milieu, with its influences in southern Scandinavia and the Baltic islands, the Pomeranian Culture, and to the east, the culture of the West Baltic barrows. All these groups entered the territories of present-day Poland, although the dominant position here was held by the Pomeranian Culture, interpreted here in unity with the Cloche-Grave Culture/West Pomeranian Culture distinguished in literature on the subject (Węgrzynowicz 1995) (Fig. 1).

Although theoretically, events unfolding beyond the Sudeten mountains would have had little impact in the Baltic zone, they certainly did not go unnoticed in the Pomeranian Culture area. This was most likely a result of the shared cultural heritage connecting the communities from the Czech Basin and the areas of present-day Poland (especially Lower Silesia), which originated from the times of the Urnfield community and particularly from the Hallstatt civilization. The latter in particular linked Lower Silesia with regions where the process of La Tène cultural influence was beginning to shape the local post-Hallstatt society through the Celtic Boii (Woźniak 1970). The presence of early La Tène-type fibulas, evident in Lower Silesia and areas of the Pomeranian Culture (such as zoomorphic, Duchcov, and Piekary Wielkie-types of fibulas; see Woźniak 1995) clearly indicates processes occurring among the communities descended from pre-Roman traditions living in the territory of present-day Poland. These changes were linked to the transformations brought about by Celtic tribes within the local population from the Czech Basin region (Danielisova et al. 2018).

This process during the La Tène B period clearly stagnated in the Pomeranian Culture area, which (as was the case in the Jastorf zone) bears no traces of the influences from the regions of the developing La Tène Culture as had been the case earlier. However, in Lower Silesia, where the local cultural

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FIGURE 1. Jastorf and Pomeranian Cultures against the backdrop of Celtic settlement in the La Tène C period (3rd Century BC). Legend: 1. La Tène Culture, 2. Jastorf Culture, 3. Pomeranian Culture

background also stemmed from the flourishing Hallstatt Culture group, material typical of Celtic communities began to appear. In the literature on the subject, this is referred to as the expansion of Celtic tribes into the fertile, loess areas of Lower Silesia. However, we cannot rule out that the process is analogous to findings from the Czech Basin, where the final Celticisation of enclaves inhabited by the post-Hallstatt communities also took place at this time. It is possible that the same process is observed in relation to the former Lower Silesian enclave of this group, which may be mistakenly interpreted as the migration of a foreign ethnic group into these areas.

Lower Silesia began to develop differently from the regions located to the north of the Oder, at this point flowing in a latitudinal direction. The area of present-day Lower Silesia is viewed as one of the few enclaves where the La Tène Culture developed in regions north of the Sudetes and Carpathians – evidenced by the presence of Celtic tribes arriving from the south.

Lower Silesia was witness to clear elements characteristic of the Celts, in both funerary practices (skeletal burials with grave goods typical of Celtic graves from the La Tène B period) and aspects of economic development. In this region, pottery produced using the potter's wheel appeared on a large scale, accompanied by vessels made from clay mixed with graphite, glass objects and items made from sapropelite[1]. Additionally, there are emissions of coins minted in the Boii zone. All of this indicates a strong connection between Lower Silesia and the Czech Basin (Madera 2016, 105–109).

The most mysterious element of this Celtic puzzle appears to be a site possibly associated with the cult of local tribes: the so-called Silesian *nemeton*, believed to be Mount Ślęża. This solitary peak, rising to an elevation of 717.5 metres above sea level

[1] Varieties of fossil coal, formed as a result of diagenesis and metamorphism of sapropel. Due to its ease of processing, it was used by the Celts, among others, to make jewelry, primarily bracelets (Dulęba 2016).

in the flat landscape of the plateau between the Oder and the foothills of the Sudeten mountains, naturally evokes the image of a sacred mountain, a place where mortals came into contact with the gods. Soaring through the clouds and enveloped in a network of lightning, Mount Ślęża sparked the imagination of the communities living at its feet. It is suggested that the cult centre on Ślęża may have existed as early as the Lusatian Culture period. This is evidenced by the ramparts surrounding the summit, which are still visible in the landscape of its slopes today (Domański 2002, 88). A special place on Ślęża, which is located on the top and around the mountain of a stone sculpture. Some researchers perceive them representations from the early Middle Ages (Schulte 1900; Lustig 1925; 1928; Geschwendt 1938, 46–52; Mierzwiński 2007), while others point to connections with the Lusatian Culture (Cechak-Hołubowiczowa 1960; Gediga 1996). In this discussion they were also seen as belonging to the Celts (Rosen-Przeworska 1961, 1964; Woźniak 1970, 65–75). Currently only monumental stone sculptures of bears, positioned on the slopes of Ślęża, have a chance to be associated with Celtic times (Domański 2002, 92). The figures of two bears or, more accurately, wild boars which refer to the Spanish *verracos* (Geschwendt 1938; Lopez-Monteaguardo 1982; 1989 145–150), as often as those from Silesia were devoid of archaeological context (Berrocal-Rangel et al. 2018). The wild boar was after all to one of the most important totemic animals of the Celtic milieu (Green 1992, 46; 89–91). Their images can be seen, among other places, on the coins also of the Boii Culture (Fig. 2).

Elements of the La Tène Culture remained evident in Lower Silesia until the 2rd century BCE, marking the mid-La Tène period, when this settlement began to disperse and eventually decline (Woźniak 1970, 63, 76). The 3rd century BCE was a significant turning point in the development of Baltic communities (Martens 1997; 2017). During this time, significant civilisational changes occurred, profoundly influencing the future of communities shaped at the end of the Hallstatt period in this part of Europe. Once again, we must look beyond the Sudetes into the realm of the Celts, who in this period were experiencing a period of great transformation. Celtic communities, operating on the fringes of the ancient world, began to mature and construct their own civilisational identity. This development is probably linked to advanced contacts with the broadly defined Mediterranean region, as well as the changes occurring at that time within the Celtic ecumene, which extended deep into ancient communities. This period marks a time when the world of Celtic values underwent significant transformation (Rosen-Przeworska 1971, 84). The original beliefs, rooted in animism and totemism, were gradually replaced by a more modern religion featuring anthropomorphic male deities, exhibiting characteristics clearly linked to the traditions of the classical world.

From the perspective of the La Tène Culture, these changes are particularly evident in the profound transformation of burial rituals. In the early 3rd century BCE, cremation rituals began to emerge on a large scale, gradually replacing the previously prevailing practice within the Celtic world of inhumation, where bodies were laid to rest in graves. Grave goods were also eradicated in their earthly form through bending, breaking, and burning on the funerary pyre. By the end of the 3rd century BCE, in La Tène C2, funerary ritual practices disappeared – marking the emergence of customs for depositing the mortal remains of the dead that are archaeologically elusive or poorly recorded. This may have included practices of water or air burial rituals, echoes of which resonate in both internal and external traditions (especially Roman). At the same time, the Celtic world began to stabilize in terms of settlement. This period saw the beginnings of urbanization, evident in the development of oppida networks. This also applies to the border zone of the non-Latèneized Central European communities.

The Celts began to take notice of the communities located to the north. The stabilization of settlements, along with economic development, led to a dual pursuit: on one hand, they sought new markets for their goods, and on the other, areas for economic exploitation. This drive for expansion played a crucial role in their interactions with neighbouring cultures.

This expansion may be linked to the emergence of another enclave of the La Tène Culture in Polish lands, following Lower Silesia. This new settlement was situated near the Moravian Gate, on the fertile chernozem of the Upper Silesian Głubczyce Upland. This clearly represents an expansion of the economic sphere of the Celtic tribes from Moravia, associated with the Volcae-Tectosagii. In this



FIGURE 2. Mount Ślęża. Stone sculpture of a bear. Photo by A. Michałowski

area, the main centre became Nowa Cerekwia (Dulęba 2026), which at one point was even suspected of having the character of an oppidum. Currently, researchers agree that Nowa Cerekwia was a large open settlement, probably serving as the central economic and political hub of this community cluster. It was a significant crossroads for trade routes, facilitating both long-distance and local commerce. Settlement continued until the decline of the eastern Celtic zone in the late La Tène period in the second half of the 1st century BCE. During this time, it was one of the settlement enclaves developing differently from the remaining areas of present-day Poland.

Economic activity, associated with the Celts' search for new markets during their peak economic development, coinciding with the period of growth of oppida (2nd century BCE; see Cunlife 2003, 272), found fertile ground among the communities around the Baltic. These communities began to seek contacts with wealthier and more economically developed southern neighbours. As Barry Cunliffe aptly noted in his book „The Ancient Celts", Central European communities were at the level of socio-economic development that the Celtic communities exhibited in the 4th and 3th century BC (Cunliffe 2003, 286). At that time, they willingly adopted patterns from the Alpine/Mediterranean zone.

The 2nd century BCE marked the beginning of the process of "Latèneization" of Central European communities. Emerging patterns of Celtic fashion were manifested in the quickly adopted and "barbarized" fibulas of the La Tène type. This phenomenon is well illustrated by the example of the Jastorf Culture communities, and probably occurs analogously in the areas of contemporary Poland. However, we have a cognitive problem related to the lack of detailed recognition of the decline of the Pomeranian Culture, which serves as a sort of alter ego to the well-documented regions of the Jastorf milieu and the overall fashion of the older pre-Roman Baltic zone. In Polish lands, at the turn of the 3rd and 2nd centuries BCE, groups appeared that corresponded to those found in the broadly defined Jastorf Culture zone. Initially, this phenomenon was perceived as an import from the Jastorf zone; it is now gaining status as an expansion from the groups of this civilisational milieu, often associated with Germanic migrants known as the Bastarnae and the Sciri to the areas of the Prut and Siret river basins, leading to the formation of the Poienesti-Lukasevka Culture (Babeș 1993). However, the currently observed scale of the

phenomenon allows us to conclude that we are dealing with a broader occurrence related to the civilisational changes among the tribes inhabiting the areas of present-day Poland at that time (Michałowski, in this volume).

The effect of the limited understanding of the development of Pomeranian Culture in its last stage unfortunately stems from the research traditions of Polish archaeology, which has left the Pomeranian Culture largely within the purview of Bronze Age and early Iron Age researchers. Thus, we have a good understanding of the initial phase of its existence, but a lack of broader reflections on the changes that introduced this group into a stylistic framework characteristic of the younger pre-Roman Iron Age (Gedl 2005, 407). This contrasts with the comprehensive studies conducted on the Jastorf Culture. At the same time, researchers of the Period of Roman Influence have focused primarily on the Przeworsk and Oksywie Cultures, which defined the civilisational development of communities in the new era. However, I will address this issue further in the text.

Considering the decline of the older and the onset of the younger pre-Roman period, it is essential to address the transition of the Pomeranian Culture into a model appropriate for the new era. Assuming a coherent development of the Baltic zone from the moment of its formation at the end of the period of influences of the Hallstatt civilization and the decline of the Nordic milieu, as a convergent civilisational phenomenon with a uniform distribution of its individual components, it should be posited that in the 3rd century BCE, it underwent similar influences and changes, including those stemming from contacts with the La Tène Culture. Thus, the appearance in the Pomeranian Culture zone of material with a stylistic similarity to the model of phase IC (Jastorf C) of the Jastorf Culture represents a proper developmental model for this group, characteristic of the Baltic zone. At the same time, the widespread appearance of material of the La Tène-influenced Jastorf Culture, phase IIA (Ripdorf), is nothing more than a transformation of the material culture of local communities, aligning with the prevailing fashion of that time in this part of the continent and contributing to their further civilisational development. There is no evidence for the collapse of the Pomeranian Culture and the depopulation of its areas, or for such a wide expansion of the Jastorf milieu communities, which has been recently postulated in Polish literature on the subject. This process of the emergence of groups characteristic of the new fashion took place until the end of the 2nd century BCE. Their decline, and thus the likely disappearance of communities with the Pomeranian Culture traditions, coincided with the advancing territorial expansion of a new element of cultural development in present-day Poland, namely the culture of pit graves, currently referred to as the Przeworsk Culture and the Oksywie Culture.

The concept of the pit grave culture was introduced in the early 20th century by Professor Józef Kostrzewski, the founder of academic archaeology in Poznań. He pointed to the emergence of a new burial rite around the mid-2nd century BCE in the form of "cremation pits", which he, like most contemporary researchers, traced back to Bornholm, with its spread associated with the expansion of the Burgundians (Kostrzewski 1914, 110–112). This was aligned with the methodology of the so-called settlement archaeology – *Siedlungsarchäologische Methode* (Kossina 1911). In Polish literature, the first ethnically neutral term "Przeworsk Culture" was used by Rudolf Jamka in his study of the burial site in Kopki, Nisko county (Jamka 1935), who borrowed it from Lubor Niederle's work *Rukověť slovanské archeologie* (Niederle 1931). This naming option quickly became established in Polish archaeological nomenclature, including in the writings of Józef Kostrzewski (Krukowski, Kostrzewski, Jakimowicz 1939–1948, 300–306, 319). The ethnic affiliation of the communities of the Przeworsk Culture was indeed extremely significant from the moment the first groups appeared. A significant number of researchers associates the Przeworsk Culture with the extent of the tribal settlements of the Vandals, which has led to that grouping being referred to in the literature (even today) by the name the Vandal Culture (Kokowski 2004).

The Przeworsk Culture is one of the longest-lasting and most stable archaeological groups that stands out in present-day Poland. Nearly 700 years of its existence in the catchment area of the Oder and Vistula rivers was accompanied by a fairly stable development of the material culture of the tribes that primarily inhabited the Lowland area of Poland. Due to shifts occurring throughout their existence, they also entered the highland zone of southern Poland. Unfortunately, its genesis (similar to the mentioned decline of the Pomeranian

Culture) is still not fully clear (Dąbrowska 1988, 85–92). Undoubtedly, the earliest groups of the Przeworsk Culture are characteristic of the Lower Silesia regions, where they appeared in an area recently considered to be associated with the settlement of Celtic populations (Dąbrowska 1988, 110–111). Perhaps the process of decline of the Lower Silesian Group of the La Tène Culture at the end of 3rd century BCE was indeed related to the arrival of new Germanic populations (specifically, the Vandals) into Lower Silesia (see Strzelczyk 1992, 60, Map)? The new arrivals were to settle in the uninhabited zone north of the mouth of the Barycz River into the Oder, and between Ścinawa, Wrocław and east of the Kaczawa River (Dąbrowska 1988, 110). This could indicate their outward migration.

These areas lay beyond the ecumene inhabited by communities of the Pomeranian Culture. Consequently, it is difficult to argue that the Przeworsk Culture developed as a simple evolutionary transformation of the Pomeranian Culture under southern La Tène influences. Nor are there sites where a clear, transitional moment between the two stylistic traditions can be observed. Instead, the stylistic features associated with the Przeworsk Culture appear to have emerged alongside those characteristic of communities rooted in earlier pre-Roman Iron Age traditions.

Of course, this new group fits within a certain trend of Central European traditions. However, despite the similarities, these elements have somewhat different manifestations compared to the main stylistic currents present in the Jastorf Culture and the late Pomeranian Culture. The emergence of faceted edges of the rims on vessels, the presence of ribbon-like handles, and the adoption of intercultural metal forms derived from the La Tène Culture are key distinguishing features of the early groups of the Przeworsk Culture. They also represent a variation of these types of markers typical for communities of the later Iron Age in Central Europe.

The Przeworsk Culture emerged in the 2nd century BCE as a fully developed grouping, with its own distinct burial rites that differed from the local traditions, a fact noted by Józef Kostrzewski (1914). The Przeworsk Culture is characterized by a cremation burial rite, with a complete dominance of pit graves in the later pre-Roman Iron Age. This pit burial model diverged from the classical scheme of cremation graves known from cemeteries of cultures emerging from older traditions, such as the Pomeranian or Jastorf Cultures. The manner of depositing grave goods (particularly bending and breaking weapons and tools) resembles the burial practices of the Celts, typical of burial sites from the first half of the 3rd century BCE (LT C1). This model, at the time of the crystallization of the Przeworsk Culture in Polish territories, had already been an anachronism. It was being displaced by burial practices, elusive from an archaeological perspective. It appears that the population that emerged in Lower Silesia at the turn of the 3rd and 2nd centuries BCE had much earlier contact with communities of the La Tène Culture and brought the traditions they adopted from them to the areas they subsequently settled (Milena Danielewska-Teska, Paulina Suchowska-Ducke in this volume).

As mentioned earlier, upon arriving in Lower Silesia, the bearers of the Przeworsk Culture most likely caused a disruption of the local settlement patterns that were linked to the post-Hallstatt-La Tène zone traditions. The local population, perhaps anticipating this disruption, may have retreated southward to areas then occupied by the Boii.

The creation of a new identity

Again, there is no clear connection between the early Przeworsk groups and the La Tène ones from this area. It is highly probable that the emergence of the Przeworsk Culture groups in this location represents the stage of the migration of the Vandal tribes – the Silingi and the Hasdingi (Strzelczyk 1992, 57–79). These communities may have migrated from the areas of northern Jutland and central Sweden, travelling through regions occupied by Celtic tribes, with which they had the opportunity to reshape their civilisational patterns. This is evident not only in elements of material culture, such as the adopted model of weaponry featuring the characteristic La Tène double-edged sword with a bell-shaped guard and attire (for example, the use of middle La Tène type fibulas), but primarily in ideological changes, as indicated by the adoption of Celtic burial ritual models. Such migrations are also documented for the period of interest in Roman written sources, as they reached the sphere of Mediterranean civilization influence. These sources mention the Bastarnae and Sciri (Babeș 1993), but primarily the Cimbri and Teutons, who effectively forced a reform of the

Roman Republic's army, carried out by the consul Marius (Rochala 2013). Such migration had the opportunity to initiate this new cultural model. This is even more convincing given that we are dealing with a rather expansive group which, over the course of several decades in the 2nd century BCE, became the main core of the cultural mosaic of Central Europe, occupying a large part of the Polish Lowlands (Fig. 3).

Initially, the Przeworsk Culture groups were more frequent outside Lower Silesia, particularly in south-eastern Wielkopolska (especially the region of the Prosna river), in Central Poland, and partially in the left-bank Mazovia (Dąbrowska 1988), as well as in Chełmno Land (Wołągiewicz 1981a, 142). This group became the driving force behind the crystallization of the "northern group of pit grave culture", namely the Oksywie Culture (Kostrzewski 1961, 85; 1970, 161). In other areas, there were sporadic signs of settlement and burials characteristic of pioneering communities that were just beginning to enter those regions. We may be witnessing a moment of subjugation of the local (e.g. late Pomeranian) communities to an expansive invading group building its own political and economic structure. Once again, this is not unusual for the times, as written sources describe similar actions of the Cimbri and Teutons in Gaul (Rochala 2013, 61–63).

The late 2nd century BCE marked the beginning of a consolidated area of settlement of the Przeworsk Culture in the Polish Lowlands. This coincided with the decline of the use of material exhibiting Jastorf characteristics – these are likely to have been associated with the late Pomeranian communities, probably subordinated by the tribes forming the Przeworsk Culture. At this time, its extent stretched from the Oder region to the areas along the Bug River, covering Lubusz Land, central and southern Wielkopolska, Lower Silesia, Central Poland, Mazovia, and Podlasie. Its settlement was gradually entering the upland areas of Lublin and the regions of western Małopolska (Michałowski 2003). Enclaves of such sites have also been identified in central Germany (Meyer 2008, 150–193). During this period, the Przeworsk Culture displayed a relatively uniform stylistic character that cannot be limited to a single developmental phase. This is particularly evident in ceramics, whose dominant forms remained comparable throughout the first two phases of the group's development. The earliest pottery is distinguished by high-quality, careful craftsmanship, with rims often profiled on the exterior and horizontal handles that narrow in the middle and feature profiled edges (so-called X-shaped handles). The range of ceramic forms is relatively limited; pear-shaped vessels, cups, bowls, and globular pots predominated (Dąbrowska 1988).

At the turn of the 2nd and 1st centuries BCE, settlement truly stabilised as evidenced in the establishment of new, permanent burial sites often on fresh soil in previously unoccupied regions, as well as a network of settlements of a similar nature. These sites, beginning their function at this historical moment, were characterized by a significant degree of long-term existence, sometimes lasting until the decline of the mentioned group. This is particularly evident in the area where the settlement of the Przeworsk Culture began to expand during the 2nd century BCE. In the initial areas of Lower Silesia, we observe a significant thinning of the population at the same time. Literature on the subject offers suggestions that perhaps the people of the Przeworsk Culture participated in Ariovistus's wars in Gaul. However, it is more reasonable to assume that due to the significant expansion within the created settlement zone, the Lower Silesian tribal core, likely formed by the incoming Vandals, was compelled to spread into newly acquired areas to ensure political authority among the subordinate groups, thereby uniting the newly formed structure.

To the north of the Przeworsk Culture, parallel communities developed in the Powiśle region and the Słowińskie Coastland. This branch of the pit grave culture is currently referred to as the Oksywie Culture, named after the eponymous burial site in Gdynia-Oksywie (Jasnosz 1972), which was studied in the first half of the 20th century. The resemblance to the cultural model known from the Przeworsk Culture leads some researchers to argue that this is merely a local group of that cultural formation. There was a similar burial rite associated with the destruction and deposition of metal objects in graves, particularly weaponry, based on an already archaic model of Celtic ritual at the time. Nevertheless, in contrast to the Przeworsk Culture, there is a significantly smaller proportion of pit graves (mainly male graves), and consequently, a significant presence of cremation burials. There is also a higher proportion of items made of bronze or combining

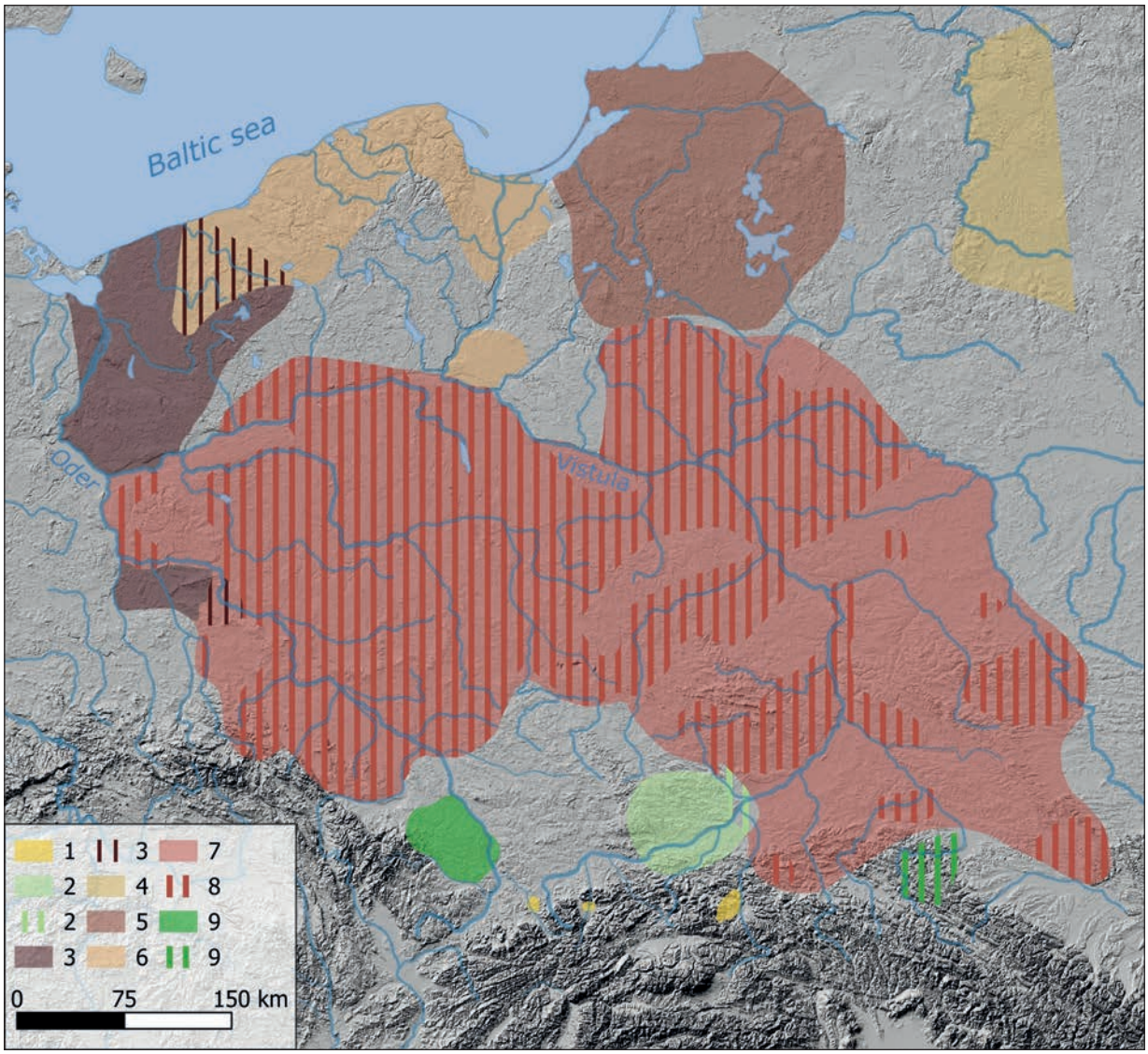


FIGURE 3. Cultural situation of Polish lands in 2nd-1st BCE. Based on Kaczanowski, Kozłowski 1999. Legend: 1 – Puchów Culture; 2 – Tyniec Group; 3 – groups of the Jastorf circle (Oder and Gubin); 4 – Etched Pottery Culture; 5 – West Baltic barrow culture; 6 – Oksywie Culture; 7 – Przeworsk Culture; 8 – area densely settled by Przeworsk Culture people; 9 – Celtic settlement

iron and bronze (bimetallism). Some pottery, especially from the earliest phase of development of the communities in the Vistula and Pomerania regions, refers to the Przeworsk style. This influence was likely due to the Chełmno Group, which is at the origin of the Oksywie Culture (Wołagiewicz 1981, 142). Nevertheless, certain elements are attributed to the strong influence of the stylistic characteristics of the Baltic region (particularly the Jastorf circle – Wołągiewicz 1979, 48, 49; 1981b, 162), which is evident in the presence of forms of both metal objects and certain types of vessels with characteristics relating to those typical of the Jastorf milieu and the islands of the Baltic Sea. This allows for the identification of a unique ritual of this group, distinct from the classical Przeworsk model (Fig. 4) (Strobin, in this volume).

Both groups, the Przeworsk Culture and the Oksywie Culture, underwent quite similar development, characterized by a gradual decline in the influence of styles borrowed from the La Tène zone by the mid-1st century BCE, in favour of forms



FIGURE 4. Sosnowiec, Site 1. Ceramic vessels from a Przeworsk Culture settlement dated to the turn of the 1st century BCE and the 1st century CE. Photo by A. Michałowski

present in the tradition of the Baltic region. This is clearly visible in the context of weaponry with a major shift away from long double-edged swords of the La Tène type with a bell-shaped guard, towards single-edged swords (Wołągiewiczowie 1964), which probably originated from local traditions evident in both the Pomeranian and Jastorf Cultures. This "back to the roots" movement coincided with the weakening of the cultural significance of Celtic communities in Central Europe, associated with their loss of the Danube territories first to Burebista's Dacians, and later with the strengthening of Roman hegemony in the region. At that time, the fashion in ceramic production also changed, as reflected in the decline of thickening and faceting of the edges of vessel rims, as well as the introduction of vase-like and sharply profiled forms, referring to the new style that was evident in the early Roman Iron Age.

