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On the edge of the Lowland: the Ahrensburgian of Rügen, Usedom, Wolin and Bornholm Islands

Na krawędzi Niżu: kultura ahrensburska na Rugii, Uznamie, Wolinie i Bornholmie

Abstract: The article presents the current state of research on the Ahrensburgian in the area of Rügen, Usedom, Wolin and Bornholm. The settlement patterns, lithic technology, economy, networks and contacts were taken into account.
Keywords: Ahrensburgian, Tanged Points Technocomplex, Final Palaeolithic, Younger Dryas, Early Preboreal Period, Western Baltic, North European Lowland, Pomerania, southern Scandinavia
Abstrakt: Artykuł prezentuje obecny stan badań nad kulturą ahrensburską na obszarze Rugii, Uznamu, Wolina i Bornholmu. Pod uwagę wzięto wzorce osadnicze, technologię krzemieniarstwa, gospodarkę oraz sieci powiązań i kontaktów.
Słowa kluczowe: kultura ahrensburska, technokompleks z liściakami, schyłkowy paleolit, młodszy Dryas, wczesny okres preborealny, Niż Północnoeuropejski, Pomorze, Południowa Skandynawia

Introduction

Rügen, Usedom and Wolin with some smaller islands located in the Pomeranian Bay form the main archipelago of the southern Baltic Sea (Fig. 1). At the end of the Pleistocene, this area was a belt of inland hills, separating two plains on the north and south respectively. The whole area was a part of the North European Plain and was directly connected with Bornholm, which at the time was a northern tip of a large peninsula, stretching from Rügen on the west, to the central part of the Pomeranian Bay on the east.

There is evidence of human presence in the Palaeolithic, though not in the oldest periods – the Hamburgian sites are absent, and the Federmesser and Bromme are represented by single stray finds. The majority of the Palaeolithic finds are related to the Ahrensburgian. The relatively large number of sites and stray finds allow for some basic analysis of the spatial patterns, as well as lithic technology, economy, networks and contacts, though in somehow limited form.

A good quality of the palaeoenvironmental research allows setting the archaeological data in the environmental context. The problem, however, is a low number of radiocarbon dating. The discussion on the detailed chronology of the Ahrensburgian and its division is therefore impossible. Thus, for this study the chronological frames of the Ahrensburgian were based on data from other areas, covering the Younger Dryas and the first half of the Preboreal Period, c. 10800–9000 cal BC. It is noteworthy that the period of c. 9600–9000 cal BC was probably a transition phase between the Ahrensburgian and the Maglemose culture (sometimes called Epi-Ahrensburgian), characterised by gradual changes of lithic and bone technology, economy, spatial and social organization, as well as networks and contacts. One must keep in mind that the radiocarbon dates from latest Ahrensburgian and earliest Maglemosian sites overlap (e.g. Stelmoor and Lundby Mose, both dated to the first centuries of the Preboreal Period; cf. Terberger *et al.* 2004, 160–163), and the data on this period in NW Poland and NE Germany is neither numerous nor certain. Many of the dated Preboreal materials from Bornholm might either be Ahrensburgian, Epi-Ahrensburgian or even Maglemosian, thus results and interpretations presented here must be taken with a grain of salt, especially in relation to the Late Ahrensburgian.

The main aim of this article is integration and presentation of the current state of research (i.e. sites, settlement patterns, lithic technology, economy, networks and contacts) on the Ahrensburgian in islands of the Pomeranian Bay (Rügen, Usedom and Wolin with other smaller islands) and Bornholm. All of them at the end of the Pleistocene and in Early Holocene were connected by a land bridge. Therefore, it is a natural decision to treat them as one coherent region. In this study, mostly names of the main islands will be used in reference to their respective archipelagos, e.g. "the Wolin area" will be used instead of "the Wolin, Chrząszczewska and Świna Gate Islands". In some places, the division into the northern (Bornholm), southern (Usedom and Wolin) and western (Rügen) parts will be used.

A secondary aim of this paper is to present some of the Author's thoughts about the Ahrensburgian and the Tanged Points Technocomplex in general. These were included in the discussion and closing remarks.

The radiocarbon dates presented in this study whenever possible were calibrated with OxCal v. 4.4 on-line calibration software (Bronk Ramsey 2009; <https://c14.arch.ox.ac.uk/oxcal/OxCal.html>; accessed: 2021-04-26 to 2021-05-18), using the IntCal 20 curve (Reimer *et al.* 2020).

The environment of the Younger Dryas and the Early Preboreal Period

The evolution of the Baltic is one of the key elements of the environmental history of the area. Through the entire period included in this study, it was

the Baltic Ice Lake (BIL), which was formed on the face of the Scandinavian Ice Sheet around 13700–13500 cal BC (c. 13000 BP). The Baltic Ice Lake reached its maximum level in Allerød and at the beginning of the Younger Dryas (Fig. 1) (Lampe 2002, 13). The analysis of the seismic profiles from Tromper Wiek in the Rügen area suggests that the maximum water level of BIL was around 9 m below present-day MSL (Lampe 2002, 13; Bellec *et al.* 2010). At that time Baltic's main water outlet was Øresund (Lemcke *et al.* 2002, 175).

The transgression of the Batlic Ice Lake ended after the retreat of the glacier from southern Sweden. Around that time, Baltic gained a new outlet around Mount Billingen in Sweden, which caused a violent and fast water level drop to around 40 m below MSL. This event took place c. 10100–10000 cal BC (10300 BP) (Lampe 2002, 15). About 200 years later, some seasonal inlets of salty water from the North Sea are suggested by the diatom series from the Gotland Basin (Lemcke *et al.* 2002, 175).

The results of cited research mean that in the early Younger Dryas the present-day Wolin and Usedom were a group of hills located close to the coast of the Baltic Ice Lake, while the western Rügen had developed coast consisting of small islands and peninsulas. In the middle and late Younger Dryas, the coastline was moved from few kilometres in the western Pomeranian Bay to few dozens in the eastern Pomeranian Bay. It is noteworthy that during the entire Late Pleistocene and Early Holocene (c. 12000–7000 cal BC), Bornholm was connected with the rest of the research area by the land bridge. The main elements of the bridge were two ridges, Rønne Bank and Adler Ground. Through most of its history, the bridge was c. 15–17 km wide, and its remains are located 12–20 m below the present-day MSL (Sørensen, Casati 2015, 43–47).

The cold Younger Dryas period at the end of Pleistocene is clearly visible in the pollen profiles of the research area, as well as the neighbouring regions. Similarly to other regions of the North European Lowland, the typical feature of the beginning of this period is a rapid cooling resulting in development of open tundra habitats and subsequent retreat of forest to around 53° N (Theuerkauf, Joosten 2012). The event is visible well in pollen profiles in the Southern Baltic Zone, e.g. in Hoher Birkengraber in Endinger Bruch, Vorpommern, NE Germany (Terberger *et al.* 2004, 153). In this profile, the Younger Dryas layers contain large amounts of wormseed (*Artemisia*) and herbs (NAP), with confirmed presence of shrubs, such as juniper (*Juniperus*), sea-buckthorn (*Hippophaë*) and dwarf birch (*Betula nana*). Some tree pollen grains are also present, suggesting single plants growing in selected places. At the end of this phase the NAP pollen reached its peak (Terberger *et al.* 2004, 153).

The pollen profile from Niechorze shows a significant decrease of tree (AP) pollen curves, with simultaneous increase in pollen productivity of herbs

and prostrate shrubs, marking the tundra development (Ralska-Jasiewiczowa, Rzętkowska 1987, 169–171). This supports the hypothesis on the rapid environmental changes at the beginning of the Younger Dryas.

In core 42/99 from the Szczecin Lagoon, the Younger Dryas layer is composed of sands. In the sediment, a significant decrease in pine (*Pinus*) pollen was registered, combined with NAP curve increase (Witkowski *et al.* 2004, 158). The sediments from the bottom of the Szczecin Lagoon contain traces of fluvial processes, most probably related to the development of Pre-Oder bed. There is also evidence for rebuilding of previously present marsh into an open tundra covering the modern-day area of the Lagoon. The Lagoon sediment characteristics suggest that in the Younger Dryas, besides rapid Aeolian processes, also periglacial processes and erosion were significantly induced (Borówka *et al.* 2002, 110).

The similar situation was registered in other profiles from the area. The development of tundra with shrubs and prostrate shrubs, such as juniper (*Juniperus*), wormseed (*Artemisia*) and crowberry (*Empetrum*), as well as typical Dryas plants, like dwarf birch (*Betula nana*), white dryas (*Dryas octopetala*) and rockfoil (*Saxifraga*) is visible in the profiles from Wolin Island (Latałowa 1989, 119). In Świętouść, besides decrease of the pine (*Pinus*) curve and increase of tundra species curves, an increase of the European white birch (*Betula alba*) curve suggests local development of birch bush. The lithology of sediments from Świętouść profile indicates development of Aeolian processes early in the Younger Dryas. Numerous charcoals suggest presence of fire, possibly related to the human activity nearby. Both presence of charred pine macrofossils and markers of plants living on burned areas were registered (Fig. 2) (Latałowa, Borówka 2006, 327).

