BEYOND URNFIELDS

New Perspectives on Late Bronze Age – Early Iron Age Funerary Practices in Northwest Europe

Edited by
Helene Agerskov Rose, Lisbeth Christensen
and Arjan Louwen

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Between the Urnfield culture and the Nordic Bronze Age. Man and environment in the Late Bronze Age on the southwestern Baltic coast

Katarzyna Ślusarska

Keywords: Late Bronze Age, environmental and settlement data integration, Szczecin Lowland

Abstract: This chapter evaluates the Lower Oder Lowlands' material finds and settlement pattern characteristics relating to the palaeoenvironmental factors in the Late Bronze and the Early Iron Ages (from the late 2nd millennium until the first half of the 1st millennium BC). The timeframe covers the development of classical traits of the so-called 'West-Pomeranian', 'Usedom-Uecker' and subsequent Göritzer groups of the Maritime Urnfield culture. According to traditional periodisation, this period comprises the Bronze Age from the late Period IV/early Period V until the final Period VI, which means the end of the 2nd and first half of the 1st millennium BC in calendar chronology. The Szczecin Lowland environment of the first half of the 1st millennium BC shows signs of human impact, manifested mainly by forest clearances. Existing societies seem to have continued the earlier 'Late Bronze Age' strategies regarding subsistence economy and settlement patterns. Transformations of the burial practices are not as evident and rapid in the Szczecin Lowland as in East Pomerania or the southern part of the European Plain. Even in Bronze Age Period VI, signs of the environmental crisis caused by the abrupt climate change in the first half of the 1st millennium BC do not seem to be visible in the Szczecin Lowland, according to available data.

Introduction

Some archaeologists use the terms 'Urnfield circle' and 'Nordic circle' to describe archaeologically observed entities within the late 2nd and early 1st millennium BC in central Europe and southern Scandinavia, respectively. In short, both traditions differ regarding material culture, funerary tradition and settlement organisation. The Urnfield circle (or culture) can be characterised by the presence of vast cemeteries containing flat cremation graves with grave pottery and a minimal amount of metal objects. The pottery is biconical in shape, which applies to both settlement and burial ware. The most characteristic features of metal object styles are modest ornamentation, riveting as a joining method, and modelling bars or wires to obtain a final product (Kaczmarek 2017).

In the Nordic Bronze Age, cremation is present, and its role in the funeral rites increases towards the end of the Bronze Age. Cremation becomes more popular than inhumation during the later periods of the Bronze Age, with an increase in the number of flat graves. The metal production style is very elaborate regarding the form of objects and the specific ornamentation. The predominant technique was casting, even for joining separately cast parts of an object. The ornamentation includes

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abstract, mostly spiral, decoration and narrative motifs. In contrast, the pottery style was far from elaborate (Thrane 2013).

The southern zone of the European Plain and European uplands north of the Alps is understood as a region of the Urnfield circle, and southern Scandinavia and northern Germany as the core region of the Nordic Bronze Age. However, the northern Baltic zone fits neither of these perfectly (see Kneisel et al. 2019; Dzięgielewski, this volume).

This chapter evaluates the material finds of the Lower Oder Lowlands according to the artefacts and the palaeoenvironmental factors in the Late Bronze and the Early Iron Age (from the late 2nd millennium until the first half of the 1st millennium BC).

Chronological and spatial framework

This chapter covers the chronological frame from the late Period IV/early Period V of the Bronze Age until the final stage of the Bronze Age (Period VI). For Pomerania, the term 'Final Bronze Age'/ Period VI reflects this transition period's main trait better than the term 'Hallstatt C and D' traditionally applied in Polish archaeological literature (Ślusarska 2022).

The study area comprises the Szczecin coastland around the Szczecin Lagoon, the lower Oder, and the areas adjacent to the Bay of Pomerania (Fig. 1). The western limit is the contemporary Polish-German border, along the River Oder. The decision on this delimitation has been made due to difficulties in comparing surface surveys on both sides of the border. However, this applies only to analyses of the archaeological material. Four palynological cores (Ahlbeck Lake) from German territory are included here. The coring places are situated only up to 5 km west of the border, and these four cores supplement information on the vegetation change in the Ueckermünde Heath region, sometimes referred to as Police Plain (German: *Ueckermünder Heide*). Poland and Germany have unique surface survey programmes, but they are built on different principles and thus are hardly comparable. Considering the archaeological material from the adjacent regions of Germany would distort the picture of the cultural situation, and for this reason these materials remain outside the presented study.

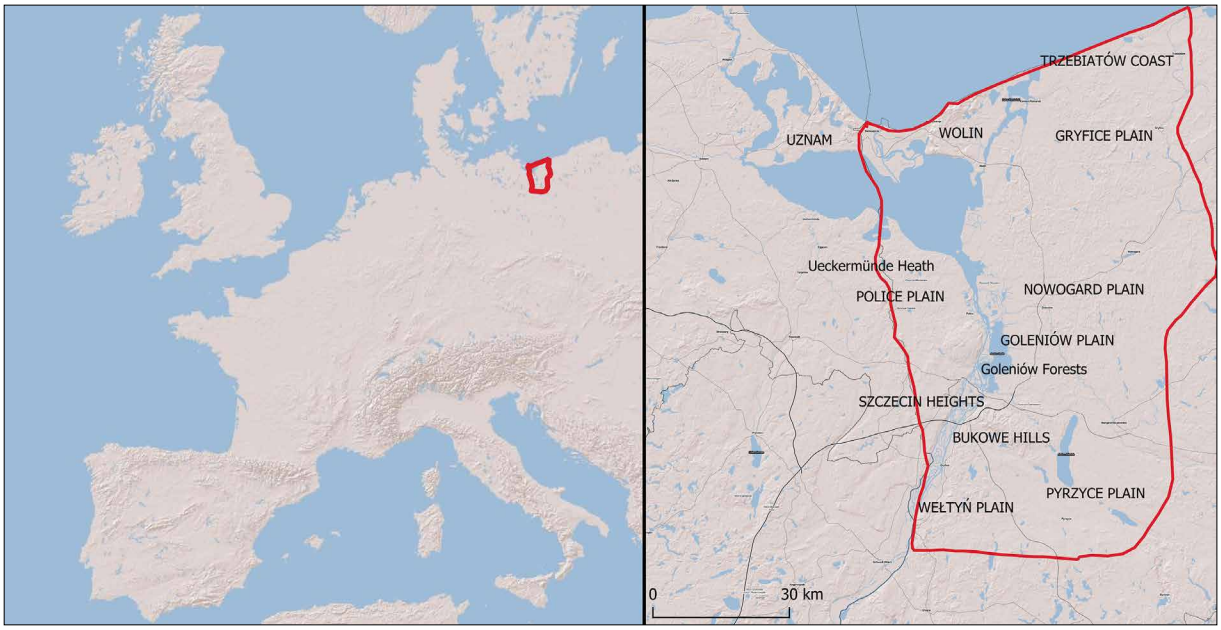


Fig. 1. The study area in the Polish Szczecin Lowland (map K. Ślusarska; basemaps: ESRI Shaded Relief, ESRI Stamen Toner Hybrid obtained through QuickMapServices QGIS plugin; map data © 2022).

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The northernmost part of the study area consists of the Trzebiatów coastland up to the Rega river mouth, including the islands of Uznam (German: *Usedom*) and Wolin. The Gryfice and Nowogard plains limit the study area to the east. South of this coastal area, the eastern border is less clear. The natural boundaries are represented by the margins of the Ińsko Lakeland and the Łobez Uplands. Furthermore, the northern course of the River Rega, north of Lisowskie Lake, also forms the limit. The Szczecin Heights and the Bukowe hills on both sides of the lower Oder River delimit the southernmost part of the study area. The landscape of these regions has been completely transformed over the last two hundred years.

