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ANALYSIS

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FLINT MATERIALS FROM CEMETERIES OF THE SOFIEVKA TYPE

1. METHOD OF ANALYSING MATERIALS

1.1. ASSESSMENT OF INVENTORY HOMOGENEITY

Cemeteries of the Sofievka type were located on sandy dunes in geological conditions favoring vertical displacements of artefacts, if only as a result of natural phenomena [Kempisty, Więckowska 1983: Tables 8 and 9]. All sites were partly destroyed by human activity and also by eolian processes already before excavations were undertaken. Excavators failed to observe traces of grave pits on any of the sites. This prevents a reliable distinction of individual grave assemblages, and each inclusion of a particular artefact in some specific assemblage is burdened with a considerable risk of error. These difficulties notwithstanding, one cannot forego attempts to eliminate technologically foreign intrusions from the investigated assemblages and to distinguish inventories from the various graves, however tentative these results might be. The homogeneity of inventories from cemeteries of the Sofievka type was assessed basing on formal and technological links between the artefacts classes distinguished in them as well as on planigraphy and refittings.

The analyses of formal and technological connections between the various classes of artefacts are unfortunately variously effective in the case of different groups of finds. Predominant in the studied assemblages are artefacts representing the macrolithic blade technology. In this case tool production consisted largely in transforming successive forms, this linking the artefact classes that were distinguished in an unequivocal manner. Since there are is no evidence that other blade techniques were used, the several fragments of small bladelets that were found scattered on the surface of sites in Sofievka and Krasny Khutor can be interpreted as foreign admixtures. A similarly homogeneous and well documented tool group is that of large core implements, namely square axes and bifacial knives. The Strzyżów-type bifacial sickle-shaped knife recovered from the ground surface in Krasny Khutor

has to be regarded as a foreign admixture. The fairly small and not very diversified group of retouched flake tools also appears to be homogeneous, although interpretations in this case cannot be viewed as absolutely certain. The situation gets much more complex when we come to arrowheads which were found in great numbers in the various inventories. Isolated specimens thereof are among the most common finds in dune areas [Kozłowski 1923: 107-8]. Studies in diverse parts of Europe have shown that various communities are capable of producing arrowheads of a single and well defined form [Borkowski 1987] but that they can also use arrowheads highly diversified as regards morphology [Uerpmann 1976: Abb. 22]. Regrettably, the morphometry of arrowheads of different communities of the Late Neolithic and Early Bronze Age has not been analyzed in the area with Sofievka type cemeteries. Given this, there are no grounds for eliminating any of these artefacts, even when facts established elsewhere suggest that their retouch or shape show them to belong to a different context. It is thus certain that the analyzed collections will feature arrowheads that are foreign intrusions. This fact must be kept in mind when classifying the various finds and drawing inferences from analyses thereof.

Maps of the various cemeteries show that archaeological materials there form concentrations of various sizes. Although flint artefacts were often discovered some distance away from the cremated body remains, they are usually associated with them in an obvious manner. The resultant concentrations may be treated as remains of individual grave assemblages.

This approach was verified by refitting of the recovered materials. In more than 70 cases the attempts were successful, and in many others it was possible to determine that ill-fitting fragments nevertheless do come from the same specimen. In a vast majority of cases it was possible to refit fragments recovered from distinct concentrations of artefacts. In exceptional cases the picture was more complex. A blade knife fragment from grave 44 in Sofievka fitted an isolated artefact discovered more than five meters away (70 cm below ground surface). In Chernin a fragment of a blade knife from grave 52 fitted an artefact recovered close to grave 11, more than two meters away. Such cases may be seen as due to site erosion or as traces of rituals preceding interment. Materials recovered from adjacent features lent themselves to refitting equally rarely, and this may be interpreted as evidence of disturbance of older graves during a new burial. Situations of this kind are documented by refitted fragments of blade knives recovered from graves 52 and 63 in the cemetery in Chernin, as well as by fragments of a stone adze from around grave 119 in Krasny Khutor.

Analysis results confirm the statistical validity of the adopted interpretation of the concentrations of materials, at the same time supporting the theoretical reservation that the available procedures cannot rule out errors. In each individual case we may have to do with foreign material admixtures and also with a depletion of the assemblage subsequent to its deposition. One must always bear this in mind when analyzing the distinguished „grave inventories".

The limitations outlined above as well as gaps in documentation preventing

the exact localization of some of the finds prompted the division of the analyzed materials into the following four groups:

1. „grave inventories" whose more or less precisely localized artefacts combine with cremated body remains to form distinct concentrations;

21. „isolated" artefacts from outside the features, that is to say finds precisely located but unconnectable to any specific concentration of artefacts;

22. „isolated" artefacts from the ground surface, collected without recording their precise position; and

23. unlabelled „isolated" artefacts stored together with all the others but without any indication of their origins.

1.2. RAW MATERIAL ANALYSIS

A considerable percentage of the analyzed artefacts are completely charred, white in color, which usually makes raw material identification impossible. There are also many fired specimens, discolored to an extent which greatly hinders proper identification. The mention of these facts is meant not only to underline the difficulties in raw material analysis. The quantities of fire-damaged specimens and the nature of this damage may provide insights into interesting aspects of burial rituals.

Raw material analyses of large samples of materials from the considered cemeteries were performed by V.F. Petrougne (cf. his contribution in this volume). His findings provided the basis for most of the conclusions concerning raw material economy presented in this paper. My experience allowed me only to identify Volhynian flint macroscopically and to distinguish it from the other flint varieties.

1.3. MORPHOLOGICAL AND TECHNOLOGICAL ANALYSIS OF FLINT MATERIALS

The analysis of flint artefacts is traditionally based on interpretations of the ways in which they were made [e.g. the definitions of „tool" or burin; cf. Ginter, Kozłowski 1990: 35, 79, 83], on their morphology [e.g. the definition of „point"; cf. Ginter, Kozłowski 1990: 83] and traces of use [e.g. the definition of scaled piece - *piéce esquillée* in French; cf. Migal 1987]. To satisfy formal requirements it would be necessary to perform separate classifications of materials for each of the above aspects and formulate final conclusions only on the basis of these classifications. However, this does not seem to be a practical possibility. The need for a separate classification with regard to use traces is usually insisted upon with special emphasis [Ginter, Kozłowski 1990: 79-80]. Even this, seemingly obvious, requirement cannot

be fulfilled. To ignore the presence in inventories of scaled pieces or hammers will always make the classifications incomplete and often render the comprehension of the investigated assemblages altogether impossible [Szymczak 1987; Małecka-Kukawka 1992].

Studies of the flint inventory cannot be treated as a one-time project whose success can be gauged by its depth of detail the number of distinguished artefacts classes. Rather, these studies should be seen as a process involving many phases, each geared to achieving a different goal. The first step is the compilation of a general list of artefact classes occurring in the given assemblage. The distinguished categories should enable the discernment of the basic principles underlying flint production in the studied assemblage. Although the proposed definitions should aim to describe the morphological canons of the distinguished categories, all the three kinds of features (including macro-traces of use!) are helpful in their creation. Experience tells us that in the process it is impossible to come up with a universally valid hierarchy of significance of the various features: one feature may receive an entirely different rank in various contexts, to mention but the shaping of the truncation in truncated blades and trapezes. Researchers must thus rely on intuition here, and the investigative process certainly cannot be formalized.

It is only in the next stage of analyses that the findings arrived at can be verified by detailed morphometric definition of the various tool categories [Sałaciński 1987: 117-137) or of differences between their varieties [Borkowski 1987], as well as by reconstructing the techniques used in making the various forms [Migal, Sałaciński 1996] or ways in which they were used [Korobkova 1981]. Each of these kinds of study requires its own unique methods, and meaningful results are possible only when the materials meet certain quality standards. All this means that a thorough description and understanding of specific flint industries must be arrived at in stages, a process usually taking up many years of study.

The analysis of flint inventories from cemeteries of the Sofievka group was deliberately limited to the first stage of the investigation process. The study was complemented with an occasional look at techniques of making the macrolithic blades occurring in large numbers in the inventories in question.

Studies of Palaeolithic flint assemblages suggest that the cultural tradition governing this particular production domain is best described by the quantitative structure of the major tool classes occurring in them [Kozłowski 1980: 40-47]. Accordingly, it was assumed that the most important step in the analysis of flint inventories is the making of a standard list of major tool classes and statistical analysis of the frequency of their occurrence [Lech 1988]. Regardless of what we mean by „cultural tradition" defining the chronological-territorial units thus revealed, we can be sure that differences in the frequency of occurrence of the basic tool types cannot be interpreted in the way proposed above in the case of materials:

- from settlement points displaying a markedly different character (not just workshop or grave assemblages but also assemblages from the diverse settlement points), and

– materials in which the basic tool types are not the final forms of the production process but represent the various stages of reshaping artefacts.

It appears that both the above factors albeit independently of one another, to a various degree and in different times determined the character of Neolithic flint assemblages in Central Europe. It seems they are the main reason why attempts to order Neolithic flint assemblages in a way typical for the older periods of the Stone Age [e.g. Balcer 1983] usually end in failure.

The two factors listed above also determine the character of the available Sofievka type inventories. Today we have in hand only materials from cemeteries which have been outside cultural circulation in the way peculiar for such finds. This makes it impossible to directly compare their structure with the structure of materials from settlement sites. What is more, the differences between collections from various cemeteries may depend more on changes in rituals rather than in flint working traditions. At the same time, already the preliminary analysis of materials showed that tool making in our case consisted largely in reshaping artefacts.

This kind of situation calls for an analysis different from the standard typological-statistical method based on a fixed typological list of fully disjoint categories [Kozłowski 1971; Kaczanowska 1985: 12-15]. Here the materials will be described employing a detailed multi-stage classification which, although devised with specimen morphology as the most important criterion, nevertheless also takes into account the forms out of which the particular specimens were fashioned as well as visible traces of use.

The classification may be presented in generalized form as a list of types present in the analyzed inventories. This list differs considerably from those previously compiled for similar assemblages [Kozłowski 1971: 145; Balcer 1975: 89-139; Kaczanowska 1985: 12-15]. It lacks the category of retouched blades because detailed morphometric analyses of a similar blade industry [Sałaciński 1987: 137-144] have demonstrated that no such tools actually existed and that this category is an artificial lumping together of diverse form types. In its place are several types of knives, daggers and blade pressers. Also lacking in the classification below are the so called combined tools, although quite a number of specimens in the examined assemblages have several elements formed. These specimens must either comprise a specific separate tool type (cf. the case of trapezes mentioned above) or be the result of reshaping. The specific nature of the analyzed finds made it necessary to distinguish separate groups of pressers and strikers. The plentiful and diverse collection of these forms made it possible to suggest a detailed division thereof, although the functional similarity and amorphous shape of many of the specimens made this job extremely difficult. It was also no easy task to categorize the rich collection of arrowheads since most of the specimens were damaged to an extent preventing detailed morphometric determinations. It was thus decided to divide them in a very general manner, basing on features that are easily measurable and to some extent possible to reconstruct, namely the manner of fashioning the base, size and elongation (length-to-width ratio). All the categories were in the end gro-

uped according to the character of half-products out of which they were fashioned.
List of flint artefacts types present in cemeteries of the Sofievka type (Fig.1-9).

1. Debitage
11. Blades
12. Flakes
121. Ordinary flakes
1221. Ordinary chips: small flakes, usually not exceeding 30 mm in size, produced in the course of splitting natural pieces or larger flakes with a hard hammer; some of the smaller specimens resemble micro-scaled flakes
1222. Chips from polished axes: pieces similar to ordinary chips but with fragments of polished axes surface on their upper faces

2. Tools
21. Blade tools
211. End-scrapers. Many of the tool types described below feature ends in the form of diverse end-scraper fronts, but it is only in exceptional cases that these fronts define the nature of the given implement. Such specimens are made from small (40-70 mm long, 20-30 mm wide, 5-10 mm thick) fragments of blade knives having sides worked with moderately steep (ca. 50°) retouch (Fig. 2:a). If the end-scraper fronts do not extend to both ends of the specimen, its base may have the form of a specific truncation.
212. Ordinary blade knives. Tools worked to give prominence to long lateral edges of the blades.
2121. Ordinary blade knives variant A. These are made from distinctly curved massive blades from the initial stages of core exploitation (often blades showing part of the preparation of a crest). They are more than 200 mm long and 30-40 mm wide, and their thickness remains around 10 mm. Their retouch usually just slightly modified the lateral edges (Fig.1:a), one of which is sometimes worked with slightly denticulated single-series retouch (Fig.1:b). The angles of so prepared lateral edges hover around 40°. The bases and tips of the tools are usually natural, or, less frequently, formed into a flat end-scraper front or transverse truncation with retouch on one side. These tools were probably used as inserts-knife edges, also as sickle inserts.
2122. Ordinary blade knives variant B. Tools made from distinctly curved large blades, about 150 mm in length, 20-30 mm wide and 7-10 mm thick. At least one edge is formed by single-series retouch, usually slightly denticulated, at an angle of about 50° (Fig.2:b). The bases and tips are shaped into transverse or slightly oblique truncations, often featuring additional flat retouch on the ventral side, as in the Upper Palaeolithic „Kostenki-type knives" [Kozłowski 1969: 45-46; Belayeva 1977]. These tools were repeatedly rejuvenated. The implements with the other edge also worked had the truncations at their ends slightly concave or notched (Fig.2:c). The „gloss" preserved on the edges suggests that the tools were used as inserts-knife edges, including also sickle inserts.

