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THE MIDDLE PLEISTOCENE SITE PŘIBICE I IN SOUTH MORAVIA (CZECHOSLOVAKIA)

The village of Přibice (District of Břeclav) is about 25 km south of Brno on the east bank of the River Jihlava. The site in question lies to the South-East of the village, on the eastern edge of an extensive plateau in the line of "Slanisko Hill", approximately on a level with the contours 200—205 m above sea level. The whole of this plateau forms the southern part of a morphologically distinctive terraced plain stretching southwards from Brno as far as the village of Ivaň, at a height of approx. 30 m above the present level of the rivers Svratka and Jihlava.

Pebble tools were scattered here over an area approx. 200×500 m, and were ploughed up together with alluvial gravel. In 1975—1976 an extensive gravel pit was opened up on the east slope of the plateau, and has now again been levelled and recultivated, destroying most of the site. But the exposure of the gravel pit made possible the geological observations made by A. Zeman and the collection of a sample of sandy soil for micromorphological classification by L. Smolíková. The sample was taken on the north-east edge, in a place where relict fossil soil about 40 cm thick had been preserved on fine windblown sands, covered by Holocene.

During numerous excursions to the site it was possible to establish the primary position of the pebble artefacts. In particular we were able to establish that the chipped pebbles lie on the terraced gravel and not in it. In the northern part of the exposed area a fair sized ploughed field had exposed the underlying gravel. We collected several artefacts here, while in the gravel layer itself, c. 2 m deep at this point, we found nothing. In the southern part of the exposed area, at a depth of 140 cm below the ploughing, on the surface of the fine sand there was preserved relict fossil soil about 40 cm thick, below which was a thin layer of gravel from which we obtained one trimmed pebble. In another place somewhat further west in this southern section there was fossil soil immediately below Holocene; on the surface there was a thin layer of gravel in the form of cryoturbations, where we found another artefact.

We can thus conclude that in the area described prehistoric hunters and gatherers lived on the exposed denuded surface of alluvial gravel.

THE EARLY PALAEOLITHIC PEBBLE TOOLS FROM PŘIBICE I

At the beginning of the forties, thanks to H. Breuil (Breuil and Zbyszewski, 1942, 1945), the attention of European archaeologist was turned to tools chipped from pebbles (particullarly quartzite and quartz) as evidence of the oldest inhabitants of continent. In 1952 K. Žebera published the first study in central Europe on pebble tools from Bohemia and later wrote other papers and books on them (Žebera, 1952, 1958, 1965, 1969).

For a long time similar finds in Moravia were unknown; at the beginning of the fifties, however, Václav Effenberger, an amateur working in cooperation with the Anthropos Institute of the Moravian Museum, collected stones which he considered to be artefacts in the region of his home at Přibice. Over

the years he found eight sites and gathered quite a number of indisputable artefacts. He gave his collection from the Přibice I site to the Regional Museum in Mikulov, the remainder to the Anthropos Institute of the Moravian Museum. With the consent of Dr. J. Unger from the Mikulov museum I published a preliminary report on the material there (Valoch, 1977), and we are now presenting a detailed study of the whole industry, together with geological and paleopedological evaluation.

The pebbles chosen for preparation were from the pleistocene alluvial accumulation. They are mostly light-coloured, white to yellowish quartz with a yellow-brown cortex, a small number being brown quartzite pebbles, volcanic rocks from the Brno massif and brown cretaceous and grey (jurassic?) hornstone. The chipped faces of quartz and quartzite artefacts usually reveal the original appearance of the rock, while the surfaces in the case of hornstones are usually covered with a thick layer of patina.

All edges and chipped faces are weathered and have a characteristic pockmarked surface. A lot of the objects which were found are not included in the list of artefacts; they were undoubtedly originally worked, but have weathered so intensively that their artificial character has been obliterated. The classified collection of artefacts consists of a collection of pebbles with demonstrably chipped faces and with a morphological pattern repeated in several examples.

For the typological classification of pebble tools we used the headings according to P. Biberson (1967) and his definitions of individual types as supplemented by J. Colina-Girard (1975), modified to suit the assemblage studied. There is a considerable number of pebbles in the collected material simply split laterally, obliquely or longitudinally; the angle between the split face and the surface of the pebble is usually very acute. Their artificiality is uncertain, and following Biberson (1967, FTA No. 34) we do not consider them intentionally manufactured artefacts.

DESCRIPTION AND CLASSIFICATION

Choppers and Chopping-Tools — Unifacial pebble tools (choppers) with a cutting-edge formed by a single flake scar at the narrower, distal end (FTA No. 35) *(Fig. 3:7,* Valoch 1977, *Fig. 2:3)*

< 10 cm	42 pieces
> 10 cm	2 pieces

Fig. 3:1. Chopper with a single transversal scar distally, but a number of small scars on the cutting-edge. *Fig. 3:3.* A similar chopper with a single oblique scar distally and small ones on the edge

< 10 cm	3 pieces
> 10 cm	9 pieces

Unifacial pebble tools (choppers) with a beaked cutting-edge formed by two flake scars, removed in one direction only from the natural untrimmed underface. They are morphologically similar to the "Nasenschaber" implements (Rust, 1971) *(Fig. 3:5)* (FTA No. 37, 38)

< 10 cm	12 pieces

Bifacial pebble tools (chopping tools) with bidirectional flaking of only two removals (FTA No. 43) (not illustrated)

