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Reutilization of axes made from Jurassic flint in G variant on the example of the materials from site 1 in Książnice Wielkie, Proszowice District, Małopolska Province

Abstract: Excavations at the Książnice Wielkie 1 site were carried out in the 1920s by Józef Żurowski. The site is known to Neolithic researchers primarily as a settlement of the Funnel Beaker culture (Burchard, Eker 1964) and as a cemetery of the Corded Ware culture (Machnik 1964). Furthermore, ceramic materials found there became the basis for distinguishing the Wyciąże-Książnice group² of the Proto-Baden horizon (Kozłowski 1971; 1989), which refers to the oldest influences from the Baden complex on the local group of the Polgár circle, and the Książnice Wielkie type (Machnik 1966) – the oldest horizon of Corded Ware funerary finds in western Lesser Poland. This article presents the results of analyses of selected flint artefacts – originating from the reutilization of axes – discovered in the context of pottery of the Funnel Beaker culture and the Funnel Beaker-Baden assemblages.

Keywords: Eneolithic, axes, reutilization, TRB, Funnel Beaker-Baden, Wyciąże-Książnice

1. Introduction

The site of Książnice Wielkie 1 is located in the southern part of the Lesser Poland Upland in Proszowice District, about 3 kilometers west of Koszyce, close to where the Szreniawa River flows from the left into the Vistula River (Fig. 1). The site was excavated by Józef Żurowski in 1921–1924, when one of the most important settlement sites of the Funnel Beaker culture (FBC) was discovered there. The materials from the excavations were published by B. Burchard and A. Eker (1964). The graves of the Corded Ware culture were published by J. Machnik (1964). The above-mentioned materials are stored in the collection of the Archaeological Museum in Kraków. This article deals with the materials associated with the reutilization of flint axes, recovered from features linked with the FBC settlement site (according to B. Burchard and A. Eker 1964). These features produced a variety of ceramic materials: the “classic” FBC, Funnel Beaker-Baden assemblages (FB-B), and elements typical of the Wyciąże group (WG; Brzeska-Pasek 2018).

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² Nowadays called the “Wyciąże group” (after: Godłowska 1976) of the Pre-Baden horizon (Brzeska-Pasek 2018).

The collection comprises axes, fragments of axes, and tools which were made from them, totalling 73 artefacts. A part of the mentioned collection has been described in a paper about the flint axes from Książnice Wielkie (Brzeska-Pasek in print). This article focuses on issues related to reutilization: the reuse of flint axes for the production of blade and flake tools, and the use thereof as other tools.

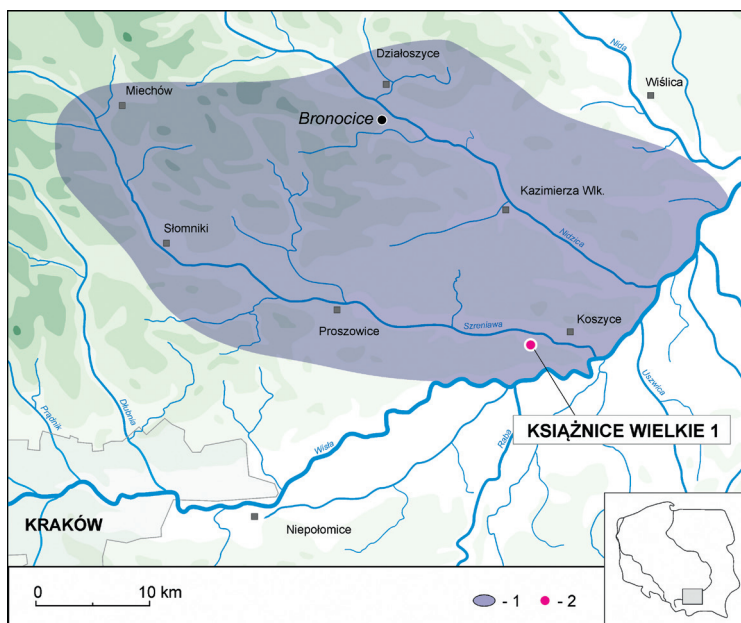


Fig. 1. The location of the Książnice Wielkie 1 site (2) against a background of the range of the FB-B settlement (1; BR III/IV, IV, V phases; 3400–2900? BC); after Zastawny 2015; Kruk, Milisauskas 2016; with modifications

