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Remarks on using tools with truncated edges in the Lublin-Volhynian culture on the example of materials from site no. 7 in Las Stocki, Puławy County

Abstract

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This article tackles the issue of the use of truncations by the population of the Lublin-Volhynian culture. The corpus of sources for their analyses is a group of 27 tools discovered during the research of the Las Stocki settlement, site 7. Microscopic observation made it possible to separate a considerable group of artefacts bearing use-wear traces on their surfaces. The most numerous were items used for processing plant material and wood. Other activities, like processing stone/pottery, hide, and other unspecified materials were recorded sporadically. Another research problem was the attempt to reconstruct the biographies of the stone tools. The analyses indicated that the materials were only partly useful in the research. This was caused by the poor preservation state of the artefacts and of the recorded use-wear traces. Tackling this issue gave the best results in the case of items used for cutting siliceous plants, which undoubtedly resulted from the distinct character of such use-wear patterns.

Keywords: Lublin-Volhynian culture, use-wear analysis, truncations, chocolate flint

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Introduction

Attempts to recognise the functions of flint tools linked with the Lublin-Volhynian culture (hereinafter referred to as L-WC) have been made for several decades. First, the main interest of scholars was focused on the analysis of materials representing grave inventories. The forerunner of research concerning this problem was Natalia Skakun, who, in the year 2003, analysed 16 microliths from grave 4 in Książnice 2, Busko County (Zakościelna 2010, 139, footnote 9; Wilk 2004, 237; Kufel-Diakowska and Wilk 2018, 247, 248). This trend was later continued by other scholars. One of them was the author of this article, who analysed sepulchral materials from such sites as: Złota, Sandomierz County, site “Grodzisko II”; Strzyżów, Hrubieszów County, sites 1A and 2A; Krasne Kolonia, Chełm County, site 16 (Mączyński and Zakościelna 2017a, 340–346; 2017b, 113–116). Simultaneously, further examination

of the materials from Książnice was conducted (Wilk and Kufel-Diakowska 2016, 157–163; Kufel-Diakowska and Wilk 2018, 260–264).

Inventories from settlements have been studied much less frequently. Already in 2015, a modest sample of materials from site 7 in Las Stocki, Puławy County, was analysed. The results of the examination were presented during workshops organised by the SKAM Flintreaders Society (Stowarzyszenie Krzemieniarskie SKAM) (Mączyński 2015, 17, 18). Only inventories from the fortified settlement in Sandomierz – Wzgórze Zawichojskie (Zawichost Hill), Sandomierz County, were presented in an extensive publication. Its author, Małgorzata Winiarska-Kabacińska, analysed 150 flint artefacts, qualified as tools, blades, flakes, and production debris, regarding their functional aspects (Winiarska-Kabacińska 2017, cf. Table 1).

In this list, publications presenting 2 collections of macrolithic blades made of chocolate flint, discovered

in Krowia Góra, Sandomierz County, and in Pełczyska, Pińczów County, should be mentioned (Skakun *et al.* 2008, 430–433; Mączyński and Polit in press).

Although the discussed research represents a relatively numerous group of analyses, not many artefacts qualified as truncations were examined. The only materials containing this category of tools come from Złota “Grodzisko II”. On this site, in symbolic grave no. 122 located in the settlement, a rich inventory containing the mentioned truncation was discovered and which included a numerous group of clay

vessels and a collection of flint tools (Mączyński and Zakościelna 2017b, 115). The next 4 tool specimens come from the settlement in Sandomierz, Wzgórze Zawichojskie (Zawichost Hill). The researcher Winiarska-Kabacińska demonstrated that these artefacts had been used for performing various activities connected with cutting cereals, piercing stones, and scraping hide (Winiarska-Kabacińska 2017, 255, 258). This article presents the results of the analysis of 27 similar tools discovered on the L-VC settlement site in Las Stocki (Table 1).

Table 1. Las Stocki, Puławy County, site 7. List of the results of the use-wear traces analysis. Legend: Ch. – chocolate flint; Ś. – Świeciechów flint; V. – Volhynian flint.

No.	Location	Morphology	Functional designation	Raw material
1	2	3	4	5
1	surface of the site	oblique truncation	– no use-wear traces were recorded	burnt
2	surface of the site	oblique truncation	– no use-wear traces were recorded	ch.
3	surface of the site	trapezoidal double truncation (Fig. 3: 2)	– whittling wood (Fig. 3: 1) – edge probably used	ch.
4	surface of the site /ploughed field	oblique truncation/retouched blade – damaged (Fig. 3: 4)	On the ridges between the negative scars and on protruding points, there is polishing, having a coarse texture, which abraded the natural microrelief of the flint. In some places, scars/linear fissures appear. These traces probably result from keeping the retouched blade in a sheath, presumably made of leather (Fig. 3: 5). – visible linear traces indicating that the tool was used for cutting or that it was kept in a sheath (Fig. 3: 6) – scraping (hide?) – scraping material of unspecified type – hide? (Fig. 3: 7) – filing material of unspecified type – soft stone? (Fig. 3: 7) – strike-a-light (Fig. 3: 3)	v.
5	ploughed field	end scraper/truncation (Fig. 4: 1)	– edge probably used – scraping material of unspecified type?	ch.
6	ploughed field	trapezoidal double truncation (Fig. 4: 2)	– cutting siliceous plants (herbaceous plants/reed?)/whittling soft wood? (Fig. 4: 4)	ch.
7	ploughed field	oblique truncation – damaged (Fig. 4: 3)	– processing siliceous plants/soft wood (young shoots/branches?) – most possibly cutting (Fig. 4: 5) – cutting soft material – most possibly hide (Fig. 4: 5)	ch.
8	ploughed field	oblique truncation	– no use-wear traces were recorded	ch.
9	ploughed field	oblique truncation (Fig. 4: 6)	– scraping wood/soft bone	ch.
10	ploughed field	straight truncation	– no use-wear traces were recorded	ch.
11	ploughed field	straight truncation	– scraping soft stone – cutting soft material	ch
12	pit 5	oblique truncation (Fig. 4: 7)	– cutting siliceous plants	ch.
13	pit 5	trapezoidal double truncation? – damaged (Fig. 4: 8)	– cutting siliceous plants (Fig. 4: 9)	ch.
14	pit 19	oblique truncation (Fig. 5: 1)	– cutting siliceous plants	ch.

1	2	3	4	5
15	pit 19	oblique truncation (Fig. 5: 2)	– cutting siliceous plants	ch.
16	pit 19	trapezoidal double truncation? – damaged (Fig. 5: 3)	– scraping soft material – skin? (Fig. 5: 4) – working edge fragmentarily preserved – scraping hide?	ch.
17	pit 24	oblique truncation (Fig. 5: 5)	– edge probably used? – unspecified activity (Fig. 5: 6)	ch.
18	pit 26	straight truncation – damaged (Fig. 5: 7)	– cutting siliceous plants	ch.
19	pit 26	trapezoidal double truncation – damaged (Fig. 6: 1)	– cutting siliceous plants (Fig. 6: 2)	ch.
20	pit 26	trapezoidal double truncation (Fig. 6: 3)	– cutting siliceous plants (Fig. 6: 4) – unspecified activity – traces indicating that the tool was used for cutting and scraping/whittling plants/wood/soft bone?	ch.
21	pit 26	oblique truncation	– no use-wear traces were recorded	ch.
22	pit 28	oblique truncation – damaged (Fig. 7: 1)	– cutting siliceous plants – edge probably used – short-lived activity of cutting siliceous plants?	ch.
23	pit 28	straight truncation (Fig. 7: 2)	– scraping soft stone/clay/pottery? (Fig. 7: 4)	ś.
24	pit 39	oblique truncation/ retouched blade – damaged (Fig. 7: 5)	– scraping stone/traces of grinding (Fig. 7: 3)	ch.
25	pit 44	oblique truncation (Fig. 6: 5)	– cutting siliceous plants (Fig. 6: 6)	ch.
26	pit 44	oblique truncation – damaged? (Fig. 8: 3)	– cutting siliceous plants/soft wood? (Fig. 8: 5) – scraping material of unspecified type (Fig. 8: 1, 2) – cutting (Fig. 8: 4) and scraping (Fig. 8: 5) material of unspecified type	ch.
27	pit 54	straight truncation – damaged (Fig. 7: 6)	– scraping stone?	ch.

