The Ahrensburgian and the Swiderian in the area around the middle Oder River: reflections on similarities and differences

Ahrensburgien und Swiderien im Gebiet beiderseits der mittleren Oder: Überlegungen zu Gemeinsamkeiten und Unterschiede

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Abstract - During the Younger Dryas (GS-1) and the beginning of the Early Preboreal (PB) the region of the middle Oder River was settled by hunter-gatherer societies defined as the Ahrensburgian and the Swiderian, which belong to the Tanged Point Technocomplex. As early as the 1930s, several archaeologists recognised similarities between the lithic inventories of these groups in terms of both technology and typology. Since that time numerous scientists have attempted to explain this phenomenon.

The major visible difference between the inventories consists of *type de fossile* – tanged points without a ventrally retouched tang in the west of the Oder River (the Ahrensburgian) and points with a ventrally retouched tang (and sometimes a willow-leaf shape) in the east of the Oder River (Swiderian/Masovian). At many sites, the different types occur together.

This paper presents the results of technological and typological studies on lithic assemblages, mainly from Brandenburg (Germany) and Greater Poland Province (Poland) , as well as two 'culturally' unmixed sites as examples for typical Ahrensburg (Burow) and Swiderian (Rzuchów) inventories. The aim of examining of the two culturally labelled collections (the Ahrensburgian and the Swiderian) is to define attributes which distinguish these inventories from each other or to determine the similarities.

Zusammenfassung - *Während der Jüngeren Dryaszeit (GS-1) und dem Beginn des Präboreals (PB) war das Gebiet um die mittlere Oder von Jäger-Sammler Gesellschaften des Ahrensburgien und Swiderien besiedelt, welche dem Stielspitzen-Technokomplex angehören. Bereits in den 1930er Jahren wurde die Ähnlichkeiten zwischen den lithischen Inventaren sowohl in technologischer als auch typologischer Hinsicht mehrfach von verschiedenen Forschern beobachtet. Hauptunterscheidungsmerkmal zwischen den beiden Gruppierungen sind die zugleich namensgebenden Stielspitzen ohne ventral retuschiertem Stiel (Ahrensburgien), welche überwiegend westlich der Oder auftreten, und solchen mit einer Retuschierung (und manchmal einer weidenblattförmigen Gestalt) (Swiderien/Masowien), die überwiegend östlich der Oder anzutreffen sind. Beide Typen sind jedoch oftmals sowohl links- als auch rechtsseitig der Oder anzutreffen, wobei ein gemeinsames Auftreten keine Besonderheit darstellt.*

Der Artikel legt anhand einer Fundplatzkartierung das Auftreten der Ahrensburg- und Swidry-Stielspitzen dar. Als Beispiel werden zwei „kulturell" unvermischte Inventare des Ahrensburgien (Burow) und Swiderien (Rzuchów) aus Brandenburg (Deutschland) und Großpolen (Polen) vorgestellt. Ziel der Untersuchung ist, potentielle Attribute herauszuarbeiten, die entweder eine Unterscheidung dieser Inventare ermöglichen, oder weitere Gemeinsamkeiten erkennen lassen. Durch die Darstellung des Auftretens von Ahrensburg-Stielspitzen östlich, und Swidry-Stielspitzen westlich der Oder wird deutlich, dass die Grenze zwischen Ahrensburgien und Swiderien nicht eindeutig festgelegt werden kann. In technologischer Hinsicht kann bei den Artefakten aus baltischem Feuerstein kein Unterschied zwischen Ahrensburgien und Swiderien festgestellt werden.

Keywords - Younger Dryas, tanged points with/without a ventrally retouch, willow leaf point, Ahrensburg tanged point, "contact zone", refitting, cultural groups
Jüngere Dryaszeit, Stielspitzen mit/ohne ventralseitiger Stielretusche, weidenblattförmige Stielspitze, Ahrensburg Stielspitze, "Kontaktzone", Zusammensetzung, kulturelle Gruppen

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Introduction

Between approximately 12'800 and 11'400 calBC in the vast area of the North European Plain bounded by northern Scandinavia and Estonia in the North, the British Islands, the Netherlands and Belgium in the West and the middle Wolga river in the East – societies used variable tanged points (Kozłowski 1999). This cultural complex, which is called Stielspitzen-Gruppen (Taute 1968), Pedunculated Point Technocomplex (Schild 1984), Tanged Points Complex (Kozłowski 1999) or Tanged Points Technocomplex (Burdukiewicz 2011), consists of several taxonomic units, namely the Brommian and the Ahrensburgian (North European Plain), the Swiderian (mainly Poland) and the Desna (Krasnosiele) Culture (in the area of the Vistula, the Pripyat, the Desna and the Dnieper basins). The present study focuses on flint assemblages of two aforementioned entities which mainly belonged to the Ahrensburgian and the Swiderian who occupied the area of the Oder Basin (Fig. 1) during the Younger Dryas (GS-1) and the very beginning of the Preboreal (PBO – Preboreal oscillation) (Sobkowiak-Tabaka 2011).

It is standard practice for archaeologists to classify ancient cultural artefacts into categories, and it is necessary to conduct studies concerning past

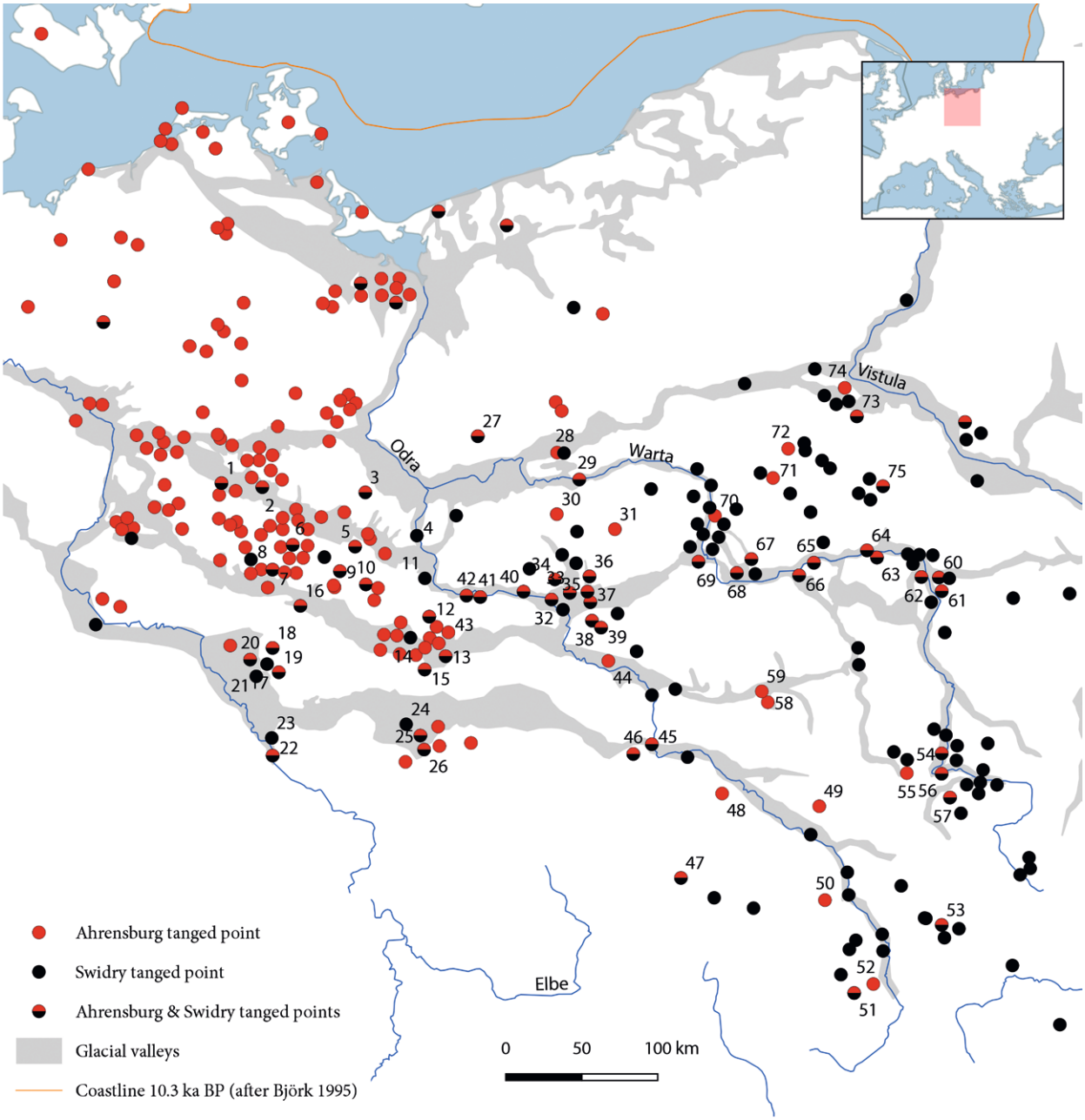

Fig. 1. Sites with Ahrensburgian and Swiderian tanged points. No. 1-26 see Fig. 2, No. 27-74 see Fig. 3. Sites without numbers acc. Winkler 2018 (drawn by K. Winkler).

Abb. 1. *Fundplätze mit Stielspitzen vom Typ Ahrensburg und Typ Swidry (s. l.). Nr. 1-26 siehe Fig. 2 Nr. 27-72 siehe Fig. 3. Fundpunkte ohne Nummern nach Winkler 2018 (Grafik: K. Winkler).*

societies. Moreover, classification based on a morphological type or formal typology is a cornerstone of archaeological methodology (Grøn et al. 2009). Thereby, similarities and differences between artefacts which occur within a well-defined territory are used to specify taxonomic units and arrange them in a cultural and/or chronological order. Several scholars have elaborately discussed this topic, including V. Gordon Childe in his work *Social Evolution* (1951).

However, the roots of classification originated in the 19th century, when the fundamentals of archaeology as a scientific discipline were created (Kristiansen 2014). The typologies and classifications have changed based on historical-methodological perspectives because they depend on the research question, hypotheses, theoretical assumptions and accepted research methodology.

It is well known that different terminological classifications often lead to misunderstandings and may complicate or prevent comparisons between taxonomic units. This is also the case for Tanged Points Complexes. Truncations, for example, could be understood in multiple ways. In the first case the term truncation (*Endretusche, pièce tronquée*) refers to blades where a generally strong and steep retouch truncates the blade, i.e. reduces the blade in its length and additionally covers the full thickness of the piece (also described in Movius et al. 1968: 17, 23–24 for the definition of truncation burin). This retouch must be straight or concave rather than convex. If a retouch does not fulfil these criteria, the artefact is considered a terminal retouched piece. Furthermore, the angle between the retouched truncated part and the unretouched axial edge exceed 60°; otherwise, it should be deemed a micropoint, or if it is more than 10 mm wide, a *Zonhoven* point (Gramsch 1973a: 20–21). In the second case, the term truncation (*półtylczak*) is also used for pieces with terminal retouch. So, this could also encompass micropoints or Zonhoven points. To avoid confusion, this article uses the term 'truncation (*sensu stricto*)' for the first case and 'truncation (*sensu lato*)' for the second case.