< 10 cm	3 pieces
> 10 cm	1 piece

Bifacial pebble tools (chopping tools) with a sinuous cutting-edge produced by bidirectional, alternate flaking on the flat cobbles (similar to FTA No. 46, 47) *(Fig. 4:1)*

< 10 cm	13 pieces

Fig. 5:2. Atypical shape of similar pebble tool with alternate flaking on three faces of the pebble

< 10 cm	1 piece

Pebble tools with a cutting-edge formed by lateral flaking in the manner of burin-spalls; the cutting-edge is oriented vertically to the two flat faces of the pebble (burin-like chopping tools) *(Fig. 3:2)*

< 10 cm	22 pieces
> 10 cm	2 pieces

Bifacial pebble tools (chopping-tools) with a sinuous cutting-edge produced by bidirectional flaking (similar to FTA No. 49, 50) *(Fig. 4:2)*

< 10 cm	19 pieces
> 10 cm	1 piece

Pebble side-scrapers. Designated as pebble side-scrapers are unifacial pebble-tools with a more or less straight cutting-edge formed by repeated flaking in one direction and in addition visible signs of minor retouches.

Transversal straight and convex side-scrapers (not illustrated)

< 10 cm	45 pieces
> 10 cm	23 pieces

Oblique concave and convex side-scrapers (*Fig. 4:3,* 1977, *Fig. 2:1*)

< 10 cm	30 pieces
> 10 cm	1 piece

Straight, concave and convex lateral side-scrapers (*Fig. 3:4, 4:4,* 1977, *Fig. 2:2*)

< 10 cm	50 pieces
> 10 cm	4 pieces

Alternate double side-scraper. Atypical shape with dorsal-distal multiple flaking, cutting-edge with traces of wear, right-hand edge trimmed ventrally by flaking and wear *(Fig. 5:1)*

< 10 cm	1 piece

Double side-scraper trimmed on the two longitudinal edges by repeated flaking (not illustrated)

< 10 cm	1 piece

Epannelés. This group, which was defined by J. Colina-Girard (1975, pp. 75—79),

includes pebble implements one face of which is centripetally flaked; this face is usually convex, the opposite face being formed by the cortex of the pebble. The perimeter is not usually very sharp.

< 10 cm 4 pieces

Fig. 2:4. Typical épannelé, centripetally flaked.
Fig. 3:6. Épannelé flaked only bidirectionally.

Bifaçoide. Bifacial, usually centripetally trimmed pebbles, creating an implement which can be described as protobifaces (primitive hand-axe). Atypical, only partly bifacially flaked pebbles are described by J. Colina-Girard (1975, pp. 81 to 82) as bifaçoides. Only one artefact in our collection qualified as a bifaçoide *(Fig. 1:4).*

< 10 cm 1 piece

Cores. Pebbles flaked partly or completely, usually on several faces, from different directions. It appears that the purpose of these artefacts was not to obtain a sharp cutting-edge, but flakes.

< 10 cm 10 pieces

Fig. 1:2. Oblong fragment of brown chalk hornstone, from whose left-hand side a large, wide flake has been removed, as well as several narrow flakes on the dorsal side. The break face and the flat ventral face form a right-angle. The remainder of the dorsal side and the right-hand lateral face are formed by natural break surfaces. All flaked and break surfaces are patinated yellowish-white, the edges are slightly weathered aeolically.

Core trimmed partly bifacially from different directions; several larger flakes have been removed (1977, *Fig. 1:2*).

Flakes. Pebble chips, usually with cortex on at least part of the dorsal face; bulb of percussion often not discernable due to aeolian weathering.

Fig. 1:3. Dorsal left-hand side flaked off, cortex on right, position of bulb can be approximated ventrally.

Oval flake with cortex dorsally, ventrally visible bulb and scar; brownish-grey painted hornstone heavilly weathered aeolically (1977, *Fig. 1:1*).

Flake-tools. Flakes with trimmed edges, modified as tools, mostly side-scrapers.

13 pieces

Fig. 2:1. Denticulated side-scraper on the right-hand side of the flake; triangular cross-section, heavily weathered aeolically.

Fig. 2:2. Elongated flake with triangular cross-section clear bulb, partly trimmed flat on the ventral side; reminiscent of Middle Paleolithic Quinson point. Cretaceous hornstone with greyish-white patination.

Fig. 2:3. Transversal convex side-scraper on a large flake, bulb discernable ventrally.

Hammer-stones. Pebbles with numerous percussion scars at one end *(Fig. 1:1).*

< 10 cm 10 pieces
> 10 cm 1 piece

CONCLUSION

The high proportion of pebble side-scrapers in this assemblage is an interesting feature of their typology. These are in fact unifacial pebble-tools (choppers) with a carefully trimmed straight-edge formed by several flake scars. Together with simple choppers these form the heavilly dominant element in the collection (64.45 %). Burin-like chopping tools are an interesting type, which are clearly artificial from the fact that there are 22 pebbles trimmed in the same way. This type was not recorded by P. Biberson or by J. Colina-Girard, nor is it mentioned by Mrs. M. D. Leakey (1971) in the Olduvai region. The small number of épannelés and the single bifaçoide may perhaps indicate that the artefacts are relatively early in date. The flake tools are almost entirely confined to various variants of side-scrapers. The presence of cores, flakes, and especially of well-worn hammer-stones completes the assemblage and confirms their artificial origin. Also worth noting is the choice of stones up to 10 cm in length, since larger ones form only 12.72 %.

