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THE MIDDLE PALEOLITHIC OF THE NORTH EUROPEAN PLAIN AT ZWOLEŃ: Preliminary Results

by

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and contributions of

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INTRODUCTION

Early in the fall of 1983, a local amateur of archaeology, Jan Grudzień, found in a scoop of a digger several large bones of a prehistoric monster. The digger had been working in a small sand and gravel quarry located on the right bank of the Zwolenka Valley. The place was Zwoleń, Voivodedom of Radom, a small town in the Radom Plain, some 120 km SSE of Warsaw. Finding stray bones in Quaternary sediments is not such a rare phenomenon in the North European Lowland. These isolated finds are often mammoth tusks, molars and jaw fragments which are only very seldom associated with traces of human activity.

Notified by Wojciech Twardowski, a curator of the Regional Museum in Radom, one of us [Zofia Sulgostowska] went to examine the bones and the quarry, just to confirm our suspicions that once again finds of stray prehistoric bones were disturbing the everyday activities of serious scientists. The reality proved to be more complex than initially believed. The bones were as expected those of mammoth: a molar, a fragment of a jaw and some odd scraps of skull or jaw. However, a close examination of the rest of the load of the original scoop, deposited by then at a local cemetery, yielded a beautiful, small biface made of imported chocolate flint. The presence of this artifact led to the discovery and subsequent

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excavation of a site that is thought to be one of the most important Middle Paleolithic localities ever excavated in the North European Lowland.

Quite naturally, the discovery at Zwoleń triggered the immediate activity of the local inspector of antiquities, who stopped the exploitation of the quarry and provided initial sums for an early salvage work, already in the fall of 1983. Since then, money awarded by local authorities has permitted the financing of three full-scale field seasons in 1984, 1985 and 1986, each of two month duration.The field work was jointly carried on by the Institute of the History of Material Culture. Polish Academy of Sciences, and the State Archaeological Museum in Warsaw, acting under a formal agreement of cooperation.

During three full field seasons most of the work concentrated in the immediately imperilled area, within the limits of the quarry, where some 240 sq. m. were excavated (compare Fig. 5). In the 1986 season, however, a large test trench was also opened in the area located ca. 140 m. to the ESE of the quarry, along the edge of the Zwolenka Valley. Several additional test trenches are planned for the next field season.

A large part of the North European Plain lies within the maximal extent of the Vistulian ice sheet, as well as the periglacial belt of this glaciation (Fig. 1). Because of this, most of the old land surfaces, formed during and before the early Vistulian, were either destroyed by the glacier or by massive land remodelling resulting from periglacial slope processes. Only two Middle Paleolithic sites in the Lowland show remarkable preservation of faunal remains. One is the fameous site of Salzgitter-Lebenstedt (TODE *et al.*, 1953; TODE, 1954, 1982), located on the northern footslopes of the Hartz. Unfortunately, its exact occupational character, geomorphology and chronology seem to be quite controversial, e.g. the contemporaneity of peat accumulation and periglacial slope processes (cf. BUTZER, 1971: 471). The second site of similar importance is at Zwoleń (Fig. 1).

Of course, important sites are not rare. In fact, every archaeologist is quite serious about the site he or she digs. Isn't it true that we dig only the important sites, at least in our scientific dreams? The site of Zwoleń, however, owes its importance also to the fact that it is a godsend, as far as the character of the finds and the timing of the discovery are concerned. Indeed, as the result of a number of hypotheses put recently forward by Lewis BINFORD (1981, 1984), we begin to see ourselves as merciless beasts in comparison with our earlier relatives. Is Middle Paleolithic man then a semi-angel, or a bloody killer of all God's creatures including large mammals? Perhaps the Site of Zwoleń will help to clarify the question, of how long ago the paradise was lost.

GEOMORPHOLOGY AND LITHOSTRATIGRAPHY

The richness and complexity of the lithostratigraphic and geomorphologic data present at the Rifle-Range Site of Zwolen [6] are of exceptional character. Here, however, we will focus only on the indispensable stratigraphic and geomorphic information necessary for the proper perception of human activity at the site.

The site lies on the right, southern slope of the Zwolenka Valley, a small left tributary of the Vistula. The river drains the Zwoleń Plateau (Fig. 2), a low plateau in the central section of the Radom Plain which, in turn, forms the southern part of the Mazovia Lowland (RÓŻYCKI, 1972: 276). The top beds of the Zwoleń Plateau are made up of altered tills deposited during the Radomka Stadial of the maximal substage of Middle Polish Glaciation (Saale) (cf. MOJSKI, 1985: 109-115). The plateau is dissected by valleys of the Zwolenka

[6] The quarry with the site lies near a rifle-range, hence the name (Note added by the editor).

drainage system cut into the underlying glacial deposits. The valleys are deeply incised along their lower and middle courses and characterized by flat, relatively wide floodplains, as well as steep slopes lacking developed terrace systems (RÓŻYCKI, 1972: 277).

The Zwolenka at Zwoleń has cut into the glacial tills and the underlying, thick fluvioglacial sands of the Radomka Stadial (Fig. 3). The tills are deeply eroded, particularly along the banks of the drainage. During the maximum of the Vistulian the valleys were heavily remodelled by intensive periglacial processes. The slopes of the Zwolenka Valley are covered by solifluction sands and gravel grading into alluvial sediments deposited at the maximum of the Vistulian and dated by TL to ca. 25,000 years ago (25,000 ± 3200 GdTL-160). The alluvial terrace system is practically non existing, although transversal cuts and trenches in the valley expose several aggradational phases, as well as sandy deposits of downcutting episodes. The relatively wide, flat floodplain consists of a thick bed of peat, presumably Holocene in age.

The excavations of the site disclosed an extremely complex lithostratigraphic setting which began to be understood only very recently. The faunal remains and flint artifacts are embedded in alluvial and niveo-eolian sediments deposited in the mouth of a narrow, fossil ravine draining into the Zwolenka Valley from the south. The ravine and its sedimentary fill are capped by the subsequent slope deposits and alluvial sands of the Zwolenka.

The ravine cut into the Middle Polish (Saale) tills and the underlying fluvioglacial sands of the same glaciation and drained into an already well incised Zwolenka Valley. Over 40 beds of boulders, gravel, alluvial sands, niveo-eolian sandy loess, redeposited boulder clay, etc., fill the mouth of the ravine (Fig. 4). Numerous truncations, secondary and tertiary channels resulting from the subsequent cycles of incision and accumulation are seen in the deposits. More than ten tributary ravines of various age enter the main channel from the south-west (Fig. 5) and a yet unspecified number from the southeast. Many of these intersect each other in a long sequence of up to seven subsequent channels providing additional, excellent stratodynamic control over the deposition in the main channel. It is evident that the main ravine was the backbone of a much larger dendritic, drainage system throughout most of the early and middle Vistulian.

Geomorphological observations conducted in the large sand quarry located immediately to the west of the excavated ravine indicated that only the head-sections of a number of side channels were present in this area. They occurred in the northern reaches of the quarry, far from the river. The banks of the Zwolenka in this section consist of slope and alluvial deposits abutting against the glacial till and the underlying fluvioglacial sands.

Downstream and to the east of the studied ravine, the banks of the Zwolenka show unmistakable attributes of heavy remodelling by slope processes. In spite of the flattening of the slopes and obvious signs of extensive removal, a test trench in this area - located some 140 m. to the east of the site - disclosed a large ravine truncated in its upper section, but partially preserved. The ravine was filled with the same sediments as those in the lower and middle sections of the Rifle-Range Site. Further downstream, the slope processes of the maximum of last glaciation completely removed the deposits overlying the basal, fluvioglacial sands. Some traces of fossil lateral drainage were also observed in quarry cuts located still further downstream the Zwolenka (see Fig. 3).

The sediments deposited in the channels during various cycles of accumulation vary from boulders in gravely and sandy matrix to alluvial sands, niveo-eolian loess and unsorted boulder clay flows. The environment and dynamics of their deposition are of extreme, but not immediate importance, except in the case of those enclosing fossil bones and artifacts.