Apart from this, the term 'Swidry point' may also warrant clarification. Some authors have differentiated between willow-leaf tanged points with a ventral retouch of the tang (Swidry type) and those where the tang is more or less distinct (sometimes called Chwalibogowice type). The distinction between the two types is often difficult to identify. For this reason, this article employs the term 'Swidry point' for both willow-leaf-shaped points as well as points with a distinct tang.

Ahrensburgian tanged points are used in the sense of Taute (1968) and require a lateral retouch on both sides of the tang. The retouch generally runs from ventral to dorsal. If the tang has an alternate lateral retouch, it is called a typical Ahrensburg tanged point. Such points with an inverse retouch of both lateral sides (so called Hintersee points) are not taken into account.

Projectile points, especially in the European Upper and Late Palaeolithic, are highly variable in both morphology and raw material (Cattelain 1997). Traditionally, morphology of projectile points is the concern of typological studies and serves to synthesise knowledge of past societies.

This article examines the selected Ahrensburgian and Swiderian inventories from the area around the middle Oder Rriver in terms of technology and typology as well as the occurrence of Ahrensburg tanged points east of the Oder River and Swidry tanged points (*sensu lato*) west of the Oder River. The paper consists of four main parts. The first provides an introduction to the research history of the Swiderian and the Ahrensburgian. The second part presents an overview of the occurrence of Ahrensburg and Swidry tanged points in the area around the middle Oder River. The third section contains the applied methods and presents two selected assemblages which exemplify typical Ahrensburgian and Swiderian inventories. The fourth part identifies and discusses the similarities and differences between the Ahrensburgian and the Swiderian. It concludes by summarising the results of the study.

Background

Research history of the Swiderian and cultural context

Tanged points were discovered in Poland in Leżajsk (south-eastern Poland) in 1851 and published five years later in the journal *Czas* (Talar 1968). In 1910, regular excavations of the Swiderian (of Płudy industry at that time) site Płudy A were performed and continued for the next three years (Schild 1964). Since that time, new research and studies have prompted several changes to the interpretation of inventories which contain basal ventrally retouched points of a willow-leaf and/or a marked tanged shape.

L. Kozłowski, on the basis of materials from the Chwalibogowice site, proposed the term 'Chwalibogowice industry' in 1919. It is noteworthy that the materials discovered at that site were mixed. At the beginning of the 1920s, S. Krukowski (1921: 165) introduced the name Swiderian, which referenced the site Świdry Wielkie in the vicinity of Warsaw. L. Sawicki (1923) then applied that term to all inventories which contain tanged and willow-leaf points. Furthermore J. G. D. Clark (1936: 62) recommended the name 'Swiderian culture' to label materials similar to Ahrensburg-Lavenstedt culture but which exist between the Vistula River and the Bug River. In the same year, L. Kozłowski (1936) also suggested that name. The latter author additionally postulated the existence of two cultures, namely the Swiderian and Chwalibogowice cultures. In one of the most well-known monographs S. Krukowski introduced the

name Mazowsze cycle as a more common unit which consisted of several industries, including Płudy, Zaświaty, Gulin, Świdry, Orońsko and Tarnowa (1939-1948: 101). In that case, there was a visible contradiction between interpretations of the name Świdry between Krukowski and Sawicki. On the one hand, the Świdry industry was part of a larger taxonomic unit called the Mazowsze cycle, on the other hand, that name was characteristic of many minor units labelled as Świdry I, II and III. These units had not only cultural but also chronological and evolutional meanings. The age of the flint artefacts of Świdry I has been described as older than the Pomeranian stage of the Last Glaciation (Sawicki 1936).

Significantly, the first attempts at cultural and chronological distinction of inventories with tanged points were carried out with materials from surface collections and, in many cases, heterogeneous. Relative chronology of single industries is based on morphological differentiation of artefacts with the assumpting that willow-leaf points occured in greater number at younger sites. Certain studies in the 1960s continued the method of typological classification of tanged points in terms of chronology. The most significant point of such studies was the separation of the Tarnowa industry from the Mazowsze cycle (Schild 1975: 273).

R. Schild has distinguished three complexes with a coexistence of the willow-leaf points and introduced the concept of the 'contact zone' in which Swiderian industries might have been subject to the phenomenon of 'cultural mixing' with inventories of separate taxonomic units. The occurrence of exclusively willow-leaf points characterises the first complex, while inventories including willow-leaf points with a minor contribution of ventrally retouched tanged points comprise the second complex. The final complex encompasses sets with only incidental admixture of willow-leaf points (Schild 1964). However, analyses of willow-leaf and tanged points from the Mesolithic cemetery located at Olenij Ostrov (Russia) have proved that various forms of the points had functional rather than chronological meaning. Both willow-leaf and ventrally retouched tanged points served as projectiles. The construction of the arrows was quite elaborate. The bottom part was made of wood, and the upper one was crafted from bone capped with flint or a quartzite point. Willow-leaf points were set in the smooth bone bars (grave no. 100) without barbs, whereas ventrally retouched tanged points were set into bars with small barbs (grave no. 118a) (Gurina 1956, Fig. 43).

It should be highlighted, however, that radiocarbon determination in the 1990s supported this evolutionary scheme. There are four major techno/stylistic and chronological stages of the Tanged Points Technocomplex development in Poland (Schild et al. 1999). The oldest is characterised by the use of hard-hammer technology to process mainly single platform heavy cores and the presence of Bromme-type tanged points, usually with a well-separated tang. The second (middle group) presents 'classical' technology of processing opposite platform cores, which are exploited with a soft hammer and/or punch technique. The set of tanged points consists of Bromme and Ahrensburg points as well as micro-truncations (*sensu lato*). Masovian points of both categories – willow-leaf and tanged points – are mostly widespread. The third stage (the youngest group) is the classical Masovian (Swiderian) cycle, and the fourth one – the so-called Grochale type – is characterised by the rare occurrence of Masovian points and numerous micro-truncations (*sensu lato*), as well as geometric microliths.

In 1968 W. Taute introduced the term '*Swidry Kreis*' which encompasses five groups (Świdry Wielkie-Skaruliai, Dobigeniewo-Eiguliai, Zakrzów-Płudy, Witów concentration III-Stańkowicze, Stallberg-Münchehofe) in the area of Poland and Lithuania.

Initially studies concerning the genesis of Swiderian culture focused on identifying similarities between Swiderian tanged points and their older forms, and they did not take chronological distance into consideration (Sawicki 1936; Kozłowski 1936; Krukowski 1939-1948: 78; Kozłowski 1969). This approach transformed as a result of systematic excavations of sites with preserved stratigraphy. It became apparent that such sites were settled during the pre-dune phase of the Younger Dryas. According to R. Schild the genesis of Swiderian societies might have been connected with Bromme-Segebro groups which adapted lifeways to new environmental conditions, namely tundra and park-tundra (Schild 1975: 273). Other scientists have shared this opinion (e.g. Fischer & Tauber 1986; Kobusiewicz 1999: 52-53).

Research history of the Ahrensburgian and cultural context

On the basis of the lithic finds from Stellmoor Hill and Lavenstedt in western Germany, Gustav Schwantes has introduced the name Ahrensburg civilisation for inventories with tanged points without a ventral retouch of the tang which are quite similar to the Lyngby type but smaller (Schwantes 1928). One year earlier, he had suggested that such assemblages belonged to the Lyngby culture (Schwantes 1927). In the early 1920s, several researchers emphasised the Lyngby (or Bromme) culture, which was characterised mainly by large tanged points (e.g. Schwantes 1923). Later, that culture could be further specified through the use of a comparatively simple technology by a direct hard-hammer technique (Madsen 1996).

The excavations from Alfred Rust between 1934 and 1936 at Stellmoor are still among the most important sites for scientific research with respect to the Ahrensburgian (Rust 1943). In the decades since, the site has repeatedly provided a basis for various studies as well as new insights into the Ahrensburgian way of life (e.g. Sturdy 1975; Grønnow 1987; Bratlund

1990, 1991a, 1991b; Bokelmann 1991; Bratlund 1996; Bokelmann 1999; Weinstock 2000a; 2000b; Bratlund 2008; Pasda 2009; Clausen 2010).

G. Schwantes initially believed that the Ahrensburg civilisation was older than the so-called Lyngby culture. On the other hand J. G. D. Clark, who published a compilation of the tanged point cultures in 1936, viewed it as contemporaneous with Lyngby culture (Clark 1936). In 1935, the results of the pollen analysis from Stellmoor proved its position in the Younger Dryas and its relatively younger age than Hamburgian culture (Schütrumpf 1935, 1943). A few years later, excavations in Hamburg-Rissen evidenced that the Ahrensburg civilisation must have been younger than so-called *Federmesser*-groups (Schwabedissen 1954).

In 1968, W. Taute introduced the term Ahrensburg-circle for inventories in which Ahrensburg tanged points outweigh sporadic Lyngby points or points with a ventral retouch of the tang (Taute 1968). A high diversity of mostly broad microliths is also typical. Furthermore, Taute has described different groups for the Ahrensburg circle based mostly on surface collections or cultural and/or chronological mixed assemblages (Geldrop-Callenhardt group, Eggstedt-Stellmoor group, Didderse-Lavesum group, Tegel-Ketzendorf group).

In Brandenburg, C. R. Schumann collected the first published finds of tanged points in the middle of the 18th century. He found numerous flint artefacts at the site Golßen and described those findings as the oldest tools (Schumann 1844a, 1844b). A few years later those artefacts could be identified as tanged points and arched-backed points (*Federmesser*).

In 1927 Karl Hohmann published the assemblage of the site Münchehofe. Just as G. Schwantes had stated for the inventory of Stellmoor, K. Hohmann assigned the artefacts to the Lyngby-culture (Hohmann 1927; Schwantes 1927). Later the artefacts of Münchehofe could be associated with the Tanged Points groups and *Federmesser*-groups. In the 1960s, Werner Mey published several articles about sites with palaeolithic inventories in the Berlin area (Mey 1960, 1961, 1962, 1967). The most important site is Berlin-Tegel A, from which several concentrations with rich silex artefact assemblages were excavated and assigned to the *Federmesser* and Ahrensburgian groups. The following decades witnessed thousands of new finds, most of which derived from surface collections. However, there were also other excavations with rich inventories of the Tanged Point Groups which offered new insights into the Tanged point cultural groups. The most important excavated assemblages with tanged points were found in Berlin-Tegel A (Mey 1960, 1961, 1962, 1967; Probst 1989), Burow 1 (Gramsch 1973b), Bad Saarow 23 (Beran & Hensel 1999a, 1999b), Zeestow 4 (Schwarzländer 2009; Eickhoff 2009) and certain sites from the open-cast lignite mines of the Lower Lusatia, such as Heinersbrück, Grötsch, Weißagk and Groß Lieskow (Stapel 1997; Bittmann & Pasda 1999; Stapel 2000a; Alves 2001; Poppschötz & Steinmann 2001; Pasda 2002a, 2002b; Steinmann 2003; Jansen 2003).

