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HOARD OF LONG FLINT BLADES FROM THE WODZISŁAW HUMMOCK, LESSER POLAND

ABSTRACT

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The subject of this article is a hoard of Volhynian flint blades discovered in Świątniki. The collection encompasses 12 macrolithic Volhynian flint blades. The blades cannot be refitted together. The morphological and technological features of the blades suggest that they were produced with the use of indirect percussion or the lever pressure technique. The traceological analysis did not reveal any utilization patterns. Only slight polishing traces were recorded, perhaps resulting from keeping/transporting the blades in a wrapping made of light material. The makers of the blades should be associated with the populations of the Trypilian, Lublin-Volhynian, or Funnel Beaker culture, which does not indicate unequivocally the cultural attribution of the hoard.

Keywords: macrolithic blades, Volhynian flint, technique, technology, hoard, Eneolithic
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INTRODUCTION

In 1955, the collection of the National Museum in Kielce was enriched with 12 Volhynian flint blades, which had been discovered during field work (?) by an inhabitant of the village of Świątniki (Wodzisław municipality, Jędrzejów district) in 1953 (Fig. 1). All the blades appear in the inventory ledger of the museum under the reference MNKi/A/433/1-12. The artefacts were handed over by Jan Gurba, the then inspector-expert (conservator) of archaeological artefacts, on behalf of the Ministry of culture and Art for the Kielce and Lublin province. Along with the artefacts, a notice, bearing reference no. K.l.d. Zd. 4-5/48, was sent. The missive cannot be found in either the museum or in the Regional Conservation Office in Kielce. Jan Gurba (1953, 34) published a short note on the finding in the *Discoveries* section of the journal *Z otchłani wieków*. Consequently, information concerning the finding has been present in archaeological literature since the mid-1950's, but it has been limited to mentions in various papers discussing the topic of hoards/deposits (e.g. Balcer 1975, 232; Libera and Zakościelna 2010, table 2). Nevertheless, the blades have never been described in detail or published. They remained in the museum storage for several decades.

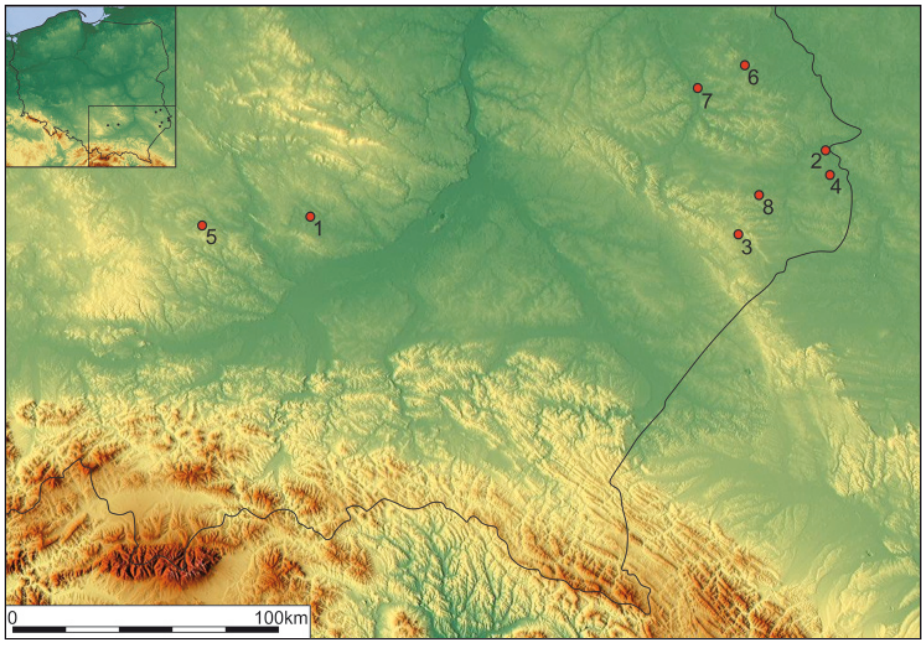

Fig. 1. Deposits containing long flint blades made of Volhynian flint or tools made on such blades (along with other artefacts) from Lesser Poland: 1 – Balice; 2 – Gródek (2 collections); 3 – Rogoźno; 4 – Szychowice; 5 – Świątniki; 6 – Weremowice; 7 – Wincentów; 8 – Zubowice (?)
(Libera, Zakościelna 2010 with authors' changes)

OVERVIEW OF THE MATERIAL

1. Blade with negative scars on the dorsal surface; regularly outlined lateral edges, cortical distal end of convergent character, slightly chipped; at nearly a quarter of the length from the butt, a secondary crest was made; a 20 mm bend is present in the mesial portion; triangular cross-section; gabled butt bearing several negative scars; abraded butt edge; trimming negatives; striking angle slightly below 90°; bulb not distinctly arched and with concentrically arranged bulb scars; unintentional segmental micro-retouch of one of the edges; dimensions: 179 × 26 × 10 mm; metric category: 66 (cf. Dzieduszycka-Machnikowa and Lech 1976, 31-33); weight: 47 gm; Volhynian flint, vitreous, homogeneous, dark steel-grey. Inventory number: MNKi/A/433/1 (Fig. 2: 1, 2).

2. Blade with negative scars on the dorsal surface; irregularly outlined lateral edges gradually narrowing to a convergent, slightly chipped distal end of partly cortical character; a 13 mm bend is present in the mesial portion; trapezoidal cross-section; flat, faceted butt; abraded butt edge; trimming negatives; striking angle of 90°; moderately prominent bulb with concentrically arranged bulb scars; dimensions: 140 × 28 × 6 mm; metric category: 65; weight: 24 gm; Volhynian flint, homogeneous, dark steel-grey, vitreous, merging into matte, striped, light steel-grey. Inventory number: MNKi/A/433/2 (Fig. 2: 3, 4).

3. Blade with negative scars on the dorsal surface; regularly outlined lateral edges; fragment of cortical surface in the mesial portion; distal end chipped; a 21 mm bend is present in the mesial portion; triangular/trapezoidal cross-section; gabled, faceted butt bearing two negative scars; abraded butt edge; trimming negatives; striking angle slightly below 90°; lip below the butt; moderately prominent bulb; unintentional segmental micro-retouch of one of the edges on the ventral side; dimensions: 172 × 30 × 10 mm; metric category: 66; weight: 47 gm; Volhynian flint, vitreous, dark steel-grey, with brighter spots. Inventory number: MNKi/A/433/3 (Fig. 3: 1, 2).

4. Blade with one cortical surface; one of the edges irregularly outlined; convergent distal end slightly chipped, with opposing microblade negatives; a 13 mm bend is present in the distal portion; triangular cross-section; flat butt bearing two negative scars; abraded butt edge; trimming negatives; striking angle slightly below 90°; lip below the butt; moderately prominent bulb; dimensions: 160 × 34 × 9 mm; metric category: 75; weight: 41 gm; Volhynian flint, vitreous, homogeneous, dark steel-grey. Inventory number: MNKi/A/433/4 (Fig. 3: 3, 4).