The development of the lateral drainage on the right bank of Zwolenka is preceded by

the formation of a polygonal network of very deep ice wedges, originally at least four to five meters in depth. All of the ice wedges of this earliest generation show very distinctive traces of extensive secondary cryo-deformations. It is believed that the beginning of thawing of these early ice veins triggered the development of the ravine system.

Over ten cycles of ravine incision and accumulation separate the oldest generation of ice wedges from the massive slope remodelling. Most of these cycles are preceded by periglacial phenomena (Fig. 4). The channels of the oldest cycle are preserved only in very fragmentary sections; however, the oldest ice wedges are all filled with alluvial gravel and sands of Cycle I. A TL date of 95,000 ± 7000 years (GdTL-153) was obtained from the redeposited alluvial, sandy fill of the oldest generation of ice wedges. Some of the ice veins of this generation also contain heavily damaged, crushed bones, among which a few are assigned to mammoth and rhinoceros. Another date of 117,000 ± 17,000 (GdTL-174) obtained from alluvial sands in a fragmentary preserved lateral, small channel is probably also associated with Cycle I.

Fossil bones and flint artifacts are present in a number of channel sediments, except perhaps in the youngest ones and Cycle IV characterized by boulder clay flows of solifluctional character. The richest in bones and artifacts are the sediments of Cycles III and VI, followed by those deposited during Cycles VII and VIII.

Two TL dates, both of 77,000 ± 13,000 years (GdTL-155 and 156) were obtained from the fast accumulating alluvial sands of Cycle V, shortly preceding the downcutting of Cycle VI. Another TL date of 85,000 ± 13,000 years (GdTL-154) comes from the fine sands at the very base of Cycle VI, while a TL date of 57,000 ± 8000 years (GdTL-176) has been obtained from the basal part of sandy loess of the same cycle (Fig. 4). The dates from Cycles V and VI lie within one or two sigmas and indicate that the accumulation of niveo-eolian loess during Cycle VI began around 80 thousand years ago, perhaps just after the interstadial of Amersfoort. The TL dates from the overlying cycles are in accordance with this hypothesis. A date of 76,000 ± 14,000 years (GdTL-161) has been obtained from the alluvial, gravely sands of Cycle VII, while the niveo-eolian loess of Cycle VIII dates 64,000 ± 10,000 years ago (GdTL-172). Cycle X yields the date of 65,000 ± 9000 years (GdTL-175) and Cycle XI has been dated to 70,000 ± 10,000 years ago (GdTL-163). The series of TL dates from the younger cut and fill cycles suggest that the accumulation of Cycle XI ended around 60,000 years ago, perhaps just before the interstadial of Moershoofd.

Several additional TL dates are being processed at the Radiometric Laboratory of Gliwice, Institute of Physics, Silesian Technical University. The general stratigraphical and geomorphological setting of the youngest erosion and accumualtion cycles, postdating Cycle XI indicates a chronological position between the interstadial of Moershoofd and the maximum of the last glaciation.

MICROSTRATIGRAPHY AND DEPOSITIONAL DYNAMICS OF BONE-BEARING SEDIMENTS

Today, even beginners in prehistoric archaeology recognize the importance of the understanding of the dynamics of sediment deposition at Paleolithic sites. At Zwoleń, the evaluation of the degree of modification and of the attrition of the bone and artifact assemblages is as much a must, as that of their kinetic behaviour during deposit formation.

Faunal and lithic remains of Cycle III are deposited in a relatively thin (5 to 20 cm. in depth), truncated bed of gravely, alluvial sand. The presence of *Pisidium amnicum* (Müller), a slowly running water bivalve (Ewa STWORZEWICZ, *in litt.*), reinforces the hypothesis that the bed was deposited by a small stram draining the glacial plateau bordering

the Zwolenka Valley. The alluvial sands overlie a thin bed of gravel in sandy matrix, as well as a bed of boulders concentrated at the base of the ravine, which are both paleontologically and archaeologically sterile. The change in the texture indicate a certain threshold in depositional dynamics of the gravely sands, most probably resulting from the stabilization of slopes by vegetation.

The bones which are embedded in the alluvial gravely sands are relatively well preserved, a fact suggesting rapid burial. The small depth of the sands and their apparently rapid accumualtion imply a very short time period involved in the formation of the fossiliferous bed.

A sandy, alluvial depositional environment usually presupposes secondary position of finds. At Zwoleń, however, although some movement of bones and artifacts is evident, most of the bones are believed to be buried near the place of their original deposition. In particular, this would apply for larger anatomical elements like tusks, skulls, etc.

The naked eye examination of bone and flint surfaces indicate their general freshness. Only a few pieces show evidence of rolling. More important, however, is the microscopic evaluation of flint surfaces. It becomes more and more evident that the microscopical examination of flint surfaces may not only yield important information as to the presence of use polish, but also supply valid data pertaining to the kinetic behaviour of artifacts before and after their final enclosure in the bed. Five stages of surface preservation have been observed from specimens characterized by surfaces of mint freshness (Stage 1) to specimens showing extensive sediment polish indicating their displacement before burial (Stage 5).

Most of the artifacts from alluvial, gravely sands of Cycle III are classified within Stages 3 to 5 indicating a certain displacement; some are in Stages 1 and 2. Moreover, some pieces show well preserved use polishes and thus imply that at least a number of elements in the bed are archaeologically *in situ*, or only slightly displaced.

Signs of displacement and gravitational selection are of importance for the evaluation of attrition of the original bone assemblage. It is believed that soft and small bones, as well as splinters and chips, are underpresented as a result of modification of the assemblage during deposition.

The bones and lithics embedded in the niveo-eolian loess of Cycles VI and VIII occur in an entirely different sedimentological environment. The rhythmically bedded loess was deposited in the form of seasonal sheets of minute thickness. The dynamics of its formation imply a considerable period of time and lack of horizontal movement. On the other hand, the slow rate of accumulation results in extensive biological and chemical attrition of bone assemblages, a fact indicated by poor preservation of fauna which, in most cases, is reduced to more durable elements including teeth and various compact bones. Undoubtedly, the accumulation of bones and artifacts in the loess represent a considerable elapse of time, at least in the range of several centuries. Additional destruction of bones was also caused by syngenetic and epigenetic cryoturbations of the bed.

The depositional character of the loess is well reflected in the microscopic characteristics of the flint surfaces, most of which are classified in Stages 1 and 2 indicating lack of horizontal movement and slight cryogenic displacement.

The depositional environment of bones and lithics in the alluvial sands of Cycle VII is similar to that of Cycle III.

BONE ASSEMBLAGES

The study of the bone assemblages, including that of their contents, the frequencies of the various anatomical parts present, of cut marks, scavenger attrition phenomena, etc. is still in an initial phaze. Also, the collection from the 1986 field season has not yet been studied. In spite of this, some information is available (cf. GAUTIER, this publication). The number of species present is small and monotonous. Most common is a large horse (over 30 individuals), followed by steppe bison (3 or more individuals), mammoth (a few individuals), rhinoceros (probably a few individuals), and a few cervids, probably reindeer and elk. Distribution of species within individual beds is quite similar, except for the bison which seems to be present only in Cycle I and/or III.

The most numerous bones occurred in the alluvial sands of Cycle III (186 bones and bone clusters). The niveo-eolian loess in Cycle VI yielded 43 finds; 19 bone occurrences were embedded in the sands of Cycle VII; while the loess of Cycle VIII gave only 10 bone finds.

The natural, biological and chemical attrition of assemblages is the most pronounced in the loess of Cycles VI and VIII. On the other hand, the bones in the sands of Cycle III seem to be characterized by considerable kinetic attrition.

Cut marks are extremely rare; intentional fractures of long bones are difficult to demonstrate, as well as traces of scavenging which seem to be in the form of radial scarring and chipped back ends to use Binford's terminology (BINFORD, 1981); no cylinders, collapsed cylinders or long scavenger split fragments occur in any of the assemblages.

ARCHAEOLOGICAL TAXONOMIC ASSOCIATION

Lithic artifacts are rare. There are only 27 pieces collected from the alluvial sands of Cycle III, 15 from the loess of Cycle VI, 14 from the alluvial sands of Cycle VII, and 11 from the loess of Cycle VIII.