In *Germania Magna*, or on the peripheries of the *Imperium Romanum*

The beginnings of the Roman Empire and the reign of Octavian Augustus solidified Rome's gains along the Danube, while the campaign across the Rhine, led by Drusus Germanicus and then his brother Tiberius, clearly changed the situation in Central Europe (Rochala 2005). During this period, the pre-Roman Iron Age came to an end, and the Roman Iron Age began. The political situation in Central Europe changed dramatically: the warriors inhabiting the Czech Basin, influenced by the expansion of the Suebian tribes moving along the Elbe, retreated behind the Danube into Noricum. They were replaced by the Suebi Marcomanni, while their relatives, the Quadi, subjugated the Celtic Cotini in present-day Slovakia. They thus changed the Celtic face of the Púchov Culture into a model of a Germanic grouping (Pieta 1982), characteristic of the Central European territories at that time. Despite the failure to establish a new province between the Rhine and the Weser (perhaps the Elbe was intended to become this boundary in Rome's far-reaching plans) and the withdrawal of the legions behind the Rhine *limes*, this civilization began to have an extraordinary influence on the tribes of Central Europe and their traditions. Thus, a zone known in literature as *Germania Magna* was formed. Undoubtedly, this area was politically dominated by the highly active Germanic

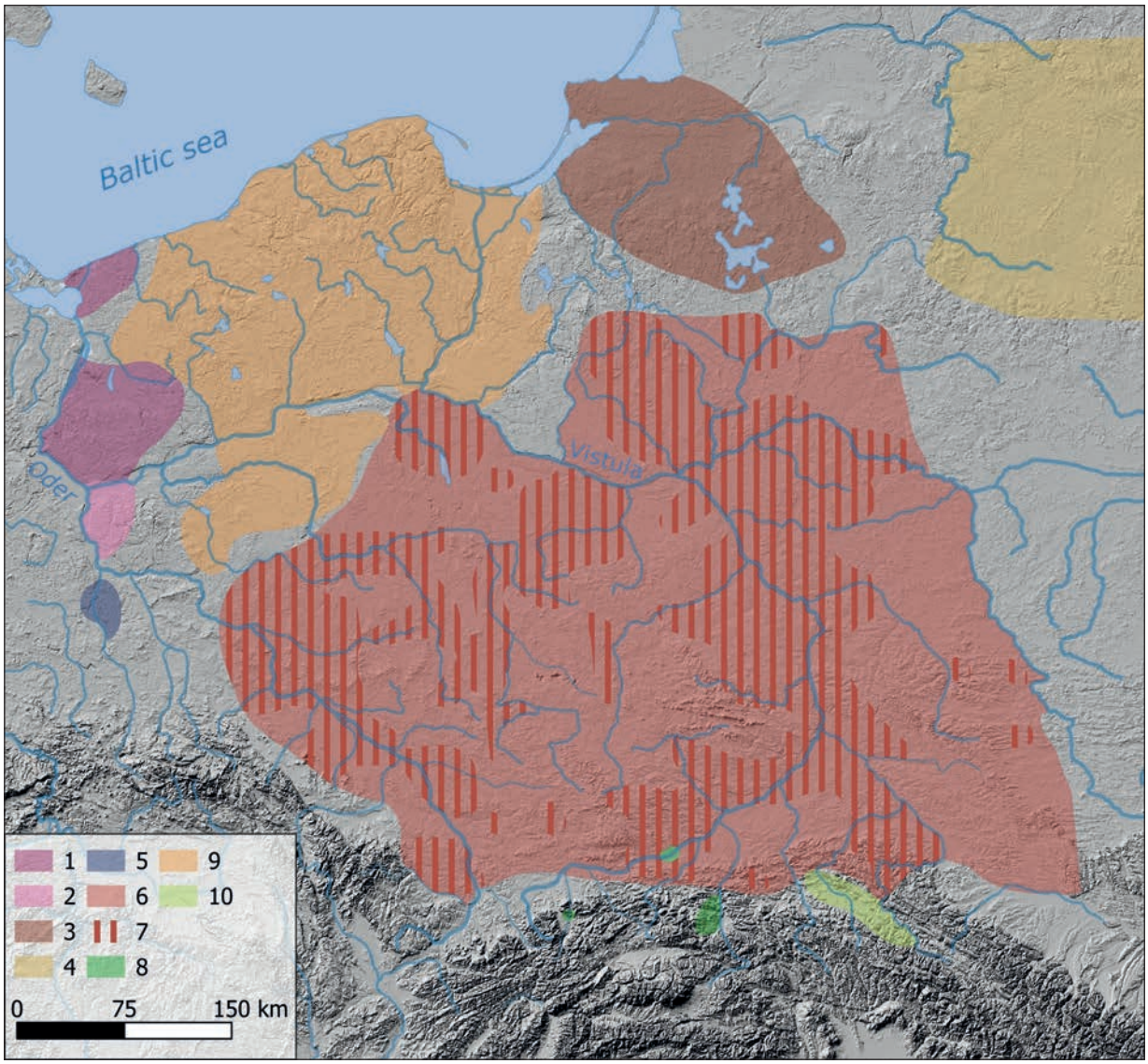


FIGURE 5. Cultural situation of Polish lands in the 1st-2nd century CE. Based on Kaczanowski, Kozłowski 1999. Legend: 1 – Gustovska Group; 2 – Lubusz Group; 3 – West Baltic Circle; 4 – Imprinted Ware Culture; 5 – Luboszyce Culture; 6 – Przeworsk Culture; 7 – area densely settled by Przeworsk Culture people; 8 – Puchów Culture; 9 – Lubowidz Phase of Wielbark Culture; 10 – Wietrzno-Solina type

tribes at that time, which, like the earlier Celtic peoples, set the tone for the character of its material culture. Certainly we are dealing with a distinctly broader spectrum of the ethnic mosaic here, as evidenced in Roman texts that indicate the presence of other, non-Germanic tribes. A fitting definition of this phenomenon was presented by Erazm Majewski in the *Tygodnik Ilustrowany* of 1898, stating that *in ancient times, "Germania" was merely a geographical term for a little-known part of Europe, just like "Scythia", "Libya", and "Hyperborea" . Although various and largely unknown peoples lived in "Germania", it was not well understood by the ancients* (Fig. 5).

In the territories of present-day Poland, both cultures deriving from the tradition of pit graves were undergoing civilizational transformations, entering a new stage of development as sedentary communities. This period had a "barbarian" character, shaped by the presence or influence of Germanic populations. At the same time, these communities remained under the influence of the Roman provincial zone, as reflected in inspirations and borrowings

in local stylistic forms. Thus, elements characteristic of the La Tène tradition completely disappeared, replaced by elements referencing styles propagated by provincial workshops. The communities of the Przeworsk Culture moved eastward, leaving the area of Lubusz Land and northern Wielkopolska, but in return, they settled the regions of Upper Silesia, Małopolska, Outer Subcarpathia, and partially Volhynia (Godłowski 1985; Kozak 1984). Yet again, settlement density increased in Lower Silesia. Current inventories clearly show influences referencing a tradition modelled after fashions from the Roman provinces, observable among communities inhabiting the zone of Germania Magna, though with its own distinctive feature (an abundance of products made of iron) especially in clothing and adornments. In weaponry, alongside the still-present single-edged swords in inventories, short double-edged swords of the Roman *gladius* type appeared, indicating the dissemination of combat methods borrowed from the Roman legions. Such forms have been discovered in grave goods, slowly moving away from the standard presence of only pit graves in burial sites, with cremation burials also emerging on a broader scale. The Przeworsk Culture burial rites are characterized by a large number of weapons. Polearms are the predominant element, while metal shield fragments are also common (Figs. 6, 7). The transition from the pre-Roman Iron Age to the times of Roman influence is primarily characterized by the appearance of vessels with a bulbous, swollen belly and a sharp angle of a double-conical body, referred to as vases. Under the influence of interactions with the Roman provinces, small vessels appeared that reference the rounded form and ribbing of the body of glass vessels. Settlement pottery widely exhibits roughened surfaces. Unlike the strap-like handles from the pre-Roman Iron Age, here the handles took a cylindrical, curved form. During the early Roman Iron Age, vessels with S-shaped and oval profiles gained extreme popularity, and many forms additionally acquired hollow footring bases (Liana 1970) (Fig. 8) (Piotrowska, in this volume).

The beginnings of similar stylistic transformations could also be observed in the Oksywie Culture, whose society began undergoing a comparable pattern of change. However, these changes were blocked by the emergence of new tribal groups originating from Scandinavia, namely the Goths and the Gepids (Strzelczyk 1984, 47–58; Olędzki 2020, 61–91). A similar pattern appears here, probably resembling what was observed in the formation of the Przeworsk Culture. The Goths, who most likely landed in the area of what is now the Kashubian-Krajen Lake District (Wołągiewicz 1981d, 88), quickly tried to make their way toward the *limes* (Droberiar 2015). They subordinated the tribes of the Oksywie Culture, establishing a support base and creating a new synthesis from the combination of their own civilisational models and those of the conquered population. The resulting fusion is now referred to as the Wielbark Culture (named after the eponymous burial site in Wielbark, now a suburb of Malbork), which, in its early phase, dominated the territories of Pomerania, northern Wielkopolska, Powiśle, and the Iława and Olsztyn Lakelands (Wołągiewicz 1981d, 84, 85). Its influence even reached the middle Oder region, where its advance toward the southwest was halted by the tribes of the Elbe cultural milieu.

The Wielbark Culture thus consolidated in the region of present-day north-western Poland, forming a cohesive group with a very distinctive identity, reflected best in its funerary practices, were characterized by a form of bi-ritualism in which cremation – probably rooted in local traditions – held equal status alongside inhumation burials (Wołągiewicz 1981c, 172). The latter constituted a relative innovation in this part of the Central European Lowlands, although isolated traces of inhumation had already appeared in the Oksywie Culture toward the end of the pre-Roman period (Strobin 2023). Bi-ritual funerary customs can also be observed, though on a more limited scale, among other communities of the Baltic Sea region (Łuczkiewicz, in this volume).

The graves of the Wielbark Culture display considerable variation, ranging from simple pit burials to graves marked with stone constructions, indicating the resting place of the deceased, and even monumental barrows built of earth or a combination of stone and earth. A distinctive feature of burial sites in the region from which the northern newcomers launched their expansion into local communities is the presence of stone circles (Wołągiewicz 1977; Grabarczyk, Lipnicki 2019). These necropolises appear to have functioned not only as burial sites but also as centres of ritual activity, venues for tribal assemblies, and possibly even astronomical observatories. This multifunctional interpretation is particularly debated in connection with the cemetery at Odry,

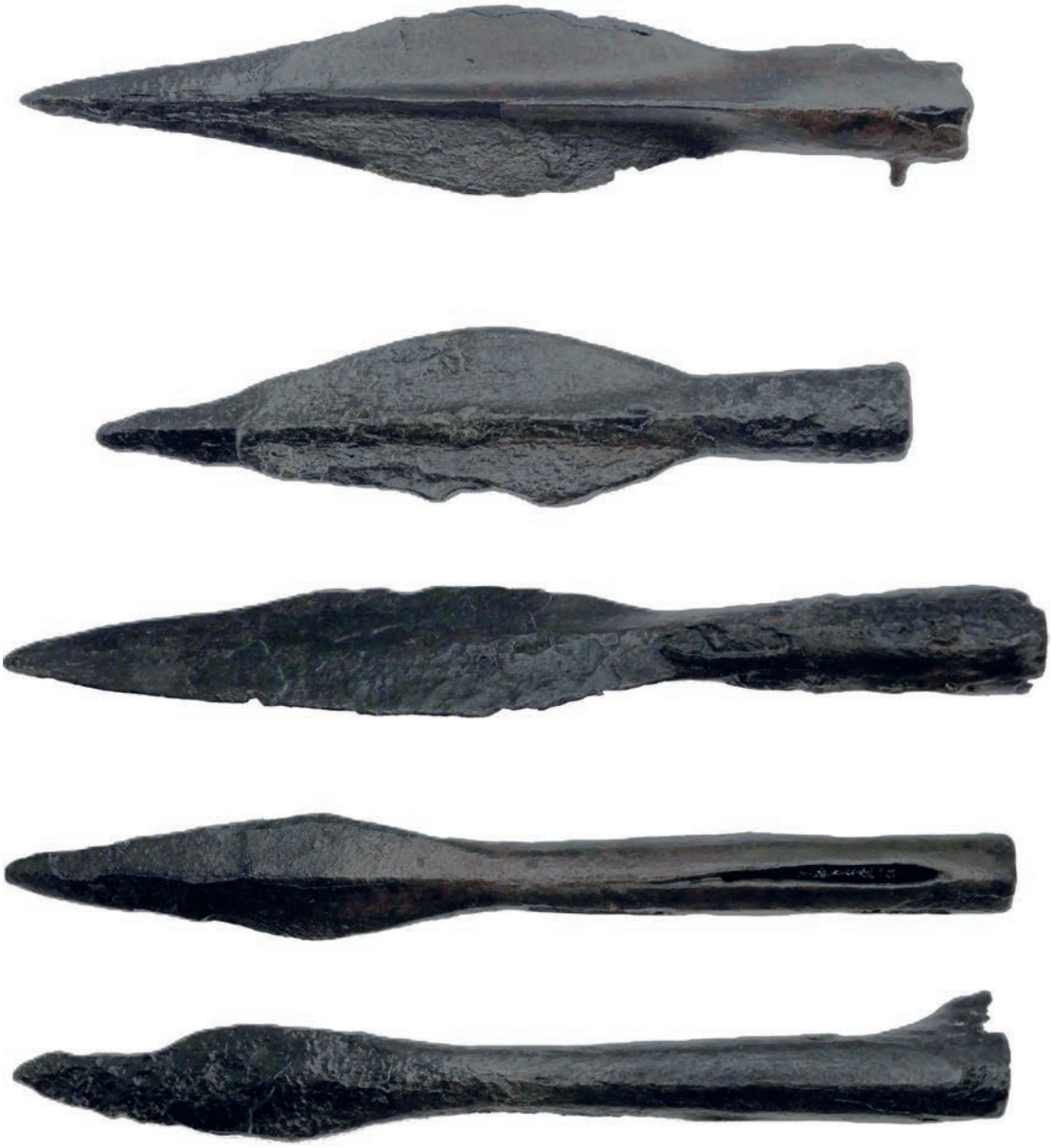


FIGURE 6. Tursko, 23. Spearheads from a Przeworsk Culture cremation cemetery destroyed by treasure hunters, dated to the 2nd century CE. Photo by G. Szczurek

located in Chojnice Country, within the municipality of Czersk (Kmieciński 1968) (Figs. 9, 10).

Differences in grave goods are also evident when comparing the Wielbark Culture with earlier traditions in the region. Whereas earlier burials often included weapons and tools, Wielbark graves frequently lacked objects made of iron, a pattern assumed to reflect a religious taboo that prohibited including such items in funerary contexts. In their place, a rich assortment of clothing components and ornaments made of bronze and precious metals (silver and gold) appeared. The peak development of this style is observed in the second half of the 2nd century, during the so-called "Wielbark Baroque", which is particularly evident in female burials (Wołągiewicz 1981a, 143; 1981c; Tempelman-Mączyńska 1989, 65–73) (Fig. 11) (Michałowski, in this volume).

To the east of the Wielbark cultural zone and to the north of the territories occupied by the



FIGURE 7. Tursko, Site 23. A shield boss from a Przeworsk Culture cremation cemetery destroyed by treasure hunters, dated to the 2nd century CE. Photo by G. Szczurek

Przeworsk Culture, communities associated with Baltic peoples developed. These societies maintained their own distinct civilisational identity, although they were also integrated into the broader Central European model characteristic of the Roman influence period. Within the western Baltic sphere, several local cultural groups can be distinguished, some of which had already been functioning in the Late Pre-Roman Iron Age, such as the Bogaczewo Culture (Nowakowski 1983; Iwanicki, Juga-Szymańska 2007). At the height of its development, this cultural grouping occupied the Mrągowo Lakeland, the Masurian Lake District, the Ełk Lakeland, and parts of the Suwałki region. It was characterized primarily by flat cremation burial sites, although in the Suwałki Lakeland, barrow burials, inhumation graves, and even horse burials have been discovered. This zone, however, is increasingly associated with the influence of the Sudovian Culture, which emerged as a result of contacts with Baltic communities located east of the Niemen River. In particular, these influences originated from the communities of the Dolkem-Kovorovo Culture, settled in Sambia, where bi-ritual burial sites are attested and the burials of warriors are accompanied by horse skeletons (Nowakowski 1996).

With a view toward Rome

The first two centuries of the Common Era, corresponding to the Early Roman Iron Age, were a period of relative stabilization for Central European communities. This is evident in the formation of cohesive cultural zones that responded rapidly to trends and influences emerging from the Roman provincial sphere. This indicates a cohesive network of economic and political contacts between individual centres of power, reflected particularly in the similarity of fashions prevailing among tribal elites. This period of stabilization came to an end with the Marcomannic Wars, fought between 167 and 180 CE during the reign of Emperor Marcus Aurelius (Olędzki 2023). These were a series



FIGURE 8. Biała, Site 1.1. An urn from a Przeworsk Culture cemetery dated to the 2nd century CE, a copy of a vessel from the collection of the Ślężańskie Museum in Sobótka. Photo by A. Michałowski

of conflicts waged by the Roman Empire against primarily Germanic tribes, both within the Roman provinces: Noricum, Pannonia, and Raetia and beyond the *limes*, mainly in the territories of present-day Moravia and western Slovakia. The tribes inhabiting the territory of present-day Poland were generally not actively involved in these wars. On the rare occasions when they may have participated, it would have been representatives of the Vandalic people (the Hasdings) and then only in alliance with Rome (Olędzki 2020, 93–99). As a consequence, they were mentioned in the peace treaty concluded by Emperor Commodus with the Marcomanni in 180 CE, which included a clause explicitly prohibiting the Marcomanni from waging war against Rome's allies, such as the Iazyges, the Buri, and the Vandals (Olędzki 2020, 99). In connection with this alliance, a portion of the Przeworsk Culture population probably moved into the fore-Carpathian zone, presumably as part of the migration of the Hasding Vandals from the Małopolska region to the Upper Tisza area (Olędzki 2001; 2020, 117–119). This marked the entry of this community into the area surrounding the *limes*, which was associated with the development of a Przeworsk Culture enclave there. Consequently, this led to the emergence of the Blazice-Bereg Culture (Olędzki 2020, 133–157), shaped by the newcomers as well as by the local communities and their civilisational influences (Fig. 12).

Significant shifts in the balance of power can also be observed in regions far from the theatre of war. In the Przeworsk Culture, changes occurring from the late 2nd century onward reflected economic development linked to the prosperity of its communities. This is evident in the movement of craftsmen (primarily potters) from the Dacian zone into Małopolska and the Subcarpathian region, leading to the emergence of a highly dynamic centre for the production of wheel-thrown pottery in Igołomia (Dobrzańska 1990a, 1990b), Tropiszów (Reyman 1934; 1936), and Zofipole (Dobrzańska 2000, 2003). The consolidation of the Hasdings in the Dacian border



FIGURE 9. Odry, Site 1. Stone circles at a Wielbark Culture cemetery from the 1st–3rd centuries BCE. Photo by A. Michałowski



FIGURE 10. Węsiory, Site 5. Grave stone structures (stele and pavement) from a Wielbark Culture cemetery from the 1st–3rd century CE. Photo by A. Michałowski



FIGURE 11. Mirosław, Site 37. Silver brooches from an inhumation grave from under barrow IV from a biritual, sub-barrow cemetery of the Wielbark Culture dating to the 2nd century CE. Photo by A. Skowronek, M. Bether

zone may also have played a role; nevertheless, their ability to find customers in the Transcarpathian region must have reflected the economic needs and capacities of the local population for such goods. At the turn of the 2nd and 3rd centuries CE, there was also an increase in the import of provincial Roman pottery, particularly *terra sigillata* vessels from Gallic workshops (Lezoux) and Rhineland (Rheinzabern, Westendorf, and Trier), which mainly reached the region via the province of Pannonia (Tyszler 1999) (Matula, in this volume). The presence of imported pottery had a significant impact on local production. In regions where imported wares held a substantial share of the market, there was a noticeable decline in demand for traditional hand-made forms. This was particularly evident for higher-quality vessels, increasingly displaced by workshop-produced ceramics. Production of utilitarian kitchen vessels, particularly pots, remained much more resilient. Of course, this situation did not apply to the entire area occupied by Przeworsk Culture communities. The further one moved from the major pottery centres, the greater the share of local production by regional potters, and the higher the proportion of hand-built ceramics, including tableware.

The economic development of the Przeworsk Culture communities was also closely linked to the demand for raw materials, with iron undoubtedly playing a central role. In fact, most Przeworsk settlements are notable for having on-site processing of this resource. Specialized production zones also emerged, where all stages of iron processing were carried out on an industrial scale. Of special importance were the Świętokrzyskie Mountains (Bielenin 1974; Orzechowski 2007, 2013), with their bloomery fields and rich iron ore deposits, exploited both through surface extraction and mining (Orzechowski, in this volume). Additionally, the Mazovia (Woyda 1977, 2002) (Woźniak, in this volume), Opole, and Brzeg (Madera 2002; Pazda 1994) (Madera, in this volume) hubs played significant roles as key points on the economic map of these communities.

The Przeworsk Culture thus became an exceptionally dynamic player in the Central European

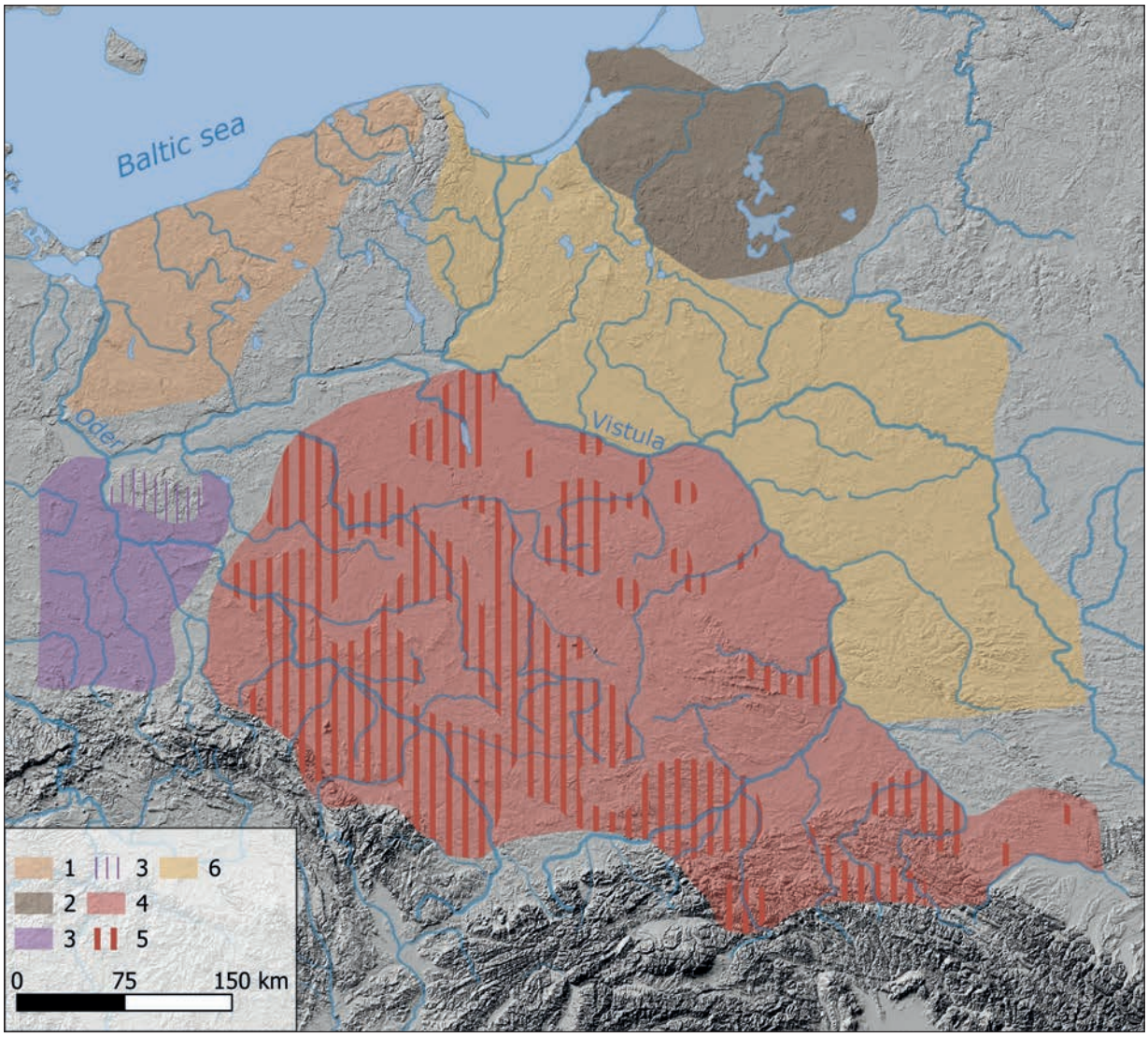


FIGURE 12. Cultural situation of Polish lands in the 3rd–4th century CE. Based on Kaczanowski, Kozłowski 1999. Legend: 1 – Dębczyn Group; 2 – West Baltic Circle; 3 – Luboszyce Culture; 4 – Przeworsk Culture; 5 – Area densely settled by Przeworsk Culture people 6 – Wielbark Culture, Cecelian phase

world, and it is unsurprising that local elites rivalled their neighbours in wealth. This is particularly evident in the presence of elite burials (so-called Zakrzów-type princely graves – Grempler 1888) which became a symbol of the shared Central European aristocratic fashion of the second half of the 3rd century CE. Popular fashion likewise did not deviate from the standards of the Central European world. This is evident in the forms of clothing components and ornaments, which resemble those from other regions of Germania Magna although the local population continued to favour iron products. Weapons and tools similarly reflect the shared civilisational framework and long-distance contacts of the tribes living beyond the *limes*. Changes in armament closely paralleled those occurring within the Roman Empire. The evolution of swords: lengthening and increasing in weight as well as the emergence of spearhead forms adapted to combat heavily armoured opponents, may serve as evidence of knowledge of the changing strategies and tactics of Roman forces. They also provide indirect evidence of service by members of local tribes in Roman auxiliary units. It is likely that some of the Roman coins found at archaeological

sites also originated from the pay of these mercenary soldiers.

Territorial changes of the Przeworsk Culture during this period are attributed to another attempt by the Goths and Gepids to penetrate the near-*limes* zone. In the early 3rd century, a significant part of the population of the Wielbark Culture left their previous settlements in Pomerania and northern Wielkopolska and moved towards northern Masovia, Podlasie, and Lublin region (Wołągiewicz 1981d, 85). The zone north and east of the Vistula underwent a cultural transformation from a "Przeworsk" to a "Wielbark" model and was ultimately incorporated into the sphere of the latter (Andrzejewski 1989). At its greatest extent, this cultural complex expanded through Volhynia and Podolia, reaching the middle Dnister and the upper Southern Boh, with associated material also identified along the Seim River. In the steppe zone, as a result of newcomers subordinating the local population, a new archaeological complex emerged, known as the Chernihiv (Sântana de Mureș) culture (Magomedov 2001; 2022). It represented a multiethnic amalgam of Gothic, Gothic-Dacian, Sarmatian, and Slavic elements and is identified with the region where the first historically attested Gothic polity (Oium) emerged (Strzelczyk 1984, 59–61).

In areas abandoned by the Wielbark Culture, a new archaeological grouping began to crystallize, drawing partly on its traditions while also incorporating influences from the Elbe cultural sphere. In the literature on the subject, this phenomenon has been termed the Dębczyno Group (Machajewki 1992; 1993). At the same time, parts of northern Wielkopolska (particularly the Gniezno Lakeland) were reabsorbed into the Przeworsk Culture, which strengthened its territorial presence in the region (Machajewski 2008, 121).

The Wielbark Culture of the so-called Cecel phase, like the Przeworsk Culture, became integrated into the Central European Late Roman stylistic horizon while simultaneously maintaining its own funerary traditions (Jaskanis, Okulicz 1981). In the case of the Wielbark Culture, cemeteries remained bi-ritual in nature. However, graves from the Cecele phase were more modestly furnished, both in terms of the quality and the quantity of grave goods. Late Roman crossbow brooches with a bent-back foot predominate in the assemblages. Iron fibulas – uncharacteristic of the Wielbark Culture but common in the Przeworsk Culture – also began to appear. Burnt ceramics, incinerated on the funeral pyre, are observable, which corresponds to funerary customs of the Przeworsk Culture. Despite a certain relaxation of the iron taboo, this metal still appears only rarely in the grave goods of Wielbark communities. The majority of funerary offerings continued to consist of objects made from non-ferrous metals, including precious materials (silver and gold). These accompanied primarily richly furnished barrow burials known as Rostołty-type mounds, named after the eponymous burial ground at Rostołty in Podlasie (Jaskanis 2012). The Rostołty barrows are associated with elite burials and form small burial sites, probably of a familial or lineage-based nature. They also contain imported objects produced in Roman workshops, including glass vessels and gaming pieces.

In the twilight of antiquity

The turn of the 3rd and 4th centuries was a time of more significant changes in Central Europe, where new trends developed in funerary traditions and, consequently, most likely in systems of values and religious beliefs. Such changes became clearly visible among the communities of the Przeworsk Culture, where a final break occurred with burial traditions originating from the period of that culture's formation. At that time, the traditional pit and urn graves disappeared together with long-functioning burial sites; some of them had been in continuous use since the 2nd century BC.