2. Materials

Of the 73 artefacts almost all, except for the burned specimens and one made from Cretaceous flint, were made from Jurassic flint in G variant (Kaczanowska, Kozłowski 1976). The vast majority (64 pcs) originated from settlement features (Table 1), and the remaining 9 specimens originated from an area outside the features. The axes and the remains from their processing were found in 19 features. In 10 of these (features 1, 9c, 18, 28, 39, 41, 49, 54, 63, and 65) there were axes, flakes, and other fragments originating from the axes found. Some of them could have been created during their use (Borkowski, Migal 1996, 150), or during repairing of the axes, whilst others are the result of exploiting damaged axes as cores (Brzeska-Pasek in print). In 9 features (features 14, 19, 20, 26/27, 30, 31, 36, 42, and 58) other forms showing final stages of utilization of the axes were discovered. Materials connected with the processing of axes were the most abundant (10–11 pcs) in features 14, 30 and 58. The most diversified materials, originating from different phases of processing and reutilization of axes, were derived from feature 14 (Fig. 2).

The artefacts related to reutilization of axes include: 1 core (Fig. 2: 4), 8 flake and blade tools, 3 ad hoc tools (hammerstones) made on axes (Fig. 3: 2, 9; 4: 6), and 7 splintered pieces (Fig. 2: 1, 7; 3: 1, 8, 10; 4: 3, 5). In addition there are 2 burin spalls and 1 blade from a splintered piece – a scaled piece (Fig. 4: 4). All specimens, except for the scaled piece, were made of Jurassic G flint.

2.1. Core

The blade-flake core on the fragment of an axe (Fig. 2: 4). Some of the flakes, those whose scars are visible at the edge at the cutting edge part, were probably removed while using the damaged cutting edge as a working part. At least one blade scar on the side is too regular to be the result of accidental detachment.

Table 1. Książnice Wielkie, site 1, Proszowice District. The number of flint artefacts related to using and reutilization of “polished” tools

No. of FEATURE	“POLISHED” TOOLS		USING/ PROCESSING/ REUTILIZATION OF “POLISHED” TOOLS			REUTILIZATION OF “POLISHED” TOOLS				TOTAL
	AXES	CHISELS	CHUNKS	FLAKES, BLADE-FLAKES	BLADES	CORES	TOOLS	SPALLS FROM TOOLS	SPLINTERED PIECES	
1					1					1
9c				1						1
14		1		2	2	1	2		2	10
18			1							1
19							1		1	2
20							1			1
26/27								1		1
28	1									1
30				10			1			11
31				4			1	1	1	7
36							2		1	3
39				2						2
41	1			1						2
42				2					1	3
49				2						2
54				3						3
58	1			8	1		1			11
63	1									1
65				1						1
stray artefacts	3			3			2		1	9
Total	7	1	1	39	4	1	11	2	7	73

2.2. Tools

2.2.1. Flake tools

The majority of the tools were made on flakes (6 pcs.). These are mainly retouched flakes (Fig. 2: 5, 3: 6, 4: 2, 7), of which two have inverse retouch (Fig. 2: 5, 4: 7). One relates to fan-shaped flakes (J. Kopacz and A. Pelisiak 1989, 348) and shows micro-alternate retouch (Fig. 4: 2), and one shows semi-abrupt retouch covering a failed burin blow (Fig. 4: 7). The