Artifact taxonomy is a pleasant and tempting passtime, but the scope of this communication is quite different and, therefore, only a general taxonomic classification is being offered. The presence of bifaces (Fig. 6; 7:3) and most probably also of the Prondnik backed knives in the lower horizon indicate a strong taxonomic association of the assemblage with the so-called Micoquo-Prondnikian, or more generally, with a post-Acheulean or Final Acheulean complex. The higher levels, namely those in Cycle VI and VII, contain bifacial asymmetric knives and biface foliates (Fig. 8:3 and 5; 9:1), suggesting closer ties with many Middle Paleolithic assemblages of the North European Lowland and adjacent areas of similar technological characteristics (cf. OTTE, 1981).

FUNCTIONAL CHARACTER OF THE SITE

The hypothesis that the Rifle-Range Site at Zwoleń is a drive, multiple kill and butchery locality has been adopted already quite early in the project. A considerable effort has been invested in testing this hypothesis, particularly in the paleogeomorphic reconstruction, evaluation of depositional dynamics, areal expansion of occurrences, association of bones with lithics, functional and technological characteristics of the assemblages, etc. Although research is still continuing, it appears that the hypothesis of a kill and butchery character of the site has not yet been falsified, as shown by the following propositions.

I. *The geomorphological setting of the bone-bearing ravine in the Zwolenka Valley is exceptional. The assemblages appear to be associated only with the first, westernmost ravine of the series.* The reconstruction of paleogeomorphology of the Zwolenka Valley in the early Vistulian (Fig. 10) suggests that the Rifle-Range ravine is the first in a series of similar drainages located in a gorge-like section of the river. The ravine occurs at the end of a wider segment of the valley where a smaller stream drains into the Zwolenka.

II. *The lack of bones in other tested ravines of the same age and lithostratigraphic characteristics, as well as the observed age distribution of the horses and the faunal spectrum decidely dominated by this species (GAUTIER, this publication), militate against the alternative hypothesis of "natural" death or predator kill taphocoenoses.*

III. *The lithic assemblage found in the bone-bearing beds show unusual characteristics and certain functional association with dead animals.* These are manifested in all the beds and are composed of the following discrete expressions:

a) Very low density of tools and debris versus bones in comparison with most of the contemporaneous cave and open-air sites;

b) Very limited range of tool types present which are practically limited to bifaces, biface foliates and side-scrapers;

c) Very special raw material economy and conservation (curation) procedures. The raw material economy was based on chocolate flint (over 70 % of the total), which was being brought probably from the outcrops located near Polany Kolonie, some 40 kilometers to the southwest from the Zwoleń Site (compare Fig. 11). The nodules were shaped in the ravine into bifaces, apparently after the decision about the desired form of the tool had been made. Waste flakes and chips of all stages of biface preparation are present (Fig. 7:1 and 2; 8:1 and 2), while almost all other than biface retouched tools are made on biface preparation flakes (Fig. 7:4 and 5), presumably also on the spot. No cores are present. The only knapped pieces, believed to be brought in, as finished products, are two Levallois flakes (Fig. 9:2).

d) Preserved use polishes on some tools may indicate wet hide cutting (Fig. 7:4) and bone scraping (a converging, asymmetric, relatively thick side-scraper).

It is presumed that the first ravine at Zwoleń was used as a game drive locality. The killed animals were butchered on the spot. It appears that the remains in each fossiliferous bed are the result of many episodes of kills. The use of the ravine was limited to certain phases of the last glaciation and its usefulness decreased with changes in the depth and the width of its bed.

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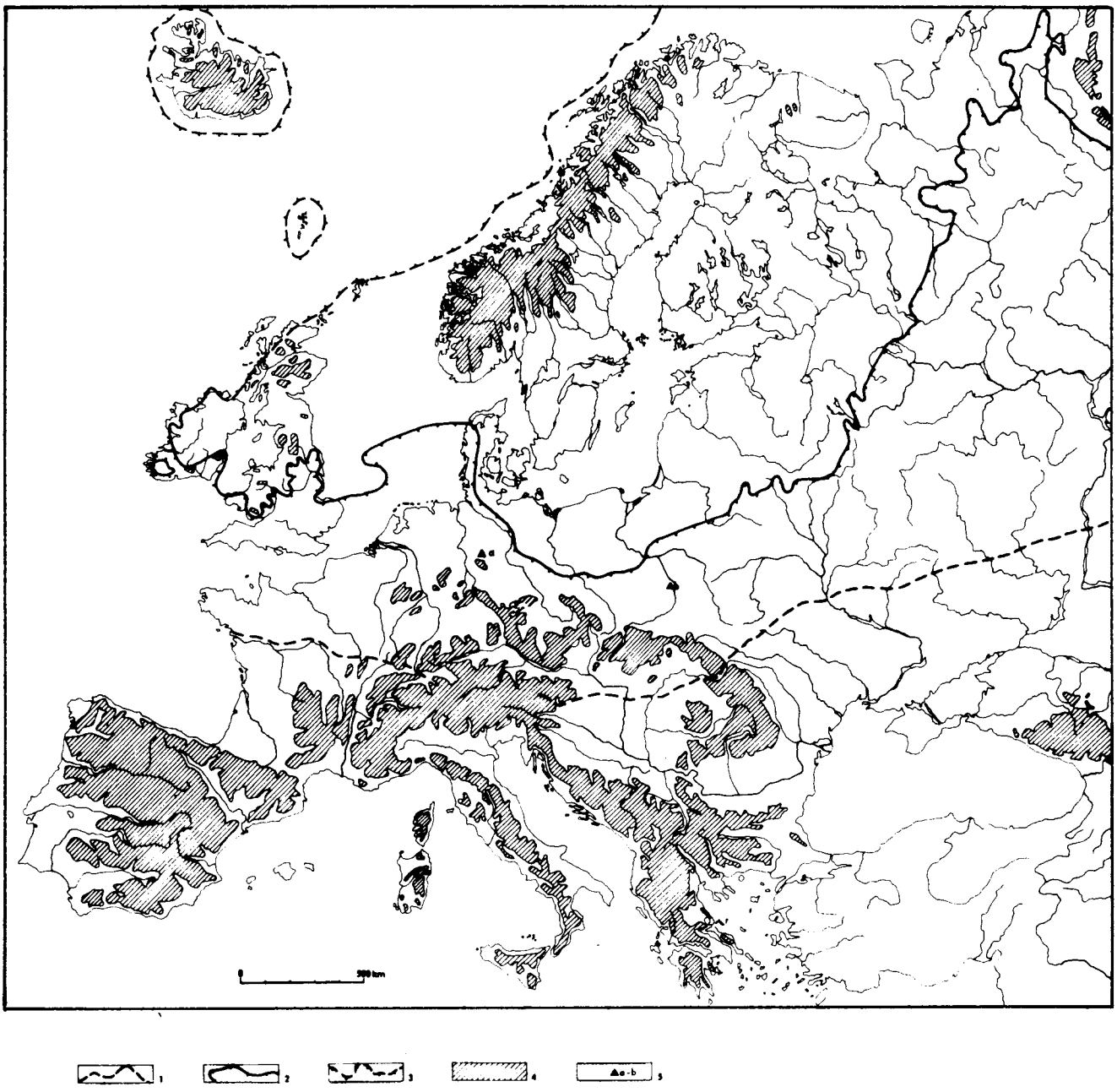

FIGURE 1

Maximal extension of the Vistulian ice sheet and the periglacial zone.
1. Southern limit of periglacial zone; 2. Maximal extension of the glacier; 3. Inferred extension of glacier; 4. Mountains; 5a. Salzgitter-Lebenstedt; 5b. Zwoleń.
According to Gerasimov and Velichko (1982)