When performing the use-wear analysis, several basic research problems were focused on. The identification and interpretation of the use-wear traces observed on the surfaces of the tools and the reconstruction of the methods of their utilisation can be indicated as the most important question. This task consisted in determining the types of activities performed with the flint tools and establishing the types of processed materials. The question of identifying traces resulting from using hafts or from keeping the artefacts in sheaths is directly connected with this issue. Both categories of traces occur on the same surfaces, which frequently causes the blurring of earlier changes.

During the research, an attempt to present the tools' biographies, that is the sequences of the utilisation of particular items, was made. Tackling this research problem consisted in identifying the utilisation zones and establishing the chronologies of their creation in relation to each other, as well as to other changes occurring on the surfaces of the tools (like retouch or fractures). Annelou van Gijn, when considering this question, indicated that one might encounter several different situations: 1. The tool was hafted; 2 The tool was used for

more than one activity; 3 The different used zones were the results of a single but complex activity; 4. The tool had been subjected to 'special treatment' after its use (van Gijn 2010, 33). We should bear in mind that the moments of creating different utilisation zones might have been separated by long time intervals and they might have been linked with different phases of using particular edges. This is why the analysis had to include changes in the morphologies of the tools.

Materials

The analysed collection of artefacts was yielded by archaeological excavations in the Lublin-Volhynian culture settlement in Las Stocki, Puławy County, site 7 (Fig. 1). Site 7 in Las Stocki is located on the terraced foreland of a vast hummock of a latitudinal orientation. The hummock is composed of Cretaceous rocks covered with boulder clay and a loess layer. The thickness of the loess on the flat areas of the hummock is smaller and it averages 1 metre, but grows significantly thicker on the slopes due to strong erosion. It is the loess cover that made it possible to intersect the slopes

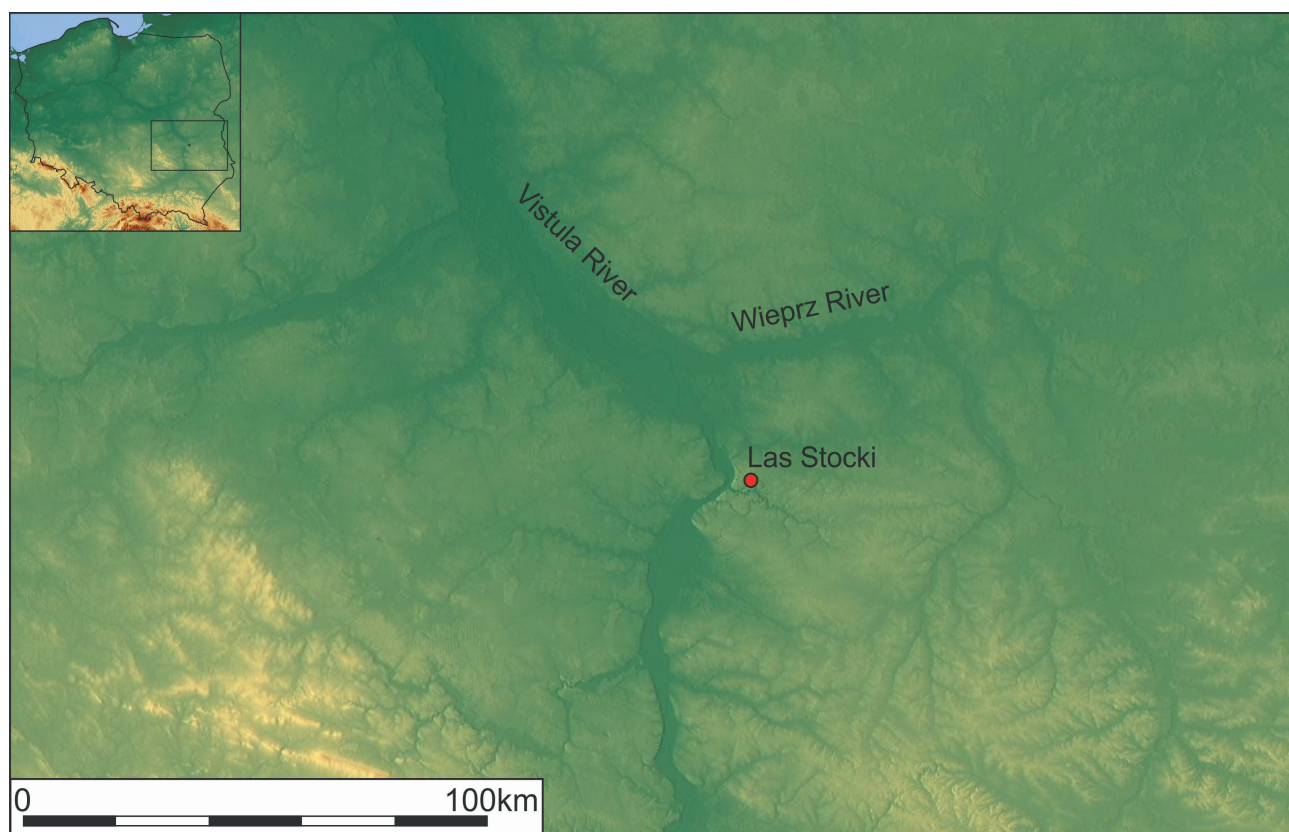


Fig. 1. Las Stocki, Puławy County, site 7. Location of the site. Drawings: P. Mączyński (<https://maps-for-free.com>).

of the foreland by numerous ravines of various sizes. From the north, the site is separated by a vast ravine, probably a valley of orientation close to latitudinal. From the south, the steep slope limiting the site is interspersed with smaller ravines which flow directly into the Bystra River. The southern and south-eastern slopes are very steep. Their altitude above the bottom of the valley reaches 40–45 metres. The research on this site, conducted in the years 1982–1985, was directed by Anna Zakościelna. During the 4 seasons of the research, the area of 1.700 square metres was explored and 2.207 flint artefacts were found (Fig. 2). This group included nearly 300 tools (see: Zakościelna 1996, 160). Chocolate flint was used in the production of most of the items while the others were made of erratic material. Świeciechów and Volhynian flint represent a minor addition (see: Zakościelna 1996, 132, 160). 27 tools from among the mentioned set were selected for the functional analysis.

Most of them (15 specimens) were discovered during the exploration of features and storage pits, in which they co-occurred with other flint artefacts and pottery. Due to the fact that the site yielded only several artefacts coming from other times, it was decided to also analyse materials from the upper surface

of the settlement, as well as those found in the topsoil (Zakościelna 1996, 13). The collection encompasses 24 truncations and also contains several combined tools. The morphology of these artefacts deviates significantly from the previously described group, although, due to the fact that their truncated edges are fairly distinct, they were included in the set. Moreover, because of the presence of macroscopically observable use-wear patterns, taking them into consideration will undoubtedly affect the character of the obtained information. One of them is an end scraper + truncation, two others are fragments of retouched blades (Figs. 3: 4; 4: 1; 7: 3), which were included into the group due to their tips corrected with oblique retouch.

The great majority of the artefacts were made on fragments of blades struck from single platform cores. Only one of the items was formed on a slender flake (Fig. 4: 6). Most of them are tools bearing negative on their dorsal sides. Nevertheless, a group of artefacts with visible cortical surfaces, arranged longitudinally to the axes of the tools or located on distal part, was also recorded. Only one specimen was entirely covered with cortex.