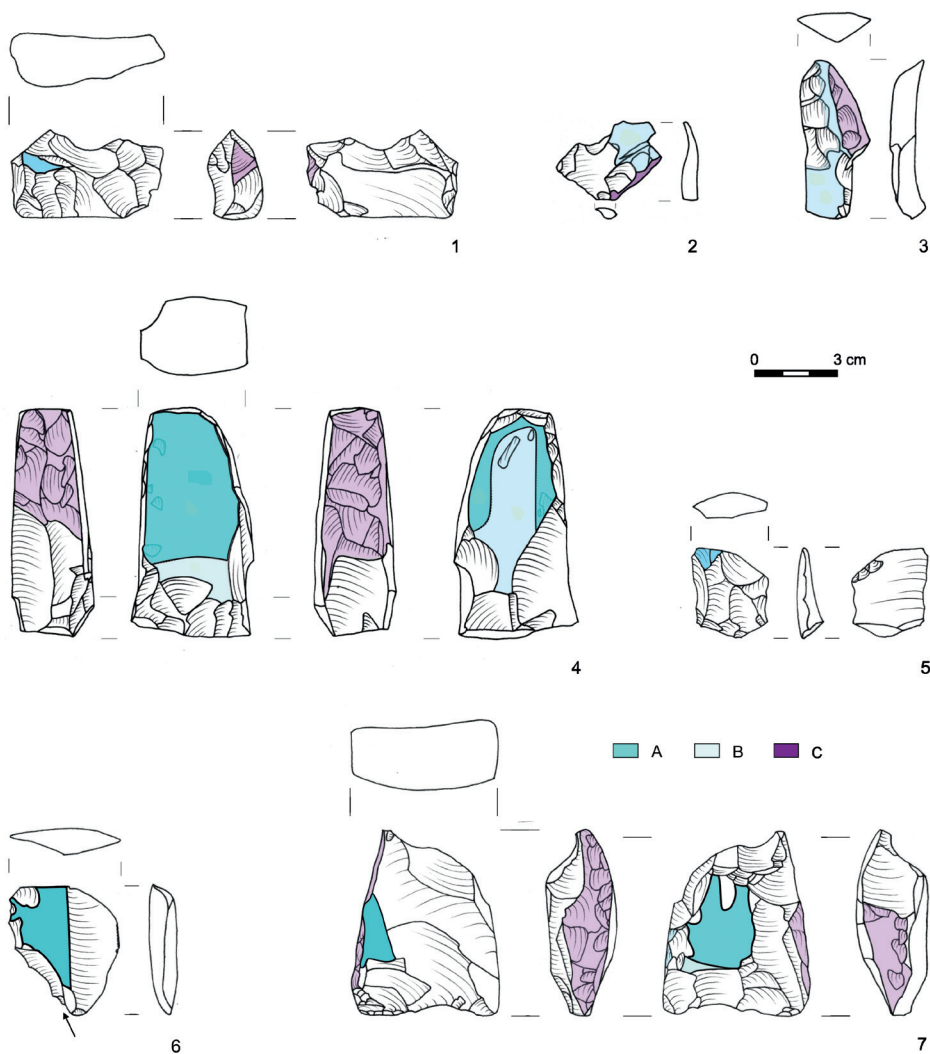


Fig. 2. Książnice Wielkie, site 1, Proszowice District. Splintered pieces (1, 7), flake (2), blade (3), core (4), retouched flake (5), burin (6): 1–7 – feature no. 14. 1–7 – Jurassic flint in G variant; A – grinding, B – smoothing, C – smoothed sides of an axe. Drawings by A. Brzeska-Zastawna [from the collection of the Archaeological Museum in Kraków]

two remaining flake tools are a single faced burin (Fig. 2: 6) and a trapeze (made on a flake obtained from a side part of an axe) with alternate retouch (Fig. 3: 4). The average dimensions of the flake tools are 33 mm in length × 34 mm in width × 8 mm in thickness. The flakes on