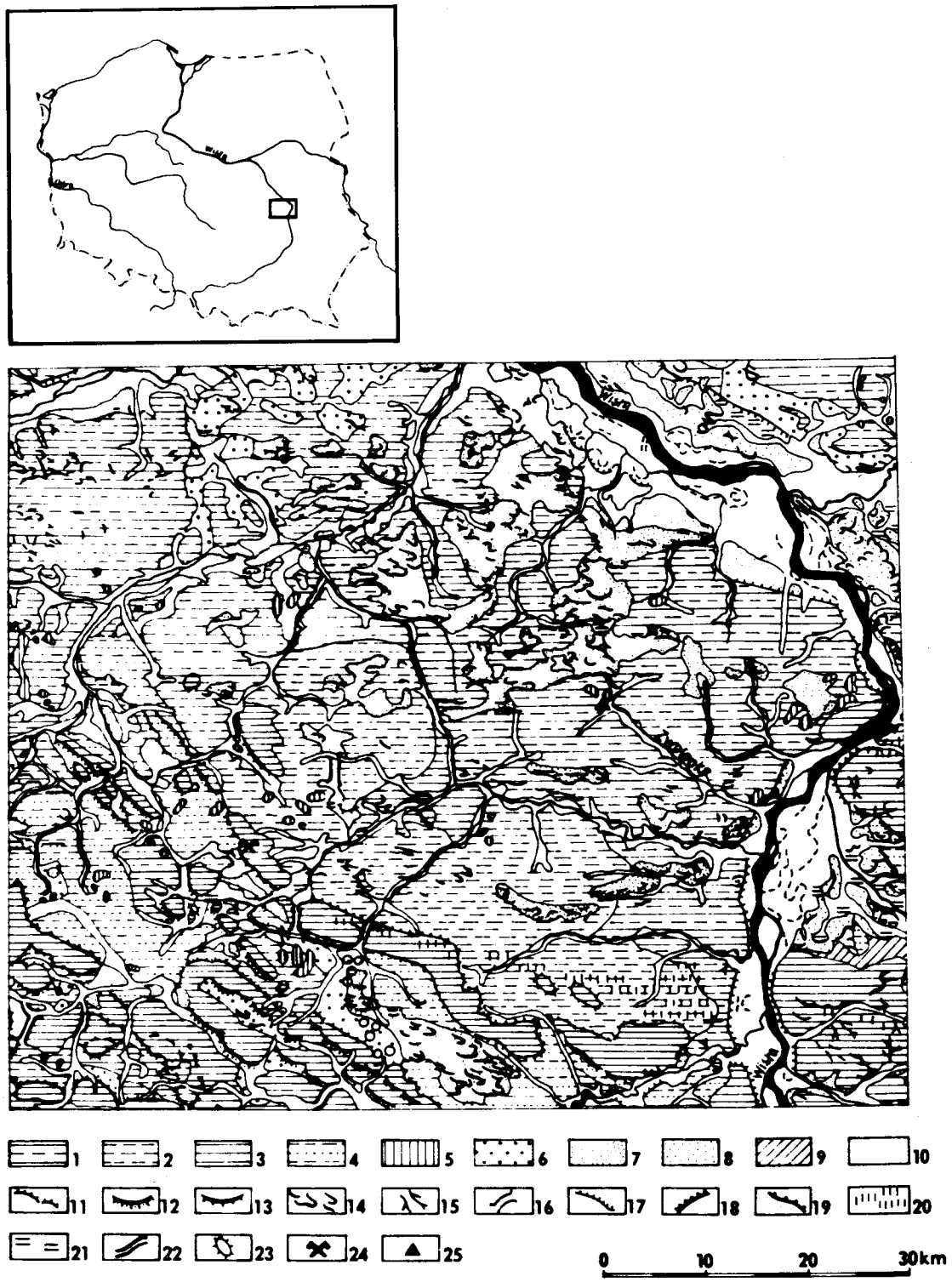

FIGURE 2

General geomorphology of the Radom Plain, according to Geomorphological Map of Poland, *edited by J.E. Mojski.*

Key: 1. Denudated tills and fluvioglacial deposits on plateaus; 2. Plateaus on degrated Miocene deposits overlain by Middle Polish sediments; 3. Low plateaus with remnants of Pliocene base-levelling; 4. Low plateaus covered by older glacial deposits; 5. Endmoraines and morainic remnants of the marginal zone of the Oder (Radomka) Stadial; 6. Denudated sandres and kame terraces; 7. Eolian sands; 8. Vistulian river terraces; 9. Low plateaus with remnants of Neogene base-levelling; 10. Floodplains; 11. Low erosional and denudational steps; 12. Sandstone cuestas; 13. Limestone cuestas; 14. Clusters of dunes; 15. Ravines; 16. Dry valleys; 17. Erosional scarps more than 20 m. high; 18. Active undercuts; 19. High denudational and/or erosional steps covered by Quaternary deposits; 20. Older relief covered by thick loesses; 21. Plains with riverine and peat accumulation; 22. Gorges; 23. Low limestone relict hills; 24. Chocolate flint outcrops of Polany Kolonie; 25. Middle Paleolithic site of Zwoleń.

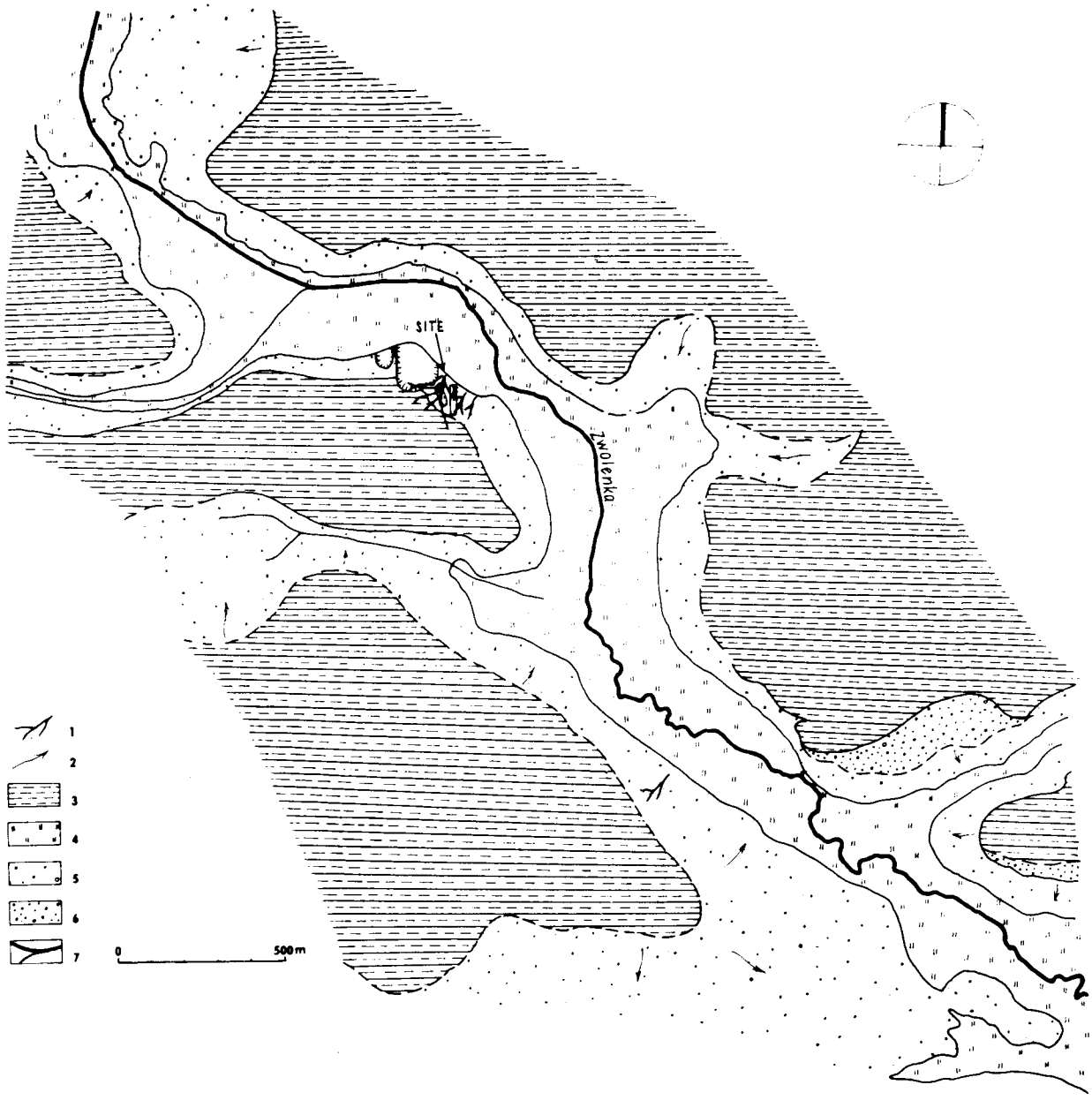

FIGURE 3

Geological sketch of the area.
Key: 1. Traces of fossil ravines; 2. Direction of slope movement; 3. Tills on plateau; 4. Peats on the floodplain; 5. Slope sands and gravel grading into alluviae and alluvial sands; 6. Fluvioglacial sands and gravel; 7. Zwolenka River.