The group of the items selected for the microscopic observation is very diversified. Tools with slanting

truncated edges, typical for the L-VC, are predominant (Figs. 3: 1, 4; 4: 2, 3, 6–8; 5: 1–3, 5; 6: 1, 3, 5; 7: 1, 3). They are accompanied by a small number of artefacts with transverse edges (Figs. 5: 7; 7: 2, 6; 8: 3). Most of the tools are items with a single truncated edge. Only 5 artefacts have double truncated edges (Figs. 3: 1; 4: 2; 5: 3; 6: 1, 3). Sometimes, they are accompanied by segmented flat or semi-steep retouch of one of the sides (Figs. 3: 1, 4; 4: 7, 8; 5: 2; 6: 1, 3, 5; 7: 1, 2, 3; 8: 3). Several items represent the “Las Stocki” type (Figs. 5: 2, 5), characterised by having truncated edges shaped with flat pressure retouch (cf. Zakościelna 1996, 59–61). Among the single truncations, items retouched from the apex are predominant. The set is practically homogeneous in respect of the used raw material. Chocolate flint was used for the production of the vast majority of the tools (25 items). The others two were made of Volhynian (Fig. 3: 4) and Świeciechów flint (Fig. 7: 2).

Research analysis methodology

The performance of the analysis was divided into several phases, using two types of microscopes that made it possible to obtain various magnifications. In the first place, the artefacts were examined with the naked eye. The main purpose of this inspection was the selection of the materials due to their usefulness in performing the use-wear analysis. It consisted in excluding from the analysis forms with surfaces whose state made it impossible to make observations (considerably burnt surfaces or surfaces covered with strong patina). At this stage, attention was also paid to the presence of

residues that might have resulted from different types of operations performed with the use of the tools or from setting them in frames. If necessary, the artefacts were additionally observed with a stereoscopic or metallographic microscope.

The next phase of the identification of the use-wear patterns consisted in the observation of the surfaces with the microscopes. At this stage, prior to the analysis, the observed artefacts were rubbed with acetone or ethanol in order to remove fingerprints. First, the stereoscopic equipment, giving small magnification between 8× and 80×, was required. For that purpose, Carl Zeiss Discovery V 8 microscope was used. During this phase, the artefacts were held in the hand and the surfaces of the flints were observed with the microscope, with light falling from various angles. The aim of this preliminary analysis was to detect edges that had been presumably used or edges bearing use-wear patterns (cf. Vaughan 1985, 56; van Gijn 1989, 16). At this stage, the observation of such elements as the features of use-wear patterns and the presence of rounded edges was considered as the most important. In the case of certain activities, it was also possible to observe linear traces and some features of the polished areas, especially their extents.

The second phase of the prospection consisted in the observation of the flint artefacts with Meiji Techno MC-50T microscope, giving the actual magnification of 50×/100×/200×. Due to the considerable magnification of the image, the observation of the scars was impossible. The researchers focused on the interpretation of characteristic features of the polished areas (topog-

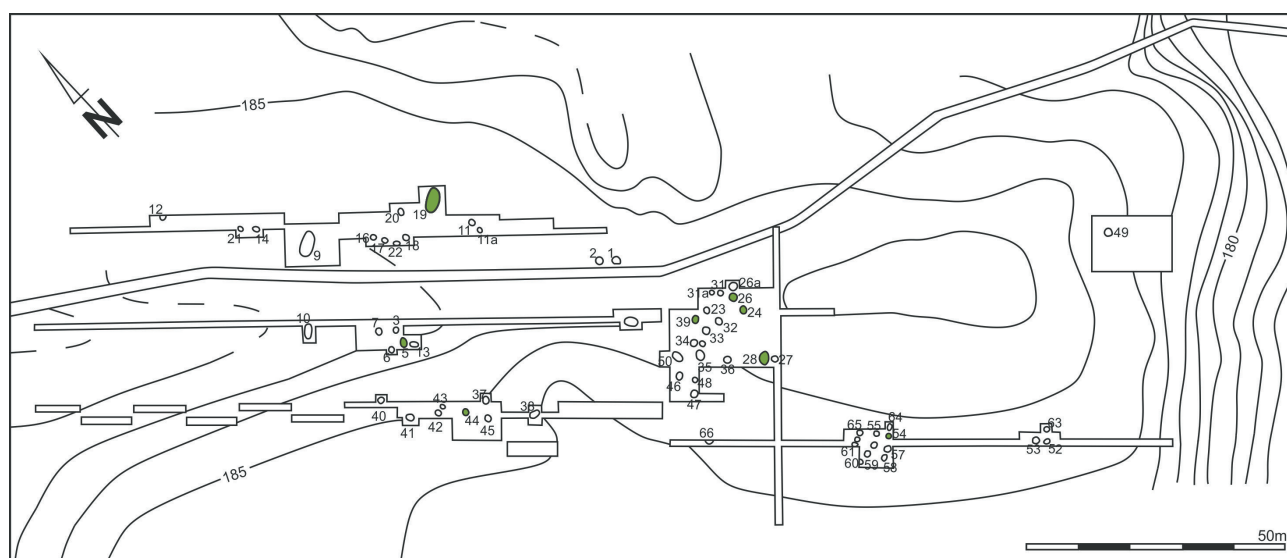


Fig. 2. Las Stocki, Puławy County, site 7. Plan of the site (A. Zakościelna 1986, fig. 1, with author changes).

Legend: ● – location of pits containing the analysed material.