Environmental conditions: Geological history, hydrology, soils and their formation

The Szczecin Lowland is situated on the fringes of the Palaeozoic platforms of west and central Europe. Before the Quaternary, the region was intensively shaped by the successive transportation and deposition processes resulting from the Fennoscandian ice cap dislocations. Pleistocene layers are made of till, sand, gravel, loam, and silt (Augustowski 1977, 14–28). Water availability and geological background were the main factors affecting the forest types and their pace of expansion. Pine forests covered the sandy soils. The oak forests, with an increasing occurrence of hazel, elm, lime and maple, developed on glacial tills (Borówka 2005, 14–15).

The Szczecin Lowland landscapes vary depending on the region. To the north is the seashore, which is formed out of the relics of a frontal moraine and dunes, while there is a range of moraine upland behind it (e.g. the Gryfice Plain). Regions with terminal moraines have an undulating relief. Highlands have substantial differences in heights in some areas. The Pomeranian glacial valley (German: *Urstromtal*) extends on both sides of the Szczecin Lagoon – the Oder mouth and Międzyodrze region. Here, on the sandy terraces that are raised above wet meadows, small patches of woodlands have survived today as the Goleniów Forest and the Ueckermünde Heath (Borówka 2002, 7–22).

The soils in the region are highly diverse, which impacts their agricultural suitability. Most are young soils formed on the moraines in the Late Pleistocene and the Early Holocene. Therefore, denudation and erosion processes have not had enough time to sort and wash out the bedrock. The soils of the Szczecin coastland are closely linked to climatic conditions as well as vegetation. Podzols are presently the most predominant soil type. Marsh soils, distributed in a mosaic-like fashion, are mostly found in the Oder Valley and on the shore of the Szczecin Lagoon. The best, most fertile soils (brown and black soils) are the less frequently represented ones within the region. Tiny patches occur in the south, next to the Miedwie and Płoń Lakes. However, black soils are also located in the north, near Kamień Pomorski (Piszczek 1960, 91–101). The regions with the most fertile soils have undergone the most substantial agricultural modification over the last two centuries, including complete deforestation and melioration, which also changed the water regime.

The water conditions in the Szczecin Lowlands are also very diverse, but their present appearance may not reflect the past situation. It can be assumed that the water system must have been more extensive in the Late Bronze Age and the Early Iron Age than now. Since the 19th century, many previously-existing water bodies and marshes have been drained. The Oder once was an anastomosing river running through its broad, boggy valley, which was overgrown with reeds before 19th-century regulation (Borówka 2002, 80–81).

The Szczecin Lagoon is the largest water basin within the study region; it is a relatively shallow lagoon connected to the Baltic Sea through the Piana, Świna and Dziwna straits. It is a brackish body of water, because the periodic inflow of seawater through the narrow straits is limited, while the annual freshwater influx is quite large. The low salinity of the shallow reservoir causes the lagoon to be

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covered in ice throughout the winter. During average winters, the ice appears late in December and lasts until late March (Borówka 2002, 74).

Due to climatic conditions and large water retention capacities in wetlands and lakes, there are no severe seasonal fluctuations in the rivers (Augustowski 1977, 85–102; Borówka 2002, 78–88). More substantial fluctuations are registered only in the River Oder, transporting snow melt waters from southern Poland. If its water level should rise from the backwater, the low-lying regions around the Szczecin Lagoon may be flooded (Borówka 2002, 78–80). Apart from the main rivers, some smaller watercourses flow through the region. However, due to drainage, their beds have also been significantly changed. Some of them are presently completely dry. There are several bigger lakes: Miedwie, Płoń, Koprowo, Gothensee, and Liwia Łuża. Many smaller bodies of water have turned into peat bogs over the last two thousand years in regions where the water level has decreased (Augustowski 1977, 85–102; Borówka 2002, 88–101). More water was retained in the Late Bronze Age and Early Iron Age in water bodies, marshes, and forests. Nowadays, the main problem is 'drying up', caused by water basin overregulation, reduced water retention in deforested lands, and strong winds over the region.

The climate of the Szczecin Lowland in the past and present is influenced by two factors – polar-marine air masses from the northern Atlantic and the Baltic Sea and the impact of the Szczecin Lagoon. Pomerania, including the Szczecin Lowland, belongs to the temperate climate zone (Augustowski 1977, 71–82). The flow of western air masses is due to the western and southwestern winds prevailing at this latitude. This results in cool summers (due to high precipitation and cloud cover) and mild winters with relatively high temperatures and rain. Even though the period of slow vegetation growth during winter is relatively short, the periodic air inflow from the Atlantic in winter causes alternate spans of cold/frost and warmth/thaw, which can be hazardous to early-germinating plants (Borówka 2002, 57–66; Czarnecka 2005, 83). For crops, frost can be disastrous and lead to reduced harvests. This might be the main element in diminishing the region's potential for agricultural activities.

The weather in the Szczecin Lowland varies on the microclimate scale in relation to the relief and vegetation. There are individual microclimates within terrain depressions (valley floors, glacial tunnels); usually, the wind is minimal, but there are higher mean temperatures within these landforms. The retention of chilly air masses and fog is also frequently seen. Slopes with a southern exposure receive much higher solar radiation than the northern ones, and thus the former seem much drier (Borówka 2002, 66). Another atmospheric phenomenon that can hurt vegetation is represented by persistent droughts, in particular those lasting more than three weeks, from April to October (Kalbarczyk/Kalbarczyk 2005, 171–183).

To sum up, soil, water, and climatic conditions make the area of the Szczecin Lowlands quite diverse in terms of the suitability of grain agriculture. This will also have been the case in pre-modern periods. At the same time, the area offers favourable conditions for other farming methods, such as animal husbandry.

Pollen data, environmental reconstructions and the palaeoenvironmental evidence

Data for flora reconstructions

Seven palynological cores are available for the Szczecin Lowland (Fig. 2 ; cf. Table 2). However, their usefulness for archaeological reconstruction varies. The main goal for most of these analyses was to reconstruct environmental change during the Late Glacial and Holocene periods. The human economy impact was considered, but it was not a main research objective (Latałowa 1994; 1998; Latałowa et al. 2003; Obremska/Cedro 2012). Three cores from Wolin Island (Kołczewo, Racze Lake, Wolin II) and the

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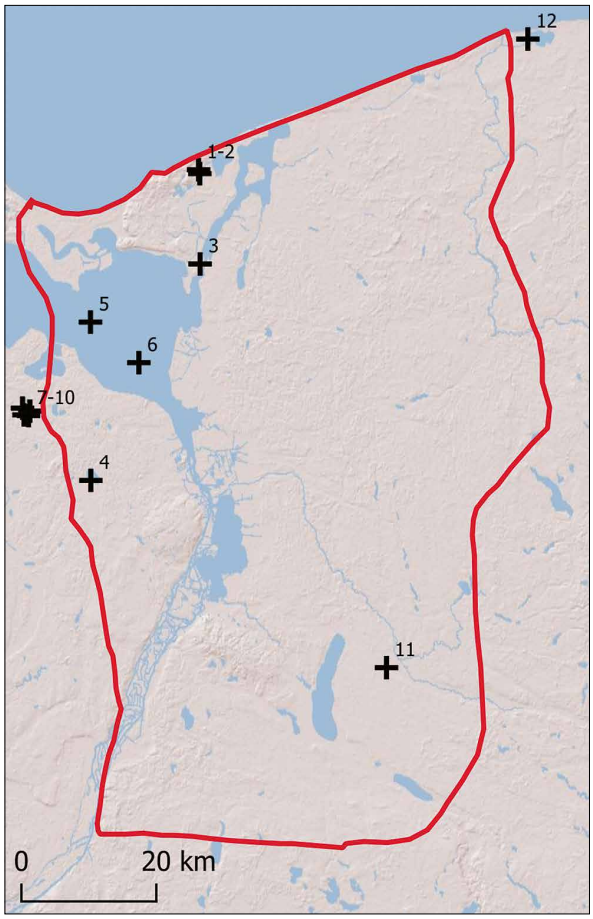


Fig. 2. Location of palynological cores. 1: Kołczewo; 2: Racze Lake; 3: Wolin II; 4: Bolkowo; 5: Szczecin Lagoon Z42/99; 6: Szczecin Lagoon Z39/99; 7–10: Ahlbeck Lake; 11: Święte 22; 12: Mrzeżyno T28 (map K. Ślusarska; basemaps: ESRI Shaded Relief obtained through QuickMapServices QGIS plugin; map data © 2022).