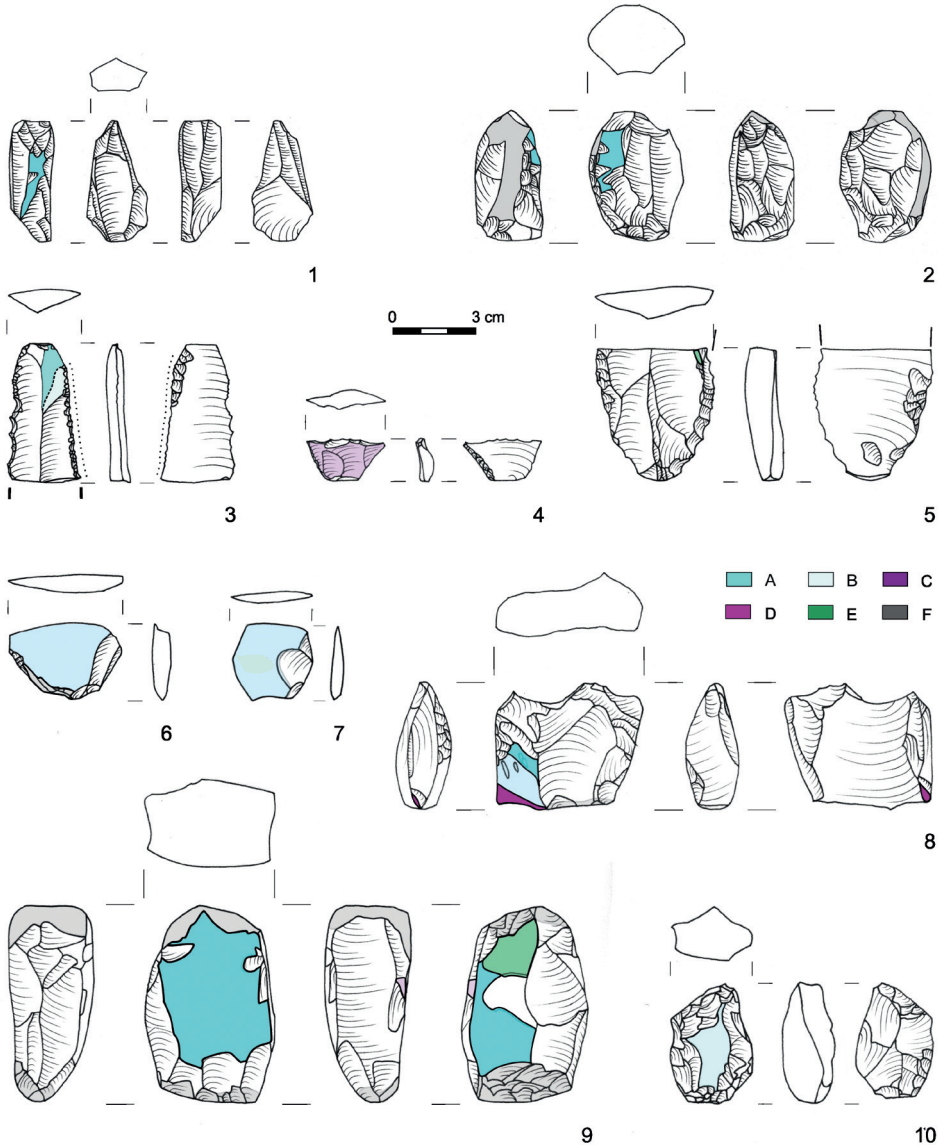


Fig. 3. Książnice Wielkie, site 1, Proszowice District. Splintered pieces (1, 8, 10), hammerstones (2, 9), re-touched blade (3), trapeze (4), combined tool (5), retouched flake (6), flake (7): 1–2 – feature 19; 3 – feature 20; 4 – feature 30; 5, 6, 10 – feature 36; 7–9 – feature 31; 1–10 – Jurassic flint in G variant; A – grinding, B – smoothing, C – smoothed sides of an axe, D – polishing, E – traces of working of an axe in a handle, F – bruising. Drawings by A. Brzeska-Zastawna [from the collection of the Archaeological Museum in Kraków]

which the tools were made have fragments of original surfaces of axes preserved. In 3 cases these were the main surfaces; in 2 cases they were the side edges of axes, from unspecified parts of the axes. 1 flake originates from the cutting edge of an axe and it was removed towards the edge of the cutting edge after the axe was damaged (Fig. 4: 1). On the dorsal sides of the flake tools, traces of grinding and smoothing (in the case of the main surface) or only smoothing (on the sides of axes) can be noticed.

2.2.2. Blade tools

Two tools were made on blades from Jurassic G flint. One is a retouched blade (Fig. 3: 3) and has the dimensions of 51×27×8 mm without the proximal part, which was snapped, probably at mid-length. It was made on a blade (probably regular on the whole) removed from an axe converted into a core. The blade was retouched on both edges by semi-abrupt retouch with

