FLINT AXES FROM THE FUNNEL BEAKER AND FUNNEL BEAKER-BADEN SETTLEMENT PHASES AT SITE 1 IN KSIĄŻNICE WIELKIE, PROSZOWICE DISTRICT

ABSTRACT

Brzeska-Zastawna A. 2020. Flint axes from the Funnel Beaker and Funnel Beaker-Baden settlement phases at site 1 in Książnice Wielkie, Proszowice district. Sprawozdania Archeologiczne 72/1, 197-211.

Excavations at site 1 in Książnice Wielkie were conducted between 1921 and 1924 by Józef Żurowski. It is one of the most important sites of the Funnel Beaker culture (FBC) in western Lesser Poland (Zastawny and Brzeska-Zastawna 2020). The materials of the FBC with Baden elements were published by Barbara Burchard and Anna Eker, and graves of the Corded Ware culture were published by Jan Machnik (Burchard and Eker 1964; Machnik 1964). This article is focused on the issues related to flint axes discovered in the context of FBC and Funnel Beaker-Baden assemblages. So far they have not been the subject of detailed elaboration.

Keywords: flint axes, Jurassic G flint, Funnel Beaker culture, Funnel Beaker-Baden assemblages, Lesser Poland

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1. INTRODUCTION

Site 1 in Książnice Wielkie is located on the northern border of the Lesser Poland Upland, on the right side of the Szreniawa River valley, in the vicinity of its mouth to the Vistula River. At this site, materials of different cultures and ages were found. As regards the Neolithic, there were materials of the classic Funnel Beaker culture (FBC), Funnel
Beaker-Baden (FB-B) and elements of the Wyciąże group (WG), not to mention graves of the Corded Ware culture. Based on general views on middle Neolithic ceramic development in western Lesser Poland, the FBC and FB-B materials perhaps belong to the BR I-IV/V phases. Frequently, these different ceramics were present in the same features.

The FBC and Baden materials from the site were elaborated by Barbara Burchard and Anna Eker in 1964. The artifacts from site 1 at Książnice Wielkie are stored in the collection of the Archaeological Museum in Kraków.

In 19 features at the site, flint axes and other artifacts relating to their use were discovered. The aim of this paper is their comprehensive examination. In total, 73 artifacts were analyzed: 8 axes (including 1 formal core), 1 chisel, 7 splintered pieces, 11 tools, 2 spalls from tools, 44 flakes, blades, blade-flakes, and chunks. It should be emphasized that chronologically and culturally diversified pottery materials were found in features where these artifacts were recorded.

2. ANALYSIS

2.1. Axes and chisel

Nine artifacts were included in Table 1: 5 (Tables 1-5 are at the end of this volume) whole axes, including 3 of original length (A1 – Fig. 4: 2, A2 – Fig. 2: 2, A4 – Fig. 5: 1) and 2 with a shortened length due to repair of the cutting edge (A3 – Fig. 2: 1, A9 – Fig. 3: 2), 1 with a strongly damaged cutting edge, but with the entire length of the axe preserved (A5 – Fig. 3: 1), 1 with only a part at the butt preserved (A8 – Fig. 7: 1), 1 chisel made from the blade of an axe (A7 – Fig. 4: 1), and 1 formal core made on a large fragment of an axe (A6 – Fig. 5: 2). All specimens were made from Jurassic G flint.

The axes have total lengths of 67-123 mm. Almost all specimens have a more or less widening cutting edge. Only in one case (A4 – Fig. 5: 1) the maximum width is not at the cutting edge, but rather just behind it. For 3 of the axes, the maximum thickness is at mid-length, about 2/3 of the length from the cutting edge; another 3 axes have maximum thickness at the butt; and for the remaining 2 axes, at 1/3 of the length from the cutting edge, the part at the cutting edge turns into a medial part. All eight specimens are axes with rectangular cross-sections. The chisel (A7), which was probably made from the blade of an axe, has a trihedral cross-section.

In the FBC, butts are most often poorly extracted and inaccurately formed (Balcer 1975, 118). Part of a specimen from Książnice Wielkie had trimmed and thinned butts. Thinned butts (which result in an axe with a lenticular longitudinal section) – sometimes almost edge butts – are common in the FBC (Balcer 1975, 116; 1983, 142; Gumiński 1989, 137). Three axes had visibly separated butts (A1; A3; A9). Some specimens had a half-separated butt, which means that the butt was separated from one of the lateral surfaces,
but trimming of the opposite surface was part of the preparation of the butt (A2, A6, A8, A9). Perhaps this was an intentional effort, which simplified putting the axe in a haft.

Most often (in 4 specimens), edges were shaped by centripetal blows from two main surfaces. Less often (in 3 specimens), edges were prepared by parallel blows from the opposite main surfaces. In a single case (A6), one edge was trimmed by parallel blows, but the second was trimmed from two main surfaces by centripetal blows. Frequently, edges converged quite strongly towards a butt, forming a regular and trapezoidal shape for the whole specimen. Axes with expanding cutting edges (usually with thick butts, but sometimes also with flat butts) are very typical for the FBC in Lesser Poland (Balcer 1983, 152).

