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LATE MESOLITHIC SETTLEMENTS FROM THE AREA OF MAZOVIA (KOKRY INDUSTRY)

SPATIAL-FUNCTIONAL CAMP INTERPRETATIONS

The presented archaeological material originates from the excavations at the site of Wieliszew (woj. mazowieckie/PL) conducted in the late 1950s and the 1960s by Hanna Więckowska from the Instytut Historii Kultury Materialnej (presently Instytut Archeologii i Etnologii Polskiej Akademii Nauk). This site is located on the left bank of the river Narew, exactly at the place where it joins the Vistula (**fig. 1a**).

Out of the material unearthed at that time, two flint assemblages from trenches XVI and XVIIc were selected (Więckowska 1965; Boroń/Winiarska-Kabacińska 2016). They represent the Kokry industry. The name has been derived from a range located in the Wieliszew district (Więckowska 1969, 79. 94). The discussed industry has been distinguished mainly on the basis of the finds from Mazovia (central Poland).

Its main features are: a significant prevalence of scrapers over endscrapers, the occurrence of splintered pieces, and the lack of variety of the microlithic types, limited basically to the trapezes (Więckowska 1985, 102). It is also worth to note the low share in perforators, borers, truncated pieces, and burins. These observations confirm that starting from the early Mesolithic the amount of the latter ones diminishes continually (Kobusiewicz 1970, 117).

The tools from trenches XVI and XVIIc are strongly miniaturised and according to some researchers, this is a characteristic feature of the Kokry industry. Our studies focused on determining whether these tools bear traces of usage and, if so, how they were used. The second question was if the microlithisation of the tools was caused by the relatively poor quality of the glacial chalk flint raw material.

The absence of ^{14}C analyses (not only for the Kokry industry sites under examination but also for the other sites in the same time horizon) makes it highly difficult to determine the periodization of the late Mesolithic. The ^{14}C dating obtained for similar inventories from Nieborowa (woj. lubelskie/PL): 5730 ± 130 BP (4897-4337 cal BC; Gd 144; 2σ 95,4 %; OxCal 4.2.3; Boroń 2014, 27) is much later than the dating of the Janisławice and Chojnice-Pieńki culture (Post-Maglemosian) from Poland (**fig. 2**). The study used the ^{14}C dates of the following Mesolithic sites: Tomaszów II (woj. mazowieckie/PL; Schild/Królik/Marczak 1985, 13); Janisławice (woj. łódzkie/PL; Sulgostowska 1990); Dęby (woj. kujawsko-pomorskie/PL; Domańska 1991, 40); Dudka (woj. warmińsko-mazurskie/PL; Fiedorczuk 1995, 57); Rydno (woj. świętokrzyskie/PL; Schild et al. 2011, 350); Woźna Wieś (woj. podlaskie/PL; Sulgostowska 1991). Only the ^{14}C dating of a sample from a grave in Woźna Wieś (Sulgostowska 1991) gave an approximate result. Generally, the ^{14}C datings place the Janisławice culture in the period between the 7th and 6th millennium cal BC (Kozłowski 2009, 451). The Kokry industry, in turn, can be related to the phase called in the German literature as *Endmesolithikum* (Cziesla 2017, 213).

FINDS AND METHODS IN WIELISZEW

Trench XVI

Trench XVI with an area of 89 m² yielded several hundred flint specimens, which make up a rather large flint scatter (**fig. 1b**). Apart from the flint, small fragments of burnt animal bones were also found. The earliest

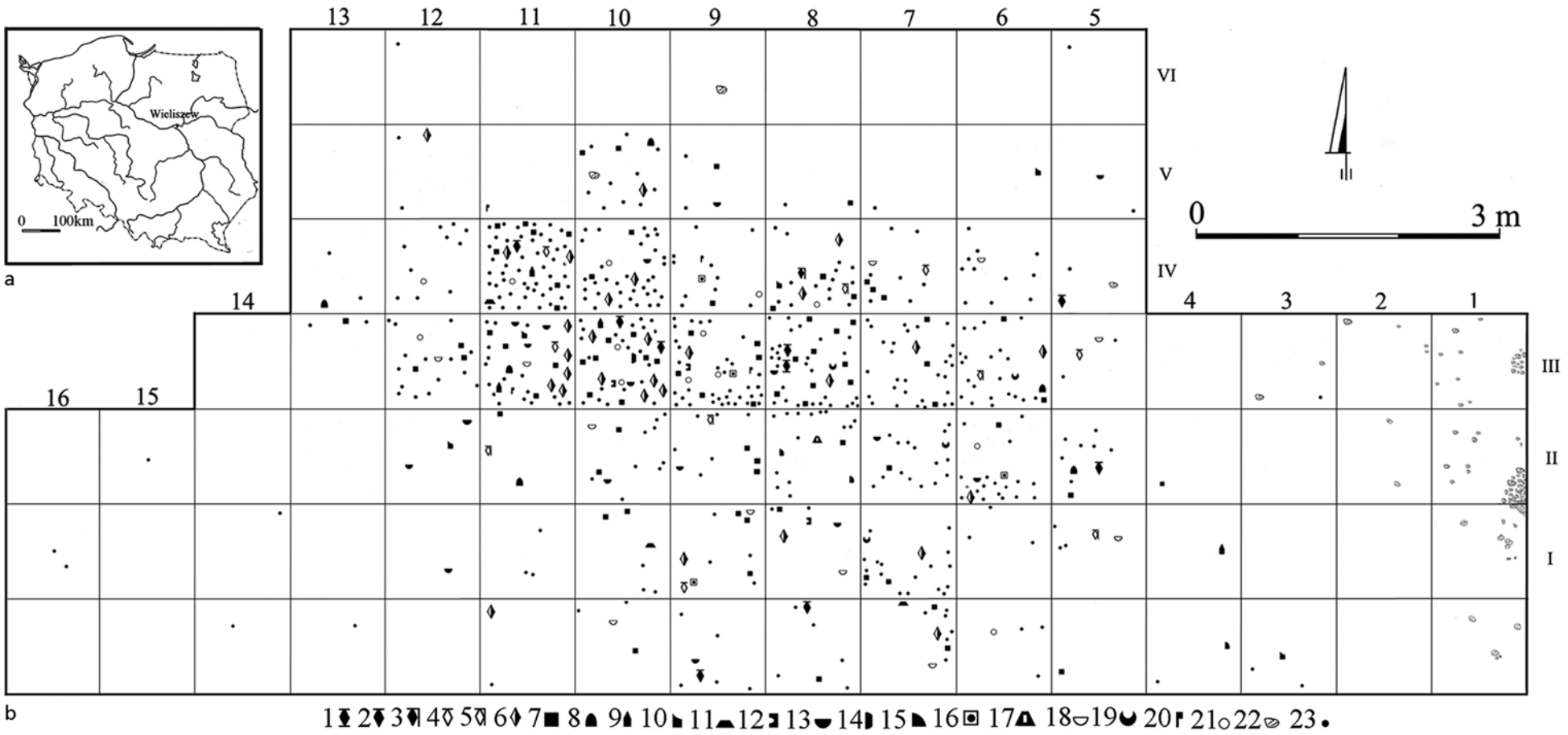

Fig. 1 Wieliszew (woj. mazowieckie/PL): **a** geographical location of the site. – **b** trench XVI: horizontal distribution of the artefacts: **1** double platform blade core. – **2** single platform blade core. – **3** changed orientation blade core. – **4** single platform flake core. – **5** changed orientation flake core. – **6** splintered pieces. – **7** scrapers. – **8** endscrapers. – **9** becs, perforators, borers. – **10** truncated pieces. – **11** trapezes. – **12** notched blade. – **13** retouched flakes. – **14** backed blades. – **15** burins. – **16** fire-flints. – **17** tranchets. – **18** retouched blades. – **19** retouched chunks. – **20** burin spalls. – **21** fragments of tools. – **22** stones. – **23** flint. – (Illustration T. Boroń).