The data from Vallensgård Mose on Bornholm suggests that pine (*Pinus*), birch (*Betula*), willow (*Salix*), herbs (NAP) and heather (*Calluna vulgaris*) were present in the main basin. It must be stressed though, that the basin is surrounded by rocks, which protect it from wind, therefore the local conditions were more suitable for trees than on more open areas of Bornholm (Fig. 3 and 4) (Sørensen, Casati 2015, 50; Theuerkauf, Joosten 2012). Additionally, pine (Pinus sylvesrtis) stamps were found in the area of Rønne Bank and Adler Ground on the land bridge (Sørensen, Casati 2015, 43–44). These, however, were not dated and might be either older or younger than the Younger Dryas, as pine pollen grains are almost completely absent in the pollen profiles from sites located north of the 53° N (Theuerkauf, Joosten 2012, 400).

Numerous reindeer (*Rangifer tarandus*) remains are known from the research area, both in natural and anthropogenic contexts. In the unknown location on Rügen, a complete reindeer skeleton and a set of lithics were found

(probably excavated) by pastor Kuhse in the 19th century (Stubenrauch 1912, 165). Unfortunately, the whole assemblage was lost, making cultural and chronological interpretations impossible. Reindeer antlers and artefacts made of them are also known from the area. They were found in the Baltic in the vicinity of Dziwnów (Kaube 1985; Galiński 1986; 41; 1992, 229; Kobusiewicz 1999, 47), in an unspecified location on the sea coast of Wolin Island (Burkhardt 1933, 6), in Venz (Walter 1909, 204; Petzsch 1928, 30–31; 1930, 56; Berlekamp 1957, 48; Gramsch 1987, 118; Terberger 1996, 120), Garz (Klinghardt 1927, 26; Petzsch 1928, 20–21, 30; 1930, 56; Berlekamp 1957, 42; Terberger 2004, 217) and Putbus/Wrechen on Rügen (Terberger 2004, 217).

The biggest collection of reindeer remains comes from Bornholm. Bones and antler of 70 specimens were found on the island, while from the entire area of Denmark there are around 360 specimens known. Nine reindeers from Bornholm were dated, and four of them (Dyndeby, Klemensker, Nørregård and Søhjem; Fig. 6) gave results suggesting the Younger Dryas chronology (Aaris-Sørensen *et al.* 2007, 914; Sørensen, Casati 2015, 50–51).

The sudden warming at the end of the Vistulian caused rapid changes of plant communities in the Central and Northern Europe. The accepted date of Pleistocene-Holocene border is c. 9600 cal BC. An intense increase in pine and birch pollen suggests a rapid growth of dense forests in the southern Baltic region (Fig. 5) (Terberger *et al.* 2004, 153). The data from Vallensgård Mose shows that similarly to the rest of the southern Scandinavia, Bornholm was quickly covered by a pine-birch forest (Sørensen, Casati 2015, 51–52). Intense environmental changes on the turn of Pleistocene and Holocene are confirmed for several areas of the North European Lowland (Kabaciński, Sobkowiak-Tabaka 2010).

Environmental changes are visible in pollen profiles from Wolin Island. With the beginning of the Preboreal Period large concentrations of birch (*Betula*) and pine (*Pinus*), as well as single poplars (*Populus tremula*) appeared, leading to development of forests (Latałowa 1989, 119). With an ongoing warming new AP species started to appear. In the area of the Szczecin Lagoon, marsh developed in place of tundra. The pollen profiles show development of bogs with presence of marsh fern (*Thelypteris palustris*) and swamp sawgrass (*Cladium mariscusi*). Starting from this period up to the Littorina Transgression, the bed of Pre-Oder was stable and the environment of the Lagoon was similar to the modern-day Międzyodrze marsh in the area of Szczecin (Borówka *et al.* 2002, 110).

There are some assemblages of animal bones that should probably be dated to the Early Preboreal Period. One of them was discovered in the early 20th century in a peat bog near Dziwnów. Among the identified species there were reindeer (*Rangifer tarandus*), elk (*Alces alces*), red deer (*Cervus elaphus*),

brown bear (*Ursus arctos*) and unspecified horses (*Equidae*) present (Walter 1919, 41–42). In Schweikvitz, elk and reindeer bones were found together (Petzsch 1928, 20–21; Terberger 2004, 217), suggesting that their chronology is similar. On Bornholm, remains of reindeers, elks and beavers (*Castor fiber*) were found in few locations, with some of them ^{14}C dated to the Early Preboreal. These come from Strangegård, Lindegård, Almindingen and an unknown location (reindeers), Dammegårds Mose, Torupgårds Mose, Rutsker, Vallensgård Mose and Bondegårds Mose (elks) as well as Anhøj Myr (beaver) (Fig. 6) (Sørensen, Casati 2015, 52).

The Ahrensburgian settlement

The Ahrensburgian settlement on Bornholm, Wolin, Usedom, Rügen and surrounding smaller islands consists of one or two excavated sites (one possibly excavated in the 19th century, although the data on it is particularly vague), five surface collections, eight stray finds and single lithics from other sites, six sites with organic finds and one pollen profile with possible evidence of human activity.

In the northern end of the research area, the most important site is Vallensgård on Bornholm. During excavation of a Neolithic site, a Palaeolithic assemblage was collected, including cores, blades, flakes, two end-scrapers and one tanged point (Fig. 7:1–6) (Nielsen P.O., Nielsen F.O. 2006; Casati, Sørensen 2006; 12–14; Sørensen, Casati 2015, 49). The assemblage might be related either to Bromme or Ahrensburg cultures, although the size of finds suggest the younger of two cultures. According to published images of the tang point from Vallensgård, its size is comparable to some other Ahrensburgian points, e.g. from Koszalin-Rokosowo (Czarnecki 1970, 39).

Interestingly, in the nearby Vallensgård Mose peat bog, five harpoons and one point were found. Two of these artefacts may be related to the Ahrensburgian, due to ^{14}C dates partially covering the Late Ahrensburgian:

- Elk antler harpoon (Fig. 8:3): 9585 ± 55 BP, 9216–8785 cal BC (95.4% [AAR 9404];
- Elk antler (?) point (Fig. 8:2): 9623 ±49 BP, 9232–9045 cal BC (42.8%) or 9027–8822 cal BC (52.7%) [AAR 13134] (Casati, Sørensen 2006, 15; footnote 17; Sørensen, Casati 2015, 55).

Another organic artefact with similar radiocarbon dates is the elk antler hoe from Torupgård (Fig. 8:1). The obtained date of 9885 ± 55 BP due to a flat spot in a calibration curve was calibrated to either 9656–9609 cal BC (3.0%), 9549–9483 cal BC (4.7%) or 9465–9247 cal BC (87.7%) [AAR 13135] (Sørensen, Casati 2015, 54–55).

The last three artefacts from Bornholm are stray finds of tools performed on blades detached with soft hammer percussion: the combined tool (burin + truncation) from Bølshavn (Fig. 7:7) and two burins from Ålyst (Fig. 7:8,9) (Casati, Sørensen 2006, 15–17).

In the southern part of the research area, the most important site is Buniewice 7 on Chrząszczewska Island. It is a surface collection containing a large Ahrensburgian assemblage, with 174 lithics in total, with cores, blades, numerous functional and typological tools, including tanged points present (Adamczyk 2014).

Two other sites from the Chrząszczewska Island, Buniewice 10 and Chrząszczewo 37, contain small amounts of soft hammer blades representing a method and technique typical for Ahrensburgian and Sviderian (Adamczyk 2014, 192). Another three surface collections contain single Ahrensburgian finds. In Chrząszczewo 8 (Chrząszczewska Island), two tanged points (described as "nail points" or "needle points") were found among others in a Funnel Beaker culture settlement (Cnotliwy 1966, 191; Siuchniński 1969, 180). In Łuskowo 12 (Wolin Island), a find resembling a willow-leaf tanged point was found together with artefacts of the Late Bronze Age (Cnotliwy 1959, 595–596), however, the artefact was probably lost and is therefore impossible to be verified. A single tanged point was also found in the area of the town of Wolin (Kowalski 2017, 14).

Two organic finds originate from this part: the antler harpoon found in the Baltic around 2 nautical miles from Dziwnów (Fig. 9:1) (Kaube 1985; Galiński 1986; 41; 1992, 229; Kobusiewicz 1999, 47) and the antler axe found on the Wolin Island sea shore (Burkhardt 1933, 6). The latter, however, was lost and no image of it exists. The harpoon was radiocarbon dated to 10140 ± 60 BP, calibrated to either 9996–9645 cal BC (81.1%), 9639–9517 cal BC (10.3%) or 9500–9453 cal BC (4.0%), which is a transitional period between the Younger Dryas and the Holocene (Orłowska, Osipowicz 2022).