The last stage of finishing included treatments that increased the effectiveness of these tools (Balcer 1983, 39). The analyzed axes were ground, smoothed and polished. These treatments left some characteristic traces visible on surfaces of the axes (Hansen and Madsen 1983; Madsen 1984; Borkowski and Migal 1996). Traces of grinding are visible only on parts of the main surfaces, because, after grinding, the other parts were successively
Fig. 2. Książnice Wielkie, site 1, Proszowice district. The axes made from Jurassic G flint: 1 – A3; 2 – A2 (from the collection of the Archaeological Museum in Kraków); a – grinding; b – smoothing; c – polishing. Drawing: A. Brzeska-Zastawna
Flint axes from the Funnel Beaker and Funnel Beaker-Baden settlement phases…

subject to the treatments mentioned above. Most often, sides as well as surfaces at the cutting edge were smoothed. Three specimens were smoothed along the whole surface (however, sometimes smoothing was inaccurate, in particular on parts further from the cutting edge). Five axes had visible traces of polishing. Frequently, axes were polished only at the cutting edge. Sometimes (in 3 of the 5 examples mentioned above), polishing encompassed

Fig. 3. Książnice Wielkie, site 1, Proszowice district. The axes made from Jurassic G flint: 1 – A5; 2 – A9 (from the collection of the Archaeological Museum in Kraków); a – grinding; b – smoothing; c – polishing. Drawing: A. Brzeska-Zastawna
also further surfaces at the cutting edge. On these same axes, there are traces visible on the part where the tools were put in a handle. In macroscopic view, this sometimes looks like wiping, gloss or traces of smoothing in the part at the butt. Most often in the FBC, axes were only partially smoothed (Balcer 1975, 122) – a portion of each axe was not smoothed at all. Total surface smoothing and polishing of the axes shows great care and willingness to maximize the technical value of the tools.

Cutting and adjacent edges were the parts most exposed to damage. Traces of repair of these parts are clearly visible on two specimens (A3, A9) and in a fragmentary way, on one-specimen (A6). The cutting edge was repaired by a very precise technique using a punch, as well as by the pressure technique. From the cutting edge towards the butt, small and flat bladelets were removed alternately (Fig. 2: 1; 6: 2). The same technique was used in forming a cutting edge (Salaciński and Migal 1997, 341). According to W. Migal and S. Salaciński, this was the most effective approach to forming of this part of an axe (1996, 127). One of these axes (A3; Fig. 2: 1) is similar in shape and longitudinal section to specimens of half-pro-
Flint axes from the Funnel Beaker and Funnel Beaker-Baden settlement phases...

ducts of the Globular Amphora culture (GAC) from Koszycy (Konopka et al. 2016, 80: fig. 9: A). The presence of GAC artefacts at the discussed site is indicated by the identification of a fragment of the amphora of this culture in materials from J. Żurowski’s research (Zastawny and Brzeska-Zastawna 2020). Very regular, rectangular transverse sections, strongly widening cutting edges, separated flat butts, meticulous smoothing on all surfaces, and small di-
Fig. 6. Książnice Wielkie, site 1, Proszowice district. Detail of the parts of the flint axes: 1 – the part at the cutting edge of the axe (A5) with visible traces of grinding (a), smoothing (b) and polishing (c). 2-3 – the parts at the cutting edge of the axes (A3, A9) with traces of repair (from the collection of the Archaeological Museum in Kraków). Drawing and photo: A. Brzeska-Zastawna
mensions (A1; Fig. 4: 2) are also common in axes of the GAC (Balcer 1983, 209, 210, fig. 40: 5-6). In this example, the differences concern the raw material. In the GAC, axes were most often made of striped flint from the Krzemionki region. The function of such axes in the GAC was also different than in the case of specimen A1 from Książnice Wielkie 1. In the GAC, such specimens most often relate to a “prestigious” function, due to the context of discoveries (graves); often, there are no traces of use, and the quality of striped flint is fairly poor. Such is not the case of the analyzed axe (A1), which was made from Jurassic G flint. Some similarities to specimens from Książnice Wielkie 1 are visible not only in the GAC, but also in the Corded Ware (CWC) and Baden cultures, which were using Jurassic G flint in axe making. For example, similarities are visible in the case of flat specimens with parallel main surfaces and edges converging towards the butt (e.g. A3, A9). A similar type is known from the CWC, but on the whole, with a smaller difference (than in the case of examples A3 and A9 mentioned above) between the width of the butt and the cutting edge (Włodarczak 2006, 25, Fig. 10; 27, 245, IB type). However, specimens with lentiform longitudinal sections are not very frequent in the CWC, because axes have the thickset butt (as in the case of the A6) and, in relation to it, they have a wedge-shaped cross-section. Some similarities to flint axes from Książnice Wielkie 1 can also be seen in axes made from Jurassic G flint in the Baden culture in western Lesser Poland. This is probably due to the derivation of flint-axe-making technology from the FB-B. For example, it relates to tetrahedral specimens in the Baden culture with thinned butts, lentiform longitudinal sections, and with regular edges that converge in the direction of the butt, forming the trapezoidal shape of the axe in horizontal projections (Kaczanowska 1982/83, 79, fig. 5: f). Similarities are especially visible in the case of axes relating to variant A in the FBC (Balcer 1975; 2002, 90; Valde-Nowak 1988, 31). In the analyzed materials, there is only the one example of an axe of consistent width from the cutting edge to the part at the butt. It is the only specimen that relates to variant B in the FBC, according to B. Balcer (1975, 116). It is necessary to elaborate a larger set of flint axes of FB-B assemblages, which will enable comparative studies that will help to distinguish different features of axes of this culture and the other mentioned above.