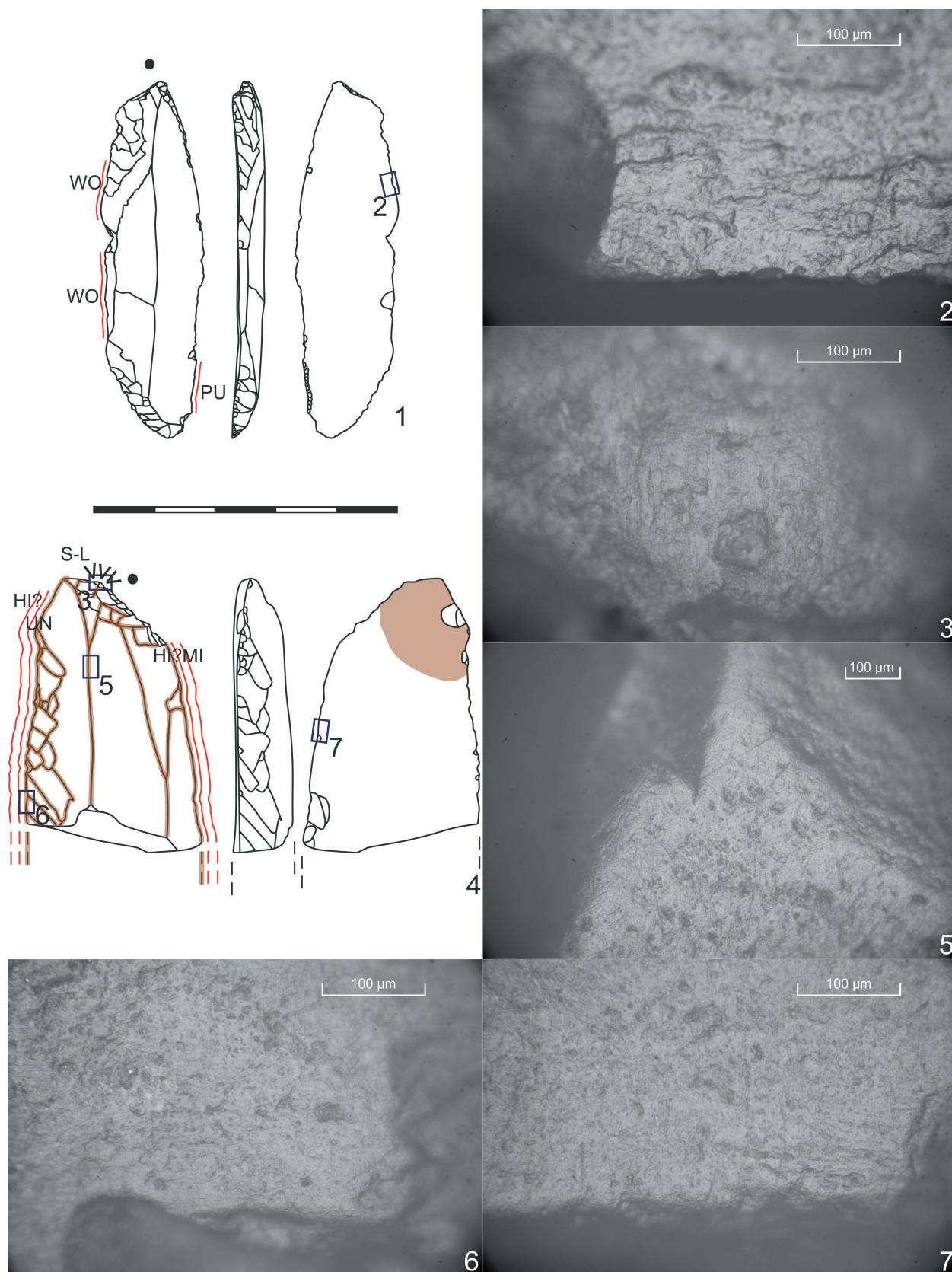


Fig. 3. Las Stocki, Puławy County, site 7. 1 – truncation, 2, 3, 5–7 – photographs of use-wear traces; 4 – fragment of a blade-dagger. Drawings/photographs: P. Mączyński. (2, 3, 6, 7 – 200× magnification, 20× objective lens; 5 – 100× magnification, 10× objective lens). **Legend:** HI – hide; PL – plants; WO – wood; BO – bone; MI – mineral; S-L – strike-a-light; PU – probably used; UN – unspecified material; – place where the photograph was taken; — – scope of the working edge; – extent of polishing caused by processing siliceous material; V – strike-a-light; — – scope of hafting; - - - – edge fragmentarily preserved (broken off).

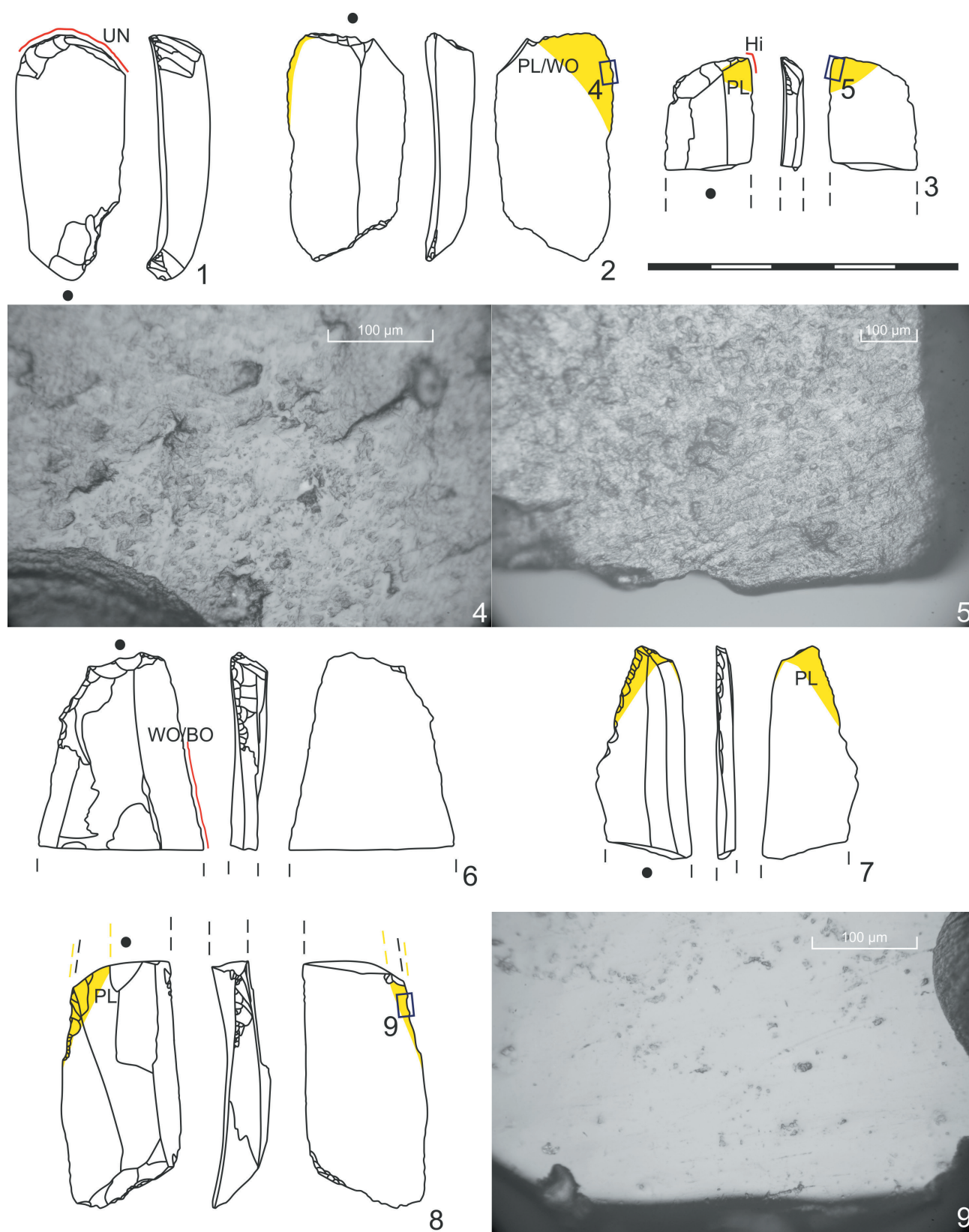


Fig. 4. Las Stocki, Puławy County, site 7. 1 – end scraper/truncation; 2, 3, 6, 7, 8 – truncations; 4, 5, 9 – photographs of use-wear traces; Drawings/photographs: P. Mączyński. (4, 9 – 200× magnification, 20× objective lens; 5 – 100× magnification, 10× objective lens).