It is noteworthy that in Świętouść, pollen profile 5/98 contains evidence for use of fire, possibly a hearth, dated to the Early Younger Dryas (Latałowa, Borówka 2006, 327).

The last single find from the southern end of the area is the tanged point from Pudagla on Usedom Island (Terberger 1996, 120).

In the western part of the area, the most significant site seems to be the surface collection from Stedar on Rügen. The assemblage contains a Bromme tanged point, numerous side-scrapers and end-scrapers, a Zinken perforator, two tanged points with a ventral side retouch, two willow-leaf tanged points, several blades and flakes (including retouched ones), as well as a core (Berlekamp 1957, 42–43; Taute 1968, 105; Terberger 1996, 120). Another surface collection is Sylvitz, containing a tanged point, some typological tools

(though without any details on them) and a number of blades (Taute 1968, 105; Terberger 1996, 120).

A noteworthy find was so-called Kuhse's collection, originating from an unknown location on Rügen, either collected from a surface or excavated by Kuhse, a local pastor in the mid-19th century, containing a complete skeleton of a reindeer and a set of lithics (Stubenrauch 1912, 165). Unfortunately, the collection was lost and its description lacked any details, therefore its exact chronology is debatable, and it may be Ahrensburgian, but it could be also older.

In three locations on Rügen, single tanged points were found: in Baabe (Terberger 1996, 120), Bergen (Taute 1968, 105; Gramsch 1987, 117; Terberger 1996, 120) and in an unknown location on the island (Berlekamp 1957, 50). There are also some artefacts made of a reindeer antler, potentially connected with the Ahrensburgian settlement. A harpoon was found in Venz (Fig. 9:2) (Walter 1909, 204; Petzsch 1928, 30–31; 1930, 56; Berlekamp 1957, 48; Gramsch 1987, 118; Terberger 1996, 120). In Garz, there were two reindeer antlers, one of which was worked, as well as a possible antler axe or mattock, all of which were found in a marl deposit (Klinghardt 1927, 26; Petzsch 1928, 20–21, 30; 1930, 56; Berlekamp 1957, 42; Terberger 2004, 217). An interesting find is also an unmodified reindeer antler deposited in a man-made pit, found in Putbus /Wrechen (Terberger 2004, 217).

The Ahrensburgian settlement on Rügen, Usedom, Wolin and Bornholm shows different types of locations in use. The first one is present in the southern part of the area and is concentrated around the Dziwna Tunnel Valley, the modern-day Dziwna strait and Kamień Lagoon (and their extension into the Baltic). These two basins are part of the same geomorphic feature, being a narrow and a wide part of the valley respectively. In the Late Pleistocene and the Early Holocene, the tunnel valley might have been a trail of reindeer yearly migrations, thus the bottleneck terrain form in the connection of the strait and the lagoon was a favourable hunting ground, probably used in spring and/or autumn, explaining presence of an Ahrensburgian settlement in the northern part of Chrząszczewska Island (Adamczyk 2014, 202; 2016, 105–106).

In the western part sites are located in the NW part of Rügen, south from the basin of Großer Jasmunder Bodden and Kleiner Jasmunder Bodden. The location of these sites on top of small hills provides a vision to the wide and shallow, now submerged valley. The single find from Usedom has a similar context. These hunting sites might have been in use during summer, when individual families settled different sectors of the research area, hunting for diverse species grazing in large valleys (Adamczyk 2016, 106–108).

In the northern part, there is only one hunting camp located in the central part of Bornholm. The presence of single finds from the western and northern

coasts suggests a wide exploration area in the northern tip of the former peninsula. This interpretation is supported by numerous Younger Dryas and Early Preboreal animal remains found in different part of the island. Similarly to the sites from Rügen, the Bornholm sites might be results of summer camping or at least of short hunting raids to the coast of the Baltic Ice Lake.

The differences in site locations between the south, west and north most probably resemble seasonal changes of settlement patterns. The Dziwna Tunnel Valley sites are probably connected with hunting during spring and autumn migrations, thus sites seem to be concentrated on a rather small area. Contrary, in the west and north, sites are more spread, resembling summer camping. It is noteworthy that some of these summer camps were possibly located on the plain north of the modern-day Wolin Island, as suggested by the finds from the Baltic. It seems possible that all sites from the research area come from a single clan or tribe consisting of few families, gathering for the winter and breaking into small groups for the summer (Adamczyk 2016, 108).

Lithic technology and raw material economy

The data on the Ahrensburgian lithic technology come mostly from Buniewice 7 site on Chrząszczewska Island. This assemblage was discussed in details in other works (Adamczyk 2014; 2016, 162–168), therefore only the most important observations will be highlighted here, with some general remarks on the technology in the research area.

The flint type used in Buniewice is the local Campanian and Upper Turonian flint. This raw material is traditionally known as the Baltic Erratic Flint. The one used in the Ahrensburgian assemblage is of a very high quality, with a glass-like internal structure, low number of inclusions and both light and dark grey colour. Possibly it was collected in the neighbourhood of the site, as suggested by the presence of large quantities of flint in the modern-day cliff next to the site. In this cliff, a layer of chalk is visible, with numerous flint pebbles, up to 15 cm in diameter, similar to the one used in the Late Pleistocene. The same type of flint is also present in inactive chalk quarries on Chrząszczewska Island and in Lubin, SW part of the Wolin Island (Alexandrowicz 1966, 19). Similarly, other Ahrensburgian sites in the area also seemed to use local raw materials, with the sole exception of Bornholm, where large flint pebbles are absent. The assemblage from Vallensgård was made of high quality Senonian flint. It is hypothesised that this raw material originates either from Rügen or from a submerged outcrop located somewhere on the land bridge (Casati, Sørensen 2006, 14; Sørensen, Casati 2015, 49–50).

Cores from Buniewice were exploited with a soft hammer, as suggested by flat negatives of ripples and bulbs, as well as sharp (70–80°) striking angles

and rather small platforms (Fig. 10). The use of soft hammer is one of the major features of the Ahrensburgian flintknapping and is present in all assemblages from the area.

All cores from Buniewice are highly reduced and come from the last stage of exploitation. They also show evidence of repairs and reworking, suggesting producers' wide knowledge of technology. Despite some morphological differences, all specimens were originally prismatic cores, with possible distinction between the main platform for long blade detachment and support platform for correction debitage detachment. The scheme of this method covers (Fig. 11 and 12):

– preparation of a back,
– preparation of platforms,
– preparation of sides,
– blade detachment.

This method is typical of both Ahrensburgian and Sviderian (Taute 1968, 16; Fiedorczuk 1995; 2006, 32–44; Migal 2007, 191–197; Grużdź 2018). It was also used in Kocierz (Czarnecki 1971; Galiński 1999). Typically, after reaching a certain size the cores may have been reworked in three ways:

– secondary preparation as a small prismatic core,
– secondary preparation as a single platform core,
– reworking into a mining tool or Lerberg type axe.

In case of Rügen and Wolin, the first two methods were used commonly (though the data from Usedom and Bornholm is insufficient). So far, there is no evidence for creating mining tools from used cores, like e.g. in the aforementioned Kocierz area (Czarnecki 1971; Galiński 1999), where this method is present.

The last method was preparation of single platform cores from the start. It is somehow less popular than the prismatic core method, yet still it is an important part of Ahrensburgian and Sviderian flintknapping (Grużdź 2018). It is noteworthy that the only core from Bornholm was made using this method.

The raw material economy suggests tendency to search for the best possible material sources and a careful treatment of raw material, reflected by intense exploitation of cores, change of method after a certain reduction stage and careful selection of blanks for tools.

Discussion: the Ahrensburgian on the edge of the lowland

The Ahrensburg culture is the best represented Palaeolithic culture in the research area. Both quantity and quality allow for a limited analysis of settlement patterns, technology and palaeoecology, as well as some comparisons with other areas of the North European Lowland.

In all aspects the Ahrensburgian of Rügen, Usedom, Wolin and Bornholm seems to have deep analogies in other Younger Dryas cultures on the Lowland. Most of all, the distinct spatial organisation with concentrated settlement around routes of annual reindeer migrations, and more spread summer camps on hilltops around hunting grounds, is very common in both Ahrensburgian and Sviderian. The classic example of those hunting stations is the complex in the Ahrensburg Tunnel Valley. Similar concentrations, significantly smaller though, are known from Pomerania, e.g. the Rotnowo area (Galiński 2007). Other notable examples are Sviderian sites in the Poznań area (Kobusiewicz 1999, 64) or in Salaspils Laukskola, Latvia (Sulgostowska 2005, 220–223).

An important element of the spatial distribution of the Younger Dryas Tanged Point Technocomplex is the presence of specialised workshops located near flint outcrops. This is especially true in case of Sviderian, as presented by the complex of sites in the Rydno area (Fiedorczuk 1995; 2006). This type of sites is probably absent in the research area. However, the aforementioned site in Kocierz (Czarnecki 1971; Galiński 1999), around 30 km to the east from the Wolin and Chrząszczewska Islands, is the example of such site.