The small axe with an asymmetrical cutting edge (A1), along with specimen A5 and the chisel (A7) were probably used in minor works, such as the making of wooden handicrafts. One of the axes (A4) stands out among the others in terms of its longitudinal section, which is the most wedge-shaped of the group.

All analyzed axes are the finished and redone forms. There are no traces (e.g. initial forms, half-products or unfinished axes) of axe production on the site. Fan-shaped flakes most often display faint traces of smoothed surfaces (Fig. 7: 5), indicating that they derive from the reutilization of axes. They were made outside the settlement sites in specialized workshops. Finishing treatments (grinding, smoothing and polishing) were made within the settlement sites, on supplied final-shape forms, to improve the efficiency of axes. This is confirmed by – among other evidence – the lack of traces of grinding in typical workshop sites (Kopacz and Pelisiak 1992, 110).
2.2. Other findings relating to the repair and processing of axes

The other artifacts (44 specimens; Tables 2-5; Fig. 7: 2-10) related to axes or axe-like tools are metrical flakes, blades, blade-flakes, etc. Most of them derived from the processing, reutilization and repairing stages of axes. Moreover, among the materials from site 1 in Książnice Wielkie related to the reuse of axes, there were 7 splintered pieces, 2 spalls from tools and 11 tools made from fragments of the axes (Brzeska-Zastawna 2018).

Most of this material was derived from trihedral or tetrahedral forms. Almost all specimens (except for 5 undetermined) were made from Jurassic G flint: 35 flakes, including 7 fan-shaped flakes (Kopacz and Pelisiak 1989, 348; Fig. 7: 5) and 3 flakes from splintered pieces, 4 blades (e.g. Fig. 7: 8, 10), including 1 technical specimen (formal burin spall or resharpening spall), 2 blade-flakes and 1 burned chip. A burin spall could derive from renovation or direct percussion on a back surface of the axe. The upper sides of flakes, on which there are visible, unambiguous surfaces of axes, most often displayed portions of a main surface (65%; e.g. Fig. 7: 2, 4, 5) or an edge of an axe (59%; e.g. Fig. 7: 4). Twenty-two percent of flakes had surfaces from portions adjoining the cutting edges (Fig. 7: 3, 6, 9), whereas 14% of specimens derive from the part at the butt (e.g. Fig. 7: 7). The same number (14%) had a fragment of the butt and also preserved two main surfaces. Only 2 fragments derive from the cutting edge, and 1 flake preserved two lateral edges of an axe.

Most of the flakes chipped from the edge of an axe (excessive flakes), displayed a lateral surface and sometimes one of the main surfaces of the axe (e.g. Fig. 7: 5). Some specimens were chipped from an axe already shortened, as evidenced by the surface of a flake butt, and which is also visible on a flake edge and on the main surfaces of the axe (e.g. Fig. 7: 6). Flakes most often had a straight or bent to bottom side longitudinal section. Traces of breakages on 2 flakes probably indicate they were chipped from the butt or from a part of an axe used as a hammer. Some smoothed axes or axe-like tools may have retained residue from the cortex. This is indicated by some flakes with a partial covering of this material. As in the case of flakes, blades most often took portions of lateral edges and main surfaces of axes. All blades had a trihedral transverse section. Most of the blades and flakes had lisse and flat butts of a triangular shape. Right angles of butts are prevailing. The thickness of a butt is most often similar to the average thickness of the specimen, but in the case of flakes, the butt is also often thick. The flakes have frequently damaged or invisible bulbs. Both flakes and blades have flake scars on the upper side, arranged parallel and diagonally or transverse. Sometimes, flakes and blades derived from axes were used as tools ad hoc (2 “use-flakes” and 1 “use-blade” with slanted cracks). The analyzed flakes and blades come from repairs and reutilization of axes, and almost all have traces of grinding and smoothing (variant IVB; Balcer 1975, 83).

Generally, in the FBC, fragments of axes were reutilized for cores, splintered pieces and tools (Budziszewski 2000, 262). Apart from one core already mentioned above (Table 1, A6; Fig. 5: 2), there are also 7 splintered pieces (two-sided multipolar and bipolar) and tools
Fig. 7. Książnice Wielkie, site 1, Proszowice district. 1 – The part at the butt (A8) from the axe made from Jurassic G flint; 2-7, 9 – flakes from the axe; 8, 10 – blades from the axe (from the collection of the Archaeological Museum in Kraków); a – grinding, b – smoothing, c – polishing, x – thermal cracking; I – the main surface of the axe, II – the side of the axe, III – the butt of the axe; IV – the surface of the part at the butt of the axe, V – the surface at the cutting edge of the axe, VI – the cutting edge of the axe.

Drawing: A. Brzeska-Zastawna
(1 burin, 4 retouched flakes, 1 trapeze, 2 hammerstones, 2 retouched blades and 1 combined tool) among the analyzed artifacts. Formally, in the group of tools made from axe fragments, there is also the chisel mentioned above (A7). All artifacts were made from Jurassic G flint.