5. Blade with one cortical side; lateral edges irregularly outlined; convergent distal end; a 23 mm bend is present in the distal portion; triangular cross-section; gabled, faceted butt bearing two negative scars; trimming negatives; striking angle slightly below 90°; lip below the butt; clearly arched bulb; unintentional segmental retouch on the dorsal and ventral surface; dimensions: 177 × 31 × 9 mm; metric category: 76; weight: 44 gm; Volhynian flint, vitreous, dark steel-grey with brighter spots. Inventory number: MNKi/A/433/9 (Fig. 4: 1, 2).

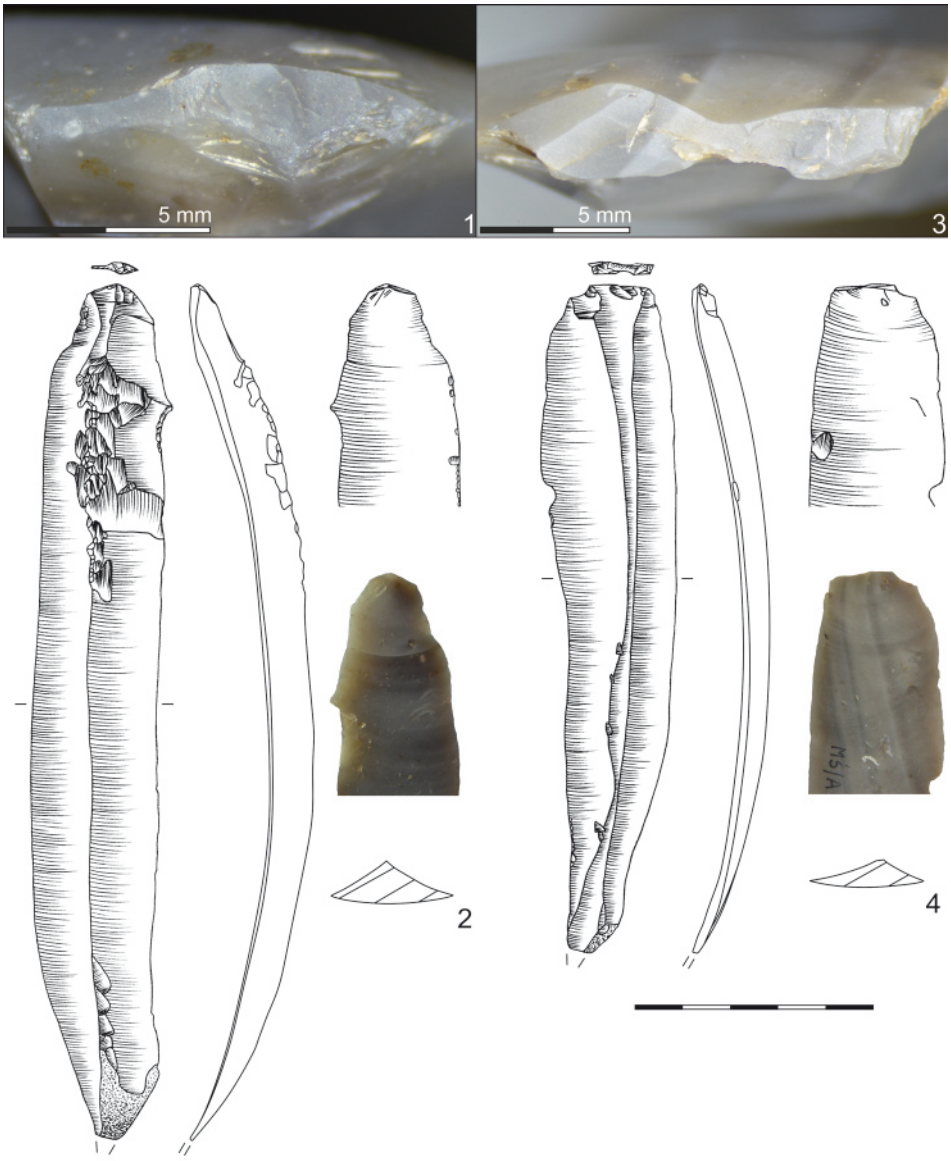

Fig. 2. Świątniki, Jędrzejów district.
1, 2 – Flint blade no. MNKi/A/433/1. 3, 4 – Flint blade no. MNKi/A/433/2.
Drawn by P. Mączyński, photo by P. Mączyński, B. Polit