Święte core can be correlated with archaeological sites in the vicinity of the coring places. However, other cores allow only for the outlining of general climatic and palaeoenvironmental processes, as they cannot be associated with archaeological sites in the area (the Szczecin Lagoon, Mrzezino, and Bolkowo, as well as the four Ahlbeck Lake cores). The four Ahlbeck Lake cores from the island of Usedom are included in this chapter, as they, along with the Bolkowo core, supplement environmental information for the Ueckermünde Heath, which lacks in-depth archaeological recognition. The Święte core was obtained during the archaeological excavation of sites Święte 7, 8, and 22. Unfortunately, this core was not ^{14}C-dated, making a correlation with nearby archaeological sites tricky. However, its late Subboreal phases indicate the presence of open land and human dwellings nearby (ruderal plants such as *Artemisia*, *Urtica*), as do cereal crops (common crop weeds: *Centaurea cyanus, Sclerantus annus*) and pastures (*Rumex* spp., *Plantago* spp.).

The island of Wolin is the most thoroughly studied part of the research area discussed here. Three palynological cores from Wolin Island cover the Late Glacial and Holocene based on ^{14}C-datings (Kołczewo, Racze Lake, Wolin II). The changes observed in the palynological record were then correlated with archaeological chronology. This procedure allowed the identification of five stages of anthropogenic forest modifications linked to periods from the Mesolithic to the Early Middle Ages. Parts of the cores, dated to the first half of the 1st millennium BC, suggest that during this period slash-and-burn agriculture and livestock grazing allowed deforested spaces on the island to persist. This timespan corresponds to the period of development of the Lusatian culture (Latałowa 1998, 23–32). The pollen analyses allow the evaluation of the environmental transformations in the area around the place of coring. The indicators of open land and the decrease in forest areas (non-arboreal plants' domination over arboreal plants, presence of heathlands – *Calluna*, or pastures – *Rumex* spp., *Plantago* spp.) is repeated in most cores in a comparable timespan. At the same time, forest fire indicators (such as charcoal microparticles or *Pteridium* spores) were traced only in cores from Wolin Island (Racze, Wolin II, Kołczewo). The plant indicators do not explicitly indicate the cultivation of crops (cereal pollen are present only in cores from Wolin Island and Święte), but they do suggest the existence of deforested areas (probable pastures for livestock). Even though most cores are not in the direct vicinity of a well-excavated site, except for Święte, they still provide proxy evidence pointing towards the occupation of these regions in the periods considered in this study.

The only direct palaeobotanical record comes from Parłówko site 11. This late Lusatian settlement provides macrobotanic samples attesting to a human landscape modification in the immediate neighbourhood of the site (Abramów 2010). The presence of ruderal, nitrophilous plants (*Urtica*

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spp., *Chenopodium album*, *Rumex* spp.) suggests increased biogenic waste from humans and farm animals. On the other hand, perennial weeds (*Polygonum* spp., *Fallopia convolvulus*) relate to the presence of cultivated land nearby (Lityńska-Zając 2005). A large deposit of non-charred seeds of *Chenopodium album* (over 230 grains) also stems from that site, but its interpretation is unclear. *Chenopodium album* is discussed as a 'forgotten crop' (former cultivar, but not cultivated anymore) or a deliberately collected food source, but it can also result from the contamination of soil samples, especially when uncharred (Mueller-Bieniek et al. 2020)

From as early as 3000 BC, the decrease in the rate of elm (*Ulmus*) in forests has been noted in Europe. This situation is associated with agriculture (including harvesting leaves and young branches as fodder for livestock) and the spread of the so-called Dutch elm disease. It is important to note that beech, as an element of forest composition, did not appear until the final stage of the Subboreal period, no earlier than the early 1st millennium BC. The increase in hornbeam and beech coincided with the decline of hazel in Pomerania. This could be related to human activity (farming) and climate changes, including temperature changes and drops in precipitation (Ralska-Jasiewiczowa et al. 2003, 233–247).

Without human impact, the European Lowlands would be predominantly covered with forests rather than other vegetation types, as the forest is a climax plant community here. Soils, water, and climate conditions suggest this could be the case in the Szczecin Lowland, as Pomerania, based on environmental conditions, ought to be covered by eutrophic and mesotrophic deciduous woodland with beech forests. Other forest types (e.g. Atlantic acidophilus forests, oak-hornbeam forests, alder carrs, wetland birch forests) would also have been a part of the woodlands (Matuszkiewicz 2008). The ancient Pomeranian Valley areas (the Goleniów Forest and Ueckermünde Heath) are areas of sparse conifer forests and wetland, and riparian forests have survived into modern times. However, most of these forests today are modern silviculture rather than natural forests. Nevertheless, complexes of dense forests in these areas have been marked on Eilhard Lubinus' 'Great Map of the Duchy of Pomerania' from the early 17th century. This map could be treated as proxy data, suggesting that there was no significant and permanent deforestations in the later part of prehistory and the Middle Ages in this area. The relatively poor, podzolic soils and vast swamps make this region unattractive for permanent settlement.

It is challenging to assess the potential of water plant communities, particularly those of the Oder river estuary, the Szczecin Lagoon and the Miedwie Lake. These areas have been profoundly transformed to allow shipping traffic in modern and contemporary times. Changes have also been caused by the construction and maintenance of the local hydro-technical infrastructure and the appearance of species foreign to the local flora and fauna that have arrived within the ballast tanks of ships (Latałowa et al. 2003, 119–122).

Proxy data for fauna reconstruction

It is difficult to evaluate the spectrum of wild animals in the Szczecin Lowland in the 1st millennium BC due to the changing composition of the fauna caused by human economy. With the presence of dense forests and extensive wetlands in the earlier phases of the Late Holocene, one would expect the existence of species similar to both the present ones (red deer, roe deer, wild boar, elk, forest marten, fox, hare, beaver, and some species of rodents), and species that no longer occur within this area (wolf, bear, aurochs, and lynx).

The water mammals should complete the list. These are the animals living in inland waters (e.g. beaver, otter, European mink) or marine environments (harbour porpoise, grey, ringed and harbour seal). Only two sites in the Szczecin Lowland yield information on game animals: Szczecin Wzgórze and Szczecin Grodzka (Chełkowski 1965; Makowiecki 2003). Two sites (both in Szczecin) were probably settlements of the Late Bronze Age. Red deer and boar bones were discovered there; a typical set of game animals (Ślusarska 2021). However, the site of Szczecin Wzgórze provides more

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important information – in addition to beaver bones, hare bones were also discovered there. Hare is a typical animal of the open landscape, so the presence of hare bones can be a proxy for deforested areas in the Szczecin Lowland at the end of the Bronze Age (Smith at al. 2005).