Thus we have a fairly large collection of stone implements from the site Přibice I, mostly in quartz, heavily weathered by the wind, belonging to the Early Palaeolithic pebble-tool industries, which can be designated Bohemian according to K. Žebera. As far as can be judged from our observations, their position was linked with the denuded surface of a gravel accumulation, which aeolian sands were preserved in places together with disturbed relicts of ferreto-type soil (according to L. Smolíková). We can presume that men frequented the area around the river, where their prospects of obtaining food were best. This could only have been in the period when this plateau was already dry land and the river was cut at a lower level. According to A. Zeman it can be supposed that the surface of this plateau was formed during the Mindel period, which is also probably the date attributable to the traces of human inhabitation.

Interest in pebble artefacts has spread throughout Europe during recent years, and today they are known in many lands. A review of the oldest industries of Europe was presented in the lectures at the Colloque VIII of the IXth International Congress of the U.I.S.P.P. in Nice in 1976 (Valoch, ed., 1976); the pebble industries of France are summarized by many authors in the work La Préhistoire Française (Lumley, ed., 1976), and finally, a significant summary of European sites, together with new Spanish sites, was published by F. Bordes and Cl. Thibault (1977). Finds which are stratified, fauna-dated, or dated by palaeopedology, radiometrics or palaeomagnetism in particular show that there were people in Europe probably as

far back as 1.5 million years (Šandalja I in Jugoslavia, Chilhac in France, El Aculadero in Spain), in the Late Villafrachian period. The Mediterranean region of Europe seems to have been the first to be occupied. We now have evidence of the presence of man in Czechoslovakia from the Cromer period (Přezletice, Suchdol, Bečov in Bohemia, Stránská skála in Moravia), which is now considered to have been a long period consisting of three forest and two steppe phases.

In the subsequent periods of the Middle Pleistocene (the Mindel and the Holstein), pebble industries still survive in Europe, though in various areas there is the uneven development of the Clactonian (in the North of Europe: S. England, N. France, Belgium, Germany, but also Italy) and the Acheulian (in W. Europe: Abbeville, Kent's Cavern, Terra Amata), and the continuation of the pebble tradition in other places (the Bohemian in Bohemia and Moravia).

K. Valoch

THE GENESIS AND STRATIGRAPHICAL SIGNIFICANCE OF THE FERRETO-TYPE RELICT SOIL AT PŘIBICE.

Ferreto-type soils, best known from the circumalpine region (cf. O. Fränzle 1965), have been observed by many authors from many different standpoints (for bibliography see L. Smolíková 1974).

In Czechoslovakia they occur especially in the Dyje-Svratka Graben, where they are bound to the surface of the Vth gravel-sand level (the so-called Tuřany terrace). Preliminary investigations have been carried out on the profiles of these soils in, e.g. Hodonice, Božice, Drnholec, Bratčice, Žabčice, Brněnské Ivanovice, Litobratčice, Černovice, etc., where they occur either in the form of relict or of fossil soils. In view of the intensive degree of weathering and prime stratigraphical importance, it is essential to register and progressively evaluate individual occurences, in order to use the material obtained for valuable paleopedological, paleogeographical, etc. deductions.

It was for this reason, and because of the fact that the Přibice relict of this soil contains an important industry, that careful attention was paid to the establishment of this profile. In addition, recent years have brought significant results from a correlation of archaeological and soil-micromorphological reseach (L. Smolíková 1978).

I should like sincerely to thank Dr. K. Valoch, of the Moravian Museum, Brno for making avilable undisturbed samples of material for soil-micromorphology.

1. MICROMORPHOLOGICAL CHARACTERISTICS

Three undisturbed samples were taken from the torso of relict soil under investigation for micromorphological purposes, and studied accordingly; these were from the surface (Sample 1), from the centre (Sample 2) and from the base (Sample 3).

Sample 1: The primary components are mainly grains of quartz and fragments of quartzite, to a lesser extent of quartz gneisses and silicified sandstones; there are small amounts of muscovite, biotite and plagioclase. The granularity of all this solid soil substance corresponds to medium to coarse sand and fine gravel. All grains and fragments have a narrow border of braunlehm plasma; this plasma form is brown in colour and shows slight birefringence under crossed nicols. Since the individual grains and fragments are large and more or less regular, the interspaces are also large and regular. In spite of the high proportion of free space, together with the composition and size of the soil skeleton, and thus their interrelation, the structure cannot be described as granular, but has a structure of cemented grains. More precisely, therefore, this is a case of a stiffened granular structure, where the stiffening is brought about by braunlehm plasma as mentioned. The spaces between the primary components, finely bordered by optically oriented clay, are all completely empty. Occasional large braunlehm concretions are preserved in the soil material. In thin sections it is not possible to find any trace of the activity of soil organisms or a humus component.

Note: The observed grains of plagioclases must be attributed to the allochtonic component, a fact confirmed by some of them (the older generation) being heavily disturbed and pervaded by braunlehm plasma, while the new ones (the younger generation) are completely without plasmatic borders and are the only solid soil components to be so.