2123. Ordinary blade knives variant C. These tools represent the final stage of reshaping the ordinary blade knives. They are about 110-130 mm long, 10-20 mm wide and less than 10 mm thick (Fig.3:a). The lateral edges are retouched with steep (about 70°) retouch, making the pieces similar to double blunt-ended pressers. They may also have served as inserts-knife edges used to scrape hard materials [Skakun 1993a, 1993b].
213. Asymmetric blade knives. Asymmetrically worked tools, giving prominence to one of the blade s lateral edges.
2131. Small asymmetric blade knives made from unsuccessful short blades, 70-80 mm long, some 30 mm wide and about 7 mm thick. Edges are formed by retouch as in the big asymmetric knives, with bases remaining natural (Fig.3:b).
2132. Big asymmetric blade knives, usually made from strongly curved small blades from the final stages of core exploitation. They are about 120 mm long, around 25 mm wide and less than 7 mm thick. The straight edge is formed with moderately abrupt (40- 50°) retouch, and the oblique edge is usually steeper than that. The bases are natural or in the form of a truncation similar to that on „Kostenki-type knives" (Fig.3:c). Specimens with gloss indicate that some of their number were used as inserts-sickle blades. At the same time they appear to resemble in shape the ordinary blade daggers and hence also the Usatovo-type copper daggers [Zbenovich 1966]. The base of one specimen carries traces indicating that it was used as a striker.
214. Daggers blade points similar in shape to copper daggers from Chalcolithic assemblages.
2141. Tanged blade daggers made from distinctly curved blades, 125-160 mm long, about 25 mm wide and up to 10 mm thick. The distal part is formed as in the asymmetric blade knives. The tapering base part, formed with slightly more abrupt retouch, ends with a slightly oblique truncation (Fig.4:a) or, more rarely, with a narrow end-scraper front. The form of these implements suggests that they are flint substitutes of Bodrogkeresztúr/Lažňany copper knives [cf. in this volume: Klochko, Copper..., Fig.1:5; see also: Patay 1961: Tab.II-6; Šiška 1972: Abb.35].
2142. Ordinary blade daggers made from fragments of blade knives by fashioning a symmetric point with abrupt (60-70°) retouch. Their bases are shaped into end-scraper fronts or left in natural state. The daggers are about 110 mm long, 20-30 mm wide and about 9 mm thick (Fig.4:b). Their bases usually carry traces of crushing, sometimes of an intensity typical for strikers. The crushings make these implements reminiscent of spike-ended pressers, but their form suggests that originally they were rather flint substitutes of Usatovo copper daggers [Zbenovich 1966].
215. Asymmetric blade perforators made from small (ca. 80 mm long) fragments of ordinary blade knives. They are about 25 mm wide and anywhere between 6 and 11 mm thick. Their slightly asymmetric point is formed with abrupt (60-70°) retouch, and their base always carries traces of use as strikers (Fig.4:c). This latter fact, as well as formal similarities to spike-ended pressers and strikers suggest that these implements may have been the original „ideal" form of a tool which might be described as perforators-strikers.

216. Blade pressers. A distinctive feature of this group of tools are use traces in the form of small crushings of the edges. However, the types described below have a well defined form repeatedly occurring in the analyzed inventories.
2161. Spike-ended blade pressers, most of them made from broken off and abruptly retouched (55-80°) distal parts of daggers. Their length ranges from 35 to 65 mm, the base width is between 15 and 20 mm, and the thickness is 5-8 mm (Fig.4:d,e). The retouch of lateral edges is usually disrupted by small crushing scars, but the most intense crushing is on the base and distal ends of specimens. In one specimen the crushing is so severe that it produced a degree of rounding typical for strikers. Although these finds are distinguished principally by the specific traces of use on them, the presence of analogous pieces made from flakes (category 2261) indicates that there existed an idea of such a tool form.
2162. Double spike-ended pressers on blades, probably made from used-up knives and daggers with abrupt (70-80°) retouch of two pointed tongues. This gives the specimens a spindle shape (Fig.4:f). Their length is 70-90 mm, maximum width is slightly in excess of 15 mm, and the thickness is about 8 mm. The retouch of lateral edges is undercut by crushing scars.
2163. Blunt-ended blade pressers made from used-up ordinary blade knives by forming a peg-shaped tongue, some 80 mm long and 10-15 mm wide (Fig.5:a) with steep (60-70°) retouch. The tongue is usually ended with a narrow end-scraper front, and the retouch of lateral edges is undercut by crushings. Their bases carry traces of use as strikers.
2164. Double blunt-ended pressers on blades made from used-up ordinary blade knives by fashioning peg-shaped tongues like those described above on both ends. In some cases a clearly wider fragment of the original knife survives between the two tongues (Fig.5:b), and sometimes both tongues are back-to-back, giving the implement the form of a narrow peg (Fig.5:c). Some of the tang tips carry traces of their use as strikers.
217. Blade strikers, a tool category distinguished by use traces in the form of fine crushings of edges in the distal part of specimens. These micro-crushings are so plentiful they give the impression that they were meant to produce a rounding on the pieces. Traces of this kind are also in evidence on some of the tools described above, but the usual practice was to fashion strikers out of fragments of destroyed tools. The existence of a series of strikers sticking to a specific shape pattern suggests that there was a conception of their typical form.
2171. Ordinary blade strikers, with one of their rounded tips broader and slightly asymmetrically rounded, the other being fashioned into a short peg-like tongue. Their length is 55-75 mm, width ranges from 25 to 30 mm, and they are from 5 to 11 mm thick (Fig.5:d,e).
2172. Amorphous blade strikers which are small (30-45 mm long) fragments of blade tools with rounding typical for strikers on their tips. These pieces are the result of *ad hoc* use of waste material of any shape (Fig.4:g).

22. Flake tools.
221. Arrowheads.
22111. Big arrowheads with concave base, usually with meticulous retouched covering nearly all of both sides of the specimens. They are from 27 to 43 mm long, 16 to 25 mm wide, and 3 to 6 mm thick. Most specimens have length-to-width ratios of 1.2-1.6 and straight sides (Fig.6:a,b); much fewer pieces are more elongated (1.8-1.9 ratios), and these are often less regular in shape and their sides are sometimes convex (Fig.6:c) or concave.
22112. Ordinary arrowheads with concave base, usually shaped with simple retouch, often with less care than the large forms. Although here too the largest number of specimens have straight sides, there are more finds with convex or concave sides, and there are exceptional cases of distinctly asymmetric implements. These arrowheads range in length from 13 and 25 mm, their width is 12-20 mm, and thickness is 2-5 mm. The largest specimens, over 21 mm long, are also the most slender ones, with their length-to- width ratio ranging from 1.4 to 1.7 (Fig.6:d). The medium-sized specimens (17-21 mm long) are usually slightly squatter (1.2-1.4 ratio; Fig.6:e), and the smallest ones are the widest of all (0.9-1.2 length-to-width ratio; Fig.6:f).
22121. Slim arrowheads with straight base, usually shaped with simple retouch. The base edge is retouched with the least care, and is therefore often rather irregular. These tools are usually 27-32 mm long (in exceptional cases this figure is merely about 22 mm), 11-18 mm wide, and 2.5-5 mm thick. The length-to-width (slimness) ratio is in most cases 1.7-1.9 (Fig.6:g), and exceptionally as high as 2.5 (Fig.6:h).
22122. Ordinary arrowheads with straight base, normally shaped with simple retouch which tends to be less meticulous in the base part, which is sometimes clearly convex as a result. The specimens predominantly have straight sides, but there are also pieces with convex or concave sides and occasional asymmetric forms (Fig.6:k). These arrowheads are anywhere between 13 and 26 mm long, 10 to 22 mm wide and 2.5 to 5 mm thick. Most of the specimens exceeding 20 mm in length have slimness ratios of 1.3- 1.5 (Fig, 6:i), and more compact forms, with these ratios in the 1.0-1.2 range, are much less frequent (Fig.6:j). The smaller arrowheads are usually less regular (Fig.6:k,l) and their length-to-width ratio ranges from 1.0 to 1.6.
22131. Arrowheads made from tips of bigger specimens, featuring a straight base with traces of breaking, only partly trimmed down with additional retouch. They are usually small (14-18 mm long) and stocky, with the slimness ratio standing at around 1.2 (Fig.6:m).
22132. Amorphous arrowheads, which are ad hoc creations, small in size. Some of them are oval-shaped and carelessly retouched (Fig.6:n), while others are specially selected triangular chips with just some traces of edge shape correction.
22133. Other arrowheads, unique in shape, not fitting any of the preceding categories. Large slim arrowhead with notched base and rounded sides (Fig.6:o) and a fragment of a large arrowhead with a massive tang (Fig.6:p).
222. Bifacial flake knives, with rounded base, one edge straight and the other bent, forming an angle of about 125°. There was only one choice specimen in the studied

inventories, carefully worked with flat surface retouch. It is 65 mm long, maximally 27 mm wide and 9 mm thick (Fig.7:a). The other specimen is a slightly smaller (51 x 30 x 8 mm) imitation of this form, executed with simple and in part bifacial retouch (Fig.7:b).
223. Flake end-scrapers. There was only one specimen in the inventories, with a narrow end-scraper front formed by retouch in the proximal part of a small pseudo-blade (Fig.7:g).
224. Flake perforators. These are usually small (some 40 mm in diameter), less frequently large, but always relatively thick (8-17 mm) flakes with one or more sharp and short tongues executed with partially bifacial retouch (Fig.7:c,d). The natural shape of the flakes was often made use of when fashioning the tongues.
225. Side-scrapers small flakes with one edge entirely or partly covered with moderately abrupt retouch on one (Fig.7:e) or both sides (Fig.7:f). The retouched edge is usually about 40 mm long.
226. Flake pressers.
2261. Spike-ended flake pressers, analogous in shape to the spike-ended blade pressers, but made from flakes (Fig.8:a) or pseudo-blades from destroyed axes (Fig.8:b).
2262. Amorphous flake pressers, which are small but relatively thick flakes (or, in fact, chips with the largest dimension usually around 30 mm), in most cases having one edge shaped with retouch on one side, undercut with fine crushings (Fig.8:c,d).
227. Amorphous flake strikers.
2271. Strikers made from ordinary flakes, usually small in size, the biggest dimension being 30-55 mm, but relatively thick (7-12 mm), with traces of crushing and rounding on two opposite-lying tips. The shape of some of these tools suggests that they represent the final stage of flake pressers use (Fig.8:e). Others, slimmer in shape, resemble spike-ended blade strikers and pressers (Fig.8:f).
2272. Strikers made from flakes from axes. These are flakes or large slender chips struck off polished axes, with one gently rounded tip that was crushed and rounded in the course of use. Their form is frequently reminiscent of spike-ended pressers or the typical blade strikers (Fig.8:g).
2273. Strikers made from flake tools. Small and large specimens with short tongues that were destroyed (crushed and rounded) during use (Fig.8:h,i). They appear to be the final stage of utilization of flake side-scrapers and perforators.
228. Micro-scaled pieces. Small (15-35 mm in length and width, 5-13 mm thick) bipolar scaled pieces (Fig.7:i), usually made from flakes or chips. There was also one specimen made from a split blade tool and another from a polished axe chip (Fig.7:h).

23. Tools made from natural pieces and chunks.
231. Square axes, about 100 mm in length and slightly asymmetric in shape. One of the narrower sides is straight while the other is arched, making the cutting edge only slightly wider than the width of the medial part of the specimen (Fig.9:a). The cutting edge is about 40 mm wide, and the head between 18 and 25 mm; the maximum thickness of these implements is 20-25 mm. Polishing is confined to the

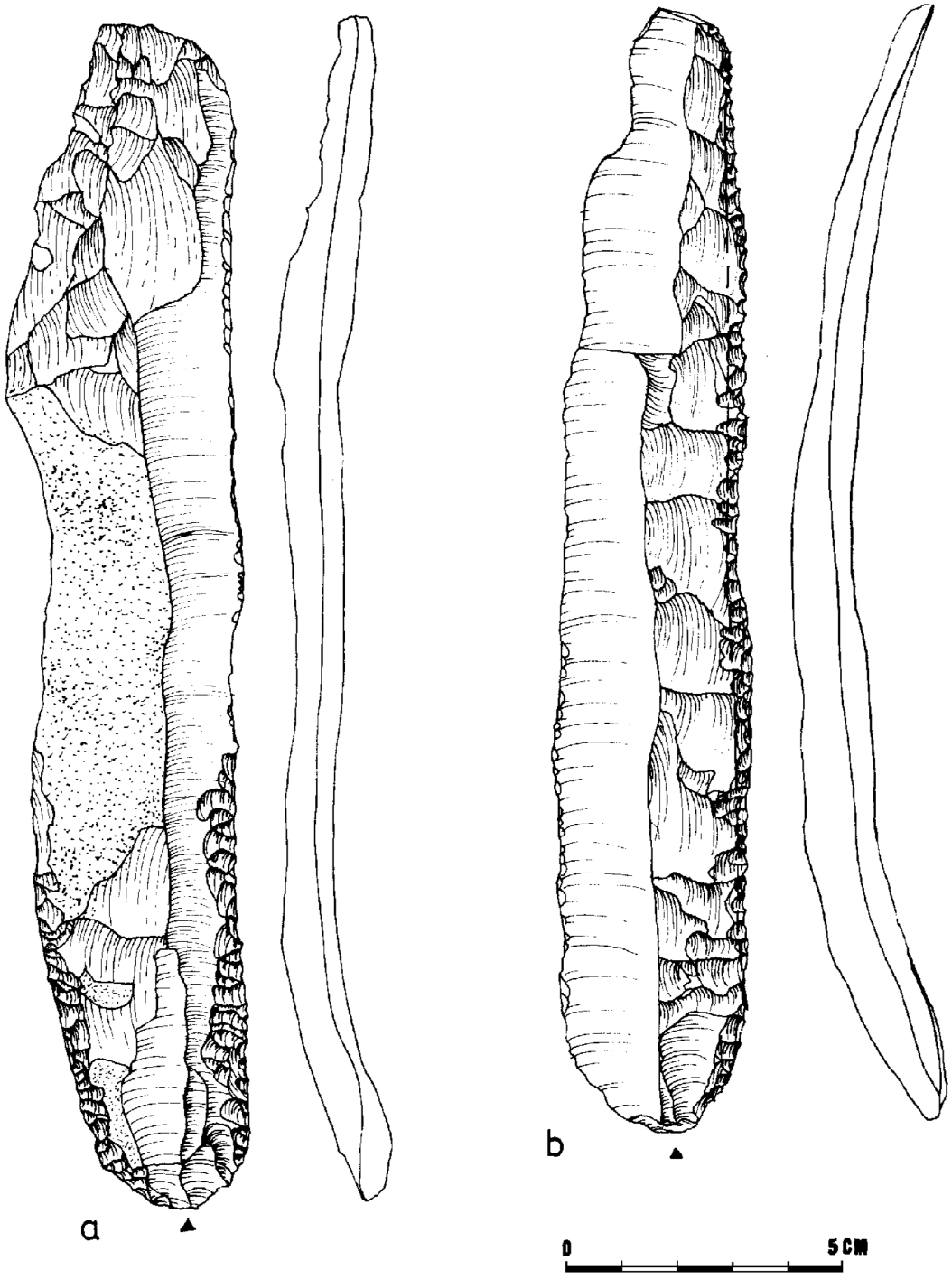

Fig. 1. Ordinary blade knives - variant A (A- Sofievka, from the ground surface; B- Sofievka, grave 34).