However, it is impossible to recreate the full list of wild species. The archaeological and historical data do not reflect the total composition of animal species, as not all of them were game animals. The whole carcass was not always brought to the settlement. Most of the hunted animals were processed and disassembled at the killing site (e.g. the remains of animals hunted only for their fur were never brought to the settlement; see Piątkowska-Małecka 2013, 69–74; Ślusarska 2021).

The moderate climate, particularly warm with relatively short winters, and the significant number of water bodies and wetlands in the Szczecin Lowland favoured periodical visits of many birds, including waterfowl, for wintering and hatching. Today, the Szczecin Lowland, the Lower Oder valley, the Kamień Lagoon, the islands in the Świna river mouth, and the Miedwie and Dąbie Lakes are overwintering places for many bird species (Ławicki et al. 2009, 268–282). Unfortunately, no archaeological animal bone collections from the Szczecin Lowland provide any information about either the presence or exploitation of waterfowl species (Ślusarska 2021).

Most fish species living in the water bodies of the Szczecin coastland can live in both habitats – fresh and saline/brackish waters. The life cycle of some of them (mostly *Salmonidae*, *Alosa alosa*, and Atlantic sturgeon) depends on seasonal environmental change. Eilhard Lubinus, in the description of his 'Great Map of The Duchy of Pomerania' (1618), stated that over 70 species of fish were known and fished from the Pomeranian water basins.[1] During the excavation of the Late Bronze Age sites in Szczecin Wzgórze and Szczecin Grodzka, the bones of several fish species were found, both anadromous and freshwater fish, such as common bream, common roach, sander, pike, and catfish, as well as sturgeon (Makowiecki 2003; Ślusarska 2021).

Archaeological research on the Late Bronze and Early Iron Ages in the Szczecin Lowland

It is not the main object of this contribution to provide a full presentation of the history of archaeological research concerning the Bronze and Early Iron Ages in the Szczecin Lowland. A brief introduction to the region's complex modern history is, however, needed to understand the uneven and incomplete nature of its archaeological data.

At the earliest stage of archaeological studies, in the 19th century, the Szczecin Lowland was part of the Kingdom of Prussia. This period, as everywhere, was a time of awakening interest in antiquities in a typical 19th-century way; it was when the first collections of material culture, mainly bronze objects, were created. But it also saw the start of the first archaeological institutions, journals and excavation programs (mainly of cemeteries). After the Second World War, the Szczecin Lowland became part of Poland but, during the war, archives and museum collections had been displaced, dispersed or destroyed. The post-war years were a time of building new institutions, exhibitions, and narratives mainly around the 'everlasting Slavic presence' issue in this region. Concerning the Bronze Age material, the main research question was whether this part of Pomerania should be included in the Nordic or the Lusatian culture zones. The Lusatian culture was, at that time, perceived as a predecessor of the Slavic tribes. The Bronze Age metallurgical style did not significantly resemble Lusatian/Urnfield styles, which lowered the interest in its 'political use' in this region and also in archaeology. In the 1980s and 1990s, the Szczecin Lowland became a region of extensive research

1 http://lubinus.pl/e-lubinusa-krotki-opis-pomorza-i-z-nim-zwiazanych-godnych-pamieci-spraw/.

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under the Polish Archaeological Record programme. This was primarily a conservation program that enabled the creation of an open and continuously active database of archaeological sites in Poland. The bulk of the data came from field surveys. The goal was twofold – to incorporate the surviving archival data and archaeological finds into a program for Poland and consistently register new sites. Unfortunately, the Szczecin Lowland was a distant western periphery of the newly-defined Poland after 1945, and the region was omitted from main construction and infrastructure projects for a long time. There was also just a minimal number of archaeological excavations in the area. It is only within the last 15 years that archaeological works, as part of the investments related to the construction of road S3 as well as housing constructions, intensified. The collection of archaeological evidence is an ongoing process, but the region's complex modern history makes it even more delayed in the Szczecin Lowland than elsewhere.

Surface survey data

The surface survey data originates from the field survey program entitled the 'Polish Archaeological Record' (PAR, Polish: *Archeologiczne Zdjęcie Polski, AZP*). The program was established in the 1970s, but new data are still being recorded according to its guidelines. The Szczecin Lowland is studied uniformly under the PAR program (Fig. 3). However, there are some exceptions, e.g. the woodlands near Goleniów, the forests between Tanowo and Nowe Warpno (Ueckermünde Heath) and the wetlands of the Międzyodrze region. The dense forests and marshes in these areas negatively affect the possibility of survey prospection.

Interpretation of the data concerning the Late Bronze and Early Iron Ages is quite problematic in the Szczecin Lowland, because the archaeological record consists of a mixture of surface survey data, partially excavated settlements and cemeteries, and hoards with and without precise localisations. The Szczecin Lowland area has been fairly evenly studied in field surveys under the PAR program. However, these data are only surface surveys, with all the restrictions that apply to them (e.g. different types of limits in the availability of observation – vegetation, existing infrastructure; taphonomic changes to the pottery).

A field survey coefficient (FSC) was introduced to refine the potential distortions of the picture of past settlement patterns introduced by the state of field surveys, deposition, preservation availability for field surveys, and so on. An FSC is the sum of sherds collected during field surveys attributed to a definite contemporary administrative locality (town or village), divided by the number of sites assigned to this locality. The

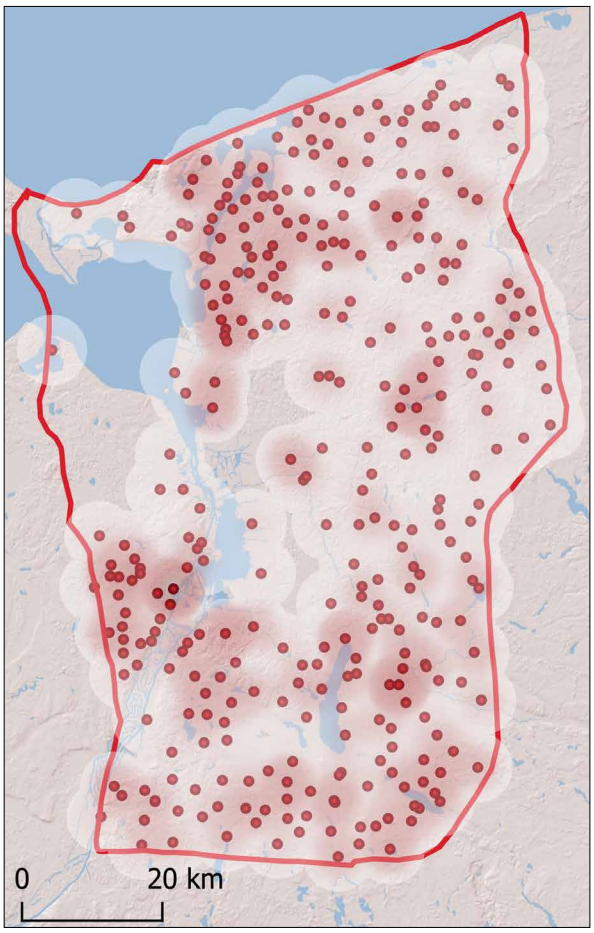
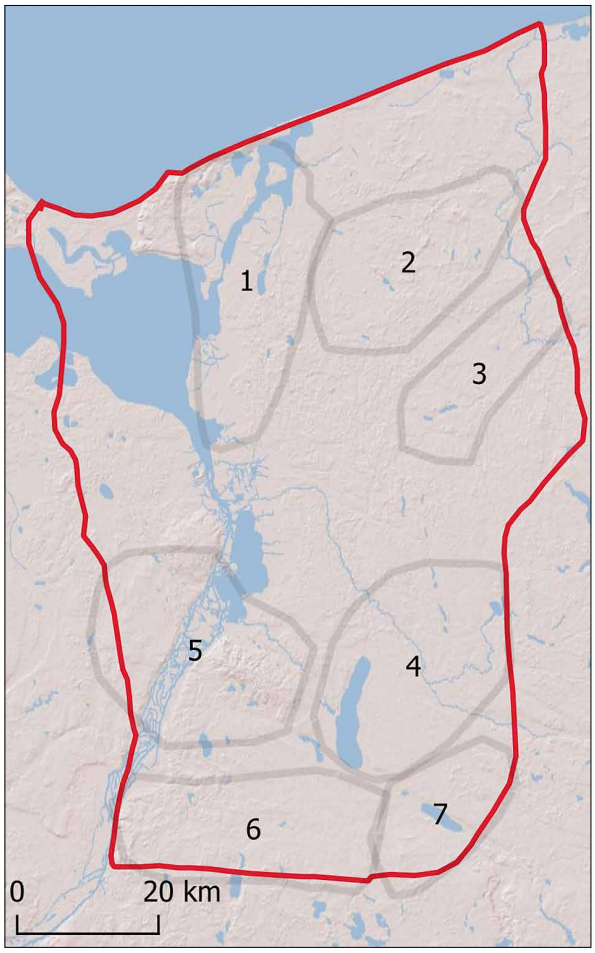