From the economic perspective, the Ahrensburgian in the research area seems to be similar to the rest of the Lowland. This conclusion, however, is based on the spatial distribution and the assumption of the significant role of reindeer in both Ahrensburgian and Sviderian (Bratlund 1996; Sobkowiak-Tabaka 2011, 122–126), although this might be only partially true. It is noteworthy that a seasonal specialisation is suggested for the area. The spring and autumn hunts may have been conducted by large groups of hunters in fixed positions around the migration route in the Dziwna Tunnel Valley, focused on killing as many reindeer as possible for winter supplies, especially in the autumn. On the other hand, the summer hunting strategy may have been more flexible, based on individual stalking of diverse game. The research on reindeer in the southern Scandinavia suggests that the species was common game on the Baltic Ice Lake coast (Aaris-Sørensen *et al.* 2007, 917; Sørensen, Casati 2015, 51), which in turn attracted hunters.

There are some finds in the research area containing various faunal remains, including reindeer and typical woodland fauna in the same sites, like in Dziwnów (Walter 1919, 41–42). The diversity of fauna increases in the Early Preboreal Period, suggesting a wide variety of hunting game available for the Late Ahrensburgian hunters, notably elks, as reflected by use of their bones and antler for tool-making. It also seems possible that single elks may migrate deep into the tundra during summers as early as the Younger Dryas, just like modern-day elks in the Arctic and High Mountains of Scandinavia. The presence of diverse fauna might result in more flexible hunting strategies than

we usually associate with the Ahrensburgian communities, adapting to local resources and changing environment, especially at turn of the Pleistocene and the Holocene.

It also seems possible that an important part of the economy might be use of water resources, such as fish, waterfowl, mammals and molluscs. It is a fact that sites on Bornholm (Ålyst and Bølshavn; Fig. 1:4 and 11) are located near the former shore of the Baltic Ice Lake. Some clue may also be the presence of harpoons from Baltic near Dziwnów (Kaube 1985; Galiński 1986; 41; 1992, 229; Kobusiewicz 1999, 47), Vallensgård Mose peat bog (Casati, Sørensen 2006, 15; Sørensen, Casati 2015, 55) and especially the aforementioned site at Venz (Walter 1909, 204; Petzsch 1928, 30–31; 1930, 56; Berlekamp 1957, 48; Gramsch 1987, 118; Terberger 1996, 120). On the other hand, harpoons can also be used for big game hunting, not necessarily in a water environment. Also importantly, seals resting on a beach might be hunted with simple tools, such as clubs, which do not preserve very well. The exact chronology of first appearance of seals in Baltic is somehow unclear, though the possibility of hunting them on the shores of BIL (Bornholm, western Rügen) should be kept in mind when discussing potential water resources used by the Ahrensburgians. As E. Cziesla (2018) points out, seals may have also been hunted in freshwater environments, as they are known for migrating upstream of large rivers, although the habit is limited in the modern times due to development of the cities. Nevertheless, Cziesla suggests that seals were often inhabiting large river systems (like the River Oder) and Ahrensburgians hunted them in winter near airholes using large harpoons of the type represented by finds from Dziwnów and Venz (Cziesla 2018, 71–77). Although there are no finds dated to the Ahrensburgian from the research area, the freshwater seal hypothesis is supported by some later finds. It is noteworthy that at least one seal bone was identified at the Funnel Beaker culture settlement in Ustowo by the Oder (Siuchniński 1958; Kubasiewicz 1958), approximately 70 km from the modern Baltic shoreline.

The gathering and its significance in overall Ahrensburgian economy is a subject that has not been discussed at all due to lack of data. A presence of some edible plants in tundra (like different species of berries), as seen from the pollen profile perspective (e.g. Latałowa 1989, 119; Borówka *et al.* 2002, 110; Latałowa, Borówka 2006, 327), is an interesting suggestion for possible gathering species though.

A serious problem of the Ahrensburgian on Rügen, Usedom, Wolin and Bornholm is absence of reliable basis for analysis of chronology. Although a significant number of faunal remains were found on Bornholm, including reindeers, some of which were ^{14}C-dated to the Younger Dryas and the Early Preboreal (Aaris-Sørensen *et al.* 2007). However, the known reindeer bones

from the island do not have any traces suggesting human treatment, such as cut marks or breaking to get marrow (Sørensen, Casati 2015, 51). Interestingly, two of three ^{14}C-dated artefacts from Bornholm possibly associated with the Ahrensburgian were made of an elk antler and are dated to the Early Preboreal Period. These are the mattock from Torupgård and the harpoon from Vallensgård Mose. According to Claudio Casati and Lasse Sørensen (2015, 15), the Vallensgård Mose harpoon has direct and strict analogies in the Ahrensburg culture assemblages, such as Stellmoor (Schleswig-Holstein) and Odermundingen (Brandenburg). This may support the hypothesis on the wide range of fauna hunted by Ahrensburgians, at least in the later phases of the culture.

As stated above, the lithic technology on the islands seems to be similar to other Ahrensburgian communities. The basis was the prismatic core method, widely used in all Ahrensburgian and Sviderian assemblages. Also the secondary reworking of prismatic cores, as well as some limited use of single platform cores seems to be a common feature of the said cultures, suggesting that the common technological tradition was essential for the Tanged Points cultures.

Rügen, Usedom, Wolin and Bornholm are located on the northern edge of the mixing zone between the Ahrensburgian and the Sviderian, which covers the eastern Germany and the western Poland (e.g. Sobkowiak-Tabaka, Winkler 2017). Therefore, in many ways traits typical of both units are present in the research area. A good example is a variety of tanged points found here (Fig. 13). Some of them do not follow any specific style, other show similarities to either one or both cultures. This rather eclectic style is one of the main elements of the Ahensburgian flintknapping tradition in the area. A variety of forms covers almost all known types, from classic Sviderian willow-leaf points, through tanged points with complete ventral retouch of tang and tip, points with partial retouch, self-pointed tanged points, to classic Ahrensburgian tanged points with dorsal tip retouch. Moreover, Zonhoven points, backed points and micro-trunctation points are also present. There is no clear pattern or any microregional differences though, and variety is seen within assemblages. The wide range of forms is culturally defined, but also is an effect of technological determinism. The Final Palaeolithic flintknappers having large knowledge of possible variants of a main form could easily match a final product shape and size to a blank morphology, causing the variety within both region and sites (Adamczyk 2016, 221–222).

In the mixing zone (including the research area) both western (Ahrensburgian) and eastern (Sviderian) forms are known (Sobkowiak-Tabaka, Winkler 2017, 236). This suggests intense contacts between both areas. Because of the rationality of human behaviour (efficient solutions are copied more often) it is possible that a system of contacts was present on the Lowland in the Younger Dryas

and the Early Preboreal Period. This network induced an unification of the material culture. It does not mean that the population was large, but rather that people were very mobile, which was possible in an open landscape of tundra. This mobile lifestyle disappeared with growing forest cover of the Lowland in the Early Holocene. Some technological solutions, however, were present for around 600 years after the rapid growth of first Holocene forests (c. 9600–9000 cal BC). The technological changes were slow, and in terms of flintknapping meant the gradual change from an elaborate soft hammer Ahrensburgian technology to a simpler Early Maglemosian hard hammer technology.

Closing remarks

To sum up the research on the Ahrensburgian on Rügen, Usedom, Wolin and Bornholm, it is worth mentioning that it shows lot of similarities to the Younger Tanged Points Technocomplex in the mixing zone. The conglomerate of eastern and western traditions, present in a vast belt around the River Oder, from the Baltic on the north, to Sudets on the south, is probably an effect of contacts between various groups roaming the Lowland. Furthermore, both Ahrensburgian and Sviderian could be interpreted as a mosaic of local groups, constantly in contact with neighbours, sharing knowledge and experience with each other. This explains why there are significant differences visible between eastern and western edges of the Tanged Points cultures area, but not in the middle. This middle part or the mixing zone traditionally was seen as an inner frontier, dividing both cultures. However, due to the presence of networks, as well as variety of traditions this area might be seen as a heartland rather than a frontier.

The regional diversity of the Ahrensburgian on Rügen, Usedom, Wolin and Bornbholm was influenced by variety of ecological niches present in the area, such as migration routes (Dziwna Tunnel Valley), summer tundra pastures and breading grounds (Bornholm, valleys on Rügen and Usedom, possibly western and northern Wolin and the land bridge), shore of a large water body (BIL coast on Bornholm and western Rügen), as well as small shrub and tree bushes (NE Wolin, Central Bornholm). Additionally, the southern and western part of the area are rich in high quality flint, which could be an important factor for the hunter-gatherers.

As stated before, the state of research allows for some basic analysis. This is especially true for the quantity and quality of sources from Rügen and Wolin. The situation on Usedom and Bornholm is a bit worse, with only one camp site and single stray finds known. On the other hand, it is possible that there are some Ahrensburgian materials present, but they were never identified

and/or published properly. Also, a low number of organic finds make the discussion on detailed chronology and economy significantly harder.