In its place appeared a funerary rite that is difficult to identify and at times virtually absent from the archaeological record. This phenomenon (reflected in a decline in the number of burial sites and, consequently, graves) has sometimes been interpreted as evidence of depopulation in the area of present-day Poland at the end of the Roman Period and during the Migration Period. However, there are traces of non-standard funerary practices expressed through a diversity of burial variants and forms. Most of these practices are generally associated with cremation. It may therefore be concluded that the phenomenon was of intercultural nature. Layered graves (Błażejewski, in this volume) that began to appear in Przeworsk settlement areas (Szydłowski 1977) are previously, from the 3rd century CE, prominent in the fore-Carpathian zone, associated with the development of Blažice-Bereg Culture (Olędzki 2020, 147, 148). A distinctive form that emerged during that period is the trench grave,

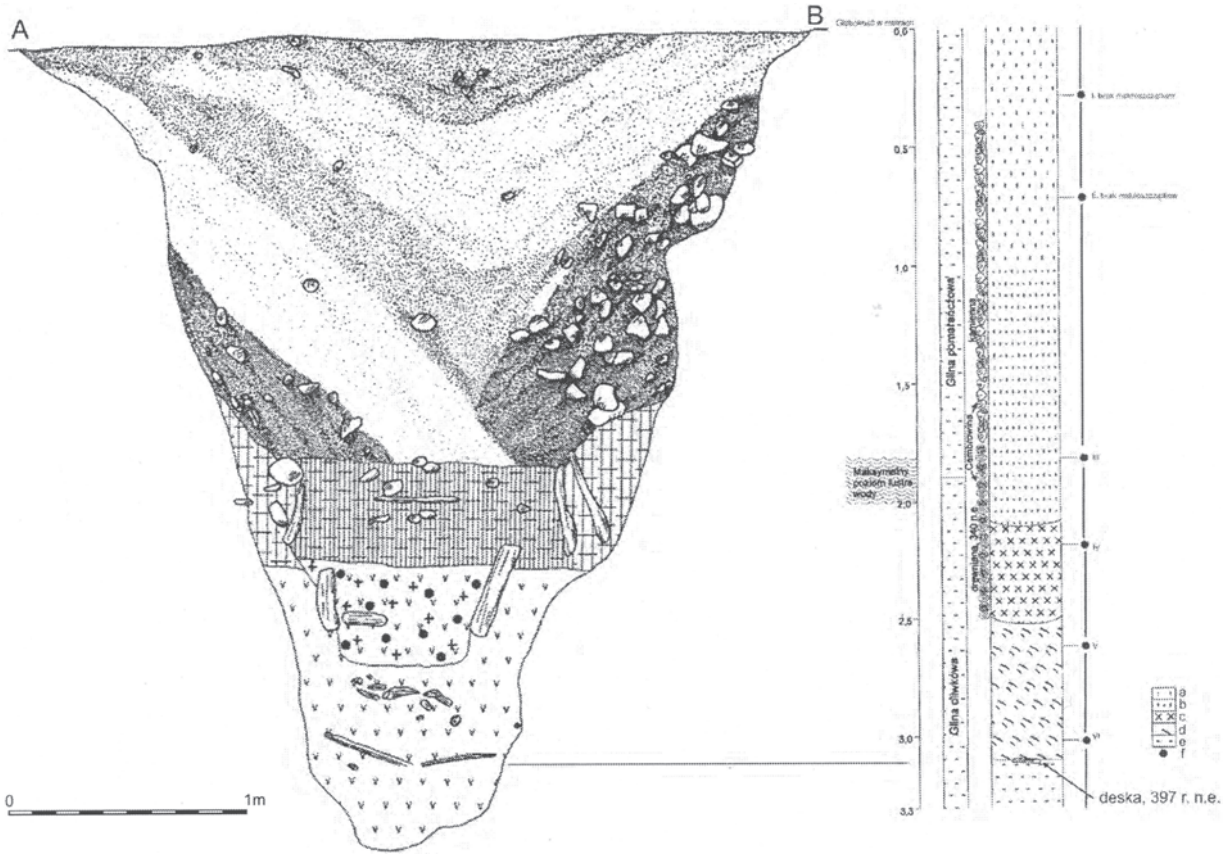


FIGURE 13. Konarzewo, Site 5. Well – extant 1535 – "well cemetery" of the Przeworsk Culture from a Przeworsk Culture settlement dated to the 3rd-5th centuries CE. After Makiewicz et al. 2008. Legend: a. mineral fill – humus soil, b. humus soil mixed with clay, c. cremation layer, d. layer of coarse detritus, e. calc clay, f. archaeobotanical sampling levels

clusters of which appear on the border of Silesia and Małopolska (Gedl 1984, 1985; Rodzińska-Nowak, Zagórska-Telega 2015), although a similar feature can be observed at the settlement in Konarzewo near Poznań (Makiewicz, Kaczor 2005). Some funerary features from this period are no longer confined to separate burial sites but have also been discovered in settlement areas. At the site of Konarzewo in Wielkopolska, a cremation "cemetery" was located in an old, disused well, which had been cleared and consecrated with a foundation offering of a goat and a roe deer (Makiewicz et al, 2008) (Fig. 13). The use of the well as a place for depositing human remains may be connected to its symbolic associations: both chthonic (linking it to the underworld) and aquatic, due to the presence of water in the well. This provides another indication of funerary practices of the period that (on a broader scale) may have been closely associated with bodies of water. It could help explain the appearance of a significant number of hoards interpreted as votive offerings, often found in riverbeds. This phenomenon may also offer insight into where the remains of the deceased were deposited – those who lived in the numerous settlements emerging at this time, which are particularly well attested in the regions of Wielkopolska and Lower Silesia (Michałowski 2003, 2011).

The increase in the number of settlements in this region in the second half of the 4th century CE may be connected with an outflow of population from Małopolska, which at that time may have fallen within the sphere of influence of the Hunnic polity, with one of its key centres probably located at the settlement in Jakuszowice (Godłowski 1991; Rodzińska-Nowak 2006) located near the grave of a Hun (?) nobleman (Żurowski 1921; Godłowski 1995). Unrest and a degree of uncertainty about the future, which led to the emergence of refugial settlements

in the region, such as the one investigated on Góra Birów (Muzofl 1994), may have prompted local communities to move to areas at a safer distance from zones of conflict. This may help explain the presence at Konarzewo in Wielkopolska of the trench grave, already mentioned above, characteristic of the Silesia –Małopolska borderlands, as well as the discovery of a Hunnic-type fibula at nearby Podłoziny (Makiewicz 2003; Kaczanowski, Rodzińska-Nowak 2012; 2013) (Fig. 14).

In the early Migration Period, from the second half of the 4th century CE, the Sösdala–Untersiebenrunn style (Forssander 1937; Kubitschek 1911) spread across vast regions of Europe, from Scandinavia through Central Europe to the southeast. It is distinguished by stamped ornamentation covering the entire surface of objects, most commonly applied to ceremonial horse harness fittings and belts. The decoration is arranged in star-shaped motifs, multicentric circles and semicircles, and filled with triangles, quadrilaterals, and dots. Also characteristic of this style is shallow incised ornamentation (including rosette motifs) and decoration using the niello technique. In this method, the engraved design in the metal was filled with a paste composed of silver, copper, and lead sulphides to produce a pattern that contrasted with the background. Most objects decorated in the Sösdala–Untersiebenrunn style were made of silver, sometimes gilded. Bronze inlaid with silver was used far less frequently, and gold only sporadically. These items were regarded as symbols of the owner's high social status (Fabech, Näsman 2017; Tejral 1997).

Under the influence of the Scandinavian Sösdala style, a local variant of stamped ornamentation developed within the West Baltic cultural sphere on the Sambia Peninsula – the so-called Sambian horizon (Bitner-Wróblewska 2001), represented by brooches with star-shaped and spatulate feet (Fig. 15). These forms also occurred at this time in the areas of the late Wielbark Culture and the Dębczyno Group. This indicates strong connections along the Baltic Sea coast between communities of different cultural spheres, as well as the growing importance of metallurgy within the western Baltic cultural complex (Kowalski 1991, 2000) in this region.

In the areas of the Wielbark Culture, stable settlement structures persisted until the second half of the 4th century CE. During this phase, their number decreased, although settlement continued across all the previously mentioned clusters

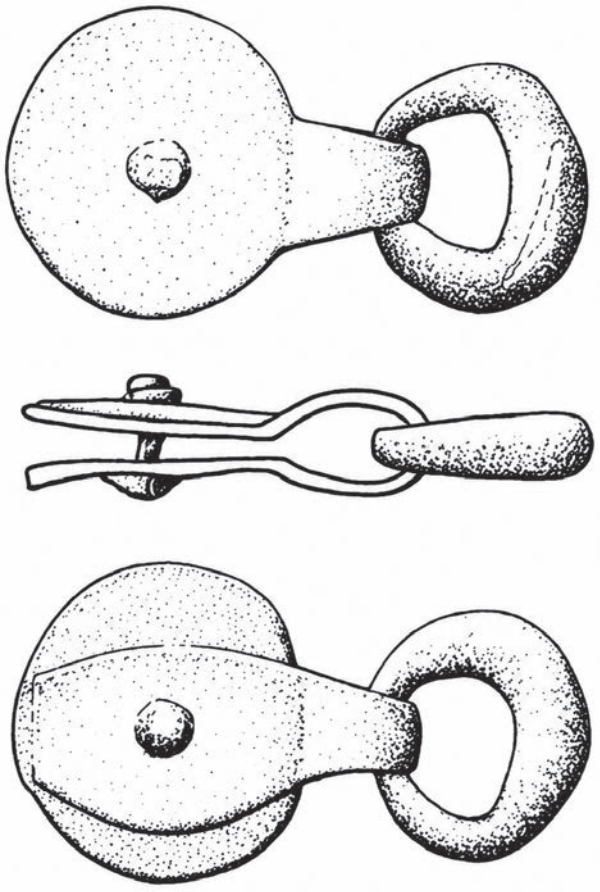


FIGURE 14. Podłoziny, Site 5. Hunnic-type belt mount from a Przeworsk Culture settlement. After Makiewicz 2003

characteristic of the Cecele phase, including the easternmost margins. The youngest assemblages may date to the early 5th century CE (Andrzejewski, Cieśliński 2007, 307, 308; Woźniak 2011; Jaskanis 2012, 245), a period when a radical depopulation of all Wielbark Culture territories became evident. In contrast, within the Przeworsk Culture zone, settlement continued across much of its territory into the Late Antique period, extending well into the 5th century CE and probably persisting into the 6th century CE (Abramek 1994, 1998, 2004; Makiewicz, Abramek 2004; Makiewicz 2005) until the emergence of a new style characteristic of the Early Medieval period, commonly referred to as Early Slavic.

The Iron Age, which concludes this study, did not in fact end in the 6th century CE, but has continued to the present in a broader sense. The chronological cut-off adopted here is associated with the disappearance, in the territory of present-day Poland,



FIGURE 15. Mirosław-Wybudowanie. Brooch with a spade-shaped stem. Photo by J. Rola

of communities in contact with the civilization of Late Antiquity. The new era, as in much of Europe, brought a new – unfortunately regressive – civilisational model associated with the formation of early medieval communities. In the territory of present-day Poland, this new era took the form of Slavic tribal traditions, which during the second phase of the Migration Period came to dominate vast areas of the continent (Leciejewicz 2007). The fall of the Roman Empire and the establishment of successor states within its former boundaries unfortunately set the continent back several centuries. A notable example of such changes is found in Lombard architecture in Italy, where long wooden houses, imported from the interior of the continent, were constructed within the ruins of older stone buildings. The Europe of this new Iron Age would long remain in the process of rediscovering its classical past. Periodic revivals would intermittently recall the glorious traditions of ancient civilization, which the realities of the feudal medieval social model would obscure for many centuries, carrying forward even into modern times within the framework of traditions shaped by that medieval order.

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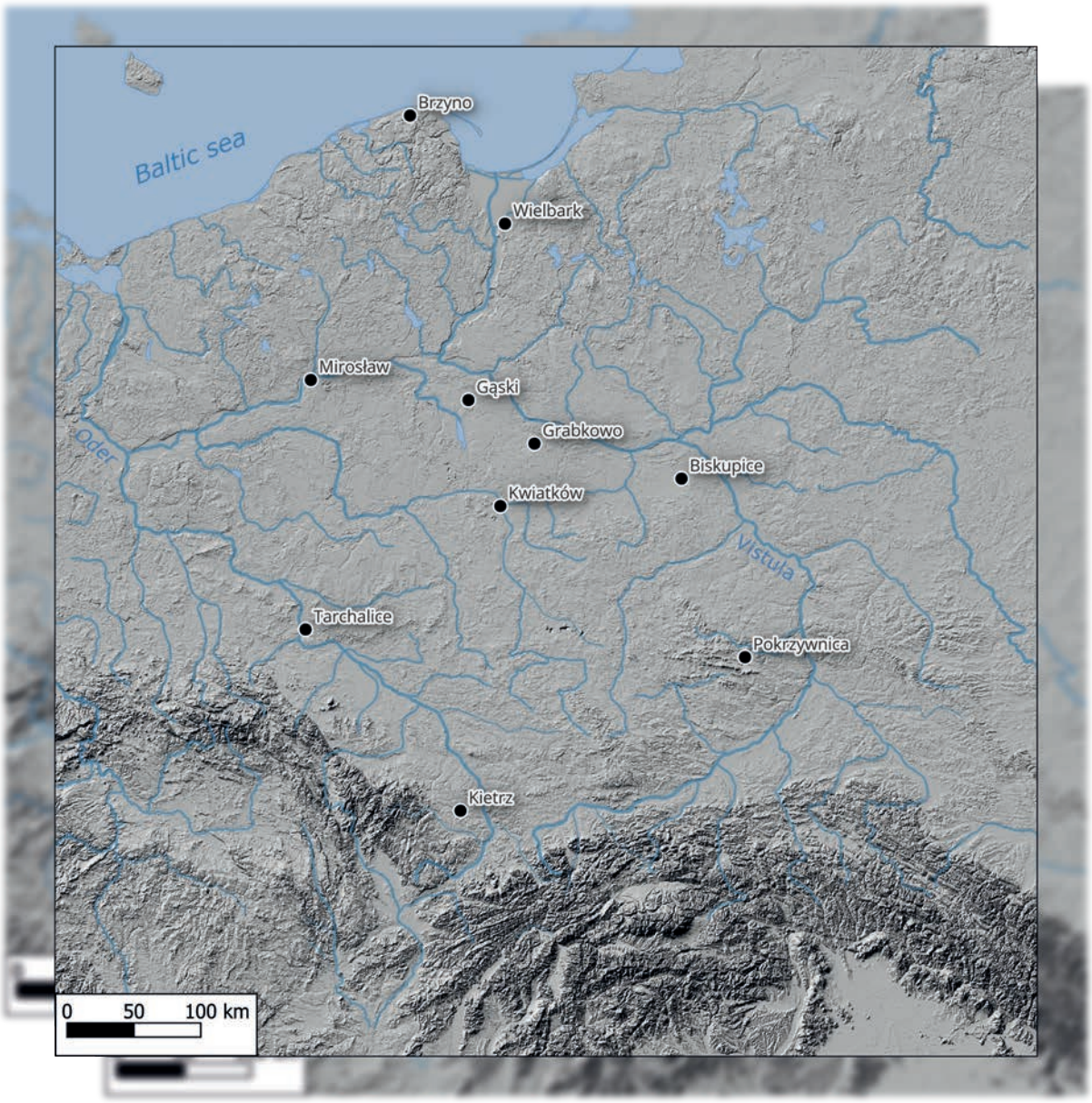
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LOCATION OF THE SELECTED PRE-ROMAN AND ROMAN IRON AGE SITES DESCRIBED IN THE FOLLOWING PAGES



GRABKOWO, SITE 7

Andrzej Michałowski

The settlement (Site 7: AZP 51-48/58), located in the village of Grabkowo, Kowal commune, Włocławek County, Kuyavian-Pomeranian Voivodeship, lies approximately 4 km southwest of the town of Kowal. The site was discovered in 2000 during surface surveys conducted prior to the construction of the A1 motorway at this location. Back then, the area of the site was estimated at 2–3 hectares, of which 200 ares lay within the impact zone of the planned motorway. Excavation work carried out from 30 October 2008 to 6 June 2009 were conducted by a team led by Artur Różański from the Institute of Archaeology of Adam Mickiewicz University in Poznań



FIGURE 1. The site at Grabkowo 7, Kowal commune, Kuyavian-Pomeranian Voivodeship during excavation. Photo by A. Różański

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(Fig. 1). During the course of the work, it was concluded that Site 7 and the nearby Site 8 in Grabkowo (investigated by Andrzej Bartczak and Piotr Mikulski) represent a single integrated settlement complex. However, for formal reasons their original numbering was retained, which is also used in studies of the materials originating from these sites.

The area of Site 7 is located on the slope of an elevation descending northward toward a former body of water. It lies within a zone of poor soils, less economically attractive than other parts of Kuyavia. This situation did not favour intensive and continuous settlement; nevertheless, a total of 390 archaeological features has been recorded at the site, and 12,378 fragments of pottery vessels have been identified.

Material from the Later Pre-Roman period represents nearly half of all finds, indicating intensive use of the site during the time in question. A the following settlement phases have been recorded: Globular Amphora Culture (GAC) – three features; Lusatian Culture – 15 features; Early Medieval period – 78 features; Modern period – four features total of 93 features is attributed to the dominant Pre-Roman period, along with a substantial portion of the 206 features lacking datable material, whose context (based on stratigraphic and chorological analysis) allowed for the identification of at least three phases of use. Therefore, the overlapping pits and economic features indicate long-term use of the area within a single stylistic and chronological phase attributable to the Pre-Roman period. The prevailing category of features consisted of pits with an area of 2–3 m^2, located mainly in the central and northern parts of the site.

Fieldwork included large-area excavations covering a total of 188 ares. Standard archaeological documentation methods were employed, including a measurement grid, drawing, and photography. Each feature was described and drawn in plan and section, and movable finds were recorded and inventoried. Chronological analysis was carried out on the basis of ceramic typology, stratigraphy, comparative stylistic analysis, and large-scale archaeometric studies.

Previous studies and scholarly publications (Michałowski, Różański, Wierzbicki 2012; Kaczor, Żółkiewski 2015; Woźniak et al. 2013) confirm that the Grabkowo Site 7 represents a key point

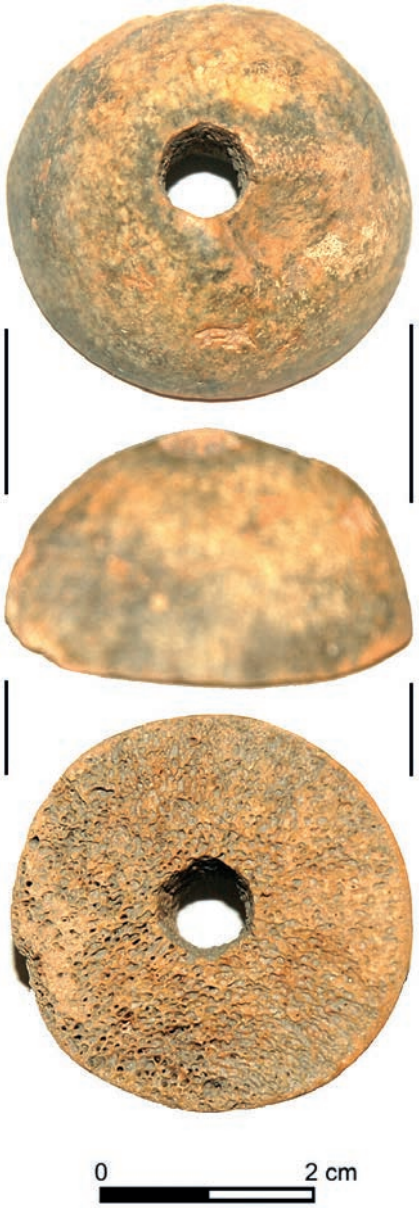


FIGURE 2. A semi-finished sword pommel (?) made from animal bone, as an example of the activity of a horn-working workshop. Photo by A. Michałowski

in research on the process of transformation of the civilizational model of Pre-Roman communities into the new, Latinized model of its younger phase. Site 7 at Grabkowo operated as the economic zone of a larger settlement complex, probably located in its immediate vicinity.

The dominant features are pits of a domestic and production nature, with an area of 2–3 m^2. This



FIGURE 3. Profile of Feature 8 – a pit containing a large quantity of osteological materials probbly resulting from the process of animal slaughter. Photo by A. Michałowski

function is evidenced by numerous workshop and economic features: pits, furnaces, horn-working workshops (Fig. 2), as well as so-called "butchering pits" containing large quantities of animal remains (Fig. 3) with traces of quartering. The ceramic assemblage, numerous and homogeneous, allows the settlement to be interpreted as a peripheral economic zone of a larger settlement of the broadly defined Pre-Roman horizon (Figs. 4, 5). Ceramic analysis has shown that vessels from Grabkowo are assemblages from the earlier and later phases of the Pre-Roman period (3rd–2nd centuries BCE) and are references to forms typical of the broadly defined Jastorf tradition, clear analogies of which have been found in the Jutland zone (Becker 1961).

The presence at Kuyavian sites of materials referring to assemblages that appeared in Denmark during the Pre-Roman period has been noted in literature on the subject (cf. Grygiel 2004, 22 ff.). This can also be observed regarding the artefact assemblage from the settlement at Grabkowo. The vessel forms from Grabkowo show a strong resemblance to assemblages dating from the end of Phase Ib and the beginning of Phase II according to C.J. Becker (1961, 4). In light of the most recent findings by J. Martens, the materials occurring here that refer to those of Becker's Phase IIIa, should be regarded as characteristic of the early Phase II in the broadly defined Jastorf zone. This results from the fact that, as summarized by Martens, Becker's Phase II became a kind of "phantom period" (Martens 1997, 121), while the ceramic forms that Becker associated with Phase IIIa occur widely in assemblages including those with Holstein pins, which serve as indicators of the beginnings of the La Tène–influenced Stage II (cf. Martens 1997, 128). Therefore, the ceramics

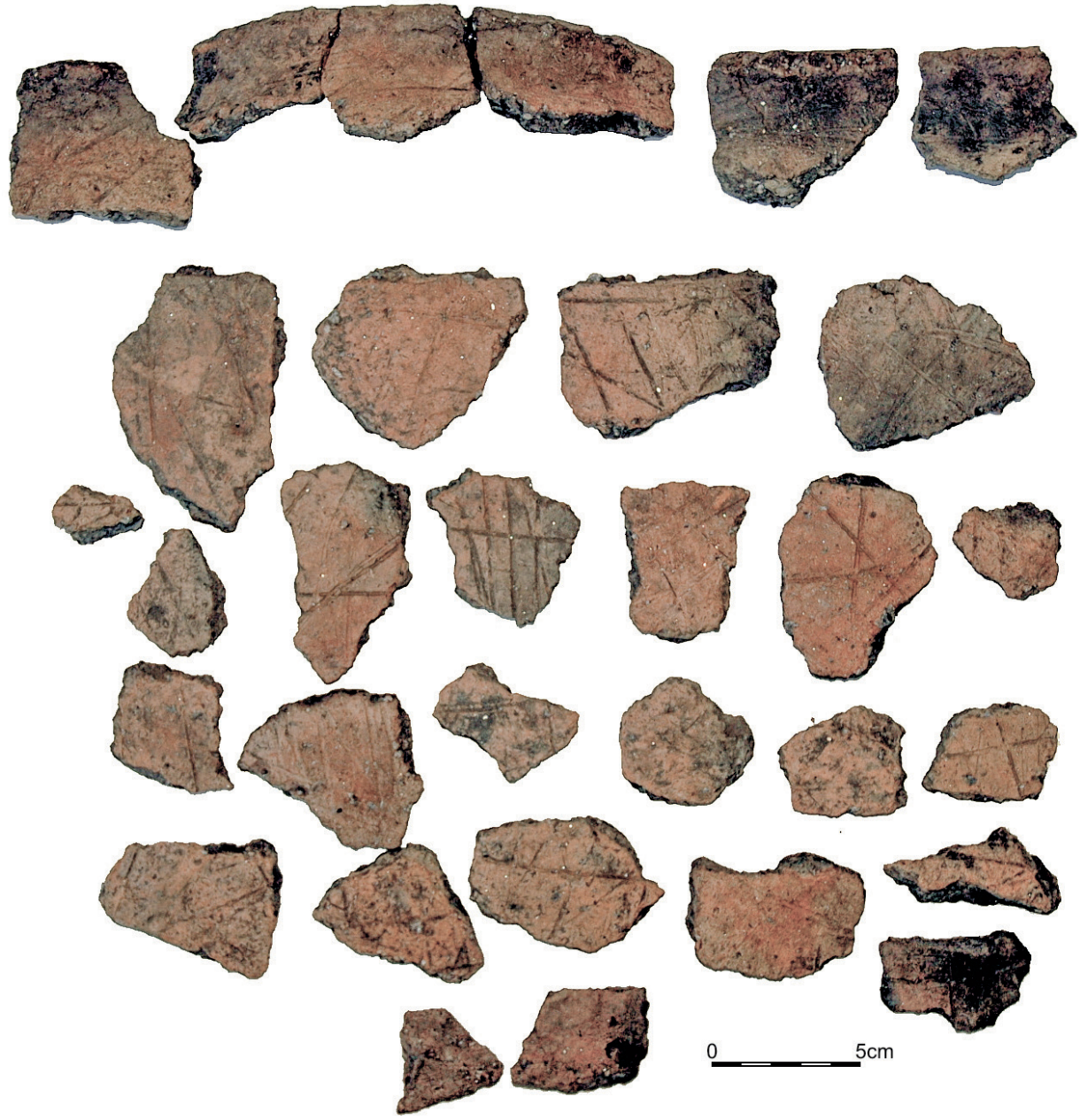


FIGURE 4. Remains of a pot from Feature 8. The vessel, with a distinct neck, is covered with ornamentation of incised lines forming an irregular network, stylistically reminiscent of finds from the Jutland region (Denmark). Photo by A. Michałowski

from Grabkowo display a style attributed to the transition from the end of Phase I (non–La Tène–influenced, connected with the stylistic traits of the Early Pre-Roman period, which may here be defined as referring to Stage Ic – cf. Seyer 1982, 21, fig. 2) to the La Tène-influenced Phase II, associated with the Late Pre-Roman period. Consequently, this ceramic assemblage has become an excellent testing ground for archaeometric ceramic research.

As part of the first stage of archaeometric research, a chemical composition analysis was conducted on 100 vessel fragments from Grabkowo Sites 7 and 8. Of these, 70 originated from Site 8 and 30 from Site 7. Unlike the situation at Site 7, the presence of settlement from the Przeworsk



FIGURE 5. Preserved part of a cup from Feature 91. Photo by A. Michałowski

Culture dated back to the Late Pre-Roman period was identified on Site 8 (cf. Kaczor et al. 2017).

In the research, a Bruker Tracer III SD handheld X-ray fluorescence (XRF) spectrometer was employed, which enables non-destructive analysis of elemental composition (Al, Si, Fe, K, Ca, P, Ti, S, Mn, Cu, Zn, Zr, etc.). Statistical analyses (tests of normality, Spearman rank correlations, cluster analysis, and factor analysis) were carried out to identify technological differences and sources of raw materials. Comparing the results from both sites made it possible to assess the degree of relatedness between pottery traditions. The ceramics from Grabkowo Site 7 were uniform with respect to their chemical composition. Their high degree of homogeneity may be an indication of the use of local clay deposits with similar chemical compositions and a uniform production tradition.

In contrast, the samples from Grabkowo 8 revealed two clearly distinct chemical groups, showing pronounced differentiation. One of these corresponded to the materials from Site 7, while the other was recorded exclusively in the materials from Site 8 (Fig. 6).

Multivariate analyses (CA, FA) made it possible to distinguish a group of samples corresponding to an older pottery tradition, concentrated in the upper and middle parts of the scatter plot, whereas the later material (probably referring to the Przeworsk Culture cycle, represented exclusively within Site 8) formed a separate cluster in the lower range of microcomponent values (Michałowski et al. 2020). The chemical analyses thus confirmed the identification of the materials previously obtained through archaeological methods.

The results of these studies became the basis for further interdisciplinary analyses, including subsequent stages of archaeometric research carried out within the framework of the NCN OPUS 8 project *Past Closed in Clay. Geochemico-archaeological indicators of Wielkopolska pottery from the younger Pre-Roman Iron Age as a source for understanding the cultural diversity of the age* (UMO-2014/15/B/HS3/02279). This led to the inclusion of the Grabkowo site in a comparative analysis of a series of sites dated to the Pre-Roman period from the Wielkopolska-Kuyavia Lowland zone. Archaeometric analyses conducted in this context and on much larger sample sets confirmed the chemical homogeneity of the local ceramic fabrics and their shared raw material sources (Jasiewicz et al. 2021).

The settlement at Grabkowo Site 7 is of key importance for understanding the cultural processes at the transition between the Early and Late Pre-Roman period, both locally in Kuyavia and in a broader chorological perspective. Research

has shown that part of the ceramic material from this site is representative of the traditions of Central European communities at the turn of the Early and Late Pre-Roman period. This is an excellent illustration of the contemporary processes of adaptation and the transmission of technological traditions in the world of the Central European Lowlands. They show connections with the regions of Jutland, Schleswig-Holstein, and Brandenburg. Importantly, we are also dealing with elements that are clearly identifiable in assemblages of the Poieneşti-Lukaševka Culture. This group is thought to have emerged in the borderlands of present-day Moldova, Romania, and Ukraine following the migration of communities originating from the broadly defined Baltic zone (see Babeş 1993). This phenomenon may be linked to the pan-European mobility of Germanic peoples during the Middle La Tène period, including, most likely, the migrations of the Bastarnae and the Skiri, which may have influenced the formation of local settlement groups along their migration routes. The discoveries made here make a significant contribution to the study of cultural processes in Central Europe at that time. Grabkowo Site 7 serves as an important reference point for future research on settlement and technological transformations in the Pre-Roman period in the Wielkopolska-Kuyavia Lowland and in central Poland – an exceptionally interesting example of clearly visible changes in the civilizational model at the end of the 3rd and 2nd centuries BCE, as reflected in settlement finds.



FIGURE 6. The ED-XRF (energy dispersion X-ray fluorescence) Bruker Tracer III SD spectrometer used in the non-destructive tests performed on the pottery. Photo by A. Michałowski

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BRZYNO, SITE 7

Anna Strobin

The Żarnowiec Heights, located in the northern part of Gdańsk Pomerania, is one of the areas relatively poorly investigated archaeologically. Most information about sites dating to the Late Pre-Roman and Roman periods, as well as very few from the Migration period, comes from before World War II. The data mainly concern accidental finds, about which information, scattered in literature and archives, information is brief and often devoid of illustrative material. There is also no publication to date of the results of archaeological work preceding the construction of the "Żarnowiec Nuclear Power Plant" in the 1980s.

Archaeological site No. 7 in Brzyno (Puck District, Pomeranian Voivodeship) is located near the shores of Lake Żarnowieckie (Fig. 1), through which flows, into the Baltic Sea, the Piaśnica River (Kondracki 2009, 58–59, fig. 9). The first news about this place, which before World War II administratively belonged to the village of Prüssau, Kr. Lauenburg, was recorded in 1936. It concerned information on more than 50 finds (Kunkel 1936, 22–23 n., 92), including the alleged grave described by Hans Jürgen Eggers and discovered in a "stone mound" (Strobin, Machajewski 2017, 550, fig. 1; Strobin 2021a, 10–11, fig. 5). The relics documented by this researcher, now lost, included elements of weaponry (two swords and two spearheads), a large bead made of amber, and skeletal bones. H. J. Eggers' suggested dating of the aforementioned finds to the Later Roman period or the Migration period should be accepted with great caution. There are also doubts whether the illustrated relics formed the furnishings of only one grave.

