

Considerations on the Topic of Exceptionally Large Cores of Chocolate Flint

Anna Zakościelna

Institute of Archaeology, Maria Curie-Skłodowska University, Plac Marii Curie-Skłodowskiej 4, 20-031 Lublin, Poland
e-mail: a.zakoscielna@gmail.com

Abstract: Among the products of chocolate flint the precores and cores of exceptionally large size draw particular attention. These are carinated specimens with narrow flaking faces, striking platforms prepared usually only within active area, and with two flaking faces on two opposite sides of flint chunk being prepared for exploitation. Lateral sides are cortical, distal ends also either covered with cortex or natural. Although they were found in ambiguous cultural contexts, their morphometric characteristics allow to associate them with Eneolithic, the so-called post metric revolution stage of the development of prehistoric flint knapping. The following paper presents two specimens of this type that are firmly placed in the context of a Lublin-Volhynian culture settlement at site 'Grodzisko I' in Złota, Sandomierz district, which indirectly also clarifies cultural attribution of the remaining similar items.

Keywords: exceptionally large cores, chocolate flint, Złota 'Grodzisko I', Lublin-Volhynian culture

Introduction

Among Polish researchers in the field of Neolithic flint knapping finds of exceptionally large precores and cores of chocolate flint arouse significant interest, no matter whether they originate from accidental discoveries or were found in caches. In either case, they are devoid of direct context, which could indicate their chrono-cultural attribution.

So far in the literature of the subject at least two such finds were described: exceptionally large concretion from the surface of site 1C in Gródek, Hrubieszów district (Zakościelna 1996: table VIII; Libera and Zakościelna 2013: Fig. 3) and an enormous core from a cache discovered in Zagórze, Kazimierza Wielka district (Kalicki *et al.* 2014). It turns out that the third one – and the most important in terms of cultural-chronological attribution – had been discovered before them, already in 1928 at a settlement of the Lublin-Volhynian culture in Złota 'Grodzisko I', Sandomierz district. However, this core had to await more than 80 years to be re-discovered. Although in 1953 Zofia Podkowińska published some information and drawings of a few items from 'Grodzisko I' (1953: 6 and Fig. 3), and several subsequent ones were presented also in other publications (e.g. Kaczanowska and Lech 1977: Figs. 7, 8 and 9), but all these publications lacked the information about this unique find. Neither can they be found in the monograph *Neolithic flint tools production in the Polish lands* [Wytwórczość narzędzi krzemienych w neolicie ziem Polski] by Bogdan Balcer, which was published in 1983. While describing the flint production during the younger period of the so-called Lengyel-Polgar cycle, in which he included 'Lublin-Volhynian group' (according to modern terminology Lublin-Volhynian culture – cf. Kruk and Milisauskas 1981,

1985; Kadrow and Zakościelna 2000; Zakościelna 2006a: 77), he investigated much more numerous series of flint materials from this site. At that time the knowledge about the flint industry of this cultural entity was in its initial stage of development – very scarce materials had been published and merely a first attempt to describe its nature had been undertaken (Zakościelna 1981). The publication by Balcer reveals that the settlement in Złota yielded a series that was assessed by the scholar to comprise over 1000 specimens (Balcer 1983: 95). He published drawings of 37 artefacts, including 5 cores (Balcer 1983: Fig. 13) and 32 tools (Balcer 1983: Fig. 14: 6–8, 11–16, Fig. 15). In the group of cores made of chocolate flint two initial cores of considerable size were included. One was referred to by Balcer as tabular (height: 105mm, width: 44mm, length: 98mm – Balcer 1983: Fig. 13: 4), and the other as carinated (height: 80, width: 76, length: 113mm – Balcer 1983: Fig. 13: 5). The latter core came from pit No. 40 at site 'Grodzisko I' in Złota.¹ It turns out that in the same pit one more similar specimen, though of much bigger size, had been deposited. In a box with a label 'stone', unwashed and covered in dirt it had been lying there for over 80 years. Bearing in mind the importance of the find and very brief description of the core that was published by Balcer (1983: 99), it was decided to present the core once again.

Description of the feature and archaeological materials

Pit No. 40 was located in the western part of the settlement within field 'Grodzisko I', about 10m to the east of the ditch marked I₁ that together with ditches

¹ Collection of the State Archaeological Museum in Warsaw stored in the Storage and Research Unit at Rybno, catalogue no. II-7700.