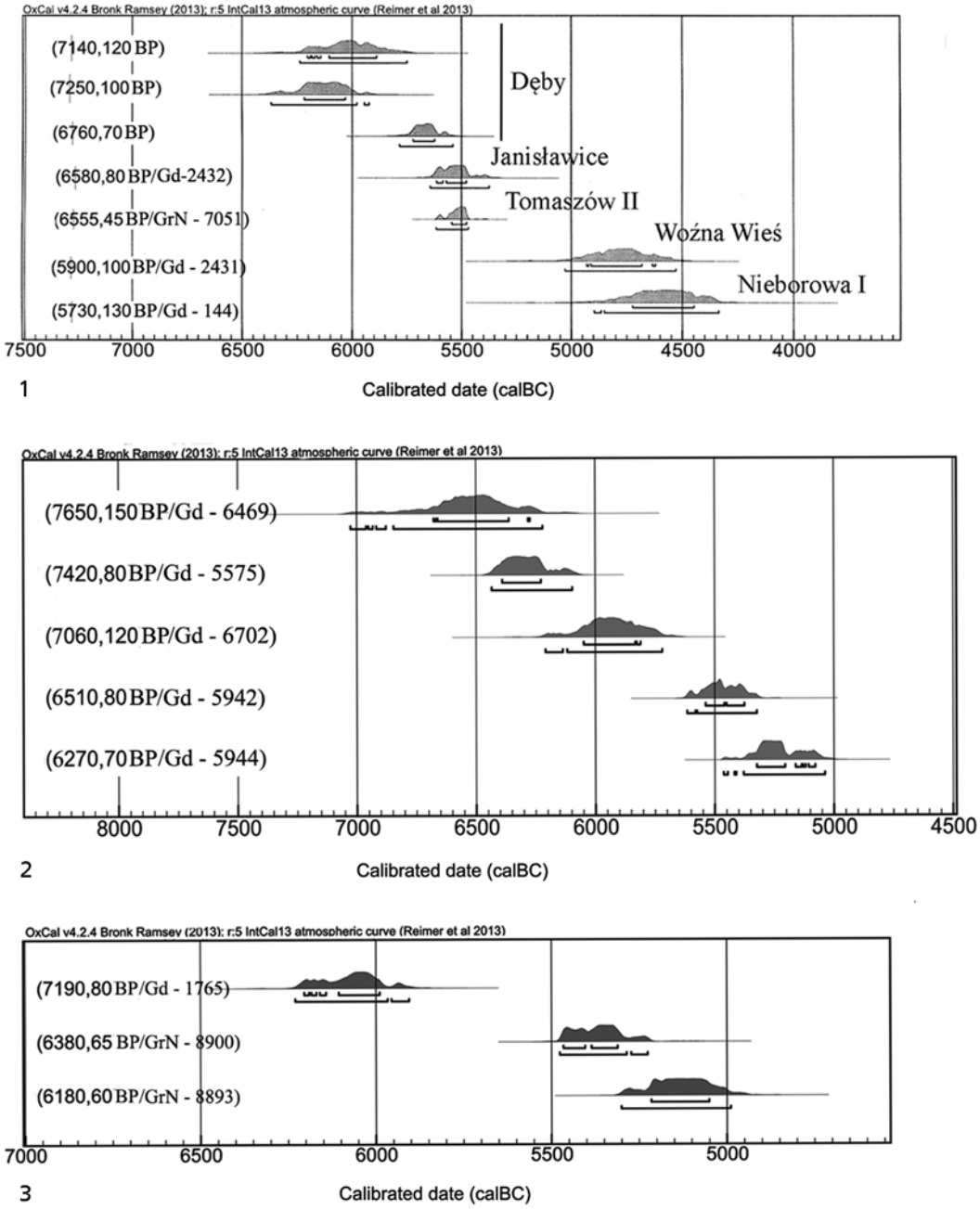

Fig. 2 Summary of ^{14}C dates of late Mesolithic sites from Poland: **1** Janislavice culture (Dęby, woj. kujawsko-pomorskie/PL; Janisławice, woj. łódzkie/PL; Tomaszów II, woj. mazowieckie/PL; Woźna Wieś, woj. podlaskie/PL) and Kokry industry (Nieborowa I, woj. lubelskie/PL). – **2** late Mesolithic layer (Dudka, woj. warmińsko-mazurskie/PL). – **3** Janislavice culture (Rydno, woj. świętokrzyskie/PL). – (Illustration T. Boroń).

settlement phase is represented by single Swiderian culture tools (the Mazovian complex) whereas the small splintered pieces are most probably related to the Trzciniec culture of the Bronze Age (**fig. 3, 11-15**).
Cores: 19 splintered and flaked pieces have been distinguished. The former can be divided into double platform cores, changed orientation cores (**fig. 3, 5**) and single platform cores (**fig. 3, 1. 6**), while the latter are represented by single platform (**fig. 3, 4. 8**) and changed orientation pieces (**fig. 3, 2-3**). Apart from the cores, 28 splintered pieces, between 11 and 26 mm long, were found. They are mostly bipolar and occasionally unipolar (**fig. 3, 9-15**).

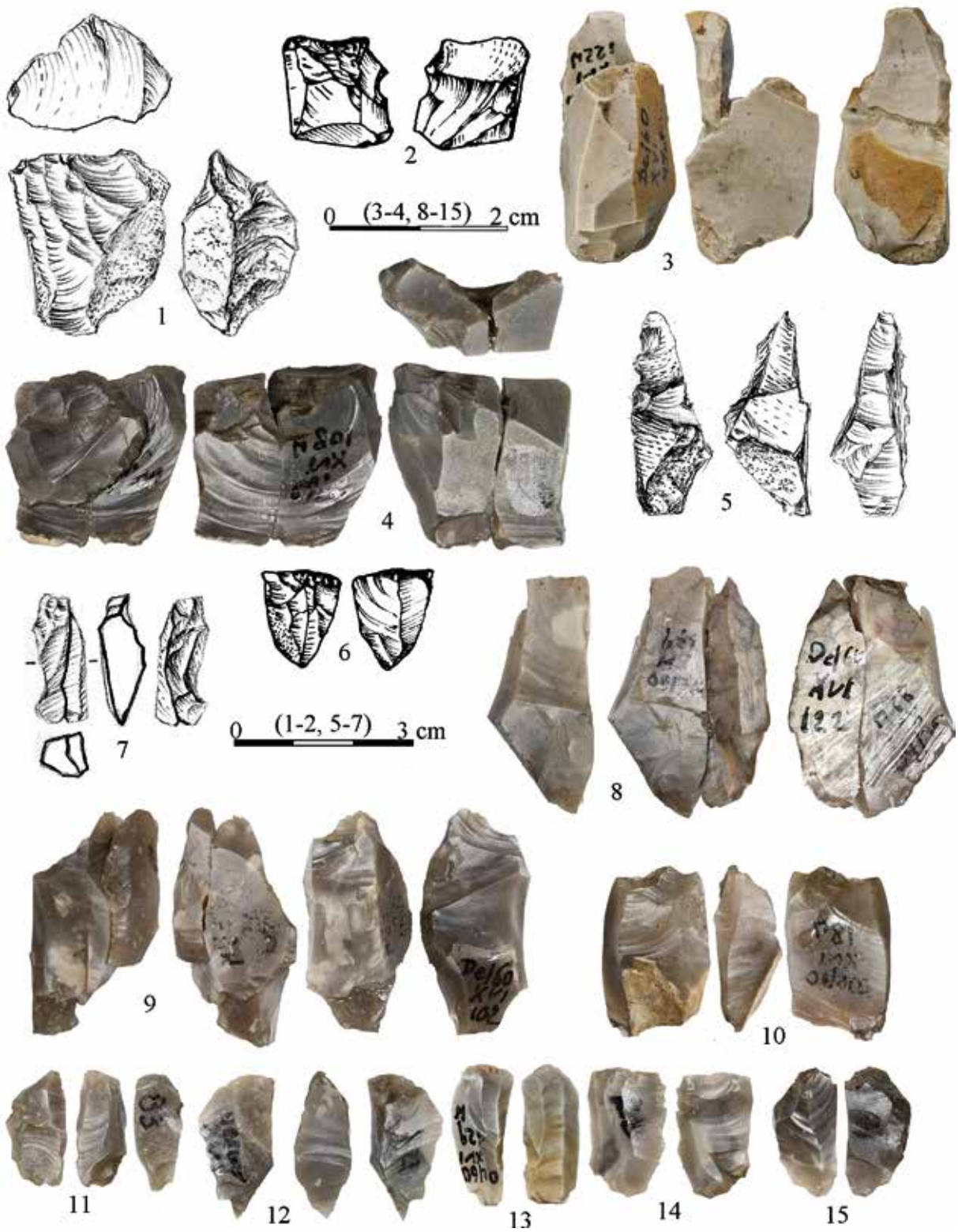

Fig. 3 Wieliszew (woj. mazowieckie/PL), trench XVI: **1-5. 7-8** cores. – **6. 9-15** splintered pieces. – **3** block no. 5. – **4** block no. 8. – **7** block no. 13. – **8** block no. 1. – **9** block no. 4. – (Photos M. Osiadacz; drawings E. Gumińska / I. Niewiadomska).

Fig. 4 Wieliszew (woj. mazowieckie/PL), trench XVI: **1-5** blades. – **6** crested blades. – **7-19** scrapers. – **20-23** endscrapers. – **24-26** trapezes. – **27** tranchets. – **28-29** trancated blades. – **30** bec. – **31** perforator. – **32-34** retouched blades. – **35** borer. – **36** burin. – **37** backed blades. – **38** notched blade. – **39** fire-flints. – **9** production of scraper (block no. 2) . – **17** refitting scraper with flake (block no. 3). – (Photos M. Osiadacz; drawings E. Gumińska / I. Niewiadomska).

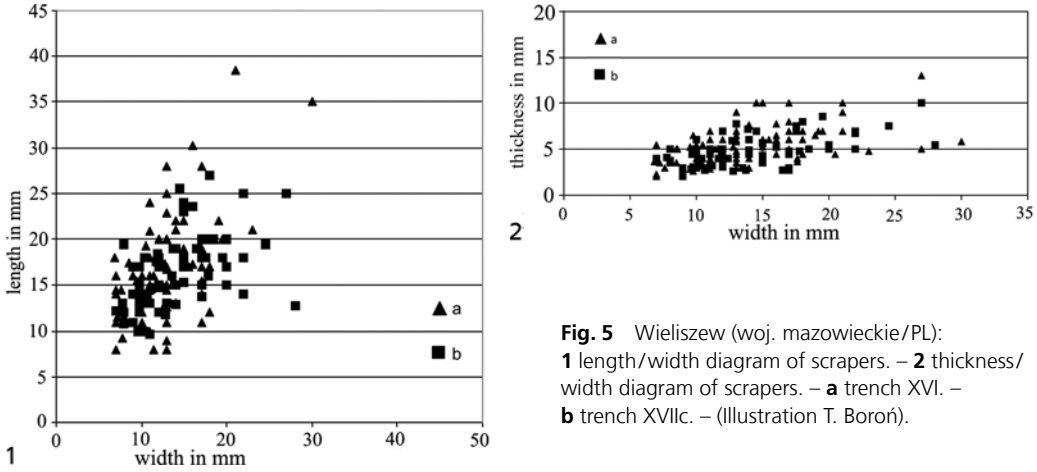

Fig. 5 Wieliszew (woj. mazowieckie/PL): **1** length/width diagram of scrapers. – **2** thickness/width diagram of scrapers. – **a** trench XVI. – **b** trench XVIIc. – (Illustration T. Boroń).

Flakes and scaled flakes: 35 items, including 60 % scar specimens were found. The flakes range between 10 and 30 mm in length and are of similar width.

Blades: 17 items have been distinguished with the length ranging, apart from one specimen, between 17 and 31 mm (**fig. 4, 2-5**). The distinctive exemplar has a prepared striking platform, an almost spot-like bulb, and parallel edges (**fig. 4, 1**) which attest the Montbani-style of debitage (Rozoy 1968, 370; Schild/Marczak/Królik 1975, 19). Additionally, five crested blades, from 16 to 26 mm long, and one secondary crested blade were found (**fig. 4, 6**).