3. SUMMARY

All analyzed artifacts (except for the undetermined ones) were made from Jurassic flint of the G variant (Kaczanowska and Kozłowski 1976). Its outcrops and workshops, where flint axes were made, were identified in the central part of the Polish Jura. Part of them probably relate to the FBC and/or FB-B. More specifically, the workshops likely correspond to the “Late Funnel Beaker” identified in the vicinity of the Krzynia River (Pradla and Huta Szklana), Jasna Cave in Strzegowa, Banański Mountains (Kopacz and Pelisiak 1987; 1990; Rybicka and Cyrek 1997; Pelisiak 2006, 79, 80). Some of the workshops mentioned above might also have been used by the Lengyel-Polgár and other cultures that made flint axes, such as the Baden culture or Corded Ware culture.

Jurassic raw materials of the G variant were used in the utmost scale in the BR III-V (Kopacz and Pelisiak 1991, 171). Its share in inventories of the “late phase of the Bronocice settlement microregion” reached from 60 to 100% (Pelisiak 2006, 81). According to A. Pe- lisiak, the apogee (100%) of the use of this raw material occurred in phase V at Bronocice (Pelisiak 2008, 149). Thus, Jurassic flint of the G variant was intensively used in FB-B assemblages in western Lesser Poland. Also, it was used in the WG, which developed in the vicinity of the FB-B, in the BR III-IV (Brzeska-Pasek 2018, 513). At site 1 in Książnice Wielkie, the pottery typical for the WG was present in some of the features with pottery of the FB-B. A very interesting tendency to “repossess” tradition in the flint industry, e.g. the use of Jurassic flint of the G variant and the use of flint axes, can be observed in the WG. Beyond Książnice Wielkie 1 we only have one published site (site 17 in Kraków-Pleszów) where features of both the FB-B (in the oldest horizon of the FB-B, of the Niedźwiedź type) and the WG were found. However, features of both units constituted two separated groups there, contrary to the situation in Książnice Wielkie (Godłowska 1976, 55-56).

Generally, the analyzed axes display visible differentiation in typology, but not the use of raw material. The same differentiation in typology, but with the use of various raw materials (e.g. Świeciechów, Volhynian, striped flints) is visible in all flint axes in the Lesser Poland industry of the FBC (e.g. Ćmielów, Gródek Nadbużny, Bronocice, Mozgawa; Balcer 1975; Kruk and Milisauskas 1981, 83; 1983, 268, table 4; Gumiński 1989, 135-137; Florek and Wiśniewski 2008). All axes correspond to variants distinguished at the other sites of the FBC (e.g. Balcer 1975; 2002). However, assuming similar proportions, they are generally smaller and flatter than the majority of their analogous shapes in the classic FBC (in particular variant A according to B. Balcer; 1975). Probably, it is one of the characteristic
features of the production of flint axes in the FB-B horizon, in the western Lesser Poland Loess Upland. These are the features that make these axes similar to GAC forms, not to mention the similarities to Baden axes. These are interesting observations, especially in the context of changes at the end of the 4th and the beginning of the 3rd millennium BC. Most typical for the FB-B assemblages is the use of Jurassic raw material of the G variant. For example, in “classic FB-B phases” (BR IV, V) in Bronocice, this is almost the only kind of raw material that was used (Kruk, Milisauskas 1981: 83; 1983). In the same timeframe, raw material at this site was used very sparingly (Kruk and Milisauskas 1981, 83). A quite similar tendency is visible at Książnice Wielkie 1, where – as in Bronocice – splinters or cores were made from parts of axes. This is probably related to the high quality of Jurassic G flint. However, it could be assumed that Bronocice had better access to outcrops of this kind of raw material (Kopacz and Pelisiak 1992, 111). Perhaps the settlement in Książnice Wielkie received this raw material indirectly from the other (production?) settlements, where artifacts such as those with traces of cortex were found (Balcer 1983, 144, fig. 24: 6; Kopacz and Pelisiak 1991, 167, fig. 4: a). Damaged axes were repaired or processed into cores, splintered pieces and tools. These kinds of remains (flakes from repairs and reutilized forms from axes) are typical for a “settlement of users” (Balcer 1983, 30). The remaining flint inventory from Książnice Wielkie 1 indicates such a type of settlement.

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### Table 1. Książnice Wielkie, site 1, Proszowice district. Characteristic features of axes (whole axes, fragments > approx. 30% preserved of axe), the core on the axe with approx. 70% preserved axe and the chisel