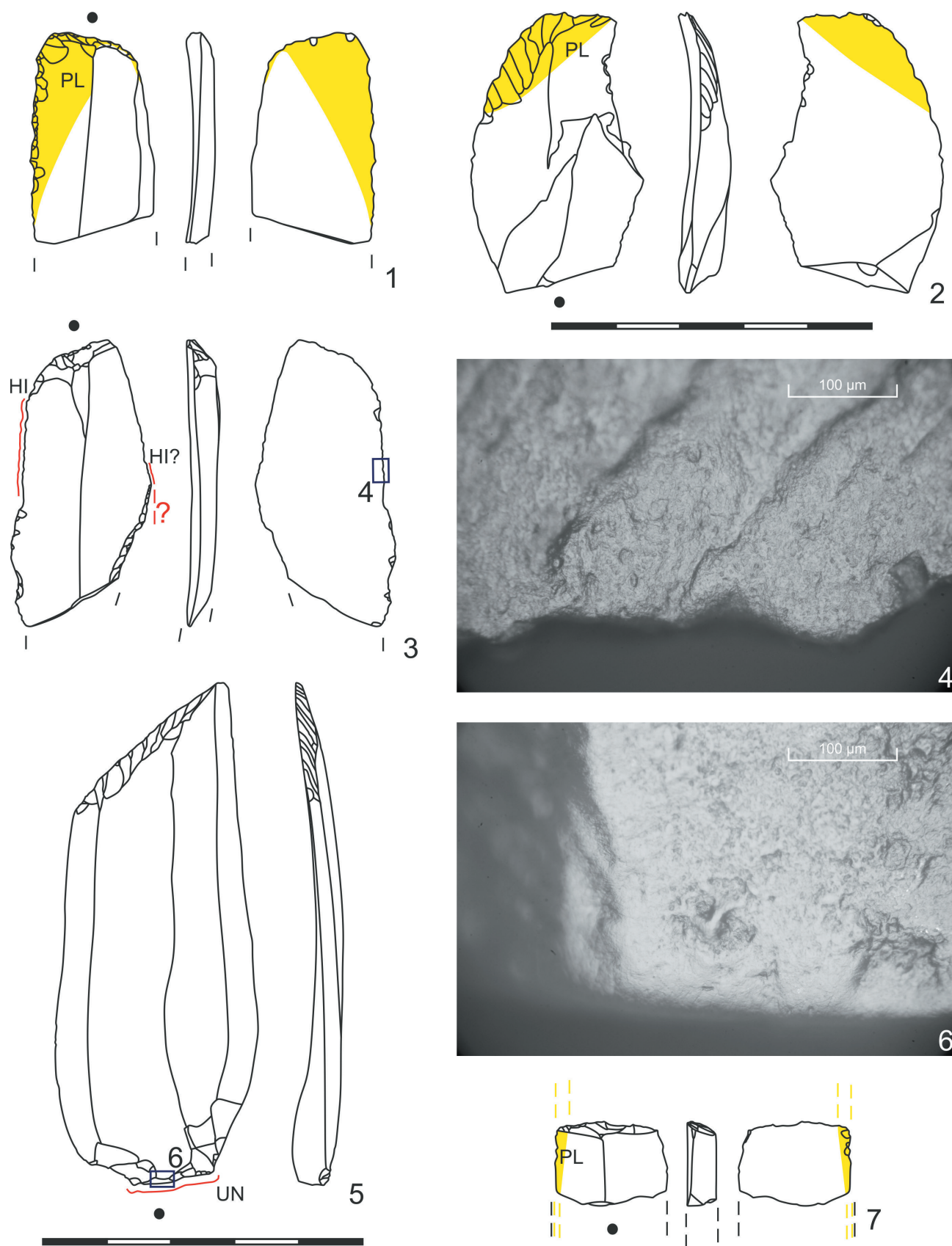


Fig. 5. Las Stocki, Puławy County, site 7. 1–3, 5, 7 – truncations; 4, 6 – photographs of use-wear traces. Drawings/photographs: P. Mączyński. (4, 6 – 200× magnification, 20× objective lens).

raphy, texture, extent) and of the linear traces. In the view of the obtained data, the types of the processed raw materials and the directions of the utilisation of the tools were established.

Before carrying out the study, it was necessary to clean the surface of the tools. It is worth pointing out that using any cleaning techniques may damage residues of mineral or organic origin preserved on tool surfaces (!). This is why their implementation, from the earliest procedures concerning the stocktake of the source material to the later stages of the analysis, should be preceded by thoughtful deliberation.

The source material used in this article was yielded by excavations conducted in the 1980s (Zakościelna 1996, 130). Due to earlier research, they were previously cleaned with warm water and detergent. This is the reason why at the present stage of the examination the items were only rubbed with acetone, just before the analysis, in order to remove fingerprints.

Functional analysis

The great majority of the analysed items (22 artefacts) either had use-wear patterns on their surfaces or were qualified as tools that had been probably used. The best known group are artefacts used for processing herbaceous plants or wood. This type of work was linked with 14 items (Figs. 3: 1; 4: 2, 3, 7; 8; 5: 1, 2, 7; 6: 1, 3, 5; 7: 1; 8: 3). The patterns observed on their surfaces indicate that not all of them were used for the same purpose. What is more, some of them also had other functions.

In this group, the most numerous are items used for processing siliceous plants. On the lateral edges of 9 tools, bright polished areas of invasive nature were observed (Figs. 4: 7, 8; 5: 1, 2, 7; 6: 1, 3, 5; 7: 1). Their shapes were close to triangular and they were accompanied by one-step or two-step chipping. The microscopic observation revealed that the topographies of the polished areas are flat, but they become increasingly vaulted in the areas located far from the edge. The texture is smooth. These marks are sometimes accompanied by linear traces (Figs. 4: 9; 6: 4, 6). Such patterns should be linked with using tools as sickle inserts for reaping siliceous plants, like wild grass and cereals (cf. Keeley 1980, 60; Vaughan 1985, 36; van Gijn 1989, 40; Juel Jensen 1994, 33). Only in one case was the surface of the polished area covered with numerous black or embedded scars (Fig. 6: 2), which indicates that the tool had been used for cutting plants of more abrasive character (?).

When discussing the question of the artefacts belonging to this group, it should be noted that the surfaces of most of the tools bear marks indicating that

they were used for only this one type of activity. It is worth pointing out that there was retouch on several artefacts, which suggests that their working edges had been "sharpened". Nevertheless, due to the fact that the use-wear patterns occurring on this retouch covered it to a small degree, and because of the character of the retouch, it is impossible to answer the above question without any doubt (Figs. 6: 1, 3, 5; 8: 1).

On two other items, there were use-wear traces indicating that these artefacts had been also used for other purposes. Apart from the marks suggesting that siliceous plants had been cut with the tools, on the opposite edges of the artefacts, marks caused by contact with another type of raw material were observed (Figs. 6: 3; 7: 1). Unfortunately, due to the modest character of the use-wear pattern, it was impossible to determine the type of the processed material. At the same time, the linear traces visible on their edges (black or embedded scars) allow us to establish the direction of the performed work, which was linked with scraping or cutting presumably soft material.

Traces observed on the other 3 tools and associated with processing plants are different from the above discussed sickle inserts. They also indicate that they were used for other activities. A double truncation discovered in humus was used for processing a somewhat different type of raw material (Fig. 4: 2). As with the case of the previously mentioned artefacts used for cutting siliceous plants, a bright polished area of triangular shape, but of more limited extent, was registered on its surface. Its topography is flat or wavy and with a smooth texture. On its edge, there are single negative scars (Fig. 4: 4). This activity was not clearly interpreted, but maybe the pattern should be associated with processing plants of unspecified type. On the other hand, the fact that the polished area on one of the opposite edges is larger than the other may indicate that the traces are the result of whittling plant stalks or very soft wood (cf. Osipowicz 2010, 53–67; Vaughan 1985, 33–34).

In the second case, the truncation (Fig. 4: 3) was probably used for cutting plants or soft wood (young shoots/branches?). What is interesting, the same edge was next utilised for cutting soft material, presumably hide. This is attested to by the visible rounding of the edge's tip, on which a polished area of crater-like topography occurred. What is more, numerous linear fissures, which indicate the direction of the performed work, were visible on its surface. These modifications blurred the bright polished area, whose emergence had resulted from the contact of the tool with plants (Fig. 4: 5).

The next tool (Fig. 8: 3) had a similar function. On one of its sides, there was a polished area, stretching in the form of a band on both sides of the edge and