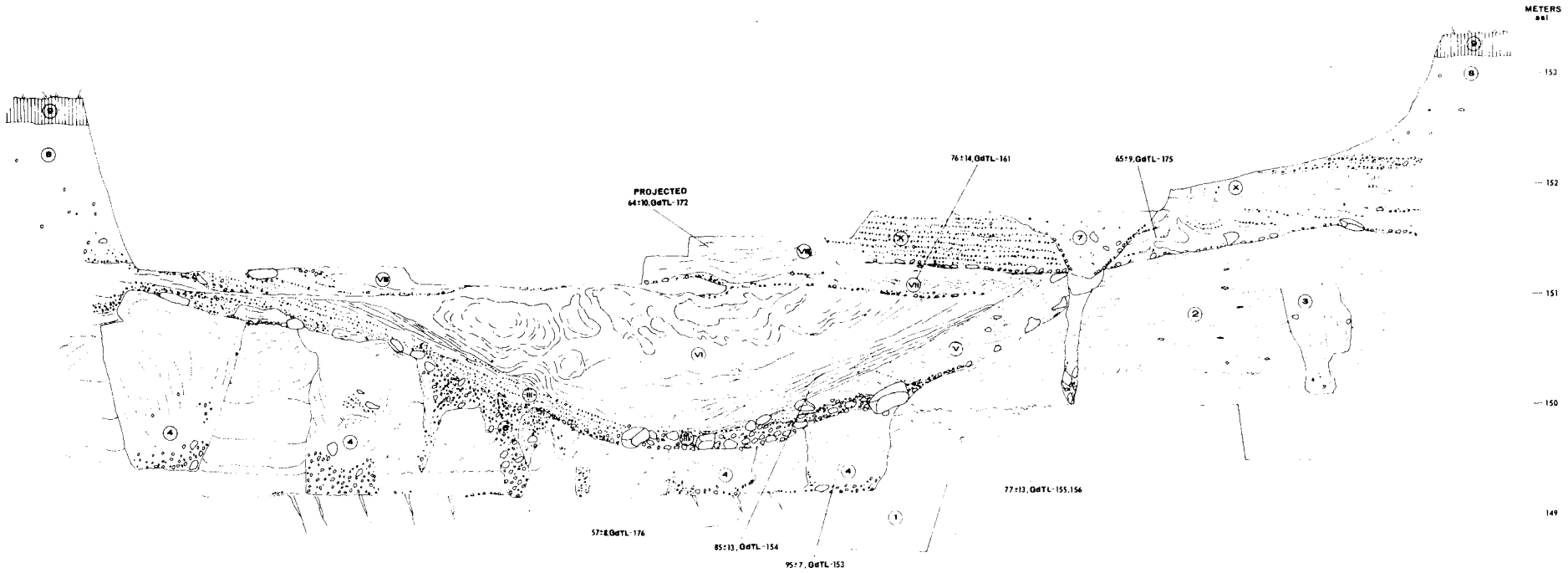

FIGURE 4

Schematic cross-section through fossil ravine, 1984 season. Location of the section seen on Fig. 5 (arrow).

Key: 1. Fluvioglacial sands; 2. Fluvioglacial sand and gravels; 3. Syngenetic ice wedge in fluvioglacial deposits; 4. Deformed ice wiedges preceding Cycle I filled with alluvial sand and gravel of Cycle I; 5. Ice cracks; 6. Ice wedges preceding Cycle III; 7. Ice wedge of the maximum of last glaciation; 8. Recent B zone; 9. Tilled soil; III-X. Sands, gravels, loess and clays of Cycles II to IX, TL dates in thy.

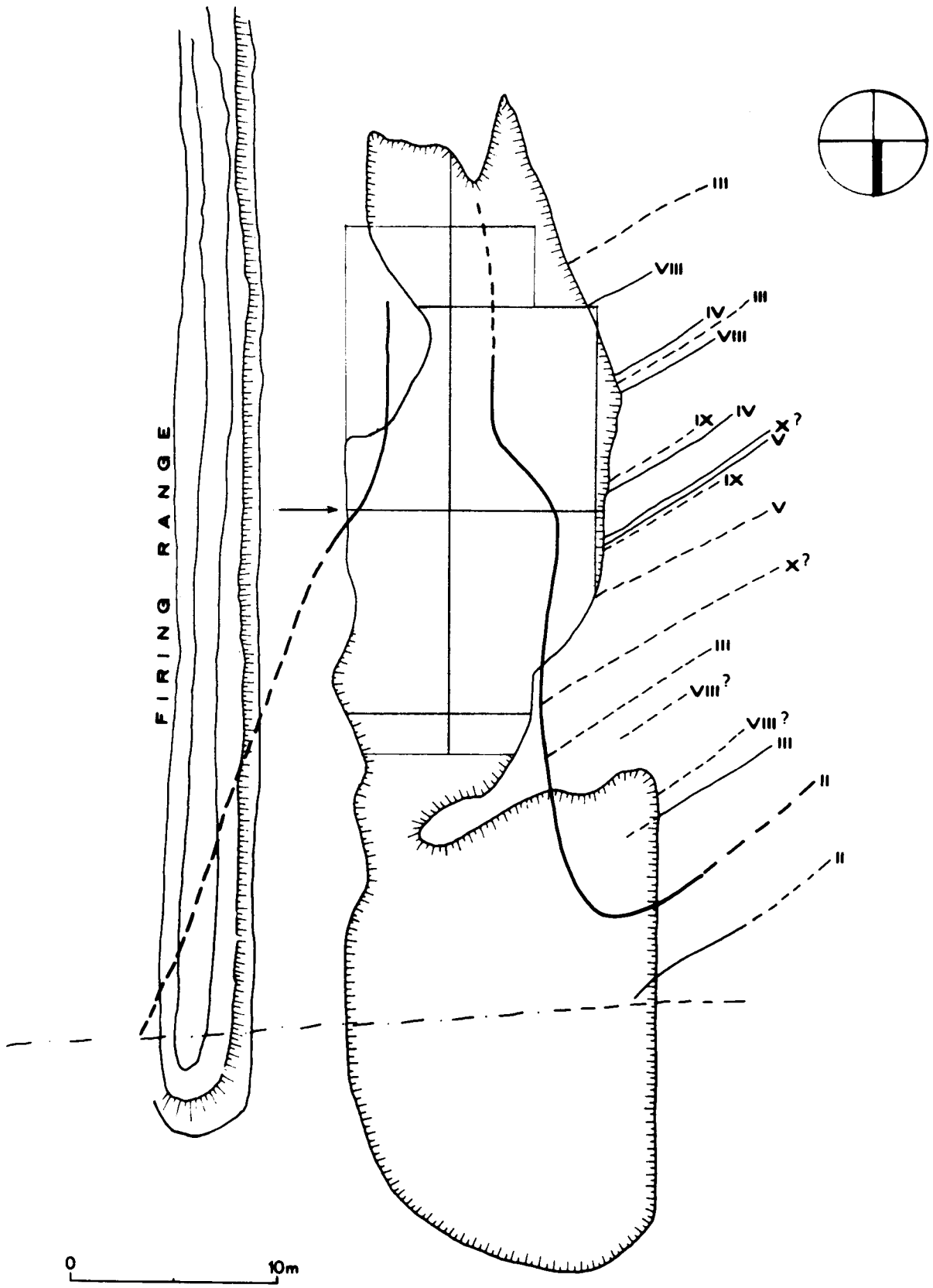

FIGURE 5

Map of sand quarry showing channel of Cycle III, as well as tributary channels of Cycles II to X.