A large part of the area was submerged during the Littorina Transgression. The fact that some Final Palaeolithic sites are present on the bottom of the Baltic is known and finds such as the harpoon from Dziwnów or the antler axe from the coast of Wolin Island are evidence for this statement.

It is noteworthy that a large part of data was lost during the World War 2, due to destruction of some collections. An example here is the Kuhse's collection, including a skeleton of reindeer and a set of lithics, or the collection of bones found in a peat bog near Dziwnów. Even if these collections will never be found, the fact of their discovery in the first place shows a huge potential for further research on the Pleistocene on the edge of the Lowland.

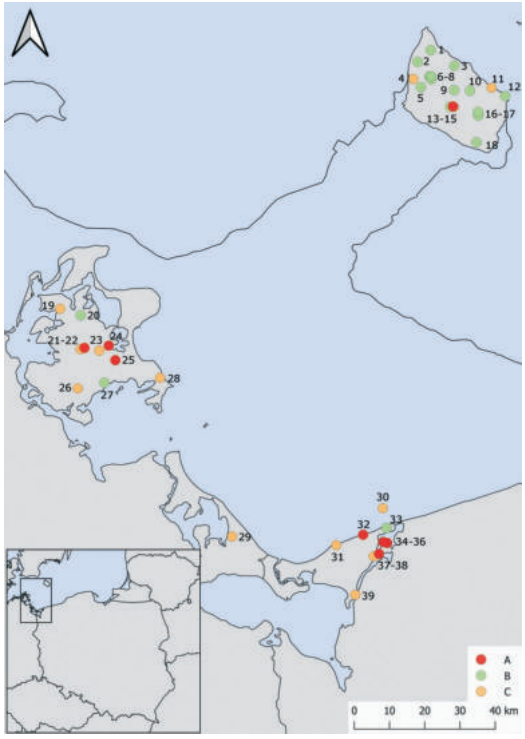

Fig. 1. Ahrensburgian sites of the Bornholm, Rügen, Usedom and Wolin Islands. The line represents the shoreline of the Baltic Ice Lake around 11000 cal BC. Campsites (A), fauna remains (B) and stray finds (C) are marked with different colours: 1 – Lindegård; 2 – Rutsker; 3 – Bondegårds Mose; 4 – Ålyst; 5 – Dammegårds Mose; 6 – Torupgårds Mose; 7 – Klemensker; 8 – Strangegård; 9 – unspecified location on Bornholm; 10 – Søhjem; 11 – Bølshavn; 12 – Nørregård; 13 – Vallensgård; 14 – Vallensgård Mose, fauna; 15 – Vallensgård Mose, artefacts; 16 – Almindingen; 17 – Anhøj Myr; 18 – Dyndeby; 19 – Venz; 20 – Schweikvitz; 21 – unspecified locations on Rügen, artefacts; 22 – unspecified locations on Rügen, Kuhse's collection; 23 – Bergen; 24 – Stedar; 25 – Sylvitz; 26 – Garz; 27 – Putbus/Wrechen; 28 – Baabe; 29 – Pudagla; 30 – Dziwnów, harpoon from the Baltic; 31 – unspecified location on Wolin's Baltic shoreline; 32 – Świętouść; 33 – Dziwnów, fauna; 34 – Buniewice 10; 35 – Buniewice 7; 36 – Chrząszczewo 37; 37 – Łuskowo 12; 38 – Chrząszczewo 8; 39 – town of Wolin. Prepared by G. Kiarszys
Ryc. 1. Stanowiska ahrensburskie na Bornholmie, Rugii, Uznamie i Wolinie. Czarną linią oznaczono przebieg linii brzegowej Bałtyckiego Jeziora Lodowego ok. 10000 cal BC. Obozowiska (A), szczątki fauny (B) i pojedyncze znaleziska (C) oznaczono różnymi kolorami: 1 – Lindegård; 2 – Rutsker; 3 – Bondegårds Mose; 4 – Ålyst; 5 – Dammegårds Mose; 6 – Torupgårds Mose; 7 – Klemensker; 8 – Strangegård; 9 – nieznane miejsce na Bornholmie; 10 – Søhjem; 11 – Bølshavn; 12 – Nørregård; 13 – Vallensgård; 14 – Vallensgård Mose, fauna; 15 – Vallensgård Mose, zabytki; 16 – Almindingen; 17 – Anhøj Myr; 18 – Dyndeby; 19 – Venz; 20 – Schweikvitz; 21 – nieznane miejsca na Rugii, artefakty; 22 – nieznane miejsca na Rugii, kolekcja Kuhsego; 23 – Bergen; 24 – Stedar; 25 – Sylvitz; 26 – Garz; 27 – Putbus/Wrechen; 28 – Baabe; 29 – Pudagla; 30 – Dziwnów, harpun z Bałtyku; 31 – nieznane miejsce na brzegu morskim Wolina; 32 – Świętouść; 33 – Dziwnów, fauna; 34 – Buniewice 10; 35 – Buniewice 7; 36 – Chrząszczewo 37; 37 – Łuskowo 12; 38 – Chrząszczewo 8; 39 – miasto Wolin. Oprac. G. Kiarszys

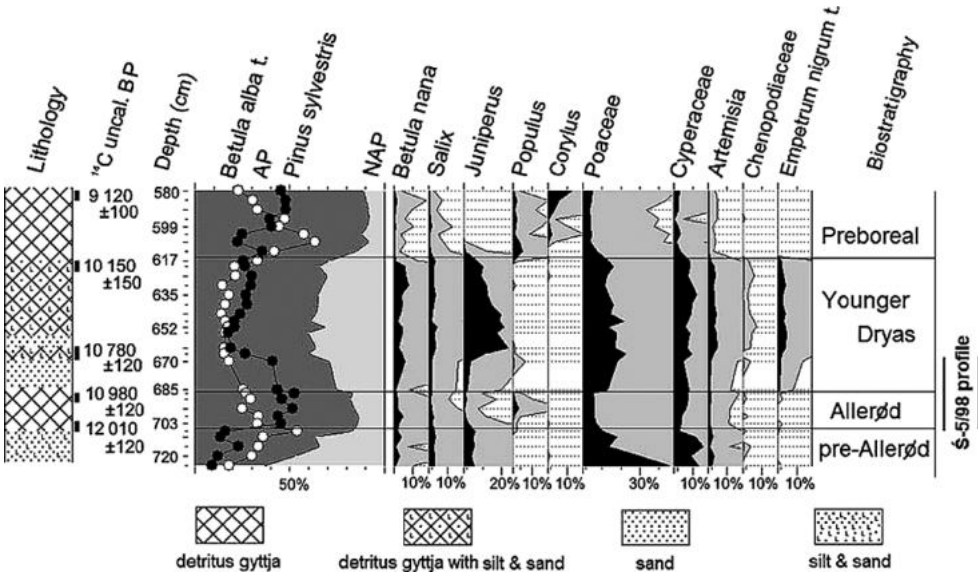

Fig. 2. Pollen profile from Świętość, a good representation of environmental context of the Ahrensburgian settlement in the area. After: Latałowa, Borówka 2006, 324, Fig. 4
Ryc. 2. Profil pyłkowy ze Świętouścia, dobra reprezentacja środowiskowego kontekstu osadnictwa ahrensburskiego na obszarze badań. Za: Latałowa, Borówka 2006, 324, Fig. 4

Fig. 3. Alpine tundra landscape in the Norwegian High Mountains (Rauland, Western Telemark). The elevation is c. 1000 m above MSL. This type of environment, i.e. trees and shrubs growing on slopes and in wind-covered spots, resembles how sheltered basins in the research area (e.g. Vallensgård Mose or Świętość) with developed park tundra or bush could have looked like in the Younger Dryas. Photograph by M. Adamczyk
Ryc. 3. Krajobraz tundry alpejskiej w norweskich Wysokich Górach (Rauland, zachodni Telemark), na wysokości ok. 1000 m n.p.m. Uwagę zwracają drzewa i krzewy rosnące na stokach i w miejscach osłoniętych od wiatru. Ten typ środowiska pokazuje, jak w młodszym Dryasie mogły wyglądać osłonięte zagłębienia z rozwiniętą tundrą parkową i zaroślami występujące na obszarze badań (np. Vallensgård Mose lub Świętość). Fot. M. Adamczyk

Fig. 4. Open tundra landscape in the Norwegian High Mountains (Mogen, Western Telemark). The elevation is c. 1200 m above MSL. More open regions of the research area (e.g. the Szczecin Lagoon) during the Younger Dryas were covered by similar type of environment. Photograph by M. Adamczyk
Ryc. 4. Krajobraz otwartej tundry w norweskich Wysokich Górach (Mogen, zachodni Telemark), na wysokości ok. 1200 m n.p.m. Taki typ środowiska jest zbliżony do bardziej otwartych rejonów obszaru badań (np. Zalew Szczeciński) w młodszym Dryasie. Fot. M. Adamczyk