In 2008, the site was located again during surface surveys, while excavations were carried out there in 2011–2016 (Strobin 2013; 2014; 2016a; 2016b; 2021a; 2021b; Strobin, Machajewski 2017; Strobin, Molęda 2013; Strobin, Strobin 2018; 2020; 2022). Their result was the examination of a part of the site and the discovery of almost 300 features dating from various periods of prehistory and the early Middle Ages. The most numerous were graves from the Later Pre-Roman and Roman periods, as well as from the Migration period, which became the basis of a monographic study (Strobin 2021a). The published work presents the characteristics of archaeological materials and their morphological-typological, as well as chronological-cultural analysis. It is supplemented by appendices devoted to: bone materials from the graves (Rożnowski et al. 2021), botanical remains of trees and shrubs found in the graves (Michniewicz 2021), raw material and technological analysis of finds made of copper and silver alloys (J. Strobin 2021), and textile materials (Antosik 2021).

The most numerous group of features discovered at the site are the cremation graves of the Oksywie Culture (161 graves in total). About 30% of them have been significantly destroyed, due to modern farming. The remaining graves represent both pit and ash burials, most often with the remains of a pyre; some of them were marked on the surface with single or several stones (Strobin 2021a, 127, table 2). Results of anthracological studies of charcoal found in grave pits show that the primary fuel in 90% of the graves was the wood of birch – *Betula* (Michniewicz 2021, table 1). Anthropological analysis of burned human bones indicated that single graves predominated, usually containing the remains of adults of both sexes (Rożnowski et al. 2021, 160–161, table 1).

Of particular importance for the study of the Later Pre-Roman period are the analyses of the artefacts found in Brzyno (Strobin 2021a, 93–126). It was noted that iron brooches of Type 65 according to Almgren (1923, Pl. IV:65) and of type J according

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FIGURE 1. Brzyno, Puck County, Site 7. View to the site and Żarnowieckie Lake from S. Photo by A. Palej

to J. Kostrzewski (1919, 31–32, fig. 16, supp. 10) may have been produced locally due to the raw material used. The documented variation of *geschweifte* type brooches (especially Type N) is also important. The observed variability of their forms is crucial for chronological determinations of the end of the Pre-Roman period and the beginning of the Roman period.

Also noteworthy is the significant number of graves discovered in Brzyno containing armaments – a total of 20 graves (Strobin 2016a; 2021a, 112–117). Their analysis proved not only the local origin of the weapons, but also the presence of scabbarded double-edged swords imported from the La Tène Culture and weapons inspired by armaments from other areas of *Germania magna* (Fig. 2). In the case of the latter sites, based on a double-edged sword ending in a triangular, flattened hilt, and iron scabbard fittings made of organic materials (Figs. 2:1–3), the links of the communities of the Oksywie Culture to the areas of central Germany and Jutland during the A3 phase were proven. With regard to the spiked umbo (Type 7 according to D. Bohnsack 1938, 58, fig. 36, supp. 38), it has been noted that the way the spike is embedded in the shield's boss may be a manufacturing feature (Fig. 2:4), rather than a trace of repair (Strobin 2016a, 119–120, fig. 7:4; Strobin 2021a, 115, pl. XX:4). Similar structural solutions, known from Central German cemeteries, may confirm workshop connections with Germanic weaponry. Evidence of supra-regional contacts with Central German sites can be found in the imported and repaired barbed belt hook (Type A of Voight 1960, 235–236, pl. 48:b.d.e; cf. Strobin 2021a, 40, pl. LI; Strobin, Strobin 2022).

The result of the research at Site 7 in Brzyno is the determination that the oldest graves of the people of the Oksywie Culture are from the A2 phase; the younger ones, associated with the A3 phase, are definitely more numerous. The latest burials of this culture are dated to the A3/B1 stylistic phase, understood as the beginning of the Early Roman period (Strobin 2021a, 135–137, table 3). The presence of the latter graves in the Brzyno necropolis confirms the longer survival of the Pre-Roman tradition in this part of Pomerania, and also points to the participation of the indigenous (Oksywie) community in the formation of a new culture – the Wielbark Culture.



More than 60 graves of the Wielbark Culture were discovered, with 59 being inhumation graves (Strobin 2021a, table 2). The grave pits were oriented on the N-S axis, with occasional records of those on the E-W line. It was observed that the deceased were usually placed in log coffins, as well as in boats (dugout canoes). The increasing recorded presence of the latter in the funerary rites of the Wielbark Culture, confirms the links with Scandinavia (cf. Natuniewicz-Sekuła, Rein Seehusen 2010), but also shows that the use of such a coffin form may have been more common in the Wielbark Culture than previously thought. The coffins at the Brzyno site, as shown by archaeobotanical studies, were made of either oak (*Quercus petraea*) or birch (*Betula pendula*) (Michniewicz 2021, table 2). The state of preservation of the human bones was exceptionally poor; 66% of the graves contained no bone fragments at all, and in the remaining cases only small fragments were preserved (Rożnowski et al. 2021, 161, table 1). Next to metal relics from inhumation graves, remnants of wool and linen fabrics were preserved (Antosik 2021, table 3). The equipment of the graves of the Wielbark Culture consisted mainly of parts of costume and ornaments (Fig. 3), as well as spindle whorls.

The typological and chronological analyses of the finds proved the functioning of the necropolises of this culture from phase B1 to phase C1 (Strobin 2021a, 137–138, table 3). The nature of the Roman period grave furnishings in the Brzyno cemetery, although rich, did not differ from the materials known from other sites of the Wielbark Culture of the Lubowidz phase.

Of exceptional importance for understanding the cultural situation in the southern Baltic coastal zone are finds from the Migration period. They are represented by seven well-dated inhumation graves, the pits of which are oriented on the N-S axis (Strobin 2021a, 138, table 3). The artefacts found in the graves are unique and represent, above all, pins (Fig. 4), including those topped with bird's heads, a garment fastening clasp hook, and glass and amber beads (Strobin, Machajewski 2017; Strobin 2021a, 138, table 3). Stylistic-chorological analysis of the relics found in the burials, dated to the second half of the fifth century and the beginning of the sixth century, revealed links to northern

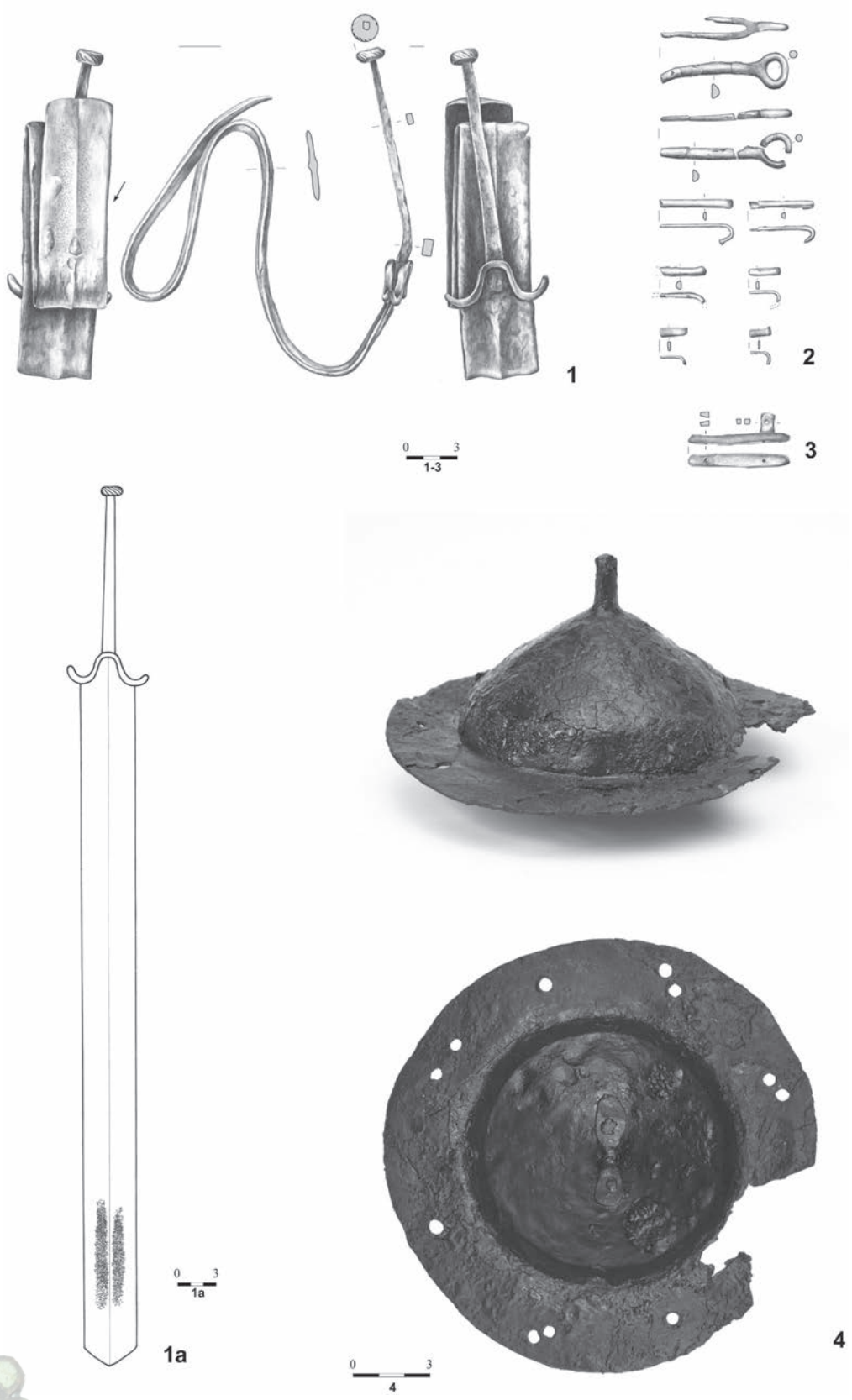


FIGURE 2. Weapons from cremation grave (feature 19): 1–3 sword and sword scabbard components; 4 shield boss. Drawn by K. Odya. Photo by J. Strobin



FIGURE 3. Inventory (brooches, bracelets, a bead and a nugget of amber) of an inhumation grave of the Wielbark Culture (feature 96). Photo by J. Strobin

Europe. Similar, cemeteries known from the area between Łupawa and Łeba, as well as a recently discovered necropolis in the Bytów Lake District, illustrate the next stage of contact between the communities of Eastern Pomerania and the northern Baltic coast, already after the disappearance of the Wielbark Culture. It can be assumed that the newcomers from Scandinavia formed small groups, and their presence in the area was relatively short.

The results of metal analysis of copper alloy finds from three chronological periods (Late Pre-Roman period, Roman period, Migration period) are extremely interesting. It has been established that the artefacts were made of bronze (copper-tin alloy) and brass (copper-zinc alloy supplemented with small additions of tin and lead) (A. Strobin, J. Strobin 2020; J. Strobin 2021). In the younger Pre-Roman period, parts of the attire were made of bronze, a copper alloy with the addition of several percent of tin. This raw material was suitable for casting as well as forging. Since the Roman period, however, brass with the addition of zinc (up to 20%) became widespread. It was a plastic material with a golden colour (imitating gold). Its spread was associated with a technological change, consisting in the ability to melt zinc (calamine) with copper in a reducing atmosphere. This raw material was imported from the territories of the Empire to the barbarian lands in the form of finished products. From the 2nd century AD, mass production of local designs is already recognised. These relatively homogeneous alloys began to be supplemented with additions of tin and lead. The production of brass ornaments dominated until the end of antiquity. From the 5th century, tin and multi-component bronze alloys were used again. This was caused by the political and economic turmoil that occurred in central Europe after the fall of the Roman Empire, and thus limited the supply of raw materials.

Thanks to the study of technology and archaeological sources, the restoration of the ancient technique of attire making and ornament production was possible (A. Strobin, J. Strobin 2018). Originally, small decorative elements were cast using the method of melted models (lost-wax technique), over time the production methods of duplicating the pattern with the help of models became more popular, this also resulted from the prevailing fashion, the use of pairs of the same brooches and expanded numbers of belt elements. In addition, metal analysis of individual silver ornaments was carried out. They were made in the filigree and granulation technique, fashionable



FIGURE 4. Inventories of inhumation graves from the Migration Period: 1 – necklace of glass and amber beads and pin with bird's head (feature 8A); 2 – pin with rhomboid head and pin with bird's head (feature 20). Photo by J. Strobin

in antiquity. These ornaments were made of high quality silver (95–97%), in the original diffusion technique of soldering details with minerals (copper salts) in a reducing atmosphere. Traces of unique decorating techniques, consisting of covering copper alloy objects with silver, gilded, pressed soldered plates using tin-lead binder, have also been found. The foils themselves were additionally decorated with embossed patterns, imitating filigree and granulation. Such forms give the impression of gold and silver ornaments.

Although the Brzyno site has not yet been fully investigated, the results so far confirm the high level of material and spiritual culture of the communities buried there. The revealed trans-regional contacts indicate the exceptional importance of the site, not only in the context of the Żarnowiec Heights, but also in the whole of Barbarian Europe.

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GĄSKI, SITE 18

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Modern-day Gąski is a small agricultural village located in the Kuyavian-Pomeranian Voivodeship (Inowrocław county, Gniewkowo commune), approximately 20 km north-east of the town of Inowrocław. In the surrounding Gąski-Ostrów marshlands, on a slightly elevated area, artefacts had been discovered by local people as early as the 19th century, suggesting the existence of an archaeological site (Zielonka 1970, 194). The first systematic field surveys were carried out in the region in 1972, resulting in the first proper identification of the prehistoric site at Gąski, that shortly after, in 1973, was added to the region's published list of archaeological sites as "Gąski, Site 18" (Cofta-Broniewska 1993, 201).

Properly supervised excavations, led by the Kuyavia Research Team of the Faculty of Archaeology of Adam Mickiewicz University (UAM), started in 1984 and were continued until 1991. These activities, across a contiguous area of 1,300 m^2, resulted in the discovery of archaeological features that had remained almost undisturbed, although located on an arable field. Excavations eventually unearthed remains from the Neolithic period, the Early Bronze Age (sparse and residual finds only), the Pre-Roman and Roman Iron Age, and the Early Middle Ages. However, the results of subsequent field work, conducted until 2020, suggest that the total area of the site is larger than originally estimated. In fact, the excavations of the 1980s and early 1990s seem to have covered only a small part of the site.

This assumption is supported by the results of field walking surveys, artefact distribution maps and trial trenches, all undertaken in the 1990s, and covering a larger area on both sides of the road leading from Gąski to the neighbouring village of Wierzbiczany. Further support for assuming a much larger extent of the prehistoric site is provided by observations on aerial photographs, as well as another surface prospection for the AZP (Polish Archaeological Record), carried out in 2006. Currently, the estimated maximum area of the site stands at approximately 120,000 m^2, based on the spatial distribution of surface finds produced by prospection with a metal detector, conducted between 2008 and 2020 (Fig. 1). These finds include over 1,000 items dated to the Iron Age, as well as over 250 Roman coins. Despite these impressive figures, it must be assumed that the finds represent an impoverished sample, because the site is regularly and illegally searched and looted by metal detectorists.

Despite the long phase of prehistoric habitation at Gąski, the most comprehensive archaeological remains at the site are related to the people of the Przeworsk Culture. The location was likely chosen by the latter for its favourable environmental conditions, such as its proximity to the tributaries of the Vistula River, the presence of fertile black soils and the availability of raw materials, like clay deposits and bog ores (Danielewski 2016, 91, 97). Moreover, it was also a region where communication and exchange routes criss-crossed, often attributed to the so-called "Amber Road" (Wielowiejski 1980; Błażejewski 2012).

The first appearance of the Przeworsk Culture at Gąski is related to the cemetery that was established there by its people, and covered an area of c. 800 m^2 (Cofta-Broniewska 1993, 201). The archaeological finds indicate that its earliest phase can be dated to as early as the second half of the 2nd century BC, and that the cemetery fulfilled its function until the second half of the 1st century AD. Most of the graves were located deeply under the modern terrain surface, undisturbed

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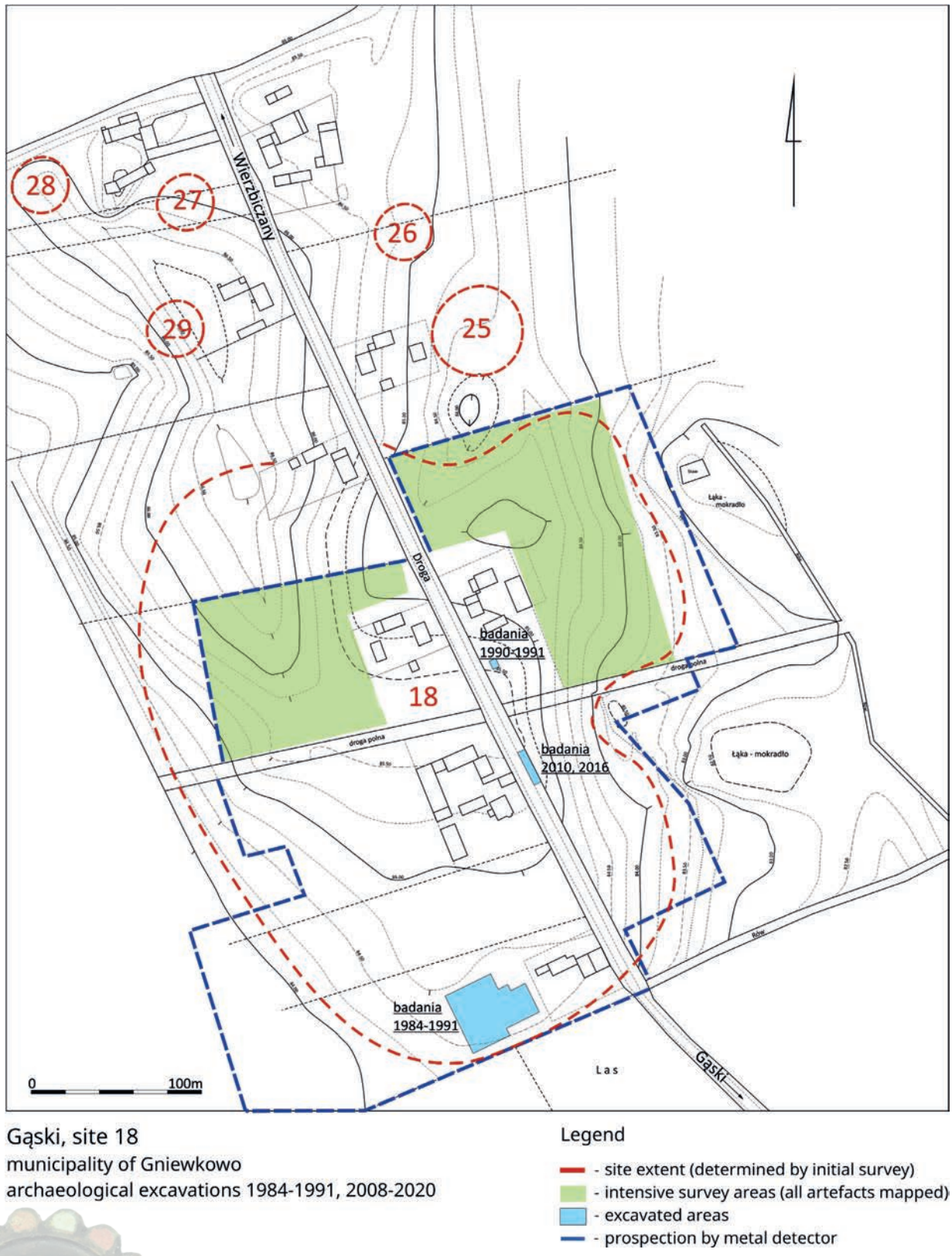


FIGURE 1. Plan of archaeological excavations and field surveys conducted at Gąski, Site 18 and in its close vicinity. Drawn by J. Bednarczyk

by modern land use and thus preserving not only their contents but also the spatial layout and stratigraphy of the cemetery. The diversity of evidence for funeral practices, observed and recorded by the excavators, includes the presence of a presumably religious or ceremonial building, located on a knoll, towards which the spatial arrangement of the cemetery was apparently orientated (Cofta-Broniewska 1993, 210).

At Gąski, the "biritualism" of cremations and inhumation graves, typical of the Przeworsk Culture in Kuyavia, is particularly well-visible. Out of all the Przeworsk Culture inhumation graves excavated across the entire Kuyavian region, most come from this site. Moreover, Gąski has the highest proportion of child burials among all known Przeworsk Culture cemeteries. Some graves were accompanied by bone clusters (containing remains of several individuals, mostly children), "symbolic graves" (with remains of grave constructions, grave goods, and animal remains, but lacking human remains), and shallowly-located single vessels, mostly cups (Cofta-Broniewska 1993, 204). The deceased buried in the necropolis at Gąski were equipped with everyday objects, metal clothing accessories (fibulae, belt buckles), tools (needles, knives, spindle whorls, whetstones) and pottery. A distinct lack of ornaments and luxury products is noticeable, however, a few graves are distinguished by the presence of weaponry (swords, spear heads and fragments of shields). Animal bones of various domestic species, including birds, were also found in some of the graves.

Around the end of the 3rd or the beginning of the 4th century AD, the people of the Przeworsk Culture also founded a settlement at Gąski. Owing to the cross-cultural contacts maintained by its inhabitants, it grew into an important centre within the Kuyavian region, until its abandonment at the beginning of the 5th century AD. The recorded remains of its buildings allow us to distinguish between residential and commercial areas (Cofta-Broniewska 1993, 220, 222). The first consisted of several houses, while the second included pits and of post-holes. Objects of material culture discovered in the remains of the residential buildings provided a wealth of information about various aspects of the Przeworsk people's everyday lives. Finds of imported glassware, Roman coins and terra sigillata indicate their well-developed long-distance contacts. Of particular interest in this context is a house, located in the central part of the settlement, that possibly belonged to a wealthy merchant family (Cofta-Broniewska 1999, 165–166). The finds unearthed during its excavation provide strong evidence that the building's inhabitants enjoyed high socio-economic status. Among the finds were items made of amber and metal, fragments of imported glass vessels, luxurious Roman pottery, and right next to its western corner, a deposit of 140 Roman *denarii*. Dating from the 2nd to the 3rd centuries AD, the coins had been hidden in the corner of one room and eventually deposited at the end of the 4th or even the beginning of the 5th century AD (Balbuza et al. 2025).

Other items of interest include numerous finds of amber (raw material, lumps, shavings, semi-finished products and beads) recorded in the settlement (Suchowska-Ducke et al. 2025, Fig. 2). Their concentrations within some of the houses suggest that there were at least three amber workshops in the settlement. Systematic surface prospection and trial trenches, carried out from 1990 to 1991, increased the number of amber items recovered from Gąski further, and led to the identification of yet another amber processing workshop, approximately 250 metres north-east of the excavated area (Cofta-Broniewska 1993, 166). Among the amber artefacts, fragments of pottery and metal objects, a glass bead, two silver Roman *denarii* (of Trajan and Faustina the Younger) and a bronze *sestertium* of Antoninus Pius were found in the remains of the fourth workshop.

The Gąski settlement also included a pottery workshop, where good-quality, wheel-made ceramic vessels were produced, as well as a metalsmith's workshop, where bronze and iron were worked, as evidenced by the finds of alloys, semi-finished metal products, decorative items, a jewellery hammer, smelting furnaces and numerous remains of slag (Cofta-Broniewska, Kośko 2002, 122, 152).

Over the years, the artefacts acquired from archaeological excavations and field surveys at Gąski have been subjected to various specialized examinations (anthropological, odontological, archaeozoological, metallurgical, numismatical, etc.). However, neither the full analytical results nor a complete monograph about prehistoric Gąski have ever been published. Therefore, a project was launched at the Faculty of Archaeology UAM recently that aims to provide more comprehensive

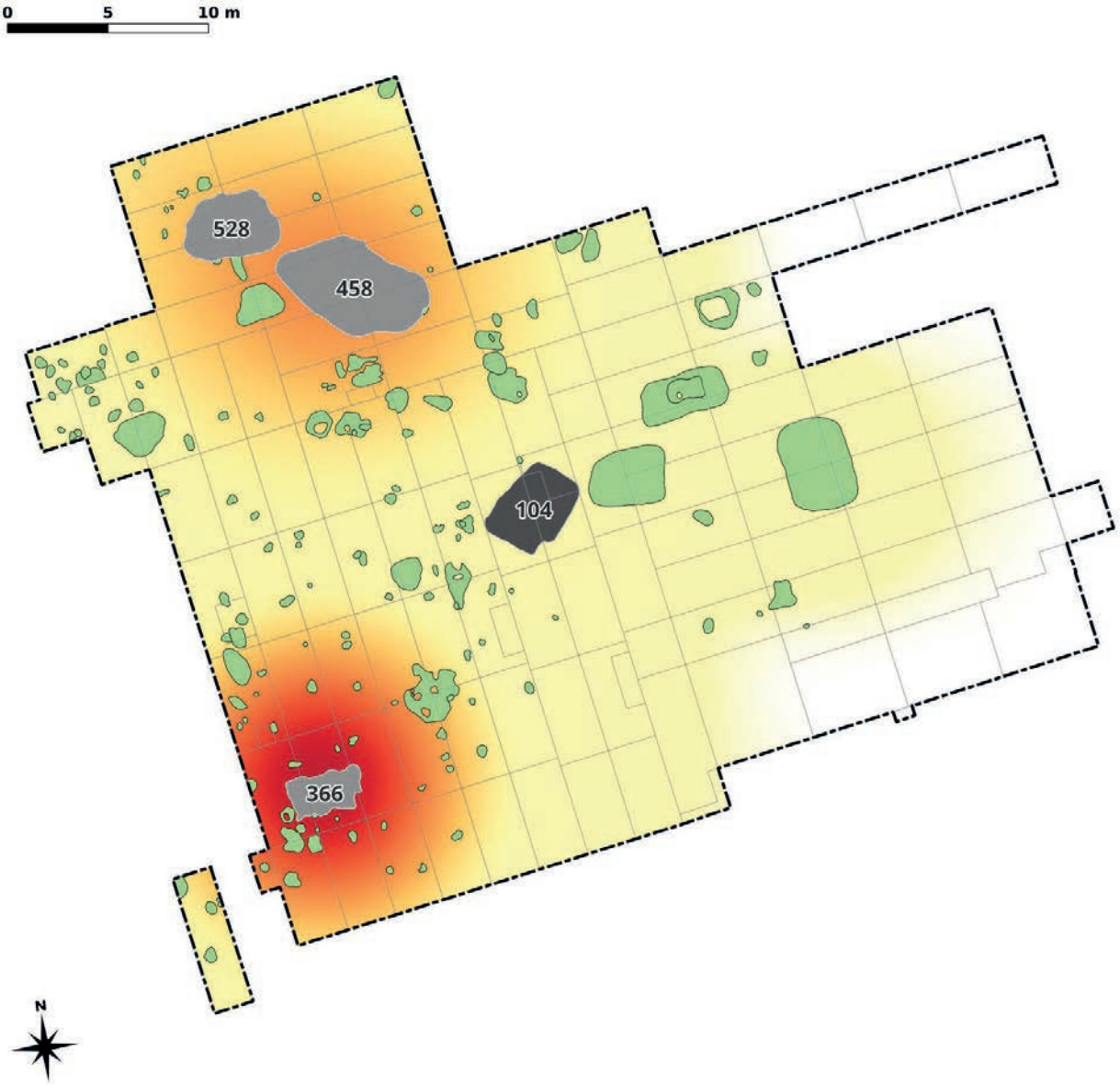


FIGURE 2. Przeworsk Culture settlement at Gąski, Site 18. Kernel Density Estimation (KDE/radius = 10 m) of amber artefacts. Elab. by B. Ducke

information about the site, add missing analyses, and (motivated by the latest advances in scientific methods) re-analyse artefacts, skeletal remains, and other finds of the Przeworsk Culture phase at Gąski.

Most recently, preliminary anthropological and odontological analyses have revealed pathological changes in several individuals, such as spinal degeneration, healed injuries, inflammatory bone defects, tooth decay and tartar, tooth and bone tissue loses (Cofta-Broniewska 1993, 209). The skeletal remains of one woman showed pathological changes that suggest she might have suffered from leprosy. Indeed, the majority of skeletal remains from Gąski (Fig. 3) are in a very good state of preservation, allowing retrieval of a significant number of samples for archaeogenetic studies. Initial aDNA analyses of 25 individuals indicated a very good degree of preservation of human genetic material, on average 67% of endogenous aDNA in individual samples (Danielewska-Teska, Stolpiak, Talarczyk-Andrałojć 2025, 79). Therefore, it was possible to determine the sex of 24 individuals



FIGURE 3. Skeletal burials at the cemetery in Gąski, Site 18. Archive of Aleksandra Cofta-Broniewska, Faculty of Archaeology UAM

buried in the Gąski cemetery: 11 skeletons belonged to men and 13 to women. Importantly, the genetic sex was also determined for two juvenile individuals with poorly preserved bone remains, for which earlier anthropological analysis were inconclusive. Remains of two individuals marked as *Infans I* turned out to be a girl, and *Infans II* – a boy. Furthermore, for as many as 24 individuals, it was possible to obtain the amount of DNA that qualifies them for further research, for instance allowing intra-population analyses and reconstruction of a full genetic picture of the Gąski population. Preliminary results also raised hopes for using the remains in metagenomic studies on bacterial flora associated with diet and diseases characterizing this population. These results will supplement the existing archaeozoological analyses, which indicate that cattle was the primary source of food (70%) for the Przeworsk people at Gąski, followed by pig (over 20%) and sheep/goat (less then 10%; Cofta-Broniewska 1993, 220).

The deposit of Roman coins from the merchant's house has also been re-examined recently, revealing silver *denarii* minted during the reigns of emperors Antoninus Pius (138–161 AD), Marcus Aurelius (161–180 AD), Commodus (180–192 AD) and Septimius Severus (193–211 AD), as well as one coming from the *interregnum* period, dated to 193 AD. The coins were in different states of preservation, most of them bearing traces of significant use-wear. This indicates that the coins were still in circulation long after the reigns of the emperors during which they had been issued (Balbuza et al. 2025, 28.). Several coins still bear visible impressions of textiles and traces of textile residues, which suggests that the coins had been deposited in a bag that was not preserved.