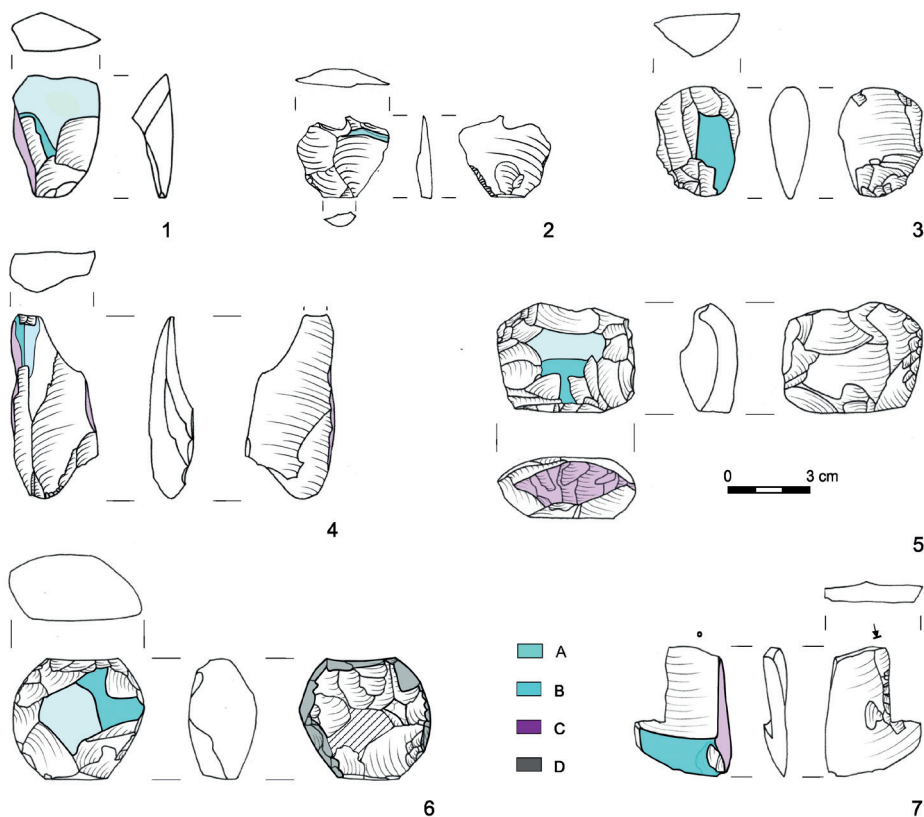


Fig. 4. Książnice Wielkie, site 1, Proszowice District. Flake (1), retouched flakes (2, 7), splintered pieces (3, 5), scaled piece (4), hammerstone (6): 1, 5 – feature 42; 2, 4 – feature 58; 3, 6, 7 – stray artefacts; 1–3, 5–7 – Jurassic flint in G variant; 4 – undetermined Cretaceous flint; A – grinding, B – smoothing, C – smoothed sides of the axe, D – bruising. Drawings by A. Brzeska-Zastawna [from the collection of the Archaeological Museum in Kraków]

partial denticulation on one edge. One edge also shows inverse retouch in the distal part. The same edge has traces of glossing, and in the distal part grinded and smoothed surfaces are visible. The second artefact is an angle burin on a broken, massive retouched blade (Fig. 3: 5) with dimensions of 48×41×11 mm. It has semi-abrupt retouch on both preserved edges and partially inverse retouch. The preserved fragment of the axe surface is the area where the axe was working in a handle (Fig. 3: 5).

2.3. Hammerstones

The 3 remaining tools are hammerstones (Fig. 3: 2, 9; 4: 6). They were made from mid-parts and butt parts of axes which were quite massive in comparison to other fragments and complete axes from Książnice Wielkie 1. One hammerstone is a nearly fully preserved axe with a strongly damaged cutting edge, which may have been used partially as a core before it was re-worked into a hammerstone (Fig. 3: 9). This specimen is made on an axe with a massive butt and probably with maximum thickness in the butt part. The dimensions of the hammerstones are: 48–71×34–45×25–30 mm.

2.4. Splintered pieces

A large group (7 pcs.) of reutilized forms represent two-sided multipolar and bipolar splintered pieces (Fig. 2: 1, 7; 3: 1, 8, 10; 4: 3, 5). At least one specimen was made on a core (Fig. 2: 7). Their average dimensions are 50×36×19 mm. Most of them come from undefined parts of axes. One was made on the part close to the cutting edge of an axe, with a partially polished section of the cutting edge visible (Fig. 3: 8). One specimen represents a fragment of the medial part and its transition into the cutting edge of an axe (Fig. 2: 7). All splintered pieces have at least one main surface of the axe preserved, and in two cases fragments of both sides are preserved. In all cases the preserved side edges of axes were trimmed by centripetal blows from two main surfaces and they were smoothed. Most of the axes from Książnice Wielkie 1 were trimmed on the side edges in the same manner (A. Brzeska-Pasek in print). The splintered pieces show traces of both grinding and smoothing of the main surfaces of the axes, and smoothed main surfaces in the parts close to the cutting edges can be seen in two cases.