| Order No. | A1 | A2 | A3 | A4 | A5 | A6\(^1\) | A7\(^2\) | A8 | A9 |
|-----------|----|----|----|----|----|--------|--------|----|----|
| Generality quantity of preservation state (approx.) | 100% | 100% | 100% | 100% | 100% | 70% | 100% | 30% | 100% |
| Inventory No. | MAK 6679 | MAK 6622 | MAK 6637 | MAK 6669 | MAK 6675 | MAK 6649 | MAK 6649 | MAK 6637 | MAK 6635 |
| Figure No. | Fig. 4, 2 | Fig. 2-2 | Fig. 2-1 | Fig. 5, 1 | Fig. 7-1 | Fig. 5, 2 | Fig. 4, 1 | Fig. 5, 1 | Fig. 2-2 |
| Dimensions (mm), Fig. 1/2 | | | | | | | | | |
| total length | 67 | 123 | 120 | 91 | 78 | 83 | 68 | 41 | 87 |
| width in the upper part of the axe | 25 | 32 | 28 | 33 | 94 | 46 | 34 | 91 | 27 |
| butt width | 18 | 23 | 30 | 24 | 18 | 24 | 13 | 46 | 22 |
| butt thickness | 7 | 10 | 10 | 18 | 10 | 31 | 71 | 12 | 13 |
| width in the % of the specimen length | 30 | 42 | 42 | 39 | 35 | 41 | 21 | 5 | 38 |
| cutting edge width | 40 | 53 | 59 | 39 | 39 | 42 | 24 | 50 | 50 |
| maximum thickness | 11 | 27 | 20 | 21 | 13 | 29 | 12 | 15 | 14 |
| thickness in the % of the specimen length | 11 | 27 | 20 | 21 | 13 | 28 | 11 | 17 | |
| Raw material | Jurassic C | | | | | | | | |
| Transverse section | | | | | | | | | |
| longitudinal section | | | | | | | | | |
| Port of the axe with maximum thicknesses | wedge-shaped | | | | | | | | |
| shape of the cutting edge | symmetrical, slightly arched | | | | | | | | |
| shape of the cutting edge | rectangular | | | | | | | | |
| preparation of a butt | threaded | | | | | | | | |
| Preparation of sides | parallel blows | | | | | | | | |
| course of lateral edges | moderately concaving, to direction of a butt | | | | | | | | |
| Shape of an axe | rectangular, trapezoid | | | | | | | | |
| Gridding | | | | | | | | | |
| Surface treatment | | | | | | | | | |
| Cutting edge | | | | | | | | | |
| Thermal cracking | | | | | | | | | |
| Patina | | | | | | | | | |
| Breakage | | | | | | | | | |
| Repair | | | | | | | | | |
| Feature No. | 28 | 63 | 63 | 63 | 63 | 63 | 63 | 63 | 63 |

\(^1\) formal core on the axe
\(^2\) chisel made on a blade

---

Pottery

Lack of pottery
Lack of pottery
FBB
WG
mainly "pure" HBC pottery

"Feature No 4", house, probably from the upper destroyed part of the pit (Zabłocki, Żamorska 29A, 27, Ryc. 19)
| Order No. | D1 | D2 | D3 | D4 | D5 | D6 | D7 | D8 |
|-----------|----|----|----|----|----|----|----|----|
| No. of inventory | MAX/659 | MAX/659 | MAX/659 | MAX/659 | MAX/659 | MAX/659 | MAX/659 | MAX/659 |
| Figure No. | Fig. 7.8 | - | Fig. 7.9 | - | - | - | - | - |
| Dimensions (mm) | length | 48 | 22 | 29 | 15 | 56 | 42 | 30 |
| | width | 16 | 17 | 30 | 58 | 22 | 22 | 22 |
| | thickness | 8 | 8 | 8 | 11 | 10 | 16 | 3 |
| Material type | flake | * | * | * | * | * | * | * |
| | blade-flake | * | * | * | * | * | * | * |
| Flakes from splintered piece | * | * | * | * | * | * | * | * |

Using retouch

Row material

| Item | Description |
|------|-------------|
| Hematite | * | * | * | * | * | * | * | * |
| Undetermined (hematite) | * | * | * | * | * | * | * | * |

Flake type

| Type of flake | Description |
|---------------|-------------|
| Non-shaped flake | * | * | * | * | * | * | * | * |

Part of axe

| Surface of cutting edge | Description |
|-------------------------|-------------|
| Surface | * | * | * | * | * | * | * | * |

State of preservation

| Description | Description |
|-------------|-------------|
| Broken | * | * | * | * | * | * | * | * |
| Cracked | * | * | * | * | * | * | * | * |
| Patina | * | * | * | * | * | * | * | * |
| Breached | * | * | * | * | * | * | * | * |

Stage of preservation

| Type of flake | Description |
|---------------|-------------|
| Whole | * | * | * | * | * | * | * | * |

Shape of cortex surface

| Description | Description |
|-------------|-------------|
| Vestigial on a side | * | * | * | * | * | * | * | * |

Longitudinal section

| Description | Description |
|-------------|-------------|
| Bent to inner face | * | * | * | * | * | * | * | * |
| Bent to outer face | * | * | * | * | * | * | * | * |
| Curved | * | * | * | * | * | * | * | * |
| Convex | * | * | * | * | * | * | * | * |

Bent altitude

| Description | Description |
|-------------|-------------|
| Convex | * | * | * | * | * | * | * | * |

Bent shape

| Description | Description |
|-------------|-------------|
| Rhombus | * | * | * | * | * | * | * | * |
| Rectangular | * | * | * | * | * | * | * | * |
| Triangular | * | * | * | * | * | * | * | * |
| Semi-elliptical | * | * | * | * | * | * | * | * |
| Asymmetrical | * | * | * | * | * | * | * | * |

Angle of a butt

| Description | Description |
|-------------|-------------|
| Round | * | * | * | * | * | * | * | * |

Butt thickness

| Description | Description |
|-------------|-------------|
| Thick | * | * | * | * | * | * | * | * |

Bulb

| Description | Description |
|-------------|-------------|
| Damaged | * | * | * | * | * | * | * | * |
| Convex | * | * | * | * | * | * | * | * |
| Slight | * | * | * | * | * | * | * | * |