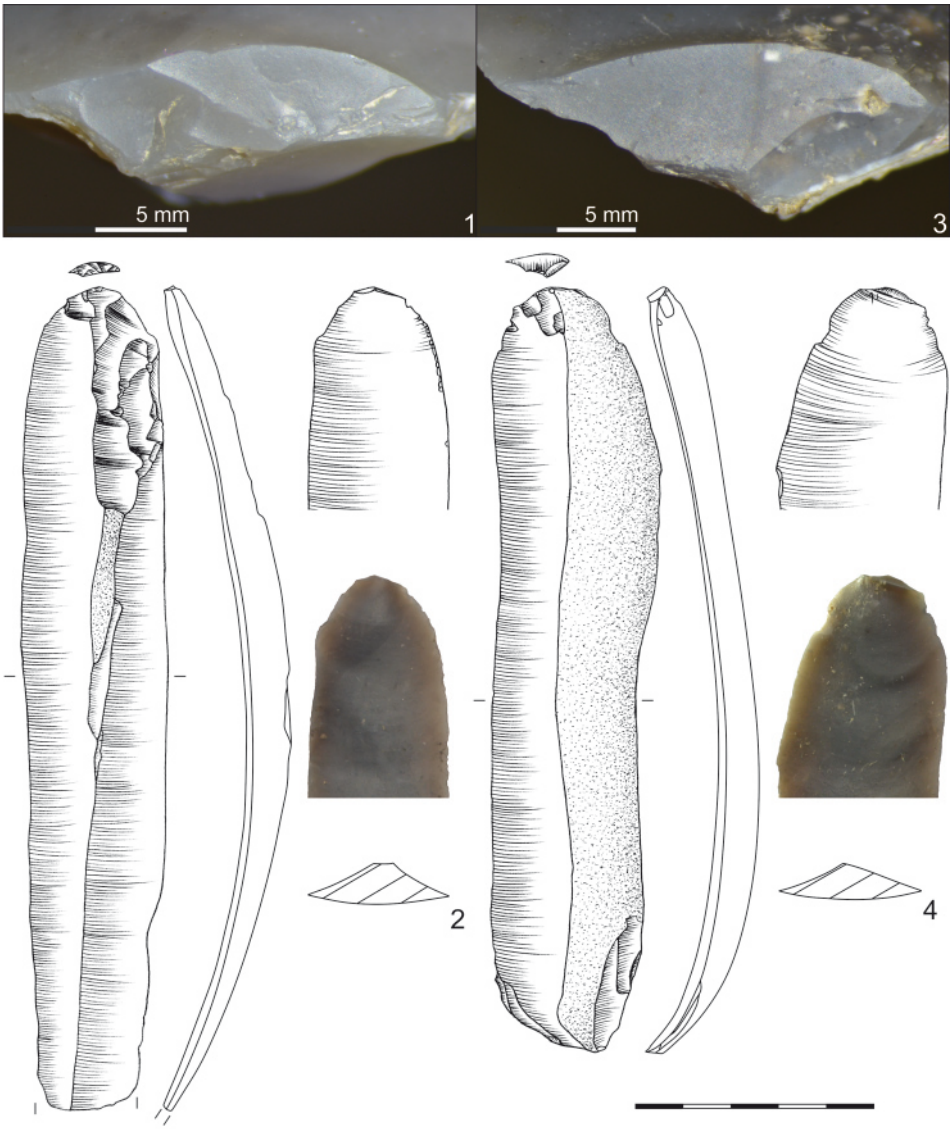

Fig. 3. Świątniki, Jędrzejów district.
1, 2 – Flint blade no. MNKi/A/433/3; 3, 4 – Flint blade no. MNKi/A/433/4.
Drawn by P. Mączyński, photo by P. Mączyński, B. Polit

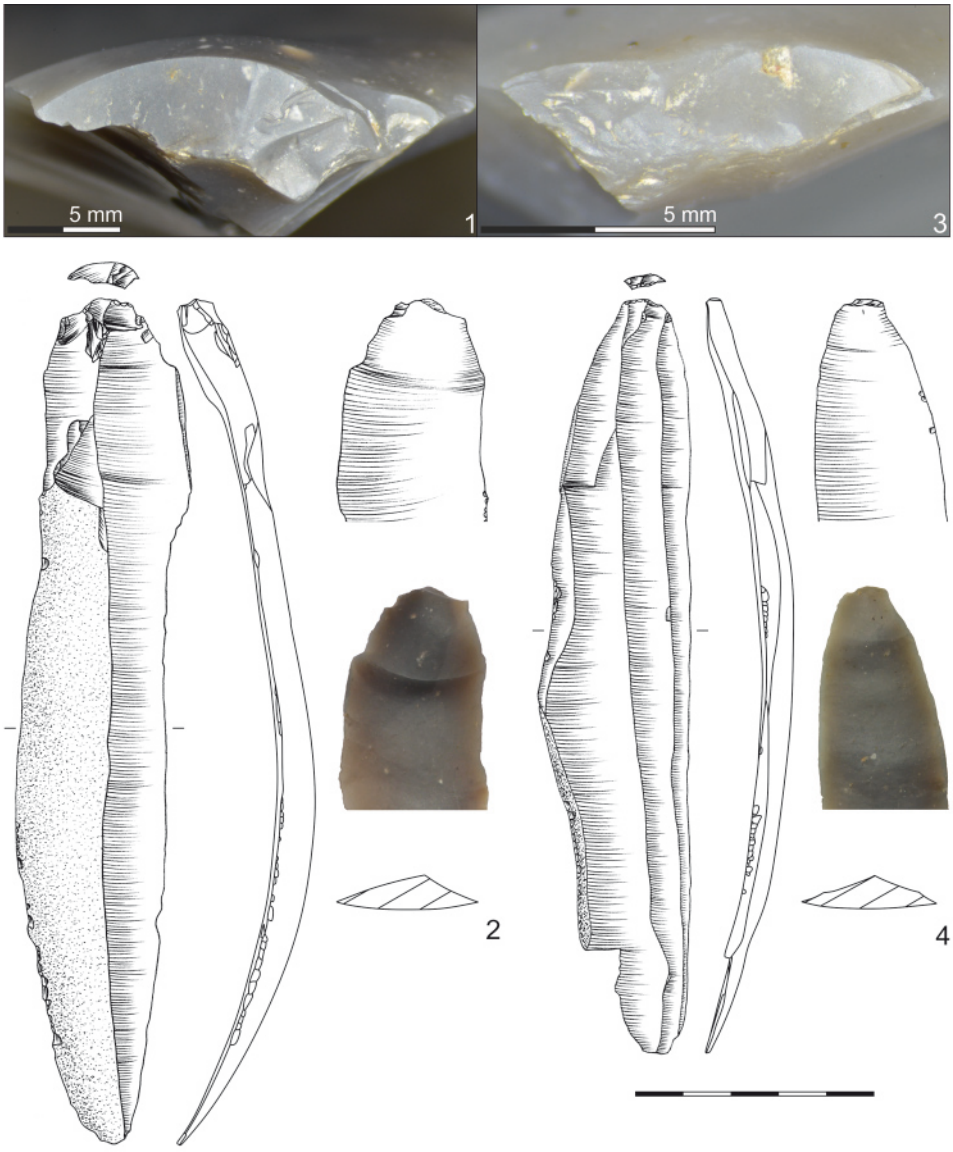

Fig. 4. Świątniki, Jędrzejów district.
1, 2 – Flint blade no. MNKi/A/433/9; 3, 4 – Flint blade no. MNKi/A/433/5.
Drawn by P. Mączyński, photo by P. Mączyński, B. Polit

6. Blade with negative scars on the dorsal surface; one of the lateral edges is irregularly outlined and partly cortical; convergent distal end slightly chipped; a 13 mm bend is present in the mesial portion; polygonal cross-section; gabled, faceted butt; abraded butt edge; trimming negatives; striking angle slightly below 90°; subtle lip below the butt; moderately prominent bulb; unintentional segmental retouch of one of the edges on the dorsal side; dimensions: 158 × 31 × 8 mm; metric category: 75; weight: 33 gm; Volhynian flint, vitreous, dark steel-grey, with brighter spots. Inventory number: MNKi/A/433/5 (Fig. 4: 3, 4).

7. Secondary crested blade, partly cortical; one of the lateral edges irregularly outlined; convergent distal end of cortical character, slightly chipped; a 27 mm bend is present in the mesial portion; polygonal cross-section; gabled, faceted butt; abraded butt edge; trimming negatives; slightly obtuse striking angle; lip below the butt; clearly arched bulb with a bulb scar; dimensions: 189 × 38 × 10 mm; metric category: 85; weight: 70 gm; Volhynian flint, vitreous, dark steel-grey with brighter spots. Inventory number: MNKi/A/433/10 (Fig. 5: 1, 2).

8. Blade with one cortical side; one of the edges irregularly outlined; convergent distal end; a 13 mm bend is present in the mesial portion; trapezoidal cross-section; flat butt bearing a single negative scar; crushing of the butt edge; striking angle slightly below 900; subtle lip below the butt; moderately prominent bulb with a bulb scar in the form of a tear-shaped quasi-negative scar; dimensions: 137 × 31 × 7 mm; metric category: 74; weight: 33 gm; Volhynian flint, vitreous, homogeneous, dark steel-grey. Inventory number: MNKi/A/433/6 (Fig. 5: 3, 4).