Tools: The most numerous sub-group of the tools are the scrapers. 79 exemplars (**fig. 4, 7-19**) have been identified. The points on the metric diagram form a well-determined cluster of items ranging from about 8 to 25 mm in length and from 7 to 17 mm in width (**fig. 5, 1**). There are very few specimens beyond this range. The thickness of the scrapers ranges from 2 to 10 mm (**fig. 5, 2**). The second largest group are retouched flakes, retouched blades, and endscrapers. Other groups of tools include from a few to single specimens (**fig. 4, 20-39**). Also, four burin spalls have been found.

Trench XVIIc

Trench XVIIc covers an area of 124 m² (**fig. 6**). During the excavations, several hundred flint pieces making up a small cluster have been uncovered.

Cores: Eight specimens have been found: two double platform blade cores and one single platform blade core (**fig. 7, 1-2**), six flake cores including four single platform cores, one changed orientation core (**fig. 7, 4**), and one sub-discoidal core (**fig. 7, 3**). Apart from the cores, four bipolar splintered pieces, 15-28 mm long, were found.

Flakes: 78 items were discovered, 71 % of which are one direction scar forms. The vast majority of flakes do not exceed 25 mm in length and width and 5 mm in thickness.

Blades: Eleven items were found: nine scar specimens and two cores. They are 18-35 mm long and 6-30 mm wide (**fig. 7, 5-7**). Apart from the plain blades, one overpassed blade (**fig. 7, 39**) and two crested blades were discovered.

Tools: Like in trench XVI the scrapers were predominant, making up 72 specimens (**fig. 7, 8-21**). On a diagram presenting the relation of their length to the width, there is a distinct cluster of items with the length between 10 and 20 mm, and the width between 7 and 16 mm (**fig. 5, 1**) whereas the diagram showing the

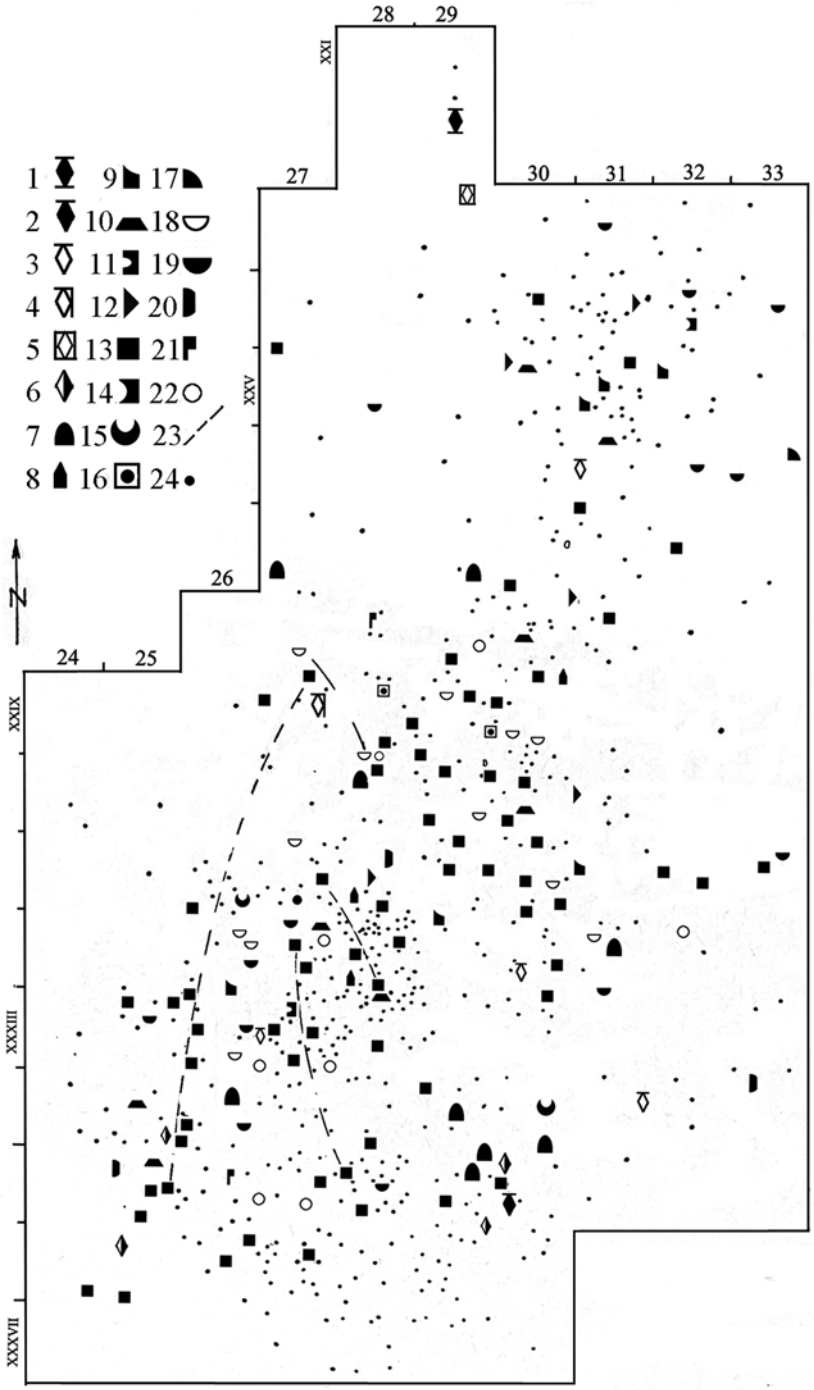

Fig. 6 Wieliszew (woj. mazowieckie/PL), trench XVIIc. Horizontal distribution of the artefacts: **1** double platform blade core. – **2** single platform blade core. – **3** single platform flake core. – **4** changed orientation flake core. – **5** semi-circular core. – **6** splintered pieces. – **7** endscrapers. – **8** becs, borers. – **9** truncated pieces. – **10** trapezes. – **11** notched blades. – **12** fragments of microliths. – **13** scrapers. – **14** grooving tools. – **15** retouched chunks. – **16** fire-flints. – **17** burins. – **18** retouched blades. – **19** retouched flakes. – **20** backed blades. – **21** microburins. – **22** fragments of tools. – **23** refittings of breaks. – **24** flint. – (Illustration T. Boroń).

relation of thickness to the width presents items between 2 and 6 mm in thickness and between 7 and 20 mm in width (**fig. 5, 2**).

Besides scrapers, endscrapers have been distinguished (**fig. 7, 22-24**), as well as trapezes (**fig. 7, 42-48**), backed pieces (**fig. 7, 34-35**), becs (**fig. 7, 32**), truncated pieces (**fig. 7, 26-27. 50**), retouched flakes, retouched blades (**fig. 7, 36-38**), strike-a-lights (flint strikers) (**fig. 13, 29**) and single tools such as: a notched piece (**fig. 7, 41**), a borer (**fig. 7, 33**), a burin (**fig. 7, 31**), and a grooving tool (**fig. 7, 40**). Five microlith fragments could not be classified as to their type (**fig. 7, 28-30**), as well as eight small tool fragments. There were also two microburins.

Fig. 7 Wieliszew (woj. mazowieckie/PL), trench XVIIc: **1-4** cores. – **5-7** blades. – **8-21** scrapers. – **22-24** endscrapers. – **26-27. 50** truncated pieces. – **28-30** fragments of microliths. – **31** burin. – **32** bec. – **33** borer. – **34-35** backed blades. – **36-38** retouched blades. – **40** grooving tools. – **41** notched blades. – **42-48** trapezes. – **49** flake. – **21** mending of scraper (block no. 7). – **25** refitting: two scrapers and one bec (block no. 11). – **39** refitting: overpassed blade and truncated blade (block no. 14). – (Photos M. Osiadacz; drawings E. Gumińska / I. Niewiadomska).

The few examples of refitting flakes reveal that the tools were miniaturised not because of their processing but rather due to some intentional actions partly resultant from the poor quality of the flint raw material.
Block no. 1: A flake core, a flake and a splintered piece (**fig. 3, 8**).
Block no. 2: A flake with a broken off bulb and a scraper made from its top (**fig. 4, 9**).
Block no. 3: A flake and a scraper, the edge of which was slightly retouched after the removal (**fig. 4, 16-17**).
Block no. 4: A splintered piece, a scraper, and a chip (**fig. 3, 9**). The location of the scars indicates that the side edge of the scraper was only slightly corrected by an abrupt retouch. The top underwent a much bigger reduction. Originally, a changed orientation flake core was converted into a splintered piece.
Block no. 5: A scraper and a core. After retouching the edges, the width of the scraper changed insignificantly (**fig. 3, 3**).
Block no. 6: Two scrapers. As in the earlier cases, the retouching of the edge consisted in correcting its line.
Block no. 7: The block illustrates a rejuvenation process of a scraper. After a flat splinter broke off on the edge, the edge was retouched for the second time (**fig. 7, 22**).
Block no. 8: An endscraper with parameters much smaller than those of the flake of which it had been made was refitted to a flake core with a wide flaking surface (**fig. 3, 4**).
Block no. 9: A flake core, a flake, a retouched flake, and an endscraper (**fig. 7, 4. 23**). The endscraper was made of a flat chip by slightly retouching its edge.
Block no. 10: Two refitted flakes and two retouched flakes.
Block no. 11: Two scrapers and a bec (**fig. 7, 25**).
Block no. 12: Two scrapers and a flake.
Block no. 13: A splintered piece and two small blades. This refitting evidences that splintered specimens could be used as semi-products (**fig. 3, 7**).
Block no. 14: A truncated blade with an overpassed piece. The retouch corrected only a small irregularity of the cross edge (**fig. 7, 39. 27**).
Among the flake and tool semi-products (**figs 4, 1. 23; 7, 34. 38**) there is a small group of finds whose occurrence relates to the presence of other cores than those left on the site. Their presumable length amounts to over 50 mm and the blades were removed with the use of the pressure technique. Those cores may be absent because they had been processed into flake forms, which is attested by a flake with regular blade scars (**fig. 7, 49**).
A much smaller number of flakes in relation to scrapers, endscrapers and other products suggests an intensive tool production. It seems that the unutilized flakes were thrown away because they did not fulfil the defined technical criterions.