Scars on a dorsal side

| Description | Description |
|-------------|-------------|
| Blunt flake | * | * | * | * | * | * | * | * |
| Blade flake | * | * | * | * | * | * | * | * |

Scars arrangement

| Description | Description |
|-------------|-------------|
| Central | * | * | * | * | * | * | * | * |
| Peripheral | * | * | * | * | * | * | * | * |
| Opposite | * | * | * | * | * | * | * | * |

Grinded

| Description | Description |
|-------------|-------------|
| Main surface | * | * | * | * | * | * | * | * |

Smoothed

| Description | Description |
|-------------|-------------|
| Main surface | * | * | * | * | * | * | * | * |

Polished

| Description | Description |
|-------------|-------------|
| Main surface | * | * | * | * | * | * | * | * |
| Order No. | F14 | F15 | F16 | F17 | F18 | F19 | F20 | F21 | F22 | F23 |
|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| No. of inventory | MAK-0402 | MAK-0402 | MAK-0402 | MAK-0402 | MAK-0402 | MAK-0407 | MAK-0407 | MAK-0407 | MAK-0427 | MAK-0427 |
| Figure No. | - | - | - | - | - | - | - | Fig. 77 | Fig. 74 | Fig. 56 |
| Dimensions (mm) | length | 19 | 19 | 11 | 19 | 23 | 24 | 25 | 48 | 27 |
| | width | 20 | 35 | 16 | 26 | 23 | 28 | 21 | 24 | 47 |
| | thickness | 5 | 3 | 4 | 6 | 6 | 8 | 5 | 6 | 7 |
| | | | | | | | | | | 11 |
| Material | Flake | * | * | * | * | * | * | * | * | * |
| | Blade-flake | * | * | * | * | * | * | * | * | * |
| | Blade | * | * | * | * | * | * | * | * | * |
| | Flake from splintered piece | * | * | * | * | * | * | * | * | * |
| Using retouch | * | * | * | * | * | * | * | * | * | * |
| Raw material | Jurassic G | * | * | * | * | * | * | * | * | * |
| | Undetermined (burn) | * | * | * | * | * | * | * | * | * |
| Flake type | thin-shaped flake | * | * | * | * | * | * | * | * | * |
| Part of use | best surface at cutting edge | * | * | * | * | * | * | * | * | * |
| | cutting edge | * | * | * | * | * | * | * | * | * |
| | side | * | * | * | * | * | * | * | * | * |
| | sides | * | * | * | * | * | * | * | * | * |
| | main surface | * | * | * | * | * | * | * | * | * |
| | both main surfaces unidentified | * | * | * | * | * | * | * | * | * |
| | surface at butt | * | * | * | * | * | * | * | * | * |
| Transverse section of the use | tetrahedral or rhomboidal | * | * | * | * | * | * | * | * | * |
| | unidentified | * | * | * | * | * | * | * | * | * |
| Transverse section of the blade | triangular | * | * | * | * | * | * | * | * | * |
| | unidentified | * | * | * | * | * | * | * | * | * |
| State of preservation | good | * | * | * | * | * | * | * | * | * |
| | cracked | * | * | * | * | * | * | * | * | * |
| | patinated | * | * | * | * | * | * | * | * | * |
| | burnt | * | * | * | * | * | * | * | * | * |
| Stage of preservation | whole | * | * | * | * | * | * | * | * | * |
| | lack of proximal part | * | * | * | * | * | * | * | * | * |
| | proximal part | * | * | * | * | * | * | * | * | * |
| | fractured in a distal part | * | * | * | * | * | * | * | * | * |
| | fractured in several part | * | * | * | * | * | * | * | * | * |
| | lateral fractured | * | * | * | * | * | * | * | * | * |
| | Fractured of proximal and distal part | * | * | * | * | * | * | * | * | * |
| Share of a cortex surface | lack | * | * | * | * | * | * | * | * | * |
| | vertigial on a side | * | * | * | * | * | * | * | * | * |
| Longitudinal section | best to inner face | * | * | * | * | * | * | * | * | * |
| | best to upper face | * | * | * | * | * | * | * | * | * |
| | best to upper face | * | * | * | * | * | * | * | * | * |
| | curved | * | * | * | * | * | * | * | * | * |
| | punctuated | * | * | * | * | * | * | * | * | * |
| Blade | blade | * | * | * | * | * | * | * | * | * |
| | Forged | * | * | * | * | * | * | * | * | * |
| | trimmed | * | * | * | * | * | * | * | * | * |
| | damaged | * | * | * | * | * | * | * | * | * |
| | edge | * | * | * | * | * | * | * | * | * |
| Blade altitude | flat | * | * | * | * | * | * | * | * | * |
| | concave | * | * | * | * | * | * | * | * | * |
| | convex | * | * | * | * | * | * | * | * | * |
| Blade shape | chisel | * | * | * | * | * | * | * | * | * |
| | lenticular | * | * | * | * | * | * | * | * | * |
| | semicircular | * | * | * | * | * | * | * | * | * |
| | triangular | * | * | * | * | * | * | * | * | * |
| | elliptical | * | * | * | * | * | * | * | * | * |
| | semi-elliptical | * | * | * | * | * | * | * | * | * |
| | asymmetrical | * | * | * | * | * | * | * | * | * |
| | trapezoidal | * | * | * | * | * | * | * | * | * |
| Angle of a butt | straight | * | * | * | * | * | * | * | * | * |
| | obtuse | * | * | * | * | * | * | * | * | * |
| Butt thickness | thick | * | * | * | * | * | * | * | * | * |
| | regular | * | * | * | * | * | * | * | * | * |
| | slight | * | * | * | * | * | * | * | * | * |
| Bulb | damaged | * | * | * | * | * | * | * | * | * |
| | convex | * | * | * | * | * | * | * | * | * |
| | spilt | * | * | * | * | * | * | * | * | * |
| | occlusive | * | * | * | * | * | * | * | * | * |
| | invisible | * | * | * | * | * | * | * | * | * |
| | concave | * | * | * | * | * | * | * | * | * |
| Scars on the dorsal side | blade | * | * | * | * | * | * | * | * | * |
| | blade-flake | * | * | * | * | * | * | * | * | * |
| | scratched blade | * | * | * | * | * | * | * | * | * |
| | scratched blade | * | * | * | * | * | * | * | * | * |
| Scars arrangement | centripetal two-way | * | * | * | * | * | * | * | * | * |
| | centripetal opposite | * | * | * | * | * | * | * | * | * |
| | parallel with slanted or transverse | * | * | * | * | * | * | * | * | * |
| | parallel with opposite | * | * | * | * | * | * | * | * | * |
| | parallel | * | * | * | * | * | * | * | * | * |
| Grinded | main surface | * | * | * | * | * | * | * | * | * |
| | surface at cutting edge | * | * | * | * | * | * | * | * | * |
| | surface at butt | * | * | * | * | * | * | * | * | * |
| | Surface of a butt's edge | * | * | * | * | * | * | * | * | * |
| Smoothed | side | * | * | * | * | * | * | * | * | * |
| | main surface | * | * | * | * | * | * | * | * | * |
| | surface at cutting edge | * | * | * | * | * | * | * | * | * |
| | surface at butt | * | * | * | * | * | * | * | * | * |
| | butt | * | * | * | * | * | * | * | * | * |
| Polished | surface at cutting edge | * | * | * | * | * | * | * | * | * |
### Table 4. Książnice Wielkie, site 1, Proszowice district. Characteristic features of the other remains related to the use, repair and processing of an axe: flakes, blades, blade flakes