Metallurgical analyses have been carried out for several artefacts from Gąski. Among them is a lion-bow (leontomorphic) fibula that was found in the cremation burial of a small child (*Infans I* accordingly to anthropological analysis; Andrałojć and Stolpiak 2004, 220). This fibula is one of only two such finds known from Poland (Pyrgała, Tomaszewska 1986). The Gąski fibula was subjected to numerous scientific analysis, such as energy-dispersive X-ray spectroscopy (EDS), scanning electron microscope (SEM), portable X-ray fluorescence spectrometer (pXRF), computed tomography scan (CT) and isotope analyses. This analysis revealed that the fibula was made of brass; the alloy itself was homogeneous (Danielewska-Teska et al. in prep.). A particularly interesting observation is that the raw material used for producing Gąski fibula may have come from the Central Massif (Danielewska-Teska et al. in print). A technological analysis of the Gąski fibula was also conducted, with the aim of reconstructing the processes and tools involved in its production. In addition, fine details of the fibula's design and its decorative elements have been revealed by microscopic observation, conducted with both an optical and a digital microscope, and augmented by high-resolution 3D scanning (Fig. 4). The precision of workmanship and the highly accurate repetition of the ornaments suggest that the fibula from Gąski was made by a professional and unusually skilled craftsman.

With its exceptionally high diversity and preservation levels of its archaeological remains, Gąski Site 18 constitutes a unique source of knowledge for Kuyavian prehistoric archaeology. Advances in analytical methods and the new possibilities available to current archaeological research make it a site of lasting scientific potential.



FIGURE 4. Process of high-resolution 3D scanning of the Gąski leontomorphic fibula, Scanner 3D CMM Series VL-700 Keyence. Elab. by M. Danielewska-Teska, M. Mostowy

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KWIATKÓW, SITE 11/20

Magdalena Piotrowska

Kwiatków, Brudzew commune, is located in the Koło Basin at a distance of 22 km in a north-eastern direction from Turek. This multicultural site lies on a small elevation, which is separated from the west by the watercourse called Siedza, from the east by the Teleszyna and further by the Warta rivers. Due to the expansion of the 'Koźmin' opencast lignite mine, Kwiatków has become one of the most interesting archaeological discoveries of recent years (Kot et al. 2015; Rzepecki et al. 2016).

Firstly, the impressive size of the area covered by the excavations is noteworthy – over 17 hectares were investigated in the four seasons of fieldwork. The only elements somewhat limiting the possibility of exploring more of the relict space were modern buildings, which made it possible to almost fully determine the extent of the site (Kot et al. 2015, 317; Rzepecki 2016, 6).

The archaeological excavations revealed a settlement of the Przeworsk Culture population to which the vast majority of features and archaeological material may be assigned. Traces of Stone Age and Bronze Age settlements and elements associated with the Jastorf Culture were also recorded, as well as the remains of a poorly preserved row-grave cemetery from the Middle Ages. Additionally, the site yielded relatively copious amounts of material from the modern period. It should be noted, however, that the remains of earliest episodes of settlement were subject to degradation due to the intensity of the settlement associated with the Przeworsk Culture (Kot et al. 2015; Rzepecki 2016, 5–14; Rzepecki et al. 2016).

The Kwiatków site is unique not only for the area surveyed and the number of artefacts retrieved or the discovered features, but also for the occurrence of remnants of a fossil forest under the surface of the surveyed area. Research carried out at the Koźmin Las site, located near Kwiatków, has allowed the identification of a subfossil forest which have been preserved in the form of carpels and fallen tree trunks (Dzieduszyńska et al. 2012, 35–36). Analyses indicated that the organic sediments and the tree remains should be linked to the late Alleröd and younger Dryas (Petera-Zganiacz et al. 2016). In the course of the work at the site, during the exploration of some features (e.g. wells), wood from the aforementioned forest was encountered.

The site presented here was surveyed in 1996 during the implementation of the AZP programme, and the excavation work lasted from 2012 to 2015. However, Kwiatków should not be associated only with large area rescue excavations in modern times, but also with information it provided in the past that is recorded in archival sources. Information on archaeological finds from the immediate area had already appeared in the earlier literature.

Over 130 years earlier, amateur excavations in the Kwiatków area had been conducted by Seweryn Tymieniecki (1847–1916). He was a lawyer by profession, a numismatist, a bibliophile, and a collector of historical memorabilia and archaeological finds (Baranowski 1995, 14–23; Kot-Legieć 2020). Kwiatków found its way into the archaeological literature thanks to this researcher from Kalisz (Tymieniecki 1878; 1881; 1904a; 1904b; 1906a; 1906b). However, the cemetery that Tymieniecki investigated was probably not a necropolis associated with the extensive settlement identified in connection with the extension of the lignite opencast mine – this is indicated by the number of the artefacts discovered and its distance from the settlement (Kot-Legieć 2020, 180; Piotrowska and Smółka-Antkowiak 2023). Among the artefacts from this necropolis are objects that belong to rare finds in the Przeworsk Culture materials and those that are unique and

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FIGURE 1. Aerial photograph of the site in Kwiatków. Photo by E. Schellner

have had no analogues so far (Piotrowska et al. 2022). The presence of a cemetery known from archival research should not come as a surprise, as the Kwiatków sites lie in a zone of intensive settlement of the population of the Przeworsk Culture. This is evidenced by the very large number of sites associated with this culture recognised in this region during the AZP programme (Gorczyca 1996; Rzepecki et al. 2016, 136 ff.).

The Kwiatków site has so far been partly analysed and published. The north-eastern part of the investigated area 11 (Zone A1) and Site 20 (Zone A2) have been discussed in print (Rzepecki et al. 2016; Rzepecki ed. 2016)[1].

As mentioned above, the vast majority of the discovered archaeological evidence is associated with an extensive and long-lasting settlement of the Przeworsk Culture. In the area of the site, where most finds of this culture were registered, a cultural layer of considerable thickness was recorded. Approximately 5,000 features and most of the recovered pottery are tentatively associated with the Przeworsk Culture. In addition, the excavations yielded an unusually rich assemblage of metal artefacts. Knives, arrowheads, fibulae, pins, rings, belt buckles, pendants and coins were discovered there. Another group of finds consisted of glass beads. The collection of everyday objects is further complemented by several dozen spindle whorls, loom weights and stone artefacts (e.g. querns). The wells contained some wooden tools. Other interesting finds include small-sized objects made of glass, which can be interpreted as gaming pieces, and other artefacts that are imports from the Roman Empire such as a bell and several fragments of *terra sigillata* (Rzepecki 2016, 8; Rzepecki et al. 2016).

Among the features associated with the settlement of the Przeworsk Culture, hearths, kilns, production

[1] The evaluation and interpretation of the entire Przeworsk settlement will be carried out after the analysis of the 'missing' parts of the site, which are awaiting a comprehensive study. However, the research and analyses carried out so far show the uniqueness of Kwiatków in comparison with other sites. The early medieval cemetery at Kwiatków Site 11, commune of Brudzew, will be comprehensively studied in the future.



FIGURE 2. One of the wells with the log lining. Photo by E. Schellner

and storage pits were recorded. The multitude of post holes indicates the existence of numerous post-built constructions. In this group of features there were small residential and economic buildings where in one of them perfectly preserved remains of lower parts of wooden posts were discovered. The location of the post pits indicates that there were probably also some longhouses within the settlement (Kot et al. 2015; Rzepecki et al. 2016; Piotrowska 2016).

Some of the most interesting features recorded at the Kwiatków site are the artificial water sources. The discovery of more than a hundred wells, almost all of which are associated with an extensive settlement of the Przeworsk Culture mainly associated with the Roman Iron Age and the early Migration Period, is an unprecedented discovery (Piotrowska 2015; Kot et al. 2015; Rzepecki et al. 2016; Kot and Piotrowska 2016, 292–294; Piotrowska 2016, 63–95). These wells, due to favourable conditions – a significant depression into the subsoil and a humid environment, helped preserve the wooden well linings in most of these features. The average depth of the wells was 1.9 meters.

The wells occurred throughout the study area relatively evenly and did not form distinct clusters. With regard to their mode of construction, these features can be divided into those with circular or quadrangular linings. Circular wells were usually constructed from a single or divided hollowed tree trunks. The latter type were wells built in a horizontal log construction. One wattle well lining was also recorded (Piotrowska 2016, 63–95; Piotrowska 2019; Piotrowska 2021).

In recent years, mainly due to large area excavations and a huge increase in the acquired materials, a change in the ways in which wells are viewed and studied can be observed – more and more interdisciplinarity and collaboration with the natural sciences can be seen (Piotrowska 2020a, 387; Piotrowska 2020b). It is thanks to interdisciplinary research (macro debris, geochemical/palynological analysis) that it was possible to address the 'mysterious' occurrence of so many wells in a settlement conveniently located in terms of hydrography. Two wells from the Roman Iron Age were sampled and submitted for palaeoenvironmental studies.



FIGURE 3. One of the wells with lining of a hollowed tree trunk. Photo by E. Schellner

Material provided for the analysis was obtained from the lower parts of the linings and fills; by the use of 'cores', the sediment sequences were sampled. The geochemical analysis of the well fills was of particular importance, as (as was noted above), the site was underlain by relics of a fossil forest. Most of the wells were buried in the aforementioned organic formations and therefore analyses were needed to answer the question of whether the water 'filtered' through that layer was suitable for drinking (Petera-Zganiacz et al. 2016; Petera-Zganiacz et al. 2019).

Such a numerous group of wells has to be explained by various functions of those facilities and local environmental conditions. This number of artificial water sources was influenced by the 'industrial' purpose of the wells related to flax soaking. By means of analyses of the macro debris recovered from one of the wells, flax remains were identified, confirming thereby the use of these facilities to supply a rettery. This observation is evidenced by the artefacts found in the wells – wooden objects resembling flax beaters and some hearths located in the vicinity of these features and probably used for drying the semi-raw material (Piotrowska 2016). The fact that some antler fragments were discovered inside the wells, indicates that these facilities may also have been used to soak the horn before processing. Additionally, they probably provided water for tanning and pottery production. Furthermore, the need to dig new water sources may have had to do with the rapid silting up of the wells due to the fast groundwater flow rate. Moreover, the results of the survey indicate that the wells at Kwiatków served as a source of drinking water for people as well as for animals. Some of the wells were probably associated with providing water to cattle and sheep, especially in winter. In the past, water sources like these also fulfilled a function of particular importance – cultic, as indicated, among other things, by the artefacts found in the wells and the remains of dogs discovered in their fills (Piotrowska 2019; 2020b).

Research at the site presented here has contributed to an understanding of the place that artificial water sources occupied in the space of ancient



FIGURE 4. Wooden artefacts from wells. Photo by M. Maciaszek

settlements and their social significance. It was possible to establish that there were both private wells – associated with individual houses – and communal ones, which tended to dominate in the Roman Iron Age (Piotrowska 2020a; 2020b).

From the above brief presentation of the Przeworsk settlement in Kwiatków, with particular emphasis put on the impressive well complex, it can be seen that we are dealing here with an extremely interesting and important site, not only because of its extent and copiousness of the material, but also because of the nature of the artefacts and features recorded. The richness of the evidence concerning the Przeworsk Culture and the duration of the settlement should be linked to the extremely convenient geographical location of this settlement. Its location in the immediate vicinity of the Teleszyna and Warta rivers and the proximity of the Prosna River, i.e. its position along ancient trade and communication routes, was probably of crucial importance for the settlement's inhabitants. In conclusion, the settlement at Kwiatków may have been one of the richer settlements located along the Amber Route (Rzepecki et al. 2016).

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MALBORK-WIELBARK, SITE 1(5)

Piotr Łuczkiewicz

The first discoveries in Wielbark (formerly Willenberg; modern: Malbork-Wielbark), Malbork district, Pomeranian voivodship, the eponymous site of the Wielbark Culture, were made during the building of a Prussian fortification system in the late 19th and early 20th centuries. Systematic and large scale archaeological excavations started in autumn 1927 (for the history of research and former German excavations: Kleemann 2017) and carried out intermittently until 1936. Up to 1460 graves were discovered during them. The burial ground was not fully excavated and no monograph was published; almost all the artefacts and documentation were lost during World War II. After the War, despite the enormous scientific value (virtually every pre-War scientific study of the Pre-Roman and Roman periods included these finds), the site was forgotten, a fact that was not altered even by the small-scale verification excavations, conducted 1984–1986 by the Malbork Castle Museum.

The discovery of copies of the reports and plans from the 1927–1933 excavations at the Hochschulu. Landesbibliothek Fulda resulted in the renewal of field research in 2008 as a joint Polish-German research and teaching project (Humboldt University in Berlin and Maria Curie-Skłodowska University in Lublin) under the direction of J. Kleemann (then at Lublin). During 2012–2014 (already with the participation of P. Łuczkiewicz) the project was carried out as an Erasmus IP programme "Wielbark Archaeological Field School", financed by the EU (e.g. Kleemann 2024a; 2024b; there earlier literature). In 2017–2021, research was funded mainly by the project of National Science Centre (P. Łuczkiewicz, MCSU). The excavations were definitively completed in 2021, with a total of more than 650 burials. The cemetery has not been 100% investigated, with a few small spaces with graves remaining unexplored, but it has been possible to record all its boundaries, determine its exact extension, spatial structure in different phases of use, and exact chronology.

The cemetery is located on the high, eastern bank of the Nogat River, in the marginal zone of a moraine plateau and on the edge of the Vistula Delta. The whole site is currently overgrown with mixed forest and covered by an aeolian dune which is up to 2.5 m thick and was formed in the Middle Ages. Such environmental conditions make excavation very difficult, but at the same time prevent the activities of metal detectorists. The area was also greatly altered by the construction of the Prussian military defences mentioned above.

The Malbork-Wielbark site is one of the largest cemeteries of the Wielbark Culture (and also between the Baltic Sea and the foreland of the Black Sea), a total of more than 2200 burials documented here (Łuczkiewicz, Kuzioła 2024; Kleemann 2024a; 2025). The necropolis is also one of the really few sites in *Barbaricum* that provides a continuous series of finds from the beginning of the Younger Pre-Roman Iron Age (phase A1b) until the early stage of the Migration Period (phase D1, maybe D2).

The vast majority of all burials can be dated to the Roman Period, mainly to its younger phase (2nd and especially 3rd centuries AD). A noticeable group, however, investigated essentially only during the German excavations, consists of finds from the early Migration Period. Only about 10–12% of the graves (not all of them can be precisely dated) are from the Late Pre-Roman Iron Age, wherein most of them belong to the second half of the 1st century BC (phase A3) and the last years BC/first years AD. The oldest burials, dated to phase A1, are very few.

Throughout its activity, the cemetery was used for both inhumation and cremation graves (urn

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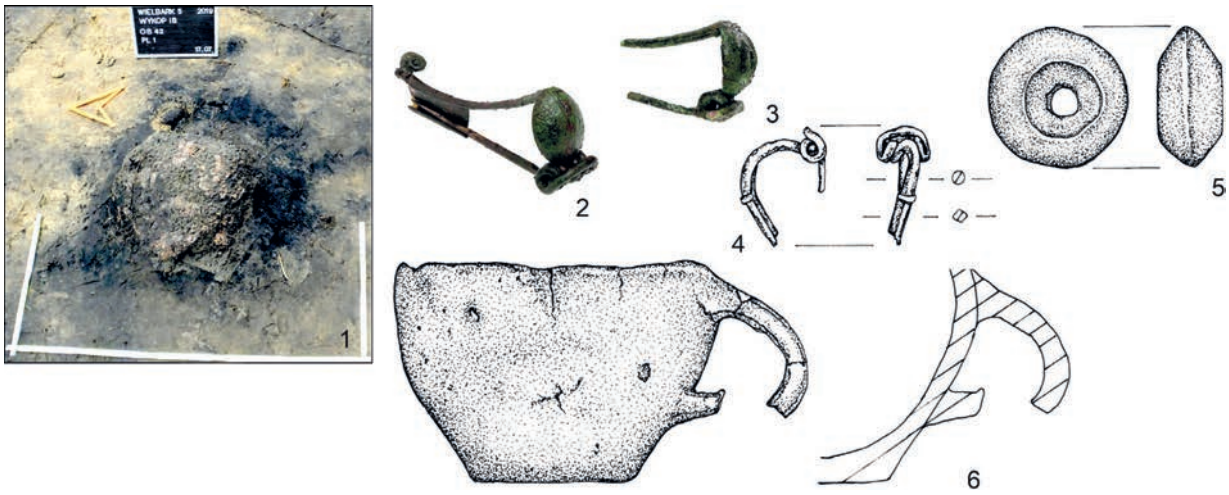


FIGURE 1. Malbork-Wielbark, grave 2019/42. 2–3: copper alloy; 4: iron. 1: photo by J. Kleemann; 2–3: photo by P. Maciuk; 4–5: drawn by A. Kuzioła

and pit graves), although in the Roman Period, inhumation graves obviously prevailed. Cremation burials dominated in the younger Pre-Roman Iron Age, but there was a remarkably high proportion (14–15%) of inhumation graves, unheard of in other necropolises in the Lower Vistula zone and on the Baltic coast, and as early as the A2 phase. According to the tendencies of the funeral rite in the Pre-Roman Iron Age, women were often buried with ornaments and parts of their attire (usually with brooches and belt buckles and hooks), and weapons appear occasionally in men's graves. This trend is generally confirmed by anthropological assessment – essentially all the bone remains from the cemetery (practically only burned ones, as unburned bones were unfortunately not preserved in the sand that forms the soil substrate at the site) have been analysed by anthropologists. The equipment of the richest female burials included brooches (up to a maximum of three) and belt hooks; other costume elements (e.g. glass beads, bracelets) were rare. Imports from the La Téne Culture area (e.g. Grave 2019/42: cf. Kuzioła, Łuczkiewicz 2024; Łuczkiewicz, Kuzioła 2019) were found practically only in female graves (Fig. 1). One of the most interesting male burials is Grave 2019/56 (Łuczkiewicz 2021), in which one warrior was buried with a multiple set of weapons, including as many as three single-edged swords and three spearheads, as well as one shield-boss. However, burials with swords (cf. Fig. 2) are relatively less frequent in Wielbark than in other large cemeteries in the lower Vistula zone and Bay of Gdańsk.

Around the turn of the eras, changes in funeral rites are clearly visible. In the Roman period, the custom of putting weapons into the graves disappeared, and the lack of these "male gender determinants" gives the apparent impression that the cemetery at that time had a female character (Kleemann 2017; 2024b). The equipment of the graves (Figs. 3–4) became more varied, mainly including elements of costume (as in the entire Wielbark Culture), usually made of bronze but also of silver, such as brooches, bracelets, buckles and belt fittings, and sometimes impressive, multi-element necklaces consisting of glass and amber beads and various types of pendants. Sometimes they were accompanied by caskets for valuables and perhaps also cosmetics, of which only the metal fittings and keys have survived. One of the more common funeral gifts, especially in the late Roman period (from the 3rd century AD onwards), were decorative bone or antler combs.

The ceramic grave goods at Wielbark are usually restricted to a single vessel; sets of two vessels are relatively rare. Larger sets of three or four vessels are almost exclusively found in Late Roman period graves. During the Late Pre-Roman Iron Age and the Early Roman Period multiple pottery sets were restricted basically to urn graves, whereas in the Late Roman period this phenomenon is seen only in inhumation burials. In Pre-Roman urn graves,

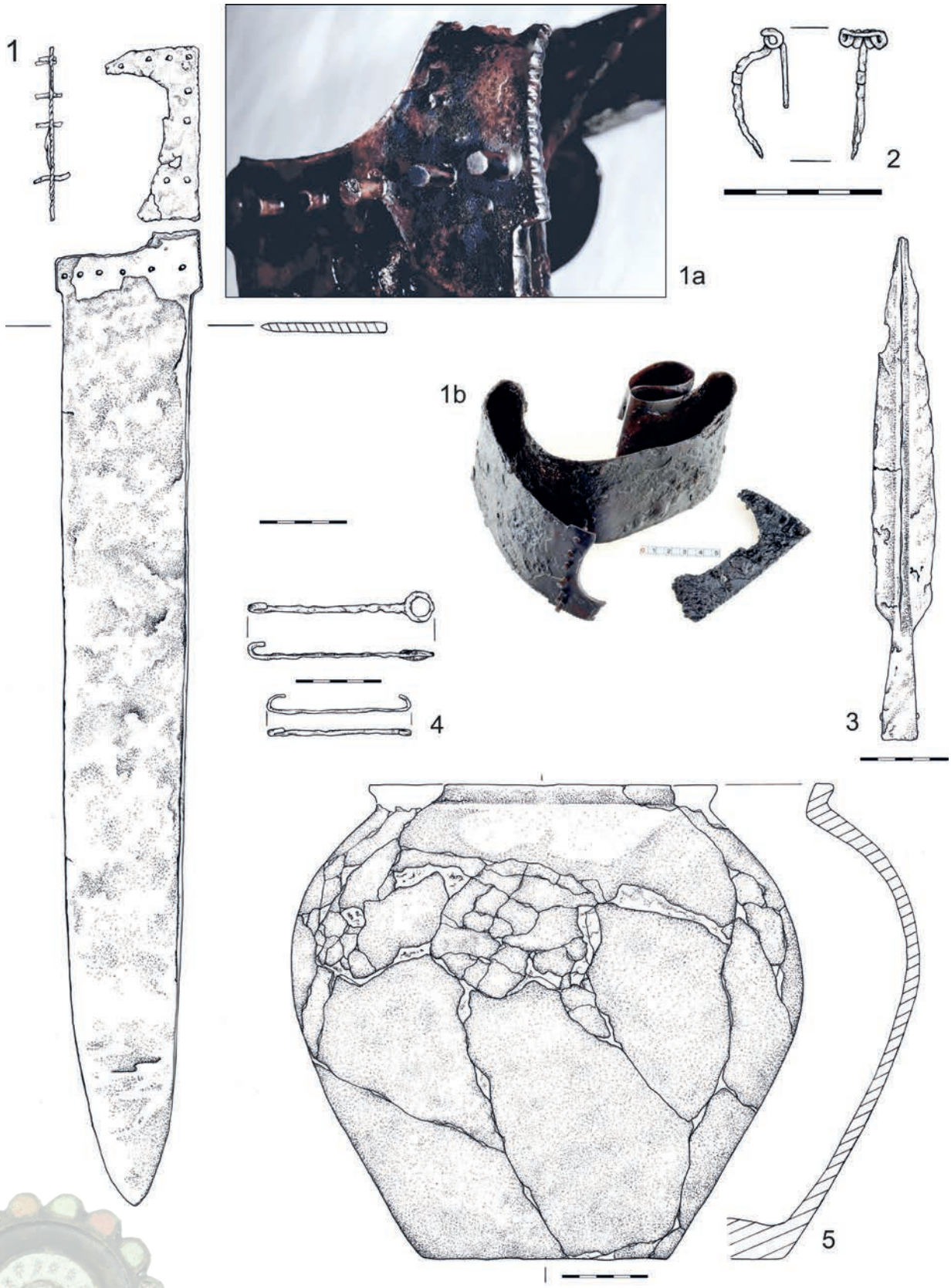


FIGURE 2. Malbork-Wielbark, grave 2009/16. 1–5: iron. 1a–1b: photo by J. Strobin; 1–5: drawn by A. Kuzioła

the pottery set usually consists of an urn and a bowl to cover it; other forms of vessels are much less commonly present.

A large part of the research, apart from excavations and archaeological analysis, consisted of palaeoenvironmental studies aimed at reconstructing the landscape and appearance of the cemetery zone at the time of its use (first results: Jankowski et al. 2023). Also carried out were physico-chemical analyses of ceramics (Daszkiewicz et al. 2019), glass beads (Łuczkiewicz et al. 2020), copper alloy artefacts (Łuczkiewicz et al. 2022).

Another piece of analytical work was $^{87}Sr/^{86}Sr$ isotopic studies (Łuczkiewicz et al. 2022). The aim of this latter research was – in the context of the gradual expansion of the Wielbark Culture, in which the Goths were an important, but certainly not the only element – to investigate the degree of mobility of the population buried in the cemetery ("how many Goths were in the Wielbark Culture"?). In contrast to the archaeological evidence, isotope markers (at least in relation to the studied, statistically relevant sample) do not provide any indication of the mobility/external origin of the population buried in Wielbark.



FIGURE 3. Malbork-Wielbark, grave 2012/77. Iron, bronze and glass. Photo by P. Maciuk

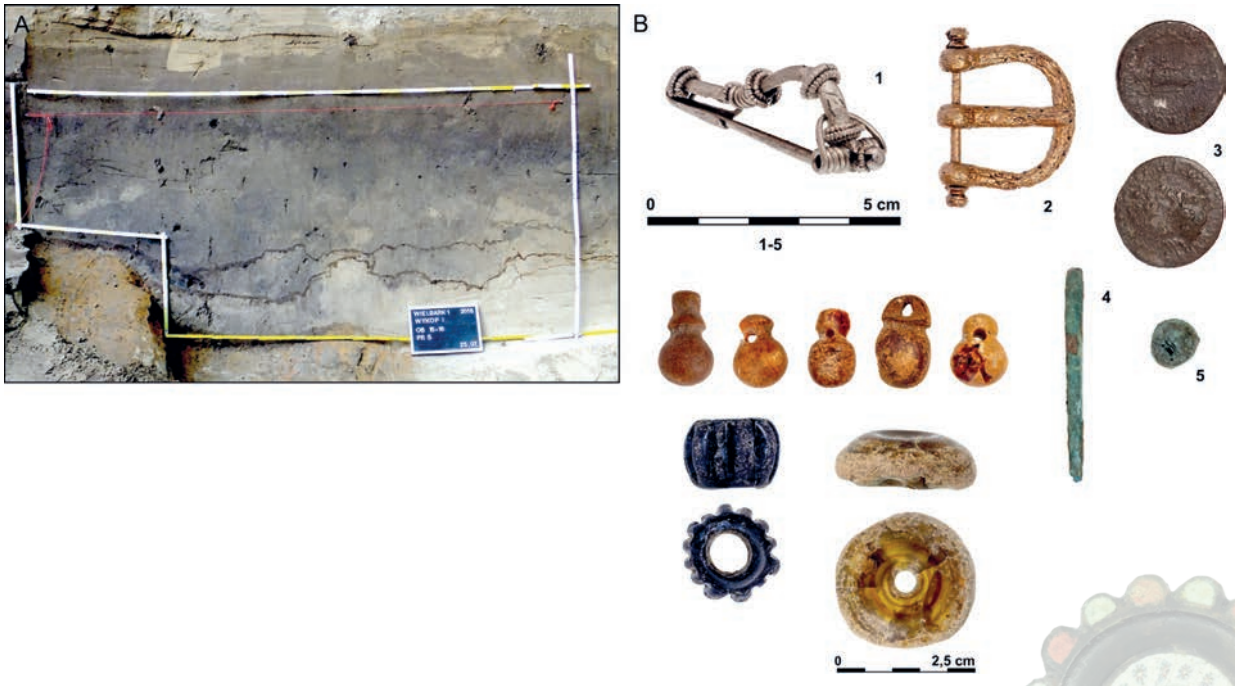


FIGURE 4. Malbork-Wielbark, grave 2016/16. Silver, bronze, amber and glass. A: photo by J. Kleemann; B: photo by P. Maciuk

Also of significance in the context of the discussion of the chronology and origins of the Wielbark Culture may be the results of technological studies of ceramics, conducted on more than 100 samples from the entire period of cemetery use. They show that there are no clear differences in preferred raw materials and preparing technologies between the Pre-Roman Iron Age and the early Roman Period. Slightly greater changes in habits regarding production techniques (though also not as significant) can be seen only in the Younger Roman Period.

Another interesting result, and not only for the analysis of the principles of the funerary rite, is the observation that a large part of the vessels were purpose-made only as grave goods. This is indicated, among other things, by appreciable water permeability and visible technical and technological negligence in their workmanship. These pottery vessels were absolutely not suitable for everyday use. However, certainly some of the vessels were previously used as, for example, cooking pots or as a food storage container. Generally, the technology of the majority of the vessels from the cemetery in Malbork-Wielbark is not very advanced.

Analyses of the chemical composition of non-ferrous metal artefacts (more than 110 samples) indicate the use of diverse production techniques and the existence of a diverse networks of the community using the Malbork-Wielbark cemetery. Their traces include not only undoubted imports from the Roman provinces, but also from other zones of *Barbaricum*. Various categories of raw materials were in use, including, to a noticeable extent, recycled ones. It may be of more than passing interest to note that in the younger Roman period, some grave ornaments (especially brooches) were made of almost pure copper, and thus as grave goods. They were too soft to be wearable as functional clothing elements. Equally interesting is the observation that most of the silver brooches from the late Roman period were made of raw material from the 2nd century Roman *denarii* (cf. Fig. 4: 1).

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MIROSŁAW, SITE 37

Andrzej Michałowski

The barrow cemetery Mirosław, Site 37 (Ujście Commune, Piła County) is located in the Jabłonowo forest district, within the Sarbia Forest Inspectorate, under the Regional Directorate of State Forests in Piła. The site was discovered in 2015 as a result of analyzing LiDAR data, which revealed five burial mound clusters along the edge of the Noteć Valley here. These clusters were separated from one another by zones significantly modified geomorphologically by glacial and fluvial processes. The study of one of these clusters was initially intended to clarify the chronology and cultural affiliation of the burial grounds discovered here (Michałowski and Teska, 2016, 119). However, it turned out to be one of the more unexpected and intriguing archaeological discoveries made in recent years in the Wielkopolska region (Michałowski, 2023). In addition, it represents one of the key discoveries for research on the funerary rites of Wielbark Culture communities in the south-western extent of Zone C as defined by R. Wołągiewicz (1981).