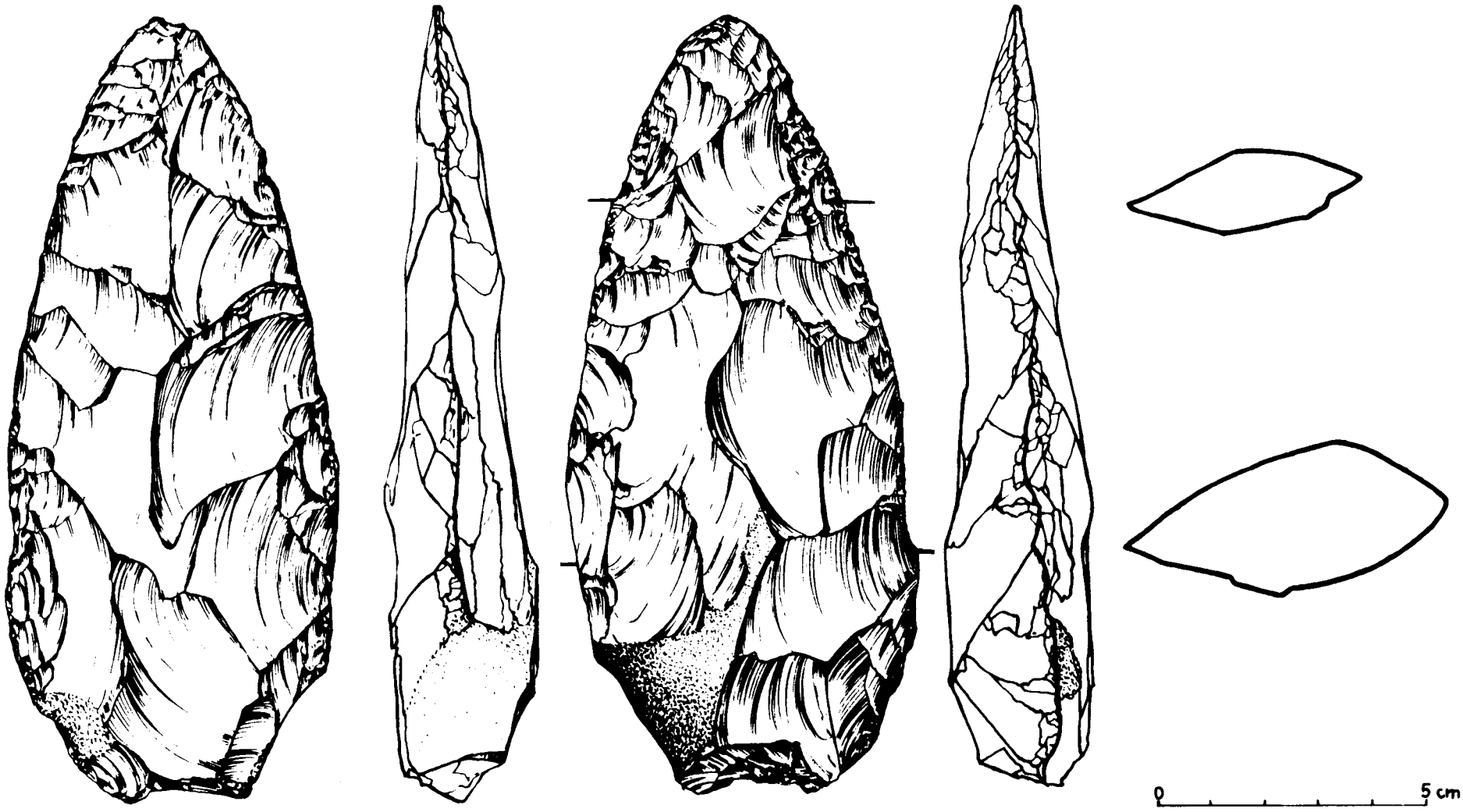

FIGURE 6

Elongated biface. Cycle III. Drafting by Izabella Niewiadomska.

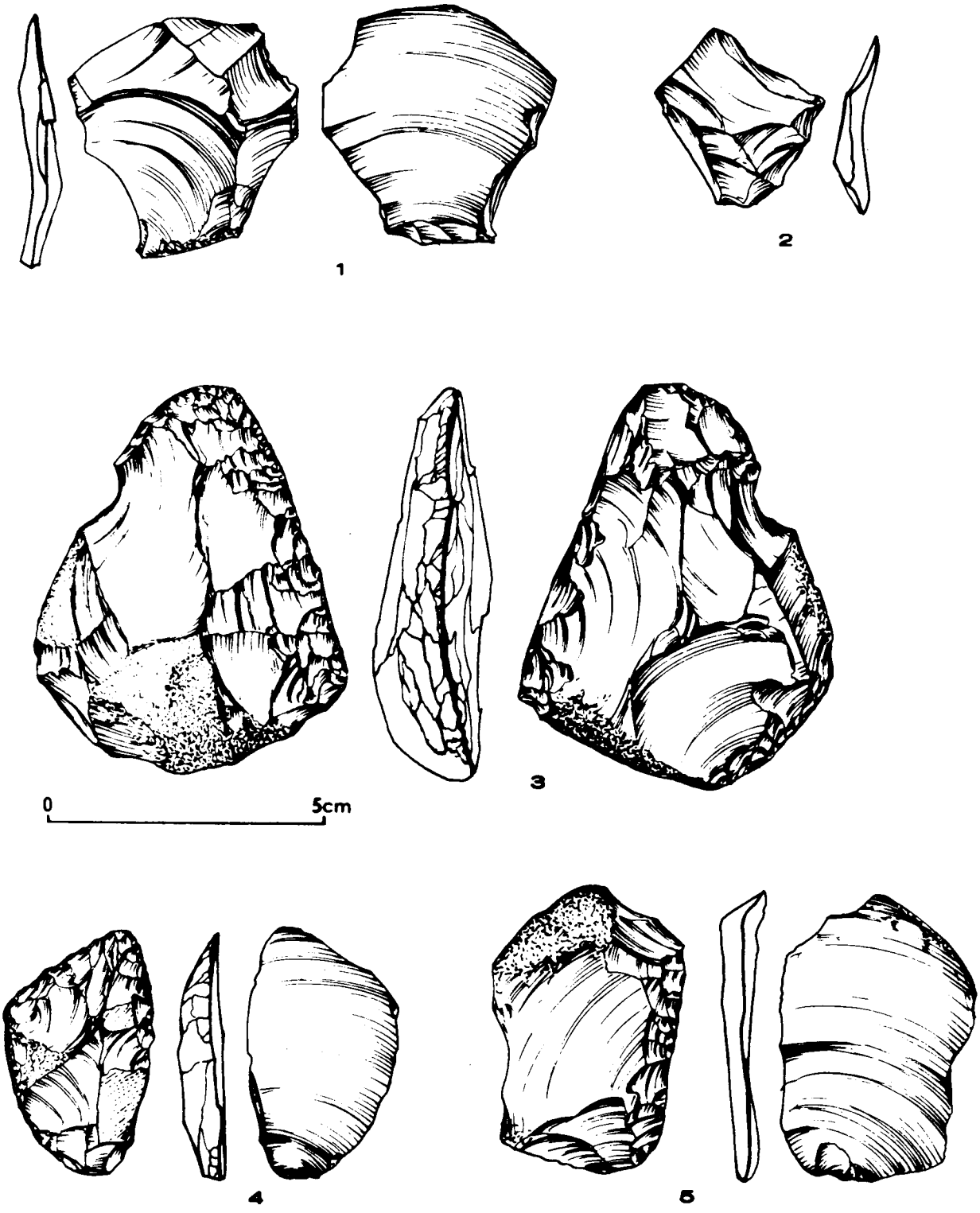

FIGURE 7

1 and 2. Biface preparation flakes; 3. Subcordiform biface; 4. Asymmetric, converging side-scraper on biface preparation flake; 5. Convex side-scraper on biface preparation flake, Cycle III. Drafting by Izabella Niewiadomska