Ahrensburgian *versus* Swiderian

In general, Swiderian inventories are characterised by the presence of ventrally retouched willow-leaf and tanged points, burins and end-scrapers amide on thin blades. Tanged points are typified by a flat retouch on the ventral side. Technological analysis has demonstrated that core-reduction process was generally focused on the detachment of intended blades. The technology relies mostly on double-platform cores which are highly and accurately prepared for processing by the use of soft-hammer technique (Schild 1984).

Similarities between Ahrensburgian and Swiderian inventories have been observed since 1930 (Zotz 1931; Clark 1936: 62; Rothert 1936). However, according to L. Sawicki (1936) the territorial scope of Swiderian industries II and III never crossed the western area of Silesia and Brandenburg. In 1960, W. Mey analysed the site in Münchehofe and labelled it a peripheral Swiderian site with *Federmesser* influences and Lyngby elements, similarly to L. Zotz (1931) and J. G. D. Clark (1936) who classified it as Swiderian. He also raised the problem of the western border of the Swiderian settlement area and the transitional zone between the Ahrensburgian and Swiderian occupation. Some years later, R. Schild (1963, 1964) introduced the term 'contact zone' for the region of Brandenburg, Greater Poland and the Łódź area.

In 1968, W. Taute distinguished the Witów C-Stańkowicze group and Stallberg-Münchehofe group for sites with Swidry and Ahrensburg tanged points. Their only difference is that the latter additionally has fewer backed pieces. It is worth mentioning that the described groups are based mainly on surface collections (Taute 1968: 226).

In Schild's opinion from middle of the 1970s, the distinction of those two (cultural) entities (Ahrensburgian and Swiderian) is needless. Similarities in technology, typology and the frequency of occurrence of single tool types do not allow a sharp border between Ahrensburgian and Swiderian cultures (Schild 1975: 333). In view of this, he proposed the term Tanged Points Technocomplex. The aforementioned similarities resulted from the adaptation of those groups of people to highly comparable environmental conditions, i.e. tundra, park tundra and very light Younger Dryas woodlands.

In 1987, L. Kocoń described the tanged points by proposing so-called *neutral types* 1 to 4 to avoid automatic cultural classification of points, i.e Ahrensburgian/Swiderian points. Type 1 contained points without the retouch on the ventral tang side, type 2 featured points with retouched edges of tangs on the ventral face, type 3 included alternate retouch and type 4 exhibited a flat retouch on both the dorsal and

ventral sides. According to Kocoń, the presence of a flat retouch on the tang ventral face is a manifestation of the cultural differentiation of societies which inhabited the Lowlands throughout that time. In areas west of the Oder River, flint inventories contained tanged points without a flat retouch on the ventral side of the tang, which was contrary to the inventories from the territories to the east.

More than 15 years later M. Kobusiewicz (1999: 52, 2002) offered the concept of the Swiderian-Ahrensburgian complex based on the similarity in terms of technology, typology, number of tools, types of harpoons and their ornamentation by using the same motifs and inhabiting the same ecological niches.

However, according to Z. Sulgostowska (2005: 135-136), there are some arguments for distinguishing between the mentioned cultures. She first noted that there were no imports of chocolate or Jurassic flints to the territory of western Oder bank. She has additionally emphasized the presence of a special breaking technique of the tang, which W. Taute (1968) has termed *Zwillingskerbtechnik* (Fig. 16) and was used for Ahrensburgian tanged points.

Materials and methods

To interrogate whether the Oder River indeed serves as a natural border between Ahrensburgian and Swiderian cultural groups, typological quantitative comparative studies on artefact types have been conducted in the area around the middle Oder River. Since the appearance or prevalence of typical tanged points (type Ahrensburg/Swidry *s. l.*) decisive for the assignment of inventories to the eponymous culture (Ahrensburgian/Swiderian), particular emphasis is placed on inventories with the *type de fossile*, i.e. the Ahrensburg and Swidry (*s. l.*) tanged points, related to the occurrence to the Oder River. Another focus is on inventories with 'culturally strange' tanged point types to determine the existence, number and location of such sites. The most important feature for type classification is the presence (Swidry type) or absence (Ahrensburg type) of a ventrally flat retouched tang (Taute 1968).

Research on production technology could be a valuable tool to discover further distinguishing factors between these groups or to identify their similarities. The theoretical foundation for such an investigation is the general observation that implements may appear equal in shape and morphology but the way how they were produced could be drastically different, and that that is transmitted among the members of a (cultural) group (e.g. Leroi-Gourhan 1993). Investigations of technological attributes of the blades (bulb, lip, butt morphology, angle of percussion, regularity), cores (core type, angle of percussion), refittings and preparation debris (core tablets, crested blades) are particularly informative of the kind and techniques of production.

To compare those groups, it is crucial to have culturally and chronologically unmixed sites. This is the most challenging aspect of investigate assemblage variability since most sites are culturally mixed sites (chronological and cultural) or stray finds. Nevertheless, Burow 1 and Rzuchów 24 are two such rare sites. Both are assumed to be culturally and chronologically unmixed sites and exemplary of 'pure' sites of the Ahrensburgian (Burow) and Swiderian (Rzuchów).

Tanged points in the area around the middle Oder River

The region of Berlin, Brandenburg and Saxony (Germany) is generally regarded as a part of the Ahrensburgian settlement area and contains approximately 102 sites with Ahrensburg and/or Swidry tanged points of which few have been excavated (e.g. Burow 1, Berlin-Tegel, Grötsch 1 and 8, Heinersbrück 45 and 76, Weißagk 20, Zeestow 4). The majority are instead from surface collections. Most of the sites are culturally and chronologically mixed sites (particularly with Mesolithic, Neolithic and sometimes *Federmesser* elements). In Berlin, Brandenburg and Saxony, 26 sites (35 %) contain Swidry tanged points (*sensu lato*) (Fig. 2). Eighteen (18 %) of those 26 sites feature both Swidry and Ahrensburg tanged points, and 8 sites (8 %) consist exclusively of Swidry-typed tanged points (Figs. 1 & 2). This supports a definition of those sites as Swiderian. Additionally, two sites have more Swidry-type points than Ahrensburg-type points (Dabendorf, Jahmen). Four sites have a relatively equal amount of Ahrensburg and Swidry types. The western part of Poland (Lubusz Land, Greater Poland, Lower and Upper Silesia, Łódź area, Kuyavian-Pomeranian, Opole), which is generally regarded as a part of the Swiderian settlement area, has approximately 136 sites with tanged points of Swidry and/or Ahrensburg types. Of those sites, 49 (36 %) contain tanged points of the Ahrensburg type, and 16 (12 %) of those 49 sites have exclusively Ahrensburg tanged points (Fig. 3). From one of those 16 sites is the classification to the Ahrensburg-type problematic (Krzekotówek). In terms of definition, those 15 sites should be assigned to the Ahrensburgian. Thirty-three sites (24 %) contain Swidry and Ahrensburg tanged points. Among them, nine sites have more Ahrensburg than Swidry types, seven sites have the same amount, and 17 sites have more Swidry than Ahrensburg types. Some of them, e.g. Cichmiana site 2, Kochlew, Strumienno, Rzuchów, Wojnowo or Zwola were excavated and yielded numerous artefacts.

Results

Burow site 1: an example for an Ahrensburgian assemblage

The site Burow 1 (northern Brandenburg, Oberhavel district, Germany) is one of the few excavated sites of the Tanged Points Complex in which Bernhard

Number in map (Fig. 1)	Site	Without a ventral retouch (Ahrensburgian tanged points) – amount	With a ventral retouch (Swidry tanged points, *sensu lato*) – amount	Source
5	Bad Saarow –Pieskow 23	9	1	Winkler 2018
2	Berlin-Tegel A	9	2	Probst 1989
10	Briescht 3, Gem. Tauche	2	2	Winkler 2018
7	Dabendorf 2	1	3	Taute 1968
11	Eisenhüttenstadt 22	0	1	Winkler 2018
4	Frankfurt (Oder) 8	0	1	Winkler 2018
16	Golßen 1	6	1	Taute 1968; Winkler 2010
21	Großrössen	0	1	Geupel 1987
13	Grötsch 1	9	9	Stapel 1997, 2000; Winkler 2018
14	Grötsch 8	0	2	Winkler 2018
12	Heinersbrück 45	23	16	Alves 2001; Poppschötz 2001; Poppschötz & Steinmann 2001; Steinmann 2003; Uhl 2003; Winkler 2018
17	Jagsal	0	1	Geupel 1987
25	Jahmen	1	3	Winkler 2018
22	Leckwitz, Gemeinde Nünchritz	4	1	Geupel 1985; Winkler 2018
18	Malitschkendorf 2	18	1	Geupel 1987
19	Malitschkendorf 7	5	4	Geupel 1987
20	Malitschkendorf 8	5	5	Geupel 1987
24	Merzdorf 1; OT Schöpsdorf	0	1	Geupel 1987
3	Münchehofe 1	12	1	Taute 1968; Winkler 2018
23	Nünchritz	0	1	Geupel 1985
9	Schwerin 5	1	1	Winkler 2018
6	Telz 9	4	2	Winkler 2018
8	Trebbin 5	0	1	Winkler 2018
15	Weißagk 20	13	6	Stapel 2000a, b; Winkler 2018
1	Zeestow 4	26	3	Eickhoff 2009; Winkler 2018
26	Zimpel-Tauer	2	1	Winkler 2018

Fig. 2. Sites in expected "Ahrensburgian" area (eastern Germany) with ventral retouched tanged points (Berlin, Brandenburg and Saxony). Sites with exclusively Ahrensburg type are not mentioned in the table.

Abb. 2. *Fundplätze innerhalb des erwarteten „Ahrensburgien"-Gebietes in Ostdeutschland mit ventral retuschierten Stielspitzen (Berlin, Brandenburg und Sachsen). Fundplätze mit ausschließlich Ahrensburg Stielspitzen sind in der Tabelle nicht berücksichtigt.*

Gramsch excavated a concentration of a culturally and chronologically unmixed flint assemblage in 1972 and 1973 (Gramsch 1973b; Winkler 2018). The inventory contains about 3'700 flint artefacts (blades, flakes, chips and cores) and about 300 tools of Baltic flint, and it comprises typical tools of the Ahrensburgian complex (Figs. 7-8).

Cores

More than 50 cores were found at this site. Based on insights gained from the refitted pieces, flint nodules of rather poor quality and of approximately 10 cm in size are to be assumed (Figs. 4-6). Twenty-four of the remnant cores have a single platform (48 %) and 17 cores have two opposite platforms (34 %). Another nine cores have orthogonal platforms (18 %). Refitted pieces indicate that in earlier stages of flaking, most of the single-platform cores had two opposite platforms, which can be seen in refitting block No. 21 of Burow, for example (Fig. 4). The refitted block suggests that the former striking platform cannot be used further for striking, which was probably due to a steep striking angle that resulted from failed flaking. In Burow, most of the cores are heavily exploited. Therefore, often only one platform is visible at the last stage of flaking.