Sample 2: The primary composition is mineralogically, petrologically and mechanically similar to that of the overlying bed, the only difference being the presence of a certain amount of dark minerals; the components are heavily displaced on the break surfaces, or even completely disturbed and pervaded by the clay component. Sporadically determined plagioclases are also either heavily disturbed, or, in the case of new grains, without coatings of optically oriented clay (allochtonic supply).

All primary elements are strongly bordered by branulehm plasma. It is brownish-orange in colour, still shows sings of a distinct fluidal texture and parallely arranged accretion zones. In these plasmatic parts numerous hairline fissures can be observed *(Plate III, Fig. 1)*. Some plasmatic parts are distinctly granulated (on the periphery of the borders there are tiny dark granules in the orange matrix formed by flocculated hydroxides of iron); in places the granulation changes to fine earthification (the granulated parts are completely separated from the original peptized hairline fissures and grouped into lumpy aggregates). The braunlehm plasma, affected by granulation and earthification caused by secondary changes, is optically inactive and brown to dark brown in colour *(Plate III, Fig. 2)*.

PLATE I, FIG. 1.
Přibice 1.
View on the site.
Photo by K. Valoch.

PLATE I, FIG. 2.
Přibice 1.
Fossil soil relict with cryoturbated gravels immediately below the Holocene.
Photo by K. Valoch.

PLATE II, FIG. 1.
Přibice 1.
Fossil soil relict with gravels in fine sand.
Photo by K. Valoch.

PLATE II, FIG. 2.
Přibice 1.
The Miocene gravels and limestone sandy clays.
Photo by K. Valoch.

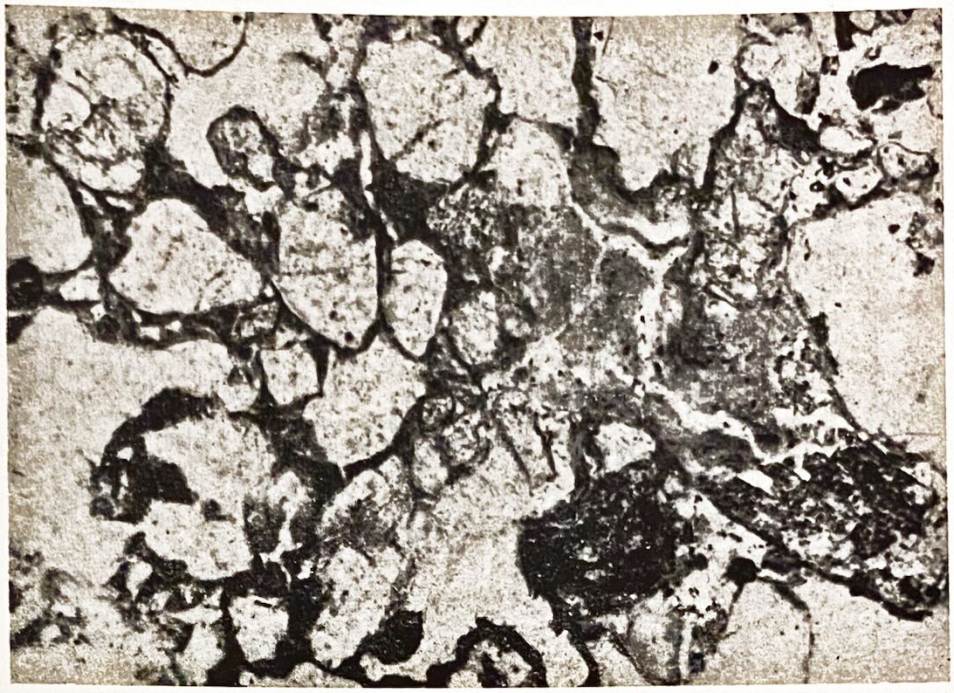

PLATE III, FIG. 1.
Fluidal textures observed in braunlehm plasma filling the free spaces between mineral grains and rock fragments.
At the bottom of the picture fine manganolimonite coatings.
Sample 2. ×20.
Microphotography by L. Smolíková.

PLATE III, FIG. 2.
Earthified braunlehm plasma, separated from the surrounding plasma parts by hairlines fissures; it is dark in colour and optically inactive.
Sample 2. ×20.
Microphotography by L. Smolíková.