Fig. 5. Sparce birch-pine forest landscape in the Norwegian High Mountains (Møsvatn, Western Telemark). The elevation of the lake is 919 m above MSL. This type of vegetation was typical of the Early Preboreal Period. Photograph by M. Adamczyk
Ryc. 5. Krajobraz rzadkiego lasu brzozowo-sosnowego w norweskich Wysokich Górach (Møsvatn, zachodni Telemark). Lustro wody znajduje się na wysokości 919 m n.p.m. Ten typ środowiska był charakterystyczny dla wczesnego okresu preborealnego. Fot. M. Adamczyk

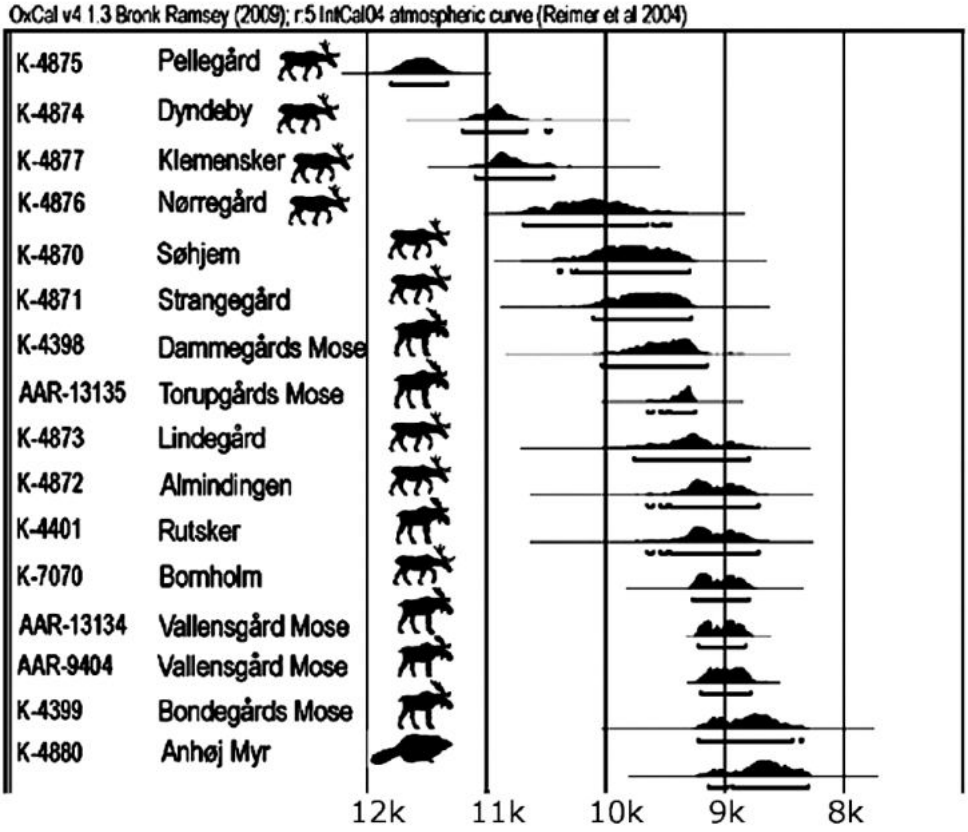

Fig. 6. ^{14}C dates of faunal remains from Bornholm, including all samples older (or partially older) than c. 9000 cal BC, i.e. dated to the Younger Dryas and the Early Preboreal Period. The oldest date from Pellegård is probably related to the Allerød thoug. It is crucial that the dates were calibrated with older curve IntCal04 and uncalibrated dates for the most part have not been published. After: Sørensen, Casati 2015, 48, Fig. 4

Ryc. 6. Daty radiowęglowe szczątków zwierzęcych z Bornholmu, włączając wszystkie oznaczenia starsze (lub częściowo starsze) niż ok. 9000 cal BC, czyli datowane na młodszy Dryas lub wczesny okres preborealny. Najstarsza data z Pellegård jest najprawdopodobniej łączona z Allerødem. Co istotne, daty oryginalnie kalibrowane były starą krzywą IntCal04, zaś daty niekalibrowane nie zostały opublikowane. Za: Sørensen, Casati 2015, 48, Fig. 4

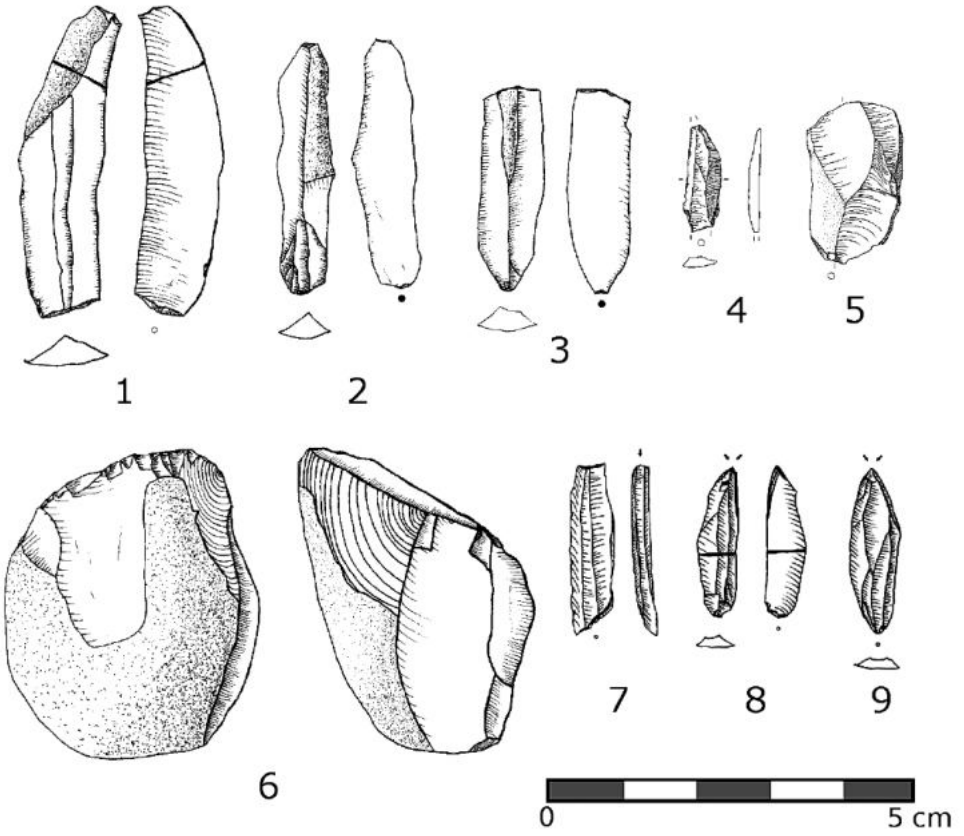

Fig. 7. Ahrensburgian flint artefacts from Bornholm: 1–6 – Vallensgård, 7 – Bølshavn, 8 and 9 – Ålyst. After: Casati, Sørensen 2006, 15–17, Fig. 4–6

Ryc. 7. Ahrensburskie zabytki krzemienne z Bornholmu: 1–6 – Vallensgård; 7 – Bølshavn; 8 i 9 – Ålyst. Za: Casati, Sørensen 2006, 15–17, Fig. 4–6

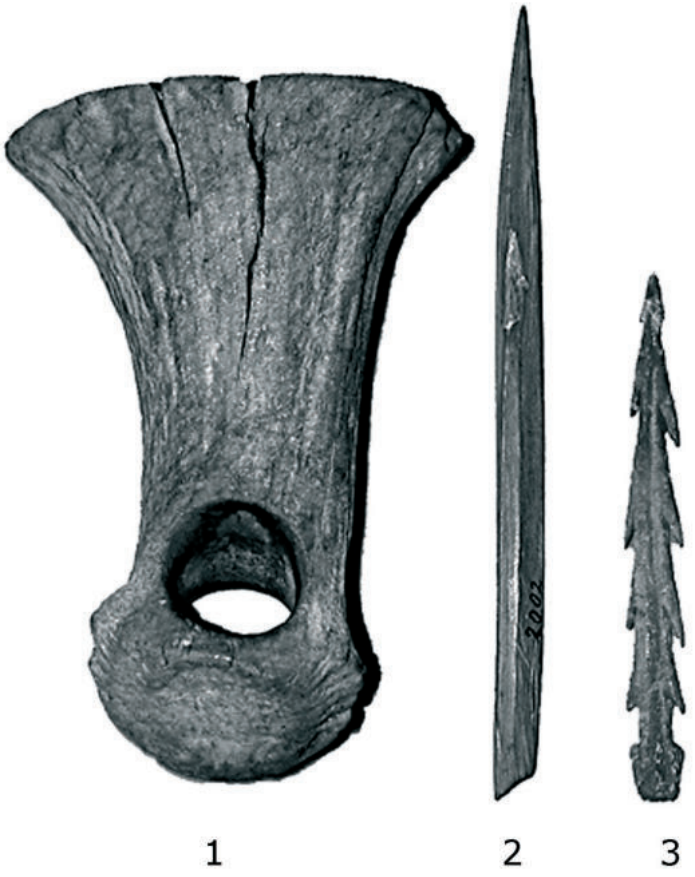

Fig. 8. Ahrensburgian organic artefacts from Bornholm: 1 – Torupgård, 2 and 3 – Vallensgård Mose. After: Sørensen, Casati 2015, 55, Fig. 5