2.5. Burin spalls

In the analysed material there were 2 burin spalls: 1 made from Jurassic G flint and 1 burned. Their average dimensions were: 43.5×12×5 mm in thickness. Fragments of preserved side and main surfaces of axes can be seen on both artefacts. One has traces of grinding and the other has traces of smoothing.

2.6. Remaining artefacts

A scaled piece (Fig. 4: 4) measuring 67×33×16 mm, was made from undetermined Cretaceous flint. On the left edge of the specimen there is a visible accidental impact scar with a hinge fracture, resembling a burin blow scar, which was made while using a splintered piece. The artefact has preserved fragments of both sides of the axe and fragments of both main surfaces of the axe. The specimen originates from an axe with a width of at least 33 mm

and a thickness of approx. 16 mm. The sides of the axe were trimmed by centripetal blows from the two main surfaces and later smoothed. The preserved main surfaces of the axe bear traces of grinding and smoothing.

3. Analysis

The artefacts related to reutilization of axes made from Jurassic G flint originated from features in which pottery of the “classic” FBC (e.g. collared flasks, *ansa lunata*), FB-B (e.g. cups with a broad band-shaped handle; pots with vertical grooves), and the WG (e.g. vase-like vessels with a surrounding groove) was present with varying frequency. Besides, there are also elements which are considered as determinants of the oldest phases of the FBC in western Lesser Poland (a plate in feature 14; e.g. Zastawny *et al.* 2011, 250). Generally, among the mentioned features containing artefacts related to processing and reutilization of axes made from Jurassic G flint, one can distinguish forms specific to various phases: BR II/III and IV (i.e. the plate mentioned above; collared flasks; *ansa lunata*; wide-mouthed dishes related to the vessel from feature 225 from Wyciąże 5 [Kozłowski 1968, pl. XIV: 1]; and a cup with a band-shaped handle above a rim; all are from one feature – no. 14), and also the BR III, IV and V phases (e.g. funnel beakers with stamped ornament; a bag-shaped vessel with knobs and pits specific to the WG; pottery with grooves and band-shaped handles fragments; and fragments of roughened pottery; all are from one feature – no. 31). Only after carrying out a more detailed analysis of the features, the pottery, and the remaining lithic artefacts will it be possible to fully determine the chronology of the discussed features.

Generally, in the lithic inventory from Książnice Wielkie 1 there are types of tools known from the south-eastern group of FBC, for example from the sites of the Sandomierz area (e.g. Balcer 1975; 1983; 2002a; 2002b; Budziszewski 2000). These are tools on macrolithic blades, variants of retouched blades, and end-scrapers. The difference as compared to the published FBC sites is the raw material structure. Here, Jurassic flint is predominant, especially in G variant. In the whole inventory there are only a few artefacts made from other raw materials (Świeciechów, Volhynian, banded flints), generally typical of the south-eastern group of the FBC (mainly Świeciechów and Volhynian flint) and “exported” to distant regions devoid of good raw materials (e.g. to the eastern group of the FBC). Within the south-eastern group they were also imported from the east to the “classical” FBC sites in the Loess Upland of western Lesser Poland. As it is the case with pottery, the lithic inventory from Książnice Wielkie 1 includes elements characteristic of both FBC and FB-B, although with the predominance of the latter. In the latter case this is particularly the use of Jurassic G flint, whose share in the Bronocice microregion in the FB-B phases was 60–100% (Bronocice, BR V – 100%; Kopacz, Pelisiak 1991; Pelisiak 2006, 81; 2008, 149). Jurassic G flint on the classic sites of the FBC was used, but probably on a smaller scale and often only from small concretions. Axes and retouched blades were produced from other imported raw materials, e.g. in Zawarża (BR II; only classic FBC), where Jurassic G was abundant, but almost all the retouched blades were made from Volhynian flint, while the only axe was made from Świeciechów flint (Kulczycka-Leciejewiczowa 2002, 91; Balcer 2002b, 123–125).

