



BEATA BIELIŃSKA-MAJEWSKA

RESEARCH REPORT: SOME COMMENTS ON LATE PALAEOLITHIC LITHIC RAW MATERIAL ECONOMY IN THE TORUŃ BASIN – BASED ON SELECTED SITES

ABSTRACT: This paper presents some comments on the raw material economy in the Toruń Basin in Poland. On the example of selected sites it gives an overview of issues related to the acquisition of raw material needed for production of the most important flint tools in Late Palaeolithic. The vast majority of the analysed artefacts relates to settlements of the technocomplex with tanged points, for most part linked to Swiderian culture, although there are also individual artefacts typical for Ahrensburgian and Bromme cultures. The presence of individual tools specific to the technocomplex with backed blades was also noted in the area. The article is based mainly on selected flint materials stored in District Museums in Toruń and Bydgoszcz. The analysis confirmed that the raw material in use is a component linking all the discussed sites of the Toruń Basin. Individual artefacts though differ among themselves in shade and colours, are all made of the same type of Baltic erratic flint (with the exception of few tools made of imported raw materials such as e.g., chocolate flint or radiolarite). Due to the fact that the article is meant to signal the presence of numerous Late Palaeolithic settlements in the Toruń Basin, it takes into account also archival sites of older discoveries. These are briefly presented, with history of their exploration as well as references from research in later years. Rich archaeological collections from the vicinity of Toruń and Bydgoszcz are an important source of data for the possibilities of research on raw material economy and Late Palaeolithic cultures of this region of Poland.

KEY WORDS: Late Palaeolithic – Toruń Basin – Swiderian culture – Raw materials

INTRODUCTION

The article presents the analysis of Late Palaeolithic raw material sources for production of lithic tools in the

Toruń Basin, Poland (*Figure 1*). The Toruń Basin (also known as the Toruń-Bydgoszcz Basin), according to Kondracki's (2009) division, includes eastern part of the Toruń-Eberswalde Glacial Valley – between Nieszawa

Received 31 January 2013; accepted 6 May 2013.

© 2013 Moravian Museum, Anthropos Institute, Brno. All rights reserved.

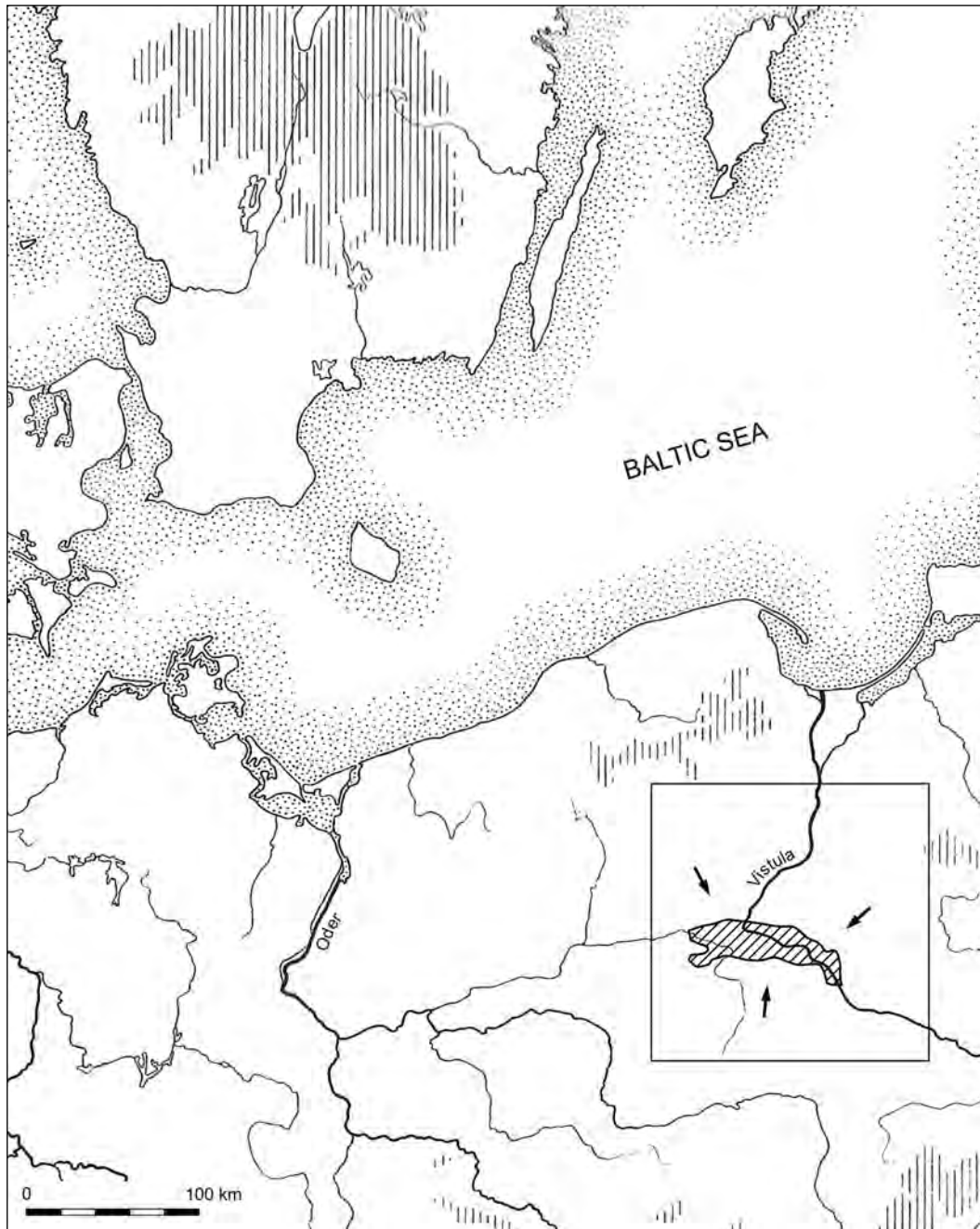


FIGURE 1. Location of the Toruń Basin (after Kondracki 2009, with author's modifications).

and Nakło nad Notecią. The valley was formed as a result of erosion due to external factors, mainly water. Considering land forms, the Toruń Basin has the largest dune complex in the Polish Lowland (Niewiarowski, Weckwerth 2006). Eolian forms developed here in the form of parabolic, longitudinal ridge like and irregular

star dunes of a maximum height of 4–5 m (Niewiarowski, Weckwerth 2006: 86).

In the Toruń Basin, there are few dozens of settlement sites (*Figure 2*) where there is flint material associated with Late Palaeolithic. This article presents only the selected, more important sites with Late Palaeolithic flint