The striking platforms of the cores are carefully prepared by the formation of a striking platform, which is either smooth (n=33; 67 %) or faceted (n=11; 22 %). Some platforms are not prepared and have a cortex (n=2; 4 %) or former flaking surfaces were used as a new striking platform (n=3, 6 %). Core rejuvenation flakes are frequently observable. The presence of whole (n=8) and partial (n=50) core tablets proves the regularisation of the striking platform. Fifteen crested blades demonstrate the preparation of the cores. Refitting block No. 58 is an example of a performed correction of the core platform whereby three flakes were stoked from the platform edge (Fig. 4). Cortex flakes proved the production at the site. The vast majority of the cores (almost 80 %) have one flaking surface which covers half or slightly over half of the core surface. The back of the core is often wedge-like and sometimes crested, flat or slightly rounded. Many cores have two flanks which were prepared to flatten the shape of the core. Some cores have one or more oblique platforms which slope obliquely to the back of the cores. The angle between platforms and cores surface is between 60°

Number in map (Fig 1)	Site	Without a ventral retouch (Ahrensburgian tanged points) – amount	With a ventral retouch (Swidry tanged points, sensu lato) – amount	Source
65	Białobrzeg 3	1	4	Sobkowiak-Tabaka 2011
71	Biskupice	1	0	Sobkowiak-Tabkaba 2011
63	Brzeźno 2	1	1	Sobkowiak-Tabaka 2011
58	Brzostowo 3	2	0	Sobkowiak-Tabaka 2011
60	Cichmiana 1	1	1	Chmielewska 1957, 1978; Kocoń 1987
61	Cichmiana 2	17	38	Kabaciński & Sobkowiak-Tabaka 2009
45	Gliniany	1	3	Sobkowiak-Tabaka 2011
53	Gliwice - Sobieszowice (former Gleiwitz - Petersdorf/Heinzemühle)	1	5	Taute 1968; Sobkowiak-Tabaka 2011
28	Gościm 23	1	0	Sobkowiak-Tabaka 2011
47	Grodziszcze 7	1	1	Sobkowiak-Tabaka 2011
62	Janów 21	1	4	Sobkowiak-Tabaka 2011
73	Januszkowo 12	2	1	Sobkowiak-Tabaka 2011
27	Jastrzębiec 2	1	1	Pyżewicz 2010
37	Kargowa b, d–j (former Unruhstadt or Karge)	8	4	Sobkowiak-Tabaka 2011
67	Kijewo	1	3	Sobkowiak-Tabaka 2011; Pawlak & Wawrzyniak 2012
54	Kochlew 1	3	3	Sobkowiak-Tabaka 2011
64	Konin-Rumin	1	8	Sobkowiak-Tabaka 2011
44	Krzekotówek (former Klein Vorwerk) 8 (compl. A)	2	0 [1 ?]	Sobkowiak-Tabaka 2011
38	Lubiatów (former Lübtow) II	2	2	Sobkowiak-Tabaka 2011
39	Lubiatów (former Lübtow) III	2	3	Sobkowiak-Tabaka 2011
55	Mokrsko Szlacheckie 8	2	0	Sobkowiak-Tabaka 2011
69	Mosina (former Moschina) 10	1	4	Sobkowiak-Tabaka 2011
75	Nożyczyn 3	1	6	Sobkowiak-Tabaka 2011
30	Policko 33	1	0	Sobkowiak-Tabaka 2011
46	Pomorsko 1	4 ?	6 ?	Sobkowiak-Tabaka 2011
59	Potasznia III	2	0	Sobkowiak-Tabaka 2011
70	Poznań - Komandoria 1a	1	0	Sobkowiak-Tabaka 2011
74	Prądocin 1	1	0	Sobkowiak-Tabaka 2011
29	Radgoszcz 15	5	2	Płonka 2007; Sobkowiak-Tabaka 2011
51	Rozumice C	1	1	Sobkowiak-Tabaka 2011
66	Ruda Komorska I-III	1	4	Sobkowiak-Tabaka 2011
52	Samborowice 51	1	0	Sobkowiak-Tabaka 2011
48	Ślęza 11/12	1	0	Sobkowiak-Tabaka 2011
50	Smolarnia 1	1	0	Sobkowiak-Tabaka 2011
32	Smolno Wielkie I	4	5	Sobkowiak-Tabaka 2011; Bobrowski & Sobkowiak-Tabaka 2016
46	Spalona 12	6	1	Sobkowiak-Tabaka 2011
41	Strumienno (former Pfeifferhahn) 1b	2	1	Sobkowiak-Tabaka 2011
42	Strumienno (former Pfeifferhahn) 1c	6	1	Sobkowiak-Tabaka 2011
49	Świerczów I	1	0	Sobkowiak-Tabaka 2011
56	Troniny 5	3	7	Sobkowiak-Tabaka 2011
57	Wapiennik 2	1	5	Sobkowiak-Tabaka 2011
43	Węgliny 4	20	0	Sobkowiak-Tabaka 2011
72	Wiewiórczyn 3	1	0	Sobkowiak-Tabaka 2011
33	Wojnowo (former Reckenwalde) 2, I/86 + I/88	5	6	Kobusiewicz 2016
34	Wojnowo (former Reckenwalde) a, I/75	8	9	Kobusiewicz 2016
35	Wojnowo (former Reckenwalde) a, III/75	11	3	Kobusiewicz 2016
36	Wojnowo (former Reckenwalde) A-D	24	15	Taute 1968
31	Wytomyśl 1	1	0	Sobkowiak-Tabaka 2011
68	Zwola 1	2	1	Sobkowiak-Tabaka 2011

Fig. 3. Sites in expected "Swiderian" area (western Poland) without ventral retouched tanged points (Lubusz Land, Greater Poland, Lower and Upper Silesia, Łódź area, Kuyavian-Pomeranian, Opole). Sites with exclusively Swidry type are not mentioned in the table.

Abb. 3. *Fundplätze innerhalb des erwarteten „Swiderien"-Gebietes in Westpolen mit nicht ventral retuschierten Stielspitzen (Lubusz Land, Greater Poland, Lower and Upper Silesia, Łódź area, Kuyavian-Pomeranian, Opole). Fundplätze mit ausschließlich Swidry-Stielspitzen sind in der Tabelle nicht berücksichtigt.*

Fig. 4. Burow site 2, refitting blocks. 1. block no. 21, unit 1; 2. Block no. 21, unit 2; 3. Block no. 58 (photos by K. Winkler).
Abb. 4. *Burow Fpl. 2, Zusammensetzungen. 1. Block Nr. 21, Einheit 1; 2. Block Nr. 21, Einheit 2; 3. Block Nr. 58 (Fotos: K. Winkler).*

and 90°. At slightly more than 50 %, the angle of approximately 80° accounts for the principal share, while an angle of less than 70° contributes around 26 % and covers the second-most frequent share. The same angle was observed at the majority of the blades and flakes. In relation to the striking angle, there is no difference between cores with one and two observable platforms.

The cores were mainly used for blade and bladelet production, but certain cores were also employed for the production of thick blades or flakes for manufacturing burins, as refittings from Burow have indicated. Figure 5: 2 depicts a core which was reduced for the purpose of producing burins, while Figure 6 illustrates the production of long blades. It is important to bear in mind that different tools require different techniques. For example the technique for the

Fig. 5. Burow site 2, refitting blocks. (1) block no. 75, (2) block no. 17, burins (photos by K. Winkler).
Abb. 5. *Burow Fpl. 2, Zusammensetzungen. (1) Block Nr. 75, (2) Block Nr. 17, Stichel (Fotos: K. Winkler).*

Fig. 6. Burow site 2, refitting block no. 10 (photo by K. Winkler).
Abb. 6. *Burow Fpl. 2, Zusammensetzung Block Nr. 1 (Foto: K. Winkler).*

production of burins could vary immensely from the technique for the production of tanged points, as burins need thicker and more massive basic forms than tanged points or micropoints.

Blades

The blades from Burow site 1 exhibit features typical for the usage of a soft hammer (antler and/or soft stone) with direct percussion technique. The main features that support this are small lips, diffuse bulbs, striking angles of approximately 80° and small oval butts as well as the irregularity and regularity (though not extreme) of the blades. The dorsal side of the blades evidence trimming, and the direction of the negatives on the dorsal side of the artefacts may provide hints if artefacts were made from opposed-platform cores. Only about 12 % of the blades, bladelets and flakes have opposing dorsal negatives and could be assigned to two-opposed-platform cores. The majority feature the same direction of the dorsal and ventral negatives (80 %), and only a few indicate transverse direction on the dorsal side of the artefacts. There is

no difference between the occurrence of the direction of dorsal negatives and the blades, bladelets and flakes (n=339; χ^2=3.938, df=4; p=0.414). The average length of the 250 unmodified blades is 40 mm (SD=0.93), the width is 14 mm (SD=0.25) and the thickness is 4 mm (SD=0.14). Statistically, there is no difference between the blades with the opposite direction of dorsal negatives and those with the same direction (u-test, n=124; length: p=0.813; width: p=0.939; thickness: p=0.957). However, one must take into account that even if the dorsal side evidences the same direction as the ventral side, the blade may still be made of an opposed-platform core. Therefore, analysing the direction of the negatives on the dorsal side does not reveal much about the real amount of opposed-platform cores that were used and merely indicates that (if there are negatives with a converging direction) opposed-platform cores were generally utilised.

Tools

Altogether, 303 tools and 98 by-products (burin-spalls) were found (Fig. 7).

Tools are dominated by the same amount of 70 endscrapers (mostly on flakes) and 70 burins (among them numerous transverse burins), which each represents a 23 % share of the tools (Figs. 8 & 9).

The inventory comprises seven Ahrensburg tanged points (2 % of all tools), 30 microlithic points (consisting of 10 Zonhoven points with and without basal retouch). Furthermore, 14 truncations (*sensu stricto*) and other tools were observed (Figs. 14-15).

Due to the lack of radiochronology data, the high amount of micropoints indicates (with regard to typology) a late phase within the Ahrensburgian period. The presence of cores, flakes, blades, chips and chunks reflects that Burow was a (likely short-term) settlement in which the production of the artefacts took place and people produced the necessary tools for everyday life.

Tool type	n	%
End-scrapers on blades	17	4.2
Short end-scrapers on flakes	34	8.5
Other end-scrapers	19	4.7
Angle Burins	29	7.2
Dihedral burins	14	3.5
Transverse burins	22	5.5
Multiple burins	4	1.0
Other burins	1	0.3
Truncations (sensu stricto)	14	3.5
Ahrensburg tanged points	7	1.8
Zonhoven points	10	2.5
Other microlithic points	20	5.0
Other points	2	0.5
Retouched microliths	3	0.8
End-scraper-burin-composite tools	4	1.0
Burins on Truncation	5	1.3
Pointed blade	1	0.3
Notched piece	1	0.3
Retouched pieces	61	15.2
Undefined Tools	35	8.7
Burin spalls	98	24.4
Total	**401**	***~ 100.0***

Fig. 7. Burow, site1. Frequency of retouched tools and by-products, baltic flint.