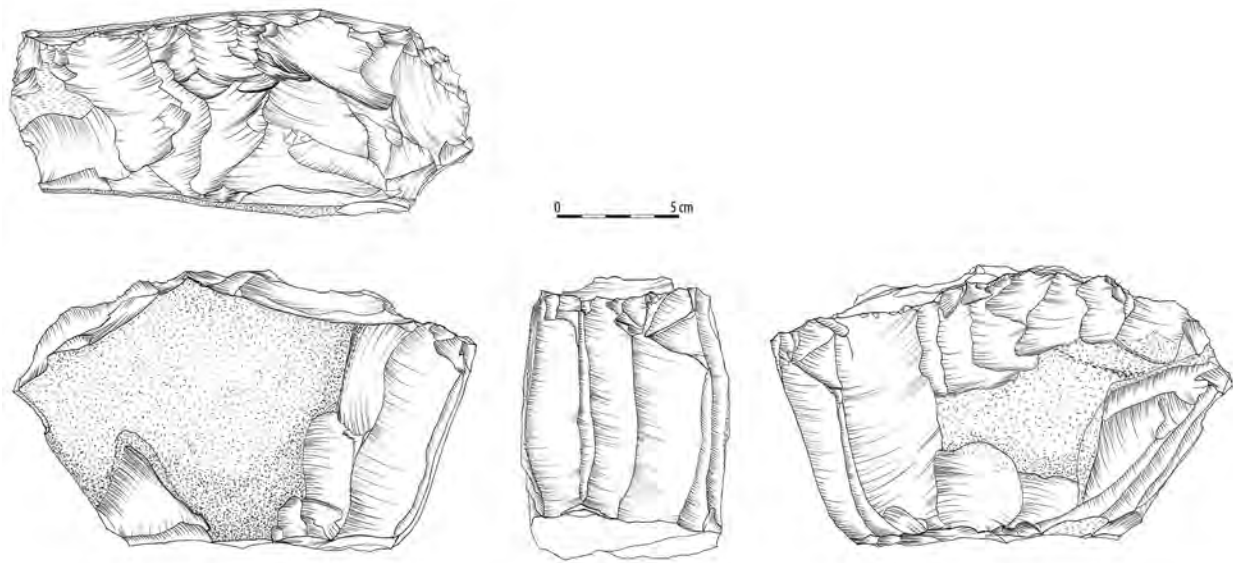


Fig. 1. Złota, 'Grodzisko I', pit No. 40, Sandomierz district. Drawn: A. Zakościelna. Graphic editing: E. Starkova.

I₂ and II₁ created from this side the fifth, innermost line of fortification of the headland (Sałacińska and Zakościelna 2007: Fig. 10). Preserved records indicate that the pit had an approximately circular outline, trapezoid cross-sectional and flat bottom. At the level of the discovery the pit had the diameter of 130cm and it equalled to 170cm at the bottom. The pit had 70–80cm in depth. According to 'quantitative inventory of materials' drawn up by Danuta Rauhut,² the fill of the pit No. 40 contained: 214 pottery sherds, 62 flint artefacts, 3 tools made of antler, and 3 fragments of animal bones. Discovered potsherds allowed for the reconstruction of at least six vessels (two cups, one small amphora, bowl, mortar-shaped vessel, and lower part of a large vessel with biconical body), out of which three were published (Podkowińska 1953: Tables II: 2 – cup, IV: 1 – small amphora, VII: 2 – 'mortar-shaped' vessel). In addition two clay nozzles (1953: Tables XVIII: 2, XX: 1), and – already mentioned – three flint artefacts (1953: Fig. 3: 2–5) from this feature were also published.

Core No. 1 (Fig. 1)

From the original descriptive label we learn that it was discovered on 7 July 1928 at the depth of 20cm. It is a carinated blade core with two separate flaking faces on both narrower sides of flat concretion. The remaining lateral sides are still cortical. Nearly entire surface of the striking platform was prepared by detachments from one of the lateral sides. Originally it probably was a natural surface, resulting from fracture and breaking off from a bigger lump of raw material – on one of the

active areas of the striking platform a fragment devoid of attributes of intentional removals is still visible. In both of the active areas of the striking platform negatives of large, flat platform rejuvenation flakes removed from the direction of respective flaking faces are visible. On the 'main' flaking face negatives of 10 blades are recorded. Most likely they were detached in two series of detachments, after which the striking platform was rejuvenated and retouched. However, the latter treatment partly destroyed the platform edge from the right lateral side, where a few deep, hinged flake negatives are seen. In this part the platform angle is close to 90°. The second flaking face was only initially exploited and abandoned. Negatives of only three blades and a few irregular flakes are visible. Moreover, also a fragment of the natural surface remained perceptible. The platform angle exceeds 90°.