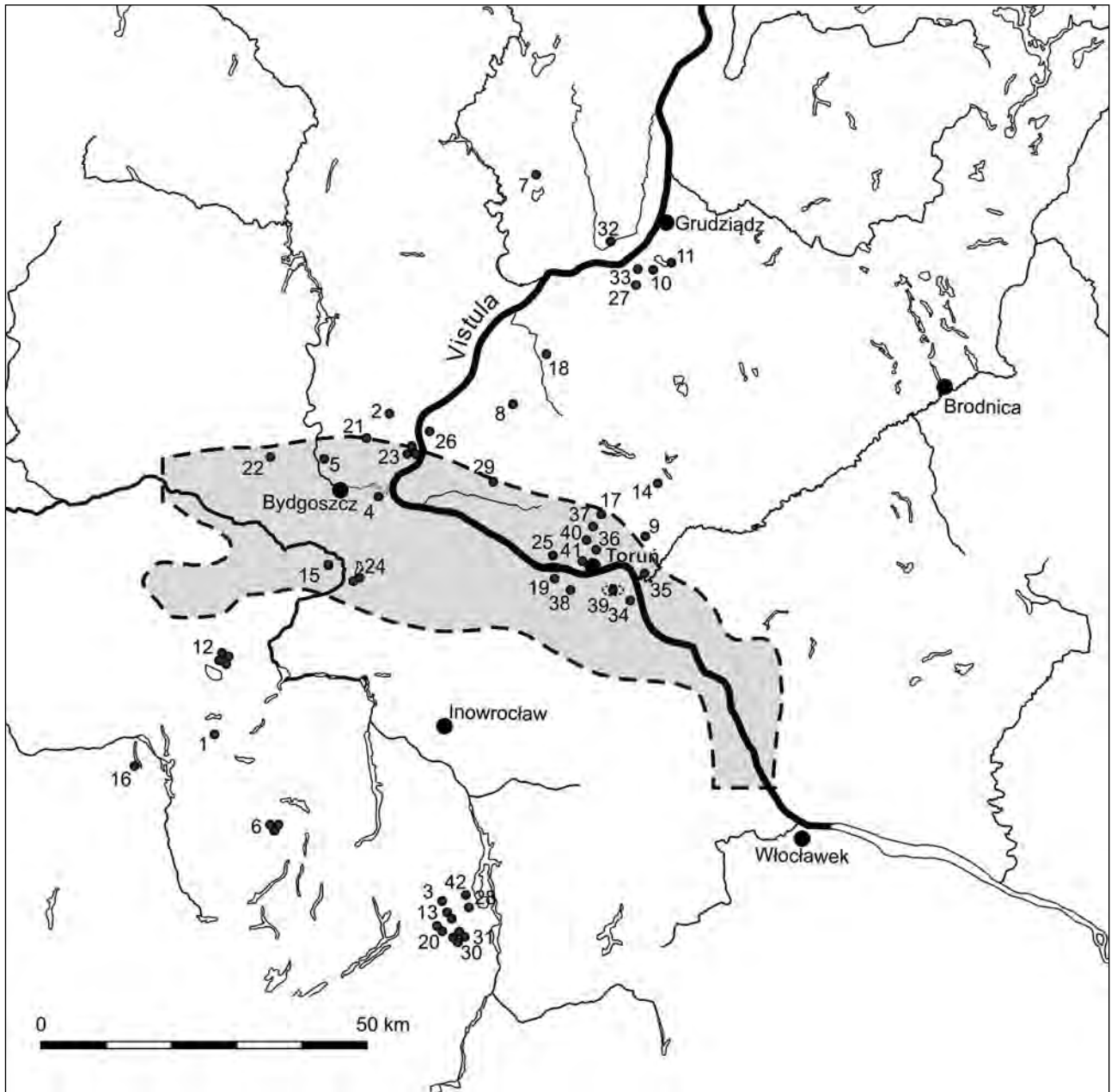


FIGURE 2. Location of Late Palaeolithic sites in the Toruń Basin. 1, Biskupin 15a; 2, Borówno; 3, Budy III; 4, Bydgoszcz-Czersko Polskie; 5, Bydgoszcz-Jachcice 10; 6, Chwałowo 1, 2, and 8; 7, Czersk Świecki; 8, Gołoty; 9, Grębocin; 10, Grudziądz-Mniszek; 11, Grudziądz-Rudnik; 12, Januszkowo Kujawskie 5a, 11, and 12; 13, Jeziora Wielkie 3 and 4a; 14, Kamionki Duże 15; 15, Kobyłarnia; 16, Kołdrąb; 17, Łysomice; 18, Małe Czyste; 19, Nieszawa; 20, Nożyczyn 3 and 4; 21, Osielsko; 22, Pawłówek; 23, Pałcz; 24, Prądocin; 25, Przysiek; 26, Rafa; 27, Ruda 3–6; 28, Rzeszyn; 29, Rzęczkowo; 30, Sierakowo 6 and 7; 31, Sierakówko 2; 32, Stare Marzy 4 and 5; 33, Szynych 13; 34, Toruń-Czemiewice; 35, Toruń Kaszczorek; 36, Toruń-Kozackie Góry; 37, Toruń-Lisi Ogon; 38, Toruń-Podgórz; 39, Brzoza (Toruń-Rudak); 40, Toruń-Wrzosy; 41, Toruń-Wzgórza Piaskowe; 42, Wycinki.

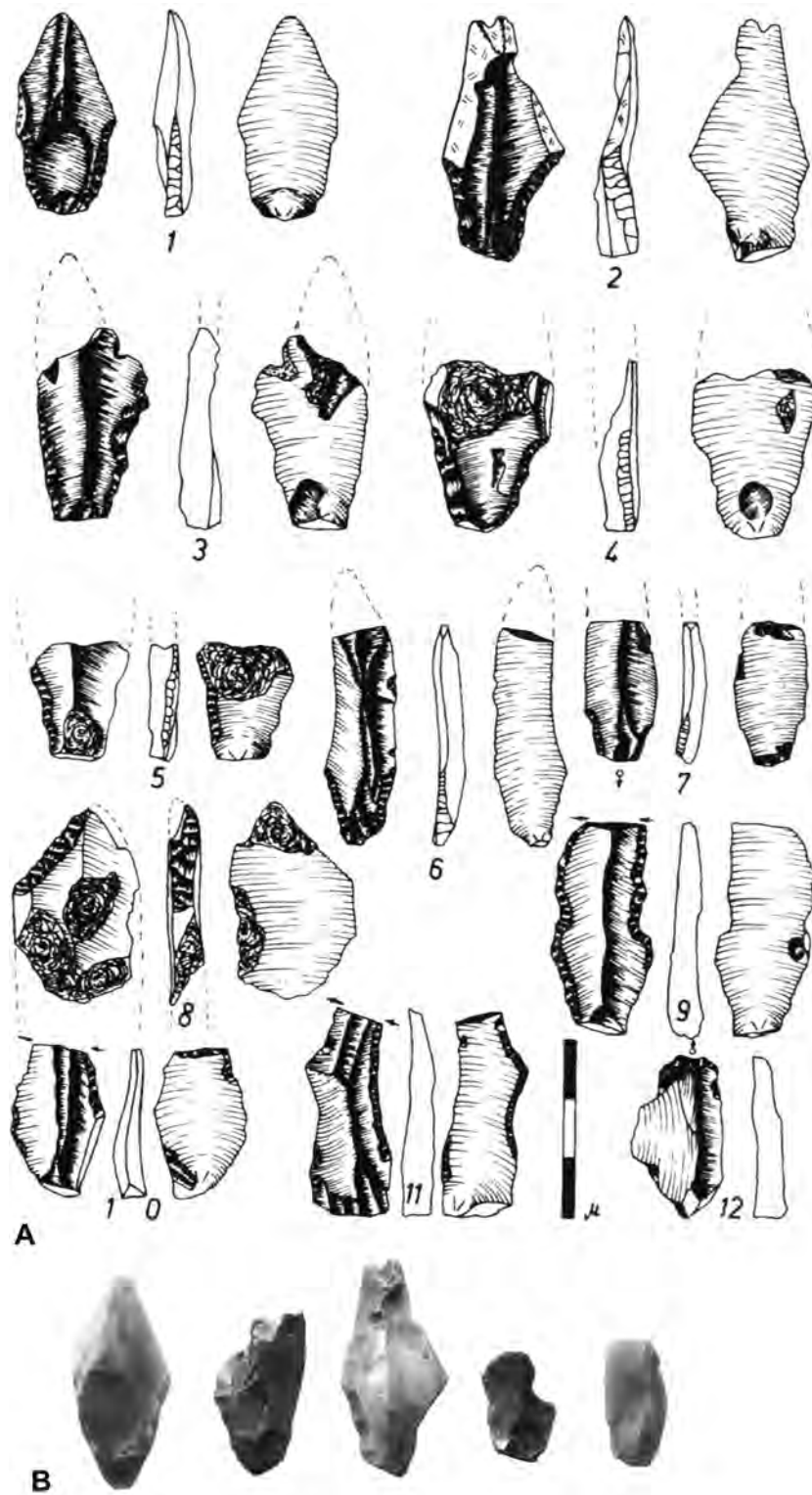


FIGURE 3. Toruń-Wzgórza Piaskowe. Selection of flint tools (A, after Marciniak 1995; B, photo by B. Bielińska-Majewska).

material. The sites include between one and several dozen Late Palaeolithic flint artefacts. One exception to this is Brzoza site (formerly Toruń-Rudak), which is described in a wider scope. It is, with its 9891 flint artefacts, the richest Late Palaeolithic site of the Toruń Basin, often referred to as a complex or agglomeration.