Fig. 3. Surface find distribution, combined with Kernel Density Estimation (KED) based on field survey coefficient (FSC). Red dots: Raw data (field survey sites with Lusatian culture pottery); surrounding circles: KDE allied to FSC, r = 5000 m (map K. Ślusarska; basemaps: ESRI Shaded Relief obtained through QuickMapServices QGIS plugin; map data © 2022).

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coefficient does not answer the question of what mechanism led to the deposition of archaeological material at a specific location, but it helps reduce the effects of current agricultural activity that otherwise obscure prehistoric occupation (Ślusarska 2022). In short, an FSC applied to field survey material describes the saturation with ceramic material. Using Kernel Density Estimation (KDE) allows the identification of the region where the pottery surface finds are more frequent. An FSC and further analyses with Kernel Density Estimation were applied to the Szczecin Lowland surface survey materials, leading to the identification of seven spatial clusters. These are (Fig. 4):



1) Wolin Island with areas adjacent to the River Dziwna between Wolin, Kamień Pomorski and Parłówko;
2) the southern part of the Gryfice Plain;
3) the northern part of the Nowogard Plain;
4) the Pyrzyce Plain – Lake Miedwie;
5) the Oder estuary to the Lagoon, with the Szczecin and Bukowe Uplands;
6) Wełtyń Plain;
7) the Pyrzyce Plain – Lake Płoń region.

The density of surface material tends to decrease gradually towards the west (to the River Randow) and northward to the Uecker estuary. This observation corresponds well to the preliminary density studies that are based on different types of sites in the region between the valleys of the Oder and Uecker on the German side of the border (see Bukowski 1998, 225 fig. 110; Griesa 1982, map 25).

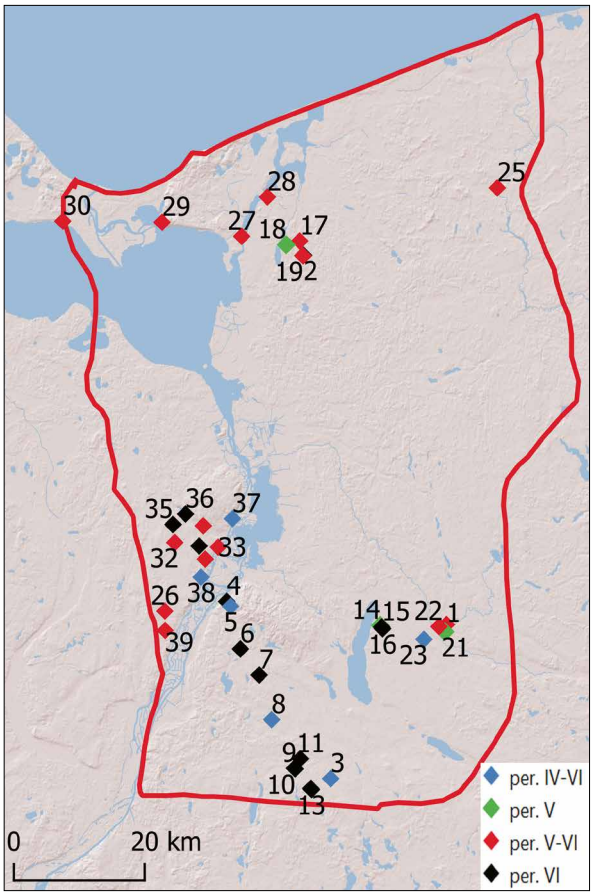
Fig. 4. Spatial clusters 1–7 based on FSC and KDE (map K. Ślusarska; basemaps: ESRI Shaded Relief, ESRI Stamen Toner Hybrid obtained through QuickMapServices QGIS plugin; map data © 2022).

Settlement data

Most data come from the dispersion analysis of sites revealed through the PAR surface survey and from some that have been excavated in the development-led mode. Moreover, there are 35 partially excavated open (non-fortified) settlements and four fortified ones (Fig. 5; Table 1). Most of the sites were only partially investigated during development-led excavations, which makes it difficult to explore their organisation and temporal development. However, Parłowko site 11 provided some information on house construction. Three one-aisled houses with pits and enclosures were identified. An area with multiple hearths, the presumed production area, was separated from the residential area. The settlement is situated 70 m from a small freshwater spring and is dated to the Bronze Age Periods IV–V based on pottery typology and technology (Pogodziński 2010).

The development-led excavations provided valuable material for establishing a preliminary pottery typology based on changes in stylistic features. The distinctive types of pottery from four sites (Kozielice 76, Szczecin-Żydowce 14, Sobiemyśl 1, Witkowo 42) indicate a continuous development

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during the Late Bronze Age until the Early Iron Age. The material from Szczecin-Goszczewo and Szczecin-Ustowo shows no signs of an occupation at the beginning of the Iron Age. Most open non-fortified settlements and fortified ones were established during Period V. Settlement and cemeteries from Period V can be identified by clay plates (German: *Tonscheiben*) and strongly profiled Lower Oder bowl-like forms with outward-turned and obliquely incised rims. When deposited in the graves, these types serve as a stand for the urn (especially the flat plates) or as lids (mostly profiled, bowl-like forms). The most striking feature of the Early Iron Age is the appearance of the Göritzer group style with highly profiled vessel forms and ornaments that emphasise the shape of vessels in the form of horizontal fluting and quasi-string patterns (the imprints of twisted necklaces on wet clay).

Fig. 5. Excavated non-fortified and fortified settlements. Numbers refer to those in Table 1 (map K. Ślusarska; basemaps: ESRI Shaded Relief, ESRI Stamen Toner Hybrid obtained through QuickMapServices QGIS plugin; map data © 2022).

Burials

There are 180 burial sites known in the Szczecin Lowlands. More than half of all cemeteries in the Szczecin Lowland were established in the Bronze Age Periods III–IV and ceased to be in use in Period V (Figs. 6–7). Only 37 cemeteries were established in the Early Iron Age. These are usually situated close to Bronze Age cemeteries but far enough away to be seen as separate burial places.