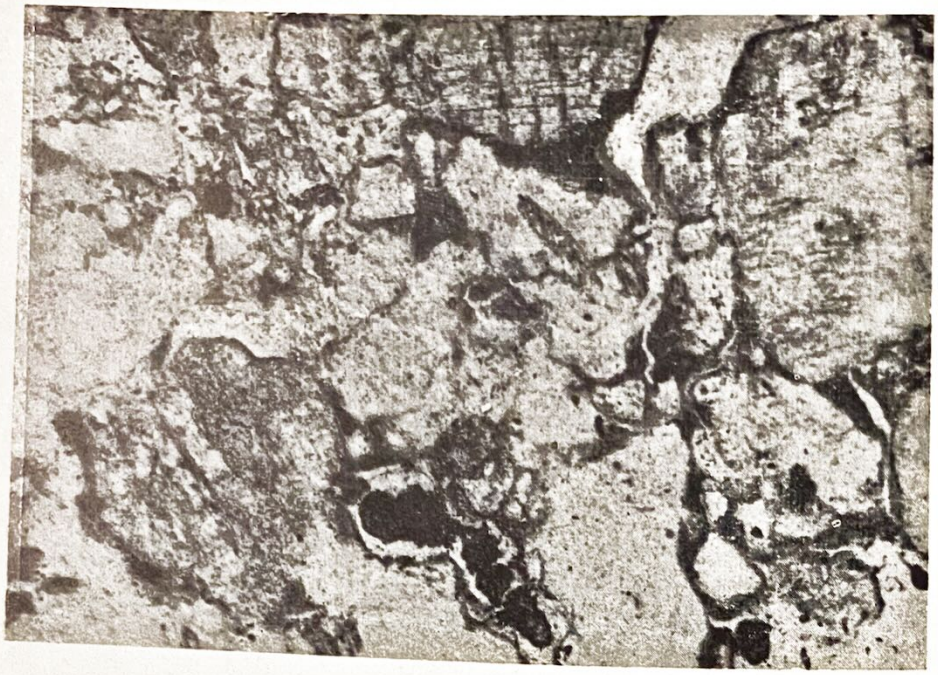

PLATE IV, FIG. 1.
Outstanding fluidal texture and fine granulation in braunlehm plasma (right), traces of secondary pseudogleying (bottom centre).
Sample 3. ×*20.*
Microphotography by L. Smolíková.

PLATE IV, FIG. 2.
Braunlehm concretion, enclosing silicate grains (right).
Sample 3. ×*8.*
Microphotography by L. Smolíková.