FUNCTIONAL ANALYSIS

The functional analysis applied involves macro- and microscopic observations of the edges and surfaces of the products made from stone and organic materials in order to record all the traces left on them when they were in use, and finally their identification. Basing on the above as well as on the experiments and ethnographical data, the traces are interpreted to create a hypothesis how these tools were used and for what purpose. The method was proposed in the 1970s (Keeley/Newcomer 1977; Semenov 1964; Tringham et al. 1974) and improved and developed in the successive decades (e. g., Anderson-Gerfaud 1981; d'Errico/Giacobino 1985; Fullagar 1988; Keeley 1980; Moss 1983; Plisson 1985; van Gijn 1990). Extended by the studies of the preserved remains (e. g. Hardy/Garufi 1998; Haslam 2006; Langejans 2010), it has become an

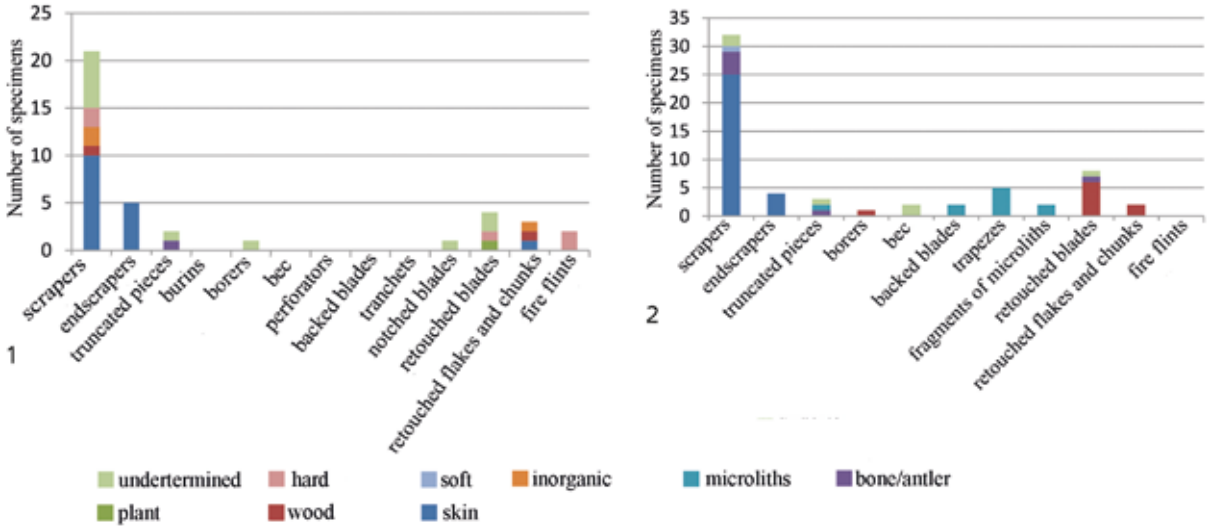

Fig. 8 A set of tools used and unused: **1** Wieliszew, trench XVI. – **2** Wieliszew, trench XVIIc. – (Drawings M. Winiarska-Kabacińska).

important method of interpreting the artefacts in order to understand the functions they played both as single items and as parts of a larger assemblage of finds and of the whole site.

The observations were conducted with the use of two Olympus microscopes: 1. a stereomicroscope Olympus SZ for observing damages, striations, breackages, roundings etc. with magnifications from 6,7× to 45× and 2. a metallographic microscope Olympus BX53M for traceological observations on flint with 100×, 200× and 500× magnification. The microscopic analyses allowed recording the macrotraces visible on the artefacts, e. g., breaks, curvatures, damaged edges of the flint pieces, and microtraces in the form of sickle polish. The functions of these tools were reconstructed on the basis of the list of these traces and their interpretation with the use of the knowledge obtained through the experiments aimed at reconstructing the old tools and the way they were used.

Trench XVI

Of the 135 analysed artefacts from trench XVI, 39 bore traces of modifications resulted from their use (**fig. 8, 1**).

Scrapers: The traseological analysis included 79 specimens, among which 21 bore traces of use. The majority were used for scraping hide (10 pieces) (**figs 9, 1-10; 10, 1**), the remaining ones for scraping wood (1 piece) (**fig. 9, 11**), hard raw material (2 pieces) (**fig. 9, 12-13**), inorganic material (2 pieces) (**fig. 9, 14-15**) and undetermined material (6 pieces) (**fig. 9, 16-21**). In all cases, the working edges were the retouched ones. The specimens used for scraping hide were possibly set in hafts.

Endscrapers: Among the seven discovered specimens, five were used for tanning hide. Their observation brought similar results as in the case of scrapers (**figs 9, 22-26; 10, 2**).

Truncated blades: The observations were made on five specimens. One of them had transformations resulting from processing of bones/antlers, found on the side and transverse edges (**fig. 9, 27**). Another one was used for processing an undefined raw material (**fig. 9, 28**).

Borers: One of the two finds was used for processing an undefined raw material (**fig. 9, 29**).

Notched blades: One of the two examined specimens bore traces of wear as mentioned above (**fig. 9, 30**).

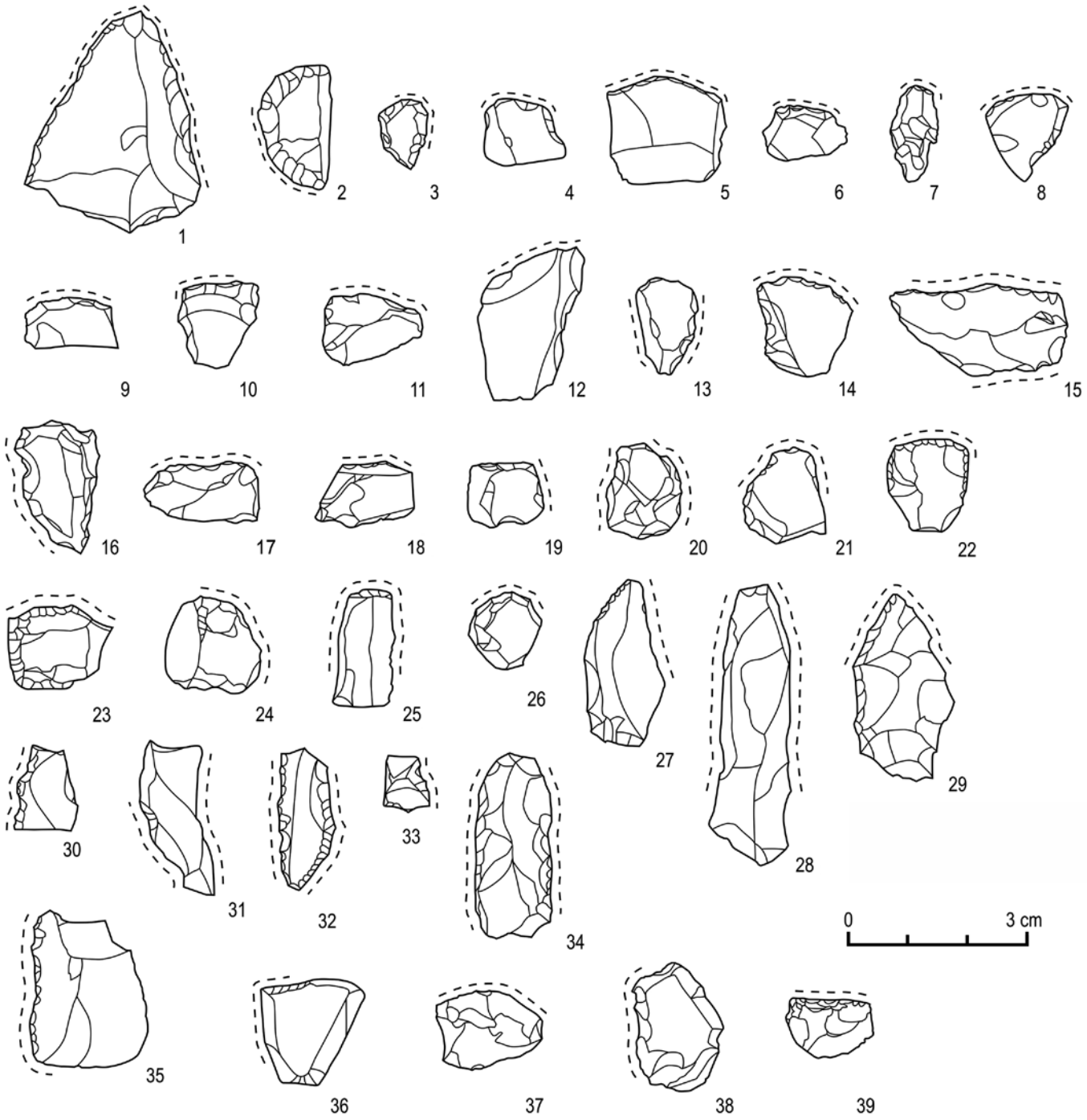

Fig. 9 Wieliszew (woj. mazowieckie/PL), trench XVI. Flint tools with traces of use. – ---- occurrence of traces. – (Drawings M. Winiarska-Kabacińska).

Retouched blades: Among the ten examined tools one was used for processing plants (**fig. 9, 31**), one for scraping a hard raw material (**fig. 9, 32**) and two for processing an undefined raw material (**fig. 9, 33-34**).
Flakes and retouched chunks: In the group of 18 pieces, three artefacts show changes of functional nature. One flake was used for cutting hide (**fig. 9, 35**), the traces of which are visible on its right edge. One flake was used for scraping wood (**figs 9, 36; 10, 3**) and another one for scraping an inorganic, soft raw material (**fig. 9, 37**). In this case, a roundness of the working edge was observed.