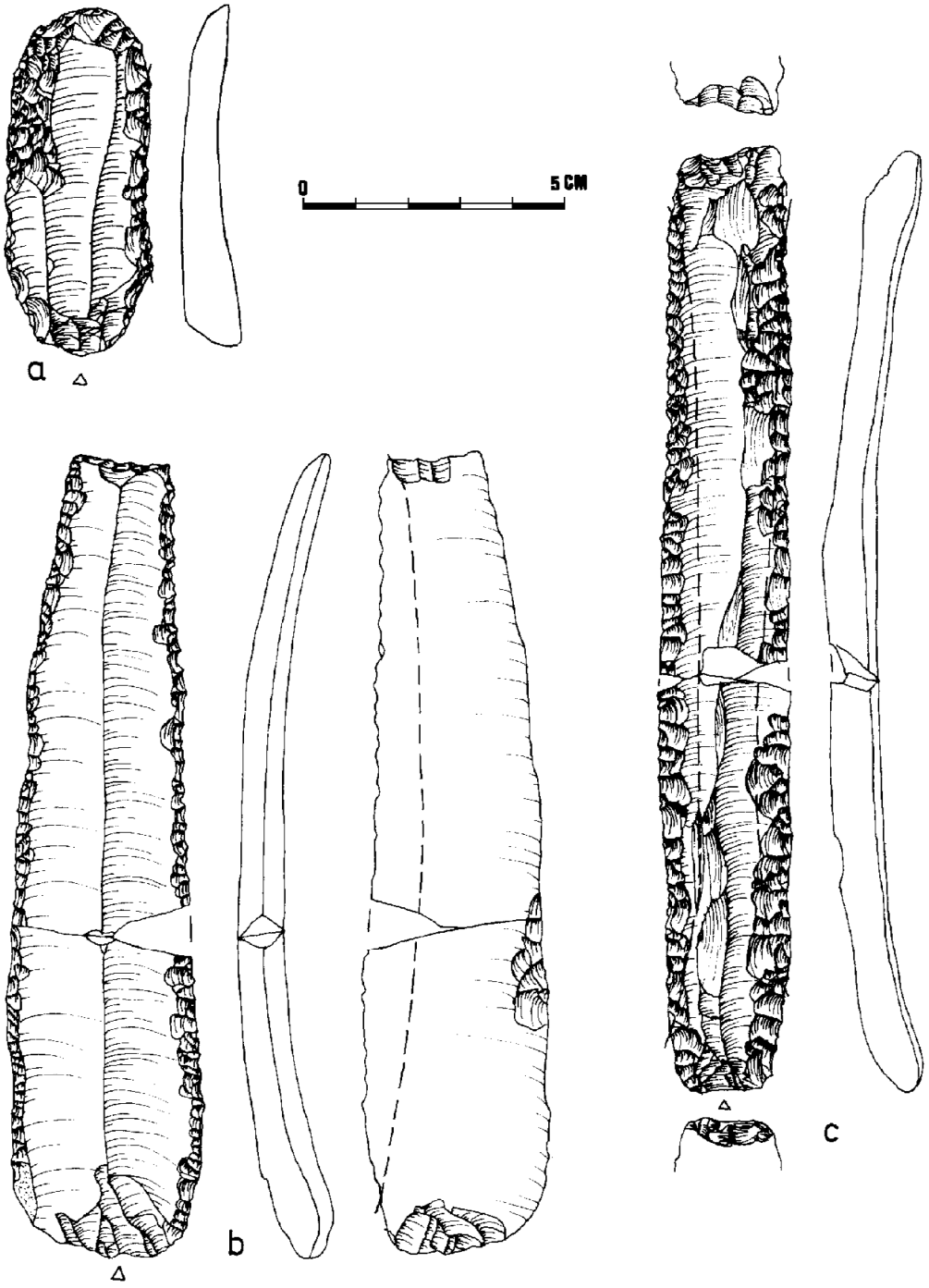

Fig. 2. A- double blade end-scraper (Krasny Khutor, grave 33); B-C- ordinary blade knives - variant B (B- Sofievka, grave 44; C- Sofievka, near grave 1/1947).

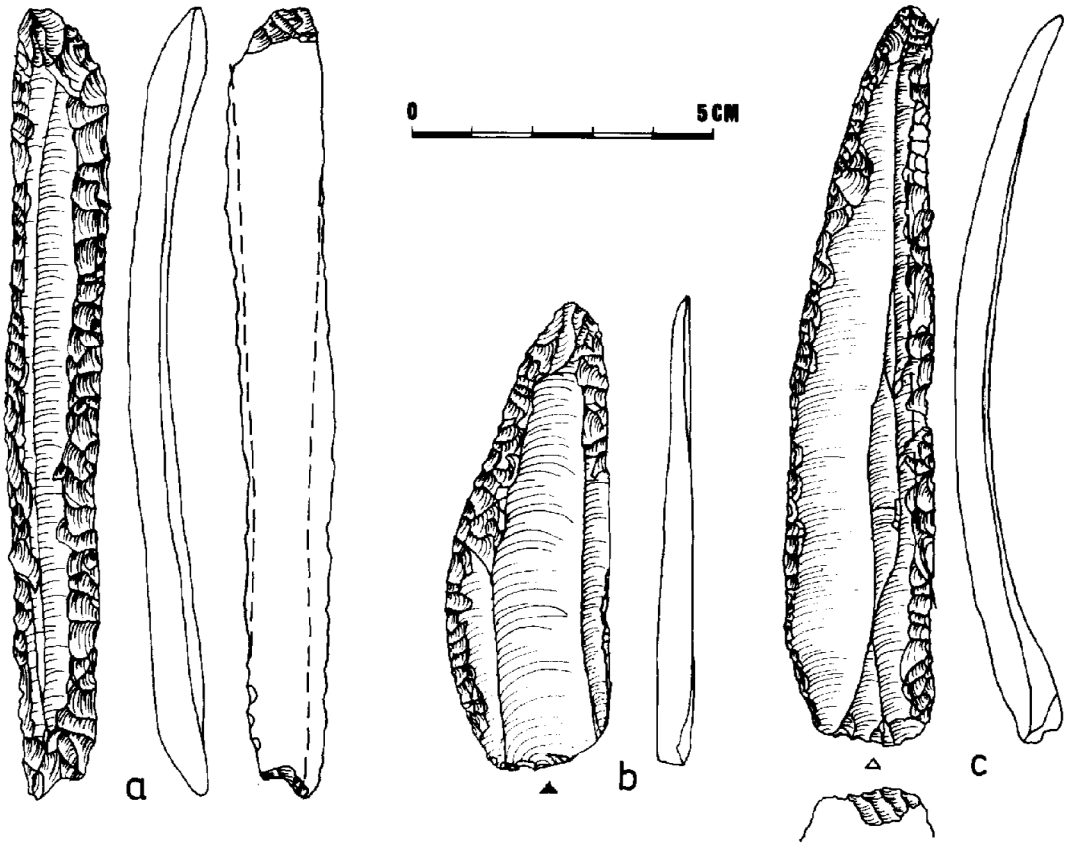

Fig. 3. A- ordinary blade knife - variant C (Chernin, grave 66); B- small asymmetric blade knife (Krasny Khutor, grave 127); C- big asymmetric blade knife (Krasny Khutor, grave 133).

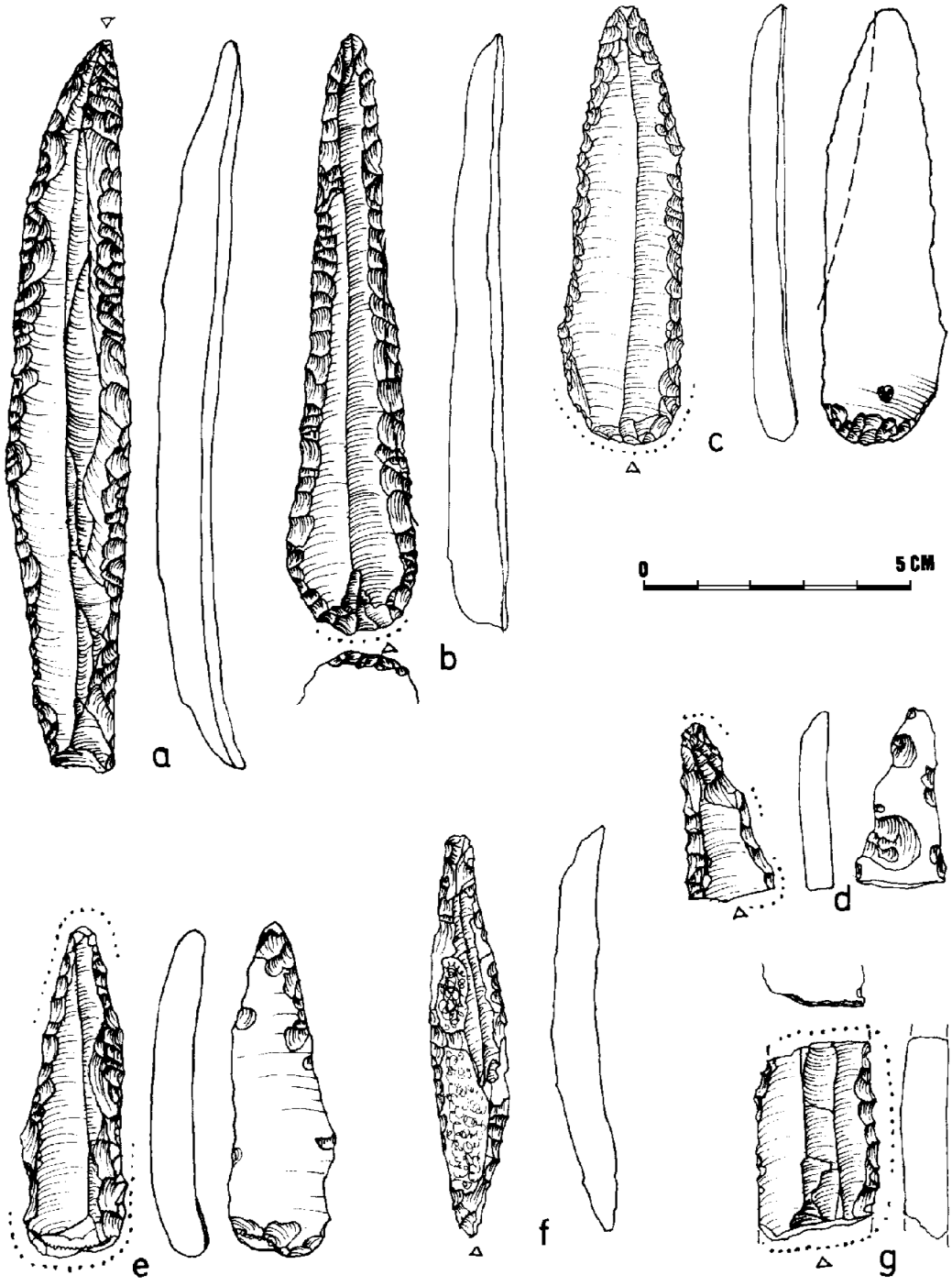

Fig. 4. A- tanged blade dagger (Krasny Khutor, grave 50); B- ordinary blade dagger (Sofievka, grave 64); C- asymmetric blade perforator (Chernin, grave 65); D-E spike-ended blade pressers (D- Sofievka, grave 60?; E- Krasny Khutor, grave 137); F- double spike-ended presser on blade (Chernin, grave 90); G- amorphous blade striker (Sofievka, grave 83?)