The necropolis at Site 37 in Mirosław consists of seven burial mounds, four of which were excavated between 2016 and 2022. A total of five burials have been discovered within the mounds: two inhumations (Fig. 1) and three cremations (Fig. 2). The mounds represented a crucial element showcasing the engineering skills of their builders. Each burial mound was constructed by a different method. They were exclusively earthen (Fig. 3), and had internal structural elements made of stone. The grave pits in all the examined mounds were centrally located. Anthropological analyses indicate that the burials primarily contained adult women and one juvenile individual, whose sex could not



FIGURE 1. Mirosław, Site 37, Piła County, Wielkopolska Voivodeship. Barrow VII, the skeletal remains of a young woman, approximately 19–21 years old. Photo by A. Michałowski



FIGURE 2. Mirosław, Site 37, Piła County, Wielkopolska Voivodeship. Barrow VI, the cremation burial of a child 11–13 years old. Photo by A. Michałowski

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FIGURE 3. Mirosław, Site 37, Piła County, Wielkopolska Voivodeship. Barrow VII, Cross-section through the mound in the earthen structure. Photo by A. Michałowski



FIGURE 4. Mirosław, Site 37, Piła County, Wielkopolska Voivodeship. Barrow IV, A complete set of four bracelets from the burial of skeletal remains of an adult woman, approximately 35 years old. Photo by A. Skowronek



FIGURE 5. Mirosław, Site 37, Piła County, Wielkopolska Voivodeship. Barrow IV, a shield-shaped brooch from the inhumation burial of an adult woman, approximately 35 years old. Photo by A. Skowronek

be definitively determined due to the highly burnt bone remains.

The grave goods, particularly in the inhumation graves, were exceptionally rich (Fig. 4). Surveys conducted at the site revealed extremely valuable archaeological material, sometimes with far-reaching connotations (e.g. the Rhine region of the Roman Empire – Fig. 5). The entirety of the artefacts (Fig. 5) discovered during the exploration of the necropolis indicates its affiliation with the Wielbark Culture of the Lubowidz phase and allows dating it to phase B2 to the early C1 stage of the period of Roman Influences (2nd century AD). The chronology has been verified by dating charcoal samples from hearths in the flat area and human remains from the double-burial Barrow IV (Michałowski, Piotrowski, Tyde 2024).

Alongside the burials there were also remarkably interesting traces of accompanying features in the cemetery area. These included traces of iron smelting furnaces (Michałowski et al., 2021), workspaces of stone masons with furnaces for roasting stones and evidence of processing lithic material (Chachlikowski, Michałowski, 2021). Under the barrows, traces of prehistoric ploughing have been identified.

In the mounds, alongside archaeological materials, numerous animal remains were identified, including selected anatomical fragments interpreted in the context of offerings and ritual feasts (Waszczuk, Żychliński, Michałowski 2024). Owing to extensive interdisciplinary research (Michałowski et al., 2019; Michałowski, Piotrowski, Tyde 2023), all these finds have opened up new avenues for the academic community to gain a better understanding of the socio-economic structures of the communities inhabiting Wielkopolska in the 2nd century BCE. They have also provided insight into the rituals and beliefs of those communities (Waszczuk, Michałowski, Żychliński, 2024).

Following the research in Mirosław and the preliminary recognition of nearby traces of settlement from the early Roman influence period (1st to 3rd century AD), we can state at this stage of the research that the north of Wielkopolska was an extremely significant settlement area. Situated along the major east-west trade route (undoubtedly the area of the ancient valley and the Noteć River at that time) this location probably represents a crossroads where this artery intersected with routes leading north to south, associated with the local crossing over the Noteć (Stażyński, Dernoga, 2006, 24). This

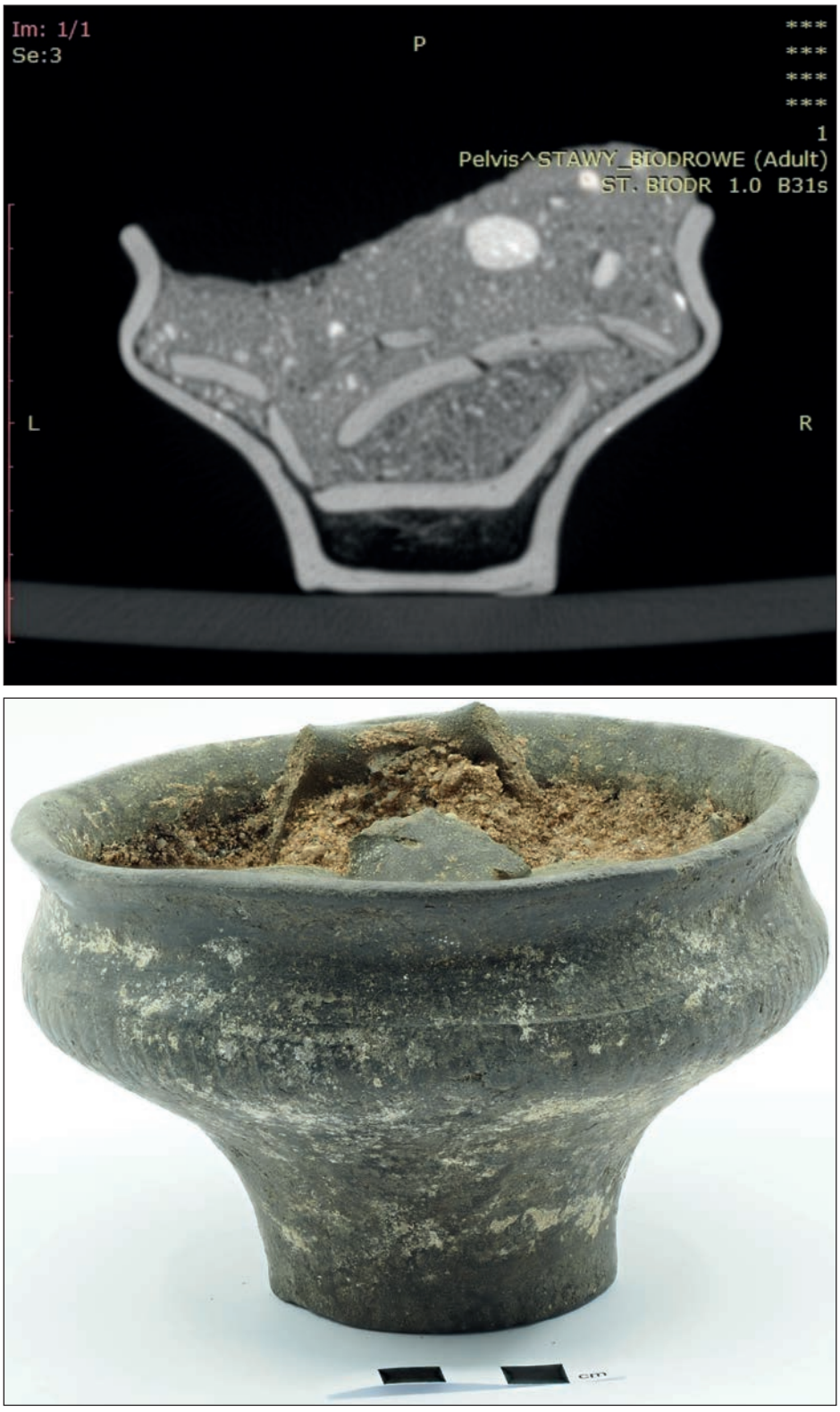


FIGURE 6. Mirosław, Site 37, Piła County, Wielkopolska Voivodeship. Barrow IV, an image taken using ultrasound tomography showing the interior of a vessel from the inhumation burial of an adult woman, approximately 35 years old, with a second vessel visibly placed inside it. CT scan by VetMR Poznań. Photo by A. Skowronek

resulted in the central Noteć area thriving, holding a prominent place in the network of political and economic contacts of that era.

Mirosław Site 37 documents burial practices on the periphery of the Wielbark Culture and indicates a complex picture of funeral rituals. The traces of craftsmanship, connections to transport routes, and a clear dominance of female burials are distinguishing features of this necropolis compared to other cemeteries of the Wielbark Culture. Research at the Mirosław site connects with trends in modern excavation work, employing contemporary analytical methods with significant cognitive potential.

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KIETRZ, SITE 7

Mateusz Matula

Site 7 in Kietrz was accidentally discovered during regulation works on the riverbed of River Troja. It was investigated in 1933–1934 by Georg Raschke and Franz Ullrich (Fig. 1). The excavated material was directly handed over to the museum in Racibórz and is currently kept in the Museum of Opole Silesia in Opole. The material has never been properly analysed and published in full, with only a few mentions about the site existing in literature (Błażejewski 1998a, 87–88, 186; Godłowski 1973, 285; Godłowski 1977, 57–63, 75; Szydłowski 1964, 31, 54, 114). Unfortunately, due to the material being frequently moved from place to place, only the documentation from the research conducted by the German archaeologists survived. The drawings mentioned in the documentation are also missing, which makes the reconstruction of the layout of investigated features and their stratigraphy far more difficult. In this situation it was only possible to localise the features on the basis of their descriptions and through the analysis of the acquired archaeological material. We know that we are dealing with a 'layered' cemetery (or one with 'layered burials'), dated to phase C_1–C_2 of the Roman period.

The graveyard is located directly on the River Troja, a tributary to the Psina, which in turn is a tributary to the Oder. The site is located on the floodplain, on the Głubczyce Plateau which encompasses the south-eastern part of the Silesian Lowland. The area sits on a loess base, with rich, fertile soils.

At the site, 25 concentrations of finds were discovered, originally identified as destroyed graves. The site is undoubtedly directly related to the consequences of the Marcomannic Wars, as the method of burial differs from the one typically used by the Przeworsk Culture. The only known analogies from the territory of Poland are the burials from the so-called Dobrodzień Group (Szydłowski 1974), and the graveyards on the Barycz River from phase C_2 (Błażejewski 2007). It should be noted that not a single piece of armament has been found there, which is probably a consequence of executing the Law of the Twelve Tables by the Romans and their army. The burial ground also produced an exceedingly large amount of animal bones (predominantly remains of cattle, horses and dogs, with a few examples of pig, poultry and wild animal bones), placing it apart from other finds in the territory of Poland. The element which decidedly proves the theory that the population using the site was of foreign origin is the typology of pottery and the technology used in its manufacture. Most of the vessels were wheel-turned, made in white, cream or light grey colour. Such colours of pottery can be achieved by using loam clays free of iron compounds. Among the finds were also fragments of *terra sigillata* (Figs. 2d, 3), whose chronology was determined to the period between the rule of Antoninus Pius and Severus Alexander (Tyszler 1999). They came from the Roman provincial workshops in Lezoux and Rheinzabern. This suggests that the population using the cemetery had some direct contact with the Romans.

Pottery artefacts are, obviously, the most numerous finds at Iron Age sites, and the situation is no different in Kietrz 7. However, the amount of material is not unique here, but its form. It is interesting that roughly 20% of the vessels were made on a potter's wheel. This is highly unusual for the Przeworsk Culture, despite the dating to phase C of the Period of Roman Influences. However, we are not certain when exactly workshop pottery spread into the territory settled by the Przeworsk Culture. There is a hypothesis claiming it might have happened as early as phase C_1. The issue requires a cautious approach – it is

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FIGURE 1. Works during the regulation of Troja riverbed in 1933. Muzeum Śląska Opolskiego in Opole

true that wheel-made pottery can be quite frequent in a certain phase, but this may be, at least partially, caused by the presence of imports (Domański 2008, 151–160). The situation is similar in the case of pottery from Kietrz, where a pottery workshop has not been archaeologically identified yet. This makes a large portion of finds appear as imports. Many vessels are lightly coloured, formed on a wheel and finely fired. A large portion of the material gives us information about the connections with the Rhine-Weser area, with characteristic ornaments – nodules, stamped patterns, meanders, combs, engraved lines and grooves, fluting, and applied ribbons.

The amount of imported wares in this cemetery is quite astonishing. Among the finds were two bronze scale pans (probably the only ones in the whole of *Barbaricum*; Fig. 2b), multiple fragments of glass and bronze vessels, fibulae made from non-ferrous metals (bronze and silver), and iron belt buckles. The most numerous imports were fragments of vessels highly desired during the Roman period – *terra sigillata*. They come from the period between the rule of Antoninus Pius and Severus Alexander (Tyszler 1999, 39–40) and were manufactured in workshops in Rheinzabern and Lezoux. The situation is similar at the adjacent cemetery in Cemetery 1 in Kietrz (Gedl 1972). The fragments found there are less numerous, but come from the same workshops, and their chronology can also be placed in the times of Antoninus Pius and Marcus Aurelius (Tyszler 1999,

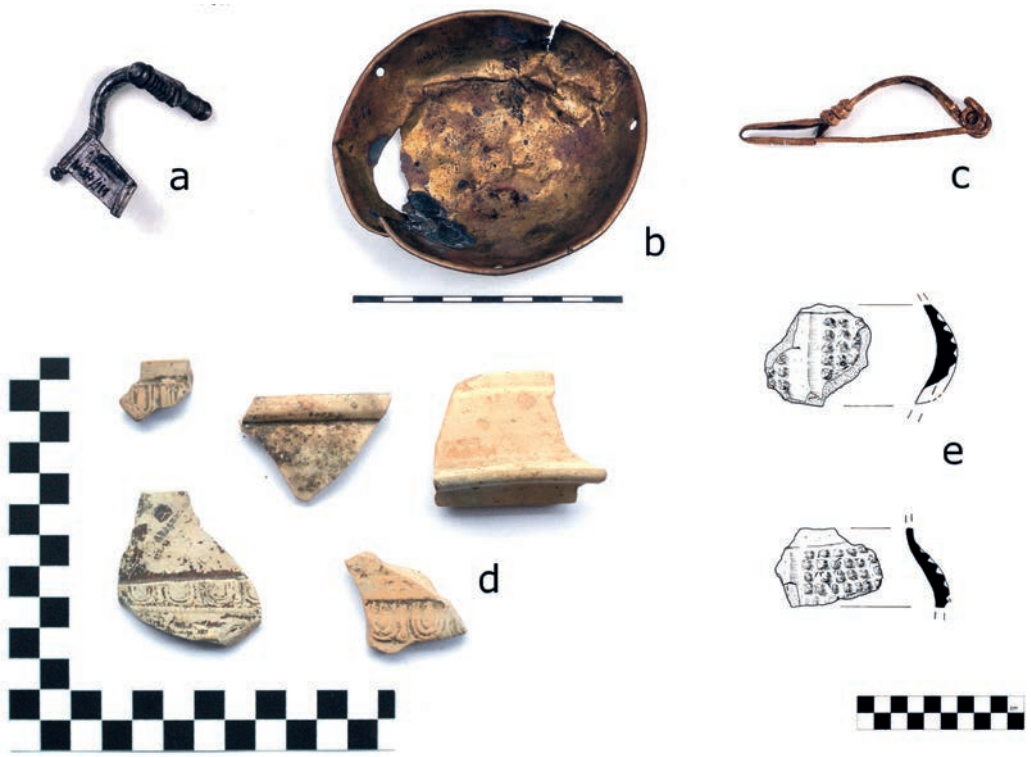


FIGURE 2. Examples of artifacts from the site no 7 in Kietrz: a – fibula A.193; b – bronze scale pan; c – fibula A.158; d – pieces of terra sigillata; e – ceramic piece with a papillae ornament; a–c: Muzeum Śląska Opolskiego in Opole; d, e: photo by K. Dołbizno

38). It should be noted that the imported vessels most probably did not arrive in Kietrz empty. Although in the case of *terra sigillata* we can speak about their decorative value and prestige they carried, we should keep in mind that they were used as containers (just like the glass vessels) for transporting liquids and dry goods, now unrecognisable archaeologically.

The Museum of Opole Silesia currently has ten fibulae from this site in its collections. A small, silver fibula, found in Concentration A, mostly resembles type A193 in Almgren's typology (Almgren 1923, 91). The only element which is different is the chord, placed closer to the bow and the spiral. It has knobs at the end of the foot and the spiral axis and additional engraved ornaments on the bow and the foot (Fig. 2a). This type is represented most commonly on the Lower Elbe (W. Matthes 1931, 78–80). In the contexts of the Przeworsk Culture fibulae of Group VII, they are usually found together with Types A40 and A41 (Godłowski 1970, 69–70). They are a leading type for phase C1a.

The most numerous fibulae at Site 7 in Kietrz were from Group VI of Almgren's classification – examples with a bent foot or similar (Almgren 1923, 75–76). These were mostly Type A158 specimens, with a narrow foot, an arched bow and a short, four-coiled spiral with an upper chord (Fig. 2c). One specimen of that type, from Concentration A, is decorated with rings mounted on the foot and the bow. Fibulae ornamented in that way are present in Upper Silesia mostly in contexts dated to the final phase of the late Roman Period and the early phase of the Migration Period. Unipartite Type A158 fibulae are the most common type of fibulae in the territory of the Przeworsk Culture in the late Roman Period. They begin to appear as early as phase B2/C1, when they are encountered primarily in male burials (Godłowski 1970, 17–27). It seems that Upper Silesia is an area where such fibulae were a favourite form, as they definitely dominate numerically over other late-Roman types (Godłowski 1977, 27). On the other hand, fibulae of Type

A162 are very rare in Upper Silesia. A fragment of such a fibula was found in Concentration 2. Its bow had a rhomboid cross-cut, with a short, six-coiled spiral set on an axis with broadened ends. The foot and the pin catch are missing, which prevents us from precisely assigning this find to a specific type. However, it bears resemblance to Type A162 (Almgren 1923, 77; Olędzki, Ziętek 2017, 63–66). This type of fibulae is most prevalent in the territories of the Wielbark and Cherniakhiv Cultures, as well as in the Elbe basin, Bohemia, and western Germany. It is quite rare in the contexts of the Przeworsk Culture and most of the finds come from Lower Silesia (Godłowski 1977, 27).

A fibula with a heavily bent, broad, band-like bow which tapered towards the foot (Type A207) has no major analogies (Almgren 1923, 96–97). The item was found in Concentration A. The pin catch is triangular and the spiral has eight coils. The unipartite construction of the artefact is quite surprising, with a long spiral and an chord underneath. It should probably be included among the late forms which stem from Group VI, most likely Type A207. It shows some similarity to the so-called Niemberg fibulae which were present mostly in central Germany. They are dated to the early phase of the Migration Period.

In the collections of the Museum in Opole are two buckles found in Concentration 25. These are bipartite, semi-oval iron buckles with regular frame width. The frame is made from a bent strip and the pin is set on a simple, clearly distinguished base. They are an evolutionary form of buckles with circular frames and a loosely attached pin. The specimens from Site 7 in Kietrz are some of the latest representatives of that type in Upper Silesia. They began to appear as early as the beginning of phase B2, and became most popular in B2/C1 (Godłowski 1977, 31).

Another type of dress accessories are beads. As in most cases of cremation burials, the beads from Kietrz are also heavily deformed by the fire of the funerary pyre. Determining their original shape is almost impossible. One bead had a piece of bronze wire stuck inside, which suggests that it might have been worn on a wire loop. Such a form of beaded jewellery was quite common in the younger phases of the late Roman period and in the Migration Period. In other cases, the beads could have been worn on a thread made from organic materials which did not survive.

Riding gear is represented by two fragments of spurs found in Concentration A. The finds are fragments of iron bows ended with knobs. No examples of wholly preserved spurs have been found, however, the shape of the knobs makes them resemble Type E8 in J. Ginalski's typology (1991). They are dated to phase C1.

Bronze rivets form a separate category of finds and are encountered in large quantities in Przeworsk Culture burial sites. They were most probably used for joining wooden and bone parts of various items which did not survive. In the case of the discussed site, it is almost certain that such rivets were joining elements of bone combs.

In Concentration 2 was found a fragment of a belly section of a thin-walled glass vessel. The belly was most probably semi-circular. It has a visible, slightly convex network ornament applied to the vessel surface. The vessel and its ornamentation are blue-green and semi-transparent with visible matte corrosion stains on the surface. This is probably a fragment of an E199–200 type vessel in T. Stawiarska's typology (1999). The remaining glass finds, due to their heavy fragmentation and melting in the funerary pyre, could not be analysed in detail.

The site Kietrz 7 seems quite unique in comparison to other sites from the same period and area. The amount of high quality workshop-made pottery definitely exceeds the standard rate for the Przeworsk Culture. Hand-formed vessels are still in the majority, but only by a small margin. There is no certainty if the hand-formed pottery is of local origin. It turns out that analogous forms were found at Czech sites in Opočno (Pleinerová 1995), Holašovice, Neplachovice, and Opava-Kateřinky (Loskotová 2009). Of course, the material from Kietrz includes forms typical for the local pottery. This is a standard occurrence, as the neighbouring populations traded with and contacted each other through various means. However, it should be assumed that the general concept of such pottery arrived together with the users of the cemetery. We cannot exclude the possibility that the vessels were made locally, but the potters were most likely migrants from the western parts of *Barbaricum*. We know that the environment of the Przeworsk Culture became differentiated in the late Roman Period. Therefore, it is difficult to determine which



FIGURE 3. Pieces of terra sigillata. Photo by K. Dołbizno

patterns were local, and which came from the outside (Pazda 1983, 193). We should keep in mind that there was a significant migration of Germanic peoples in the period that began after the Marcomannic wars.

It can be concluded that the pottery artefacts found at Site 7 in Kietrz are heavily influenced by the Rhine-Weser zone. This is supported by the vessels' forms, ornamentation, and chronology. It turns out that the tribe of Chatti, originally inhabiting in the land between the Rhine and the Weser, moved into Thuringia after the Marcomannic wars, and then migrated further east into Bohemia. Later the tribe probably split – some of its members remained in Bohemia, some moved into modern Polish territory across the Sudetes (Błażejewski 2007, 141–149). They settled in Lower Silesia, alongside the Barycz river, where such sites as Kocian, Miłochowice, Niezgoda, Wymysłowo, and Zubrza were found (Błażejewski 1998b, 2007; Jasnosz1952; Pazda 1983). All of those sites featured similar burial forms and artefacts finds to those from Kietrz.

Such finds seem to further confirm the hypothesis. However, it is uncertain whether the population from Kietrz belonged to the same group that settled in the Barycz basin, or a different community that had detached from the group earlier and travelled into Poland through the Moravian Gate. In such case it must have been a substantial group of people, considering how prominent and numerous were the traces it left behind.

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TARCHALICE, SITE 1

Paweł Madera

The site is located in Wołów Commune and County in south-western Poland, in the central part of Lower Silesia, approximately 50 km north-west of Wrocław (Fig. 1). Settlement traces (Site 1, AZP 81/74-23) have been identified in the north-eastern part of the village of Tarchalice (until 1945 *Tarxdorf*), on the eastern bank of an oxbow lake that divides it along a north–south axis, and about 800 m from the right bank of the Oder River (Fig. 3). From a physiographic perspective, the site lies within the meridional section of the Oder valley forming part of the Ścinawa Depression. The valley is filled with thick fluvial deposits which, on the right bank, form sandy terraces. The wide Holocene terrace built of alluvial soils is occupied by meadows, while forests grow on the sandy terraces (Kondracki 1994, 117). The site lies on flat terrain, until recently used for agriculture, adjacent to an extensive forest complex. The substratum consists mainly of loose sands and gravels on which brown soil has developed.

The site was discovered in 1893 by an entrepreneur from nearby Ścinawa named Frey. Attention was first drawn to 'prehistoric' iron slags and fragments of early medieval ceramic vessels found on the surface of the field (Seger 1894, 64). Similar finds reported to the heritage authorities in subsequent years (Seger 1895, 177–178) led to excavations in 1903, continued in 1908. In addition to prehistorians from Wrocław (*Breslau* at the time), metallurgists and metal scientists from the Technical University in Berlin (*Technische Hochschule Berlin*) also took part in the research.These were therefore among the first interdisciplinary investigations carried out on this type of site. Along the edge of the oxbow lake, over an area of about 1 are, the remains of 37 bloomery furnaces of the slag-pit type were uncovered (Fig. 2). On the basis of nearby pottery fragments, these features were dated to the Hallstatt period and attributed to the Lusatian Culture. Moreover, due to the spread of slag over an area exceeding 6 ha, their total number was estimated at 30,000–40,000. As a result, *Tarxdorf* was promoted as one of the oldest and largest ancient metallurgical centres in this part of Europe (Schliz 1925, 62; Weiershausen 1939, 97–103; Rieth 1942, 85).

Over time, these conclusions proved to be incorrect, as did the earliest attempts to reconstruct the structure and operation of the discovered furnaces. Nevertheless, the role the site played in shaping views on the beginnings of iron metallurgy in present-day Poland and in Central Europe (as well as in the emergence and development of archaeometallurgy) cannot be overstated (cf. Orzechowski 2013, 21). As reflected in scholarly literature over several decades, the very first excavations sparked a wave of interest in ancient metallurgy, not only among archaeologists. The related discussion was initiated by articles published in volume 41 of the *Zeitschrift für Ethnologie* (Olshausen 1909, 60–66; Giebeler 1909a, 53–55, 57–58; 1909b, 98–99; Krause 1909, 88–98). Since the very beginning, fundamental interpretative problems emerged. Attempts by metallurgists to explain the functioning of the investigated devices by analogy with blast furnace metallurgy led to absurd conclusions (Giebeler 1909b, 98). There were also controversies concerning furnace construction, resulting from the failure to consider the stratigraphic context of the discovered slag-pits. Setting technological issues aside, the concepts proposed by Eduard Krause (1909, 91–95) as well as by Carl Giebeler and Karl Humperdinck came closest to the idea of the furnace of the slag-pit type. In turn, the concept of a furnace constructed entirely above ground level was proposed in a monograph by Paul Weiershausen

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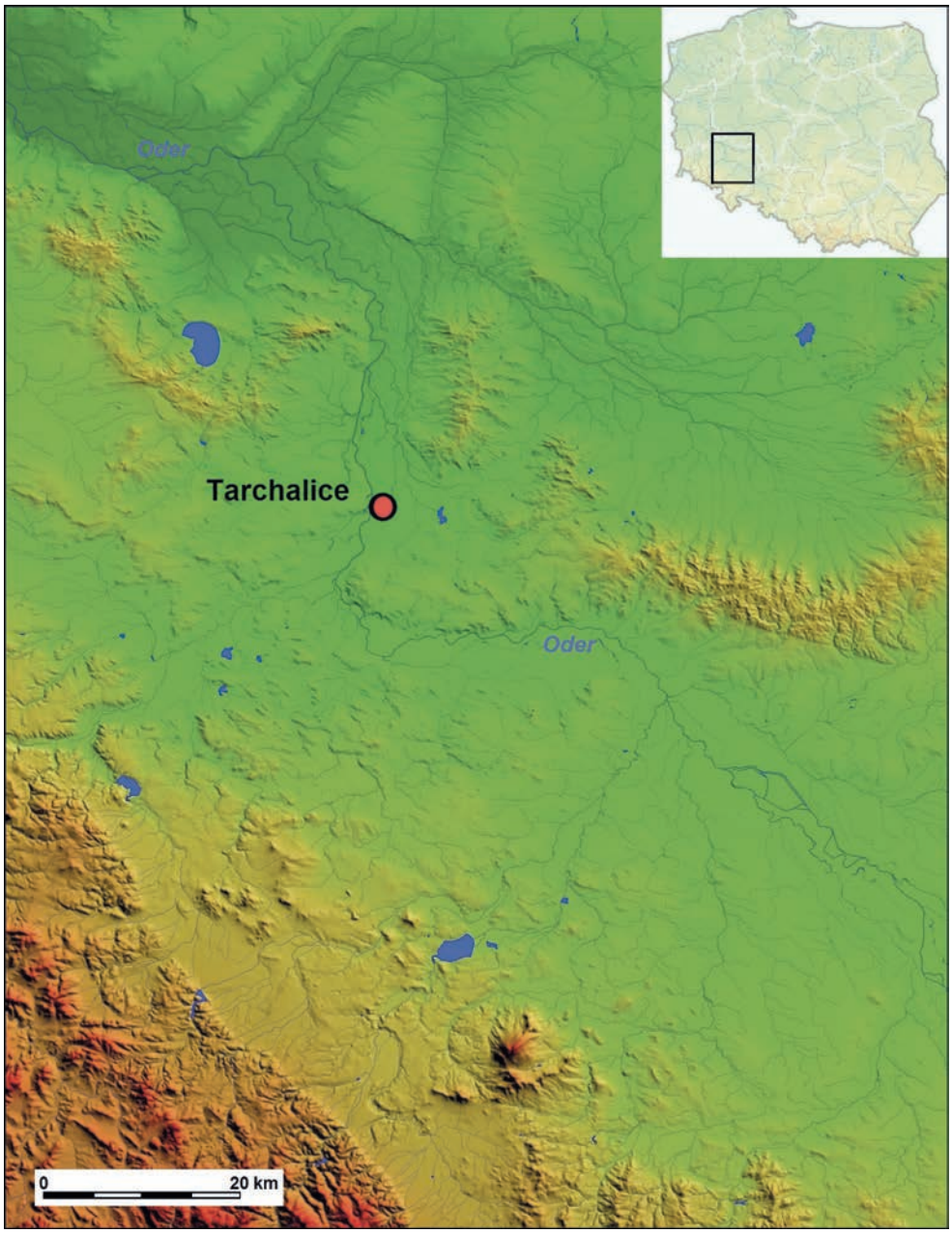


FIGURE 1. Tarchalice, Wołów Commune, Lower Silesia, Site 1. Location of the site. Elab. by M. Furmanek, P. Madera

(Weiershausen 1939, 101–103). This view persisted until the 1970s (Hołubowicz 1956, 211–212; Domański 1972, 432; 1975, 455–459), even though the slag-pit furnace had already been sufficiently well understood. The first reconstruction attempt after many years based on this furnace model was made by Radomir Pleiner (1965, 32). However, the structural scheme of the Tarchalice furnace that remains essentially valid today – including the hypothetical form of its shaft section – was only later presented by Kazimierz Bielenin (1973, 68; 1975, 174–187).