Abb. 7. *Burow, Fpl. 1. Häufigkeit der retuschierten Geräte und Herstellungsabfälle aus baltischem Feuerstein.*

Rzuchów, site 24: an example for a Swiderian assemblage

The site in Rzuchów (eastern part of Greater Poland, Dąbie district, Poland) was excavated during the rescue excavations from 1999 to 2000 in response to the planned construction of highway A2 from Konin to Łódź (Kabaciński, Sobkowiak-Tabaka 2009). This excavation distinguished three concentrations of flint materials, which were heavily disturbed by the remains of younger settlements. Almost 460 items (including 88 tools) were matched with Late Palaeolithic (Fig. 10). The concentrations differ in terms of size, function and raw materials. The assemblage was fashioned mostly from Baltic flint (383 items), chocolate flint (47 items) and Jurassic flint (2 items). Twenty-six artefacts were heavily burned.

Cores

Twelve cores for blades were registered at the site in Rzuchów, including four single-platform cores, six opposite-platform cores and two with changed orientation (Fig. 11). Flint working largely aimed to produce blade blanks which were shaped into a variety of implements. However, more blades from single-platform cores than from opposite-platform cores were registered. The part of opposite-platform cores was seemingly exploited *de facto* in the same way as single-platform cores. Blades were processed from one striking platform, and the second was exploited later or treated as subsidiary and used only when the correction of flaking surface was needed. Cores were carefully prepared for working by the formation of striking platforms (smooth or prepared) with an acute core angle (55° to 75°) and regularisation of striking platform edge. Seven out of 12 cores had prepared sides and back sides. Only three crested blades (secondary *lamelles a crête*) were noted, so the range of the cores' reparations cannot be studied in detail.

Blades

The blades exhibit typical features for the usage of a soft hammer (antler and/or soft stone) with direct percussion technique. On average, blades from single-platform cores are 33.32 (SD=6.29) mm long,

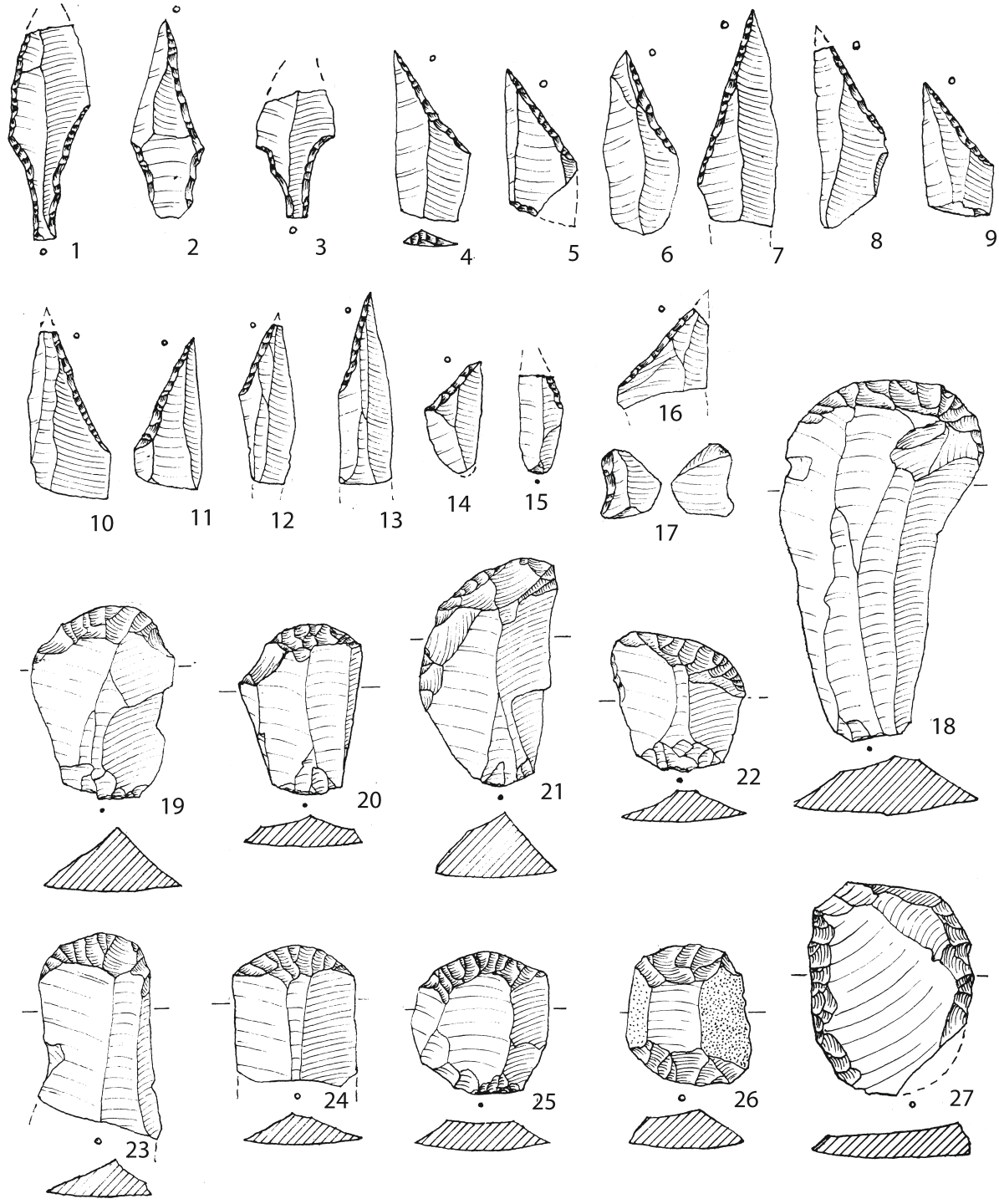

Fig. 8. Burow site 1. Tools. (1-3) Ahrensburg tanged points, (4-11,16) Zonhoven points, (12-15) microlithic points, (17) microburin ?, (19-27) end-scrapers (modified from Gramsch 1973b Fig. 1-3).

Abb. 8. *Burow Fpl. 1. Gerätespektrum. (1-3) Ahrensburg-Stielspitzen, (4-11, 16) Zonhoven-Spitzen, (12-15) mikrolithische Spitzen, (17) Kerbrest ?, (18-27) Kratzer (verändert nach Gramsch 1973b Abb. 1-3).*

11.42 mm (*SD*=2.55) wide and 4 mm thick (*SD*=1), whereas blades from opposite-platform cores are longer (average 39.5 mm; *SD*=9.61), wider (average 13.5 mm; *SD*=3.5) and thicker (average 4.1 mm; *SD*=1,37). Blades are quite regular with mostly smooth butts (n=27; 63 %) in the majority of cases and less often faceted (n=10; 23 %), punctuated (n=5; 12 %) or cortex (n=1; 2 %).

Tools

Altogether, 89 tools and 10 by-products (burin spalls) were registered. Tools are dominated by end-scrapers (33 items; 37 % of all tools), mostly on flakes, in some cases by short, so-called 'Tarnowian end-scrapers'. There is the presence of forms with symmetrical and asymmetrical and both flat and sharp end-scraper fronts that are mostly 18 to 34 mm in

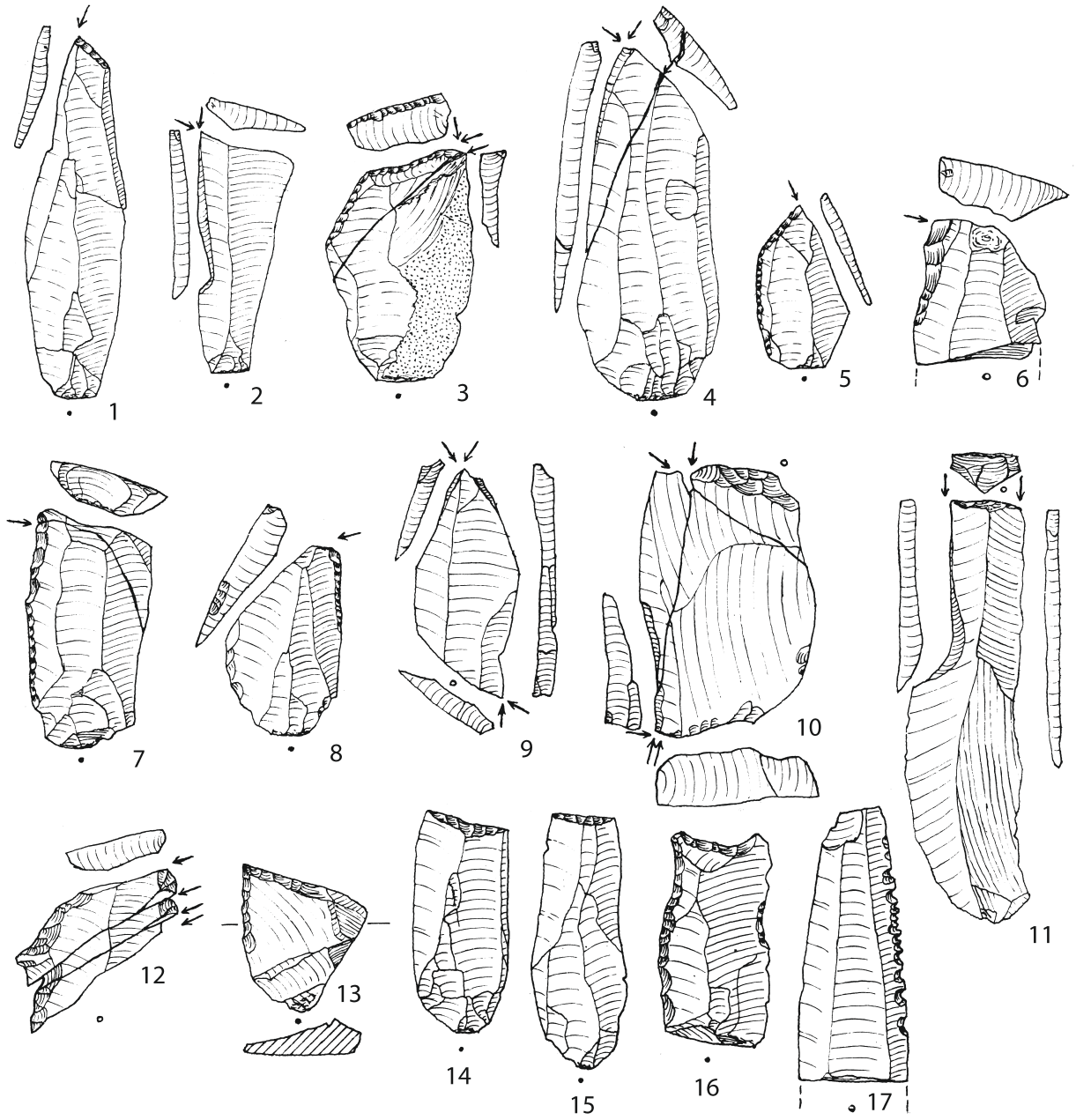

Fig. 9. Burow site 1. Tools. (1-12) burins, (13) retouched flake, (14-16) truncations (sensu stricto), (17) denticulated blade (modified from Gramsch 1973b Fig. 2-3).

Abb. 9. *Burow Fpl. 1. Gerätespektrum. (1-12) Stichel, (13) retuschierter Abschlag, (14-16), (17) gezähnte Klinge (verändert nach Gramsch 1973b Abb. 2-3).*

length (made on flakes) (Fig. 12: 1-5; Fig. 13: 1 & 2).