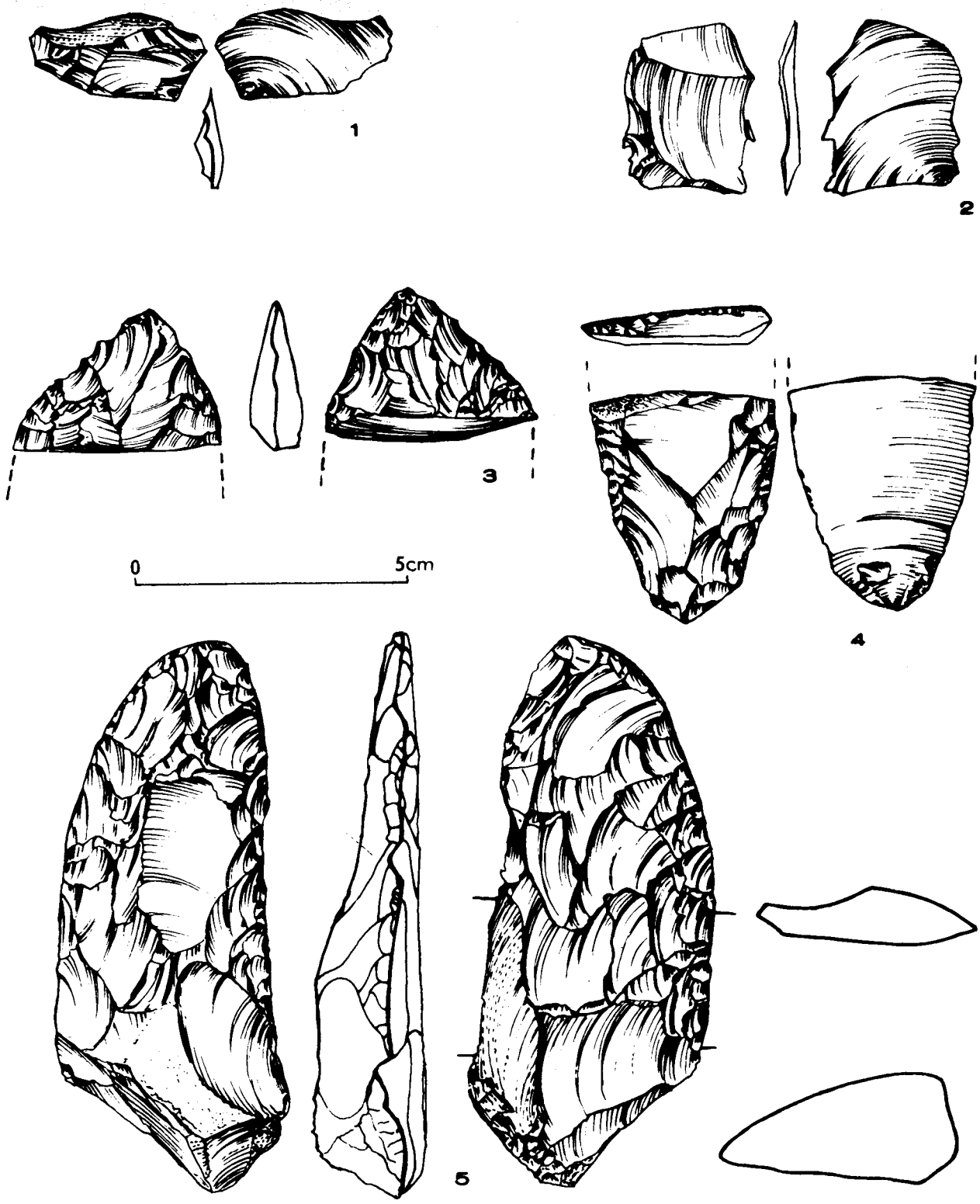

FIGURE 8

1 and 2. Biface preparation flakes; 3. Distal part of biface foliate; 4. Bilateral, convex side-scraper with broken and retouched distal end; 5. Asymmetric biface foliate with natural butt. Cycle VI. Drafting by Izabella Niewiadomska.

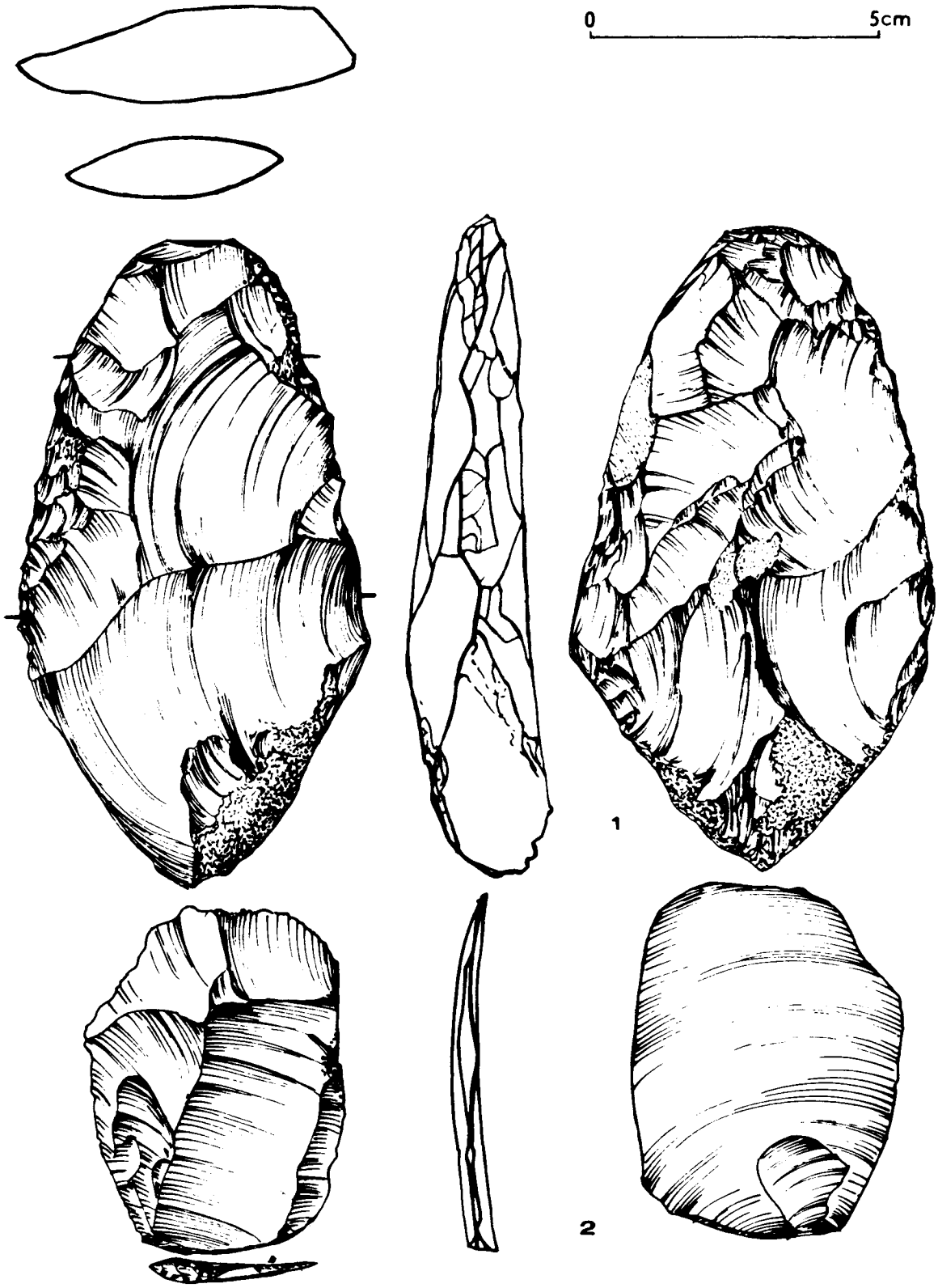

FIGURE 9

Unfinished biface foliate; 2. Levallois flake.
Cycle VIII. Drafting by Izabella Niewiadomska.