The 'main' flaking face was extended to both lateral sides of the core. The cortex on the right lateral side is nearly completely removed, and it is still present only in the central part of the surface. The cortex was removed by extending the 'main' flaking face, probably using cortex blade removal method and a series of regular, fairly short blade-like flakes and flakes detached from the direction of the striking platform. Also negatives of the 'abandoned' flaking face partially extend to this side. From the core distal end the cortex on this lateral side is removed by two flat flakes. The left side is almost entirely covered by thin, smooth cortex with ferruginous staining indicating the conditions of deposition while still in natural flint bed. It is possible that in order to form the 'main' flaking face originally at least partial crest was created, which seems to be suggested by a fragment of a large flake negative perpendicular to

² Department of Scientific Documentation of State Archaeological Museum in Warsaw no. 6374 in the register of arrivals.

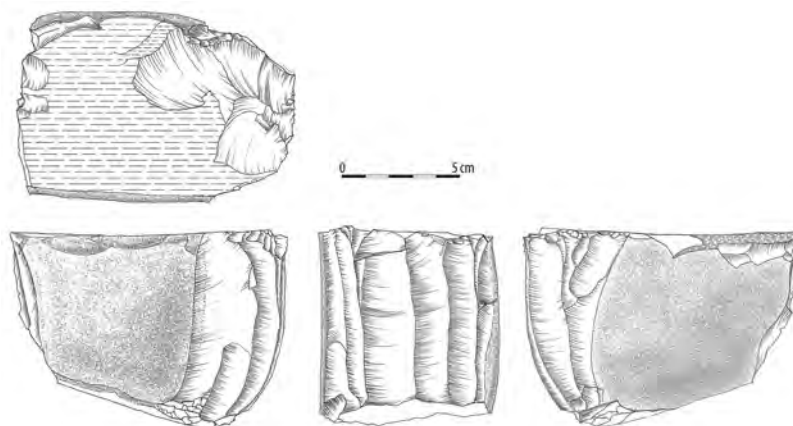


Fig. 2. Złota, 'Grodzisko I', pit No. 40, Sandomierz district. Drawn: A. Zakościelna. Graphic editing: E. Starkova.

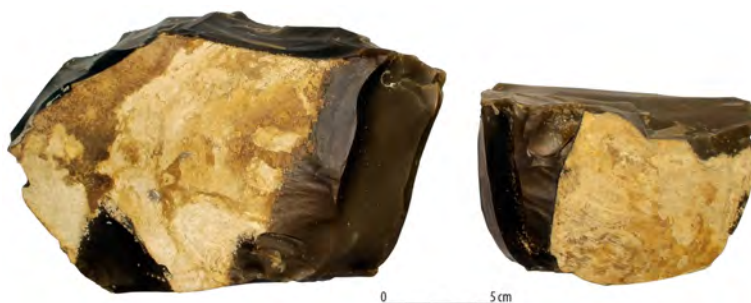


Fig. 3. Złota, 'Grodzisko I', pit No. 40, Sandomierz district. Photo: E. Starkova.

flaking face. In addition, a few negatives detached from the direction of the core distal end are also visible. The core distal end itself is flat, natural in the central part, and partially flattened with a few removals detached from both lateral sides. Dimensions: length: 191mm, width/thickness: 82mm, height: 116mm, width of the 'main' flaking face: 77mm, the longest blade negative: 91mm, width of the 'abandoned' flaking face: 64mm, the longest blade negative: 83 mm, weight: 2655g.

The core still has considerable potential for further reduction, as it was abandoned at an early stage of exploitation. However, in the present form it was in fact unsuitable for further use. It would demand a re-working of the striking platform by considerable shortening of the core to remove the existing protuberance, or breaking the core into half and forming two new, smaller cores.

Core No. 2 (Fig. 2 and 3).

It was discovered on 9 August 1928, at the depth of 40–60cm. This is a carinated blade core with flaking face on the narrow side of a concretion of regular shape.

A flat, natural surface of concretion was chosen for striking platform. It was only prepared in the active area adjacent to the flaking face by detachment of a series of a few removals from the side of the flaking face and right lateral side. The platform edge is retouched (one hinged negative), denticulate with platform angle of about 90°. The flaking face is rounded, extending to both cortical lateral sides (probably without need to form crests), with negatives of nine blades. Both flat lateral sides have almost entirely preserved smooth, thin (1.5–3mm) cortex. The back of the core is flat, created by natural, fractured surfaces, partly flattened by removals of flakes from the direction of both lateral sides, perhaps intended to prepare surfaces for second flaking face. Natural and cracked distal end. Dimensions: length: 117mm, width/thickness: 79mm, height: 80mm, width of the flaking face 62mm, the longest blade negative: 73mm, weight: 1160g. The core is in initial stage of exploitation.