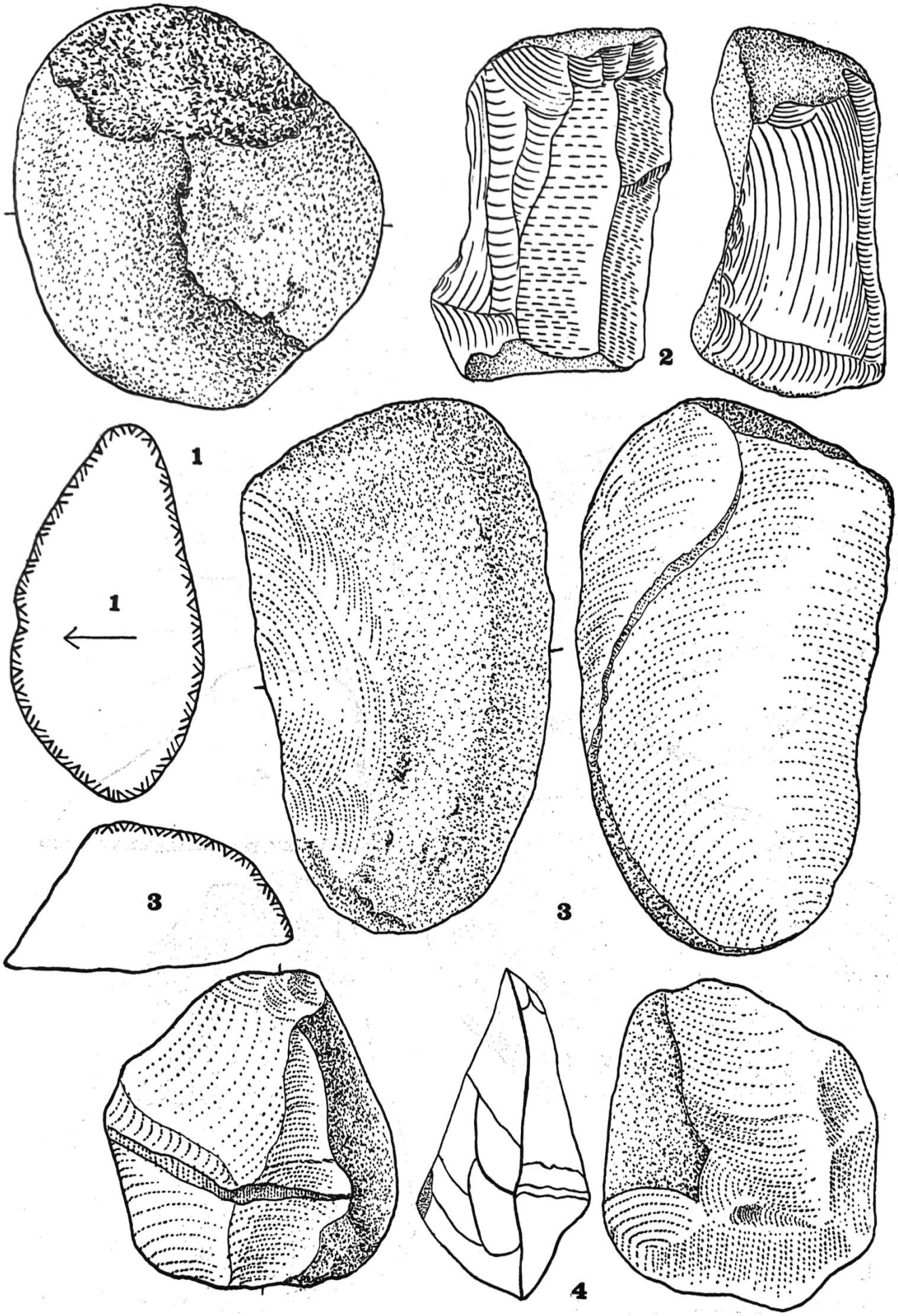

FIG. 1. *Přibice I. Pebble-tools. — Nat. size 1/1.*

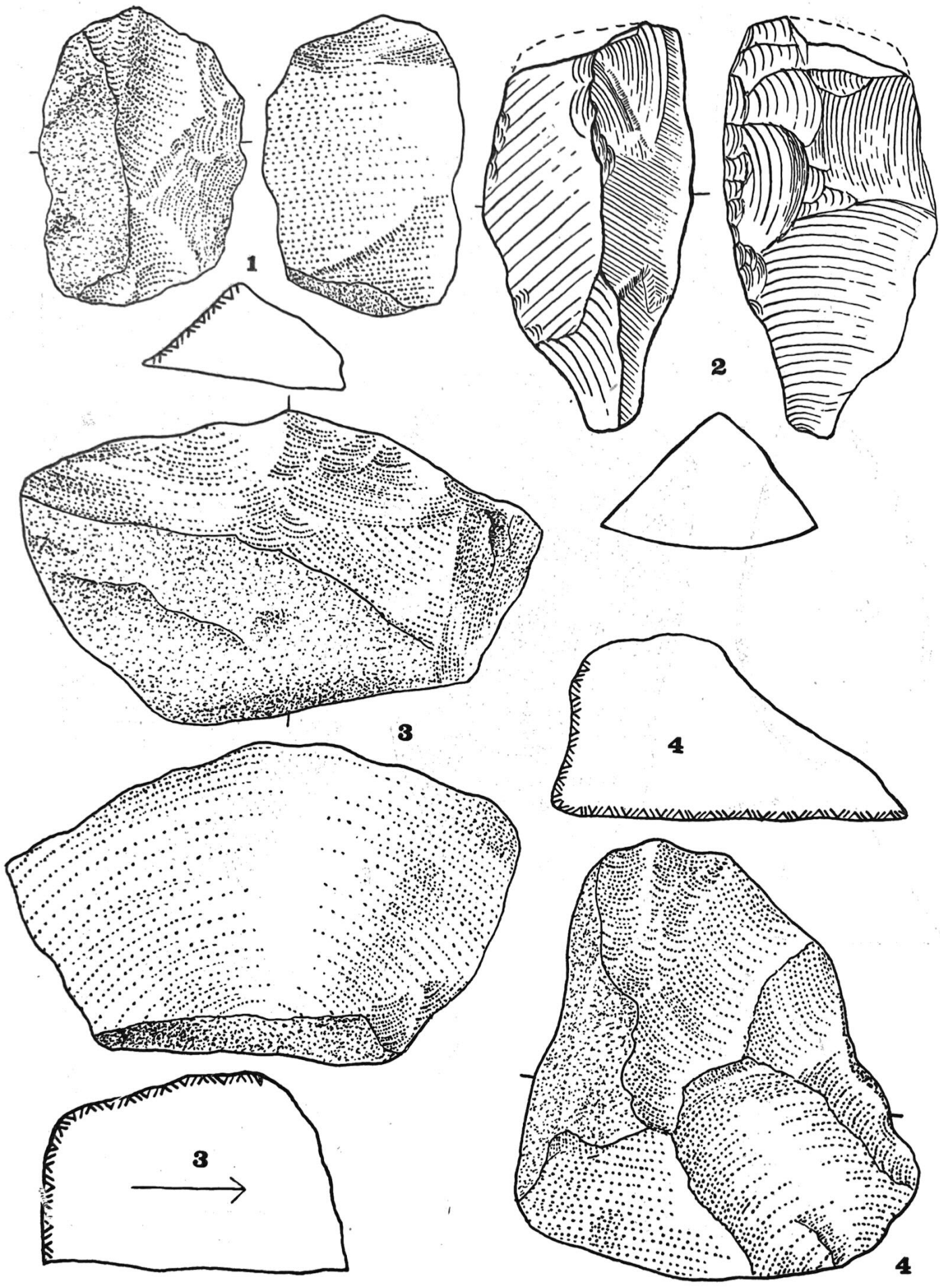

FIG. 2.

Přibice I. Pebble-tools. — Nat. size 1/1.