The lithic inventory retrieved from the features with the FBC and the FB-B pottery in Książnice Wielkie 1 is not numerous, which is typical of non-production sites situated far from deposits of good quality raw materials (so-called “user’s sites” according to Balcer 1975). A similar situation with regard to general structure of the inventory was observed on the FBC site in Zawarża, where there were no pieces typical for production, and flint materials (including imported specimens) were used, repaired and reutilized on this site (Balcer 2002b, 127). Another example of a site

with similar typological and raw material structures (but more numerous) is the Niedźwiedź site, where there were FBC materials included in the Pre-Baden horizon (Niedźwiedź type; BR III). From the overall description it is known that there were completely smoothed tetrahedral axes found, as well as many splintered pieces and flakes from axes (Burchard 1977, 77; Kozłowski 1989, 210). The majority were made from Jurassic (Cracow) flint, and according to Pelisiak and Kopacz a few of them were made from Jurassic G flint (Kopacz, Pelisiak 1991, 170, fig. 7d). A similar tendency to use G flint is visible in the WG (which is synchronized with the BR III or BR III–IV phases; Zastawny 2015, 128; Kruk, Milisauskas 2016, 48), elements of which are visible in pottery from a few of the discussed features at the Książnice Wielkie 1 site.

Comparisons with other lithic inventories from the FB-B sites are problematic because of the sketchy state of their descriptions. Brief references suggest that in the FB-B phases in Bronocice there was local production from Jurassic G flint (unlike in Książnice Wielkie, because of the close proximity of Bronocice to the deposits of Jurassic G flint in the central Jura), and there were numerous chips from repairs, processing of axes and, despite the proximity to the sources of this raw material, a large number of splintered pieces from the axes were found (Kruk, Milisauskas 1981, 83).

In the whole lithic inventory from Książnice Wielkie 1 there are only relatively few pieces indicative of local “production”, only ad hoc, and mostly related to the processing of finished (damaged) products, primarily axes made from Jurassic G flint. From the map in Fig. 1 it is clear that, compared to other FB-B sites, Książnice Wielkie 1 is one of those most remote from the Jurassic G outcrops. Thus, this flint may have found its way there through other production sites, such as Bronocice.

The axes and artefacts discussed above represent all stages of processing axes until they are exploited to the maximum. If its tetrahedral form could not be restored by repairing (and reducing the size at the same time), an axe was reutilized as a core or used ad hoc as a tool. After damage to the cutting edge, larger and more massive axes with thick butts were used as cores, because of the large mass of raw material and the possibility to take up exploitation by e.g. adapting the surface of the massive butt (sometimes also damaged) as a striking platform, by removing the sides and main surfaces of axes. Such axes were used ad hoc as hammerstones, sometimes after having been previously used as cores. The second group are axes which were damaged also in the butt part due to improper mounting in a handle (Borkowski, Migal 1996, 148). Even the thin (usually the thinnest) parts of such axes were used, i.e. the parts close to the cutting edge. They could be processed into flake cores and splintered pieces. The site has not yielded trihedral or dihedral axes processed from tetrahedral axes, and the only example of a trihedral section is a chisel made on a blade (Brzeska-Pasek in print).

Artefacts evidencing reutilization of axes are often found at FBC sites (e.g. Gródek Nadbużny; Balcer 1975, fig. 29d; Szychowice; Balcer 1975, fig. 22:16; Grzegorzowice-Zagaje; Balcer 1975, fig. 36h; Zawichost; Balcer 1975, fig. 29c; Ćmielów; Balcer 2002a, fig. 45e; Mozgawa 1; Florek and Wiśniewski 2008, fig. 14: 14; Pliszczyn 9; Chmielewski 2015, fig. 40, 41). There are hammerstones, splintered pieces, and tools made on fragments of axes. The main difference, obviously in comparison with the FB-B, is in the prevalence of axes made from raw materials other than Jurassic G flint (mainly Świeciechów and Volhynian flint; less commonly banded flint). The examples of reutilization of flint axes made from Jurassic G flint can also be observed in the Baden culture in western Lesser Poland (e.g. Zesławice 21; collection of the Archaeological Museum in Kraków; Kaczanowska 1982/83, 82), which, according to the research, appeared in this area simultaneously with the decline of at least some of the FB-B sites (e.g. Zastawny 2008, 187).

4. Summary

A total of 73 artefacts related to using, processing, and reutilization of axes, coming from 19 features (and the area outside them) were subjected to the analysis. The analysis was partly covered in a paper about axes from site 1 in Książnice Wielkie (Brzeska-Pasek in print). This article is focused on reutilization of axes and their later processing into other typological forms and further use. Such forms include a total of 21 artefacts: 1 core, 3 hammerstones, 7 splintered pieces, 8 tools, and 2 burin spalls (not to mention the scaled piece and the other blades and flakes (Fig. 2: 2, 3, 3:7, 4: 1) from axes described in Brzeska-Pasek in print). Almost all the artefacts (except for the burned ones and one scaled piece mentioned above, which were made from Cretaceous flint) were made from Jurassic G flint. This raw material was used by FBC, but gained maximum significance and was most widely used during the development of FB-B assemblages. This information is important in the light of co-occurring ceramic materials of the FBC, WG and FB-B in the features in this site. It can be generally concluded that both the pottery and flint artefacts reveal many traits of FB-B. The issues of the cultural classification of these features and the time of existence of the settlement(s) in Książnice Wielkie is still open.