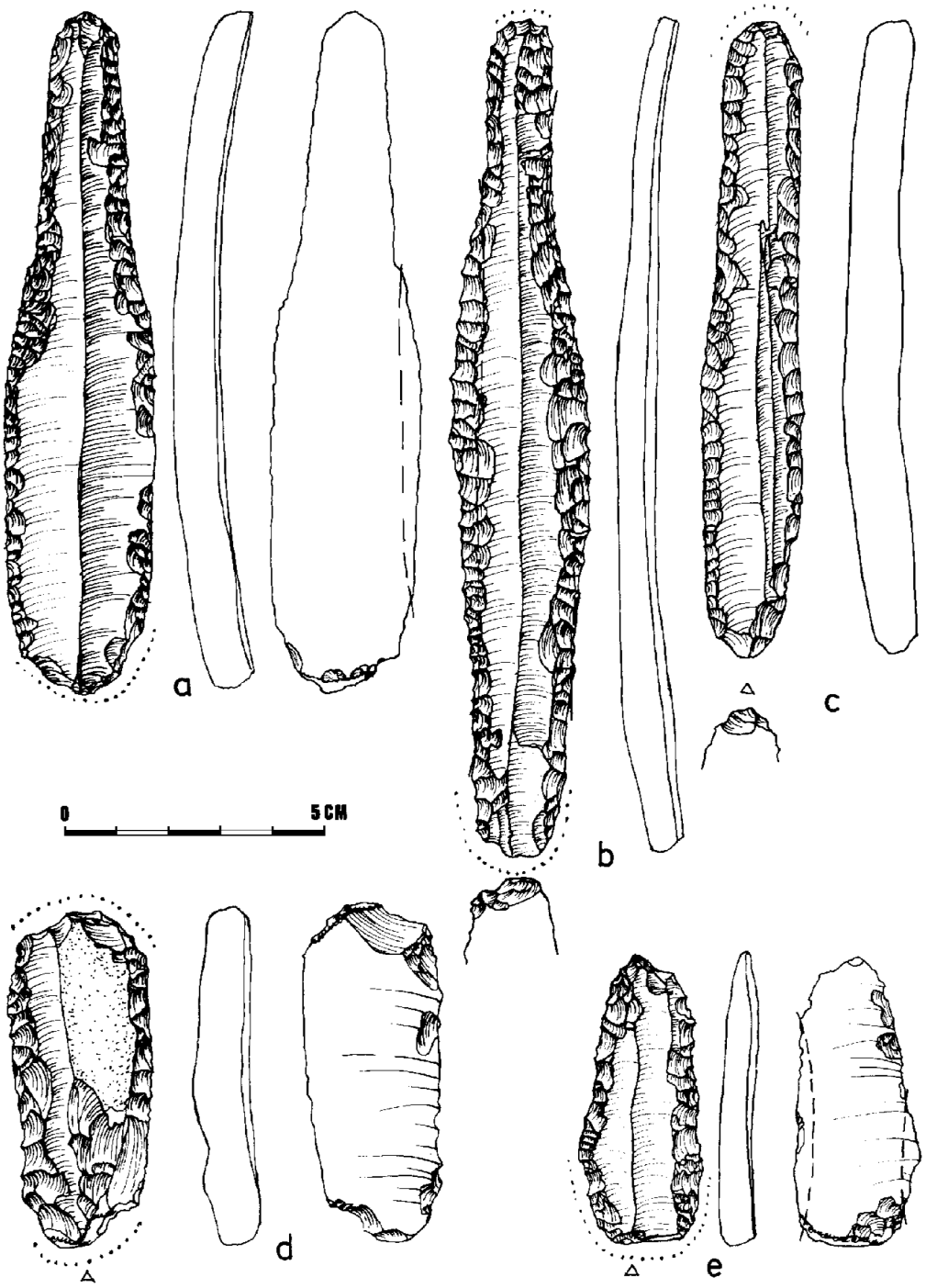

Fig. 5. A- blunt-ended blade presser (Krasny Khutor, grave 53); B-C- double blunt-ended pressers on blades (B- Krasny Khutor, grave168; C- Krasny Khutor, grave 80); D-E- ordinary blade strikers (D- Sofievka, from outside the features - sq.I-8; E- Krasny Khutor, grave 122).

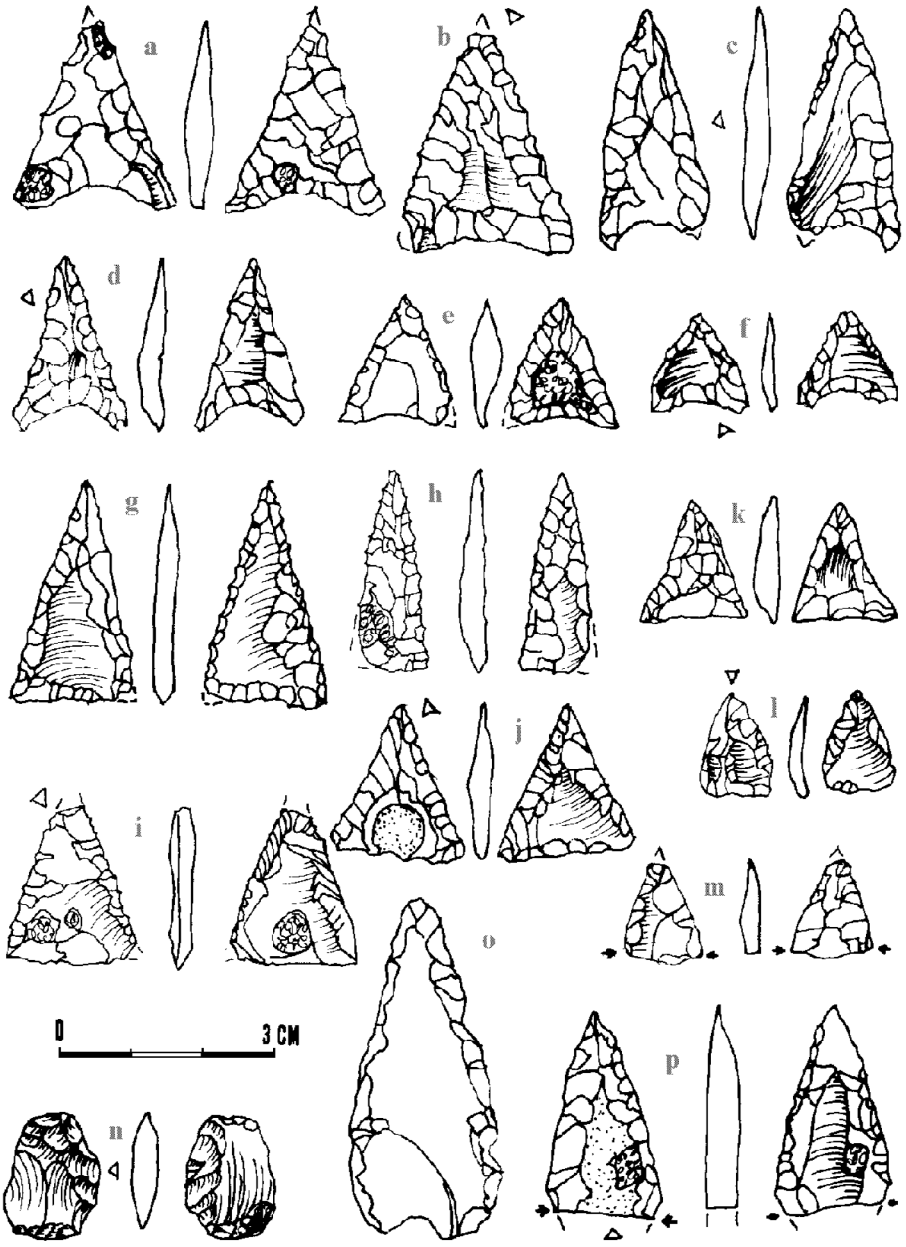

Fig. 6. A-C- big arrowheads with concave base (A- Sofievka, from outside the features - sq.J-11; B- Krasny Khutor, unlabelled artefact; C- Krasny Khutor, grave 130); D-F- ordinary arrowheads with concave base (D- Sofievka, from outside the features - sq.G-4; E- Krasny Khutor, grave 119; F- Sofievka, from the ground surface); G-H- slim arrowheads with straight base (G- Sofievka, grave 5+6+7?; H- Chernin, grave 43); I-L- ordinary arrowheads with straight base (I- Chernin, unlabelled artefact; J- Sofievka, from outside the features - sq.G-6; K- Chernin, grave 63; L- Krasny Khutor, grave 75); M- arrowhead made from tip of bigger specimen (Krasny Khutor, grave 119); N- amorphous arrowhead (Krasny Khutor, grave 75); O-P- other arrowheads (O- Krasny Khutor, grave 126; P- Zavalovka, grave 3).

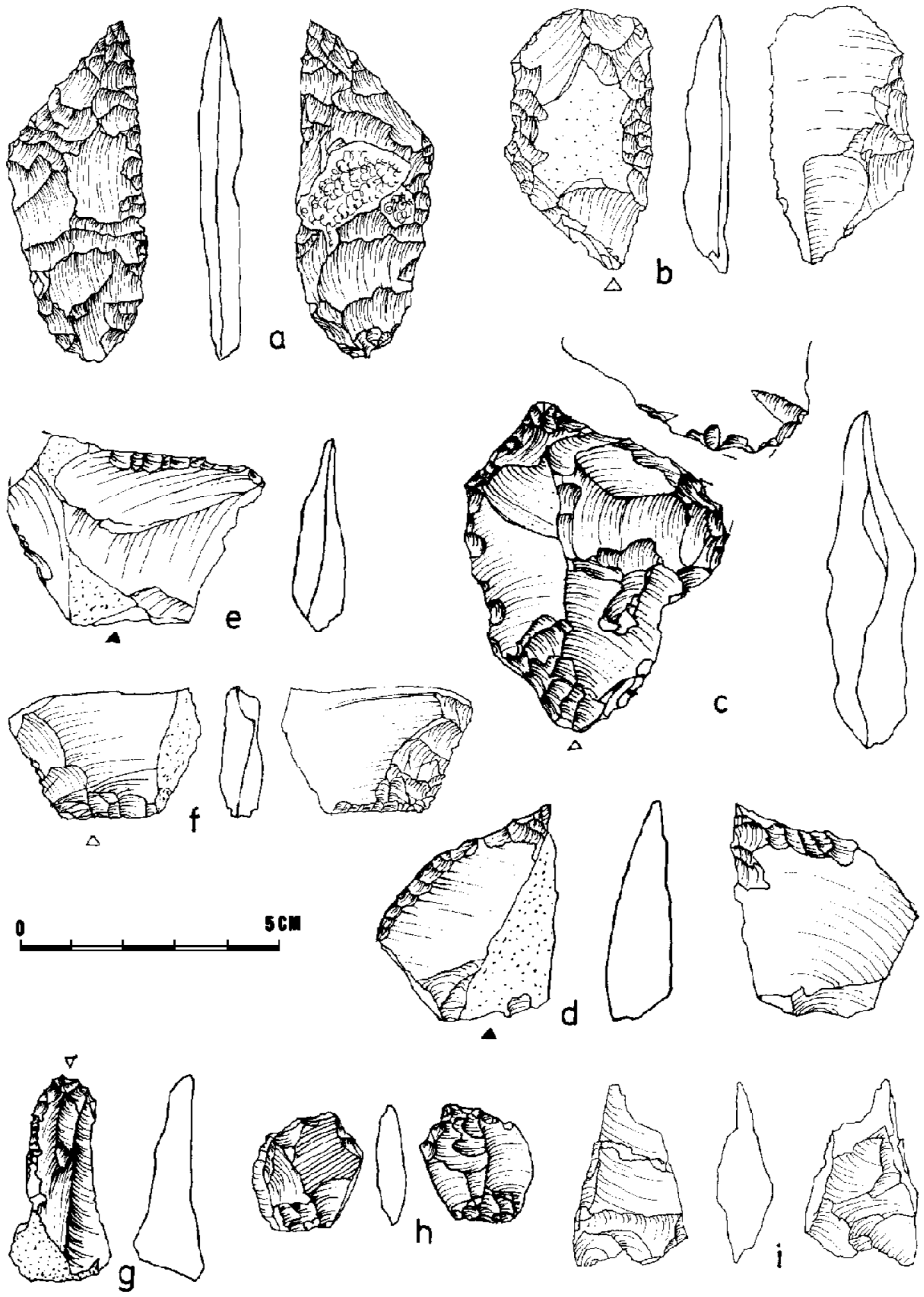

Fig. 7. A-B- bifacial flake knives (A- Chernin, grave 42; B- Chernin, unlabelled artefact); C-D- flake perforators (C- Krasny Khutor, grave 29; D- Chernin, grave 63); E-F- side-scrapers (E- Chernin, grave 12; F- Chernin, grave 48); G-flake end-scraper (Krasny Khutor, from outside the features - sq.I-15); H-I- micro-scaled pieces (H- Krasny Khutor, grave 3; I- Chernin, grave 88).