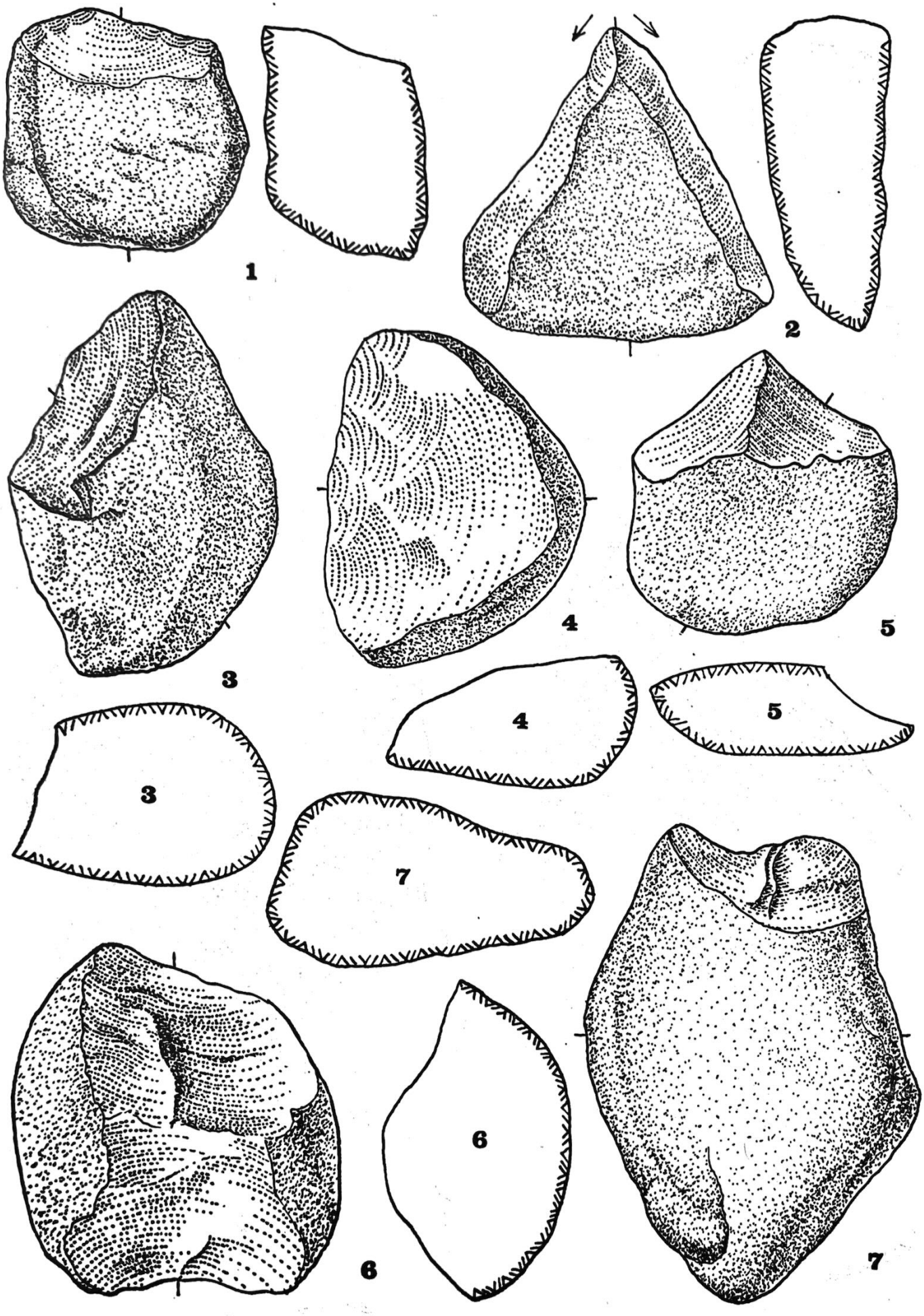

FIG. 3. *Přibice I. Pebble-tools. — Nat. size 1/1.*

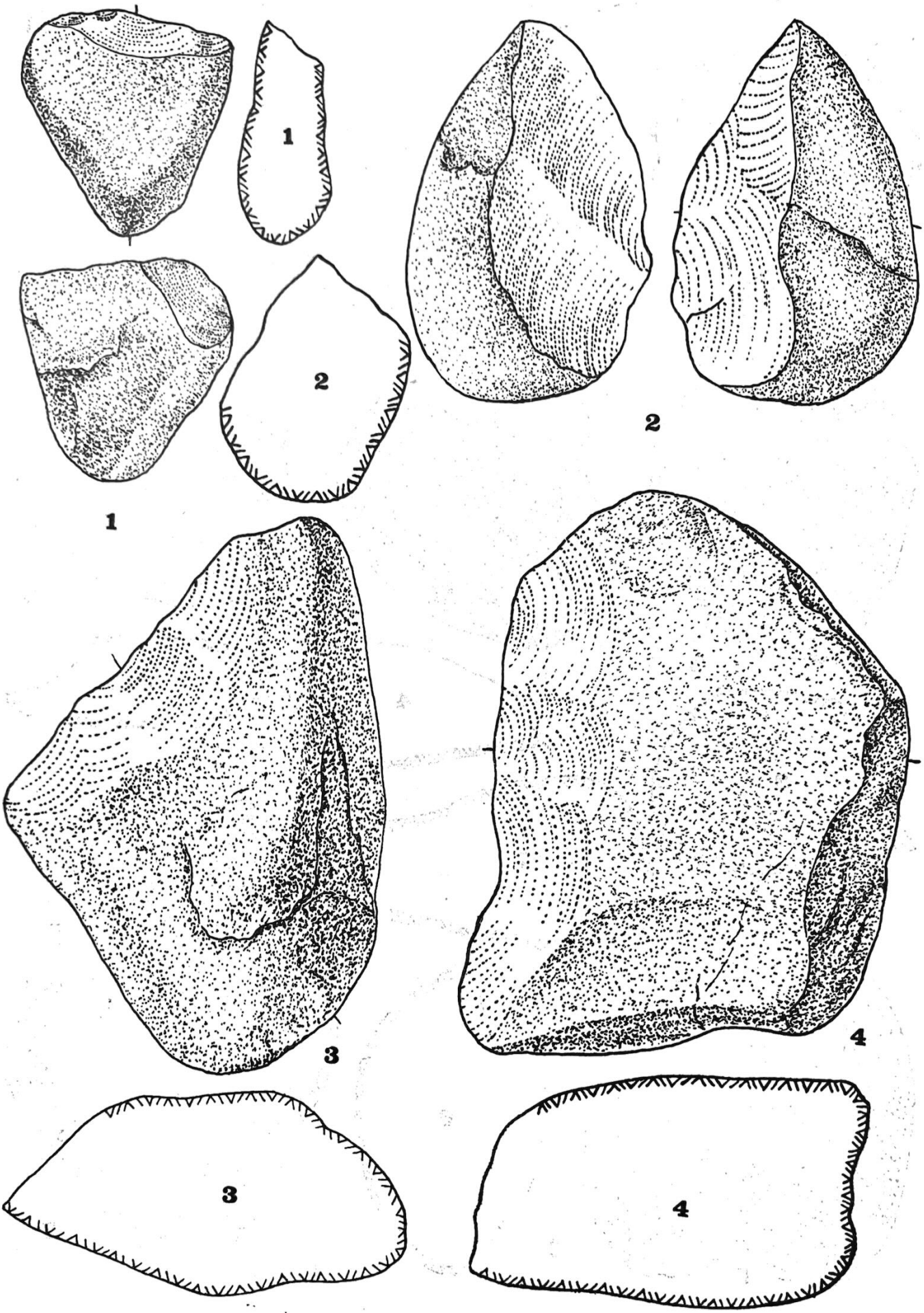

FIG. 4.