Cremation is the main trait that allows attribution to the Lusatian culture (1300–500 BC). Of all the features of the basic description of the Lusatian culture graves (cremation, burial in a ceramic urn with a bowl as a lid, flat grave, equipment limited to a set of additional vessels), only cremation applies to the Maritime Lusatian culture.[2] The transition from inhumation to cremation occurred during Bronze Age Period III. However, in some graves, the cremation remains were distributed at the bottom of a rectangular pit that was paved with stones. These graves also hold rich grave goods consisting of metal objects, including bronze knives and toiletries (razors, tweezers). Based on the metal finds typology and pottery style, these can be dated to the earliest phases of the Lusatian culture in the region (Bukowski 1998).

Even though the barrow is not a typical element of Urnfield circle funeral rites, it is one of the distinctive features of the Maritime Urnfield culture. Barrows covering cremated burials were erected from the start of Period IV of the Bronze Age. Towards the end of the Bronze Age, their frequency decreased (Fig. 8). The barrow usually contained a centrally placed structure – a cist made of stone slabs. Cremation remains under barrows were placed in the urn or distributed on the stone-

2 Term applied by M. Kaczmarek to the Lusatian culture groups from Pomerania: Kaczmarek 2017.

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Table 1. List of non-fortified and fortified settlements. BA per. = Bronze Age Period.

No.	Site	Type of settlement	Period	Lab. code	Result BP
1	Święte 22	Open	BA per. V–VI		
2	Ostomice 7	Open	BA per. VI/ Pre-Roman	MKL-517 MKL-518	2310 ± 50 2230 ± 50
3	Kozielice 76	Open	BA per. IV–VI	Poz-31792	2485 ± 35
4	Szczecin-Żydowce 12	Open	BA per. VI		
5	Szczecin-Żydowce 14	Open	BA per. IV–VI		
6	Wysoka Gryfińska 29	Open	BA per. VI		
7	Drzenin 9	Open	BA per. VI		
8	Sobiemyśl 1	Open	BA per. IV–VI		
9	Parnica 6	Open	BA per. VI		
10	Parnica 7	Open	BA per. VI		
11	Czarnowo 59	Open	BA per. VI		
12	Mielno Pyrzyckie 18	Open	BA per. VI/Pre-Roman		
13	Mielno Pyrzyckie 20	Open	BA per. VI		
14	Kunowo 31	Open	BA per. VI		
15	Kunowo 30	Open	BA per. VI		
16	Kunowo 4	Open	BA per. VI		
17	Parłówko 11	Open	BA per. V–VI	MKL-515 MKL-516	2820 ± 80 2420 ± 60
18	Troszyn 10	Open	BA per. VI/Pre-Roman		
19	Ostomice 14	Open	BA per. V–VI		
20	Ostromice 9	Open	BA per. V–VI		
21	Święte 7	Open	BA per. V–VI/Pre-Roman	MKL-66	2620 ± 70
22	Święte 8	Open	BA per. V–VI/Pre-Roman	MKL-67 MKL-72 MKL-73	2710 ± 70 2370 ± 59 2390 ± 60
23	Witkowo 42	Open	BA per. IV–VI		
24	Szczecin -Gumieńce 17	Open	BA per. V–VI		
25	Gryfice Stare Miasto	Open	BA per. V–VI		
26	Kolbaskowo 1	Open	BA per. V–VI		
27	Wolin Wzgórze Młynówka	Open	BA per. V–VI		
28	Sibin 4	Open	BA per. VI		
29	Lubin	Fortified	BA per. V–VI		
30	Kamminke	Fortified	BA per. V–VI		
31	Szczecin-Niemierzyn	Open	BA per. V–VI		
32	Mierzyn	Open	BA per. V–VI		
33	Szczecin Wzgórze Zamkowe	Fortified	BA per. V–VI		
34	Szczecin Świerszczewo	Open	BA per. VI		
35	Bezrzecze	Open	BA per. VI		
36	Szczecin Głębokie	Open	BA per. VI		
37	Golęcino	Open	BA per. IV–V		
38	Ustowo	Open	BA per. IV–V		
39	Krzemieniec	Fortified	BA per. V–VI		

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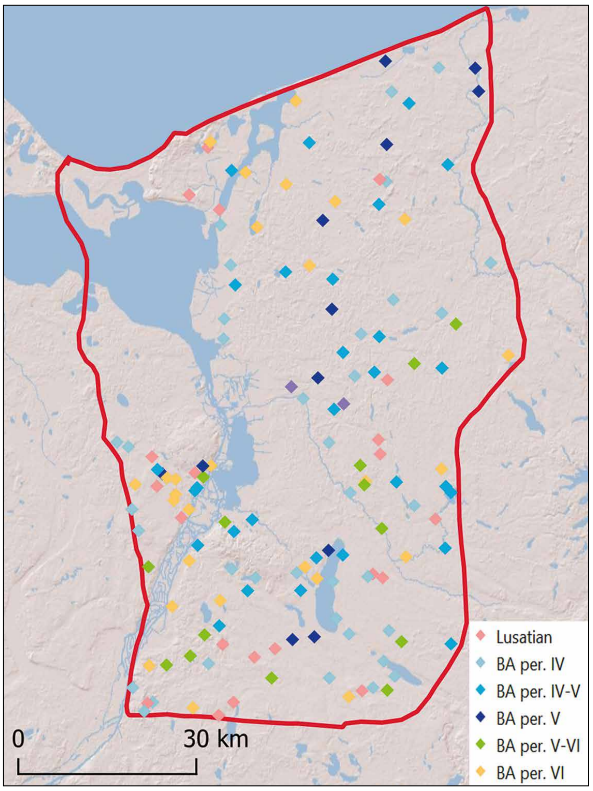


Fig. 6. The distribution of cemeteries, based on the number of cemeteries attributed to one contemporary administrative locality (towns or villages). BA per. = Bronze Age Period (map K. Ślusarska; basemaps: ESRI Shaded Relief, ESRI Stamen Toner Hybrid obtained through QuickMapServices QGIS plugin; map data © 2022).

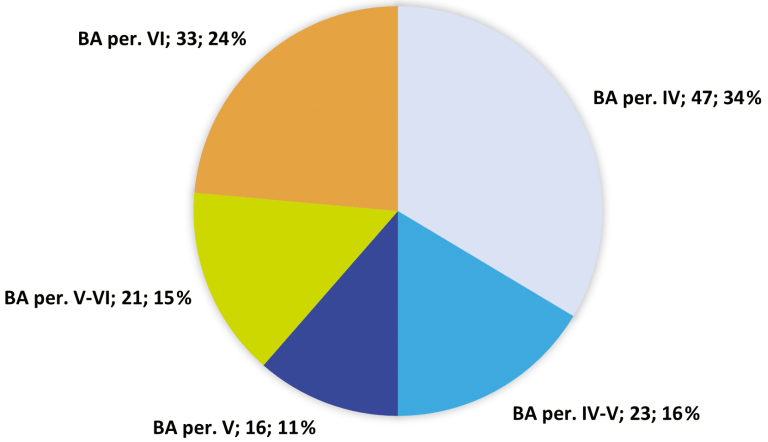


Fig. 7. The number of cemeteries/graves assigned to particular Bronze Age phases. BA per. = Bronze Age Period.

paved bottom. Flat graves usually resemble typical urnfield culture graves (pit with lidded urn) or have small stone circle-like or nest-like structures (Polish: *groby obwarowane*) built around the urn (Kaczmarek 2015; the term 'stone nest' is applied in Fig. 8). Barrows were even constructed during Period VI of the Bronze Age, but less frequently (Bukowski 1998, 198–199; Siuchniński 1956, 7–40). Unfortunately, detailed analyses of the funeral rites and of the dynamics of change in this field are not yet completed for Pomerania. Most data come from partially excavated sites or/and are unpublished.