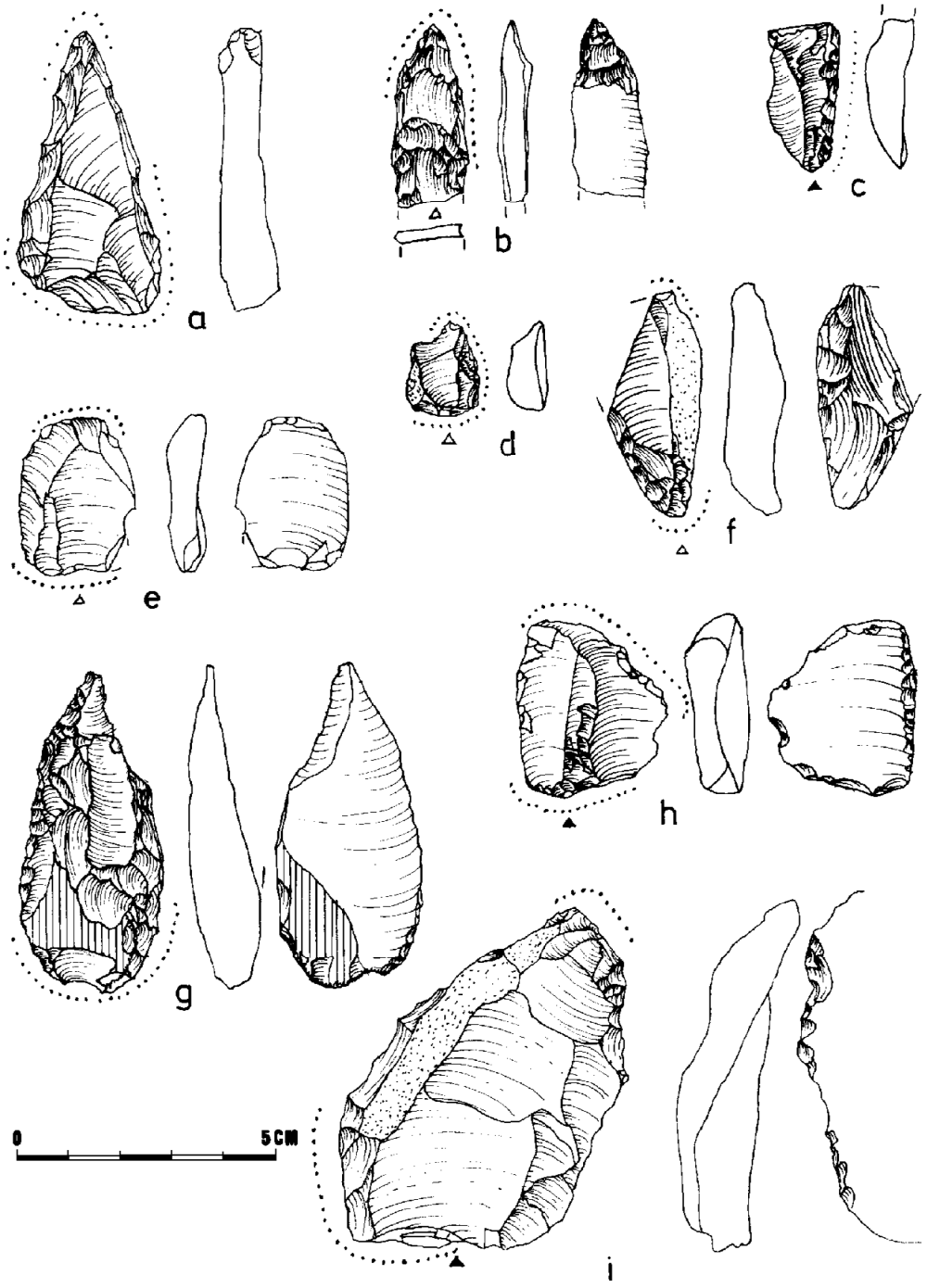

Fig. 8. A-B- spike-ended flake pressers (A- Chernin, grave 66; B- Sofievka, grave 70); C-D- amorphous flake pressers (C- Zavalovka, from outside the features; D- Krasny Khutor, from the ground surface); E-F- strikers made from ordinary flakes (E- Sofievka, grave 39; F- Krasny Khutor, grave 45); G- striker made from flake from axe (Krasny Khutor, grave 149); H-I- strikers made from flake tools (H- Krasny Khutor, grave 126; I- Sofievka, grave 34).

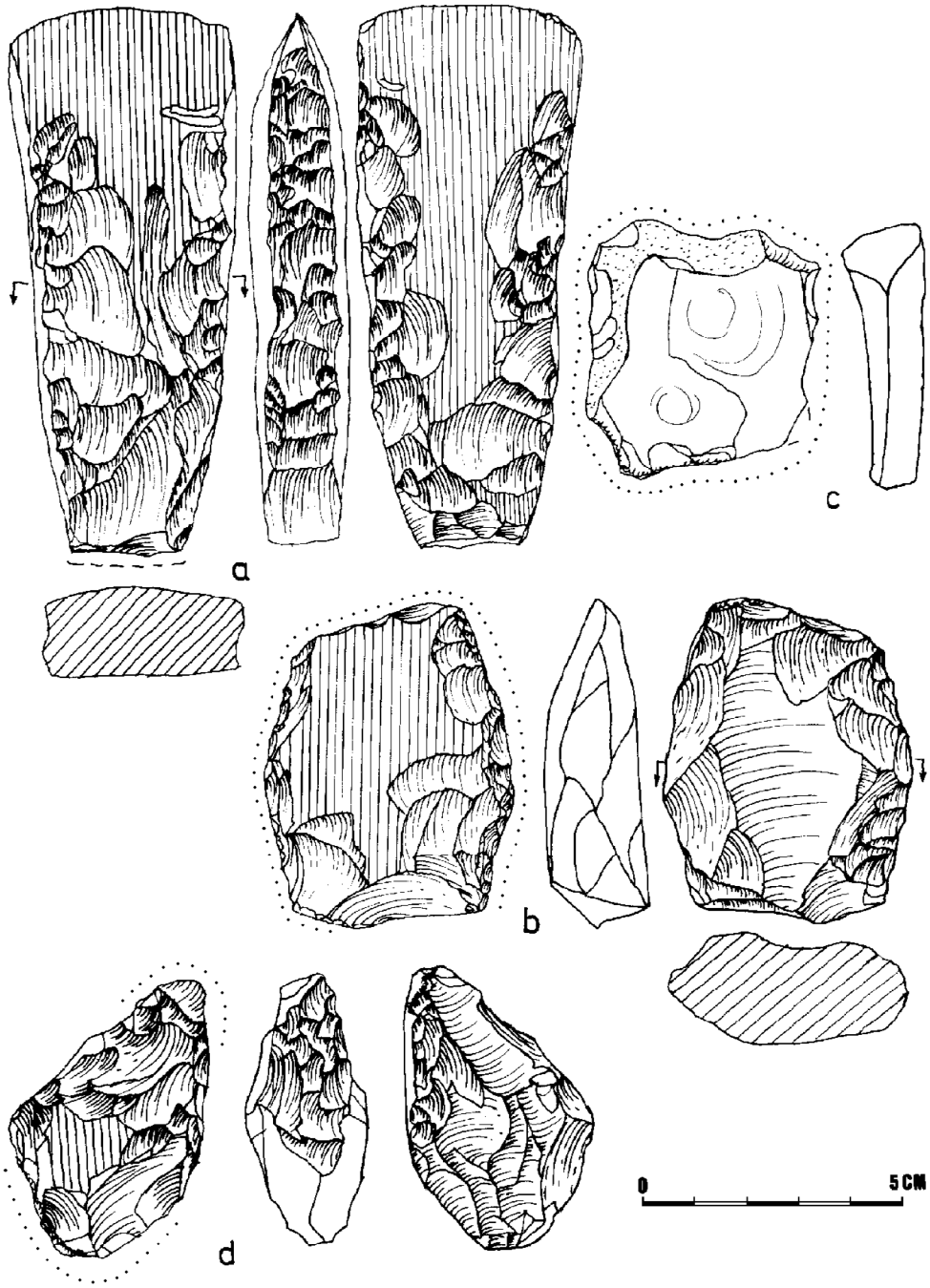

Fig. 9. A- square axe (Sofievka, grave 43?); B- hammer (Krasny Khutor, grave 137); C- striker made from natural piece (Sofievka, grave 43); D- striker made from axe fragment (Krasny Khutor, grave 63).

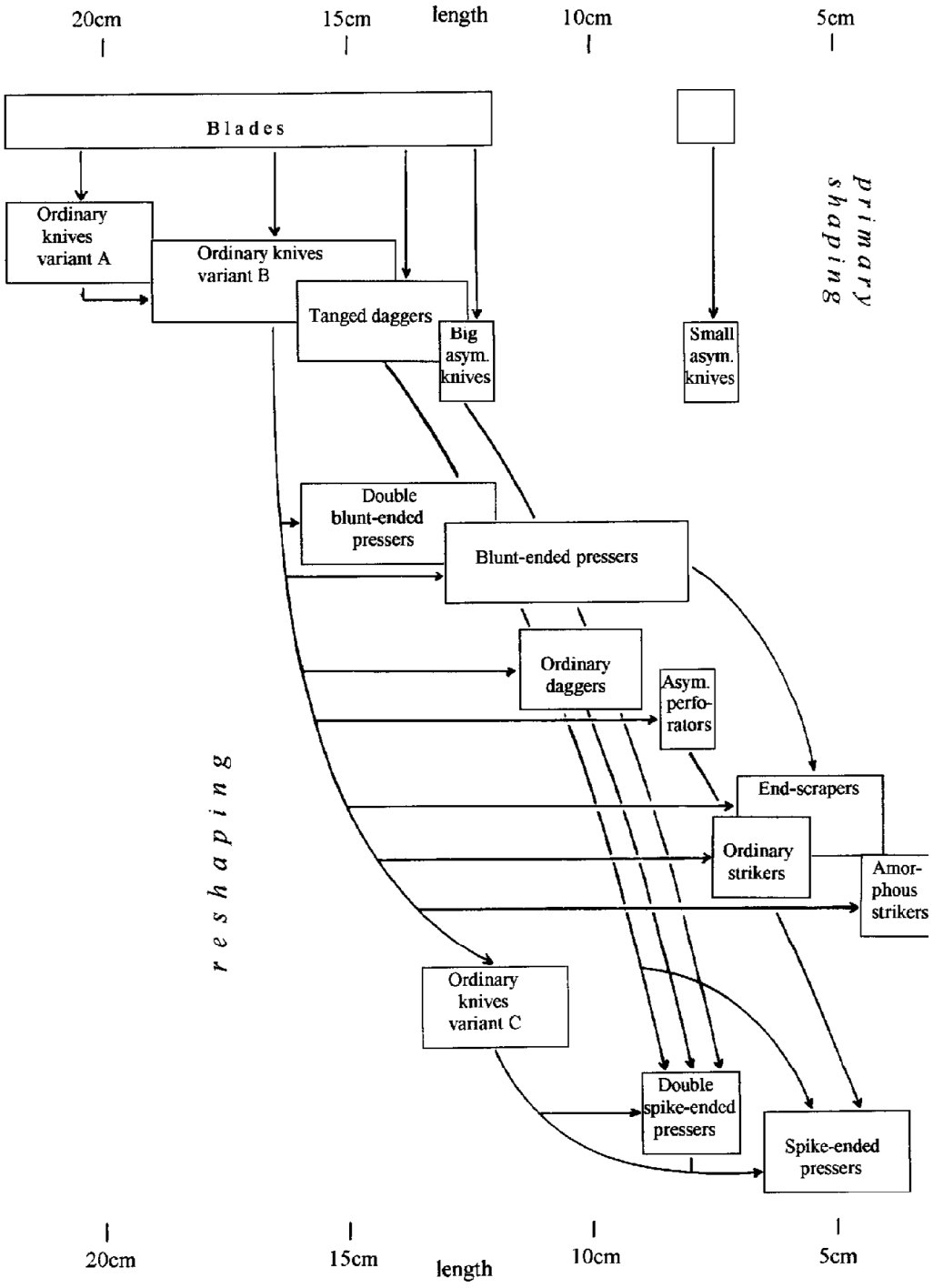

Fig. 10. Scheme of tool production organization in the Sofievka group, based on macrolithic blades imported from Volhynia.

larger surfaces of specimens next to the cutting edge. The heads are usually glossy.
232. Hammers. The distinctive feature of this tool category are use traces in the form of impact crushing of the edges or sides of specimens. There were two examples in the analyzed materials, both made from large fragments of square axes. Traces of smashing are along what once used to be the narrow sides of the axes (Fig.9:b). Dimensions: 60-65 x 40-50 x 20 mm.
233. Amorphous pressers made from chunks, analogous in form to the amorphous flake pressers made from chips that could have originated from destroyed axes.
234. Amorphous strikers.
2341. Strikers made from axe fragments. Although these are markedly more massive than the typical blade strikers, they clearly resemble them in shape: one of their rounded tips is visibly wider than the other (Fig.9:d). Dimensions: 40-60 x 35-40 x 15-25 mm.
2342. Strikers made from natural pieces, namely small, relatively flat nodules. The largest dimension is 45-60 mm and the pieces are 10-25 mm thick. They usually have crushed edges along their entire circumference. The most intense traces concentrate around the discernible short peg-shaped tongues (Fig.9:c). The base of one the specimens, clearly bipolar in shape, shows crushing characteristic for hammers.

3. Chunks

An attempt was made to include specimens surviving in fragmentary form in appropriate categories. Unfortunately, in the case of some of the tools this proved impossible, and these finds were grouped in additional categories that reflect the insurmountable obstacles in analysis:
212-3?. Fragments of undefined blade knives.
213-4?. Fragments of blade daggers or asymmetric knives.
212-7?. Fragments of undefined blade tools.
212-7?2. Fragments of undefined blade tools used as strikers, being fragments of undefined blade tools carrying traces of use as strikers on one tip, and traces of truncation or thermal fracture on the other. It is impossible to judge whether these are fragments of tools used as strikers or strikers made from destroyed blade tools.
2211-3?. Undefined arrowheads.
223-7? Fragments of undefined flake tools.
21-3?. Fragments of undefined tools.

Given that the numbers of specimens in the various categories listed above cannot be interpreted in the simple traditional manner, the analyses based on the presented ordering of materials must also differ from those employed in the classical typological-statistical method. The basic role here has to be played by indices documenting the morpho-technological character of the examined collections. These are customarily calculated as a percentage of specimens of a given class in a broader category of artefacts. Since there are large numbers of fragmentary artefacts, the indices can often be just approximations, computed using the imprecise figure of the minimum number of finds identified as belonging to a given category. In order to calculate the various indices here, the above ordering was rearranged

to allow combinations of the distinguished categories of artefacts to meet specific needs. In this approach the proposed classification served either as a typological list of non-disjoint categories or as a compilation of several disjoint classification lists.

The same method was used not only to analyze the numbers of artefacts in the various categories but also the frequency of their occurrence in grave inventories.