9. Blade with negative scars on the dorsal surface; one of the edges irregularly outlined; convergent distal end of cortical character; a 27 mm bend is present in the distal portion; trapezoidal cross-section; flat, faceted butt bearing a single negative scar; abraded butt edge; trimming negatives; striking angle slightly below 90°; moderately prominent bulb with a tear-shaped quasi-negative scar; unintentional segmental retouch of one of the edges on the dorsal part; dimensions: 198 × 31 × 8 mm; metric category: 76; weight: 51 gm; Volhynian flint, vitreous, dark steel-grey with brighter spots. Inventory number: MNKi/A/433/11 (Fig. 6: 1, 2).

10. Blade with negative scars on the dorsal surface; regularly outlined lateral edges, convergent distal end slightly chipped; a 12 mm bend is present in the mesial portion; trapezoidal cross-section; gabled, faceted butt bearing two negative scars; trimmed/abraded butt edge; acute striking angle; lip below the butt; moderately prominent bulb; dimensions: 163 × 29 × 8 mm; metric category: 66; weight: 37 gm; Volhynian flint, dark steel-grey, vitreous, merging into matte, striped, bright steel-grey. Inventory number: MNKi/A/433/7 (Fig. 6: 3, 4).

11. Blade with negative scars on the dorsal surface; regularly outlined lateral edges; broken off distal end of unspecified type; a 20 mm bend is present in the mesial portion; triangular cross-section; gabled, faceted butt bearing two negative scars; trimming negatives;

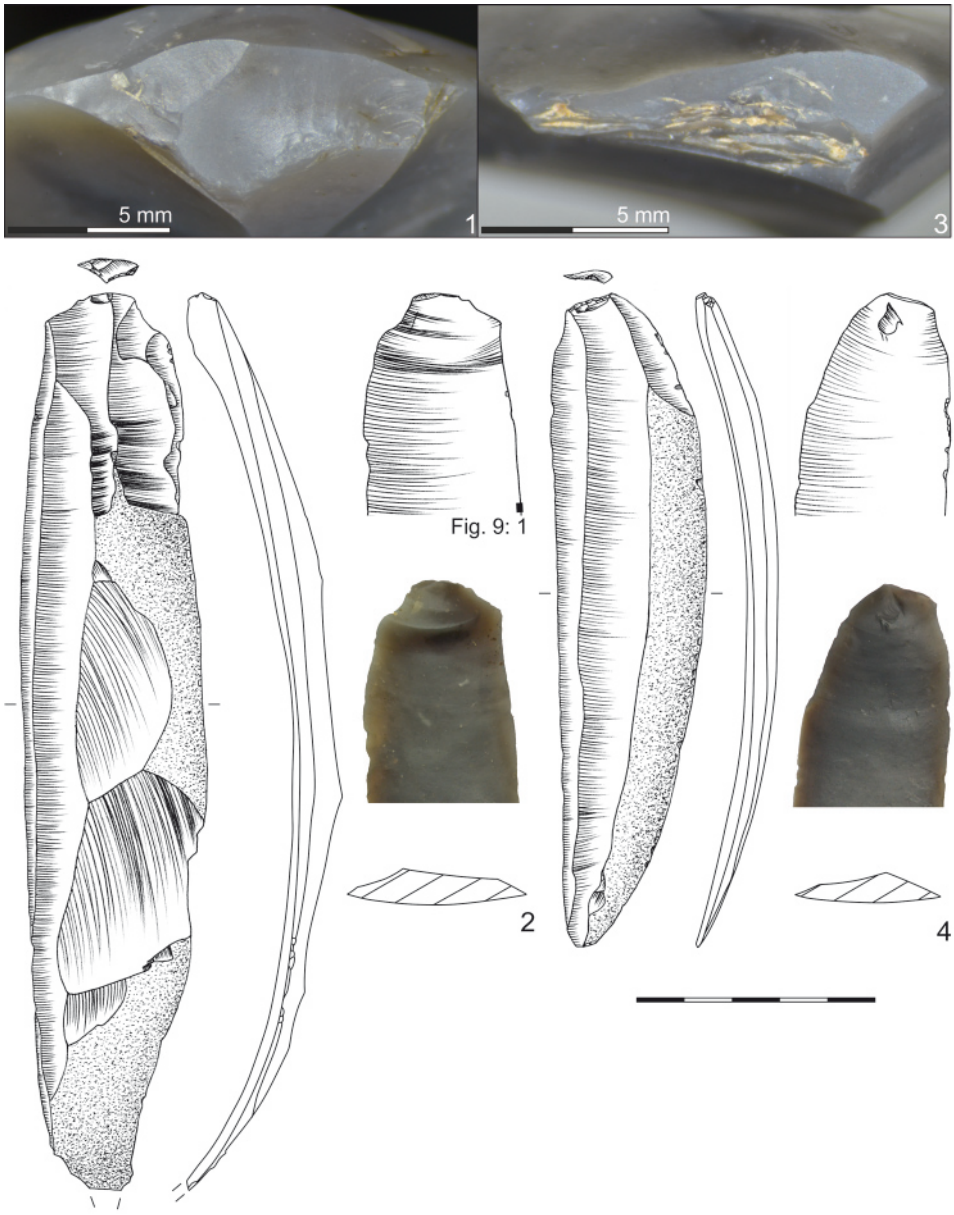

Fig. 5. Świątniki, Jędrzejów district.
1, 2 – Flint blade no. MNKi/A/433/10; 3, 4 – Flint blade no. MNKi/A/433/6.
Drawn by P. Mączyński, photo by P. Mączyński, B. Polit