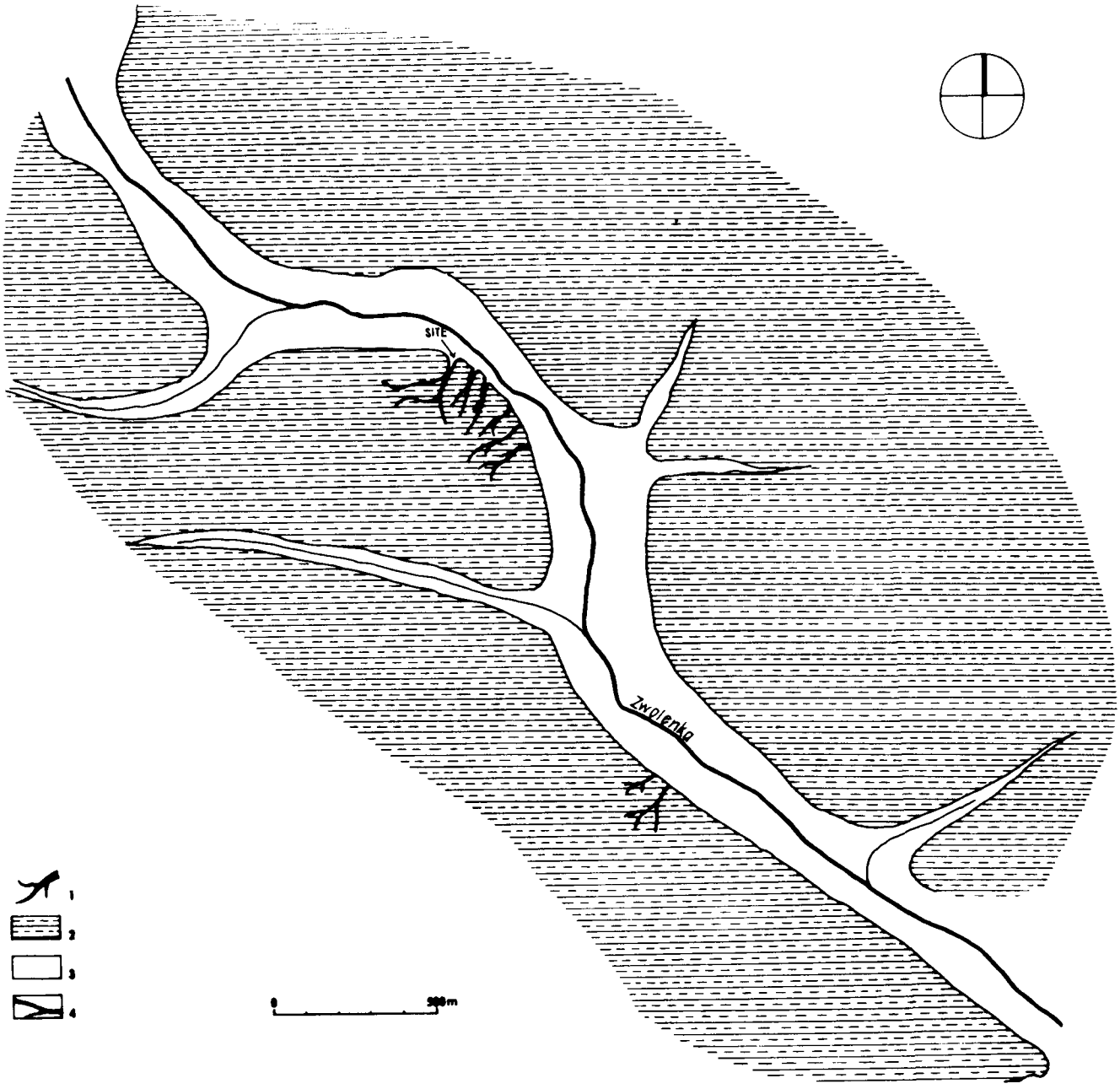

FIGURE 10

Paleo-geomorphological reconstruction of the site area.
Key: 1. Fossil ravines; 2. Tills on plateau; 3. Floodplain; 4. River.

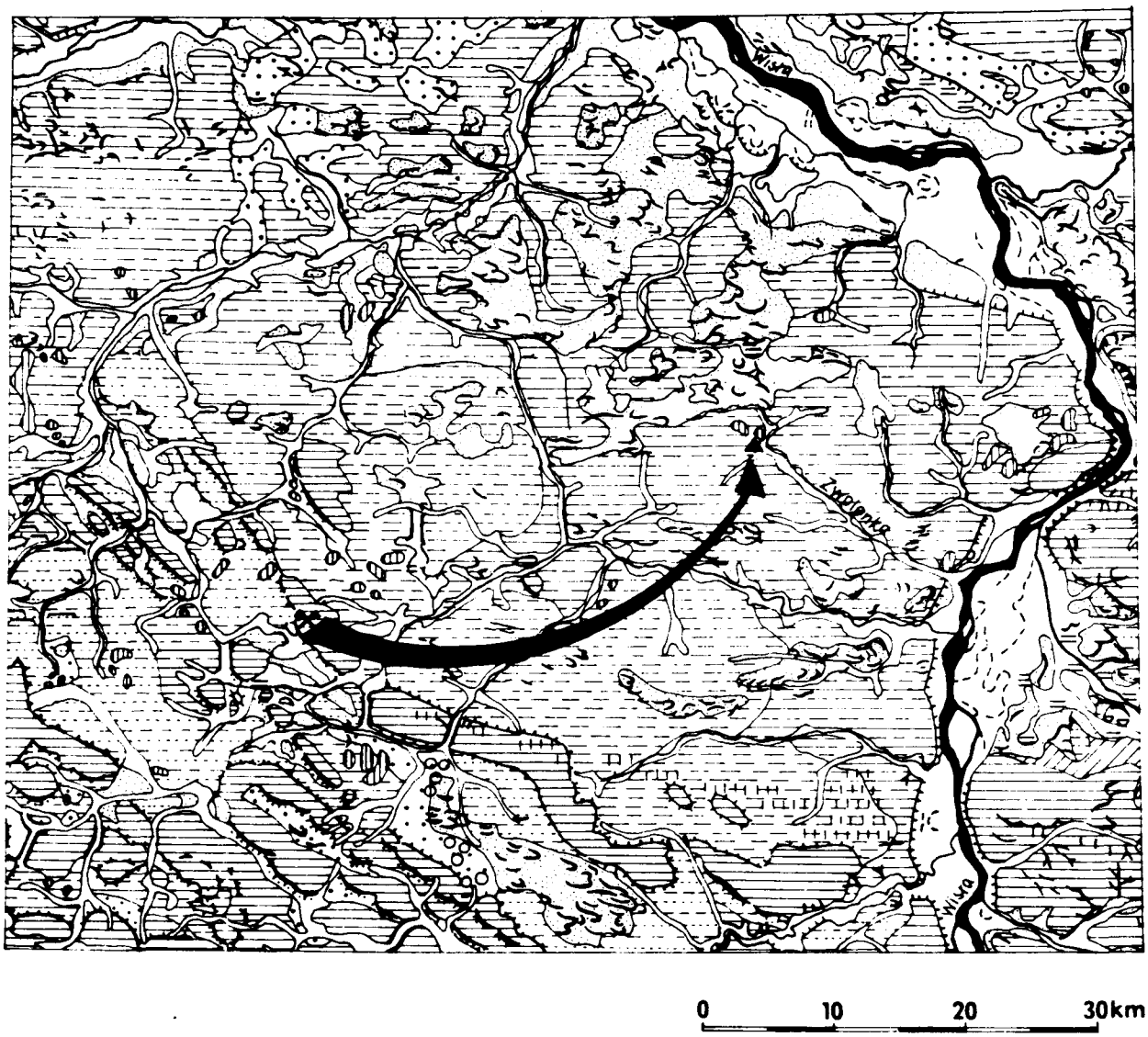

FIGURE 11

Source of the chocolate flint at Zwoleń.