Discussion

As mentioned in the introduction the cores from pit No. 40 at site 'Grodzisko I' in Złota, Sandomierz district

are the only specimens, whose cultural attribution does not raise any doubts. Rich pottery inventory clearly indicates the association of the feature with a settlement of the Lublin-Volhynian culture. In the case of the other two pieces there are strong, but only indirect, indications pointing to their affiliation with the said culture. Precore from Gródek, Hrubieszów district was found on the surface of a multicultural site 1C, known primarily as an extensive upland settlement of the Funnel Beaker culture (Gumiński 1989; Jastrzębski 1991; Zawiślak 2013 and older literature there). However, the Eneolithic sequence of settlement at this multicultural site begins with a settlement of the classic phase of the Lublin-Volhynian culture, which is accompanied by graves 'scattered' within various areas of the site. It is then followed by a settlement and cemetery of the late phase of the same culture. It was not until around 3650 BC when this site was taken over by the Funnel Beaker culture population (Bronicki *et al.* 2003: 24–32, 2004: 101–108 and 121–123; Zakościelna 2010: 35). Taking into consideration the characteristics of the flint knapping of both the Lublin-Volhynian culture and the Funnel Beaker culture, and especially raw material preferences of the representatives of these two cultures, the exceptionally large precore, despite the fact of being an accidental find lacking direct archaeological context, was associated with the former of these cultures (Zakościelna 1996: 31; Zakościelna and Libera 2013).

The core from Zagórzycze, Kazimierza Wielka district, discovered at a multicultural settlement, is a part of an utilitarian cache deposited at the bottom of a settlement pit together with a few pottery sherds, one of which has the formal and stylistic characteristics similar to pottery production of the Lublin-Volhynian culture (Kalicki *et al.* 2012: 124–127 and Fig. 6). The analysis of all the cores found in this cache, additionally supported by the presence of said pottery sherd, led the researchers to associate pit No. 92 with the Lublin-Volhynian culture (Kalicki *et al.* 2012: 129–131).

Presented here chocolate flint cores from Złota, and the items from Gródek and Zagórzycze have a few things in common: shape, metric category, the method of knapping, and the level of exploitation. These are carinated specimens with narrow flaking faces, prepared striking platforms, which were usually worked to prepare them for blade production from two flaking faces on the opposing sides of the flint lump. Lateral sides are cortical, distal ends are also either cortical or natural, resulting from cracking or breaking off of an exceptionally large concretion. Sometimes they have traces of crushing from resting cores on hard anvil. In order to prepare such cores, one had to choose flat, 'headcheese-shaped' concretions of regular shape with smooth and not very thick cortex. This allowed knappers to reduce the amount of preparatory

treatments. Preliminary treatment was limited to the preparation of active area of striking platform(s), for which usually flat natural surface of concretion was selected (core No. 2 from Złota, precore from Gródek, core from Zagórzycze). Only core No. 1 from Złota bears traces of intense work on the striking platform. The platform angles of these specimens are close to 90°. Additionally, convenient shapes of concretions with reasonably thin cortex did not require forming crests for future flaking faces. The exploitation probably started with the detachment of a cortex blade. In similar manner flaking faces were extended on cortical lateral sides. If during the core reduction flaking face became too flat, it was corrected by partial crests in the distal part of a core.

A common feature of these specimens is that blade production was in absolutely initial stage. In almost all cases, one or both of flaking faces display traces of negatives of one, clearly trial series of blade detachments, after which exploitation was put on hold in order to adjust, or not, the platform edge. At this stage, with enormous potential of raw material, the precores/initial cores were taken from workshops located in immediate vicinity of mining fields and transported, at times, over great distances. The settlement in Złota is the closest one to the outcrops of chocolate flint. In a straight line the distance separating them is around 78km. The distance to Zagórzycze increases to about 115km, and in the case of Gródek it is about 210km. All these finds are a significant contribution to understanding the organisation of raw material supply in the Lublin-Volhynian culture settlements, to which primarily blade blanks were imported, but also some precores and initial cores, even – despite of the economics of transport – such exceptionally large ones (Zakościelna 1996: 82–85).

Dimensions of all the specimens are impressive (Tab. 1). They belong to a group of the largest blade cores, not only those of chocolate flint, so far known in the Polish territories. Their weight varies from 1160g (core No. 2 from Złota) up to 8405g (core from Zagórzycze). Similar weight, though of a fundamentally different form, is known only in the case of some cores of the Funnel Beaker culture made of Świeciechów flint (Balcer 1975: Tab. 2, Figs. 8 and 9, 2002: 35–41; Libera and Zakościelna 2013: Fig. 7).

With such extraordinary dimensions and weight, cores described here were not intended for production of macroblades in a manner that is accepted for obtaining Eneolithic specimens by pressure flaking, probably using simple machines increasing pressure (e.g. Migal 2002: 258–259, 2003: 61; Pelegrin 2006: Fig. 5). And this fact is not affected by the longest blade negative that is present on the core from Zagórzycze, which has 180mm

Table 1. Characteristics of exceptionally large items for core exploitation made of chocolate flint.