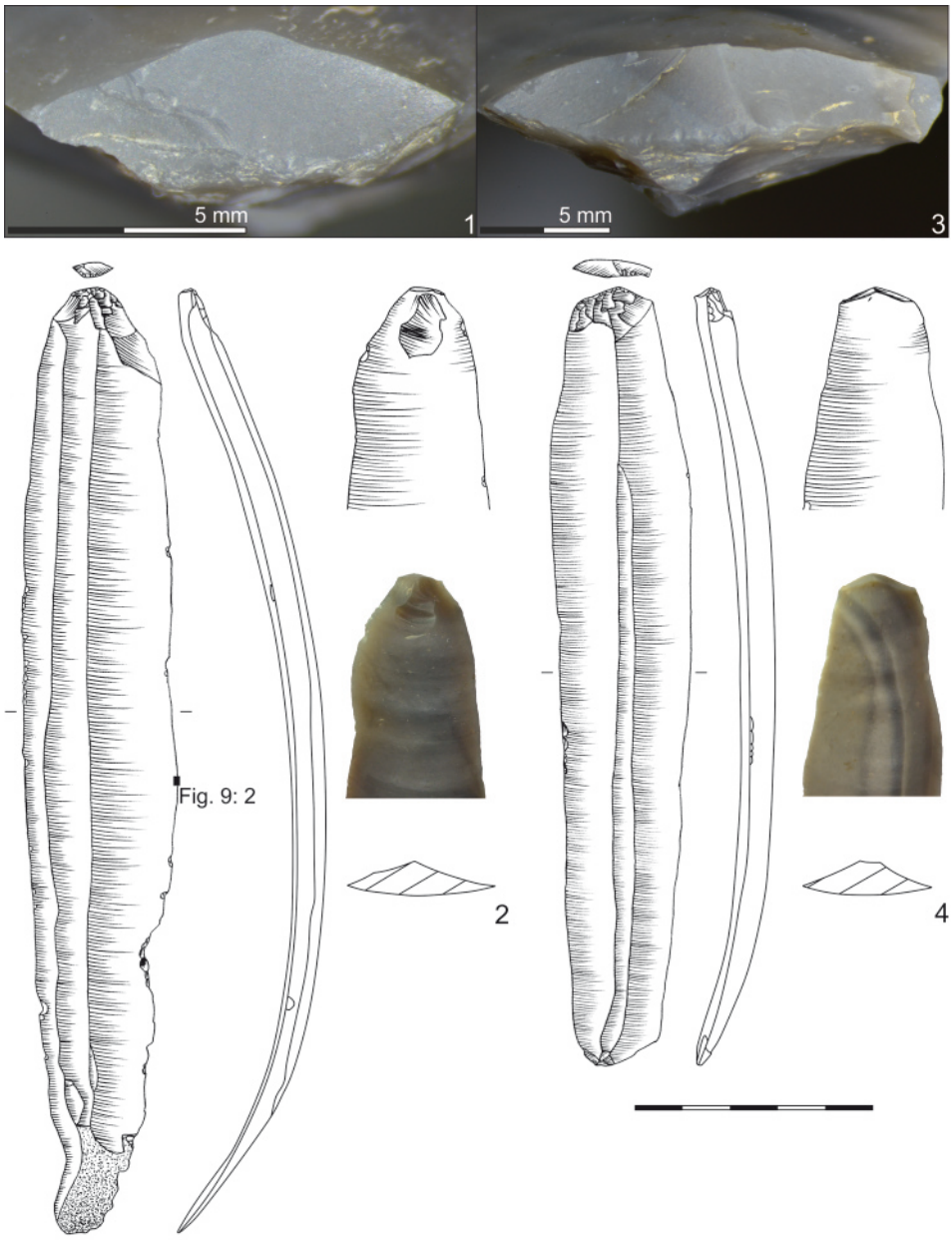

Fig. 6. Świątniki, Jędrzejów district.
1, 2 – Flint blade no. MNKi/A/433/11; 3, 4 – Flint blade no. MNKi/A/433/7.
Drawn by P. Mączyński, photo by P. Mączyński, B. Polit

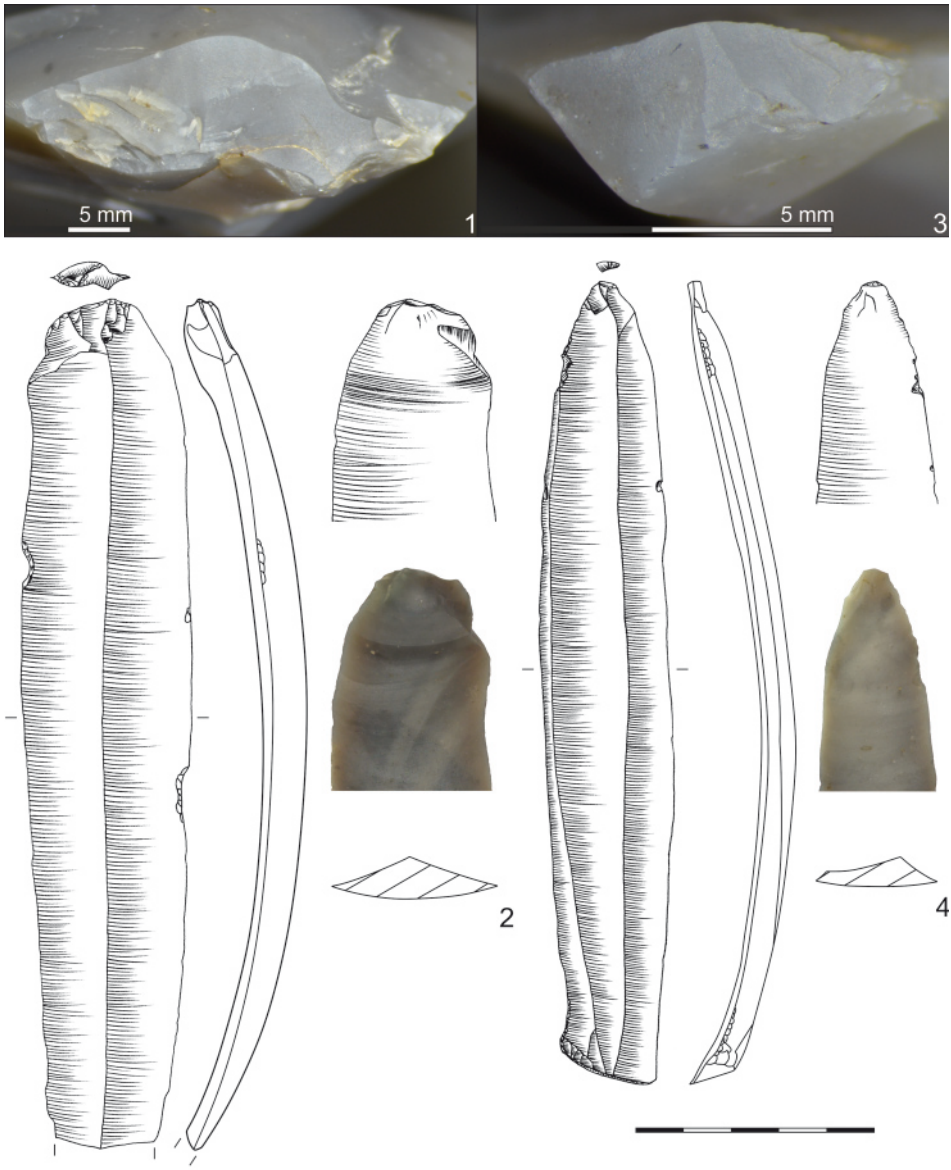

Fig. 7. Świątniki, Jędrzejów district.
1, 2 – Flint blade no. MNKi/A/433/12; 3, 4 – Flint blade no. MNKi/A/433/8.
Drawn by P. Mączyński, photo by P. Mączyński, B. Polit

obtuse striking angle; lip below the butt; clearly arched bulb with a bulb scar; unintentional segmental micro-retouch of both edges on the dorsal part; dimensions: 179 × 35 × 10 mm; metric category: 76; weight: 64 gm; Volhynian flint, vitreous, dark steel-grey, merging into striped, bright steel-gray. Inventory number: MNKi/A/433/12 (Fig. 7: 1, 2).

12. Blade with negative scars on the dorsal surface; regularly outlined lateral edges; slanting distal end of cortical character; a 17 mm bend is present in the mesial portion; trapezoidal cross-section; gabled, faceted butt; abraded butt edge; trimming negatives; striking angle slightly below 90°; lip below the butt; moderately prominent bulb with concentrically arranged bulb scars; dimensions: 168 × 26 × 7 mm; metric category: 66; weight: 37 gm; Volhynian flint, vitreous, dark steel-grey with brighter spots. Inventory number: MNKi/A/433/8 (Fig. 7: 3, 4).