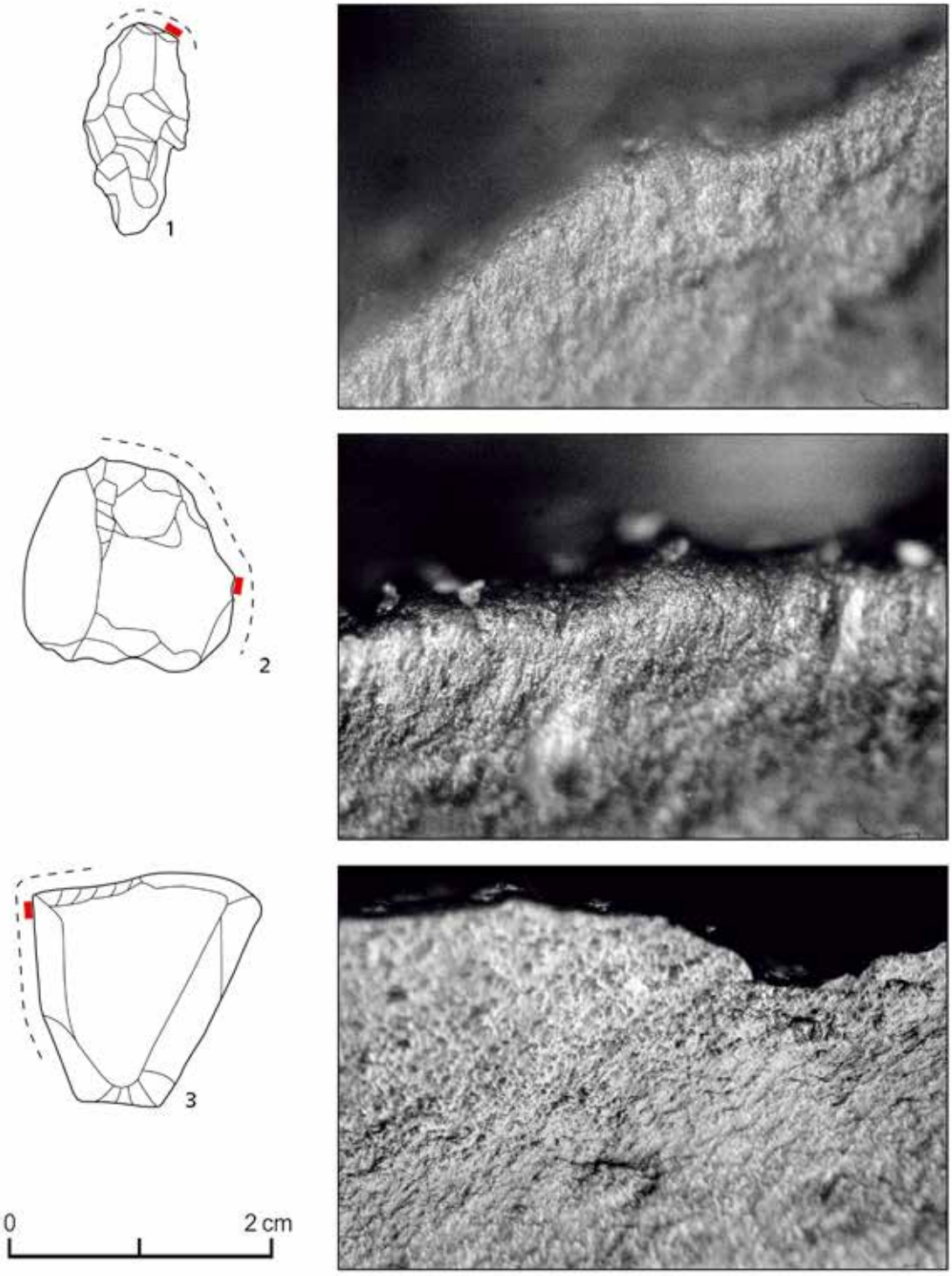

Fig. 10 Wieliszew (woj. mazowieckie/PL), trench XVI: **1** scraper, photomicroscope, skin scraping, 200×. – **2** endscraper, photomicroscope, skin scraping, 200×. – **3** retouched flake, photomicroscope, wood scraping, 200×. – (Photos M. Winiarska-Kabacińska).

Flint strikers: Of the three examined strikers, two had transformations caused by processing a hard raw material (fig. 9, 38-39).

The other examined artefacts: two burins, a bec, a perforator, a backed piece and a flake-axe did not bear traces of use.

Trench XVIIc

132 artefacts from trench XVIIc were subject of observation of the microtraces of use on the edges. 62 specimens bore traces of use (**fig. 8, 2**).

Scrapers: 69 pieces underwent microscopic examination and in 32 cases traces of use were found. They were discovered both along the whole length of the retouched edges and on the edge fragments, sometimes on the more exposed ones. They were present on the lower and on the upper surface, which shows that the pieces were used effectively. 25 specimens were used for hide tanning (**fig. 11, 1-25**). In many cases, such activities result in a macroscopically visible roundness of the edges (**fig. 12, 1-2**). On four tools there were traces resulting from bone processing (**fig. 11, 26-29**). In each case, they were accompanied by the same retouch in the form of »crushes«. One scraper (**fig. 11, 30**) was used for scraping some soft raw material, two others (**fig. 11, 31-32**) for scraping an undefined raw material.

In the course of the examination the presence of brownish-red discolouration was observed on the upper surface of one retouched blade, and in three other cases on the butts of the scrapers (**figs 12, 3-4; 13, 1**). The discolouration seems to be remains of ochre processing.

Endscrapers: Of the nine specimens examined, four bore use-wear traces (**fig. 11, 33-36**). The tools were used for scraping hide and two specimens additionally bore traces left by a haft in which they were set (**fig. 11, 34-35**).

Trapezes: Eight pieces underwent trace analysis. Five of them (**fig. 11, 37-41**) had features indicating their use as arrowheads. There were also traces left by a haft in the form of polish or breaks on the shorter, transverse edge which had been set in the haft (Rots 2008; 2010; Cristiani/Pedrotti/Gialanella 2009). On the surface of one trapeze (**fig. 11, 38**) some microscopic traces of polishing in the shape of lines were found. This kind of traces is related to the use of a trapeze as an arrowhead (truncated point) and such transformations are induced when the tool reaches its goal. These traces were found on the bottom part of the artefact, near the broken off edge (**fig. 13, 2**). On the surface of another trapeze (**fig. 13, 3**), next to its longer transverse edge, a scar after removal was observed. Its character and location show that also this trapeze was used as an arrowhead.

Backed pieces: The two examined finds showed the presence of attributes which indicated their use as truncated points. The first of them (**fig. 11, 42**) was an inset embedded in a haft by its retouched edge, while the traces of contact with soft raw material are present on its longer, unretouched edge. The other one (**fig. 11, 43**) was also part of a weapon. There is a visible burin detachment on its distal end (**fig. 13, 4**), ensued probably after the arrowhead reached its goal. The macroscopically visible rounding of the retouched edge, which is accompanied by a characteristic polish, indicates that one backed point was used for hide scraping (**fig. 11, 50**).

Two of the undefined microlithic fragments have use-wear traces. The first one (**fig. 11, 44**), broken at the base, with retouched both sides, has polish traces of undefined character. The second specimen (**fig. 11, 45**), with an unclear polishing, is broken on both sides. Possibly, both pieces were used as insets.

Of the two analysed becs one was used for carving in an undefined raw material (**fig. 11, 47**) whereas the other one was used for undefined purposes (**fig. 11, 46**).

The borer was used for boring, possibly in wood (**fig. 11, 48**), whereby the traces of wear are visible on its distal end.

Truncated pieces: Six specimens were examined. One was an inset (**fig. 11, 49**). A burnt backed piece was broken at its base and the scar of this break is characteristic for items used as parts of weapons. The next piece had transformations on the retouched edge. They were formed by scraping some undefined material

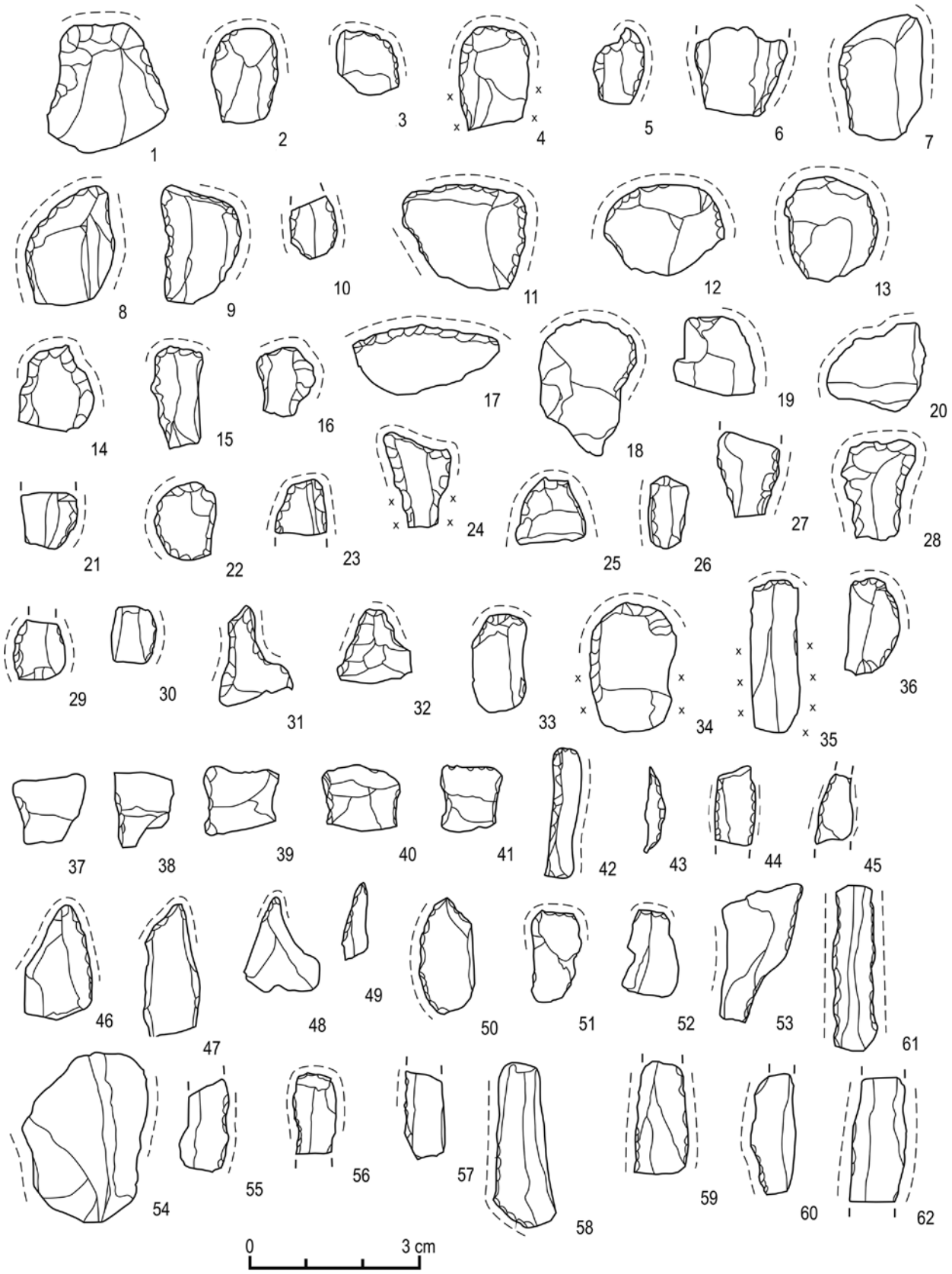

Fig. 11 Wieliszew (woj. mazowieckie/PL), trench XVIIc. Flint tools with traces of use. – ---- occurrence of traces. – xxx traces hafted. – (Drawings M. Winiarska-Kabacińska).