It is reasonable to assume that both types of grave architecture (flat graves and barrows) are included in the funeral tradition of the Szczecin Lowland Lusatian groups. Unfortunately, it is impossible to assess the rules governing the choice of a particular grave form at this stage of the study. The correlation analyses performed on the group of 180 sites in this study indicates a low to medium correlation between chronology and grave architecture ($r = 0.35$). Considering that funeral sites are only partially excavated (only one barrow from each group), not published at all or only partially, it is pretty

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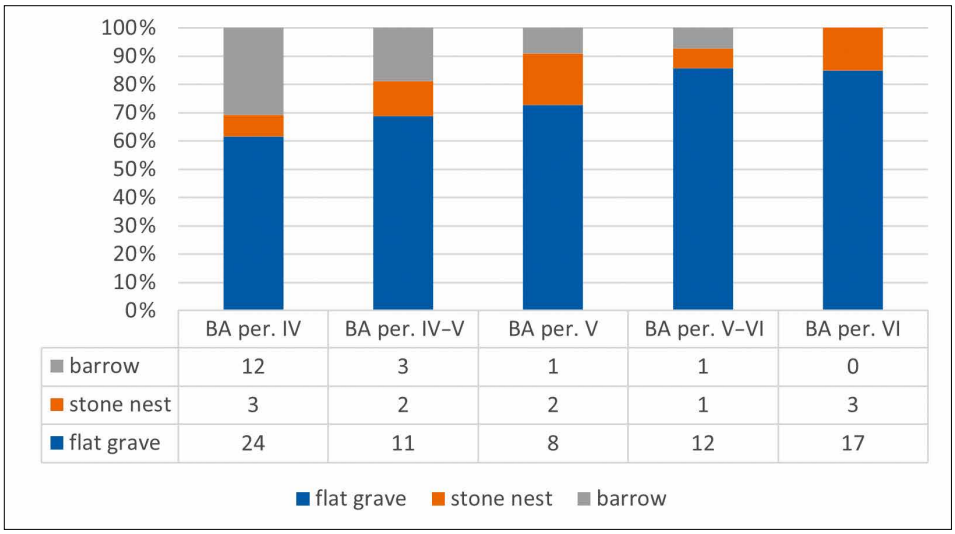


Fig. 8. Chronological distribution of burial structures. BA per. = Bronze Age Period.

challenging to formulate any detailed hypotheses. For this reason, only the spatial distribution on funeral sites was considered for this study.

Hoards

Sixty-eight hoards and 59 single finds can be attributed to the Late Bronze and Early Iron Ages in the study region. Most hoards are not precisely located, so it is difficult to compare their location to known settlements or cemeteries. Hence, hoards and even single metal finds just show human activity within a general area.

Quite a substantial amount of the Szczecin Lowland hoards from Periods V–VI could have been primarily deposited in a wet environment context. The stylistic features of objects (e.g. plate fibulas, hanging vessels) fit the Nordic Bronze Age style better than that of the Urnfield culture (Bukowski 1998; Kaczmarek 2017).

Absolute dating

The absolute chronology of the Late Bronze and the Early Iron Ages in the Szczecin Lowland has not yet been finally established. There is a limited number of ^{14}C-dates available from archaeological sites in the Szczecin Lowlands: nine dates from five sites (Fig. 9). All samples are charcoal from sites investigated during development-led excavations. Three sites (Kozielice 76, Święte 7, Parłówko 11) have been related to the Lusatian culture based on stylistic attributes of the pottery. At Kozielice 76, two features were sampled; feature 2 dates to the Late Bronze Age, whereas feature 168 dates to the Early Iron Age. The sampled features, however, did not contain any pottery, making any stylistic correlation with the ^{14}C-dates impossible. A similar situation was observed at the settlement of Święte 8, which provided three ^{14}C-dates on charcoal from features 19, 302, and 409. Feature 19 (kiln) is dated to the Late Bronze Age phase of the settlement, but unfortunately again no pottery was present in this feature. The other sampled features provided dates pointing to the second half of the 1st millennium BC, and they contained pottery consistent with the Jastorf culture. Charcoal samples from site 7 at the settlement of Ostromice date the place to the second half of the 1st millennium BC. The dates and the pottery style also point to the early phase of the Jastorf culture (in this region the so-called Marianowo phase). This culture defines the end of the Lusatian tradition in West Pomerania. Thus, the ^{14}C-dates alone provide no basis for a detailed chronological evaluation of the region. Although it is challenging to form any general statement based on such a minimal data set, the final stages

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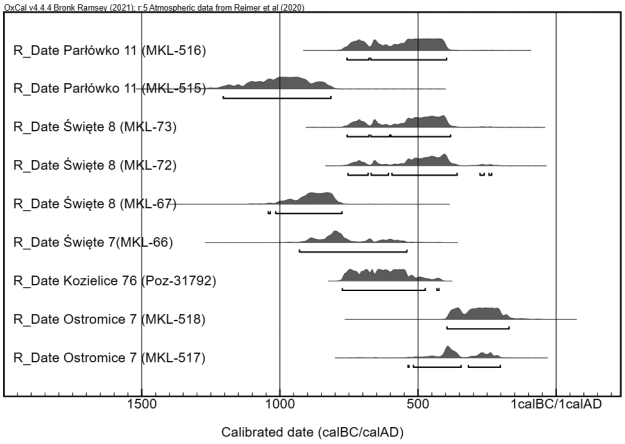


Fig. 9. Calibrated ^{14}C-ages (68 % probability; calibration after Bronk Ramsey 2009; Reimer et al. 2020).

of the Lusatian culture (the Göritzer group phase) seem to overlap partially with the early Jastorf culture of the Early Pre-Roman Iron Age. While changes are noticeable in pottery style, bronze artefacts, and burials, they are not that evident in the settlement patterns and subsistence economy.

Discussion

The comparison of the clusters identified by an FSC with other known archaeological sites (excavated settlements both non-fortified and fortified, cemeteries and hoards in the region) allows us to identify two main areas with intense occupation in the Bronze Age Periods IV–VI. One of them is the coastal region (islands of Uznam/Usedom and Wolin, from the Dziwna strait to the Rega river mouth). This northern concentration is reflected in different types of archaeological and environmental data. There are two fortified (Lubin, Kamminke) and eight non-fortified settlements concentrated in the western part – on islands and both sides of the Dziwna strait. The presence of the most fertile soils could explain their existence here. Based on pottery style, these settlements began their existence in Period V of the Bronze Age and continued into the Early Iron Age, which is supported by ^{14}C-data from the sites of Parłówko 11 and Ostromice 7. Hoards and cemeteries are more evenly distributed all over the region, also in its eastern part. Intensive human activity, including deforestation and livestock grazing, is also detectable based on palynological cores from Wolin Island and the Trzebiatów coastland (Table 2). However, cereal pollen were present only in cores from the island of Wolin. The plant macro remains from the settlement of Parłowko 11 attest to the anthropogenic modification of the site's environment, including grain agriculture (presence of common cereal weeds).

The other area of intensified occupation is located on the Pyrzyce Plain, in the Oder estuary up to the Szczecin Lagoon (Szczecin and Bukowe Uplands), as well as on the Wełtyń Plain. The southern concentration is better recognised based on archaeological data from recent development-led excavations on the ring road of Stargard, dual carriageway S3, and constant Szczecin urban agglomeration development. Undoubtedly, the attractiveness of this area is linked to the presence of fertile, alluvial soils, mainly on the Pyrzyce Plain. Based on pottery styles from excavated sites, this region was occupied by Lusatian culture groups from Period V to the beginning of the Early Iron Age, when Jastorf group settlements started to emerge in the area. The ^{14}C-dates from Święte 7 and 8 as well as Kozielice are consistent with this hypothesis. However, the palynological evidence from the southern concentration is minimal and inconclusive, because there are no ^{14}C-dates from the Święte core.