MORPHOMETRIC ANALYSIS

The blades are very well preserved. Furthermore, they are not covered with patina. The distal end of only one specimen (no. 11) is visibly broken off. The distal ends of six others are slightly chipped (nos. 1, 3, 4, 6, 7, 10). As experiments have shown, this type of damage can be the result of detaching blades from the core (Pelegrin 2006, fig. 2).

The discussed blades have very regular shapes. A remarkable repeatability of morphometric features also characterizes the collection. In the descriptions of particular specimens, we paid attention to the irregular outline of usually a single edge, but this means only slight undulation or convexity, mainly in artefacts having one cortical side (nos. 4, 5, 7, 8). Such blade shapes result from broadening the striking surface to the cortical sides bearing slight irregularities of different kinds, which did not affect the blade detachment effectivity, so there was no need to remove them during core shaping. Considerable portions of some blades have edges parallel to the axis and to ventral ridges, and their masses are evenly distributed: they are thicker in the butt-bulb area and gradually get thinner towards the distal end. In the side view, they all are bent: nine specimens in the mesial part, and the rest in the distal portion. The bends are various: slight ones of 12-13 mm in the mesial portion (nos. 2, 10, 6, 8) and less frequently in the distal portion (no. 4), average ones of 17 mm in the distal portion (no. 12), sharp ones of 20-23 mm in the mesial (nos. 1, 5, 11) or in the distal portion (no. 3), and even very sharp bends of 27 mm in the mesial (no. 10) or in the distal portion (no. 9).

The dorsal surfaces of only two specimens are completely covered with negative scars (nos. 10, 11); three blades are covered with cortex on one side (nos. 4, 5, 8), and two others bear vestigial cortex: on one side (no. 6) and in the mesial portion (no. 3); three specimens have cortical distal ends (nos. 1, 9, 12). The collection also includes a partly cortical secondary crested blade (no. 7) and a blade with negative scars on the dorsal surface (bearing a segmental secondary crest in the butt-bulb area: made on the core, probably in order to

Table 1. Morphometric characteristics of the blades from the Świątniki hoard (maximum sizes were measured; M – mesial bend; DE – distal bend)

No.	Débitage taxon	Length	Width	Thickness	Metric category	Height of the bend (mm)	Weight (grammes)	Cross-section	Remarks	Fig.
1	with negative scars on the dorsal surface and with a cortical distal end	179	26	10	66	20 – M	47	triangular	segmental micro-retouch of the right edge, unintentional traces of wrapping (?)	2: 1
2	with one cortical side	140	28	6	65	13 – M	24	trapezoidal		2: 2
3	with negative scars on the dorsal surface and with cortex in the mesial portion	172	30	10	66	21 – D	47	triangular/ trapezoidal	traces of wrapping (?)	3: 1
4	with one cortical side	160	34	9	75	13 – D	41	triangular	segmental micro-retouch on the dorsal surface, unintentional	3: 2
5	with one cortical side	177	31	9	76	23 – D	44	triangular	segmental micro-retouch on the dorsal and the ventral surface, unintentional	4: 1
6	with negative scars on the dorsal surface	158	31	8	75	13 – M	33	polygonal	segmental retouch of one egde on the dorsal surface, unintentional traces of wrapping (?)	4: 2
7	secondary crested blade; partly cortical	189	38	10	85	27 – M	70	polygonal	traces of wrapping (?)	5: 1; 9: 1
8	with one cortical side	137	31	7	74	13 – M	33	trapezoidal	traces of wrapping (?)	5: 2
9	with negative scars on the dorsal surface and with a cortical distal end	198	31	8	76	27 – M	51	trapezoidal	segmental micro-retouch of one egde on the dorsal surface, unintentional traces of wrapping (?)	6: 1; 9: 2
10	with negative scars on the dorsal surface	163	29	8	66	12 – M	37	trapezoidal	traces of wrapping (?)	6: 2
11	with negative scars on the dorsal surface	179	35	10	76	20 – M	64	triangular	traces of wrapping (?)	7: 1
12	with negative scars on the dorsal surface and with a cortical distal end	168	26	7	66	17 – D	37	trapezoidal	traces of wrapping (?)	7: 2
	minimum	**137**	**26**	**6**			**24**			
	maximum	**198**	**38**	**10**			**70**			
	average	**168,3**	**30,8**	**8,5**			**44**			
	standard deviation	**18,12**	**3,53**	**1,38**			**13,11**			

Fig. 8. Colour diversity of Volhynian flint based on the example of the materials from Świątniki. Photo by P. Mączyński

remove some irregularity of the structure). Their dorsal surfaces bear negative scars after the previous removal of two (nos. 1, 3, 4, 5, 8, 11), three (nos. 2, 9, 10, 12), or, exceptionally, four blades (no. 5). Thus, their cross-sections are triangular (4 specimens), triangular/trapezoidal (1 specimen), trapezoidal (5 specimens), or polygonal (1 specimen). Cracking ripples on the ventral surfaces are distinct only in the butt- bulb areas, as well as near the bent distal ends. They are not visible in other sections.

All the specimens bear in their butt-bulb sections traces of procedures preceding blade detachment: trimming, faceting, and abrading the edge of the striking platform. In the planar projection, the butts are mostly gabled (8 specimens), bearing two (4 specimens) or several negative scars (1 specimen) created with delicate blows struck from the direction of the striking surface. Occasionally, facets cover the whole butt surface (3 specimens). Four blades have flat butts with one (2 specimens) or two negative scars (1 specimen), whereas one specimen has a flat butt completely covered with facet negatives. In nine cases, a blade bears a subtle or a prominent lip below the butt. In most cases, the angles between the butt and ventral surfaces are c. 90°; however, in eight specimens, they are marginally less than 90°, while one is slightly obtuse, and two others are acute. The bulbs are of various types: from moderately prominent (7 specimens), through slightly arched (1 specimen), to distinctly arched (3 specimens). Traces, in the form of concentric lines, were recorded in five specimens (nos. 1, 2, 7, 11, 12), and in two cases they take the form of tear-shaped quasi-negative scars (nos. 8, 9). An important technological feature of the analysed blades is their width in the bulb area, always greater than the width of the butt.

The blades from Świątniki are macrolithic. Their length varies from 137 to 190 mm, their width from 26 to 38 mm, and their thickness from 6 to 10 mm. They represent three metric categories: 60, 70, and 80. In each category, they belong to classes five (65, 75, 85) and six (66, 76). They are also thin, which attests to their slenderness, or even considerable slenderness (Dzieduszycka-Machnikowa and Lech 1976, 31-33). The weight of particular specimens varies from 24 to 70 gm, and the entire collection weights 528 gm (Table 1).