Ryc. 8. Ahrensburskie zabytki z surowców organicznych z Bornholmu: 1 – Torupgård; 2 i 3 – Vallensgård Mose. Za: Sørensen, Casati 2015, 55, Fig. 5

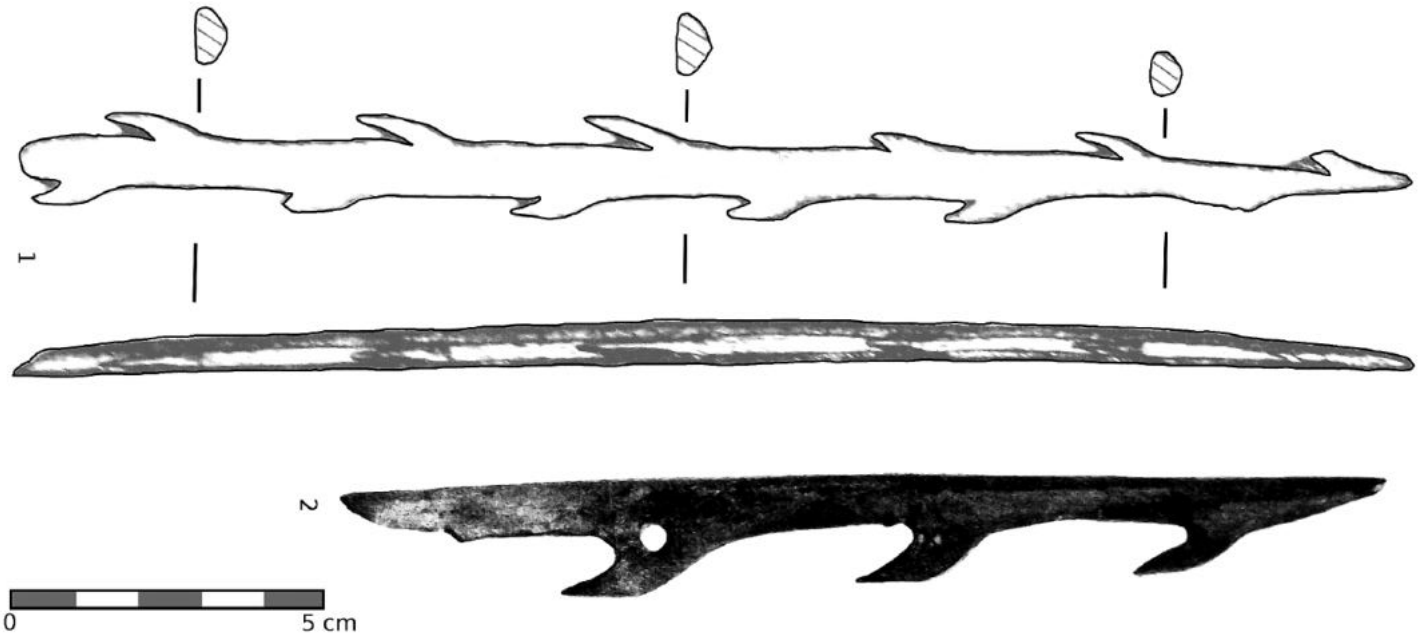

Fig. 9. Ahrensburgian reindeer antler harpoons: 1 – Dziwnów, 2 – Venz. After: Berlekamp 1958, Taf. 5:2; Kaube 1985, 410, Fig. 19:1
Ryc. 9. Ahrensburskie harpuny z poroży reniferów: 1 – Dziwnów; 2 – Venz. Za: Berlekamp 1958, Taf. 5:2; Kaube 1985, 410, ryc. 19:1

Fig. 10. Examples of butts of Ahrensburgian blades from Buniewice 7. Small size of most of them is noteworthy – it is a distinct feature of skilled soft hammer knapping. After: Adamczyk 2016, 168, Fig. 149

Ryc. 10. Przykładowe piętki wiórów ahrensburskich ze stan. Buniewice 7. Uwagę zwracają niewielkie rozmiary większości piętek – typowa cecha odbić miękkim tłukiem wykonanych przez doświadczonego krzemieniarza. Za: Adamczyk 2016, 168, ryc. 149

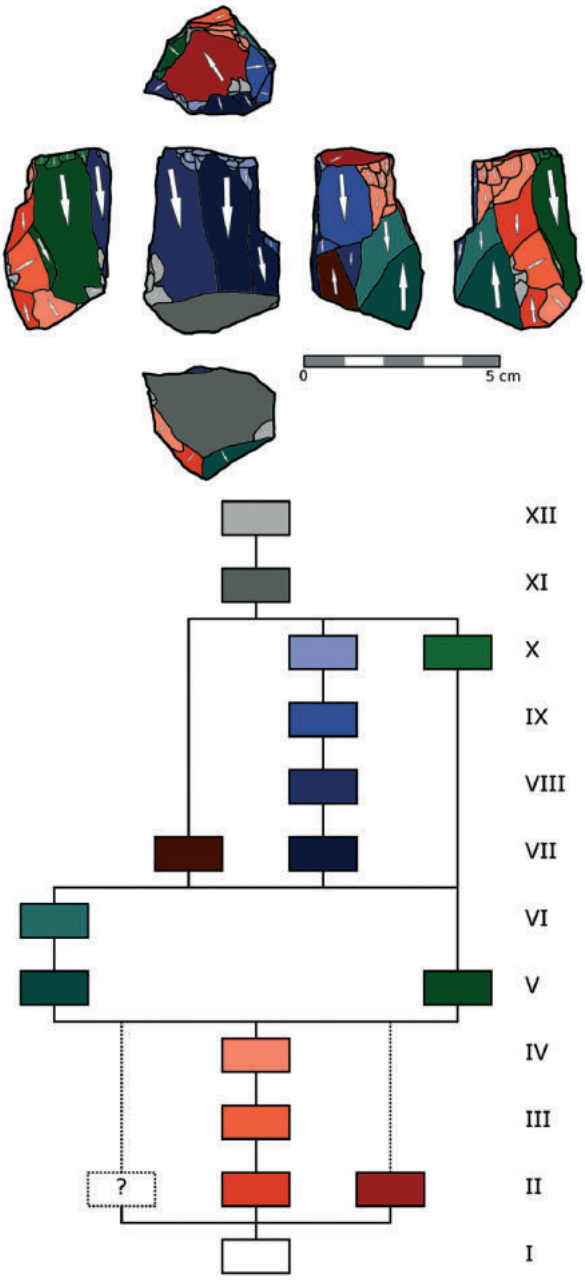

Fig. 11. Example of Ahrensburgian *schema operatoire*, a broken prismatic core from Buniewice 7. Similarities between this core and the one presented in Fig. 12 are worthy of note. After: Adamczyk 2016, 160, Fig. 159

Ryc. 11. Przykład *schema operatoire* kultury ahrensburskiej, pęknięty rdzeń pryzmatyczny ze stan. Buniewice 7. Uwagę zwraca podobieństwo z rdzeniem z ryc. 12. Za: Adamczyk 2016, 160, ryc. 159