Burins (18 items, 20 % of all tools) are quite variable in term of type: dihedral, on truncation, angle burins on a break, single-blow burin and multiple burins (Fig. 12: 6-13; Fig. 13: 3 & 4; Fig. 14: 1 & 2).

Two kinds of points were registered: willow-leaf point (one item) and tanged points with retouch on the ventral side (five items, all tanged points 7 % of total tools). All points were rather small (the whole ones are 28 and 30 mm in length) and broken in the tip part (Fig. 13: 8-10).

In the assemblage six variable truncations were registered (two truncated pieces with transversal truncation, three truncated pieces with oblique truncation and one truncated piece with double truncation). Worth highlighting is the item from concentration one (105 x 26 x 9 mm) made of chocolate flint with transversal truncation (Fig. 14: 6).

In the group of tools, four perforators, one borer, one composite tool (burin on truncation jointed with perforator), four notches and 12 retouched blades and flakes were also registered (Fig. 10).

Tool type	Raw material									
	baltic flint		chocolate flint		Jurassic flint		undefined (burnt)		Total	
	n	%	n	%	n	%	n	%	n	%
End-scrapers on blades	6	8.5	2	9.5					**8**	8
End-scrapers on flakes	12	17	3	14.3			3	50	**18**	18.2
Short end-scrapers on flakes ("Tarnowian")	3	4.2							**3**	3
Fragments of end-scrapers	4	5.6							**4**	4
Dihedral burins	4	5.6			1	100	1	16.7	**6**	6.0
Burins on truncation	5	7	1	4.7					**6**	6.0
Angle burins on a break	1	1.4	1	4.7					**2**	2.0
Single blow burins			1	4.7					**1**	1.0
Multiple burins	1	1.4							**1**	1.0
Fragments of burins	1	1.4					1	16.7	**2**	2.0
Perforators	4	5.6							**4**	4
Borers	1	1.4							**1**	1.0
Truncations	3	4.2	2	9.5			1	16.7	**6**	6.0
Willow leaf points	1	1.4							**1**	1.0
Tanged points with retouch on the ventral face	5	7							**5**	5.0
Composite tools	1	1.4							**1**	1.0
Notched pieces	2	2.8	2	9.5					**4**	4
Retouched blades	3	4.2	4	19					**7**	7.1
Retouched flakes	2	2.8	3	14.3					**5**	5.0
Fragments of tools	3	4.2							**3**	3
Burin spalls	9	12.7	1	4.7					**10**	10.1
Total	**71**	***~100***	**21**	***~100***	**1**	***100***	**6**	***~100***	**99**	***~100***

Fig. 10. Rzuchów, site 24. Frequency of retouched tools and by-products with respect of raw material structure.
Abb. 10. *Rzuchów, site 24. Häufigkeit der retuschierten Geräte und Herstellungsabfälle unter Berücksichtigung des Rohmaterials.*

Discussion: Technological and typological approaches for Ahrensburgian and Swiderian inventories

First of all it has to be emphasised that a comparison between Ahrensburgian and Swiderian assemblages is often problematic as the inventories often differ in their function, size, raw material, excavation methods and so on. Therefore the results must be considered to the reservation and has to be understand as a subject to discussion which need further investigations.

Inventories of the Swiderian are well known for their uniform concept of prismatic core reduction, also known as the 'Swiderian method' (Migal 2007; Schild et al. 2011: 223). The precores are mostly well prepared, which includes the preparation of the flaking surface, the back and the flanks as well as the (opposed) striking platform(s). The back is often wedge-like or flat. The blade cores have one flaking surface, which is often exploited from two opposed platforms. The exploitation of the cores is through a direct soft hammer technique. Single-platform cores are extremely rare, especially in assemblages with chocolate flint raw material (Schild 1980: 60). According to R. Schild the Swiderian exploitation of the two-opposed-platform cores is nearly simultaneous from both opposed platforms (Schild 2011: 223). Other authors have described not only simultaneous but also consecutive exploitation of the cores, which is also visible in the presented example of Rzuchów (Kabaciński & Sobkowiak-Tabaka 2009).

As the presented example of Burow has demonstrated, the above-mentioned concept of prismatic core reduction ('Swiderian method') also occurs at Ahrensburgian sites. The same concept is evident at other sites in Brandenburg as well as in other parts with Ahrensburgian inventories. Typical of such inventories is the presence of prismatic two-opposed (oblique)-platform cores, which are mainly not faceted and mostly trimmed with one flaking surface. The back of the core is sometimes wedge-like and crested. The technique for blade production is a direct soft hammer technique, whereas burins or cortex flakes could be detached by a direct hard technique. The occurrence of two-opposed-platform cores is substantiated by a couple of Ahrensburgian inventories if raw material of good quality and a reasonable

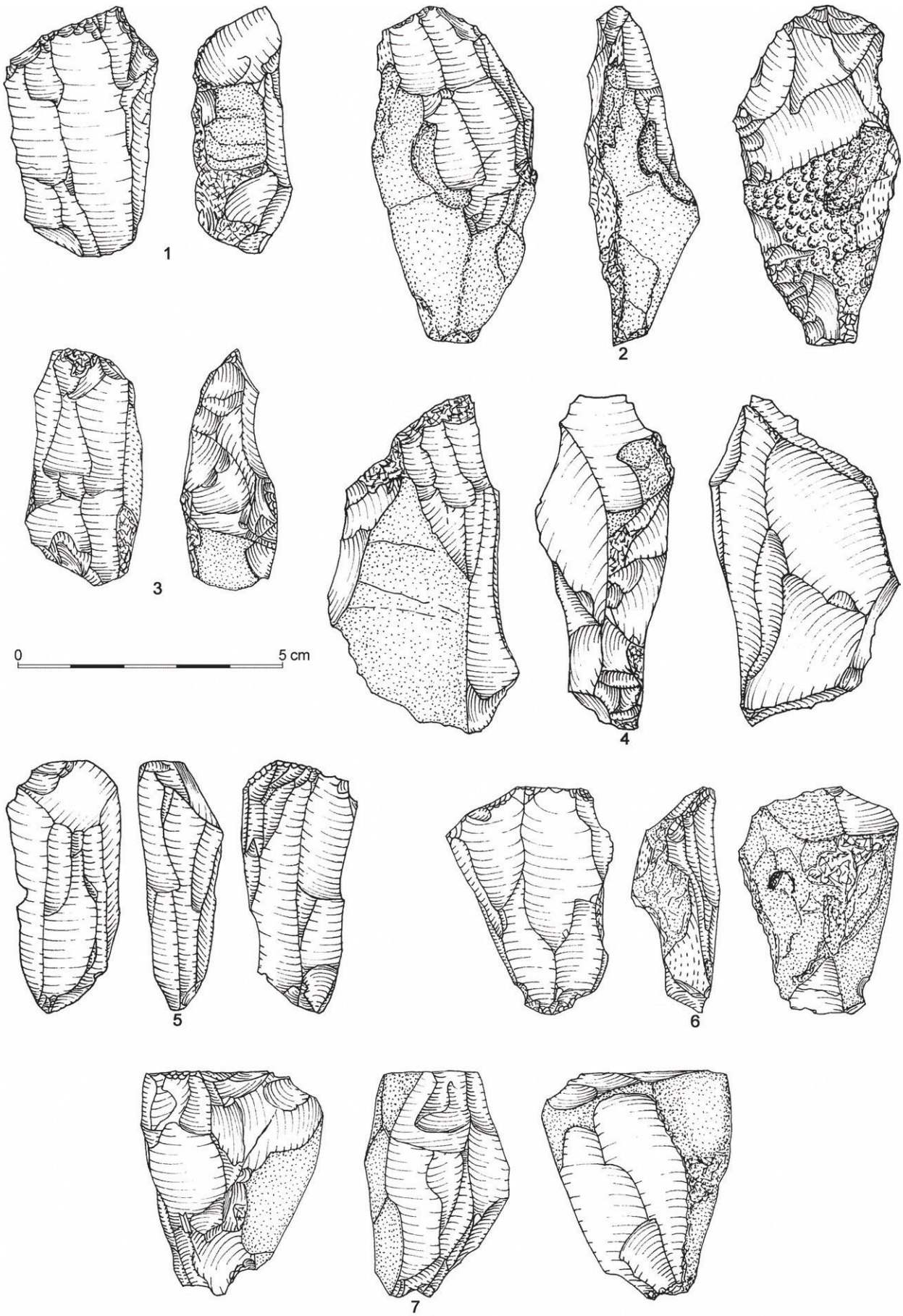

Fig. 11. Rzuchów, site 24. Cores (after Kabaciński & Sobkowiak-Tabaka 2009).
Abb. 11. *Rzuchów, site 24. Kernsteine (nach Kabaciński & Sobkowiak-Tabaka 2009).*