	Length	Width	Height	The longest blade negative	Weight (g)
	in mm				
Złota, 'Grodzisko I' pit No. 40, Sandomierz dist., core No. 2	117	79	80	73	1160
Złota, 'Grodzisko I' pit No. 40, Sandomierz dist., core No. 1	191	82	78	116	2655
Gródek, 1C, Hrubieszów dist.	220	117	135	72	4640
Zagorzycze, site 1, pit 92, Kazimierza Wielka dist.	270	160	165	180	8405

in length (Kalicki *et al.* 2012: 125). Exceptionally large carinated cores were exploited with the use of antler drift. Although this technique renders the opportunity to detach relatively long and very long blades – up to 30cm in length, but as it was evidenced by the experimental trials of Witold Migal (2003:61) – they have substantially different characteristics than macrolithic super blades. Blades obtained by indirect percussion have plain butts, rather prominent percussion bulbs, traces of intense retouch and abrading to correct the platform edge, unevenly distributed weight and edges rarely parallel over the entire length, not to mention strong incurvation of blade and even its plunging (Migal 2002: 257; Pelegrin 2006: Figs. 2 and 3a).

Indirect percussion as the primary technique for blade detachment is very typical of the flint knapping of the Danubian milieu, particularly in the early stages of its development, when it was the dominant technique (e.g. Kaczanowska *et al.* 1987; Balcer 1983; Mateiciucová 2008; Papiernik 2008). During the younger phase strong pressure (lever?) appears, by means of which macroblades were produced. People of the Lublin-Volhynian culture utilized both blade production techniques: macroblades were made mostly of Volhynian flint (Zakościelna 1996: Figs. XXV, XXVI, XXXII–XXXIV, 2006b: Figs. 2, 4:1, 2008: Figs. 1–2, 3:1,2,4), short and mid-sized blade blanks were made of chocolate flint (Zakościelna 1996: Table X:13–16, XII:12, 2006b: Figs. 3, 4:2), although there are single pieces known of blades obtained from this raw material by a strong pressure method (blade from grave No. 122 in Złota 'Grodzisko II', retouched blade with converging edges from Zaliszcze, Parczew district – cf. Zakościelna 1996: Table XXXVIII: 19 and XL:7).

Blades from a cache in Krowia Góra, Sandomierz district, seem to be very much in line with the size of the discussed cores and the indirect percussion method of reduction. This underwater deposit that was accidentally found within the bottom of the Vistula river

valley contained 24 blades of chocolate flint, including 18 complete or slightly damaged pieces (Florek and Zakościelna 2003: Figs. 1, 2 and Table 1). They were obtained from at least three single platform cores in early stages of exploitation when striking platforms did not require rejuvenation by removal of rejuvenation flakes or core tablets. Only one piece has butt with visible negatives, the others have natural plain butts, hence the striking platforms were not prepared even in the active area. However, all blades with preserved proximal part wear traces of corrections made during core exploitation, primarily retouch of platform edge (Florek and Zakościelna 2003: Figs. 3, 6, 8:2,3,9 and 10:1–3,5), and in distal parts of some specimens relics of crests correcting flaking face are visible (Florek and Zakościelna 2003: 4:2,4 and 6:3,4). Majority of the specimens have cortex surfaces, usually lengthwise along one side, or at least in the distal part (Florek and Zakościelna 2003: Figs. 3:4, 4:1,3,4, 6:1,2,4, 8:2,3 and 9:1). All pieces are of macrolithic size and are very short and broad. They are incurved, sometimes very strongly, and plunging in the distal parts. The blades from the cache in Krowia Góra are sound examples of products obtained by indirect percussion (Migal 2002: 257), and at the same time they correspond with the morphometrics of the discussed exceptionally large cores.

It is an extremely difficult task to try to associate the exceptionally large precores and cores with any of the known points of prehistoric exploitation of chocolate flint, having in mind diversity and variability of macroscopic characteristics of this raw material (shape and size of concretions, colour and thickness of cortex, or colour of the siliceous body) often present even within a single flint deposit. This peculiarity has been emphasised by all researchers (Budziszewski 2008: 45–49 and older literature there). Any macroscopic assessments, even those articulated in the form of classifications, are intuitive and subjective in nature. In the case of the discussed here artefacts the situation is somewhat 'easier' since their dimensions strongly differ