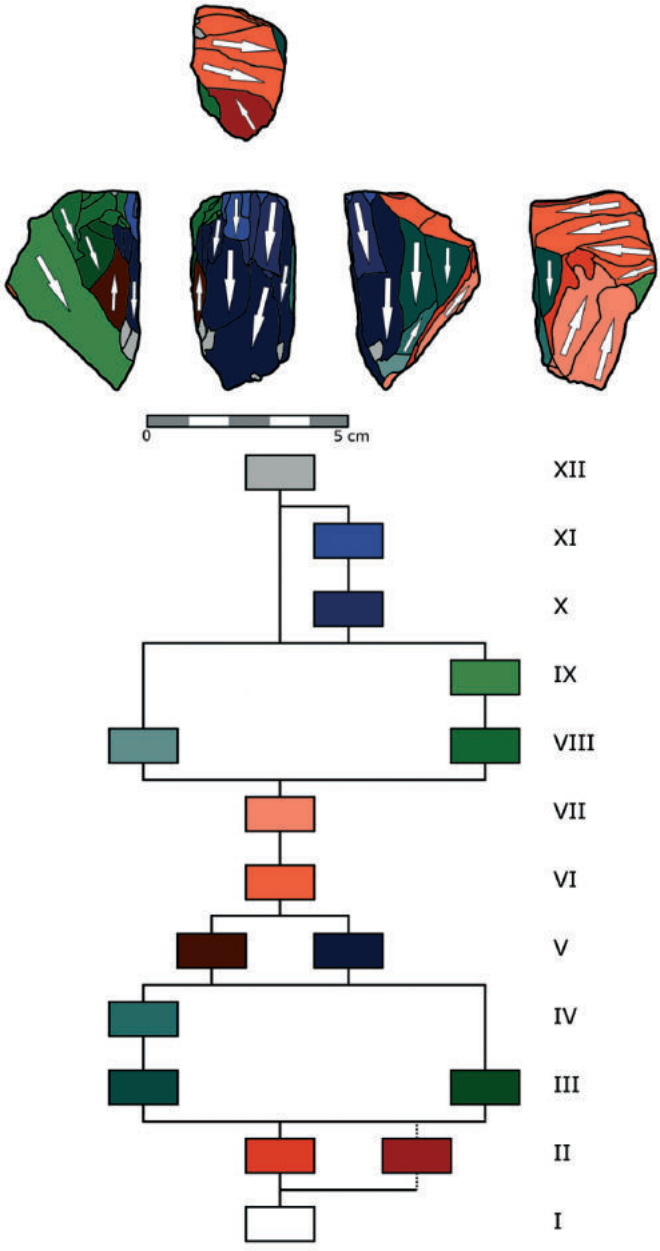

Fig. 12. Example of Ahrensburgian *schema operatoire*, a broken prismatic core reworked into a single platform core. Similarities between this core and the one presented in Fig. 11 are worthy of note. After: Adamczyk 2016, 161, Fig. 142

Ryc. 12. Przykład *schema operatoire* kultury ahrensburskiej, zniszczony rdzeń pryzmatyczny przerobiony na rdzeń jednopiętowy. Uwagę zwraca podobieństwo do rdzenia z ryc. 11. Za: Adamczyk 2016, 161, ryc. 142

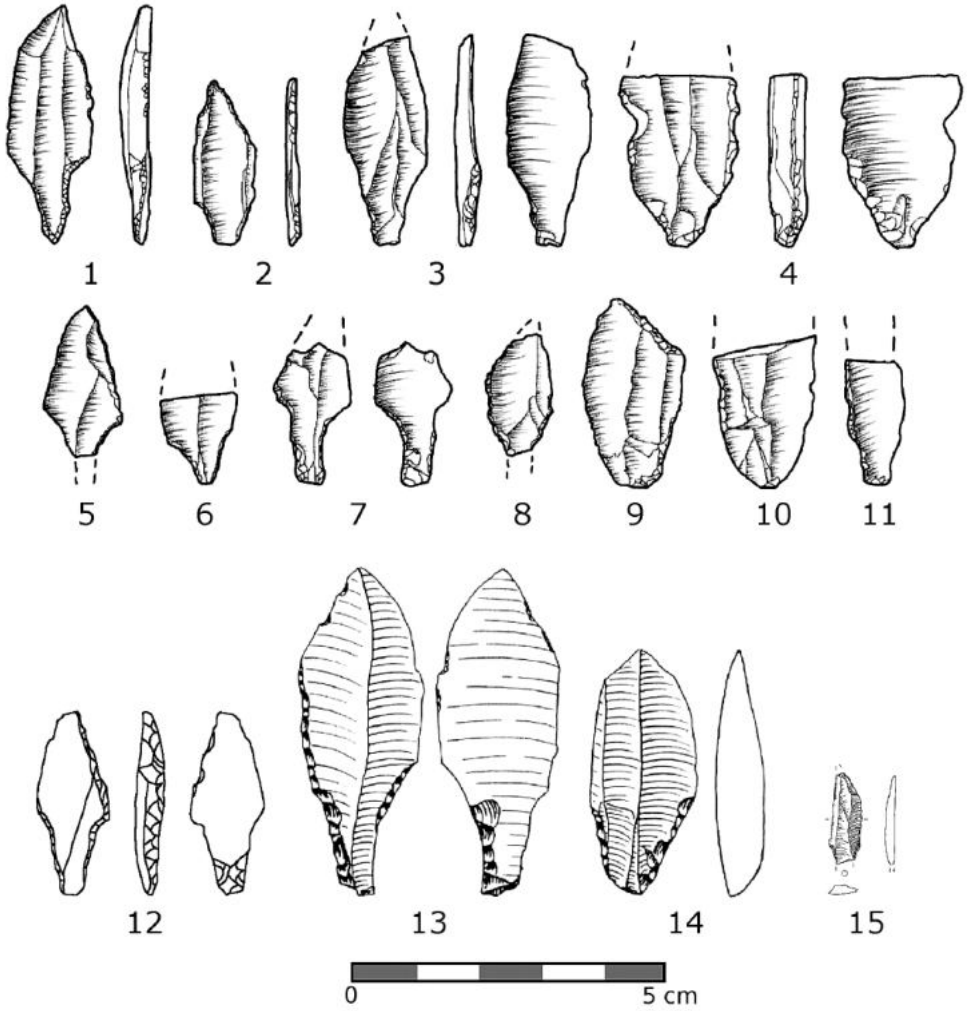

Fig. 13. Diversity of Ahrensburgian points from the research area: 1–8 – tanged points and their fragments; 9 – Zonhoven point from Buniewice 7; 10 and 11 – backed points from Buniewice 7; 12 – tanged points from the town of Wolin; 13 – Stedar; 14 – Sylvitz; 15 – Vallensgård. The one from Vallensgård seems to be exquisitely small, but tanged points of this size are also present in some assemblages. After: Taute 1968, Taf. 107:3,4; Casati, Sørensen 2006, 15, Fig. 4; Adamczyk 2014, 188, Fig. 7; 193, Fig. 10

Ryc. 13. Zróżnicowanie ahrensburskich grotów na obszarze badań: 1–8 – liściaki i ich fragmenty; 9 – półtylczak typu Zonhoven z Buniewic 7; 10 i 11 – tylczaki z Buniewic 7; 12 – liściaki z Wolina; 13 – Stedar; 14 – Sylvitz; 15 – Vallensgård. Okaz z Vallensgård wydaje się być ekstremalnie mały, jednak liściaki o takich rozmiarach są spotykane w zespołach ahrensburskich. Za: Taute 1968, Taf. 107: 3–4; Casati, Sørensen 2006, 15, Fig. 4; Adamczyk 2014, 188, Fig. 7; 193, Fig. 10

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On the edge of the Lowland: the Ahrensburgian of Rügen, Usedom, Wolin and Bornholm Islands

Summary

The human presence at the end of the Pleistocene in the area of Rügen, Usedom, Wolin and Bornholm Islands was confirmed in the past research, with the Ahrensburgian being the best represented taxon. The quantity and quality of archaeological and environmental data allows for some basic analysis of the settlement patterns, lithic technology, economy, networks and contacts. The area is located in the northernmost region of the Lowland, thus the results can supplement our understanding of the Younger Dryas and the Early Preboreal hunter-gatherers of the Western Baltic.

The Ahrensburgian in the area shows a lot of similarities to the Younger Tanged Points Technocomplex in the mixing zone. The conglomerate of eastern and western traditions, present in a vast belt around the River Oder, from the Baltic on the north, to Sudets on the south, is probably an effect of contacts between various groups roaming the Lowland.

The regional diversity of the Ahrensburgian in the area was influenced by variety of ecological niches present in the area, such as migration routes, summer tundra pastures and breading grounds, shore of a large water body, as well as small shrub and tree bushes.

Na krawędzi Niżu: kultura ahrensburska na Rugii, Uznamie, Wolinie i Bornholmie

Streszczenie

Badania odnoszą się do najbardziej na północ wysuniętej części Niżu Północnoeuropejskiego. Obecność ludzi w plejstocenie na Rugii, Uznamie, Wolinie i Bornholmie została potwierdzona już wcześniej, przy czym najlepiej reprezentowana jest tam kultura ahrensburska. Jakość i ilość danych archeologicznych i środowiskowych pozwalają na przeprowadzenie podstawowych analiz w zakresie wzorców osadniczych, technologii krzemieniarstwa, gospodarki oraz sieci powiązań i kontaktów. Wyniki badań mogą uzupełnić wiedzę na temat społeczności łowiecko-zbierackich młodszego Dryasu i wczesnego okresu preborealnego na obszarze Zachodniego Bałtyku.

Kultura ahrensburska na badanych terenach wykazuje wiele podobieństw do młodszego technokompleksu z liściakami w strefie przejściowej. Mieszanina tradycji wschodnich i zachodnich – obecna w szerokim pasie wzdłuż Odry: od Bałtyku na północy po Sudety na południu – jest najprawdopodobniej efektem kontaktów pomiędzy różnymi grupami przemierzającymi Niż.

Regionalne zróżnicowanie kultury ahrensburskiej na obszarze badań jest efektem dostosowania do różnorodnych nisz ekologicznych, takich jak trasy wędrówek zwierząt, letnie pastwiska i obszary rozrodcze w tundrze, wybrzeże dużego zbiornika wodnego oraz niewielkie zbiorowiska krzewów i drzew.

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