| Order No. | F34 | F35 | F36 | F37 | F38 | F39 | F40 | F41 | F42 | F43 |
|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| No. of Inventory | MAK/0463 | MAK/0467 | MAK/0467 | MAK/0469 | MAK/0494 | MAK/0533 | MAK/0534 | MAK/0534 | MAK/0535 | MAK/0535 |
| Dimensions (mm) | - | Fig. 7.9 | - | - | - | - | - | - | - | - |
| Length | 34 | 42 | 29 | 46 | 25 | 39 | 34 | 22 | 24 | 45 |
| Width | 26 | 32 | 30 | 36 | 19 | 30 | 41 | 28 | 24 | 31 |
| Thickness | 16 | 13 | 16 | 14 | 17 | 15 | 12 | 7 | 6 | 4 |
| Metric type | blade-flake | blade-flake | blade-flake | blade-flake | blade-flake | blade-flake | blade-flake | blade-flake | blade-flake | blade-flake |
| Flake type | - | - | - | - | - | - | - | - | - | - |
| Part of axe | - | - | - | - | - | - | - | - | - | - |
| Transverse section of an axe | triangular | triangular | triangular | triangular | triangular | triangular | triangular | triangular | triangular | triangular |
| State of preservation | - | - | - | - | - | - | - | - | - | - |
| Longitudinal section | - | - | - | - | - | - | - | - | - | - |
| Best | - | - | - | - | - | - | - | - | - | - |
| Best altitude | - | - | - | - | - | - | - | - | - | - |
| Best shape | - | - | - | - | - | - | - | - | - | - |
| Angle of a butt | - | - | - | - | - | - | - | - | - | - |
| Best thickness | - | - | - | - | - | - | - | - | - | - |
| Bulb | - | - | - | - | - | - | - | - | - | - |
| Scars | - | - | - | - | - | - | - | - | - | - |
| Scars arrangement | - | - | - | - | - | - | - | - | - | - |
| Ground | - | - | - | - | - | - | - | - | - | - |
| Smoothed | - | - | - | - | - | - | - | - | - | - |
| Polished | - | - | - | - | - | - | - | - | - | - |
| Articulation | - | - | - | - | - | - | - | - | - | - |
| Features No. | 41 | 43 | 49 | 49 | 54 | 52 | 58 | 58 | 58 | 58 |
| Order No. | I-34 | I-35 | I-36 | I-37 | I-38 | I-39 | I-40 | I-41 | I-42 | I-43 | I-44 |
|-----------|------|------|------|------|------|------|------|------|------|------|------|
| No. of inventory | MAK-0675 | MAK-0673 | MAK-0673 | MAK-0673 | MAK-0673 | MAK-06588 | MAK-06588 | MAK-06588 | MAK-065623 | MAK-06529 | MAK-06554 | MAK-06555 |
| Figure No. | - | - | - | - | - | - | - | - | - | - | - |
| Dimensions (mm) | | | | | | | | | | | |
| length | 45 | 20 | 22 | 66 | 31 | 19 | 33 | 33 | 28 | 40 | 19 | 40 |
| width | 19 | 21 | 19 | 33 | 33 | 28 | 40 | 35 | 36 | 25 | 40 |
| thickness | 12 | 3 | 3 | 15 | 8 | 6 | 10 | 8 | 15 | 4 | 9 | 9 |
| Material type | flake | * | * | * | * | * | * | * | * | * | * | * |
| *bladed-flake* | | | | | | | | | | | | |
| blade | | | | | | | | | | | | |
| Flake from splintered piece | * | | | | | | | | | | | |
| Chink | | | | | | | | | | | | |
| Technical blade - barb spill | * | | | | | | | | | | | |
| Using retouch | * | | | | | | | | | | | |
| Raw material | Jurassic G | * | * | * | * | * | * | * | * | * | * | * |
| unidentified (burnt) | * | | | | | | | | | | | |
| Fish bone type | fan-shaped flake | * | | | | | | | | | | |
| Part of use | bone | * | | | | | | | | | | |
| surface at cutting edge | * | | | | | | | | | | | |
| cutting edge | * | | | | | | | | | | | |
| side | * | | | | | | | | | | | |
| sides | * | | | | | | | | | | | |
| main surface | * | | | | | | | | | | | |