When comparing inventories from the various cemeteries using the simple quantitative method it is possible to interpret differences in the same categories of artefacts only, such as the preferences for diverse types of arrowheads. Quantitative differences in the occurrence of different tool categories such as arrowheads or axes may be interpreted only after taking into account factors stemming from differences in burial rituals.

1.4. FUNCTIONAL ANALYSIS

With the above assumptions in place, there was no need for detailed use-wear analyses at the presented stage of study. However, all macroscopic traces of use high gloss, crushings and smoothing were noted. The positioning of high gloss served only to help reconstruct the morphological sense of the various implements and recreate the history of reshaping each form.

The observed crushing and smoothing were given functional sense. Forms with such use traces are usually being described in the literature as fabricators or retouchers. When these traces occur on the tip, the implements are sometimes regarded as blunt-ended borers [Balcer 1975: 110]. The copious and diverse collection of artefacts of this kind in materials from cemeteries of the Sofievka group provide a good opportunity to examine the sequence of use wear accumulation, and also to explore the relations between these traces and the various elements of specimens morphology. Analyses of this kind allow to include a vast majority of the examined forms in the category of strikers (or *briquets* in French), well described in the literature, used to kindle fire with pyrite and marcasite [Patte 1960; Witthoft 1966; Champion 1976; Chelidonio 1988; Nieszery 1992]. This interpretation is in good accord with the exceptional copiousness of artefacts of this type in materials from the analyzed crematory cemeteries. When use wear is not too intense, it is impossible to macroscopically distinguish them from marks caused by pressing a hard material of any kind. These forms have been described as pressers. It may be surmised however that a great majority of amorphous pressers are in fact initial strikers. It were only the blade pressers, with numerous traces of work down their long lateral edges, that served a different function initially at least and deserve to be described as „fabricators".

1.5. ANALYSIS OF RITUAL AND SOCIO-ECONOMIC FACTORS AFFECTING GRAVE GOODS

The specific nature of the considered inventories calls for an expansion of the standard flint artefacts analyses aimed at a tentative explanation of the significance of the various forms in individual assemblages. There are two questions to answer here:

(i) Do all categories of artefacts qualify as grave goods, or were some of the specimens connected with burial rituals?

(ii) What were the principles of selecting the various artefact categories to serve as grave goods?

In this context, the state of preservation of the artefacts and regularities in the co-occurrence of various artefact categories in individual assemblages were examined. All finds with traces of fire on them were noted, assuming these traces were acquired during cremation of the dead. Attention was also paid to all indications of other practices leading to the destruction/„killing" of a flint artefact, such as breaking or splitting them. The results of these observations were taken into account when exploring dependences between the kind of artefacts deposited in the grave and the number of grave goods. All this served to identify funeral flint inventories typical for each cemetery and to assess these inventories quantitatively, distinguishing those that were poor, rich or in some way exceptional. It was also examined how graves with similar grave goods were positioned within a cemetery.

Regrettably, the insufficient numbers of analyzed materials made it impossible to employ more advanced statistical methods.

2. FLINT INVENTORIES FROM CEMETERIES OF THE SOFIEVKA TYPE

2.1. CHERNIN

The north-eastern part of the cemetery was completely destroyed before explorations were launched, but the south-western part survived in good condition (cf. in this volume: Videiko, Archaeological..., Fig.1). The manner in which the site was explored makes it impossible to reliably distinguish at this point in time the various individual assemblages. Nonetheless, a series of isolated features suggest that the graves were small, probably some 50 cm in diameter. They contained concentrations of charred bones (e.g. graves 1+2, 14+15) which were sometimes accompanied by a vessel (e.g. graves 21, 52, 71) and in other cases by urns with body cremation

remains (e.g. graves 22+23, 39+40, 62+63). Less frequently, the cremated human remains were placed in urns (e.g. grave 53+?54) which could have been accompanied by a vessel (e.g. graves 43+44, 51). It is estimated that there are 55-65 graves in the preserved part of the cemetery. 27 of them (or about 45%) contained flint inventories (Table 1).

The average number of artefacts in a grave flint inventory from Chernin is relatively high more than three. This figure is deceptive, however, as one of the assemblage is very large. About two-thirds of the inventories are decidedly poor, containing not more than two artefacts. In most cases the grave goods consisted of tools. Flake forms were less than half as numerous, and quartzite pebbles occurred in two cases.

Blade tools were the most frequent forms deposited in graves. Usually, these were ordinary knives, with less frequent perforators, pressers and strikers. The surprisingly rare occurrence of the latter artefacts and the contexts in which they appear suggests they were an ordinary element of grave goods. Noteworthy is the lack of asymmetric knives and daggers in the inventories. The blade tools whose raw material could be identified were all made from Volhynian flint. Only one specimen was identified by V.F. Petrougne (in this volume) as „gaize-Cenomanian flint".

Arrowheads were placed in graves almost as frequently as blade tools, but their numbers were clearly higher. Straight-based forms predominate decidedly. This predominance may have been even more pronounced than it would appear from Table 1 since the manner of execution of ordinary arrowheads with notched base (especially of the finds from the vicinity of graves 79 and 87) is more reminiscent of the Early Bronze Age. None of the eight arrowheads whose raw material could be identified were made from Volhynian flint.

Flake tools were deposited in graves with the same frequency but in evidently smaller numbers. The predominant forms were side-scrapers and scaled pieces, while strikers were absent altogether. Of the 11 flake tools whose raw material was identifiable, only one side-scraper was made from Volhynian flint. Particularly noteworthy is the appearance in the Chernin cemetery of unique knives with bifacial flat surface retouch (Fig.7:a,b), the only ones of their kind in materials of the Sofievka group.

Also worth noting is the absence of square axes and forms made from their fragments in the grave goods. It is hard to judge to what extent this is a reflection of the flint industry standards of the community responsible for the Chernin cemetery on the one hand and of the burial customs on the other. The plunging flake from grave 64 may be evidence of the production of square axes.

Flake forms were deposited in graves just as frequently as the various tool categories, and they are relatively numerous. Raw material could be identified in 16 cases, but only two of the specimens appear to be made from Volhynian flint.

Almost 40% of the finds are charred. More than 30 refittings were successfully made during studies of these materials, which means that special care was taken during the burial rituals to deposit the tool remains. Different categories of imple-

Table 1

Flint inventory from Chernin

FEATURES	Types of artefacts																						
	121	1221	2122	2123	215	2162	2171	212-7?1	212-7?2	22111	22112	22121	22122	22133	2211-3?	222	224	225	2261	2262	223-7?	228	3	TOTAL
Grave 3													1											1
Grave 10	1?																							1
Grave 12			1						1									1						3
Grave 30							1																	1
Grave 33+42					1								3	1		1								6
Grave 36			1																					1
Grave 40										1		3	5		1									10
Grave 43												1												1
Grave 46		1?																						1
Grave 48		1																1						2
Grave 49		1																				1		2
Grave 50	1																							1
Grave 52			2																					2
Grave 56			1										1											2
Grave 62+63	1	10						2	1				3		1		1				1		9	29
Grave 64+65	1	3			1			1												1		1		8
Grave 66				2				1				1							1					5
Grave 68	1																							1
Grave 69											1													1
Grave 71																		1						1
Grave 77																						1		1
Grave 78	1																							1
Grave 79											1													1
Grave 84	1						1						1											3
Grave 87											1													1
Grave 88																						1		1
Grave 90						1												1						2
TOTAL	7	16	5	2	2	1	2	4	2	1	3	5	14	1	2	1	1	4	1	1	1	4	9	89
Unlabelled artefacts													2			1					1	1		5
TOTAL	7	16	5	2	2	1	2	4	2	1	3	5	16	1	2	2	1	4	1	1	2	5	9	94

ments were exposed to fire to a different extent. Three out of four arrowheads and almost the same proportion of blade tools were charred, as compared to less than one out of four flake tools (not one of which was a scaled pieces) and some 15% of flakes and chips.

Looking at the dependences between the kinds of artefacts deposited in graves, the traces of fire on them, and the sizes of assemblages in which they occur, it is possible to divide the flint grave goods from Chernin into three groups. The least rich ones contain one or two artefacts flakes, chips or scaled pieces; in exceptional cases a flake tool or perhaps a flint striker. These artefacts were usually deposited in graves in uncharred form. One gets the impression that they ended up in graves as a result of an intention to place there „just some flint piece". They constitute almost 40% of assemblages. A grave typically contained anywhere between one and ten tools. Not more than three blade specimens and flake tools were present in any one grave, and the size of assemblages appears to depend on the number of arrowheads. Although the arrowheads may occur alongside other tool classes, they alone constitute the richest inventory of the group, and in most cases appear to have been deposited singly. The poorer grave assemblages are entirely charred, with the exception of single arrowheads; however, the connection of some of the latter with the Sofievka group materials remains doubtful. In the larger assemblages only some of the artefacts are charred. Assemblages of this type amount to about 45% of all assemblages with flint goods. In four of these large assemblages, containing from two to nine tools, there were also from two to 19 chips, chunks or quartzite pebbles. The significance of these additions is not clear.

The graves with flint goods are concentrated in the south-western half of the cemetery. Those with the least quantity of materials are grouped along the north-eastern boundary of this zone, while graves with rich goods and those containing arrowheads are along the north-western periphery, i.e., arranged diagonally in the central part of the site.

The tentative interpretation of grave goods from the Chernin cemetery differs radically from the conclusions arrived at by A. G. Kolesnikov [1993]. This is also true of analyses of the other cemeteries. The differences stem from an entirely different understanding of the fundamental evidence categories.

2.2. KRASNY KHUTOR

The north-western and south-eastern extremities of the cemetery were destroyed prior to the beginning of excavations. The remaining part probably survived in good state, although the relatively large quantity of materials collected on the surface may be cause for concern. The methods used to explore the site do not allow us today to distinguish separate assemblages with reliability, especially in the

Flint inventory from Krasny Khutor

FEATURES	Types of																			
	11	121	1221	1222	211	2121	2122	2123	2131	2132	212-3?	2141	2142	213-4?	215	2161	2162	2163	2164	2171
Grave 86+87																				
Grave 5																				
Grave 3+168																1			1	
Grave 89													1							
Grave 169						1														
Grave 16																1				
Grave 104							1								1					
Grave 94																	1			
Grave 29																				
Grave 27												1								
Grave 32			1															1		1
Grave 45																				
Grave 122																				1
Grave 33					1															
Grave 120												1								1
Grave 117		1?																		
Grave 119				1						1						1				
Grave 101+114				1			1						1							
Grave 40+116														3						2
Grave 115							1													
Grave 113												1								
Grave 50+129					1			1				1								
Grave 127									1	1										
Grave 130																				
Grave 126+128		4																		
Grave 53																		1		
Grave 133										1										
Grave 134																				
Grave 137							1									1				
Grave 54																				

Table 2

artefacts																								
2172	212-?!1	212-?!2	22111	22112	22121	22122	22131	22132	22133	223	224	225	2262	2271	2272	2273	228	232	2341	2342	21-3?	3	TOTAL
				1		1															1		3
	1																						1
																1	2						5
																							1
						1									1								3
																							1
																							2
																							1
											1												1
																							1
																							3
				2										1		2							5
														1									2
		1																					2
																							2
	1		1	1		1	1																6
	1		1	3	1	1	2					1											13
																							3
	1					1																	7
																			1				2
																							1
																							3
	2													1									5
			2																				2
				1					1							1		1					8
													1										2
																							1
	1			3																			4
															1			1					4
2																							2

FEATURES	Types of																			
	11	121	1221	1222	211	2121	2122	2123	2131	2132	212-3?	2141	2142	213-4?	215	2161	2162	2163	2164	2171
Grave 146																				1
Grave 60											1									
Grave 149						1														
Grave 63																				
Grave 65			8																	
Gravc 74											1									
Grave 75																				
Grave 156																				
Grave 80+81+82							1												1	1
Grave 84	1		1			1	1													
TOTAL	1	5	10	2	2	3	5	1	1	3	2	4	2	3	1	4	2	2	2	7
Artefacts from outside the features														1						
Artefacts from the ground surface	1		1	1		1	2							2		1				
Unlabelled artefacts										1										
TOTAL	2	5	11	3	2	4	7	1	1	4	2	4	2	6	1	5	2	2	2	7

central richest part of the cemetery. The well isolated features from the fringes of the cemetery suggest that the graves were small, some 50 cm in diameter [cf. in this volume: Videiko, Cemeteries. . . , Fig.4]. Only one grave, number 84 at the edge of the destroyed area, had its goods scattered over the surface of more than one square meter. The graves contained from one (e.g. graves 10 and 16) to four (grave 4+5+11+12) cremation urns. In most cases one or two urns were accompanied by charred remains deposited loosely in the grave pit (e.g. graves 3+9+168, 15+90, 48+139). There were much fewer numbers of pit graves (e.g. number 100) in which cremation remains were sometimes accompanied by a vessel (e.g. graves 91 and 104). According to estimates, there were about 100 graves in the surviving part of the cemetery, and 40 of their number contained flint relics (Table 2).

The average number of flint artefacts in the grave inventories in Krasny Khutor is high almost four specimens. The grave goods usually consisted of tools, rarely accompanied by flakes, and in just one case by a single blade.

The most frequently occurring and most numerous in Krasny Khutor graves were blade tools. Predominant among them are knives, with the ordinary variety occurring twice as often as the asymmetric type. The second most numerous category

artefacts																							
2172	212-?1	212-?2	22111	22112	22121	22122	22131	22132	22133	223	224	225	2262	2271	2272	2273	228	232	2341	2342	21-3?	3	TOTAL
																							1
			1																				2
															1								2
																			1				1
																				1			9
	2						1							1									5
				4		1		1														1	7
				1																			1
			4	2	1	1		1													1	1	14
		1		1																			6
2	9	2	9	19	2	7	4	2	1		1	1	1	4	3	4	2	2	2	1	2	2	144
										1													2
	3	5	1	1									1										20
			2																				3
2	12	7	12	20	2	7	4	2	1	1	1	1	2	4	3	4	2	2	2	1	2	2	169

of blade tools are strikers, but these appear to be evidence of burial rituals merely adding to the volume of inventories. Daggers, especially the tanged specimens are relatively numerous, and also present are spike-ended blade pressers as well as the blunt-ended pressers and end-scrapers which are known only from this site. The blade tools which could be identified as to raw material were all made from Volhynian flint.