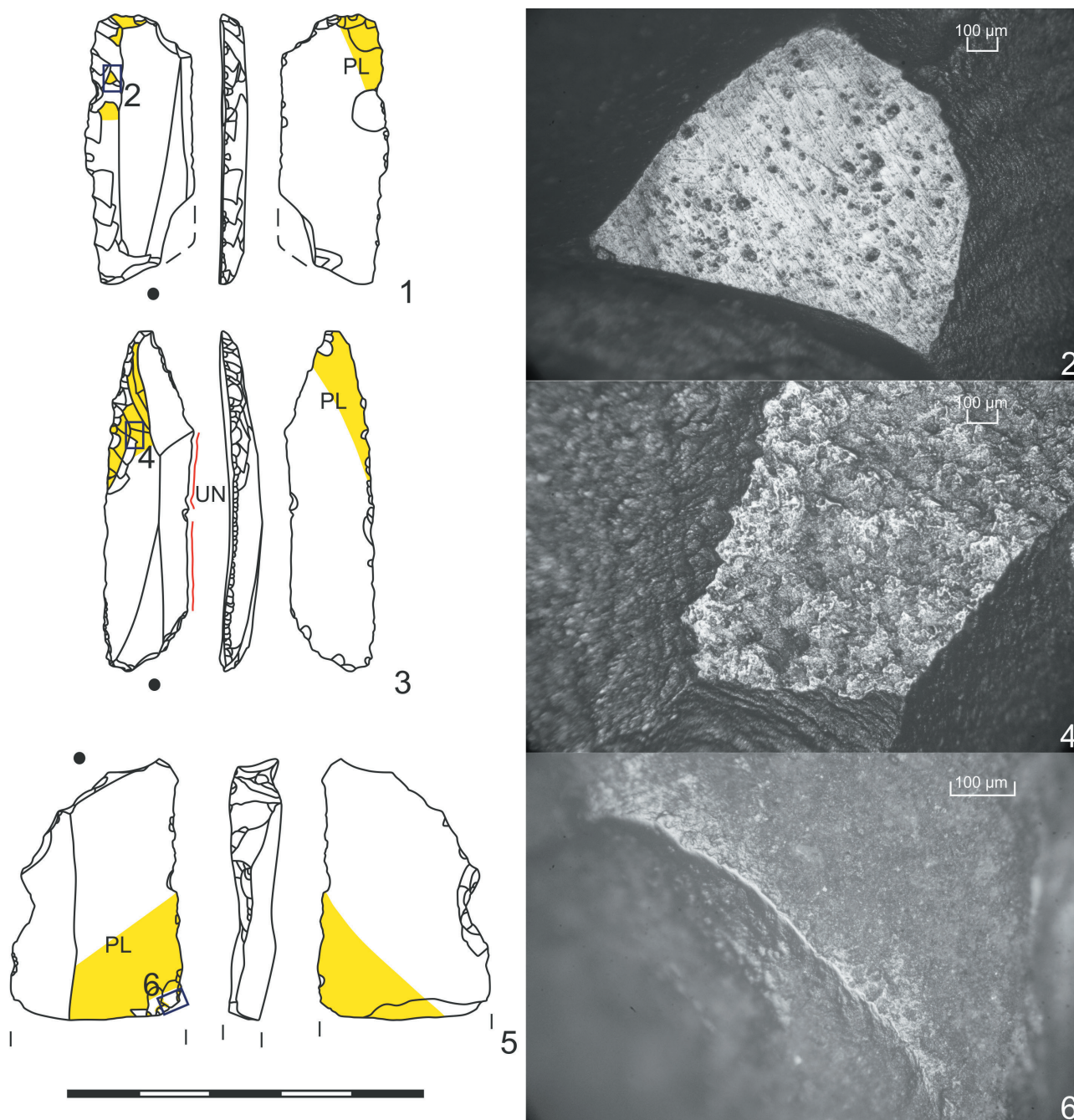


Fig. 6. Las Stocki, Puławy County, site 7. 1, 3, 5 – truncations; 2, 4, 6 – photographs of use-wear traces. Drawings/photographs: P. Mączyński. (2, 4 – 50× magnification, 5× objective lens; 6 – 100× magnification, 10× objective lens).

having a dome-like topography, as well as a soft texture (Fig. 8: 5). The pattern should probably be associated with cutting plants or soft wood (?). This was presumably one of the first functions of this edge, but we should note that it was not its only role. On the same side, there was multi-step, continuous retouch covered with a dome-like/crater-like polished area, which had damaged the previously mentioned traces. The modifications are accompanied by linear traces in the form of black scars or linear furrows which are parallel or

perpendicular to the edge, which indicates that they were caused by both cutting and scraping (Fig. 8: 4, 6). These traces were associated with processing material of an unspecified type.

On the opposite edge, there is retouch having a similar morphology. It is accompanied by a polished area: its topography is flat/concave and the texture is coarse. This pattern completely blurred the natural micro-relief of the flint and significantly rounded the edge. On the surfaces of these traces, black scars, indi-

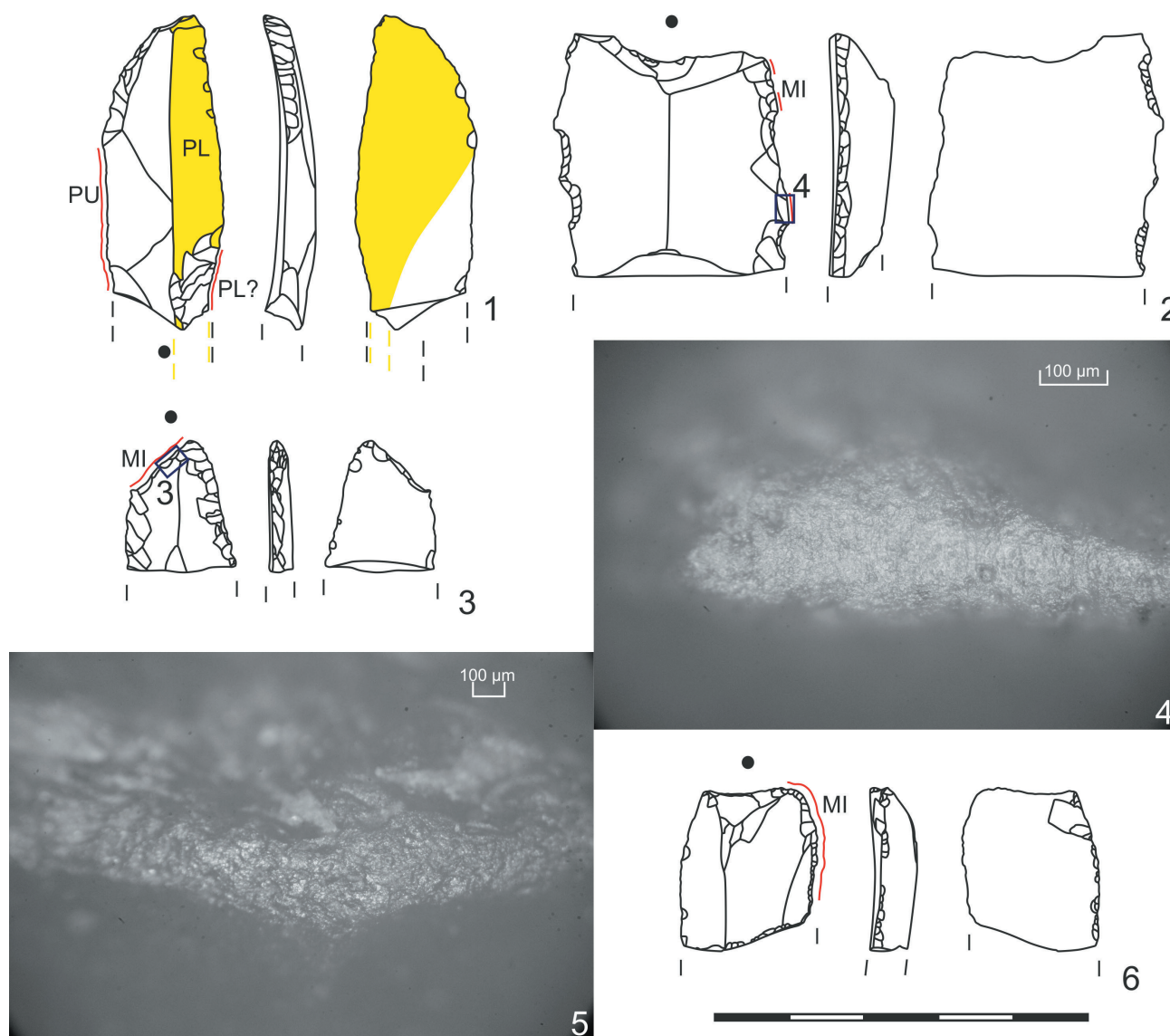


Fig. 7. Las Stocki, Puławy County, site 7. 1, 2, 6 – truncations; 3 – fragment of a retouched blade; 4, 5 – photographs of use-wear traces. Drawings/photographs: P. Mączyński. (4 – 100× magnification, 10× objective lens; 5 – 50× magnification, 5× objective lens).

cating that the tools was used for scraping, are visible (Fig. 8: 1, 2). Just like in the case of the opposite edge, this side was utilised for performing long-lasting work that consisted in scraping hard material.

It is very probable that the side edges of one truncations was used for processing wood (Fig. 3: 1). On their surfaces, traces in the form of bright polished areas, of invasive extent and dome-like or dome-like and crater-like topographies, were recorded (Fig. 3: 2). These patterns are accompanied by indistinct, embedded scars arranged perpendicular or slightly obliquely to the edge (cf. Osipowicz 2017, 60; Pyżewicz 2013, 45; Korobkova 1999, 50).