from sizes of concretions occurring in most of the known points of procurement. Janusz Budziszewski stresses that 'Definitely beds of big loaf-shaped nodules having thickness of several centimetres and diameter of several dozen centimetres are the most rarely encountered' (Budziszewski 2008: 45), and such nodules had to be the initial forms of all presented here specimens. In the light of the present-day state of research on the occurrence and exploitation of chocolate flint, places of extraction of raw material suitable for items with the size and shape analogous to the discussed precores and cores should be primarily looked for in the north-western and central stretch of the deposits of this flint. Identification through surface surveys of the points of chocolate flint extraction indicates that it is, indeed, within this area that traces of activity of Neolithic communities are particularly visible. They are, *inter alia*, evidenced by the presence of single platform blade cores with narrow flaking faces (Budziszewski 2008: 92). Here quarry Tomaszów I is located, in shafts 4 and 5a of which very similar carinated precores of significant dimensions were discovered (Schild *et al.* 1985: Tables VI, VII). The discoverers associate these cores, on the basis of radiocarbon determinations, with communities of the Linear Band Ceramic culture and of the earlier phases of the so-called Lengyel-Polgar cycle (Schild *et al.* 1985: 70–74, *contra* Zakościelna 1996: 80–81).

Conclusions

For many years intensive research on the occurrence and exploitation of chocolate flint did not reveal materials that would allow to correlate any of the existing procurement points with the activities of the Lublin-Volhynian culture flint knappers, even though in settlement clusters on the Nałęczów Plateau, Sandomierz Upland, and also on the Rzeszów Foothills (the so-called western zone of raw materials procurement) it used to be a strategic resource and had to be brought in by direct expeditions to flint deposits (Zakościelna 1996: 77–78; Zakościelna and Libera 2013: 277–278). In small quantities it also reached the West Volhynian Upland and Miechów Upland, though settlements located there benefited primarily from closer located outcrops of Volhynian flint (in the case of the former area) and Jurassic flint (in the case of the latter one). Chocolate flint was used to produce blade tools using indirect percussion method, primarily short and medium long ones (Zakościelna 1996: 37–40). The demand for macroblades blanks was accommodated by Volhynian flint products obtained by pressure core reduction and brought in from own centres of the discussed culture located in Volhynia. It is obvious that flint knappers of this culture, who had extensive knowledge and skills in the field of new technology allowing to obtain macroblades, had to look for raw materials with appropriate properties during their

penetrations into the outcrops of chocolate flint. Having found it they undertook attempts to obtain blades of bigger sizes, of the so-called post metric revolution parameters, obtained primarily using the indirect percussion method (presented precores, cores and the cache from Krowia Góra) and – perhaps to a limited extent – also the pressure technique (mentioned above: blade from grave No. 122 in Złota 'Grodzisko II' and convergent retouched blade from Zaliszcze).

Recently a discovery of a mining field 'Przyjaźń' in Rzekkowo, Radom district, was announced. The discoverers with no doubts associated it with the Lublin-Volhynian culture (Budziszewski *et al.* 2014: 13; 2015: 56). Description of the raw material obtained there and, above all, further studies on it will clarify whether this mining field could have provided concretions suitable for exceptionally large blade cores.

Translated by Paweł W. Zagórski

Acknowledgements

I would like to thank the management of the State Archaeological Museum in Warsaw for the opportunity to use the materials. I also would like to express my gratitude to Adam Kulesza, MA – the head of the State Archaeological Museum Storage and Research Unit at Rybno and his staff taking care of the collections, for comfort of work and always hospitable attitude. Last but not least, I would like to thank Elena Strakova, PhD for the joint work in Rybno, taking photographs of the artefacts and computer-based editing of the figures.

References

- Balcer, B. 1975. *Krzemień świeciechowski w kulturze pucharów lejkowatych. Eksploatacja, obróbka i rozprzestrzenienie*. Wrocław, Zakład Narodowy im. Ossolińskich.
- Balcer, B. 1983. *Wytwórczość narzędzi krzemienych w neolicie ziem Polski*. Wrocław, Zakład Narodowy im. Ossolińskich.
- Balcer, B. 2002. *Ćmielów - Krzemionki - Świeciechów. Związki osady neolitycznej z kopalniami krzemienia*. Warszawa, Wydawnictwo Instytutu Archeologii i Etnologii PAN.
- Bronicki, A., Kadrow, S. and Zakościelna, A. 2003. Radiocarbon Dating of the Neolithic Settlement in Zimne, Volhynia, in Light of the Chronology of the Lublin-Volhynia Culture and the South-Eastern Group of the Funnel Beaker Culture. In: A. Koško (ed.), *The Foundations of Radiocarbon Chronology of Cultures between the Vistula and Dnieper 4000–1000 BC*: 22–66. Baltic-Pontic Studies 12. Poznań, Adam Mickiewicz University Press.