LATE PALAEOLITHIC SITES OF TORUŃ BASIN

In the Toruń Basin there are two distinct concentrations of Late Palaeolithic sites – one around Toruń and the other around Bydgoszcz. Around Toruń there are a few dozens of archaeological sites with flint finds of the Late Palaeolithic. Among these there are sites known from before World War II – mainly surface surveyed – and those excavated after the war or known from recent years – mainly from the Polish Archaeological Record surface survey – such as Toruń-Kaszczorek or Toruń-Lisi Ogon. In these places, some tanged points were found, as well as end-scrapers and broken blades made of Baltic erratic flint – prepared in a technique characteristic for the Swiderian culture. In the future, these sites require verification by means of excavation works.

Toruń-Wzgórza Piaskowe

One of the oldest discoveries associated with the Late Palaeolithic is a group of finds collected probably in year 1866. According to the inventory books of the District Museum in Toruń, they were gathered on a site known as Toruń-Wzgórza Piaskowe. The artefacts were collected on the right side of Vistula. They are listed in the inventory of the Städtisches Museum (Wawrzykowska 2002) under the number II.B.110. In total, 191 flint artefacts were collected on the site. The inventory is, however, intermixed and it contains Late Palaeolithic, Mesolithic, and Neolithic artefacts. The group of artefacts linked to Late Palaeolithic consists of flint tools, blades, and flakes, amongst which according to Marciniak (1995: 50) we can distinguish Lyngby points. Besides of blades, flakes and tools dated (at the time) to Stone Age, in the group of artefact there were also seven Lyngby points (two complete points and five fragments), fragment of a Federmesser truncated blade, two regularly retouched blades, a blade end-scrapers, and a groover (*Figure 3A*). All the artefacts were made of Baltic erratic flint (*Figure 3B, Table 1*).

Toruń-Kaszczorek

The site was discovered by Jolanta Małecka-Kukawka, Stanisław Kukawka, and Wojciech Sosnowski

during the Polish Archaeological Record surface survey in 1990. A total of a 145 flint artefacts were collected. In the inventory there are one double platform core for blades, one initially struck core, one burin, one scraper, 22 blades (10 complete and 12 fragments), 26 debris, 44 scales, 48 flakes and one blade from double platform core. All the artefacts were made of Baltic erratic flint (*Table 1*).

Toruń-Kozackie Góry

The material was collected at the end of the 19th and the beginning of the 20th century. It was collected on the site's surface and is intermixed. As Lissauer wrote, 'on Kozackie Góry in Toruń many flint products and cores were found, their age was not determined' (Lissauer 1887: 30). The site, which is now completely destroyed, was located on the right site of Vistula. On the site 73, flint products were uncovered; two fragments of unidentified tools, two burins, 13 blades (two complete and 11 fragments), 31 debris, 25 flakes (one with retouch). 98.6% of the material (*Table 1*) was made of Baltic erratic flint, besides of that there was one piece of debris made of chocolate flint, which makes 1.4%.

Toruń-Lisi Ogon

The material comes from Polish Archaeological Record surface surveys conducted in years 1990–1991. Surveys were conducted by Jolanta Małecka-Kukawka, Stanisław Kukawka, and Bogusława Wawrzykowska. In total, 14 Stone Age sites were discovered in the area. On the base of technological assignation seven of these were identified with Swiderian culture. These in total amounted to 44 artefacts; six tanged points, one unidentified tool, two end-scrapers, two initially struck cores, one crested blade as well as blades and flakes. All the artefacts were made of Baltic erratic flint (*Table 1*).

Toruń-Podgórz

At Toruń-Podgórz, two Late Palaeolithic sites were discovered (no. 1 and no. 4). Site 1 was surface surveyed in 1912–1913 by Józef Kostrzewski. 27 flint products were discovered; 19 blades (five complete and 14 fragments), five debris and three flakes. Technology of the make of some artefacts is characteristic of Swiderian culture – blades made of double platform cores.

Site 4 was discovered during a verification survey by Andrzej Prinke and Wawrzykowska in 1972. 13 flint artefacts were discovered; three flakes, three debris, and seven blades (three complete and four fragments). All the artefacts from these sites were made of Baltic erratic flint (*Table 1*).

TABLE 1. The Toruń Basin's raw material structure on the example of selected sites.

Site	Raw material											
	Baltic flint		Chocolate flint		Radiolarite		Chert		Other		Total	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
Sites around Toruń												
Brzoza (Toruń-Rudak), excavations up to 1970	1149	99.73	3	0.26							1152	100.0
Brzoza (Toruń-Rudak), 1972 and 1973 excavations	2873	99.93	1	0.03					1	0.03	2875	100.0
Brzoza (Toruń-Rudak), 1979 excavations	1013	99.90	1	0.10							1014	100.0
Brzoza (Toruń-Rudak), 1996 excavations	3165	99.90	1	0.03			2	0.1			3168	100.0
Brzoza (Toruń-Rudak), 2001 excavations	1678	99.76			1	0.1			3	0.18	1682	100.0
Przysiek	17	94.44	1	5.55							18	100.0
Toruń-Kaszczorek (AZP)	145	100.00									145	100.0
Toruń-Kozackie Góry	72	98.60	1	1.36							73	100.0
Toruń-Lisi Ogon (AZP)	44	100.00									44	100.0
Toruń-Podgorz, site 1	27	100.00									27	100.0
Toruń-Podgórz, site 4	13	100.00									13	100.0
Toruń-Wzgórza Piaskowe	191	100.00									191	100.0
Sites around Bydgoszcz												
Bydgoszcz-Czersko Polskie	59	100.00									59	100.0
Januszkowo Kujawskie, site 5a	1	100.00									1	100.0
Januszkowo Kujawskie, site 11	1	100.00									1	100.0
Januszkowo Kujawskie, site 12	10	100.00									10	100.0
Kobylarnia	76	85.40							13	14.60	89	100.0
Pałcz, site 1	25	100.00									25	100.0
Pałcz, site II	4	100.00									4	100.0
Pałcz, site 5	1	100.00									1	100.0
Pawłówek	10	100.00									10	100.0
Prądocin	9	100.00									9	100.0
Total	10,583	99.74	8	0.07	1	0.0	2	0.0	17	0.16	10,611	100.0

Brzoza (Toruń-Rudak)

Brzoza site was in earlier literature known as Toruń-Rudak (Marciniak, Mroczyński 1983, Prinke 1980). Considering the amount of the finds it is the richest site in the Toruń Basin (there are around 90 flint concentrations – in literature known as sites). It is located south of Toruń, on the left side of Vistula, on the grounds of military training range. The site was already known in the 19th

century. At the beginning of the 20th century it was investigated by the custodian of the Toruń Städtisches Museum Artur Semrau. The proof of this is the collection of artefacts gathered during that time, composed of 60 Baltic flint artefacts and one broken blade of chocolate flint.