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Table 2. Interpretation of the pollen diagrams.

Region	Core	Observation	References
Szczecin Lagoon	Szczecin Lagoon Z42/99, 6, Szczecin Lagoon Z39/99	1. Early Holocene: significant reduction of the lagoon environments, the rate of these changes is not precisely recognised; 2. Decrease of pine tree pollen, increase of hornbeam, beech and grazing indicators (e.g. *Plantago lanceolata*); 3. *Triticum* pollen present; 4. Decrease in salinity; 5. Green algae increase – eutrophisation	Latałowa/Święta 2003, 128–129; Latałowa et al. 2003, 145
Wolin Island	Kołczewo, Wolin II, Racze Lake	1. Decrease in tree pollen; 2. Increase in fire indicators (charcoal, *Pteridium* spores); 3. Anthropopressure indicators present (*Plantago lanceolata*); 4. Cereal pollen grains recorded in all cores, but mostly in the core from Kołczewo (*Hordeum*, *Triticum* and *Secale*)	Latałowa 1992, 123–249
Trzebiatów Coastland	T28	1. Decrease in the number of trees; 2. Open-land indicators (*Plantago lanceolata*, *Rumex* spp.)	Obremska/Cedro 2012, 84
Pyrzyce Plain	Święte 22	1. Four settlemental phases related to Subboreal; 2. Indicators of open-land present, but without charcoals and *Pteridium* spores; 3. No cereal pollen, but weeds present	Malkiewicz 2009, 114–119
Ueckermünde Heath	Bolkowo 4, Ahlbeck Lake	1. Plant indicators for grazing, no cereals, alluvial forests with alder and riparian forests with elm and ash (Bolkowo); 2. Indicators of open environments (*Plantago lanceolata*), lack of plants indicating cereal cultivation (Ahlbeck Lake)	Latałowa 1994, 220; De Klerk 2005, 104; Herking/Wiethold 2004, 21–22

The late Subboreal section of the core indicates the presence of open land, including pastures and arable fields. Also, hare bones found at the fortified settlement of Szczecin Wzgórze can be proxy data suggesting the existence of substantial open areas in the site's vicinity.

The lower density of sites recorded in the Goleniów Forest and on Ueckermünde Heath is most probably due to the lack of adequate data. However, these low-lying regions with soils of a relatively low fertility, endangered by periodic floods, would not have been suitable for permanent occupation. The pollen data (cf. the Bolkowo core mentioned above) demonstrate that the areas in question were probably only used for seasonal activities (e.g. animal grazing; Ślusarska 2022).

What needs to be more frequently addressed is that the change we observe in archaeological materials does not necessarily mean the simultaneous modification of all aspects of human existence. The dynamic is high in some spheres (e.g. costume elements, bronze object styles) but relatively low in others (e.g. subsistence strategies). However, costume elements should be quite a conservative element as a method of identity expression. Conservatism refers to the costume's composition, not to its components' stylistic features, which can change quite quickly. It seems to relate more to the presence of some dress elements (e.g. the presence of a necklace in a female costume), not their style and material. An example can be the ornaments on the shepherd's hats of the Carpathian highlanders. Usually, red ribbons or gold chains were used as hat decoration, but since the highlanders from the Austrian Partition became involved in the textile trade with the Adriatic coast in the 18th century, the custom of sewing on kauri shells has emerged. Today, this is a hallmark of the Zakopane highlanders' costume.

I would suggest that stylistic features, especially metal objects associated with clothing, are related to subjective values of 'attractiveness', 'novelty', and 'fashion'. These values do not show any regular-

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ity in their transformations as they are strongly context-related. However, they can mirror the shifts in the most frequent contact direction or contact zones. On the other hand, the worldview expressed in funeral practices seems less prone to modifications based on changes in fashion. Modifications in this sphere usually reflect more general changes concerning ideas of man, his fate and afterlife. Most of the data available from archaeological observations come from graves or hoards. A burial costume is a unique form of costume – a ceremonial one, and as such is subjected to the same rules of conservatism as other elements of funerary rites. Hoards are more complex depending on the type of hoard and the method of its deposition.

Bronze Age people could have realised the ineffectiveness of traditional solutions and looked for new ways of responding to environmental changes (employing new settlement or subsistence strategies). The difference could have been recognisable, even though it was not recognised as an environmental change. This term is a contemporary construct we apply to interpret the overall situation based on relevant data (a rise of the water table, a change in forest composition, and so on). But crop failure cannot go unnoticed, especially when it happens twice or even for a third time. And it needs an explanation (most likely in terms of offending supernatural powers, e.g. Man had offended God, and he sent a catastrophe to punish humankind – a widespread mythological trope) and finding possible solutions. Some of these solutions would relate to apologies to the superpowers for the offence, but others would be associated with the need for biological survival (subsistence strategies, settlement strategies).

Conclusion

In summary, the environmental data for the Szczecin Lowland in the first half of the 1st millennium BC show signs of human impact, mainly in the form of deforestation. The limited data set depicts changes to the dynamics of settlement structures and economic strategies. Although climatic variation during the first half of the 1st millennium BC is quite well documented on a European scale (Van Geel/Renssen 1998), this general picture does not fully correspond to the situation in the Szczecin Lowland. The same can be said of the transformation of cultural traits and styles from the Late Bronze Age to the Early Iron Age within the Urnfield culture. The first half of the 1st millennium BC is a continuation of the previous strategies regarding subsistence economy and settlement patterns. The transformation of burial rites was not as evident and rapid in the Szczecin Lowland as in east Pomerania or the southern part of the European Plain (Dzięgielewski 2017; Kaczmarek 2017). There are also indications of cereal cultivation in this region, which corresponds well with the palaeobotanical assessment of soil samples from site Parłówko 11. The most densely settled region was situated on both sides of the Dziwna River as far as the Kamień Lagoon, and pollen profiles from the area confirm a significant human impact on the environment at the end of the Bronze Age and start of the Early Iron Age (progressive deforestation). The presence of *Pteridium* spores indicates that forest fires must have been frequent. These fires can have been caused by human activity, but not exclusively. Seasonal herding in fallow fields is another factor contributing to the development of meadows. The region is mostly covered by post-glacial moraine formations, but with a mosaic of more fertile soils at the mouth of the Dziwna. Fertile soil and different environmental resources can have favoured the development of settlements in the periods corresponding to the first half of the 1st millennium BC.

The abrupt climate change at this time is not detectable in the Szczecin Lowland. The shift in subsistence strategies and settlement patterns that could be proxy evidence of environmental instability was not noticeable in the Szczecin Lowland before the end of Period VI. Based on ecological data, the economy in Periods V–VI was mixed, with a higher rate of cereal agriculture on rich soils and a higher rate of pasture on more deficient soils. However, a temporary decline in settlement activities, synchronous with the archaeologically observed disappearance of Lusatian culture settlements and

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cemeteries in the second half of the 1st millennium BC, can be understood as related to environmental change – slightly postponed effects of the abrupt climate change at the end of the Subboreal phase.

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Katarzyna Ślusarska
University of Szczecin
Institute of History
Szczecin
Poland
katarzyna.slusarska@usz.edu.pl

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This volume presents the results of an international network project on Late Bronze Age and Early Iron Age urnfields from northwest Europe.
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