Arrowheads were encountered half as often, although their numbers are also high. Specimens with concave base outnumber those with straight base three to one. This tendency is underlined by the presence of a unique specimen, large and slim, with a notched base and rounded sides (Fig.6:o). Also relatively numerous are arrowheads made on an ad hoc basis from destroyed larger forms or chips. Of the seven specimens whose raw material could be identified, at least four are made from non-Volhynian flints.

Amorphous strikers made from flakes, chunks and in one case from a natural piece occur in the inventories with the same frequency but in much smaller numbers. Their significance in the inventories appears to be only as evidence of burial rituals. Just one out of four of these finds is made from Volhynian flint.

Ordinary flake tools and scaled pieces occurred in just three assemblages. All are made from Volhynian flint. Flakes ended up in graves equally rarely but in quite large numbers. A single blade was also among the finds. The flakes, originating from axes, and the one blade were made from Volhynian flint, whereas the remaining finds represented other raw materials.

There are no square axes in the Krasny Khutor materials, but at the same time artefacts made from destroyed specimens of such axes occur in almost one in four of the grave assemblages. They include hammers, strikers made from large fragments or flakes, a flake scaled piece, two chips fragments of polished surfaces, and a plunging flake. Almost half of these finds are made from non-Volhynian flints. V.F. Petrougne distinguished among them both local varieties and flints from along the Dniester. The contexts in which the artefacts from this group were found suggest that they were not alternative offerings, but that they document just one way of acquiring raw materials for more amorphous flint production.

More than 55% of the finds from Krasny Khutor bear traces of fire. More than 30 refittings were done in the course of examining the recovered material, and this means that great care was exercised to deposit all fragments of tools charred in the course of burial rituals. Not all categories of artefacts were subjected to fire treatment to the same extent. Nearly 95% of arrowheads are charred, as are 60% of blade tools and just under 15% of the other artefacts.

Three basic groups may be distinguished in the flint grave goods in Krasny Khutor, basing on the kind of tools that were deposited, traces of fire they bear, and the size of assemblages they were found in. The first are inventories with blade tools. The poor ones consist of one to five implements, there usually being one or two, in exceptional cases three ordinary blade tools. These are often accompanied by strikers of diverse type, and sometimes a flake tool or scaled piece. Although assemblages of this type account for more than half of grave furnishings, single arrowheads occur in just two cases. The richer assemblages with blade tools just three of which are known contain from five to seven artefacts. These include at least three ordinary blade tools and always a single arrowhead. Normally only some of the specimens in these assemblages carry traces of charring. Five grave furnishings consisting exclusively of strikers, in one case accompanied by numerous chips, may be treated as a variety of the poorest assemblages. These objects are probably apparent grave goods, being in fact remains of burial rituals.

The second group of inventories consists of assemblages with arrowheads, containing between one and eight artefacts. The poorest assemblages consist of arrowheads alone, while the richer ones contain also strikers and flakes. The arrowheads nearly always carry traces of fire. There were eight assemblages of this type in Krasny Khutor.

The last group of inventories, represented by two assemblages, boast the richest grave goods. They are combinations of rich varieties of both the types described above, containing three or four blade tools, eight or nine arrowheads, and either a

chip or a chunk. Nearly all the arrowheads and some of the blade tools bear traces of charring.

The graves containing flint artefacts, regardless of the richness and kind of their furnishings, are scattered throughout the area of the cemetery, tending to concentrate in its center, as do other graves in fact.

2.3. SOFIEVKA

The northern part of the cemetery was destroyed completely before excavations were undertaken, while almost all of the western part was considerably damaged by wind erosion. The scale of this erosion and the displacements of materials it brought about is illustrated by the performed refittings of flint materials. A fragment of a blade knife from grave 44 was discovered more than five meters to the north-west of it, while a part of a stone adze from grave 64 was found lying more than two meters east of the feature. It is thus no wonder that more than half of the flint finds recovered from this site cannot be associated with specific graves.

Today it is no longer possible to distinguish individual assemblages in a reliable manner, given the state of preservation and manner of documenting relics from the cemetery. However, a number of distinctly isolated concentrations of materials indicate that individual graves were up to one meter in diameter (cf. in this volume: Videikio, Cemeteries..., Fig.5:1]. Each usually contained several concentrations of charred bones and sometimes grave goods in the form of one or two vessels and flint, stone or copper artefacts, often deposited close to the bone concentrations (e.g. graves 34-36, 44, 114-117; [cf. Videiko, Cemeteries..., Fig.5:3-4, 5:6]). Sometimes a part (e.g. graves 17-19, 62-64 [cf. Videiko, Cemeteries..., Fig.5:2, 5:5]) or all of the remains (e.g. grave 8) were placed in urns. According to estimates, there were at least 70 to 80 graves in the surviving part of the cemetery. Today flint finds can be associated with only a third of their number, but this figure appears to have been reduced as a result of the state of preservation of the site.

The average number of flint artefacts in a grave inventory in Sofievka is low just two but this may be due to the considerable ruination of the site. The flint objects are practically nothing but tools, with single blade or flakes occurring sporadically (Table 3).

Blade tools are the most frequently occurring and most numerous category in Sofievka. Ordinary and asymmetric knives are the predominant types, and strikers are also plentiful. The only identifiable raw material is Volhynian flint. The single blade that was recovered from the site is also made from this kind of flint.

The second most frequent tool category deposited in graves comprises square axes as well as pressers and strikers made from their fragments. In this case too the identifiable raw material was Volhynian flint, the only exception being a loose

Table 3

Flint inventory from Sofievka

FEATURES	Types of artefacts																													
	11	121	1221	1222	2121	2122	2123	2131	2132	2141	2142	2161	2171	2172	212-7?1	212-7?2	22111	22112	22121	22122	22132	2211-3?	2261	2271	2273	231	233	2341	2342	21-3?	3	TOTAL
Grave 3/1947									1																							1
Grave 5/1947															1																	1
Grave 6/1947																			1													1
Grave 5+6+7																	1		1													2
Grave 19																										1						1
Grave 22						1																										1
Grave 34					1																				1	1						3
Grave 37													1																			1
Grave 39+40																								1					1			2
Grave 43	1																									1			1			3
Grave 44						1																				1						2
Grave 45															1													1				2
Grave 47																1																1
Grave 60												1																				1
Grave 63+64								1			1		1		1	1		1		2	1						1					10
Grave 67		1																								1						2
Grave 68																	1			1												2
Grave 69		1																														1
Grave 70+71									1					1									1									3
Grave 72																													1			1
Grave 83													1	1	1																	3
Grave 88																												1				1
Grave 94(94,95)							1																									1
Grave 114+115						1														1		1										3
TOTAL	1	2			1	3	1	1	2		1	1	3	2	4	2	2	1	2	4	1	1	1	1	1	5	1	2	3			49
Artefacts from outside the features		1	2	3		1							1		1	1	1	3		5		1						1	1		2	24
Artefacts from the ground surface					1					1		1			2	1		2				2								1	13	24
Unlabelled artefacts																		3	1	2	1											7
TOTAL	1	3	2	3	2	4	1	1	2	1	1	2	4	2	7	4	3	9	3	11	2	4	1	1	1	5	1	3	4	1	15	104

find of an amorphous striker with traces of polishing on its surface which was made from a local raw material.

Slightly less frequent but occurring in greater numbers in the graves were arrowheads. Specimens with straight base predominate, but the larger assemblages always feature also forms with concave bases, mostly large in size. About half of the artefacts whose raw material could be identified are made from Volhynian flint. Among the other raw materials V.F. Petrougne distinguished specimens made from flints originating in the Ukrainian Shield zone.

The explored graves did not yield any ordinary flake tools, but there were fairly numerous strikers made from pebbles of local flints as well as strikers made from flakes struck off these pebbles or tools made out of them. The specific function of these implements as well as the technology and raw material setting them off from the rest of the inventory suggest that they are not so much elements of standard grave furnishings as items connected with burial rituals.

Merely around one-fourth of the flint artefacts from Sofievka carry traces of fire, most frequently arrowheads, and slightly less often (25-30%) blade tools. The other artefacts are not affected by fire. It appears that prior to deposition in the graves the tools were killed /destroyed in some other manner. Practices of this kind are documented by broken blade knives and destroyed axes from graves 34-36 and 44. Similar customs may be surmised in the case of inventories in which the blade tools and axes are replaced by strikers made from these implements (e.g. graves 37 and 45). These strikers appear to have a twofold role in grave inventories, namely that of a gift symbolizing the tool from which it was made, and of a tool used in the course of burial rituals.

Looking at the relationships between the kinds of deposited artefacts, the manner of their destruction and size of inventories of which they are a part, we can divide the grave goods in Sofievka into the poor and the rich. The former contain one or, less frequently, two artefacts. They come in two kinds. On the one hand we have inventories featuring a blade tool or a striker made from such a tool. Two inventories including strikers made from natural pieces and a flake may be seen as a variant of this kind of grave goods, although they are probably not grave goods in the strict sense of the term but rather evidence of burial rituals. The artefacts from poor assemblages were not charred. They account for about 40% assemblages with flint goods. The poor assemblages of the second kind consist exclusively of arrowheads, all of which are charred. Only three such inventories were discovered. The two discoveries of single uncharred axes cannot be regarded as poor grave goods. These implements were all accompanied by artefacts made from other raw materials, namely lithic adzes and copper tools, and should thus be seen as a unique variant of rich inventories. The rich inventories typically consist of two or three specimens, in most cases an axe together with a blade tool, and possibly also a striker or flake. One such assemblage consisted of a blade knife and two arrowheads. Some strikers and blade tools in a number of these assemblages are charred. The exceptionally rich inventory from grave 62-64 appears to represent a variant of this kind of grave

goods. It features three blade tools (including the only dagger recovered in Sofievka), two blade strikers, a presser made from a chunk (probably originating from an axe), probably four arrowheads, and also a lithic adze. Two of the flint tools display signs of charring.

The graves with flint goods concentrate in the central part of the cemetery. The richer ones (with axes) tended to be closer to the cemetery's north-eastern limit, while the poor ones occupied the site's center. Graves with arrowheads as well as the isolated finds of these implements were distributed mostly around the periphery of the cemetery, the exception being the richest grave 62-64 which was right at its center.

2.4. ZAVALOVKA

This small cemetery was almost completely destroyed before archaeologists commenced their excavations. Because of this, it is impossible to say today whether the graves were larger units, each containing several concentrations of charred bones, or whether each small concentration of remains constitutes a separate unit. The fairly modest surface collection of artefacts suggests that whatever its arrangement the cemetery was tiny, comprising not more than 16 or so graves (Table 4).

At least half of the uncovered grave features contained flint objects. The grave goods were fairly modest, on average numbering two or three artefacts in every inventory, usually tools. The size of flint inventories and the small number of recovered artefacts precludes quantitative analyses of the entire collection. However, several basic facts are worth noting.

Nearly 90% of the discovered artefacts bear traces of fire. All categories of artefacts were consigned to flames, and the charring is usually so intense that quite a number of the finds cannot be fully identified.

Blade tools were placed in graves most frequently and in the greatest numbers. Arrowheads were half as frequent and much less numerous. The dominant category of these implements are arrowheads with a straight base. Noteworthy among their number is an untypical specimen with a massive tang (Fig.6:p) and the fact that the only find of this category whose raw material could be identified was made of Volhynian flint. Also worth noting is the small number of strikers, among which there are no flake forms or implements made from natural pieces. There are just a few flake tools, scaled pieces and flakes. None of the three finds in this group which could be identified as to raw material were made from Volhynian flint. The grave inventories lack any trace of the use of axes. However, one of the published unlabelled finds was probably an amorphous axe (cf. in this volume: Videiko, Archaeological..., Fig.76:3e).

Table 4

Flint inventory from Zavalovka

FEATURES	Types of artefacts																		
	121	1221	213-4?	2161	2171	212-7?1	212-7?2	22112	22121	22122	22132	22133	225	2262	223-7?	228	231	3	TOTAL
Grave 2										2									2
Grave 3						1		1				1		1					4
Grave 4				1						1									2
Grave 7						1									1	1		1	4
Grave 11					1														1
Grave 13						1													1
Grave 15	1																		1
Grave 16		1	1	1									1						4
TOTAL	1	1	1	2	1	3		1		3		1	1	1	1	1		1	19
Artifacts from outside the features						3	1				1			2					7
Artifacts from the ground surface	2					1		1		1						1			6
Unlabelled artifacts					1	1		1	2	1		1					1?		8
TOTAL	3	1	1	2	2	8	1	3	2	5	1	2	1	3	1	2	1?	1	40

The graves with arrowheads were clustered together in the center of the cemetery.

2.5. DIFFERENCES BETWEEN FLINT INVENTORIES FROM THE VARIOUS CEMETERIES

Flint materials from the various Sofievka group cemeteries differ considerably from each other. Virtually the only element they share is the leading role of an industry relying on macrolithic blades imported from Volhynia, more than 200 kilometers away. Differences in access to the Volhynian flint blades should therefore perhaps be viewed as the most important factor differentiating the studied assemblages.