In 1930's, the area was investigated by Jacek Deleka and after World War II by Bonifacy Zielonka. A verification surface surveys were conducted in 1972–1973 by Prinke

and Wawrzykowska. During this investigation, 44 separate sites (concentrations) were identified (Prinke 1980).

Subsequent investigations were conducted by Marian Marciniak and Wojciech Mroczyński in 1979. They located 18 new sites, preserving the continuity of numeration they marked the sites 45–62 (Marciniak, Mroczyński 1983). In this article, the authors suggest that some of the flint concentrations may be overlapping with those discovered earlier.

The Polish Archaeological Record investigations in 1990's resulted in 29 flint concentrations described as Brzoza 15–43 (again treated as separate sites). During the excavations of 1996, five of these concentrations were explored (11, 15, 30, 34, and 47). A total of 3168 Late Palaeolithic flint artefacts were collected (Kukawka *et al.* 1996).

Small scale excavations were also conducted in 2001 by Krzysztof Cyrek of the Institute of Archaeology of Nicolaus Copernicus University in Toruń. Nine flint concentrations were excavated (1, 2, 3, 4, 5, 14, 47, 63, and 64). A total of 1682 Late Palaeolithic artefacts were collected (1679 flint artefacts and three stone objects).

Older collections (dated up until 1970) have given a total of 1152 flint artefacts; 99.7% of them are made of Baltic erratic flint (*Table 1*). Only three artefacts were made of other material – chocolate flint (0.3%). These are: one broken blade, one retouched blade, and one Swiderian point.

Investigations of 1972–1973 brought 2875 artefacts of Baltic erratic flint, one piece of debris of chocolate flint and one tanged point made of undefined material (0.03%, *Table 1*). It has to be noted that Prinke, who conducted these excavations assumed that some of the finds were made of Jurassic flint (Prinke 1980), as the scholar notes they are strongly differentiated. Recent analysis of the inventory of these excavations suggests that there are no Jurassic flint artefacts. The artefacts are likely made from Baltic erratic flint. Certainly a thorough petrographic analysis would solve this matter. Practically all of the remaining material of Prinke's excavations was made of Baltic erratic flint. The colour of flint ranges from creamy-white, through light to dark gray. In many cases, whitish spots can be observed on darker surfaces. Some of the artefacts have patina of various intensities. Its formation is associated with a long term deposition of artefacts in sand or on the surface. During the excavations, Prinke uncovered 86 tanged points (in that one of Wojnowo type), 35 end-scrapers, 14 burins, two perforators, three truncations, and 57 cores (or their fragments) (Prinke 1980). The flint's bulk is sometimes

cracked, crushed, or polished, which is associated with land-water transportation of material.

During excavations conducted in 1979, Marciniak and Mroczyński collected a total of 1014 flint artefacts (part of which was collected from the surface). 1013 of them (99.9%, *Table 1*) were of Baltic erratic flint, one end-scraper was made of chocolate flint (0.1%).

Authors of the 1979 excavations identified 13 Ahrensburgian points and 17 Swiderian tanged points (Marciniak, Mroczyński 1983). Among tools, they identified 15 end-scrapers, six burins, and 27 cores.

During the excavation of 1996, 3165 Baltic erratic flint artefacts were acquired (99.9%, *Table 1*); one of chocolate flint (a broken end-scraper) and two chert tanged points (0.06%). In this collection, there were seven end-scrapers, three scrapers, 16 burins, 27 tanged points (or their fragments), three fragments and four whole backed blades, one truncated blade, two borers, one notch tool, and one fragment of a side-scraper. Most of tanged points were interpreted as Swiderian culture products. Only two tanged points are of a form characteristic to Ahrensburgian culture.

During the excavations of 2001, a total of 1682 artefacts were acquired. Of that 1678 (99.8%, *Table 1*) were of Baltic erratic flint, one microtruncation was made of radiolarite and there were three stone artefacts. In this material, there were 41 flint tools and 36 cores (or their fragments). Among tools there were nine burins, 11 tanged points (or their fragments), as well as individual finds of backed blades, truncated blades, trapezes, microtruncations, and a fragment of backed bladelet (Bielińska-Majewska 2009).

Excavations of 1996 and 2001 gave a total of over 4500 flint artefacts (*Figure 4*). The results of the technological-morphological and typological analysis of the material of the excavations in 1996 and 2001 were presented in Bielińska-Majewska (2006, 2009). All of artefacts from two flint concentrations (no. 34 and 15, excavations 1996) have undergone a traceological analysis, which was conducted by G. Korobkova from the Institute for History of the Material Culture of Russian Academy of Sciences, St. Petersburg. The analysis confirmed that the people of this area among other things did initial processing of the butchered game (Bielińska-Majewska 2006).

In total, excavations conducted in the complex – starting with the surface survey of 1934 up until the excavations of 2001 – produced close to 10,000 flint products associated with Late Palaeolithic period. According to Zofia Sulgostowska, 'the quantity of few hundred tool, with over a hundred tanged points allows