After World War II, excavations were undertaken several times by Polish archaeologists. The first took place as early as 1952 and, following the model of the early-20th-century investigations, also involved metallurgists. During this work, the remains of 47 furnaces were uncovered, including 36 excavated previously. At the same time, trial



FIGURE 2. Tarchalice, Wołów Commune, Lower Silesia, Site 1. View of the excavations in 1908. Photographic Archive of the Museum of Archaeology, Branch of the City Museum of Wrocław. Elab. by T. Gąsior

trenching challenged the idea of an exceptionally high density of such features across the entire site. A new general chronology was also proposed (albeit with some reservations) dating the furnaces to the Roman period and linking the bloomery production with communities of the Przeworsk Culture (Hołubowicz 1956, 207–214; cf. Domański 1972, 392–393). During subsequent excavations in 1960, a second cluster of furnaces was discovered, consisting of 22 features located several dozen metres south of the first one (Fig. 3). Because early medieval artefacts were also found, a concept emerged dating the furnaces to that period. This was further suggested by the lack of parallels with known Roman-period furnaces (Cehak-Hołubowiczowa 1960, 12–19; cf. Domański 1972, 393). The unresolved chronological issues led to renewed investigations in 1969, which resulted in the discovery of three additional furnaces, while the ceramic material provided grounds for dating the settlement, together with the metallurgical production, to the 2nd–3rd centuries CE (Domański 1972, 393, 434). Up to that point, excavations had been conducted exclusively within a narrow strip of land along the edge of the oxbow lake and covered an area of 1,278 m^2 (Fig. 3). In total, the remains of 73 bloomery furnaces were discovered, grouped mainly into two irregular clusters that may be described as medium-sized, disorganized slag-pit furnace clusters (Bielenin 1973, 79, 82). Along the edge of the oxbow, a few other production features were recorded, including four hearths interpreted as roasting hearths and charcoal piles, as well as a feature identified as a storage area (?) for roasted bog iron ore. The remains of a post-built residential structure were also uncovered (Domański 1972, 422; 2000, 190).

Researchers believed that the area of the site located further east of the oxbow was occupied by the settlement's residential zone. Archaeological investigation of this area was carried out only in 1998 as part of rescue and protective works following the catastrophic flood that had affected the village the previous year (Domański 2000, 189–197). During the research, conducted in three trial trenches – this time oriented perpendicular to the oxbow (Fig. 3) – a cultural layer and several dozen

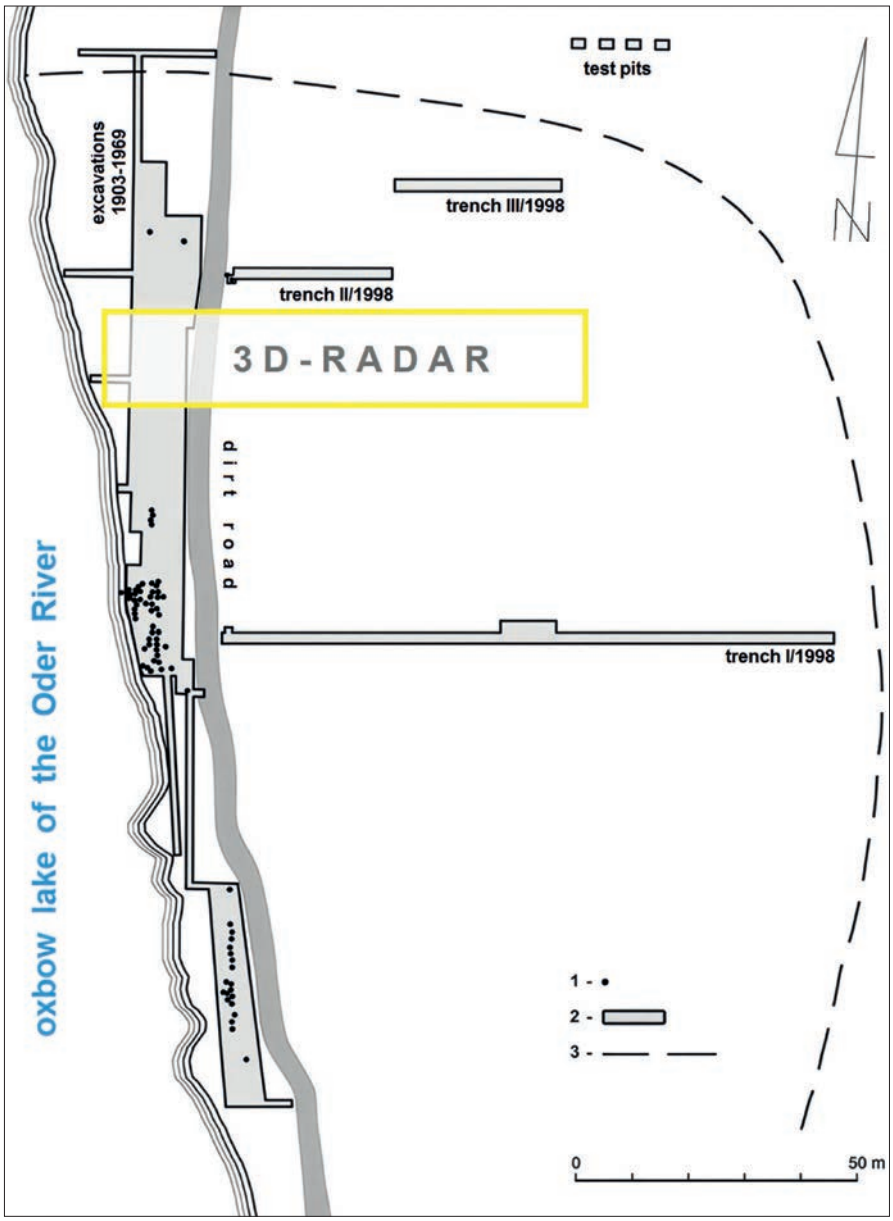


FIGURE 3. Tarchalice, Wołów Commune, Lower Silesia, Site 1. Distribution of trenches from 1903–1969 and trial trenches from 1998, together with the location of ground-penetrating radar surveys from 2008. Prepared by P. Madera, T. Gąsior. 1 – bloomery furnace; 2 – archaeological trench; 3 – presumed extent of the site

features of residential and utility character were identified, many of which were associated with the Przeworsk Culture. Among these features, traces of above-ground post-built structures and quadrangular stone hearths typical for the discussed period can be distinguished. A notable surprise was the uncovering of two additional bloomery furnaces in this part of the settlement (Domański 2000, 190–192). As a result of these investigations, the extent of the settlement to the north and east was also determined, allowing to estimate the occupied area at no less than 2 hectares (Fig. 3). Moreover, the ceramic material recovered significantly broadened the chronological framework of the Przeworsk

Culture settlement, spanning from the Late Pre-Roman period to at least the transition between phases C1 and C2 (Domański 2000, 194–195).

During the excavations conducted to date, the total area of the trenches amounted to 16–17 ares, thus not exceeding 10% of the settlement's total area. The inventory of movable finds from the Przeworsk Culture is relatively modest. In addition to several thousand fragments of ceramic vessels, a few clay spindle whorls and six loom weights were discovered. Artefacts made from other raw materials are very scarce and include a decorated bronze key for a wooden box and a small iron knife with a tang for a handle. The collection of artefacts related to metallurgical production includes fragments of bloomery slag found in the fills of certain features, within the cultural layer, and on the surface of the site. Apart from around a presumed storage facility, small lumps of bog ore were also scattered across the site (Domański 1972, 394–419; 2000, 192–195). It should be added that the location of ore extraction has not yet been established. What stands out among the movable finds is a deposit discovered accidentally in 2011 in the eastern part of the site. It consisted of several flat pieces of iron probably derived from forged iron bloom deposited in a small pit. However, due to the medieval origins of the village of Tarchalice, the dating of this find remains uncertain.

In 2008, non-invasive research using GPR tomography were also conducted on an area measuring 20 × 80 m of the northern part of the site, (Fig. 3). Application of a multichannel 3D-RADAR AS system revealed anomalies that may correspond to individual furnaces located in the vicinity of residential and utility structures (Madera 2014, 17, 19–20). This allows for a hypothesis that there were two production streams within the settlement: a team-based, large-scale iron smelting documented by the furnace clusters along the oxbow river, and 'domestic' production, intended to meet the individual needs of the smelters' families. It is difficult to determine at present whether these streams operated simultaneously or were chronologically separated and, if so what their order was.

All of the 75 bloomery furnaces discovered to date belong to the slag-pit-type furnace. The only remnants of them are the pits preserved to varying degrees, containing *in situ* slag structures. In the case of the best-preserved features, they contained complete, conical or cylindrical blocks of slag (Figs. 2, 4). The diameter of the blocks in the upper, more or less regularly widened part, the so-called 'cap', reached 85 cm (Domański 1972, 415–416). This resulted from the gradual partial melting of the clay lining of the slag-pit walls, together with the surrounding soil, by liquid slag accumulating in its upper part. Its original diameter, corresponding approximately to the internal diameter of the lower part (the base) of the shaft, ranged from just over 30 to nearly 70 cm. The depth of the slag-pits reached up to 130 cm (Hołubowicz 1956, 211). Their lower, and sometimes middle, sections were filled with extensive structures of solidified slag flows and droplets, while the bottom layer consisted of charcoal. For these reasons, some of the Tarchalice furnaces may be classified as devices with a 'very large' slag-pit. These are a characteristic class of features of the Silesian region during the Roman period (Madera 2008, 171–173, 193–194, 199). This classification is confirmed by the weight of some slag blocks, which exceeded 300 kg (Hołubowicz 1956, 211–212). Undoubtedly, the quantity of iron produced far surpassed the needs of the local community and was therefore intended primarily for trade purposes. At the same time, there is no source-based evidence to indicate that forging (refining) or smithing activities were also carried out at the settlement.

In addition to the exceptional size of the slag-pits and the weight of the slag blocks, the furnaces from Tarchalice are distinguished by a form of casing of the slag-pit walls that is unique across the entire region of *Barbaricum*. It consisted of vertical wooden stakes (rods) with a quadrangular cross-section and a thickness of 3–5 cm, arranged around the circumference in numbers ranging from a dozen to 21, coated with an approximately 10-cm-thick layer of clay containing a substantial admixture of chopped grass (Fig. 4) (Hołubowicz 1956, 211; Bielenin 1973, 55–56). This construction protected the walls of the spacious pits, dug in loose sandy–gravelly subsoil, from crumbling or spontaneous collapse. It also allowed for the transfer of substantial loads associated with the shaft section of the furnace. This solution became the basis for distinguishing a specific type of the slag-pit wall reinforcement and, consequently, a separate variant of the slag-pit type furnace (Bielenin 1973, 55, 74; 1983, 48, 59).

A characteristic feature of the metallurgical technique, related among other things to the



FIGURE 4. Tarchalice, Wołów Commune, Lower Silesia, Site 1. Slag block from Furnace 34 with clay lining of the slag-pit walls and negatives of wooden stakes (rods); the upper part of the block widened in the form of a so-called 'cap'. Photo by K. Bielenin

construction of the slag-pit walls, is also the presence of slag-pit channels, sometimes evidenced by cylindrical slag casts. Their function seems obvious, given the need to effectively dry the clay lining of the pit during the furnace construction stage. However, the possibility should also be considered that air was supplied to the slag-pit during the reduction process in order to improve the fluidity of the slag, or to support the burning out the filling of charcoal or brushwood before the liquid slag arrived (cf. Pleiner 2000, 158). improve the fluidity of the slag.

The use of slag-pits with above-standard dimensions – and thus shafts – to increase furnace efficiency required appropriate technological parameters, among other things by increasing the force of the air blast or the number of operating bellows. The routine execution of such smelts, despite exceptionally unfavourable ground conditions, made possible by reinforcing the walls of the slag-pits, testifies to the high adaptive abilities as well as the innovative nature of the local smelters. All this places the furnaces from Tarchalice at the pinnacle of achievements of metallurgical technique and technology beyond the borders of the Roman Empire.

In recent years, thanks to reports by the forest ranger Zbigniew Czeryba, two additional sites with furnaces of the discussed variant have been located less than 3 km from Tarchalice, to the south and southwest. In 2005, in the locality of Dębno, three upper parts of slag blocks of typical size and morphology were found in a secondary deposit (Madera 2014, 21–22; 2023, 136–137). In turn, in 2022, traces of iron production were discovered in the locality

of Domaszków (Madera 2023, 137–138). During small-scale excavations within a forest plantation area, two well-preserved slag-pits were uncovered, analogous to the features known from Tarchalice. Non-invasive investigations revealed the presence of a settlement there, dated on the basis of ceramic fragments to the 2nd–3rd centuries CE. The existence in each case of a clear 'workshop signature' in the form of the specific construction of the walls of the slag-pit, combined with its 'endemic' character, indicates that these installations were the work of one group of smelters (one bloomery workshop) originating from the local milieu – perhaps even members of one lineage. The more than 300-year span suggested by the artefactual dating of the discussed settlements certainly does not correspond to the actual period of production activity there. Rather, regardless of emerging organizational changes, its timeframe should be narrowed to approximately one to three generations.

The accidental nature of the discoveries made across an area that is currently extensively forested may indicate that we are dealing with only a small portion of the elements comprising a Przeworsk Culture settlement microregion where such production activities were carried out. According to territorial divisions, it lies in the central part of the Lower Barycz–Oder region of the Przeworsk Culture iron smelting, active throughout all phases of the culture's existence and shows the highest concentration of metallurgical remains in Silesia (Madera 2002, 63–64).

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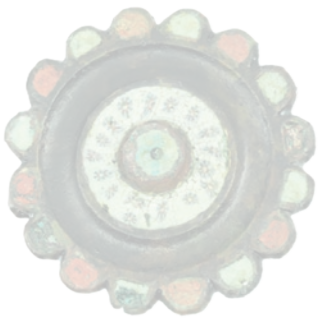
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KOCINA, SITE 2

Artur Błażejewski

Site 2 in Kocina, Ostrów Wielkopolski district, Greater Poland province, is located in the eastern part of the Barycz River basin, a right tributary of the Oder River. The area is covered with numerous sand dune hills, clearly visible in the landscape. The entire Barycz River basin is heavily irrigated, with the eastern part cut by numerous watercourses of various sizes. Interestingly, the phenomenon of bifurcation occurs there. The Barycz itself flows more or less along the W-E axis, and was certainly an important transportation artery.

The site is now covered with dense forest. It stands on a sand dune hill, the western slope of which just below the summit is divided into two parts by a small but clearly visible hollow. Nearby, on a flat area at a distance of about 1 km, there are three settlements, which together with the cemetery constitute one settlement complex (Błażejewski 2004; 2007, 314).

The Kocina 2 site is a cremation burial ground, dated to phases B2/C1 – C2 of the Roman period, i.e. the period from the middle of the 2nd century AD to the end of the 3rd century AD. The period of most intensive use of the necropolis falls in the second half of the 2nd century AD (Błażejewski 2007, 205–206).

The cemetery at Site 2 in Kocina was discovered in 2000 by archaeologist Marcin Paternoga, then a doctoral student at the Institute of Archaeology at the University of Wrocław. The very next year, a research team undertook excavations there, which lasted two seasons. Guided by experience from other similarly dated sepulchral sites from the Barycz River basin (Błażejewski2001), exploration was undertaken using a technique similar to that used at Stone Age sites, particularly Mesolithic. Exploration took place within individual metre squares of the site, removing and documenting successive layers of 2 cm thickness one by one. This resulted in a very precise survey of graves with complex stratigraphy (Błażejewski 2015).

It was not possible to survey the entire area of the necropolis due to forest cultivation – besides, a significant part of the sites had been completely destroyed at the time of the investigation. However, a fairly large strip of 5 by 125 metres wide oriented along an east-west axis was surveyed. As a result, two clusters of graves located on the western slopes of small sand dune hills were recorded. It can be concluded that the graves were established on the western slopes of the hill (Błażejewski 2007, 240).

Twenty-six grave sites were discovered, but most of them had a complicated stratigraphy. This is because they were, for the most part, stratified, layered graves, i.e. graves in which the burned remains of the deceased along with equipment (elements of clothing, grave gifts), also subjected to fire on the funeral pyre, were deposited in the form of a layer scattered on the ground surface or possibly in a small depression. It is the discoveries from Site 2 in Kocina and other cemeteries, located in the Barycz River basin, provided the basis for defining 'layer graves' as a specific type of cremation rite sepulchral features. It can be estimated that the original area of the cemetery may have been about 2 hectares.

In the course of the excavations, it was established that different layers of cremation burials, minimally different in terms of chronology, overlapped within individual features. This proves conclusively that we are dealing with burials of different people, perhaps related to each other or connected by other social ties. Careful exploration and documentation of the sites indicates that the layers were most often different in shape and

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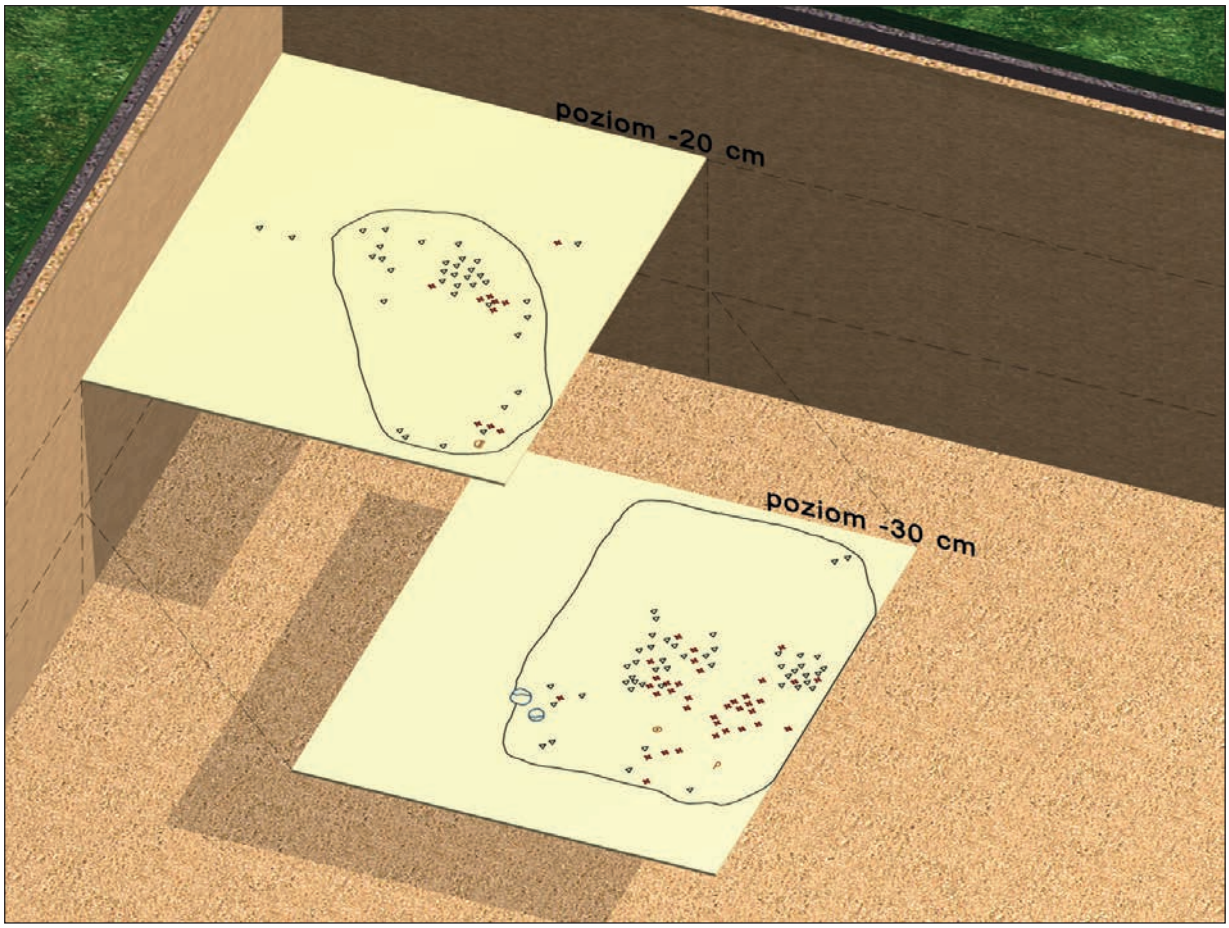


FIGURE 1. Kocina, Site 2. Layer grave No 8. Two levels of cremation. After Błażejewski 2007

thickness, and there were sometimes differences in furnishings (Błażejewski 2007, 36–43; 2015).

Only one of the burial features had a different form, but it in no way refers to typical graves of the so-called "Przeworsk Culture". Namely, it was a *bustum*-type object, in which the burned remains of the deceased were left at the cremation site. This is an extremely rare find in this part of European *Barbaricum*. Most likely, this object occupied a central place in the structure of the entire cemetery (Błażejewski 2007, 26–29, 222).

Similar graves are found in the area of *Barbaricum* far to the west, between the Rhine and Weser rivers. The *bustum* tomb, on the other hand, obviously refers to the Roman burial ritual. Sites of this type are found in large numbers in the Roman Empire, especially in the zone near the border: the Rhine and the Danube (Struck 1993).

The equipment of the 'layer graves' in Kocina is also unique. The inventories are dominated by intentionally fragmented pottery. It was possible to conclude that the vessels had already been smashed after the funeral pyre had been extinguished, because after the individual vessel fragments were glued together, it turned out that they were deformed specimens as a result of the high temperature. Numerous Roman imports were found in almost all the features. These included numerous fragments of vessels of the terra sigillata type, among which it was possible to identify specimens from Rheinzabern. Several fragments of terra nigra type vessels were also found. A very interesting and rare import is a sigillata type vessel from Argonne (so called *Argonensigillata*), marking the decline of the cemetery's use. Thus, this is a broad spectrum of ceramics that can be described as exceptional. Some of these vessels are extremely rare in this part of Barbarian Europe.

Glass beads and heavily damaged fragments of glass vessels, small fragments of unidentified

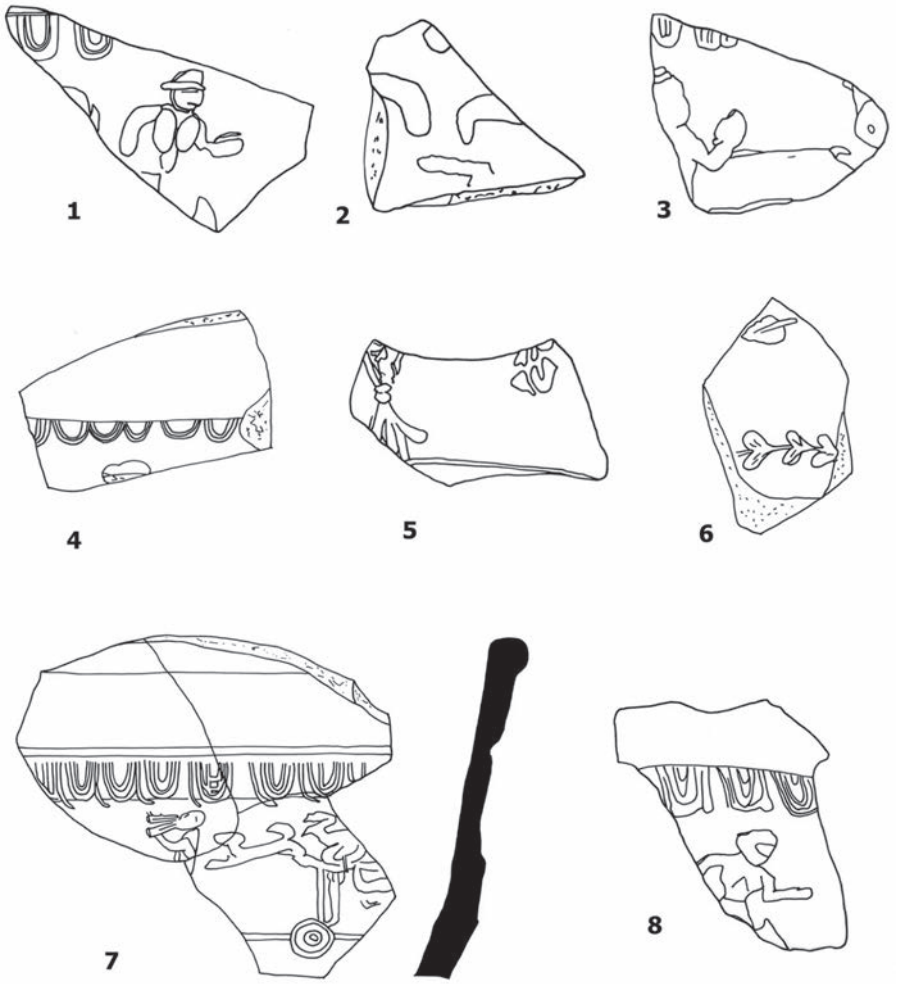


FIGURE 2. Kocina, Site 2. Fragments of terra sigillata vessels from layer graves. After Błażejewski 2007

bronze vessels were also found. All these artefacts were also brought from the Roman provinces. In addition, there were, of course, numerous items of clothing deposited in the graves: clasps, belt buckles. However, there were no militaria, with the exception of a knife, a bronze belt ferrule and a fragment of a bronze scabbard of a Roman dagger. For the 2nd to 3rd centuries AD Przeworsk Culture in the Oder River basin, it was the norm to deposit weapons in about 25% of the graves (Błażejewski 1998, 93).

Among the "barbarian" pottery, there were numerous fragments of vessels decorated in the fashion typical of the Rhine-Weserian Germanic environment. Thus, there were motifs resembling warts (nodules) and stamped, pseudo-brow motifs – probably imitating the appearance of containers woven from straw and wicker (Błażejewski 2007, 57–79; cf. Walter 2000).

For the Kocina 2 cemetery, it is characteristic that Roman imports and objects with West Germanic characteristics were found in all graves. Other cemeteries from the Barycz River Valley that have been studied in recent decades present a completely different picture. For example, at the Niezgoda 1 site (Błażejewski 1999), imports were found in nearly half of the graves, while at the Świętoszyn 10 cemetery (Błażejewski 2001), no imported artefacts were found at all (Błażejewski 2007, 80). All these cemeteries have a very similar chronology. Their use coincides with the greatest development of settlement in the Barycz River basin (Pazda 1980, 124–137; Godłowski 1985, 85; Błażejewski 2002). It should also be noted that these other cemeteries were dominated by grave goods of a local character, typical of the Przeworsk Culture in the Roman period. Particularly noteworthy here

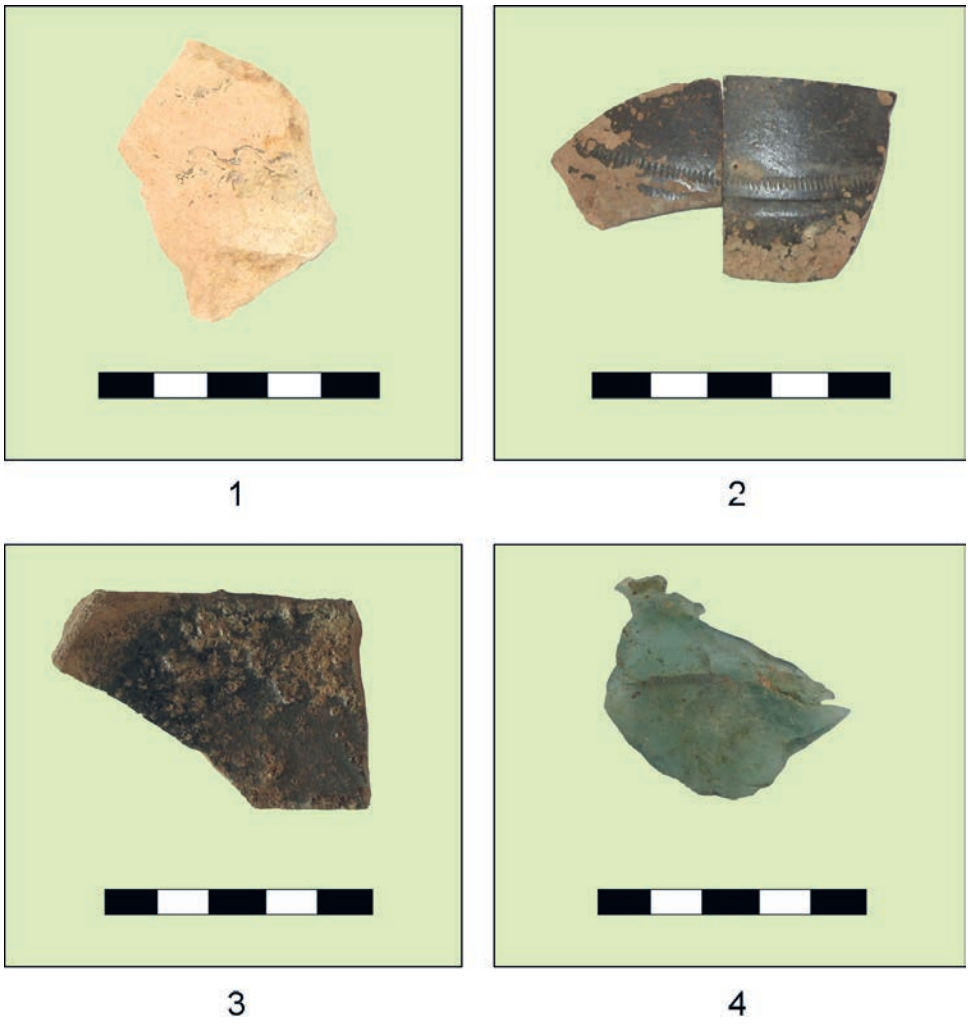


FIGURE 3. Kocina, Site 2. Fragments of Roman artefacts: 1 – terra sigillata, 2 – terra nigra, 3 – glazed vessel, 4 – glass vessel. After Błażejewski 2007

is the site of Świętoszyn 10. Thus, there is a clear correlation between the foreign form of the graves and the imported grave inventory. Therefore, it is possible that in the case of the Kocina 2 site we are dealing with an alien community that arrived in the area of present-day Poland from areas far to the west (Cf, Pazda 1984). It is also possible that this was a group of local people who migrated for some time and had close contact with tribes from the western zone of *Barbaricum* (Błażejewski 2011).