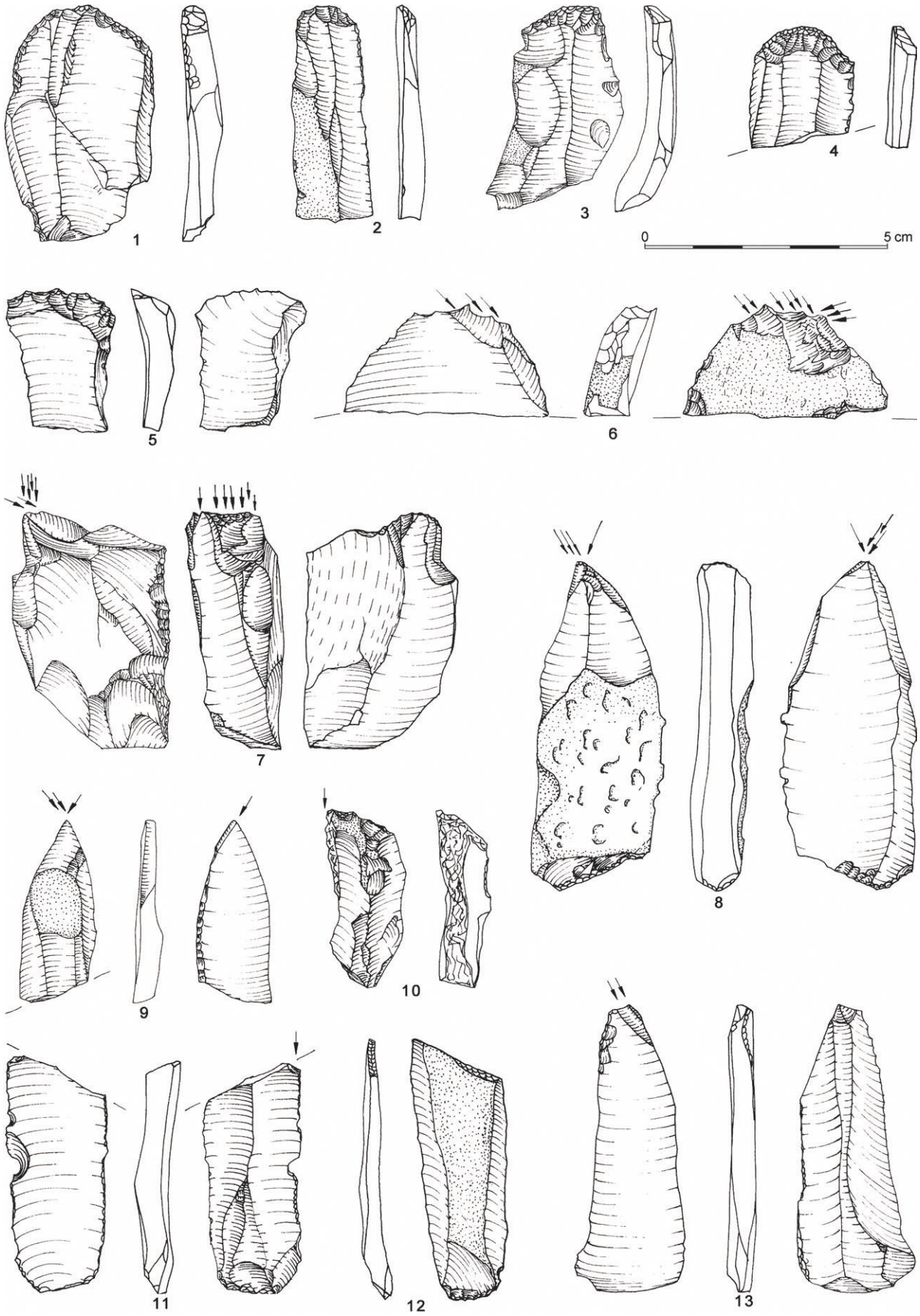

Fig. 12. Rzuchów, site 24. Tools (after Kabaciński, &Sobkowiak-Tabaka 2009).
Abb. 12. *Rzuchów, site 24 Werkzeuge (nach Kabaciński & Sobkowiak-Tabaka 2009).*

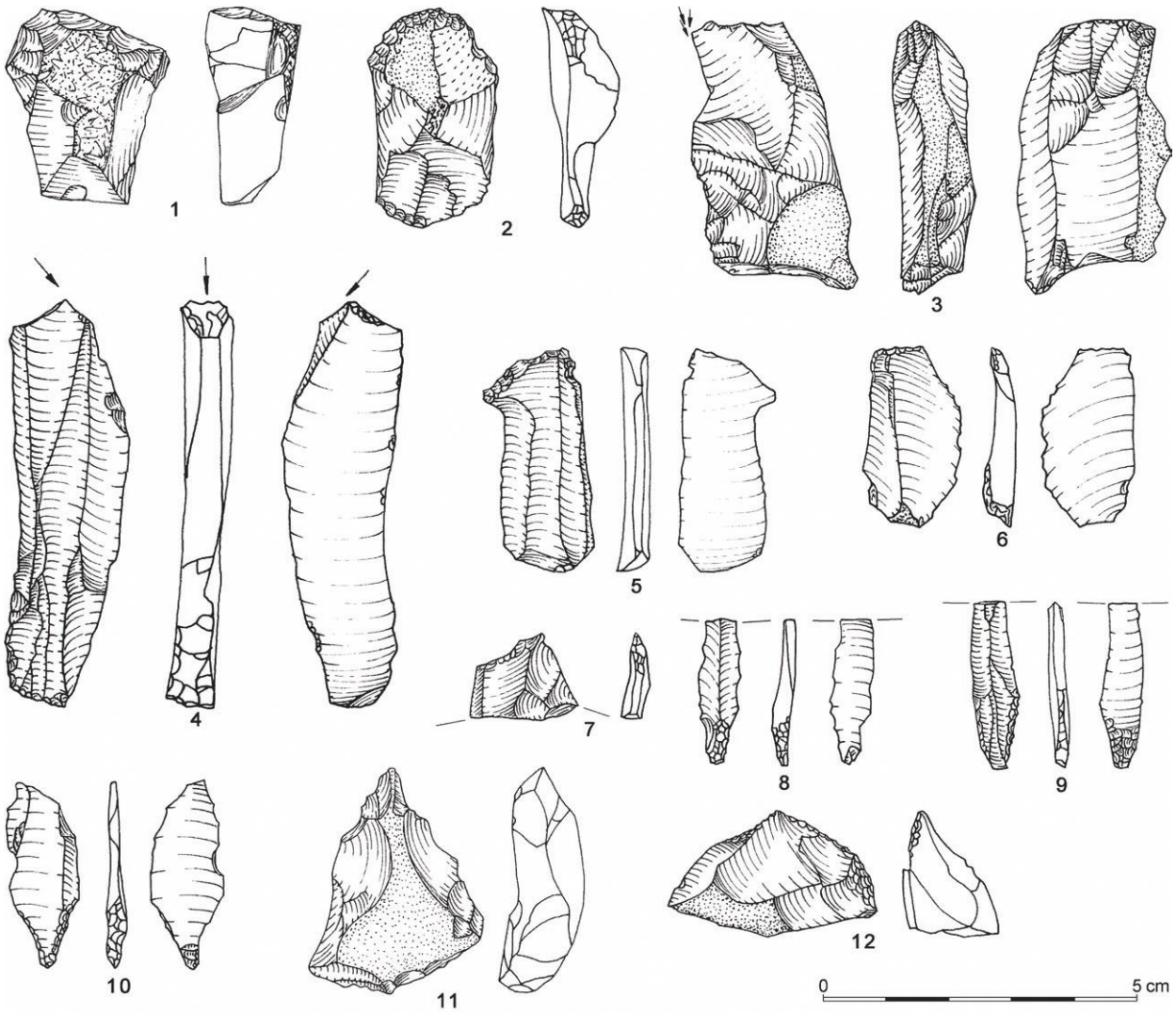

Fig. 13. Rzuchów, site 24. Tools (after Kabaciński & Sobkowiak-Tabaka 2009).
Abb. 13. *Rzuchów, site 24 Werkzeuge (nach Kabaciński & Sobkowiak-Tabaka 2009).*

size was available. This is particularly evident at the Ahrensburgian site Alt Duvenstedt LA 121, where some double-platform cores strongly resemble typical 'Swiderian method cores' (Clausen 1995, 1996; Clausen & Schaaf 2015). In Ahrensburgian assemblages, the second platform was often used for shaping the core or correcting accidental flaking (e.g. Burow 1, Alt Duvenstedt LA 121). The simultaneous method was most likely preferred for the production of long willow-leaf-shaped projectiles with no retouch of the distal part of the point (Migals 'preferential or predefined blade', Migal 2007). It is conceivable that shorter projectiles with a retouched distal part (such as the Ahrensburg type) probably did not require such a technique. Almost every blade could be used for such pieces and can be shaped into the desired form by retouching the terminal part. Nevertheless, it is obvious that two-opposed-platform cores with a simultaneous exploitation of the cores seems to be more frequent in inventories with good-quality raw material and elongated willow-leaf points than it is in other assemblages. This theory warrants further research. However, the two platforms of the cores from the presented sites (Burow and Rzuchów) were not used simultaneously. Generally, there is no visible difference between the two-opposed-platform cores made of Baltic erratic flint in Ahrensburgian and Swiderian inventories in the area around the middle Oder River.

The presence of single-platform cores is typical for Ahrensburgian sites but occurs in Swiderian sites as well, although the refittings from Burow clearly indicate that cores could have had two platforms in earlier stages of exploitation. This process is also known from other sites such as Buniewice 7, whose inventory consists of tanged points of the Swidry and Ahrensburg types (Adamczyk 2014). A potential reason for the missing second platform could be an exploitation failure, for example if a plunged blade removed the second platform. As mentioned above, raw material availability, size of raw material and the desired product may account for the occurrence of

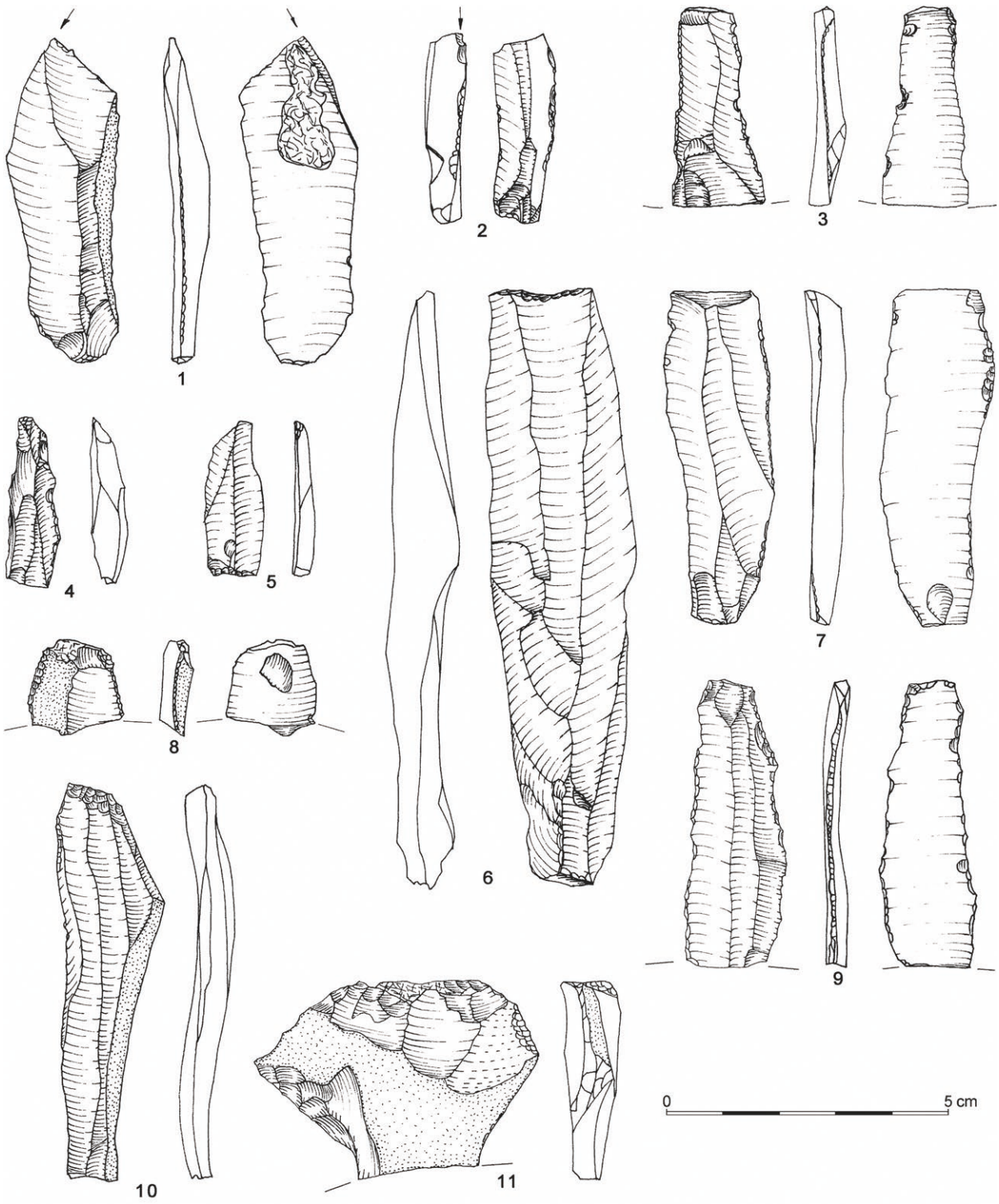

Fig. 14. Rzuchów, site 24. Tools (after Kabaciński & Sobkowiak-Tabaka 2009).
Abb. 14. *Rzuchów, site 24 Werkzeuge (nach Kabaciński & Sobkowiak-Tabaka 2009).*

single- and two-opposed-platform cores. It seems that two-opposed-platform remnant cores prevail in areas with good-quality flint, and this is especially true for chocolate flint. It should be stressed that chocolate flint never occur in sites west of the Oder River, which seems to be an important issue for Swiderian inventories. In areas with poor-quality flint or only a small amount of flint, the remaining cores often reflect one (mostly smooth) striking platform (i.e. Sobkowiak-Tabaka et al., in press.). However, future studies should further evaluate this theory.