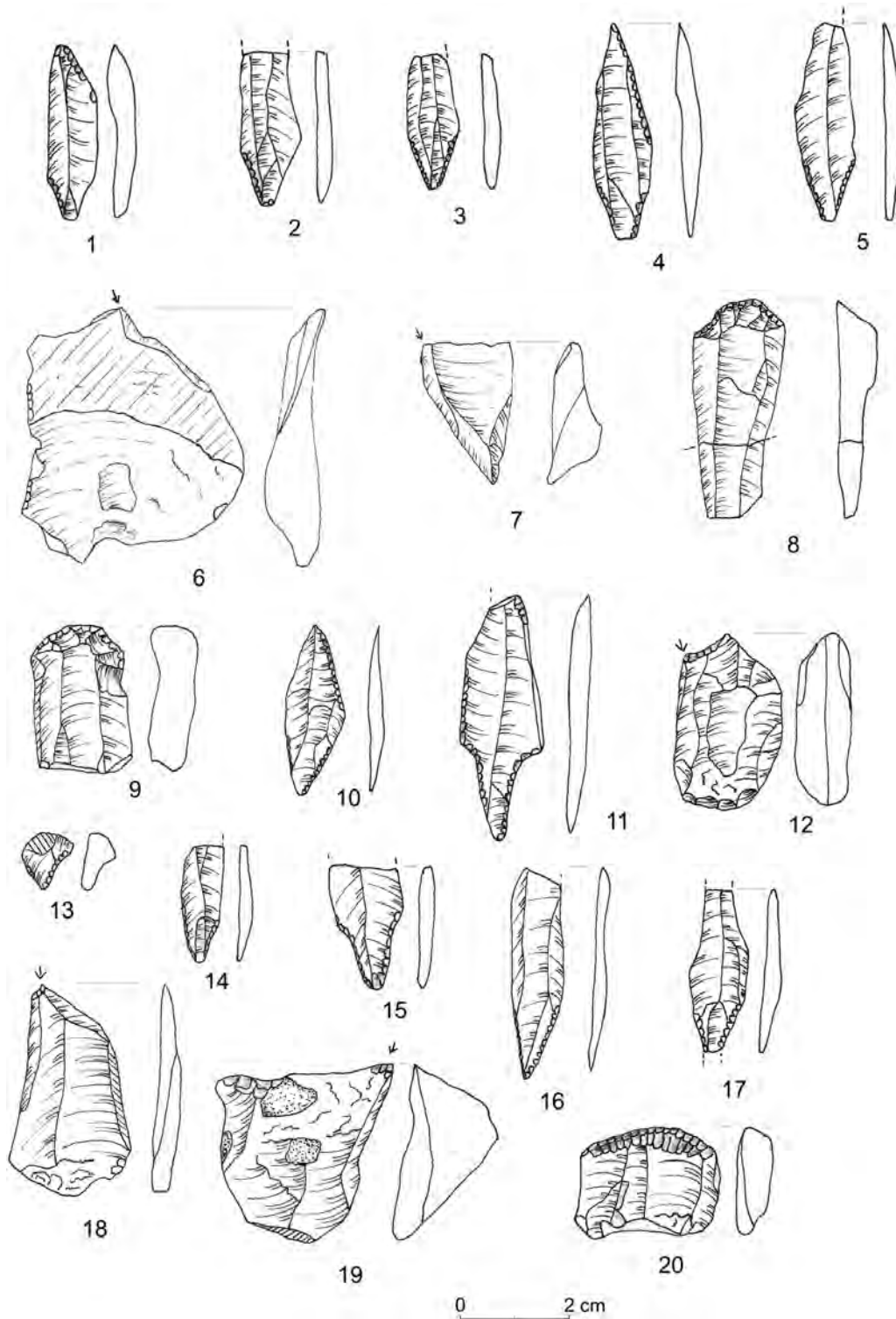


FIGURE 4. Brzoza, commune Wielka Nieszawka. Selected flint tools from excavation seasons 1996 and 2001. 1996: 1–5, tanged points; 6–7, burins; 8: end-scraper (chocolate flint); 9, end-scraper. 2001: 10–11; 14–17; tanged points; 12, 18–19, burins; 13, microtruncation (radiolarite); 20, end-scraper.

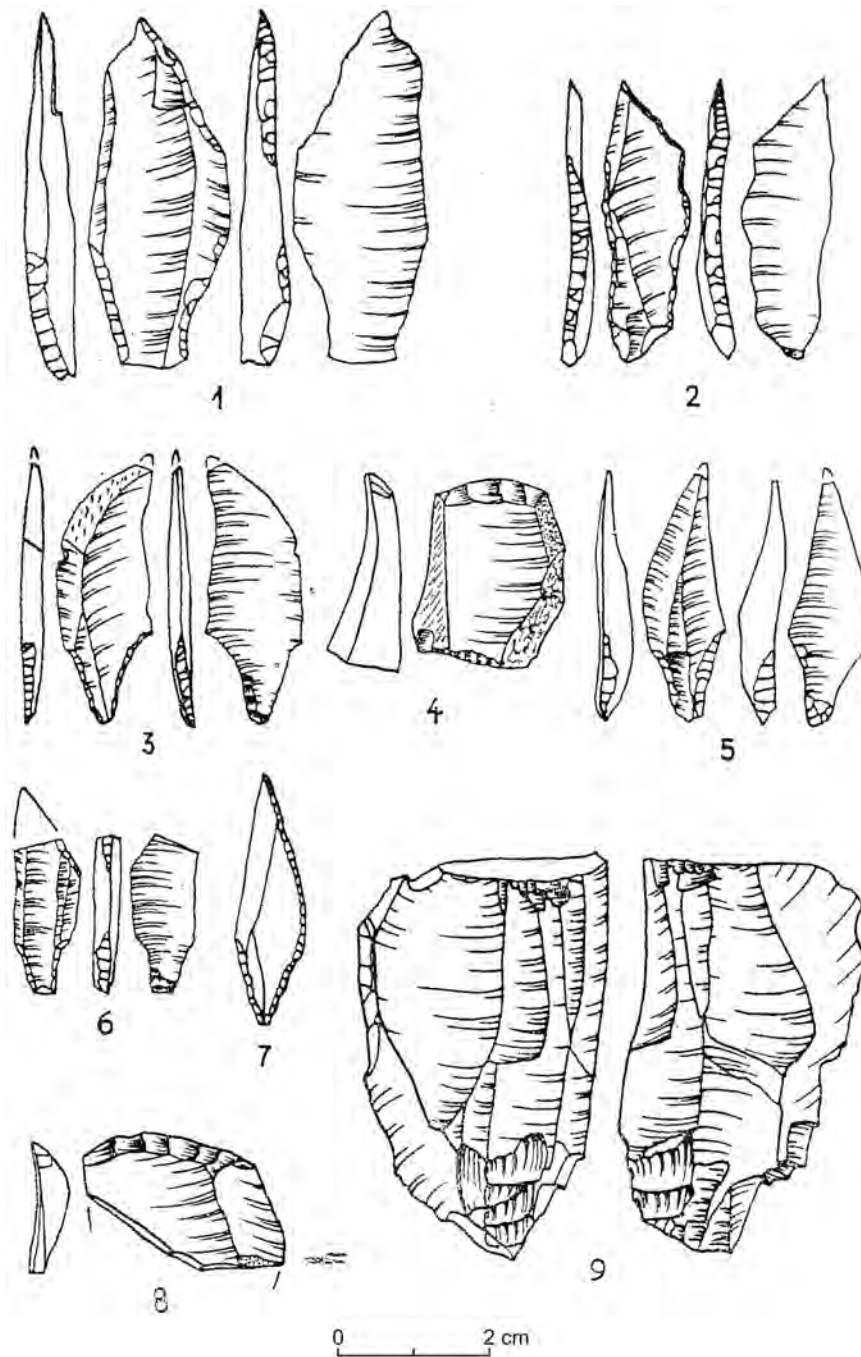


FIGURE 5. Selected flint artefacts from Bydgoszcz area. 1–4, Pałcz II; 5, Pałcz 5; 6–9, Pawówek (after Stoczkowski 1982).

calling the Brzoza site complex an agglomeration' (Sulgostowska 2005: 231). Around Toruń, it is the largest of such complexes dated to Late Palaeolithic technocomplex of backed blade and tanged points.

In the Toruń Basin, Late Palaeolithic sites are also found in the vicinity of Bydgoszcz, where according to Stoczkowski (1982) these are around 13 Late Palaeolithic sites. Most important of these are

Bydgoszcz-Czersko Polskie, Pawłówko, Januszkowo Kujawskie, Kobylarnia, Prądocin, Pałcz (Stoczkowski 1982), and Bydgoszcz-Jachcice (Kobusiewicz 1999: 14). Material of these sites is stored mainly in District Museum in Bydgoszcz.

Bydgoszcz-Czersko Polskie

The site was surface surveyed between 1905 and 1914 by Konrad Kothe. There were artefacts dated to Late Palaeolithic and Mesolithic.

Late Palaeolithic artefacts include two tanged points, 25 end-scrapers (nine short end-scrapers), as well as six double platform cores for blades, 16 blades made of double platform cores, and three blade fragments (Stoczkowski 1982). The entire inventory is made of Baltic erratic flint. Typologically most of the products can be linked with Swiderian culture. Presence of short end-scrapers suggests links with backed blade technocomplex.

Januszkowo-Kujawskie

In Januszkowo-Kujawskie, three sites with Late Palaeolithic artefacts were uncovered (numbered as 5a, 11, and 12). The investigations were conducted by Józef Kostrzewski in 1929 and Tadeusz Wiślański in 1951. The collection is stored in Poznań Archaeological Museum.

From site 5a, there is one tanged point with retouched dorsal side. From site 11, there is one tanged point and from site 12, there were five tanged points (in that two with no retouche on dorsal side), four burins, and one broken blade (Taute 1968). All of these finds were made of Baltic erratic flint. Asides of two tanged points (with no retouche on dorsal side) all the artefacts are linked with Swiderian culture (*Figure 6*).