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BISKUPICE, SITE 1

Marcin Woźniak

The site covers an extensive area (approx. 6 ha), encompassing a slight elevation together with an adjacent part of the Zimna Woda river valley. Archaeological investigations have recorded evidence of settlement from all periods of human occupation. The most numerous finds are associated with a settlement of the Lusatian Culture functioning here during the late Bronze Age and the early Iron Age (along with a small accompanying grave field), and – above all – with an extensive settlement of the Przeworsk Culture dated to the Late Pre-Roman Iron Age, the Roman Period, and the early phase of the Migration Period. The assemblage from Biskupice also reveals a discernible settlement horizon of the so-called Jastorf Culture from the beginning of the Late Pre-Roman Period. The site has also yielded materials from the Neolithic (e.g. the Funnel Beaker Culture), the Early Bronze Age (Trzciniec Culture), as well as from the medieval and early modern periods, in addition to an extensive system of World War I trenches.

The results of the investigations at Biskupice have not yet been comprehensively published, and relatively little is known about the site's stratigraphy and spatial development. This observation applies to finds predating the Iron Age. Preliminary observations indicate that remains of the Przeworsk Culture settlement were recorded across the entire investigated area. Finds associated with the Lusatian Culture were located mainly in its eastern sector, on terrain situated above the flood terrace of the Zimna Woda. The line of World War I fortifications ran across the highest part of the site. Remains from individual settlement horizons overlapped, with features of later date occasionally disturbing those of an earlier chronology.

The site was discovered in 1971 during field survey investigations carried out as part of the *Archaeological Survey of Masovia and Podlasie* (Archeologiczne Zdjęcie Mazowsza I Podlasia), initiated by Stefan Woyda, then Regional Conservator of Archaeological Monuments for Masovia. It was identified through extensive surface concentrations of pottery sherds, daub, and iron slag visible on cultivated fields In 1973, the site was placed under heritage protection as a valuable source for the study of ancient iron metallurgy. Excavations commenced in 1976. Initially conducted as rescue investigations in advance of the construction of the A2 motorway, they subsequently evolved into fully developed research-oriented excavations. Fieldwork was carried out using the open-area method, typical of large-scale pre-investment archaeology. Research efforts focused primarily on achieving the most comprehensive possible recognition of the Przeworsk Culture settlement from the Late Iron Age, which was associated with evidence for large-scale iron production. Excavations were conducted over 14 seasons (1976–1986, 1990–1992), resulting in the investigation of approximately 31,500 m^2 (about half of the estimated total site area) and the discovery of several tens of thousands of archaeological features.

From the outset, excavations were accompanied by a wide range of non-invasive and specialist studies. These included large-scale magnetic surveys; aerial archaeological investigations, including analyses of infrared, panchromatic, and spectrozonal imagery; and advanced geological research aimed at reconstructing the environmental conditions of settlement and the raw material base of metallurgical production (e.g. the location of ore and clay deposits). Numerous specialist analyses

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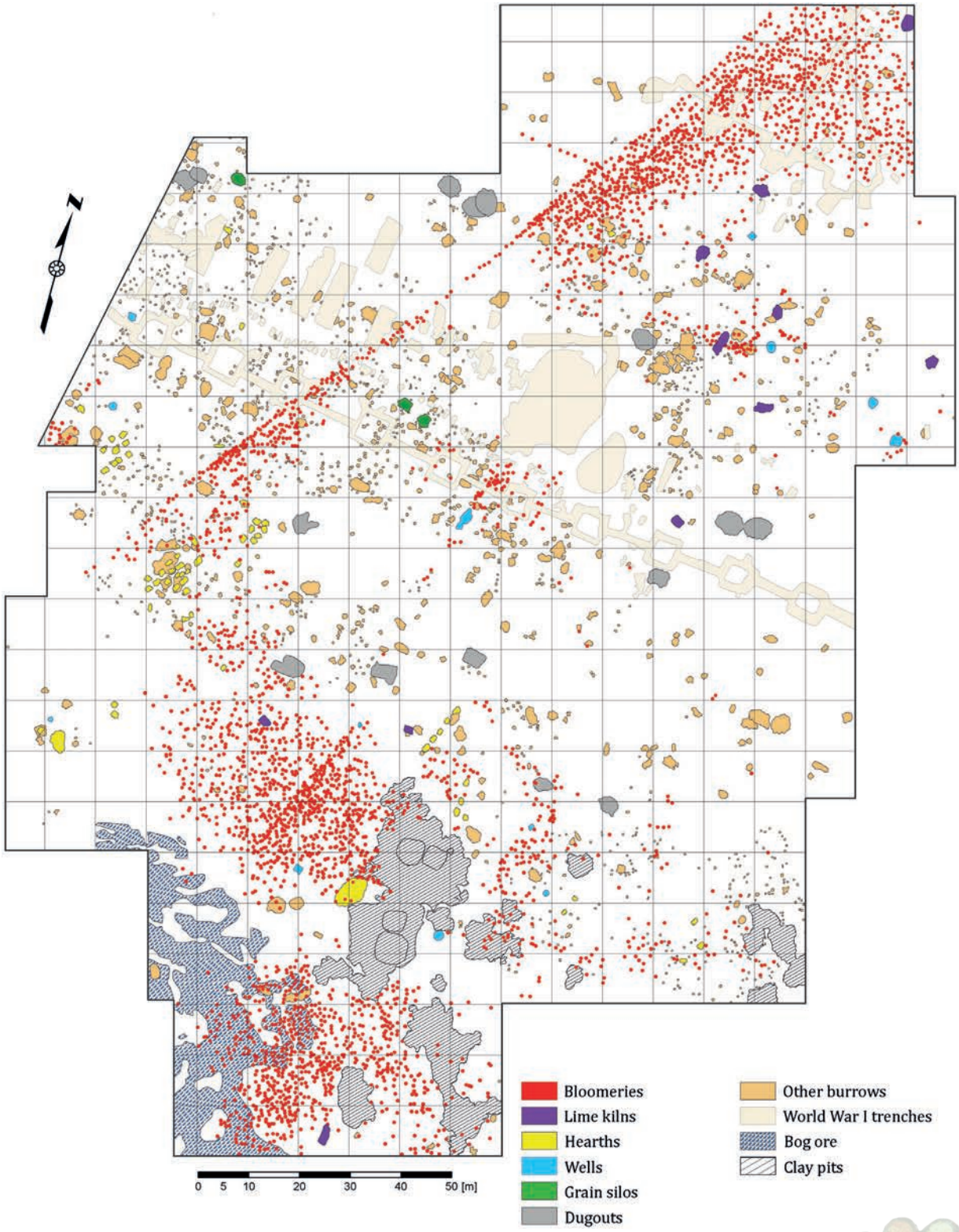


FIGURE 1. Biskupice, Pruszków County, Masovian Voivodeship, Site 1. Site plan



FIGURE 2. Biskupice, Pruszków County, Masovian Voivodeship, Site 1. Research in 1976. Photo by S. Syndoman



FIGURE 3. Biskupice, Pruszków County, Masovian Voivodeship, Site 1. Research in 1976. Exploration of the furnace in sector 3. Photo by S. Syndoman



FIGURE 4. Biskupice, Pruszków County, Masovian Voivodeship, Site 1. Research in 1976. Sector 3 – furnaces. Photo by W. Jabłosiński



FIGURE 5. Biskupice, Pruszków County, Masovian Voivodeship Masovian Voivodeship, Site 1. Research in 1978. Sectors 10 and 11, view from the N-E. Photo by T. Biniewski



FIGURE 6. Biskupice, Pruszków County, Masovian Voivodeship, Site 1. Research in 1992. Trench I. Object 70. Photo by S. Woyda

were also conducted on the movable artefacts, particularly those directly associated with iron production. These studies sought to reconstruct local metallurgical technologies and smelting techniques. The examined materials included, among other things, the remains of bloomery furnaces (e.g. fragments of furnace shafts), metallurgical waste (including physicochemical analyses of slag), and artefacts related to the post-reduction stages of iron production.

Until recently, the Przeworsk Culture settlement at Biskupice has been the best-recognised site within the so-called Masovian Metallurgical Centre. The wide range of immovable features of diverse function, the richness of the finds assemblage and the long duration of occupation (Phases A2–D1, c. 2nd century BCE to 5th century CE) make the results of research at this site a fundamental source for understanding the nature of local settlement systems.

Investigations at Biskupice have confirmed what was previously hypothesised on the basis of field surveys, the internal spatial division of settlements within the Masovian metallurgical hub into two zones: a residential-economic zone and a more or less distinct production zone. The residential-economic zone was situated in the higher parts of the site, above the river valley. It comprised structural remains such as post-built houses, semi-subterranean buildings, pit-houses, wells, and numerous storage pits, some of which were used for grain storage. The movable finds recovered from building remains, such as loom weights and waste from amber working, indicate that craft activities were carried out within the residential zone, particularly



FIGURE 7. Biskupice, Pruszków County, Masovian Voivodeship, Site 1. Research in 1992. Exploration of objects in trench I. Photo by S. Woyda

in the sunken-featured buildings. Industrial activity, however, was spatially separated from this zone. Within the production zone, nine lime kilns and numerous hearths were recorded, but above all installations related to iron production. Excavations at Biskupice revealed features that allow reconstruction of nearly the entire production process, from the preparation, sorting, and roasting of ore to the smelting stage. The latter was carried out exclusively in single-use bloomery furnaces of the slag-pit type. The remains of nearly 3,700 such furnaces were investigated at the site. They were grouped into clusters forming extensive complexes, each consisting of several dozen to several hundred installations. In terms of internal structure, two types of so-called "unorganised" furnace fields were identified. The first consisted of clusters with a chaotic arrangement and indistinct boundaries (generally circular or oval), while the second – highly characteristic of Masovian metallurgical settlements – comprised elongated clusters with clearly defined boundaries (in this case, particularly on the northern side), beyond which metallurgical activity was essentially absent.

Iron production was most likely based on local bog iron ores (limonite), extensive deposits of which were identified in the southern part of the site within the Zimna Woda valley. Adjacent to these were large clay extraction pits, probably exploited, among other purposes, for the construction of furnace shafts. No evidence of charcoal clamps was identified at the site; therefore, it is therefore a possibility that the charcoal used as fuel in smelting was transported to the site in a ready-made form.

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POKRZYWNICA, SITE 1

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The settlement-metallurgical complex of the Przeworsk Culture from the Roman Period in Pokrzywnica is located in the very centre of the Świętokrzyskie metallurgical region, about 9 km northeast of the Łysogóry Mountains. It occupies the middle and lower parts of a loess promontory with a north-eastern exposure, descending into the valley of the Pokrzywianka River, which (via the Świślina) feeds into the Kamienna River. From the south, the landform is bounded by the valley of a small watercourse flowing into the Pokrzywianka, which originally ran at the foot of the promontory. During the period between the World Wars, as a result of flooding, the main river channel was shifted about 200 m to the east.

The site has been known since the 1960s, when it was discovered by K. Bielenin. Back then, only a surface survey was carried out, and it was not until the late 1980s that the site was selected for rescue excavations in connection with the construction of the "Wióry" reservoir. Regular excavations began in 1993. The metallurgical settlement in Pokrzywnica is among the best-investigated sites of this type within the Świętokrzyskie metallurgical centre. During nine excavation seasons conducted between 1993 and 2002, an area of nearly 32 ares was explored. Fieldwork was carried out within six larger trenches and several smaller test pits, mainly in the eastern part of the settlement.

A detailed discussion of all aspects of the research conducted here goes beyond the scope of this study. Therefore, we will limit ourselves to presenting several of the most important issues related to metallurgical production and its relationship with the settlement zone. Previous levels of investigation at this type of site rendered such analyses impossible. As a result of the exposure of a relatively large area, larger clusters of furnaces were identified, referred to as so-called slag-pit cluster sites (cf. Bielenin 1992, 125–126; Orzechowski and Wichman 2006, 81). It was determined that these complexes consisted of production workshops, known as slag-pit clusters, which vary in size and layout. New research opportunities also arise from the analysis of datable material, especially metal artefacts, whose previous absence significantly hindered the establishment of a reliable chronology for metallurgical sites. However, the most important aspect of these investigations was the discovery of evidence for previously unrecognized post-reduction phases of the metallurgical process, associated with the initial working of raw iron sponge.

Surface investigations carried out since the late 1980s have shown that, alongside individual metallurgical workshops, there were also large settlement-production complexes in which numerous furnace clusters were established on the outskirts of settlements. A case in point is the site at Pokrzywnica where the relationship between these elements has been confirmed through excavations.

The archaeological evidence suggests the existence of at least two settlement phases in the history of this site. The older phase, associated with the Early Roman period, occurs in the western and north-western parts of the examined area and shows clear connections with the slag-pit clusters located there. The younger phase, dated to the Middle and Late Roman periods, is attested in the eastern and southern parts of the settlement and includes the outskirts of the aforementioned promontory. A clear feature distinguishing these two phases is the presence of "grey" pottery, which represents a significant share of the ceramic material in the eastern and southern parts of the site, while it is virtually absent in the western section.

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The western part of the site, where large quantities of bloomery slag occur, was subjected to geophysical investigations in 2000 using a proton magnetometer. Across an area of approximately 4.5 hectares, nearly 70 magnetic anomalies of varying size and intensity were recorded, indicating the presence of large concentrations of bloomery slag. Excavations were carried out on two of these anomalies, uncovering eight furnace complexes (slag-pit clusters), comprising a total of 383 pits, 12 metallurgical hearths, 9 pits of indeterminate function, and 5 large structures probably serving as dwellings (Fig. 1). The spatial arrangement of the slag-pit clusters in relation to the potential dwellings suggests that their periods of use were probably separated by a short interval, although it cannot be ruled out that some of the more distant metallurgical workshops were contemporary with the houses.

The total number of furnaces uncovered across the entire site now amounts to 466. However, the large number of magnetic anomalies recorded in the north-western part of the settlement suggests that several thousand of these structures may once have been in operation there. Alongside the large, organized slag-pit complex (Complex 3 – 140 furnaces), there are medium-sized two-line clusters (No. 4 – 25 furnaces; No. 6 – 40 furnaces; No. 8 – 42 furnaces (though part of this area of the site has been destroyed); No. 9 – approx. 47 furnaces). There were also medium-sized (No. 5 – 33 furnaces) and small (No. 10 – 8 furnaces) unorganized furnace clusters (cf. Fig. 1).

The layout of the 140 metallurgical structures of Complex 3 appears to reflect a somewhat disrupted organization, forming three rows of sequences of three- and two-unit arrangements (3×3×2). The other organized furnace complexes consist of two-line arrangements built from rows of two- and three-unit sequences. It should be emphasized, however, that unlike classical two-line furnace clusters, the layout of the furnaces here is irregular and, in some places, disrupted.

In addition to the clusters mentioned above, grouped within a relatively small area, two other slag-pit groupings located at some distance from this zone were also investigated: Cluster 1 –organized (2×3×4) with 65 furnaces, and Cluster 2 – unorganized with 18 furnaces. From this slag-pit cluster, a block of loess weighing approximately 5 tons was extracted, containing four perfectly preserved pits (Fig. 2). The specimen is currently housed at the J. Pazdur Museum of Nature and Technology in Starachowice and has undergone detailed metallurgical and mineralogical analyses (Orzechowski et al. 2016).

Near the slag-pit clusters, a group of features was recorded in the form of various types of sunken metallurgical hearths containing bowl-shaped slag pieces, as well as other types of material attributed to the metallurgical process, including slag debris and remnants of the shaft lining of some unidentified metallurgical structures. These features are located on the outskirts of the production zone and most likely formed a single functional complex with it.

Of special interest are the hearths that probably functioned as annealing furnaces, associated with previously unknown post-reduction stages of the metallurgical process. These were partially sunken pits with low shaft linings made of thin walls. At Pokrzywnica, at least three types of such features can be distinguished. They differ not only in size and shape but, above all, in the type of material contained within them (Fig. 3).

The most interesting are the features in which bowl-shaped slag elements occur *in situ*, represented for example by Pits 174, 192, 195, and 198. They are clustered at some distance (from several to several dozen metres) from the slag-pit concentrations, nearer the residential features. These are pits with diameters of 170–220 cm and depths of 50–70 cm, with almost vertical side walls and flat bottoms. The walls show traces of intense burning reaching depths of 2–4 cm and, in sporadic cases, even 5–7 cm (Features 174, 198). These features contained bowl-shaped slag elements of various sizes weighing from several dozen to over 200 kg, as well as from several dozen up to nearly 100 kg of slagged thin wall fragments from the above-ground shaft superstructure. The installations were probably powered by a bellows placed in a shallow adjacent pit (Features 189, 199). The bellows supplied air through a massive nozzle with a centrally positioned opening about 2.5 cm in diameter.

As already mentioned, these features are interpreted as reheating furnaces, where the simultaneous carburization and partial melting of raw iron sponges (originating from several or even a dozen smelting furnaces) may have been carried out. It should be noted that the bowl-shaped slag pieces found in these features are more massive and heavier than the examples discovered in the

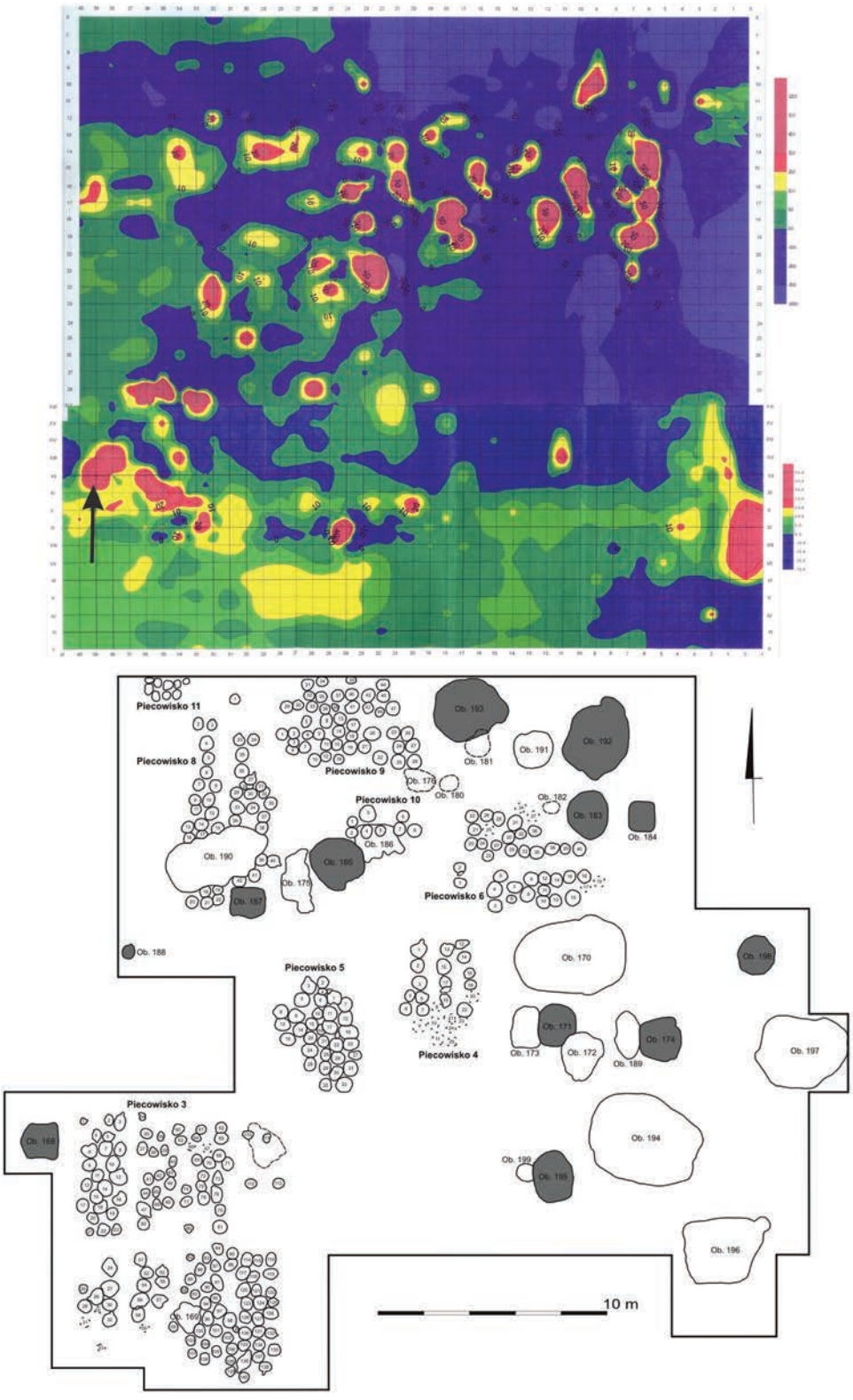


FIGURE 1. Pokrzywnica, Pawłów commune, Świętokrzyskie Voivodeship, Site 1. Magnetic anomalies corresponding to the location of individual smelting furnaces on the western outskirts of the settlement. Below is a plan of the archaeological excavation established within one of them (marked with an arrow). After to Orzechowski 2006



FIGURE 2. Pokrzywnica, Pawłów commune, Świętokrzyskie Voivodeship, Site 1. Furnace no. 2 with furnaces intended for transfer as a museum exhibit (nos. 1, 13, 14, 15). Photo by S. Orzechowski



FIGURE 3. Pokrzywnica, Pawłów commune, Świętokrzyskie Voivodeship, Site 1. Feature no. 168. Photo by S. Orzechowski

eastern part of the settlement. They typically reach sizes of about 10–20 cm, although specimens exceeding 25 cm in diameter also occur, with weights reaching up to several kilograms (Figs. 4: 11, 12).

The issue of the so-called post-reduction phases in the bloomery process, as well as the interpretation of the bowl-shaped and tap/channel slags formed as a result, has been the subject of several studies (Suliga, Orzechowski, Góra, Cieśla, 2004; Orzechowski, Suliga 2025).

The presence of various types of metallurgical hearths associated with the slag-pit cluster, and above all the occurrence of different kinds of amorphous, channel, and bowl-shaped slags (difficult to link directly with the reduction stage) suggest that after the initial "knocking off" or preliminary cleaning of the bloom at the furnace site (as indicated by the gromps found there), it was taken to the settlement area for further processing. This clearly requires further research and discussion, and the remarks presented here serve only as an introduction to this interesting issue.

Determining the chronology of iron-smelting sites in the Świętokrzyskie Mountains faces serious difficulties due to the lack of datable finds. The slag-pit cluster at Pokrzywnica, located on the outskirts of the settlement, offers much greater possibilities in this respect. Material from the slag-pit clusters represent the same types of pottery as those found in the houses. The presence of vessels with gently S-shaped profiles alongside forms with biconical bodies and sharply carinated shoulders, as well as cups with outward-curving rims, allows for dating thereof to the transition between the Early and the Late Roman Period.

These findings are confirmed by a strongly profiled fibula with a triangular foot, discovered in the upper layer of slag-pit cluster No. 5. Forms similar to Almgren forms 70 and 73 are very rare north of the Carpathians and occur primarily in the Roman provinces, especially Pannonia Superior and Noricum. It is assumed that specimens found north of the Carpathians probably reached these areas before the Marcomannic Wars. A very interesting coil brooch discovered in House 194 can be dated in a similar way; it shows certain features of Series 9 of Almgren's group V, referring to Types 132 and 137. These should be dated to the later part of phase B2 and phase C1a. Unlike a similar fibula from Nadkole, the example from Pokrzywnica is made of iron (Orzechowski 2006, 54).

A completely different situation has been observed in the eastern part of the settlement, located on the edge of a promontory cutting into the valley of the Pokrzywianka River. Over an area of nearly 23 ares, about 70 features were excavated, mainly associated with the post-reduction activities mentioned earlier. This is evidenced by large quantities of various types of amorphous and bowl-shaped slags found in the fills of almost all pits. These are clearly smaller than those from the western part of the settlement (Fig. 4: 1–10).

These materials were the subject of detailed metallographic and chemical analyses conducted by French specialists, which indicate that they represent the remains of one of the stages associated with the refining of iron sponges (see Fluzin 1998; Ploquin 1998). The issue is not entirely clear, however, because of a lack of other elements typically accompanying this activity, such as gromps, mill scale, metal waste, or more diagnostic types of slag.

Among the more interesting finds are four fragments of terra sigillata vssels. Two of them (of form Dragendorff 37?) were probably produced in the workshop at Pfaffenhofen. Particularly noteworthy is a type of bead made from this kind of vessel. The best-preserved fragment most likely comes from the workshop of HELENIUS in Westerndorf. All are dated to the first half of the 3rd century. In addition to the terra sigillata fragments, eight pieces of glass vessels were discovered at Pokrzywnica, including a fragment of a glass beaker decorated with blue enamel, probably representing Type 189 or 190 of Eggers. The list of Roman imports is completed by two denarii of Antoninus Pius and Faustina the Younger (Orzechowski 2006, 59).

In the overall context of ancient metallurgy in the Świętokrzyskie region, the research conducted at Pokrzywnica enjoys a particularly important position. It provided valuable information on the existence of large settlement-production complexes and the relationships between the residential and production areas of the settlement. In the process, a substantial amount of material was recovered, including pottery, metal artefacts, and various imports, reflecting the extensive contacts of the communities inhabiting the Świętokrzyskie Mountains during the period in question. Finally, the investigations at Pokrzywnica revealed previously unknown traces of the post-reduction phase in the bloomery process in this area.

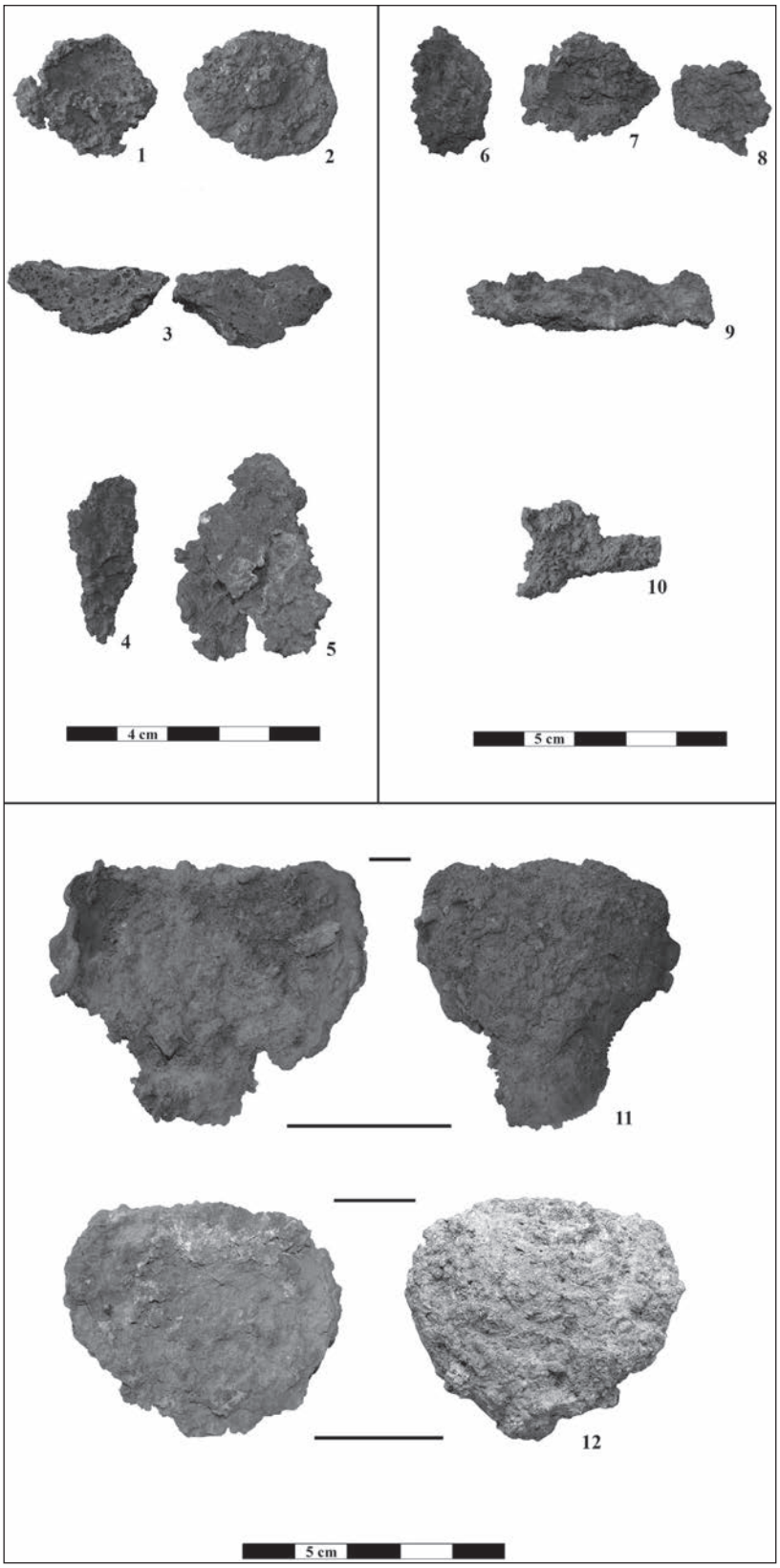


FIGURE 4. Pokrzywnica, Pawłów commune, Świętokrzyskie Voivodeship, Site 1. Bowl-shaped slags from the eastern (1–10) and western parts of the site (11–12)

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