Regarding typology, there are substantial similarities between the investigated sites of typical Ahrensburgian and Swiderian assemblages. Apart from

different tanged point types (such as the Ahrensburg and Swidry types), both groups contain a large quantity of scrapers and burins. The scrapers are often made on short flakes, and while transverse burins seem to prevail in Ahrensburg assemblages, they also occur in Swiderian sites. Furthermore, small microlithic tools, such as 'Zohnhoven points' and micropoints, occur in both groups. The absence or existence of those tool types could be further interpreted in a functional or chronological way (e.g. Burow and Rzuchów).

Figure 15 lists the similarities and differences between Ahrensburgian and Swiderian assemblages.

It is also important to highlight the problem of the occurrence of microburins in collections from the analysed area. Microburins, and especially the *Zwillingskerbresttechnik* (twin-notched microburin technique), are typical for Ahrensburgian inventories (Fig. 16) (Taute 1968; Clausen 1996). Twin-notched microburins were registered at several sites with Ahrensburg tanged points: in Germany, Alt Duvenstedt LA 121 (Clausen 1995; Clausen & Schaaf 2015; Berg-Hansen in press.), Berlin-Tegel B (Probst 1989 Taf 67: 8 & 78: 2); Heinersbrück 45 (Winkler 2018) and Malitschkendorf 2 (Geupel 1971); Malitschkendorf 8 (Geupel 1987, Taf. 59: 11); in Poland, Cichmiana 2 (Fig. 17: 1), Ełk (NE Poland) and Szczebra (NE Poland) (Fig. 18) and in Salaspils Laukskola in Latvia (Siemaszko 2000; Sulgostowska 2005: 135). Remarkably, they could also occur in pure Swiderian assemblages, as the examples of six tang spalls (among them twin-notched microburins) and five microburins found in Michałów-Piaska (Rydno) would suggest (Figs. 17: 2-5 & 25) (Tomaszewski et al. 2002; Schild et al. 2011: 461). That site exclusively yielded Swidry tanged points. Thus, the twin-notched microburin technique was also known in typical Swiderian inventories.

Conclusions

The occurrence and amount of Ahrensburg tanged points together with Swidry tanged points in the area around the middle Oder River precludes the establishment of clear border between the Ahrensburgian and Swiderian settlement areas. The high amount of Ahrensburg tanged points in some assemblages in the area east of the Oder River, and respectively of Swidry points to the west of the Oder River, render it difficult to assign such assemblages to the Ahrensburgian or the Swiderian. With regard to typology there could not be observed any difference between those two entities in the area around the middle Oder River (of course except of the different types of tanged points, namely the Ahrensburg and Swidry tanged points). Moreover from a technological point of view, no significant differences are visible in the striking technique and core-reduction processes (except for the production of willow-leaf points, whereby predefined/preferential blades were sometimes produced). If the raw material was suitable, the 'Swiderian method' was used at Ahrensburgian sites as well (double-platform core, oblique platforms – mostly flat, sometimes crested back, one flaking surface, etc.) (Fig. 15). The extensive similarity in raw material processing that was observed in both Ahrensburgian and Swiderian inventories might imply continuous and intensive cultural transmission as a result of an extensive and active network between the societies, which occupied a significant part of Europe during the Younger Dryas and the beginning of the Preboreal

Ahrensburgian	Swiderian
Points of Ahrensburgian type. The tang could be clearly marked as well as willow leaf shaped, but always without a ventrally retouch of the tang	Tanged points with clearly marked tang as well as willow leaf shaped, but always with flat ventrally retouch of the basal part of the tang
Sometimes twin-notched microburins (Zwillingskerbreste) occurred	Twin-notched microburins could have occurred (Rydno)
?	Sometimes production of ‚preferential blades' for the making of willow-leaf points (acc. Migal 2007)
Missing or minor appearance of tanged points with a ventrally retouch of the tang (Świdry or Chwalibogowice type)	Missing or minor appearance of tanged points without a ventrally retouch of the tang (Ahrensburg type)
Cores with two opposed platforms. Sometimes with preparation for processing like core tablets, dorsal reduction etc. (if the core is suitable/ big enough)	Cores with two opposed platforms. Sometimes with rich preparation for processing like core tablet, dorsal reduction etc. (if the core is suitable/big enough)
Single platform cores (often observable on exhausted cores)	Single platform cores (often observable on exhausted cores)
Short end-scrapers, long end-scrapers on a blade	Short end-scrapers, long end-scrapers on a blade
Burins of various type (often transversal burins)	Burins of various type (missing or minor transversal burins?)
Micropoints (especially ‚Zonhoven' type and truncated micropoints)	Micropoints (especially ‚Zonhoven' type and truncated micropoints)
Direct soft percussion technology	Direct soft percussion technology
No chocolate flint west to the Oder River	Often chocolate flint in Swiderian inventories

Fig. 15. Similarities and differences between Ahrensburgian and Swiderian complexes.

Abb. 15. *Ähnlichkeiten und Unterschiede zwischen Inventaren des Ahrensburgien und Swiderien.*

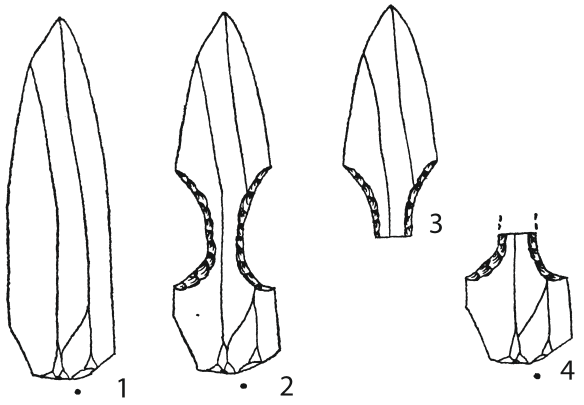

Fig. 16. Scheme of the tanged points production by (twin-)microburin technology. (4) twin-notched microburin (after Taute 1968, Abb. 44).

Abb. 16. *Schema zur Herstellung der Stielspitzen durch (Zwillings-) Kerbtechnik. (4) Zwillingskerbrest (nach Taute 1968, Abb. 44).*

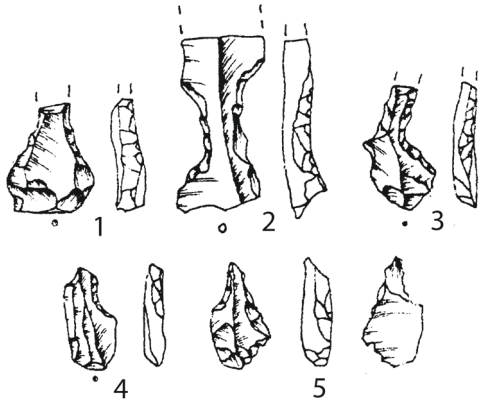

Fig. 18. Szczebra site 14. Twin-notched microburins (after Siemaszko 2000 Fig. 4,10-14). Natural size.

Abb. 18. *Szczebra Fpl. 14, Zwillingskerbreste (nach Siemaszko 2000 Fig. 4,10-14). Natural size. Maßstab natürliche Größe.*

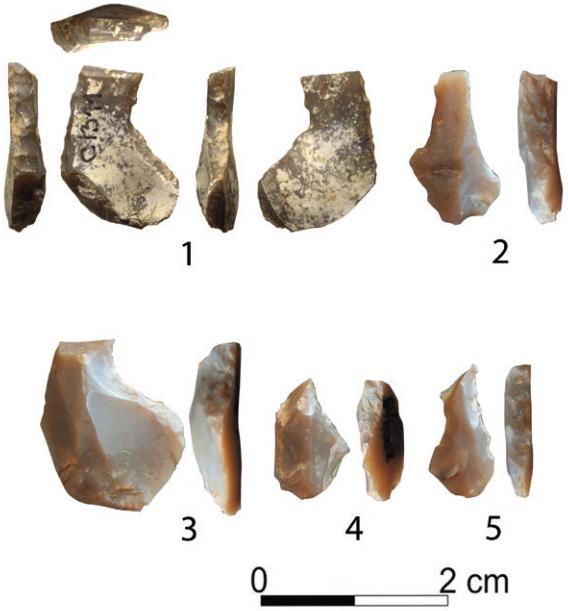

Fig. 17. (1) Cichmiana, site 2. Characteristic waste product of tanged point (twin-notched microburin) Michałów-Piaska (Rydno). (2-3) twin-notched microburins, (4-5) single-notched microburin (Photo 1: K. Winkler, 2-5: W. Grużdź. Courtesy of State Archaeological Museum in Warsaw).

Abb. 17. *(1) Cichmiana Fpl. 2. Charakteristischer Herstellungsabfall (Zwillingskerbrest) einer Stielspitze, (2-5) Michałów-Piaska (Rydno): (2-3) einfache Kerbreste, (4-5) Zwillingskerbreste; (Fotos: 1: K. Winkler, 2-5: W. Grużdź. Mit freundlicher Genehmigung des staatlichen Museums Warschau).*

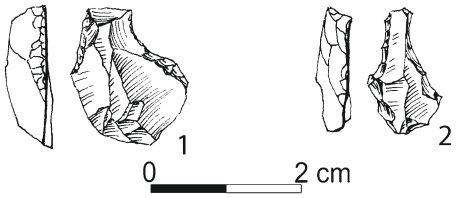

Fig. 19. Michałów-Piaska (Rydno). (1-2) twin-notched microburins). No. 1 s. Fig. 18,3, No. 2 s. Fig.18,3) (Drawing: E. Gumińska).

Abb. 19. *Michałów-Piaska (Rydno). (1-2) Zwillingskerbreste. Nr. 1 s. Fig. 18,3, Nr. 2 s. Fig. 18,3) (Zeichnungen: E. Gumińska).*

(Lemonnier 1986). The technological as well as the typological results support the hypothesis of a transitional or contact zone in the area between the Vistula and the River Elbe. However, the low database must be taken into account, and further investigations on 'unmixed' sites are necessary The hitherto observed similarities suggest that there is little reason to distinguish between two cultural groups in that area. The present study has highlighted the limits of the traditional nomenclature in navigating assemblage variability. Furthermore, it has stressed that the existing archaeological data are insufficient and unsuitable for distinguishing between the Ahrensburg and Swidry cultures.

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