An interesting group of artefacts is represented by tools bearing traces resulting from contact with or processing mineral material (Fig. 7: 3, 6). In the case of

three items, such marks were recorded on the truncated edges, on which multi-step retouch, crushed edges, and abrasion, which indicate that the artefacts had come in contact with mineral raw material, were recorded. In one case (Fig. 7: 3), the marks are so distinct that the abrasion/smoothing can be seen with the naked eye (Fig. 7: 5). Unfortunately, the character of the marks makes it impossible to state whether they result from using the tools or from the blunting of one of the tool's sides. Similar traces were recorded on a truncation made of Świeciechów flint (Fig. 7: 2). Its edge had been secondarily retouched, but in some places, abraded/rounded fragments of the blade were preserved. On its surface, a polished area of a distinctly crater-like topography was observed. It was accompanied by indistinct, vast linear fissures indicating that the tool had been

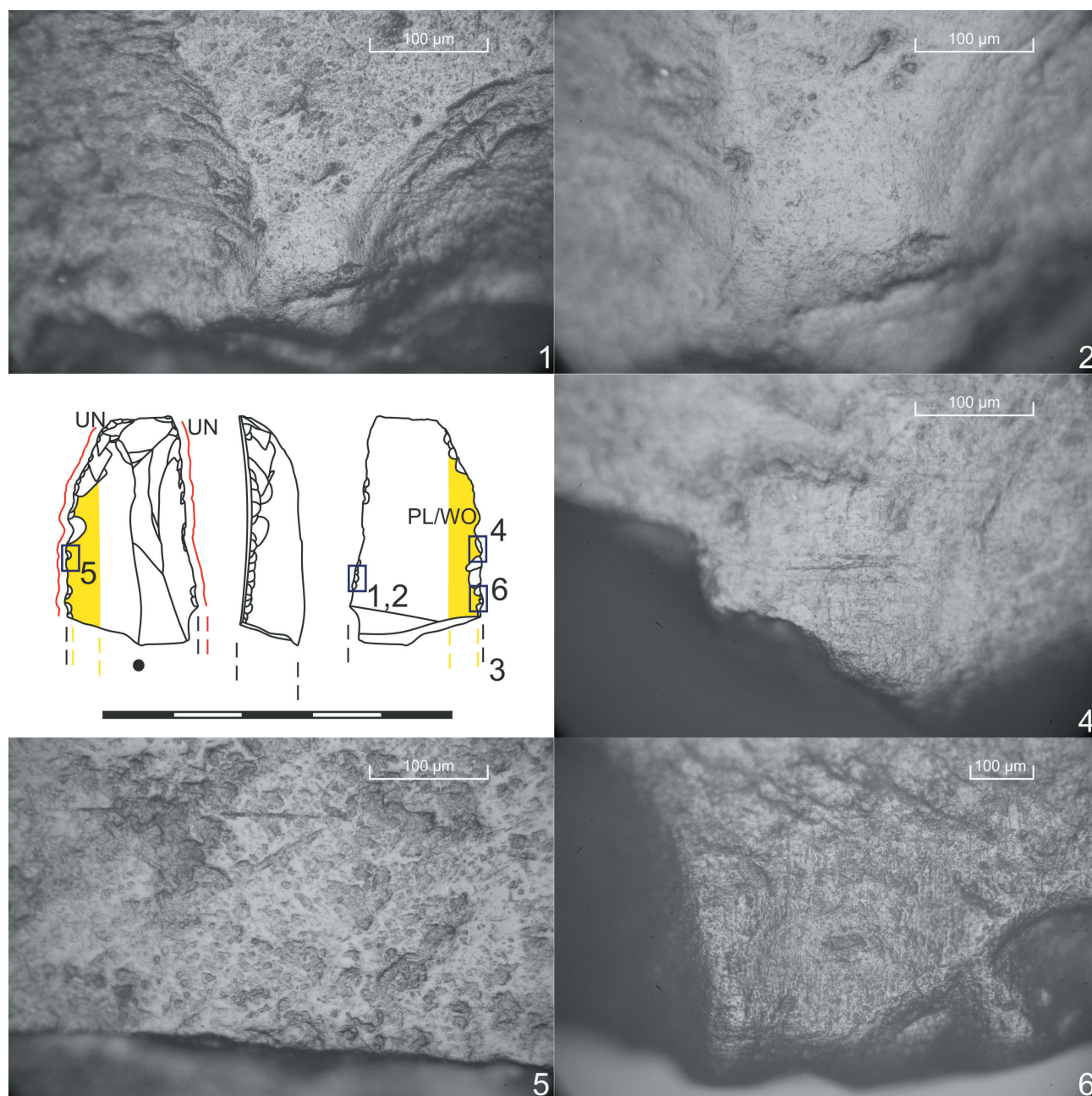


Fig. 8. Las Stocki, Puławy County, site 7. 3 – truncation; 1, 2, 4–6 – photographs of use-wear traces. Drawings/photographs: P. Mączyński. (1, 6 – 100× magnification, 10× objective lens; 2, 4, 5 – 200× magnification, 20× objective lens).

used as a scraper for processing soft material of mineral origin or clay/pottery (Fig. 7: 4).

The next noteworthy artefact is a massive Las Stocki type truncation (Fig. 5: 5). There are no typical use-wear traces on the tool, but a bright polished area of a flat topography and slightly coarse texture was recorded on the butt (Fig. 5: 6). The origin of these traces is not certain. Nevertheless, it appears that their location on the butt of the tool is not accidental.

A fragment of a blade-dagger formed on a massive Volhynian flint blade stands out from the rest of

the collection (Fig. 3: 4). Such tools are relatively rare in settlement materials. Most of the known and well-preserved items come from grave inventories. Because of their unusual size and the technique of their production, they are interpreted as prestige tools (Zakościelna 2008, 586). Materials of this type have been analysed several times for the identification of the use-wear patterns. Marks indicating that the items were kept in sheaths or set in frames are typical of such artefacts. From among the activities performed with their edges, cutting soft material, as well as processing plants and

hide deserve our attention. On the other hand, the areas adjacent to the butts bear traces indicating that the items were used for striking fire (Wilk and Kufel-Diakowska 2016, 157–163; Mączyński and Zakościelna 2017a, 344; 2017b, 114).

The above-mentioned fragment from Las Stocki is also covered with patterns indicating that it was utilised for long time. On the ridges between the negative scars, as well as on the lateral edges and protruding points, polished areas of crater-like topographies and coarse textures were recorded. Micro-relief had been completely blurred in many parts of the tools. The above presented marks are accompanied by a small number of linear traces in the form of black scars (Fig. 3: 5). Such abrasions can be probably linked with keeping tools in sheaths made of hide (cf. Wilk and Kufel-Diakowska 2016, 157, 106; 162; Mączyński and Zakościelna 2017b, 114). The above described traces were not recorded on the truncated edge, present on the apical part of the tool, which indicates that it had been formed in the later stage of using the artefact. In addition to the mentioned patterns associated with storing, many traces of use-wear character were recorded. On the retouched side, there was a distinct polished area of a crater-like topography and coarse texture, which had blurred the natural micro-relief of the flint. These marks were accompanied by numerous linear traces arranged parallel to the edge. The recorded patterns should be linked with cutting soft material (Fig. 3: 6). On the surface of the discussed section, linear traces were observed. They were arranged perpendicular to the edge, and their nature indicated that they had been used for scraping hide or other type of soft material. On the opposite side of the tool, strong abrasion of the edge was observed. It was accompanied by linear traces in the form of fissures arranged parallel to the edge. Because of the fact that the use-wear traces were distinct, it was suggested that they might have resulted from cutting such materials as soft minerals/pottery. Moreover, as in the case of the previously discussed edge, these marks were accompanied by traces in the form of scars indicating the activity of scraping (Fig. 3: 7). However, due to the fact that patterns associated with several types of work overlapped each other, establishing the type of the processed material was impossible. It appears that the last stage of using this artefact was the utilisation of the truncated edge as a strike-a-light. This assumption results from the established chronology of the modifications, described above, which is indicated by the fact that the edge bears no patterns left by keeping the tool in a sheath. On the surface of the truncated edge, characteristic abrasion/rounding, discernible with the

naked eye, was recorded. At the same time, bright polishing was observed under the microscope. Within its area, embedded scars were recorded (Fig. 3: 3). These types of traces represent typical marks indicating that the flint came in contact with pyrite or marcasite (Pyżewicz and Rozbiegalski 2012, 263; Sorensen *et al.* 2014, 481–483).