Kobylarnia

The site was surface surveyed by Stoczkowski in 1977. In total, he collected 89 artefacts. In this collection, 76 (85.4%, *Table 1*) were made of Baltic erratic flint; two tanged points, four end-scrapers, and one piece with traces of retouch, as well as two cores (one with double platform), 26 blades (four made of a double platform core), 26 flakes, and 15 scales. 13 artefacts (14.6%) were made of gneiss, these are flakes and scales (Stoczkowski 1982). The collection is linked with Late Palaeolithic and Swiderian culture.

Pałcz

In Pałcz there are three Late Palaeolithic sites; these are Pałcz 1, Pałcz II, and Pałcz 5. The first two sites were surface surveyed by Stoczkowski in 1977, and Pałcz 5 was excavated by Czesław Potemski in 1965 and it is

mainly a Neolithic site with one Swiderian culture artefact – tanged point.

In Pałcz 1, there were two distinct concentrations marked A and B (Stoczkowski 1982). From concentration A, there were 11 flint tools; three backed blades (in that one arched backed blade), five end-scrapers, three burins, and one single platform core for blades. From concentration B, there were: five double platform cores for blades, three blades made of double platform cores, and two crested blades and debris (Stoczkowski 1982). From Pałcz II, there are four artefacts; three tanged points (two Lyngby points and one tanged point) and one end-scrapers. From Pałcz 5, there is one tanged point. All of Pałcz Late Palaeolithic artefacts are made of Baltic erratic flint.

Pawłówek

Precise location of Pawłówek site is unknown. It was surface surveyed by Kothe in 1914–1918. The material preserved to our times includes two tanged points, one end-scrapers, two double platform cores, and five blades made of a double platform cores. All of Pawłówek Late Palaeolithic artefacts are of Baltic erratic flint. The technique of make allows linking them with Swiderian culture.

Prądocin

The site was surface surveyed by Stoczkowski in 1977. In the inventory, there are nine artefacts; one burin, one tanged point (with no retouch on the dorsal side), one flake end-scrapers, five flakes, and one burin flake. The material is linked with Swiderian culture, with the exception of a tanged point with no retouch on the dorsal side linked with Ahrensburgian culture. All artefacts of Pradocin are made of Baltic erratic flint.

DISCUSSION

Baltic erratic flint

Baltic erratic flint is a basic raw material used in Late Palaeolithic in the Toruń Basin (making 99.7% of analysed sites inventory, *Table 1*). It predominates over other raw material which is used rather sporadically. It is well known that people of the Late Palaeolithic obtained raw material mainly by way of collecting concretions found on the surface (Cyrek 1983). Another well known way was to explore moraines and fluvio-glacial landforms. In this way, Baltic erratic flint was easily available in the area as well as in all of the North European Plain and it was its common use (Sawicki 1922).

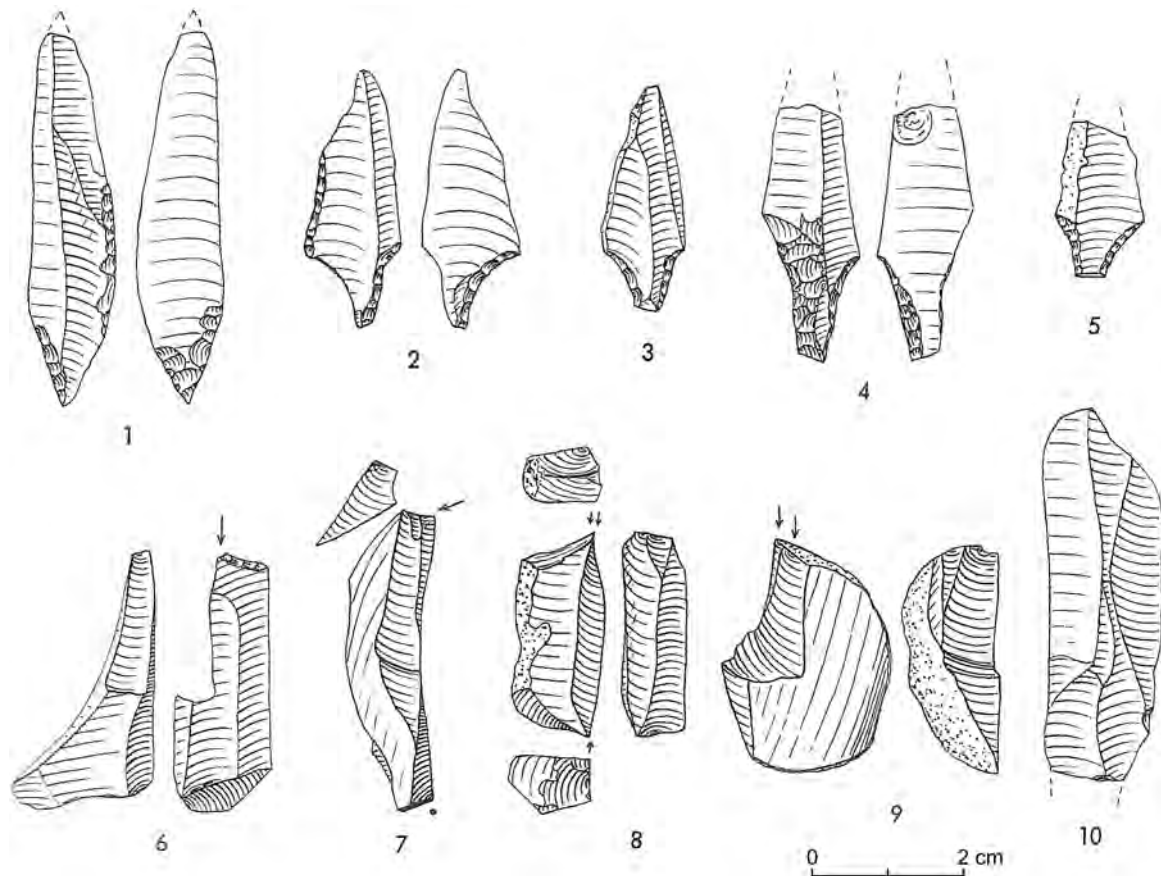


FIGURE 6. Januszkowo 12, commune Nowa Wieś Wielka. Selected flint tools: 1–5, tanged points; 6–9, burins; 10, blade fragment (after Taute 1968).

Baltic erratic flint, also known as the Cretaceous flint, was collected on the surface, but also by means of exploration of shallow pits and sections exposed in river valleys (Cyrek 1983: 106). It was probably so in Brzoza and in other places. Various deposition conditions of flint probably influenced the size of acquired concretions, their state of preservation, colouring, presence or lack of cortex, appearance of fractures and the character of patina occurring (Cyrek 1983). Acquisition of flint material was very important in Late Palaeolithic people. According to Michał Kobusiewicz, for the people of Hamburgian culture, in the area of northwest Poland, raw material was harder to obtain than it was in northwest Germany or Netherlands (Kobusiewicz 1999: 56). This is well visible on material from Liny, where majority of cores is used up to the maximum – testified by changes in orientation of work surfaces (Kobusiewicz 1999). Maximum use of blanks can be also observed on the example of numerous reparations of tools, even those of

a very small size (Kobusiewicz 1999). According to Kobusiewicz (1999), very important were also natural concentrations of flint nodules, especially in Dryas III. As an example author gives the areas around Poznań–Starołęka and around Międzychód (Kobusiewicz 1999: 60, 1997). Material of better quality – larger nodules, was found in river valleys and in places where moraine landforms were washed out by water (Wiślański 1979: 220). Over Noteć River close to Piechocin and Wapno (former Bydgoszcz voivodship), there are also such concentrations (Wiślański 1979: 220). It was also commonly found in sands and cliffs of river valleys. Some of the scholars think that material of better quality was acquired via exploration of moraines' surface layers (Wiślański 1979). In case of site complex in Brzoza we do not know if there are such places in close vicinity. Examination of the sites' surrounding area could help to solve this problem, as was signalled by archaeologist who explored the site in the past (Kukawka *et al.* 1996).