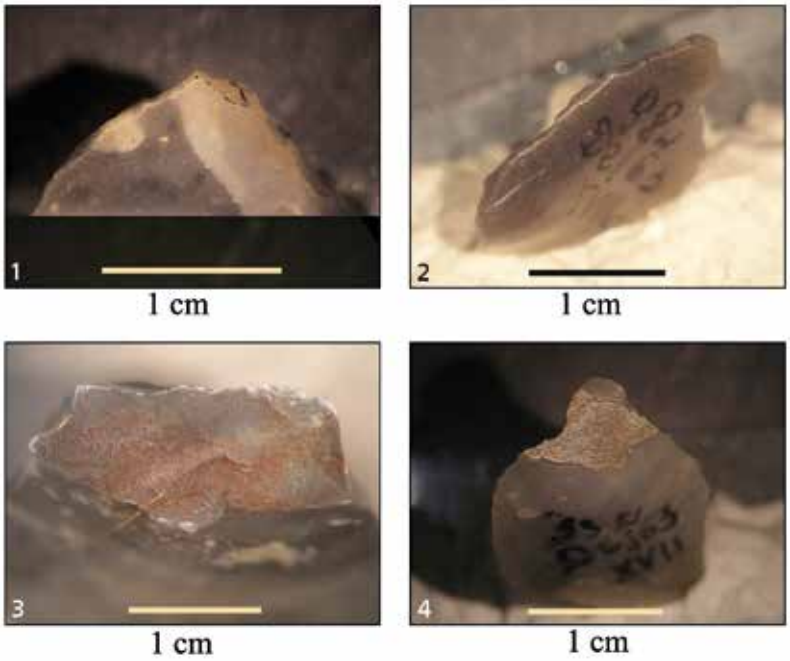

Fig. 12 Wieliszew (woj. mazowieckie/PL), trench XVIIc: **1-2** rounding found on scraper's edge. – **3-4** stains visible on scraper surfaces. – (Photos M. Winiarska-Kabacińska).

(**fig. 11, 51**). The last, burnt specimen bears intensive traces on its working edge, which were made by scraping bones (**fig. 11, 52**).

Retouched flakes: 13 pieces were analysed. Two of them bore traces suggesting wood scraping. In the first case, the traces are present on the slightly concave side edge (**fig. 11, 53**). In the second case, they are visible on both side edges (**fig. 11, 54**). The character of those transformations indicates the possibility of being used for barking the trees.

Retouched blades: Among the twelve analysed specimens eight bore use-wear traces. One piece (**fig. 11, 55**) was used for scraping bones, another for scraping an undefined raw material (**fig. 11, 56**); additionally, on its upper surface, there is a reddish-brown discolouration (**fig. 13, 5**). Six other blades were used for wood processing. They were used for a variety of activities such as striating (**fig. 11, 57**), scraping (**fig. 11, 58**), and cutting (**fig. 11, 62**). Three other blades were multifunctional tools (**fig. 11, 59-61**) used for various activities related to wood processing. The single striker did not show any unmistakable changes of use-wear character under trace analysis.

SPATIAL ANALYSIS

The essential feature which determines the reconstruction and interpretation of spatial organisation is the homogeneity of the assemblage which, if found in the shape of a compact and small flint scatter, is a strong argument for its oneness (Schild/Marczak/Królik 1975, 37; Grön 1987, 65). Stone artefacts do not decompose as easily as organic products (Andrefsky 2009, 65). Therefore, they are the best diagnostic scientific source in the spatial analysis of the Mesolithic camps.

The analysis bases above all on the horizontal distribution of the artefacts (Schild 1980, 79-80) and on their refitting. This allows distinguishing separate activity zones, to identify them, and to determine the spatial relations between them (Tomaszewski 1986, 257-273).

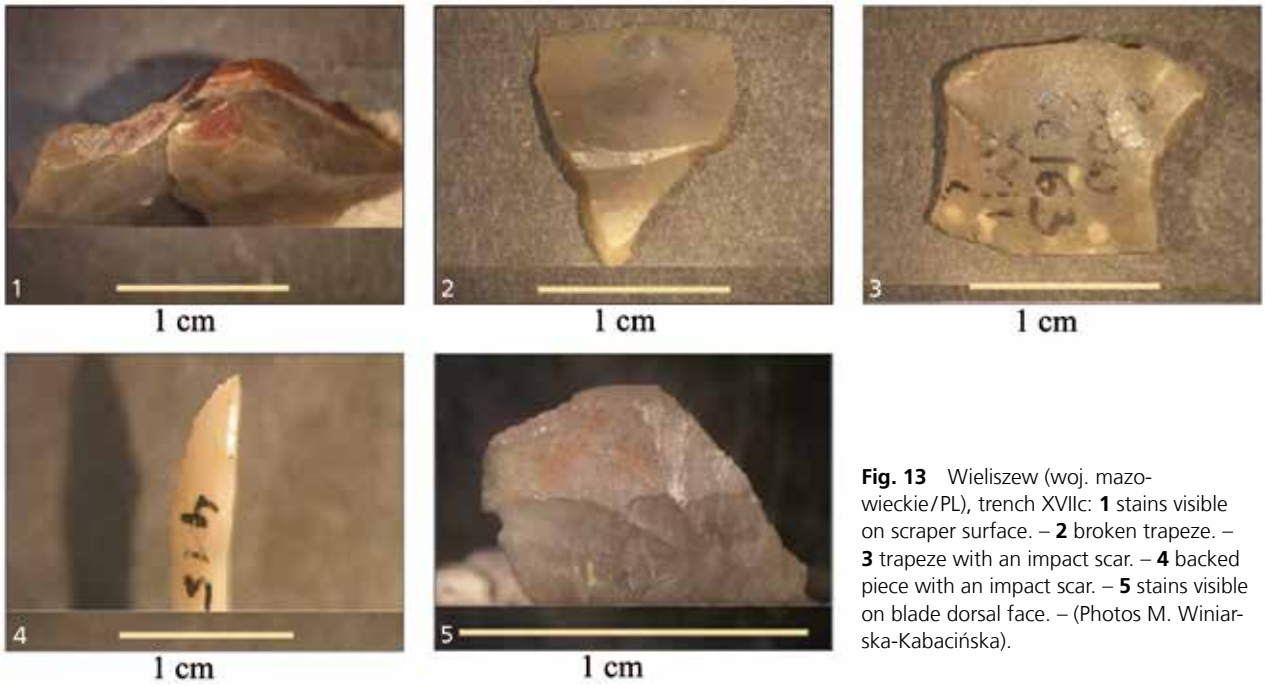

Fig. 13 Wieliszew (woj. mazowieckie/PL), trench XVIIc: **1** stains visible on scraper surface. – **2** broken trapeze. – **3** trapeze with an impact scar. – **4** backed piece with an impact scar. – **5** stains visible on blade dorsal face. – (Photos M. Winiarska-Kabacińska).

The fact that the relation between the deposition of flint artefacts and the place of their use is not straightforward is evidenced by the spatial organisation found at level 4, trench 9, in Całowanie (woj. mazowieckie/PL) where the tools were thrown or cleared away after the work had been finished (Schild 1984, 230 fig. 4, 23). The joints of refitted products are displayed as lines connecting points as proposed by E. Cziesla (1990, 9-10).

In trench XVI the network of junctions between the pieces of flint is grouped in two different areas: the eastern and the western one. There are no refittings joining the two areas. This division is also partially present in the scatter pattern of the relics. The assigned zones are characterized by very similar assemblages of products. Apart from the cores and splintered pieces, also scrapers, endscrapers, trapezes, truncated pieces, and borers were found (**fig. 14a**).

In each of the zones, there were also small, burnt animal bones next to which burnt flint was discovered. Two of these specimens were documented on the eastern and western edge of the concentration whereas the third one was localized between the zones, in the region where small splintered pieces occurred.

The regular dispersion of the flint material may suggest that there was no single central place where the concretions were processed, i. e., the site where the most intensive knapping activity was taking place (Stevenson 1991, 274). Core exploitation was carried out in different places in the camp. On the basis of the spatial distribution of functionally defined tools, it was ascertained that in both zones pieces of flint related to hide processing and hard raw materials were found. By contrast, on the borders of the western zone singular finds occurred, indicating wood, bone/antler and plant processing.