Reutilization of axes can be interpreted as a fixed component of lithic production – a sign of savings with regard to the use of raw materials in areas without deposits of good quality raw material, or as an element of ad hoc production, not exactly related to limited access to raw material. For example, in the Polish Lowlands reutilization, along with the splintered technique, can be considered in terms of savings and making maximum use of raw materials of lower quality taken from the immediate vicinity (Baltic flint) and tools made from imported good-quality raw materials (including axes) (e.g. Volhynian and Świeciechów flints; Domańska 2013, 90, tables 45, 46). In the south-eastern group of FBC, production settlements with very good access to the sources of raw material yielded evidence of reutilization of axes (even several times), which were re-worked into cores, splintered pieces, and hammerstones (e.g. Ćmielów; Zawichost; Balcer 2002b, fig. 29, 188). Thus, regardless of the region, the access to flint raw materials, and the type of reutilization of axes, reutilization (obviously with varying intensity) was an element of the FBC lithic production, permanent or temporary (e.g. Ćmielów; Gródek Nadbużny; Balcer 1975, 119, fig. 29; Gumiński 1989, 127; Budziszewski 2000, 262; B. Balcer 2002b, 67, 110, 114, 125). The situation was probably similar in the FB-B sites. For example in Bronocice in FB-B phases, besides the artefacts proving local production based on Jurassic G flint, there were numerous pieces from repair, processing and a large number of splintered pieces made from axes (Kruk, Milisauskas 1981, 83).

The settlement(s) in Książnice Wielkie is an example of a site where reutilization of axes was actually the only element of the local “production”, but only ad hoc. Other artefacts, such as macrolithic blade tools, were brought here as blanks or finished forms from workshops situated close to the outcrops (maybe through other settlements). In the case of Książnice Wielkie, site reutilization could be connected with the site location. Among FB-B assemblages in western Lesser Poland it is one of the most distant sites from the central part of the Polish Jura, where workshops, deposits, and mines of Jurassic G flint were located (e.g. Peliśiak 2008). It should be noted, however, that reutilization is also present in Bronocice, a site located in the vicinity of outcrops. Consequently, reutilization could reflect an economical approach and use of good quality raw material even at the sites with good access to sources, but it also could be attributed to temporarily restricted access to raw material. In the case of Książnice Wielkie the access could be limited, e.g. for other groups inhabiting the areas located closer to flint outcrops.

Reutilizacja siekier wykonanych z krzemienia jurajskiego G na przykładzie materiałów ze stanowiska 1 w Książnicach Wielkich, pow. proszowicki, woj. małopolskie

Stanowisko w Książnicach Wielkich 1 było badane wykopaliskowo w latach 20. ubiegłego wieku przez Józefa Żurowskiego. Jest znane badaczom neolitu przede wszystkim jako osada kultury pucharów lejkwatych (Burchard, Eker 1964) oraz cmentarzysko kultury ceramiki sznurowej (KCS; Machnik 1964). Niniejszy artykuł dotyczy zabytków związanych z reutilizacją siekier krzemiennych, pochodzących z obiektów z opublikowanej osady kultury pucharów lejkwatych. Z obiektów tych pochodzi zróżnicowany materiał ceramiczny: KPL, KPL-B oraz elementy typowe dla grupy Wyciąże (Brzeska-Pasek 2018). Zbiór zawierający siekiery, fragmenty siekier oraz narzędzia na nich wykonane liczył 73 zabytki. Niniejszy artykuł skupia się tematyce dotyczącej reutilizacji, czyli wtórnemu wykorzystaniu siekier do produkcji narzędzi wiórowych i odłupkowych oraz używaniu ich jako innych narzędzi. Część omawianego zbioru została uwzględniona w opracowaniu dotyczącym siekier ze stanowiska w Książnicach Wielkich (Brzeska-Pasek in print).

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