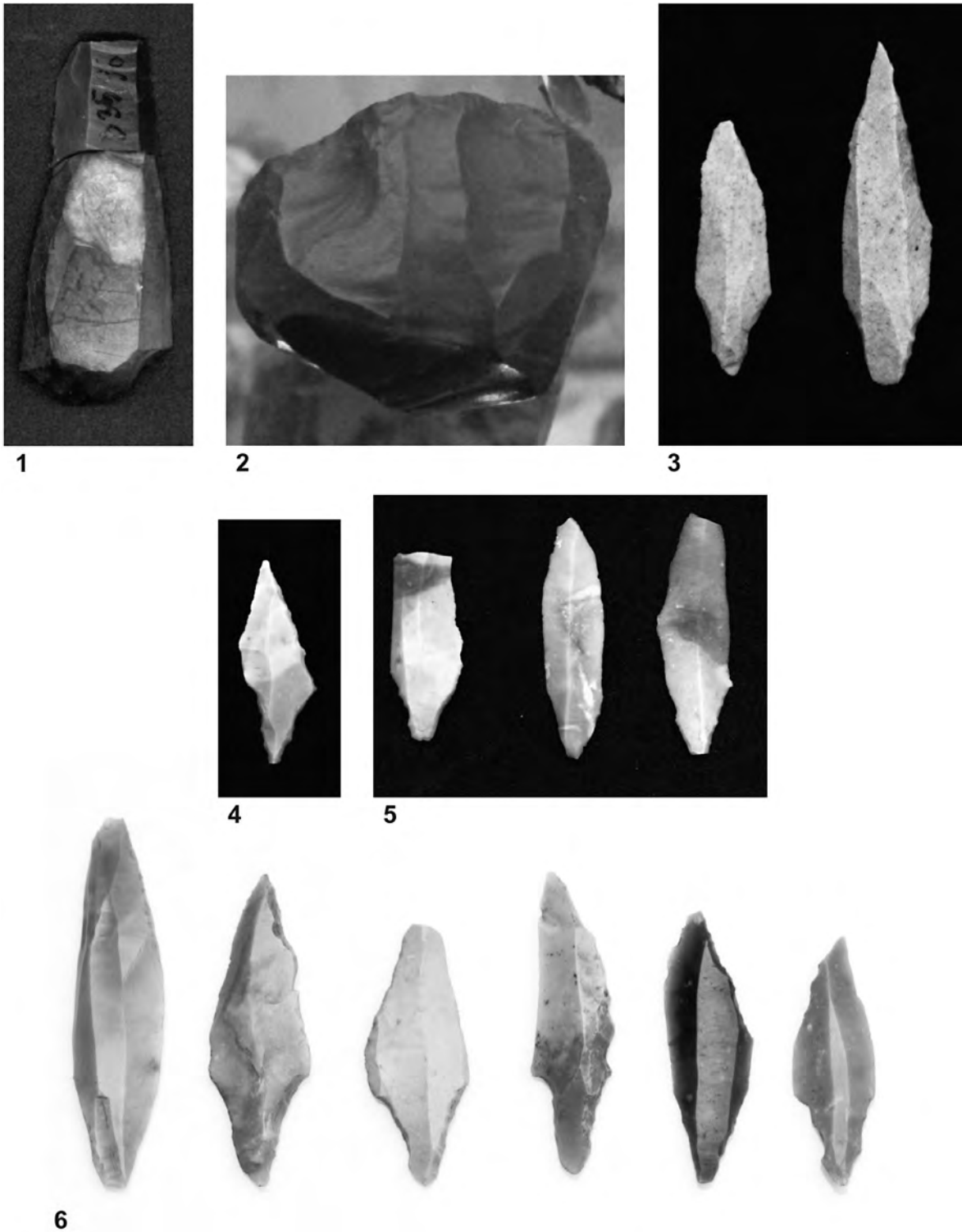


FIGURE 7. Examples of raw material. Chocolate flint: 1, burned end-scraper (Brzoza 1996). Radiolarite: 2, core (Szynych). Chert: 3, tanged points (Brzoza 1996). Baltic erratic flint (Brzoza): 4, Ahrensburgian tanged point; 5, 6, tanged points (1, 2, 3, 4, and 5, photo by B. Bielińska-Majewska; 6, photo by K. Deczyński).

Chocolate flint

Chocolate flint (Upper Oxfordian and Kimerian flint) was also used in Late Palaeolithic, though in the Toruń Basin it is not found very often. This type of flint can be acquired as erratic material or via mining (Cyrek 1983: 109). The erratic finds are usually small pebbles with almost no cortex and a smoothed out surface. The nodules acquired through mining have a number of good utilitarian characteristics. The source of the Upper Astartian flint was located in north-eastern part of Świętokrzyskie Mountains (Sulgostowska 2005: 22). Artefacts made of this flint are known *inter alia* from the Całowanie site and are associated with backed blade and Mazovian technocomplex (Sulgostowska 2005).

Only very few artefacts of chocolate flint are known from the Toruń Basin. These are one end-scraper from 1979 excavations in Brzoza, one slightly burned end-scraper (*Figure 7:1*) from excavations in 1996 also in Brzoza, and three artefacts from the same area from the earliest investigations. A small amount of this material suggests that it was brought here from elsewhere as a result of migration of late Palaeolithic people. The Final Palaeolithic societies, Arch Backed Pieces and Mazovian, organised logistics expeditions in various directions (south-north, west-east) using natural roads such as river valleys, but also crossing mountains' (Sulgostowska 2006: 41).

Radiolarite

There is only one known radiolarite tool in the Toruń Basin (uncovered at Brzoza site in 2001). A core (*Figure 7:2*) of this material was also uncovered on Szynych site around 65 km to the north of Brzoza. Though the technique in which the core was exploited does not allow for a certain dating to Late Palaeolithic. Radiolarite is characterised by poor transparency and a large variety of colour (Sulgostowska 2005). The source of this material is found among other in White Carpathians region of western Slovakia and the source of a red radiolarite flint is known to be in Hungarian Sumeg Mountains (Sulgostowska 2005: 29). In Poland, this stone occurs in Pieniny Mountains. Unfortunately, there was no petrographic analysis of the specimen from Brzoza, therefore we do not know from which deposits it originates. Besides of the radiolarite microtruncation (*Figure 4:13*) from Brzoza, there is no other Late Palaeolithic artefact of this material in collections of the Toruń Basin.

Other material

In the Brzoza inventory (1996 excavations), there were two items made of chert (*Figure 7:3*). Two

Mazovian type points were made of this material of a great hardness. Traceological analysis of the artefacts did not reveal any signs of use-wear (Bielińska-Majewska 2006). Near Bydgoszcz, on Kobylarnia site 13 flakes and blades were found that were made of gneiss (Stoczkowski 1982). Artefacts of chert and gneiss together make up 0.2% (*Table 1*) of Late Palaeolithic artefacts of the Toruń Basin.

CONCLUSIONS

The vast majority of the Toruń Basin Late Palaeolithic inventory is associated with Swiderian culture. Individual finds are also associated with Bromme culture. These were two Lyngby (Bromme) tanged points on sites Pałcz II (*Figure 5:1, 2*) and Bydgoszcz-Czersko Polskie (Stoczkowski 1982) and Toruń-Wzgórza Piaskowe (Marciniak 1995). In Swiderian inventory, some tanged points typical to Ahrensburgian culture were noted. Single Ahrensburgian points were found on sites Prądociń and Januszkowo Kujawskie (site 12). Larger quantity of Ahrensburgian points was noted in Brzoza during excavation season 1979. 13 Ahrensburgian points were then uncovered as well as 17 Swiderian points (Marciniak, Mroczyński 1983).