In trench XVIIc three concentrations of typologically differentiated tool assemblages (**tab. 1**) have been distinguished. The first of them is located in the northern part and contains scrapers, trapezes, microlith fragments and retouched flakes; there are no endscrapers or retouched blades. The second concentration comprises the central part of the flint scatter. There were scrapers, endscrapers, trapezes, single retouched flakes, truncated pieces, one borer and almost all the retouched blades. The third concentration was located in the southern part. This is the richest concentration in terms of the number of finds. The scrapers are

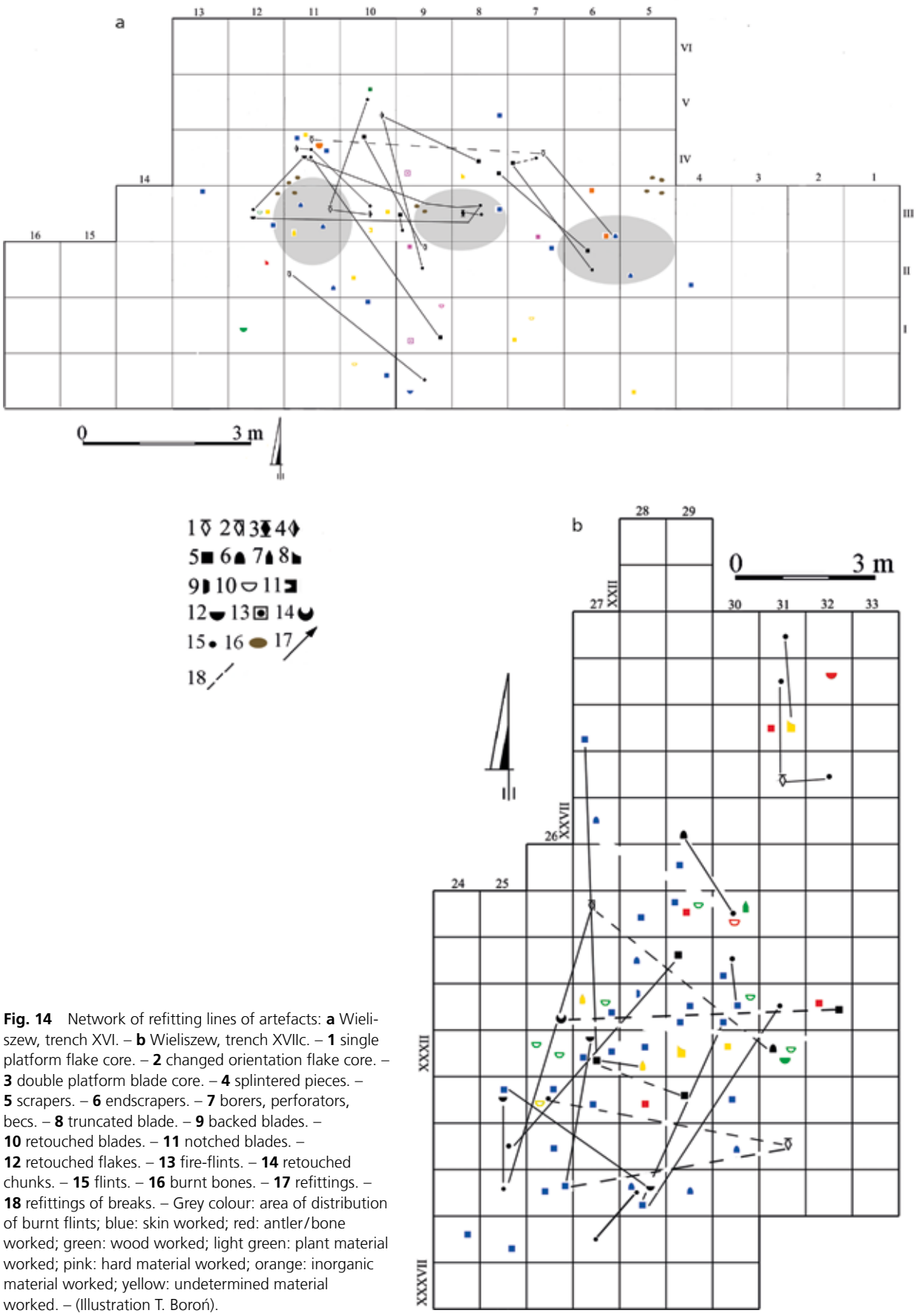

Fig. 14 Network of refitting lines of artefacts: **a** Wieliszew, trench XVI. – **b** Wieliszew, trench XVIIc. – **1** single platform flake core. – **2** changed orientation flake core. – **3** double platform blade core. – **4** splintered pieces. – **5** scrapers. – **6** endscrapers. – **7** borers, perforators, becs. – **8** truncated blade. – **9** backed blades. – **10** retouched blades. – **11** notched blades. – **12** retouched flakes. – **13** fire-flints. – **14** retouched chunks. – **15** flints. – **16** burnt bones. – **17** refittings. – **18** refittings of breaks. – Grey colour: area of distribution of burnt flints; blue: skin worked; red: antler/bone worked; green: wood worked; light green: plant material worked; pink: hard material worked; orange: inorganic material worked; yellow: undetermined material worked. – (Illustration T. Boroń).

northern focus	central focus	southern focus
present: trapezes, fragments of microliths, scrapers, retouched flakes, truncated blades	*present:* scrapers, endscrapers, almost all retouched blades, borer, trapezes, truncated blades, retouched flakes	*present:* scrapers, endscrapers, splintered pieces, truncated blades, backed blades, becs, retouched blades
absent: endscrapers, retouched blades, borers, backed blades, becs	*absent:* becs, backed blades	*absent:* borers, notched pieces

Tab. 1 Wieliszew (woj. mazowieckie/PL), trench XVIIc. Set of tools in particular focus.

clearly predominant while the quantities of the other types of tools range between single artefacts (the grooving tool) and five pieces (the endscrapers).

Basing on the scarce number of the refittings, being the result of the small sizes (like in trench XVI) and intensive processing of the core flint pieces, the reconstruction of the spatial plan of the camp is rather limited by the quality of the sources. The refitting lines between the products link the central and southern concentration. By contrast, there are no refitting lines between these assemblages and the northern group, which seems symptomatic even though the amount of refitted flint is small (**fig. 14b**).

Two spatial units have been discerned. The first one embraces the central and southern concentration. The refittings of the scrapers and other tools and a refitting of a core with semi-products point to the fact that this area was a place of core processing as well as tool production and use. Also, numerous flints related to hide tanning and a few related to wood and bone processing were found there.

The second unit is the northern concentration. Singular refittings point to the fact that also here the exploitation of cores took place. Single flint finds suggest bone processing.

FINAL REMARKS

Basing on the spatial analysis, two activity zones were distinguished in trench XVI: the eastern and the western one, with hearths on their borders. It is difficult to decide with certainty whether this was one big camp with two simultaneous settlement structures or two separate camps. A similar spatial plan was found in trench 2 at Nieborowa I (Boroń 2013, 74) and at the Mesolithic site at Bukówna 5 (woj. dolnośląskie/PL; Masojć 2004, 39), with the difference that there the hearths were discovered in the central parts of the camps.

Placing the hearths inside the camps results in forming concentrated flint processing and economic activity around it (Schmider/de Croisset 1990, 435; Olive 1998, 89; Wenzel 2009, 116; Wenzel/Jagu 2010, 79). In contrast to this, placing the hearths on the borders of the camps results in a polarisation of all the household activities (Séara et al. 2002, 252 fig. 225). Burnt flint found between the eastern and western zones suggests that there may have existed a hearth related to a Trzciniec culture settlement.

The central parts of the two distinguished activity zones were used for the activities related to hide tanning and work with a hard raw material. Processing of wood, bones/antlers and plant material took place on the borders of the camp on its western side. All these activities were presumably temporary and short-term. The way in which the economic activities were arranged in the two zones indicates that the camp had a symmetrical structure (**fig. 15, 1**).

The spatial planning in trench XVIIc is slightly different. It seems likely that the southern and central concentrations belonged to one and the same zone of activity (residential camp), while the northern concentration was another zone, possibly of a secondary character.

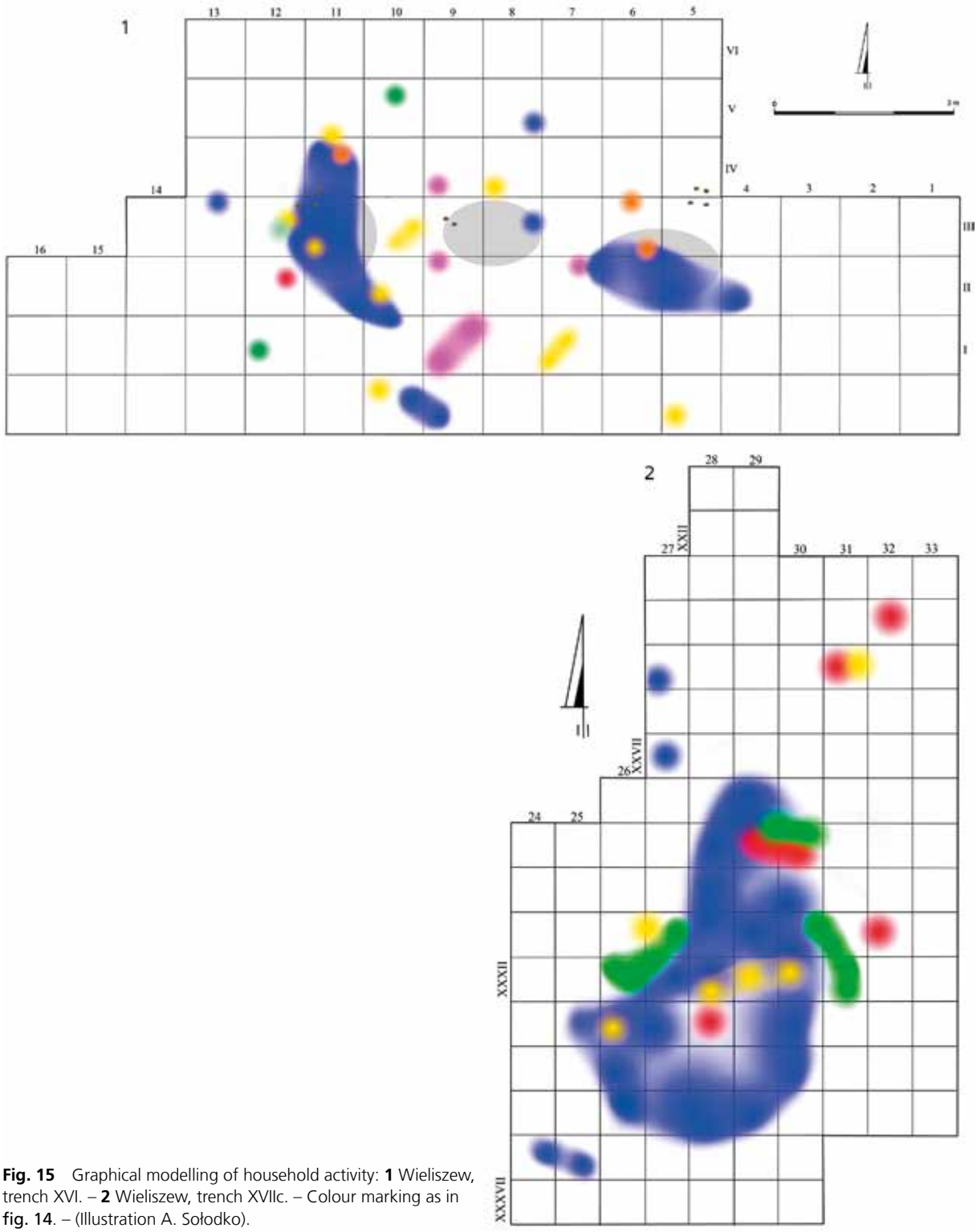

Fig. 15 Graphical modelling of household activity: **1** Wieliszew, trench XVI. – **2** Wieliszew, trench XVIIc. – Colour marking as in **fig. 14**. – (Illustration A. Sołodko).