- Bronicki, A., Kadrow, S. and Zakościelna, A. 2004. Uwagi na temat wzajemnych relacji chronologicznych późnej fazy kultury lubelsko-wołyńskiej oraz kultury pucharów lejkowatych z uwzględnieniem najnowszych wyników badań w Zimnie. In: J. Libera and A. Zakościelna (eds), *Przez pradžię i wczesne średniowiecze. Księga pamiątkowa dedykowana doc. dr. Janowi Gurbie w siedemdziesiątą piątą rocznicę urodzin*: 101–125. Lublin, Instytut Archeologii UMCS.
- Budziszewski, J. 2008. Stan badań nad występowaniem i pradžięową eksploatacją krzemieni czekoladowych. In: W. Borkowski, J. Libera, B. Sałacińska and S. Sałaciński (eds), *Krzemień czekoladowy w pradžięach. Materiały z konferencji w Orońsku, 08-10.10.2003*: 33–106. Warszawa–Lublin, Instytut Archeologii UMCS and Państwowe Muzeum Archeologiczne. Studia nad gospodarką surowcami krzemiennymi w pradžięach 7.
- Budziszewski, J., Gróźdź, W., Jakubczak, M. and Szubski, M. 2014. Nowe punkty pradžięowej eksploatacji krzemieni czekoladowych. In: J. Libera and A. Zakościelna (eds), *XXX Konferencja Badania archeologiczne w Polsce środkowowschodniej, zachodniej Białorusi i Ukrainie w roku 2013. Streszczenia wystąpień*: 13. Lublin, Instytut Archeologii UMCS and Muzeum Lubelskie.
- Budziszewski, J., Gróźdź, W., Jakubczak, M. and Szubski, M. 2015. Chalcolithic raw material economy in light of new data from the 'Przyjaźń' mining field in Rzeczkowo (Central Poland). In: X. Mandago and O. Crandell, M. Sánchez, M. Cubero (eds), *International Symposium on Knappable Materials. Barcelona, 7-12 september 2015 University of Barcelona. Abstracts volume*: 56. Barcelona, SERP – Universitat de Barcelona.
- Florek, M. and Zakościelna, A. 2003. Depozyt wiórów krzemiennych z Krowiej Góry koło Sandomierza (stan. 14, gm. Łoniów, woj. świętokrzyskie). *Wiadomości Archeologiczne* 56: 51–60.
- Gumiński, W. 1989. *Gródek Nadbużny. Osada kultury pucharów lejkowatych*. Wrocław, Narodowy Zakład im. Ossolińskich.
- Jastrzębski, S. 1991. The Settlement of the Funnel Beaker Culture at Gródek Nadbużny, the Zamość District, Site 1C – Brief Characteristic. In: D. Jankowska (ed.), *Die Trichterbecher kultur. Neue Forschungen und Hypothesen. Material des Internationalen Symposium, Dymaczewo, 20–24 September 1988, Teil 2*: 189–196. Poznań, Adam Mickiewicz University Press.
- Kaczanowska, M., Kozłowski, J.K. and Zakościelna, A. 1987. Chipped Stone Industries of the Linear Band Pottery Culture Settlements in the Nowa Huta Region. *Przegląd Archeologiczny* 34: 93–132.
- Kaczanowska, M. and Lech, J. 1977. The flint industry of Danubian communities north of the Carpathians. *Acta Archaeologica Carpathica* 17: 5–28.
- Kadrow, S. and Zakościelna, A. 2000. *Outline of the Evolution of Danubian Cultures in Małopolska and Western Ukraine*. In: A. Koško (ed.), *The western border area of the Tripolye culture*: 187–255. Poznań, Adam Mickiewicz University Press. Baltic-Pontic Studies 9.
- Kalicki, S., Valde-Nowak, P. and Witkowska, B. 2012. Neolithic deposit of flint cores in Zagórzycze, Kazimierza Wielka district. *Recherches Archeologiques*: 123–134. Nouvelle serie 4.
- Kruk, J. and Milisauskas, S. 1981. Chronology of Funnel Beaker, Baden-like and Lublin-Volynian Settlements at Bronocice, Poland. *Germania* 59(1): 1–19.
- Kruk, J. and Milisauskas, S. 1985. *Bronocice. Osiedle obronne ludności kultury lubelsko-wołyńskiej (2800–2700 lat p.n.e.)*. Wrocław, Zakład Narodowy im. Ossolińskich.
- Mateiciucová, I. 2008. *Talking Stones: The Chipped Stone Industry In Lower Austria and Moravia and the Beginnings of the Neolithic in Central Europe (LBK), 5700–4900 BC*. Brno, Muni Press.
- Migal, W. 2002. Zamysł technologiczny wióra krzemiennego z Winiar, gm. Dwikozy. In: B. Matraszek and S. Sałaciński (eds), *Krzemień świeciechowski w pradžięach. Materiały z konferencji w Ryni 22 – 24. 05. 2000*: 255–266. Warszawa, Semper. Studia nad gospodarką surowcami krzemiennymi w pradžięach 4.
- Migal, W. 2003. Analiza technologiczna wiórów z Krowiej Góry. *Wiadomości Archeologiczne* 56: 60–62.
- Papiernik, P. 2008. Krzemieniarstwo grupy brzesko-kujawskiej kultury lendzielskiej. In: R. Grygiel, *Neolit i początki epoki brązu w rejonie Brześcia Kujawskiego i Osłonek*. Vol. II. Part 3. *Środkowy neolit. Grupa brzesko-kujawska kultury lendzielskiej*: 1271–1534. Łódź, Fundacja Badań Archeologicznych K. Jażdżewskiego.
- Pelegrin, J. 2006. *Long blade technology in the Old World: an experimental approach and some archaeological results*. In: J. Apel and K. Knutsson (eds), *Skilled Production and Social Reproduction. Aspects of Traditional Stone-Tool Technologies*: 37–68. Uppsala, Societas Archaeologica Upsaliensis.
- Podkowińska, Z. 1953. Pierwsza charakterystyka stanowiska eneolitycznego na polu Grodzisko I we wsi Złota, pow. Sandomierz. *Wiadomości Archeologiczne* 19: 1–52.
- Sałacińska, B. and Zakościelna, A. 2007. 'Pierwsze groby kultur ceramik wstęgowych w Polsce'. Groby kultury lubelsko-wołyńskiej ze stanowiska Złota 'Grodzisko I' i 'Grodzisko II'. *Wiadomości Archeologiczne* 59: 77–114.
- Schild, R., Królik, K. and Marczak M., 1985. *Kopalnia krzemienia czekoladowego w Tomaszowie*. Wrocław, Zakład Narodowy im. Ossolińskich.
- Zakościelna, A. 1981. Materiały krzemienne tzw. kultur południowych z Lubelszczyzny. *Annales Universitatis Mariae Curie Skłodowska*, sec. F, vol. 35/36: 3–23.
- Zakościelna, A. 1996. *Krzemieniarstwo kultury wołyńsko-lubelskiej ceramiki malowanej*. Lublin, Wydawnictwo Uniwersytetu Marii Curie-Skłodowskiej.
- Zakościelna, A. 2006a. *Kultura lubelsko-wołyńska. Zagadnienia jej genezy, periodyzacji i chronologii/ The Lublin-Volhynian Culture. The problems*