The blades cannot be refitted together, although they represent similar raw material textures. A technical blade present in the collection (partly cortical secondary crested blade), as well as three specimens with single cortical sides, indicate an early exploitation stage of a single striking platform core with a convex striking surface, cortical sides and apex, and preserved scars of preparation. The homogeneous technological style of the analysed blades allows us to suspect that at least some of them come from a single core. Insignificant hue differences of the dark steel-grey colour, and the presence of spots and stripes in some specimens do not contradict this assumption. Such variations of siliceous mass are macroscopically observable in large Volhynian flint concretions (Fig. 8).

USE-WEAR ANALYSIS

The microscopic observations were conducted using two types of microscopes. In an early phase of the research, a Carl Zeiss Discovery V8 stereoscopic apparatus was used, providing actual magnification between 10x and 80×. The microscope was equipped with a dedicated source of cold LED light. The first stage of the research concerned searching for potential working edges (van Gijn 1989, 13). The next step was observing the artefacts with the use of a Meiji Techno MC-50T apparatus. It is a metallographic microscope that allows much greater magnifications (between 50× and 500×). At this stage of research, we focused on the observation of use-wear abrasions and traces in the form of lines.

Photographic documentation of the recorded patterns was also prepared. Prior to the analysis, in order to remove fingerprints, the flint artefacts were cleaned with acetone. The applied method of conducting microscopic observations does not deviate from general guidelines for such research (van Gijn 1989, 13; Korobkowa 1999, 15; Osipowicz 2010, 24, 25). Also, the conceptual system and the terminology employed in the project were based on the nomenclature employed in archaeological literature (van Gijn 1989, 3-8, 16-20; Osipowicz 2010, 25-35 – further literature there). The primary goal of the research was the reconstruction of the manner of use of the blades from the hoard and the identification of the materials processed with them. The analyses also focused on identification of traces originating from the use of frames and wrappings/sheaths.

The analysed artefact group is characterised by a good state of preservation. The surfaces of certain specimens are only covered with bright post-depositional abrasions, penetrating or covering the flint. Additionally, the lateral edges of all the artefacts bear micro-

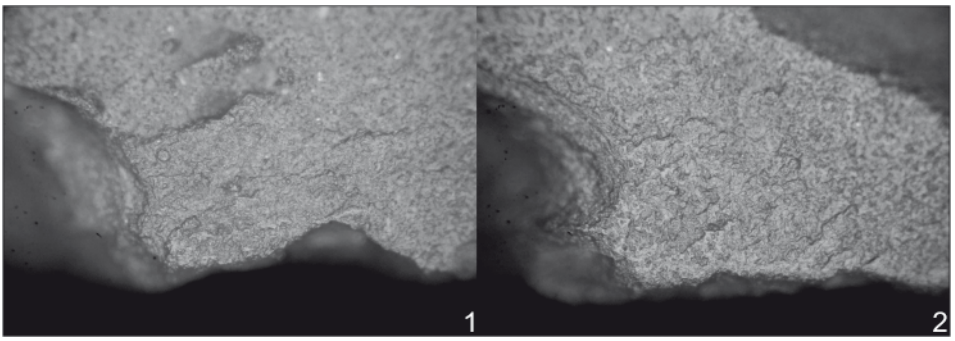

Fig. 9. 1, 2 – Microscopic photographs of use-wear traces observed on the surfaces of flint blades, resulting from keeping the items in wrappings? (1 – no. MNKi/A/433/10; 2 – no. MNKi/A/433/11). Photo by P. Mączyński (1, 2 – 200x magnification, 20x objective lens)

retouch that takes the form of continuous, or occasionally scattered, two-step or multi-step, steep chippings with step or feather terminations. The origin of the micro-retouch on the relatively delicate edges could also be associated with the considerable weight of the blades, which, through accidental pressure, could lead to creation of the chippings. It appears that such patterns are not of use-wear character. Most possibly, they were created accidentally, as a result of bumping against a hard surface, both in prehistory and during activities accompanying the storage of the artefacts in the museum collection.

The performed analysis made it possible to observe pale, indistinct polish on protruding points and lateral edges (Fig. 9: 1, 2) on most of the artefacts (Fig. 2: 2; 3: 2; 4: 4; 5: 2, 4; 6: 2, 4; 7: 2, 4). The patterns may indicate that the blades were kept in a soft material wrapping, e.g. during transport, in order to protect their delicate edges (cf. Rots 2010, pl. 90, 91). This hypothesis is plausible, taking into consideration the site of the discovery, 350 km in a straight line from the Volhynian flint deposits. The fact that all blades are entirely preserved, as well as that they bear abrasions, as mentioned above, makes us suspect that they were deposited in a wrapping or in an organic container and, in modern times, they were ploughed up together, in a single ridge/clod of earth. Usually, during casual discoveries, at least some of the artefacts are damaged, blades are broken, and some fragments are missing (Libera 1990, fig. 1: a-f; Zakościelna 1997, fig. 1, 2, 4, 5; Florek and Zakościelna 2003, fig. 3: 4, 6: 4, 8: 2; 9: 2, 3, 1, 3-5).

BLADE PRODUCTION TECHNIQUE

The above mentioned morphological and metrical features of the blades from Świątniki should indicate their manner of production. Two methods, distinguished in prehistoric materials, and experimentally tested, should be taken into consideration: the indirect per-

Fig. 10. Reconstruction of the process of blade production by indirect percussion. Drawn by M. Synak, based on Pelegrin 2012

Fig. 11. Reconstruction of the process of pressure blade production with a lever. Drawn by M. Synak, based on Pelegrin 2012, fig. 18.10

cussion (Fig. 10) and the lever pressure technique (Fig. 11). The question is challenging, because they both enable the production of macrolithic blades, although applying considerable pressure obviously gives longer blades, whose length extends 20, 30, or even 40 cm (Manolakakis 2005, e.g. pl. 95: 1, 2; pl. 106: 1, 2; pl. 108: 1). Both techniques have been accurately described and discussed in archaeological literature, although attention has been also paid to considerable similarities between the morphological features of the blades obtained with the use of these two methods (Girâ 1997, 68-75; Migal 2002, 264; Pelegrin 2006, 39-47; Budziszewski and Grużdź 2013, 167-169), which makes it difficult to come to a final conclusion, especially with regard to specimens whose length does not exceed 20 cm. Jacques Pelegrin (2006, 41, 42) even stated that the indirect percussion technique can give results very similar to those obtained by using the lever pressure method, and various positions of core stabilisation make it also possible to control the profile shapes of such blades. As experiments indicate, the following elements affect the similarities in morphological features: core shape (striking surface curvature) and the method of its stabilisation during blade production, the part of the striking platform to which force is applied (flat or convex: at the junction of two negative scars of platform preparation), and the use of a copper or antler intermediate punch – or in the case of the pressure method, the type of lever ending made of copper or antler (Migal 2002, 258; 2006, 391-395; Pelegrin 2006, 39-47).