The grave goods from cemeteries in Zavalovka and Chernin are considerably poorer, both in terms of quantity and quality. In both these sites the tool set was

augmented using amorphous flake core processing and the splintering technique applied to local raw materials of inferior quality [cf. Petrougne, Petrographical..., in this volume]. Also noteworthy is the presence in Chernin of a greater number of variant C of the ordinary blade knives in very advanced stages of exploitation. The difficulties in accessing Volhynian flint blades suggested by the previous observations are not justified by the geographical position of the Chernin and Zavalovka sites [cf. Petrougne, Petrographical..., Fig.1]. It would thus seem that the communities responsible for these cemeteries occupied a place in a strictly hierarchical Volhynian flint distribution market that was opposite to the communities from Sofievka and Krasny Khutor. A comparison of the size of the various sites and the numbers of copper artefacts shows that differences between the sites were not confined to the flint industry alone. The cemeteries in Zavalovka and Chernin were probably used by peripheral groups living on the extremities of the Sofievka ecumene, while Sofievka and Krasny Khutor represent the principal centers of this tradition.

Considerable differences are also apparent between flint inventories within each of the above groups. These signify differences not just in funeral rituals and flint production, but also the much more important differences in socio-economic organization.

In Krasny Khutor the flint artefacts were charred more than twice as often as in Sofievka where they were sometimes killed by breaking or splitting. Also the role of strikers in the two sites was different. All this suggests that the ritual involving body cremation was still not fully established in the days when the Sofievka cemetery was operational. This hypothesis is also supported by data unrelated to the flint industry, such as the large size of graves in Sofievka, uncharacteristic for cremation graves. It may thus be surmised that the site dates to an older period, something that is confirmed by the few radiocarbon dates available from the two sites [sf. Kovalyukh, Videiko, Skripkin, Chronology..., in this volume].

The grave goods in Sofievka are considerably less rich than in Krasny Khutor. One of the principal artefact categories in the former cemetery was the square axe which was of no significance whatsoever in Krasny Khutor, and this despite indirect evidence in the recovered materials of a continued widespread use of these tools. In Sofievka graves containing arrowheads are few in number, poor and confined to the edges of the cemetery. In Krasny Khutor on the other hand they are almost twice as frequent, with richer grave goods and distributed in the standard manner. These differences had to be due to socio-economic transformations taking place among Sofievka communities, which appear to consist in the emergence within these communities of a group of people who were buried with unique grave goods including military equipment a bow [cf. Klochko, Kośko, Weapons..., in this volume]. Worth recalling in this context that V.F. Petrougne distinguished among the arrowheads in Sofievka specimens made from flints originating in the Ukrainian Shield zone. This may be an indication of the direction from which this trend arrived [Petrougne, Petrographical..., Fig.1]. Another possible indication of this trend

may be the relatively numerous flint daggers in grave inventories in Krasny Khutor. It cannot be ruled out however that, similarly as in the case of the appearance of end-scrapers, the daggers may simply be a consequence of an increasing richness of grave goods.

The transformations referred to above must have affected the flint industry. The demand for arrowheads stimulated the development of core exploitation techniques geared to flake production. Evidence of this process is the appearance of ordinary flake tools in the Krasny Khutor materials. There also emerge differences between flint industries that are easily detectable by means of classical typological analyses and which consist in various preferences for different types of implements within the same important tool category. In Sofievka the numerically predominant type of arrowhead is the one marked by a straight base, whereas in Krasny Khutor an even more popular form is that with the concave base. This change may be seen as possibly due to influences from the south [cf. Klochko, Kośko, Weapons...].

The inventories from Zavalovka and Chernin are also different, although the paucity of materials in this case hinders the relevant analyses. The Chernin materials contain clearly more arrowheads (although they are still of the straight-base variety), the flake tools are clearly present, while there are relatively fewer blade tools and no axes whatsoever. Applying the same kind of reasoning that was used in the case of Sofievka and Krasny Khutor, it may be concluded that the cemetery in Chernin is relatively younger. This suggestion is supported by the percentage of artefacts charred in the course of burial rituals which in Chernin is similar as in Krasny Khutor. Also in tune with these observations are the relatively early ^{14}C dates for two graves in the Zavalovka cemetery [cf. Kovalyukh, Videiko, Skripkin, Chronology...and Kadrow, Absolute..., in this volume]. However, out of tune with all these dependences, the percentage of charred forms in materials from Zavalovka is higher than in Chernin, in fact being the highest among all the cemeteries considered here. If this is not an incidental situation, it may point to the direction from which the body cremation ritual arrived to the Sofievka group.

As for the areas with which the communities from Zavalovka and Chernin maintained contacts, it is worth recalling the bifacially retouched knives found in Chernin. Their closest analogy is the specimen from the Pit- and Comb-marked Pottery culture site of Pogorelovka-Vyrchishche on the middle Desna [Neprina, Zaliznyak, Krotova 1986: Fig.63:34]. Materials from this region, including also those from the site just mentioned, contain also numerous analogies of the arrowhead with massive tang recovered from the Zavalovka cemetery [Neprina 1976; Neprina, Zaliznyak, Krotova 1986]. Both these forms fit in the long flint working traditions of the Pit- and Comb-marked Pottery and Volosovo cultures of the vast Eastern European Lowland and the Valday Upland [Zimina 1981: Plates 63:7-8 and 64:28; Kraynov 1987: Fig.4].

3. FLINT INDUSTRY OF THE SOFIEVKA TYPE

Throughout the development of the Sofievka type, the principal element of its flint industry was processing of macrolithic blades imported from Volhynia. These blades were obtained from carefully prepared single-platform cores with the debitage surface shaped by crests and a meticulously prepared striking platform ensuring a steep angle de chasse. The characteristic features of these blades include:

- small butts, finely faceted, clearly standing out against the width of the pieces (Fig.1:a,b);
- a visible lip along the entire length of the butt which lacks a bulb (the proximal part of the lower face of the blades is often downright concave);
- parallel lateral edges and distinct curving of specimens, most pronounced in the medial part (Figs 1:b and 3:c).

Experiments intended to reconstruct the technique of making such blades were performed by Witold Migal, whose kind assistance is gratefully acknowledged here. Migal's findings suggest that the above features were the product of exploiting uniquely prepared cores with the use of a soft wooden punch. At the same time many elements of the core shaping are similar to features known from the older Tripolye assemblages produced with the help of copper punches. The production technique responsible for blades of the Sofievka group thus appears to be a deteriorated form of the Chalcolithic traditions typical for the older Tripolye workshops from Volhynia.

Originally, the cores were more than 20 cm long (Fig.1). They were repeatedly re-prepared, and thereby shortened, during exploitation. They remained in use until they provided blades about 12 cm in length (Fig.3:c). The final and useless blades finally finishing off the core were 7-8 cm long (Fig.3:b).

The complete absence of crested blades and the mere trace presence of Volhynian flint flakes in the studied assemblages show that only carefully selected blades arrived to the areas occupied by the Sofievka people. The examined materials contained no traces whatsoever of alternative blade processing. What is more, the processing of local raw materials is highly primitive, employing the hard hammer and lacking core form preparation. This suggests that the Sofievka people were nor familiar with the technique of making macrolithic blades, and that their skills were apparently limited to just retouch-shaping specific tools.

The parameters of the blade determined the kind of tools that was fashioned out of it. The largest specimens over 15 cm in length were usually used to make ordinary blade knives (Fig.1, 2:b). Medium-sized blades (12-16 cm long) also served to make tanged daggers (Fig.4:a), while the shortest pieces were fashioned into asymmetric blade knives (Fig.3:b,c). All these tools were later reshaped many times. The modifications could have consisted in repeated sharpening of the same tool, such as an ordinary blade knife (Figs 2:c and 3:a), by means of retouch. Also,

the given tool could have been turned into a different type of implement. The analyzed inventories provide evidence of a whole range of such reshapings (Figs 2:a, 4:b,c, 5:a,b,e) which are schematically illustrated in Fig.10. It appears that, generally speaking, tool production in the initial phase consisted mostly in fashioning implements utilizing the long lateral edges of blades (diverse knives). In the next phase, these were usually turned into tools whose crucial elements were suitably shaped tips, namely the smaller daggers, asymmetric perforators, some of the pressers and, finally, the end-scrapers. The remains of fully used blade tools served as pressers/strikers. The same fate befell fragments of destroyed axes and flake tools.

The blade industry of the Sofievka group is marked by strong influences of the copper production traditions, evident in:

- the organization of production in a specialized center which then exported implements but not the know-how,
- tool production organization consisting in repeated remodeling of used-up forms,
- the form of some of the tools, notably the daggers and square axes.

Industries of this type are known from several groups of slightly older Chalcolithic sites scattered over a large area of central Europe. The shared features of these industries transcend the borders of archaeological cultures. Suffice it to say that good analogies of almost all the blade tool categories distinguished in the Sofievka group can be found, for example, in the Funnel Beaker culture assemblages of the Little Poland Upland which are about 500 years older in age [Balcer 1975: Figs 16-24]. Analogies in raw materials use suggest that the flint blade industry of the Sofievka group was taken over from the slightly older assemblages of the Tripolye culture from Volhynia [Peleshchyshyn 1990; Konopla 1990]. At this point in time it is impossible to say whether the similarities between the two areas have to do with the genesis of the Sofievka group or whether they have appeared already in an earlier phase of the Tripolye culture [Kruts 1977]. In the beginning of the 3rd millennium BC, the flint blade industry of the Sofievka group gives the impression of being a relic of a previous age.

Because of the manner of tool production organization in the Sofievka group, the numbers of specimens belonging to each tool category in the various inventories cannot serve as indicators of cultural traditions. Rather, they could serve to illustrate the raw material affluence and function of the individual settlement points. Indications of cultural uniqueness must be sought among subtle morphological and technological differences between specimens of the same tools categories. Worth mentioning in this context is the preparation of distal and proximal ends of blades for hafting, a process characteristic for the Sofievka type and consisting in the fashioning of distinctive truncations similar to those on the Upper Palaeolithic „Kostenki-type knives".

In the older stage of the Sofievka group, the macrolithic blades arriving from Volhynia were also accompanied by square axes. These too are typical components of Chalcolithic flint industries, and their ties with copper tool production

are sometimes seen in morphological features of secondary significance, such as for example the slight widening of the cutting edge in some of the flint specimens [cf. Videiko, Archaeological..., Fig.50:2, and also Dobeš 1989: Abb. 1]. As the significance of flint axes in the burial rituals of the Sofievka group decreases, the manner of their acquiring also changes. In Krasny Khutor we have specimens imported from the middle Dniester area [cf. Petrougne, Petrographical...] and even more numerous evidence of independent production of these tools from local raw materials.

The third important element of the flint industry of the Sofievka type is arrowheads production. Arrowheads are already known from the older assemblages of the Tripolye culture, but these were slightly different in shape and usually much larger [e.g. Ryndina, Engovatova 1990: Fig.3; Sorokin 1991: Fig.16]. The fact that the production of this type of implements was related with the older Tripolye tradition may be confirmed by the relatively large percentage of Volhynian flint specimens in the Sofievka materials as well as by the predominance in most inventories of straight-based forms. The production of these tools evolved considerably in the Sofievka type, this being shown by the dominance of arrowheads with concave bases in Krasny Khutor. The presence of arrowheads made from flint from the Ukrainian Shield zone indicates the areas where the influences stimulating this evolution process originated. This theory is supported by the fact that production of arrowheads with concave bases had a long tradition in the steppe regions in the Southern Bug and Dnieper river basins. Specimens of this kind are known not only from the Yamnaya culture which is contemporaneous to the Sofievka group [Shaposhnikova 1985: 343] in the area in question these implements boast an extremely long tradition [Rassamakin 1994].

The ties to southern regions discernible in arrowheads production are important, being indirect indications of the origins of the socio-economic transformations taking place in the history of the Sofievka group. These transformations are also apparent in the specific role of this class of artefacts in burial rituals - as well as in the flint industry. Analyses of raw materials used to make arrowheads from Krasny Khutor and Chernin show that this production developed independently of the Volhynian production center relying mainly on local raw materials. It is probably no accident that the richer grave goods with arrowheads recovered from Krasny Khutor usually contain also flakes or strikers made from flakes and flake tools. They probably document the evolution of a flint industry which is distinct as regards technology (flake core) and organization (individually completed production cycle, from raw material acquisition to production of the final form). In this part of Europe, flint production of this kind is typical for later times the turn of the Neolithic and the Bronze Age. Richly furnished graves of flint knappers/arrowhead makers are known from the Catacomb culture along the Don [Smirnov 1983; Nikolova, Bunyatyan 1991], as well as from the Middle-Dniester culture along the Upper Dnieper [Artemenko 1964] and from the Corded Ware culture in Little Poland [Tunia 1979].

The previously discussed affinities of the knives shaped with bifacial flat surface retouch, which are exotic among the Sofievka materials (Fig.7:a,b), may be an important contribution to analyses of the origins of this manner of tool formation in the part of Europe in question. The technique took hold along the middle Dnieper slightly later at the turn of the Neolithic and Bronze Age [Artemenko 1964; 1987] while in Volhynia and Little Poland only in the Early Bronze Age [Machnik 1977].

The performed analyses show that the flint industry of the Sofievka type is a good illustration of the transition of Chalcolithic flint processing into that typical for the turn of the Neolithic and the Bronze Age. The facts emerging from evidence from the investigated cemeteries appear to be a *signum temporis* for communities inhabiting this part of Europe in those days. Many analogies to them may be indicated in materials of the so called Złota culture, a small community of those times inhabiting the border with the Globular Amphorae ecumene in the Vistula valley [Krzak 1976; Machnik 1979; Lederman 1980; Ścibior 1991a, 1991b]. Although both these groups are still not too well known, they appear to resemble *the Gateway communities* in a number of respects [Hirth 1978].

Translated by Andrzej Lewandowski