| medial and/or at cutting edge surface | * | | | | | | | | | | | |
| both main surfaces | * | | | | | | | | | | | |
| unidentified | * | | | | | | | | | | | |
| surface at butt | * | | | | | | | | | | | |
| Transverse section of the axe | trapezoidal | * | * | * | * | * | * | * | * | * | * | * |
| trapezoidal | * | | | | | | | | | | | |
| unidentified | * | | | | | | | | | | | |
| Transverse section of a blade | triangular | * | * | * | * | * | * | * | * | * | * | * |
| State of preservation | good | * | * | * | * | * | * | * | * | * | * | * |
| broken | * | | | | | | | | | | | |
| cracked | * | | | | | | | | | | | |
| patina | * | | | | | | | | | | | |
| burned | * | | | | | | | | | | | |
| Stage of preservation | whole | * | * | * | * | * | * | * | * | * | * | * |
| lack of proximal part | * | | | | | | | | | | | |
| proximal part | * | | | | | | | | | | | |
| fractured in a distal part | * | | | | | | | | | | | |
| fractured in several part | * | | | | | | | | | | | |
| lanceol fractured | * | | | | | | | | | | | |
| fractured of proximal and distal part | * | | | | | | | | | | | |
| Share of a cortex surface | * | | | | | | | | | | | |
| Longitudinal section | * | | | | | | | | | | | |
| lenticular | * | | | | | | | | | | | |
| triangular | * | | | | | | | | | | | |
| semi-elliptical | * | | | | | | | | | | | |
| elliptical | * | | | | | | | | | | | |
| semi-elliptical | * | | | | | | | | | | | |
| semi-elliptical | * | | | | | | | | | | | |
| semi-elliptical | * | | | | | | | | | | | |
| Angle of a butt | straight | * | * | * | * | * | * | * | * | * | * | * |
| obtuse | * | | | | | | | | | | | |
| acute | * | | | | | | | | | | | |
| Butt shape | regular | * | * | * | * | * | * | * | * | * | * | * |
| convex | * | | | | | | | | | | | |
| concave | * | | | | | | | | | | | |
| Butt altitude | convex | * | * | * | * | * | * | * | * | * | * | * |
|បផ dermatol | * | | | | | | | | | | | |
| Butt thickness | thin | * | | | | | | | | | | | |
| thick | * | | | | | | | | | | | |
| Blist | regener | * | * | * | * | * | * | * | * | * | * | * |
| *convex* | | | | | | | | | | | | |
| *concave* | | | | | | | | | | | | |
| Scan on a dorsal side | * | | | | | | | | | | | |
| blade | * | | | | | | | | | | | |
| *bladed-flake* | | | | | | | | | | | | |
| *blade-flake* | | | | | | | | | | | | |
| *flaked-flake* | | | | | | | | | | | | |
| *scraped-flake* | | | | | | | | | | | | |
| Scan arrangement | * | | | | | | | | | | | |
| *centripetal* | | | | | | | | | | | | |
| *centrifugal* | | | | | | | | | | | | |
| *oppolite* | | | | | | | | | | | | |
| *parallel with started or transverse* | | | | | | | | | | | | |
| *parallel with opposite* | | | | | | | | | | | | |
| *parallel* | | | | | | | | | | | | |
| *entirely transverse* | | | | | | | | | | | | |
| *entirely transverse* | | | | | | | | | | | | |
| Grassed | * | * | * | * | * | * | * | * | * | * | * | * |
| *main surface* | | | | | | | | | | | | |
| *surface at cutting edge* | | | | | | | | | | | | |
| *surface at butt* | | | | | | | | | | | | |
| *surface at a butt* | | | | | | | | | | | | |
| *blade* | | | | | | | | | | | | |
| *butt* | | | | | | | | | | | | |
| Polished | * | | | | | | | | | | | |
| surface at cutting edge | * | | | | | | | | | | | |

| Feature No. | 58 | 65 | stone finds |