Generally, it is thought that flint half-products obtained with the use of the indirect percussion technique are less regular, with regard to both the outline of their lateral edges and the irregular mass distribution (it can be greater in the distal portion than in the butt-bulb area – cf. Migal 2003, 60; Florek and Zakościelna 2003, fig. 3: 1, 4: 4, 6: 1, 3, 9: 1; Pelegrin 2006, fig. 2). Attention is also paid to frequently appearing bends, occasionally very sharp, especially in the distal portions, and to the rather stumpy dimensions of the blades, which make them more massive than those obtained through lever pressure (Migal 2003, 60; Pelegrin 2006, 42; Budziszewski and Grużdź 2013, 168). Nevertheless, these features (except the massiveness), especially in the case of specimens not longer than 20 cm, can characterise specimens produced with the use of both techniques (cf. Pelegrin 2006, fig. 1, 2).

Core shape, and, above all, the degree of the curvature of the striking surface influence the shape of blade profiles. If a flat, heart-shaped core is exploited with the use of a lever (Pelegrin 2002, fig. 2; Zakościelna 2018, fig. 3), the blades are nearly straight or slightly bent in the mesial, and, less frequently, in the distal portion. In the case of sub-conical cores (Zakościelna 1996, pl. XXV, XXVI: 4, XXIX: 1; Migal 2006, fig. 4, 5), the bend is much sharper and can move to the distal portion (Mączyński and Zakościelna 2017, fig. 2, 3).

Technological features of the butt-bulb area depend on the part of the striking platform to which force (strike or pressure) is applied. In cases in which an antler intermediate punch is used, the butt is planar, flat, bearing one or several negative scars (Pelegrin 2006, fig. 3: a). Nevertheless, if the strike force is transmitted to an intermediate punch having

a copper ending and the point of application is at the junction of two negative scars left after preparation of the striking platform, their shape can be gabled or approximately so (Pelegrin 2006, fig. 3: b). In both cases, the bulbs are generally somewhat large and arched, but flat, moderately prominent bulbs, nearly invisible in blade profiles, also occur (Pelegrin 2006, fig. 2, 3: a-K2.4, b-Cu8.3). In the case of lever pressure, if an antler ending was used and the force was applied to a flat surface of a striking platform, the blade butts are flat, bearing single negative scars, and bulbs are prominent, but shorter. Thus, features similar to those resulting from striking a flat platform with the use of an antler intermediate punch appear (Pelegrin 2006, fig. 3: c – cf. fig. 3: a). When a copper ending is employed, butts that are distinctly gabled in planar projection occur only when force is applied to a faceted striking platform or at the junction of ridges left by two negative scars. Regarding the lip, J. Pelegrin (2006, 42), based on the results of his experiments, stated that this feature appears after using a lever with an antler ending.

Coming back to the blades from Świątniki, it should be stated that most of their morphometric and technological features indicate that they were detached from the core with the use of considerable lever pressure. The only thing that differentiates them from blades obtained through this method (whose profiles are generally straight or slightly bent) is the sharp, or even very sharp bend of most of the analysed specimens, which is especially typical of products of the indirect strike method. Nevertheless, the bend, distinguishing the blades from Świątniki, could be the result of exploiting a sub-conical, and not a flat, heart-shaped core. Such cores employed in the production of macrolithic blades (often with conical apices) are known from Trypilian culture sites, above all from a workshop settlement in Bodoki, located directly on Volhynian flint deposits (Skakun 2004, fig. 3), whereas the finds from Polish territories are associated with the Lublin-Volhynian culture (Zakościelna 1996, pl. XXV, XXVI: 4, XXIX: 1).

Even if the question of the technique employed in the production of the blades from the Świątniki hoard is challenging, we can establish with greater certainty the raw material of which the lever ending, used in the detachment of particular specimens from the core, was made. Most of them bear a subtle lip (nos. 3-8, 10, 12) that co-occurs with a gabled butt, which indicates that an antler ending was used (cf. Pelegrin 2006, fig. 3: d). Other blades lack this feature. Additionally, if a copper ending is used, flat butts bear a characteristic crack in the form of a circle (or a partial circle), with a diameter of 2-3 mm. It appears that the mark is a result of the greater hardness of the copper ending (Pelegrin 2012, fig. 18.18; 19.19). Traces of this type have not been recorded in the collection from Świątniki.

CULTURAL ATTRIBUTION

The question of deposits/hoards of Volhynian flint long blades is inextricably connected with difficulties in the cultural identification of prehistoric artisans. Although it is possible for us to fairly accurately establish the time frame of blade macrolith production and

utilisation, limited to the Eneolithic, assigning them to a particular culture is very difficult, if not impossible. The metric and morphological characteristics, as well as the technological style of the blades, are not helpful in solving this problem. All the potential premises are indirect and not useful in this matter (Libera and Zakościelna 2011, 98, 99). In the case of the blades from Świątniki, we cannot employ one of the major indirect premises – that is, the location of the finding in a particular environment – because we do not know the exact site of the discovery (cf. Bronicki 1995; Florek and Zakościelna 2003, 58). The cultural attribution of long and marcrolithic blades has been comprehensively reviewed (Migal 2002, 261; 2006, 287, 388; Florek and Zakościelna 2003, 55-59; Libera and Zakościelna 2011, 98, 99). Here, we will only state that at least three Eneolithic groups should be taken into consideration: the Trypilian, Lublin-Volhynian, and Funnel Beaker cultures, in which flint production underwent specialisation and whose artisans had the technology of blade macrolith production with the use of both the intermediate antler punch and the lever pressure. Moreover, the populations of the Trypilian and Lublin-Volhynian cultures had direct access to the Volhynian flint deposits, thus the blades from Świątniki should be associated with them. This fact is not, however, decisive concerning the cultural identification of the hoard. The set was discovered far from the territory of the Trypilian culture. In this regard, this culture should be excluded from consideration. There are also many indications that the Lublin-Volhynian culture population did not hoard half-products. Macrolithic blades have been discovered only in richly equipped male graves of this archaeological culture (Zakościelna 2008; 2010, 166, 167). Therefore, only the Funnel Beaker culture remains. Its people used to store flint products in hiding places within settlements (*vide* Gródek, site 1C – Libera 2003), as well as in isolated places, especially of aquatic or semi-aquatic character (Kadrow 1989; Bronicki 1993; Libera and Zakościelna 2011).

CONCLUSION

So far, 10 hoards of Volhynian flint macrolithic blades and blade tools have been recorded in the territory of Poland. Most of them are located in the Lublin region, in the interfluve of the Wieprz and Bug Rivers (Libera and Zakościelna 2010, fig. 1, table 2). The deposits/hoards are linked with particular aspects of living in Eneolithic societies: raw material provisions, the establishment and maintenance of social bonds (including intercultural ones), ceremonial traditions, and the circulation of prestige items (Libera and Zakościelna 2011, 89, 102-104; Zakościelna and Libera 2013, 289, 290). They are evidence of strongly developed exchange contacts in the Eneolithic, governed by the rules of exchanging processed products, and not raw materials. The discovery from Świątniki, along with the 19th century find from Balice, is the only hoard of Volhynian flint macrolithic blades located in the left drainage basin of the Vistula River (Kaflińska 2006, fig. 13), in the Wodzisław Hummock (Świątniki) and in the Pińczów Hummock (Balice).

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