- of its origin, periodization and chronology. In: M. Kaczanowska (ed.), *Dziedzictwo cywilizacji naddunajskich: Małopolska na przełomie epok kamienia i miedzi/The danubian Heritage: Lesser Poland at the Turn of the Stone and Copper Ages: 77–94*. Kraków, Muzeum Archeologiczne w Krakowie.
- Zakościelna, A. 2006b. Flint Inventory of Graves of the Lublin-Volhynian Culture on Site 2 in Książnice, Busko Zdrój District/Inwentarz krzemienny grobu nr 5 kultury lubelsko-wołyńskiej ze stanowiska 2 w Książnicach, pow. Busko Zdrój. *Sprawozdania Archeologiczne* 58: 271–291.
- Zakościelna, A. 2008. Wiórowce-sztylety jako atrybuty pozycji społecznej mężczyzn kultury lubelsko-wołyńskiej. In: J. Bednarczyk, J. Czebreszuk, P. Makarowicz and M. Szmyt (eds), *Na pograniczu światów. Studia z pradziejów międzymorza bałtycko-pontyjskiego ofiarowane Profesorowi Aleksandrowi Kośko w 60. rocznicę urodzin: 577–591*. Poznań, Wydawnictwo Poznańskie.
- Zakościelna, A. 2010. *Studium obrządku pogrzebowego kultury lubelsko-wołyńskiej*. Lublin, Wydawnictwo Uniwersytetu Marii Curie-Skłodowskiej.
- Zakościelna, A. and Libera, J. 2013. The flint raw materials economy in Lesser Poland during the Eneolithic Period: The Lublin-Volhynian culture and the Funnel Beaker culture. In: S. Kadrow and P. Włodarczak (eds), *Environment and Subsistence – forty years after Janusz Kruk’s ‘Settlement studies’: 275–293*. Studien zur Archäologie in Ostmitteleuropa/Studia nad Pradziejami Europy Środkowej 11. Rzeszów–Bonn, Instytut Archeologii, Uniwersytet Rzeszowski.
- Zawiślak, P. 2013. Obiekty neolityczne ze stanowiska 1C w Gródku, pow. Hrubieszów (z badań w latach 1983–1985 Sławomira Jastrzębskiego). In: A. Pozikhovskij, J. Rogoziński and M. Rybicka (eds), *Na pograniczu kultury pucharów lejkowatych i kultury trypolskiej: 109–214*. Uniwersytet Rzeszowski. *Collectio Archaeologica Ressoviensis* 26. Rzeszów, Instytut Archeologii.