Most of the analysed artefacts relate to the settlements of technocomplex with tanged points, for most part linked to Swiderian culture, although there are also individual artefacts typical for Ahrensburgian and Bromme cultures. The presence of individual tools specific to technocomplex with backed blades was also noted in the area. Individual artefacts associated with Federmesser culture were found in Brzoza during 1996 excavation season and in Pałcz on site 1 (concentration A).

On the basis of technology and raw materials analysis of the presented sites of the basin, it was found that the basic raw materials used by Late Palaeolithic flint tool makers was the Baltic erratic flint (99.7%; *Figure 7:4, 5, 6, Table 1*), from which blank blades were obtained. Chocolate flint is very rare (0.1%) as well as radiolarite (0.01%). Presence of gneiss (0.1%) and chert (0.03%) suggests that lack of better material sometimes made the people of the Late Palaeolithic Toruń Basin experiment with material, which they would not use otherwise.

Concerning the technique, single or double striking platforms cores were used. A maximum utilisation of available raw material was also observed, which is visible both on cores and tools that are usually smaller than those typical for the period. The element that connects all the findings discussed here is the raw

material from which most flint tools of the Toruń Basin were made. Individual artefacts differ in shade and colour, but are of the same kind of Baltic erratic flint (with the exception of few tools made from imported raw materials such as chocolate flint or radiolarite). It should also be noted that some of the products made of Baltic erratic flint are of good quality, such as those from Brzoza sites complex. It is possible that in a close area there is a place where this type of material was obtained by way of excavation and not just from the surface. As was already mentioned above, this issue requires further study.

REFERENCES

- BIELIŃSKA-MAJEWSKA B., 2006: Zabytki krzemienne pochodzące z badań wykopaliskowych kompleksu stanowisk schyłkowopaleolitycznych w Brzozie, gm. Wielka Nieszawka przeprowadzonych w 1996 roku. *Rocznik Muzeum Okręgowego w Toruniu* 15: 57–81.
- BIELIŃSKA-MAJEWSKA B., 2009: Schyłkowopaleolityczne materiały krzemienne z kompleksu stanowisk w Brzozie, gm. Wielka Nieszawka (badania wykopaliskowe w 2001 roku). *Rocznik Muzeum Okręgowego w Toruniu* 17, 2008: 117–140.
- CYREK K., 1983: Surowce krzemienne w mezolocie dorzeczy Wisły i górnej Warty. In: J. K. Kozłowski, S. K. Kozłowski (Eds.): *Człowiek i środowisko w pradziejach*. Pp. 106–113. Państwowe Wydawnictwo Naukowe, Warszawa.
- KUKAWKA S., MAŁECKA-KUKAWKA J., WAWRZYKOWSKA B., 1996: Sprawozdanie z badań archeologicznych kompleksu stanowisk schyłkowopaleolitycznych w Brzozie, gmina Wielka Nieszawka przeprowadzonych w okresie 09–23 września 1996 roku. Manuscript deposited in the archives of the District Museum in Toruń.
- KOBUSIEWICZ M., 1999: *Ludy łowiecko-zbierackie północno-zachodniej Polski*. Poznańskie Towarzystwo Przyjaciół Nauk, Poznań.
- KOBUSIEWICZ M., 1997: Sources of Flint on the West Polish Plain. In: R. Schild, Z. Sulgostowska (Eds.): *Man and Flint. Proceedings of the VIIth International Flint Symposium. Warszawa–Ostrowiec Świętokrzyski, September 1995*. Pp. 83–89. Institute of Archaeology and Ethnology of the Polish Academy of Science, Warszawa.
- KONDRACKI J., 2009: *Geografia regionalna Polski*. Wydawnictwo Naukowe PWN, Warszawa.
- LISSAUER A., 1887: *Prahistorischen Denkmaler Provinz Westpreussen und der angrenzenden Gebiete*. Leipzig.
- MARCINIĄK M., 1995: Paleolit i mezolit w międzyrzeczu Wisły, Drwęcy i Osy. In: W. Filipowiak (Ed.): *Najnowsze kierunki badań najdawniejszych dziejów Pomorza (X Pomorska Sesja Archeologów z okazji 40-lecia powrotu Pomorza do Polski, Szczecin 1985, Marzec 28–30)*. Pp. 49–62. Muzeum Narodowe w Szczecinie, Szczecin.
- MARCINIĄK M., MROCZYŃSKI W., 1983: Nowe materiały schyłkowopaleolityczne z kompleksu stanowisk kultury świderskiej w Toruniu-Rudaku. *Acta Universitatis Nicolai Copernici. Archeologia* 7: 3–39.
- PRINKE A., 1980: Schyłkowopaleolityczne stanowiska kultury świderskiej w Toruniu- Rudaku. *Rocznik Muzeum w Toruniu* 7: 127–163.
- NIEMIAROWSKI W., WECKWERTH P., 2006: Geneza i rozwój rzeźby terenu. In: L. Andrzejewski (Ed.): *Toruń i jego okolice-monografia przyrodnicza*. Pp. 65–96. Wydawnictwo Uniwersytetu Mikołaja Kopernika, Toruń.
- SAWICKI L., 1922: Przyczynek do znajomości technik obróbki krzemienia. *Wiadomości Archeologiczne* 7: 58–77.
- STOCZKOWSKI W., 1982: Schyłkowopaleolityczne i mezolityczne materiały krzemienne z okolic Bydgoszczy. *Komunikaty Archeologiczne. Badania wykopaliskowe na terenie województwa bydgoskiego w latach 1973–1979*: 127–163.
- SULGOSTOWSKA Z., 2005: *Kontakty społeczności późnopaleolitycznych i mezolitycznych między Odrą, Dźwiną i Górnym Dniestrem*. Instytut Archeologii i Etnologii Polskiej Akademii Nauk, Warszawa.
- SULGOSTOWSKA Z., 2006: Final Palaeolithic Societies' Mobility in Poland as Seen from the Distribution of Flints. *Archaeologia Baltica* 7: 36–41.
- TAUTE W., 1968: *Die Stielspitzen-Gruppen im nördlichen Mitteleuropa. Ein Beitrag zur Kenntnis der späten Altsteinzeit*. Böhlau Verlag Köln Graz, Köln.
- WIŚLAŃSKI T., 1979: Kształtowanie się miejscowych kultur rolniczo-hodowlanych. Plemiona kultury pucharów lejkatych. In: W. Hensel, T. Wiślański (Eds.): *Prahistoria Ziemi Polskich t. II, Neolit*. Pp. 165–260. Polska Akademia Nauk, Instytut Historii Kultury Materialnej, Warszawa, Wrocław, Kraków, Gdańsk.
- WAWRZYKOWSKA B., 2002: Zarys historii muzealnych zbiorów archeologicznych w Toruniu. In: B. Wawrzykowska (Ed.): *Archeologia toruńska. Historia i teraźniejszość* (Materiały z konferencji naukowej zorganizowanej z okazji 140-lecia muzealnych zbiorów archeologicznych w Toruniu, Toruń 16–17 maja 2002). Pp. 31–56. Muzeum Okręgowo w Toruniu, Toruń.

Beata Bielińska-Majewska
Department of Archaeology
District Museum in Toruń
ul. Św. Jakuba 20a
87-100 Toruń
Poland
E-mail: bmmajewscy@gmail.com