Hide tanning activity took place almost at the whole area of the camp, while the other tasks such as processing of wood or bones were concentrated on its perimeter and in the northern zone (**fig. 15, 2**). Like in trench XVI, these activities were incidental.

A large number of typologically differentiated tools clearly evidences that the camp functioned as a household. The wide net of refittings from almost the entire area of the flint scatters also proves this fact. The

widespread distribution of artefacts belonging to the refitted blocks is also found in other flint scatters considered as household ones (Ginter 1975, 282; Veil 1987, 316; Wenzel 2002, 7; Boroń 2004, 15; Kind 2006, 223).

Although the analysed assemblages differ slightly from one another as to the presence and number of particular tool categories, in both of them scrapers are predominant and also they are the largest tool group with attested signs of use. It is worth to emphasise that they were mainly used for hide processing. It remains unsolved how they were set since most of them are very small in size. Only in very few cases of scrapers, it was possible to find traces left by the hafts.

The discussed materials are unique due to the extremely microlithic character and the domination of small scrapers with relatively evident functions, highly specific for the Kokry industry. As a result, any broader comparative analyses of the functions of the artefacts have a limited value, especially as very few Mesolithic assemblages from the area of Poland have been subject of functional analyses. Also, scrapers are quite scarce in the early Mesolithic assemblages, in contrast to the late Mesolithic ones, in which they are quite numerous. The functional analyses of scrapers from the other Mesolithic sites indicate that these tools served for a variety of purposes. The scarce specimens from the sites from north-western Poland (Wojnowo 3, woj. wielkopolskie/PL; Jastrzębia Góra 4, woj. pomorskie/PL; Turowiec 3, woj. pomorskie/PL) were used for scraping wood, antlers, and other hard raw materials (Pyżewicz 2013) or they were not used at all (Smolno Wielkie 2, woj. lubuskie/PL; Winiarska-Kabacińska 2016a). The finds uncovered at the Mesolithic sites from the Chełmno region were mainly used for scraping bones/antlers and, to a lesser degree, hide and wood (Osipowicz 2010, 224; 2017). At the early Mesolithic sites of Verrebroek, Doel (both prov. Oost-Vlaanderen/B), Rosnay (dép. Marne/F) and Noyen-sur-Seine (dép. Seine-et-Marne/F; Guéret 2017), scrapers were used for scraping hide, and at Star Carr (North Yorkshire/GB; Dumont 1983) and Vænget Nord (Hovedstaden/DK; Juel Jensen/Brinch Petersen 1985) there were used for scraping bones, antlers, and wood.

The second most numerous group after the scraping tools found in the inventory from trench XVIIc are the specimens used as insets – both as points and as other elements of weapons. These are trapezes, backed pieces, truncated blades and fragments of undefined microliths. This interpretation is supported by the characteristic traces, many times described and induced experimentally (Fischer/Hansen/Rasmussen 1984; Crombé et al. 2001). Characteristic break offs, signs of percussion and linear traces of polish – these all are modifications, which take place when an arrow reaches its goal. However, they are not always traceable, particularly if the microliths were side insets of a weapon (Crombé et al. 2001).

It remains an open question what method was used to set the analysed microliths in the hafts. The microscopic and macroscopic traces left by a haft may indicate that the trapezes, one backed piece (**fig. 11, 43**), one truncated piece and one fragment of an undefined microlith (**fig. 11, 45**) were used as points, whereas other insets were used as side insets. This information corresponds with the observations made by other researchers who examined Mesolithic assemblages and the insets themselves (Nuzhnyj 1989; 1990; 2000; Crombé et al. 2001; Osipowicz 2010; Pyżewicz 2013; Winiarska-Kabacińska 2007; 2016a; 2016b). The presence of relatively numerous flint fragments used as elements of hunting weapons in trench XVIIc may be an effect of their mending. After the hunt, the animals were quartered and cut up into smaller pieces. It is possible that this happened at the place where the hunters camped. However, in the two assemblages from Wieliszew such works were not confirmed by the traces left on the flint tools.

The functional analysis of the flint tools from the two trenches suggests that a rather uniform economic activeness related to the production of hide was conducted there. As the ethnographical data, the results of functional experiments, and the archaeological flint materials indicate, the hide processing was a common activity performed by the Mesolithic communities. The identification of the traces recorded on the artefacts

combined with the spatial analysis allows indicating the places in the occupied area where such work was conducted. At Sąsieczno 4 (woj. kujawsko-pomorskie/PL) in the Chełmno-Dobrzyń Lakeland, there are clear concentrations of tools used for hide and meat processing at which also tools used for processing bones, antlers, and wood were found (Osipowicz 2017, 133-137). The distinguished zones of activity were located within habitation structures (Osipowicz 2017, 156-157). Also at the second site analysed from the Chełmno-Dobrzyń Lakeland, Ludowice 6 (woj. kujawsko-pomorskie/PL), there were places related with hide processing and butchering. In flint concentration 2 this place was located within the presumed hut (Osipowicz 2017, 188-189). In flint concentration 1, a zone of wood processing was set out around the hearth and a zone of hide, meat, and plant processing were located slightly farther away (Osipowicz 2015, 77; 2017, 223-224). In Vænget Nord in Denmark, in the central part of the camp, besides hide processing also bone working took place (Juel Jenssen/Brinch Petersen 1985, 49). In Verrenbroek, in turn, besides hide dressing also intensive processing of plant material was recorded (Beugnier/Crombé 2005, 537).

The intentional production of miniature scrapers, the large proportion of those artefacts in the assemblage, and the absence of diagnosed hafted traces may suggest that the hunting activity may have been directed at small mammals. They were hunted in the late autumn when their fur was of the best quality. Therefore, the camps in Wieliszew may be related to a seasonal migration of the Mesolithic society.

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Zusammenfassung / Summary / Résumé

Spätmesolithische Siedlung in Masowien (Kokry-Industrie). Räumlich-funktionale Interpretationen von Lagerplätzen

Der Fundort in Wieliszew (woj. mazowiechie/PL) liegt am linken Ufer der Narew, unmittelbar an deren Mündung in die Vistula. Die Kokry-Industrie zeichnet sich durch ein signifikantes Überwiegen von Schabern gegenüber Klingenkratzern, das Vorkommen von ausgesplitterten Stücken und nur wenige mikrolithische Typen aus, die sich im Grunde auf Trapeze beschränken. Die Methoden, die in der räumlich-funktionalen Untersuchung zum Einsatz kamen, sind die Analyse der Mikroverschleißspuren auf Feuerstein, die Analyse der horizontalen Verbreitung von Artefakten und das Refitting.

Ausgehend von der räumlichen Analyse wurden zwei Aktivitätszonen im Schnitt XVI identifiziert: eine östliche und eine westliche, an deren Grenzen Herdstellen lagen. Die räumliche Gestaltung im Schnitt XVIIc unterscheidet sich davon geringfügig. Es hat den Anschein, als ob die südlichen und zentralen Konzentrationen zu derselben Aktivitätszone gehörten (Wohnbereiche), während die nördliche Konzentration eine andere Zone darstellte und sekundär entstanden sein kann.

Übersetzung: M. Struck

Late Mesolithic Settlements from the Area of Mazovia (Kokry Industry).
Spatial-functional Camp Interpretations
The site of Wieliszew (woj. mazowieckie/PL) is located on the left bank of the river Narew, directly at its influx to the Vistula. The hallmarks to identify the Kokry industry are the significant prevalence of scrapers over endscrapers, the occurrence of splintered pieces and the paucity of the microlithic types limited basically to trapezes. The methods used in the spatial/functional analysis had been the analysis of the microwear traces on flint, the analysis of the horizontal distribution of artefacts, and refitting.
Basing on the spatial analysis, two activity zones had been detected in trench XVI: the eastern and the western one, with hearths on their borders. The spatial planning in trench XVIIc is slightly different. It seems likely that the southern and central concentrations belonged to the same zone of activity (residential camp), while the northern concentration was another zone, only it could have been secondary in character.

Etablissements mésolithiques tardifs de la région de Mazovie (industrie de Kokry).
Interprétation spatiale et fonctionnelle des campements
Le site de Wieliszew (woj. mazowieckie/PL) est situé sur la rive gauche de la rivière Narew, précisément sur la confluence avec la Vistule. Les caractéristiques de l'industrie de Kokry sont la prévalence importante des grattoirs sur les racloirs, la présence de pièces éclatées et la rareté des types microlithiques limités essentiellement aux trapèzes. Au niveau méthodologique, l'analyse spatiale/fonctionnelle repose sur l'étude tracéologique des silex, l'analyse de la stratigraphie horizontale des artefacts et les remontages.
Sur la base de l'analyse spatiale, deux zones d'activité ont été détectées dans la tranchée XVI: une à l'est et une à l'ouest, avec des foyers à leurs frontières. L'aménagement de la tranchée XVIIc est légèrement différent. Il semble probable que les concentrations du sud et du centre appartenaient à la même zone d'activité (campement résidentiel), alors que la concentration du nord relève d'un autre type d'espace, probablement de caractère secondaire.
Traduction: L. Bernard

Schlüsselwörter / Keywords / Mots clés

Polen / Spätmesolithikum / Feuerstein / Geräte / räumliche Analyse / funktionale Analyse
Poland / Late Mesolithic / flint / tools / spatial analysis / functional analysis
Pologne / Mésolithique final / silex / outils / analyse spatiale / analyse fonctionnelle

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