Remarks on the chronologies of the modifications

One of the aims of this work was to reconstruct the biographies of the flint tools (van Gijn 2010, 33). Performing this task consisted in establishing the relative chronologies of the modifications observed on the artefacts. Such patterns were divided into three types: retouch forming the truncated edge, retouch of the lateral edges, and transverse fractures.

The analysis of the first category of the modifications, truncated edges, in most cases did not reveal the presence of use-wear patterns on their surfaces. They were visible only on four analysed artefacts (Figs. 3: 4; 7: 3, 6). In 7 cases of tools used for processing plants, polishing caused by harvesting also entered the surface of the retouch, but the recorded extent of the intrusion indicated that it did not result from using these edges, but from the invasive character of the siliceous polishing (Figs. 4: 2, 3, 7; 5: 1, 2; 6: 1; 7: 1). The observed relations make it possible to state that the function of shaping the truncated edge was to make the tool shorter and probably to change its geometry. It should be also noted that in many cases no direct correlation between the working edge and the truncated edge was detected (Figs. 3: 1; 4: 1, 6, 8; 5: 3, 5; 6: 3, 5; 7: 2; 8: 3). Due to this fact, it cannot be ruled out that both categories of modifications were separated by a certain time interval and that there is no correlation between them. However, they are currently interpreted by archaeologists as a whole. This state of affairs can be represented by a tool on which retouch forming the truncated edge damaged harvest polishing, which indicates that it was created after reaping plants (Fig. 5: 7). Unfortunately, because the tool is incompletely preserved, the reasons for retouching the edge of the tool by its users are not clear.

In the case of most of such tools, the edge located opposite to the truncated edge is limited by a transverse fracture. None of these fractures bore on their surfaces use-wear patterns. The great majority of these artefacts had fractures whose observation did not indicate that they had damaged or shortened the working edges. Such situations, indicating that the tools had

been damaged were recorded only in the case of several specimens (Figs. 3: 4; 4: 8; 5: 3, 7; 7: 1; 8: 3). It appears that the observed damages were the direct cause of the abandonment of the tools. It is however worth pointing out that this number may be actually higher, since the observation of the stratigraphies of the fractures was extremely difficult.

The last category of the morphological modifications encompasses retouches of lateral edges, which appeared on 12 tools. Use-wear patterns were recorded on the edges of 10 items (Figs. 3: 1, 4; 4: 7, 8; 5: 2; 6: 3, 5; 7: 1, 2; 8: 3). In several cases, a retouched edge damaged earlier use-wear patterns. This concerns 6 tools: a truncation serving as a scraping tool (Fig. 7: 2) and 5 tools used for processing siliceous plants (Figs. 6: 1, 3, 5; 7: 1; 8: 3). Unfortunately, in most cases, the reason for the formation of retouch was not determined.

Final remarks

The main goal of this article was to specify the functions of the truncations and to establish the chronologies of their modifications. The first task has been accomplished to a considerable degree. In many cases, it was even possible to establish the types of performed activities. It is also worth pointing out that the majority of the tools was used for processing siliceous plants. The other identified functions were recorded much less frequently. It should be noted, however, that tools used for cutting siliceous plants are very often identified, since they are easily recognised. The role of knives for cutting siliceous plants was usually played by oblique truncations. In several cases, items used for processing this material were transformed in later stages of utilization, which hinders determining precisely their forms. Tools used for cutting siliceous plants (herbaceous plants, grass) could have played different roles and been linked with harvesting, as well as with obtaining food for animals or materials for roofing houses or clothing production. Other, rarely registered activities associated, among others, with processing hide, wood, and mineral substances, should be assuredly linked with producing goods. Unfortunately, due to the small number of the tools, it is difficult to link particular activities with specific artefacts.

Truncations present in the L-VC materials represent rarely analysed artefacts. Previously, only several items of this type were subjected to such an examination. One of the specimens, discovered in Złota ("Grodzisko II" site), in grave 122, had been earlier examined by the author. In the section adjacent to the butt of this artefact, there is considerable rounding of the edge, discernible with the naked eye, accompanied

by vast crushing. A bright polished area of a dome-like topography is visible under the microscope. The presence of a macroscopically discernible rounding is often considered as an indication that a tool was used for striking fire (Mączyński and Zakościelna 2017b, 115).

The next 4 tool specimens were discovered in features nos. 5A, 7, 8, and 32, in the Wzgórze Zawichojskie settlement (Sandomierz). Two of them had been used as sickle inserts. In the case of another item, the apex of the transverse edge had been used to drill soft stone and the last specimen was used for scraping hide (Winiarska-Kabacińska 2017, 255, 258, Fig. 3: 11; 8: a, c).

The comparison of this set with the result of the observation of the materials from Las Stocki makes it possible to remark certain analogies in the methods of their utilization. This concerns mainly using the tools as sickle inserts. In the case of the rest of the items, it is also possible to see minor similarities associated with performing similar activities and processing raw materials. Single tools, used as strike-a-lights or linked with processing stone and hide, were found in Las Stocki. Nevertheless, the way of their utilization (how they were held during performing the work) was different, which is attested by the location of the patterns in different parts of the tools.

The fragment of a blade dagger, with the truncated edge in the butt region, stands out from the collection. This item, apart from patterns indicating that it was kept in a sheath, bears numerous use-wear traces indicating that it was used as a strike-a-light, as well as for processing hide and mineral material. Flint daggers have been analyzed by the author (Złota, site "Grodzisko II"; Strzyżów, sites 1A and 2A), as well as by B. Kufel-Diakowska (Książnice, site 2). Usually, patterns present on such tools suggest that the items were used for a long time. The typical traces recorded on their surfaces are those that indicate keeping them in sheaths or frames. At the same time, the performed activities include processing meat/hide/plants and using the edges as strike-a-lights (Mączyński and Zakościelna 2017a, 344, 345; 2017b, 113, 114; Wilk and Kufel-Diakowska 2016, 157, 106; 162, 157–163). The fragment of the dagger with preserved truncated edge (from Las Stocki) was used in a similar way. The similarities concern keeping the tool in a sheath, scraping hide, and using it as a strike-a-light, but the patterns present on the items from Złota and Książnice were observed in the butt regions, whereas the working edge of the artefact from Las Stocki was the truncated edge.

The next aim was attempting to recreate the biographies of the tools. The results of the conducted observations indicate that tackling this question is a difficult and complicated task. In many cases, establishing chrono-

nologies of the modifications did not give expected results. On this point, most information was obtained from the analysis of tools used for processing siliceous plants. Working with these raw materials results in forming use-wear patterns of very invasive extents and bright polishing, clearly distinct from the natural surfaces of flints. In the case of tools used for activities that resulted in forming use-wear traces of insignificant extent of intrusion, establishing the stratifications in regard to fractures and retouch was immensely difficult. In certain cases, the observation made it possible to establish a relative chronology between the working edges and the truncated edges, as well as to record changes resulting from sharpening the working edges. In some cases, it was observed that certain transverse fractures had damaged the working edges. This was undoubtedly the direct cause of the tools being abandoned. It is interesting that in the case of a few items, the formation of the truncated edge or retouching of the lateral edge was chronologically the final recorded modification of the tool. The reasons for such activities have not been interpreted. It cannot be ruled out that these artefacts were used for a short time, which did not result in the creation of clearly visible use-wear patterns.

The fact that in many cases it was impossible to detect close correlations between the working edges and the truncated edges is immensely interesting. It cannot be ruled out that both types of modifications could have been separated by certain time intervals and they were not related to each other. However, currently observed use modifications are associated with the preserved morphologies of the tools. Of course, the mentioned correlation is not a mandatory requirement. It is possible that using such tools did not require the truncated edge to come in contact with the processed material. Nevertheless, such doubts raise questions concerning the credibility of the results of such analyses and the methods of interpreting the functions of flint tools.

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