Přibice I. Pebble-tools. — Nat. size 1/1.

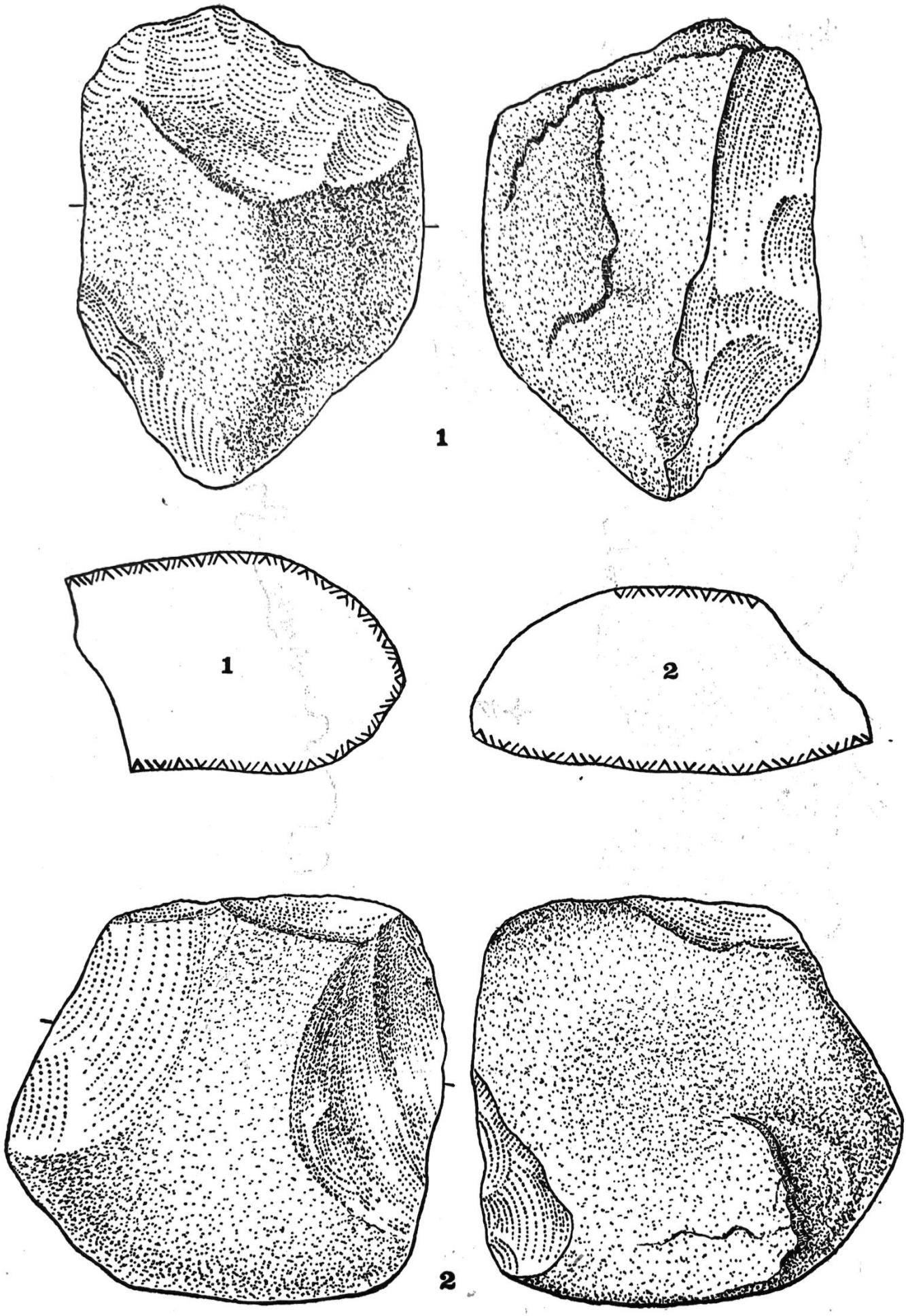

FIG. 5. *Přibice I. Pebble-tools. — Nat. size 1/1.*

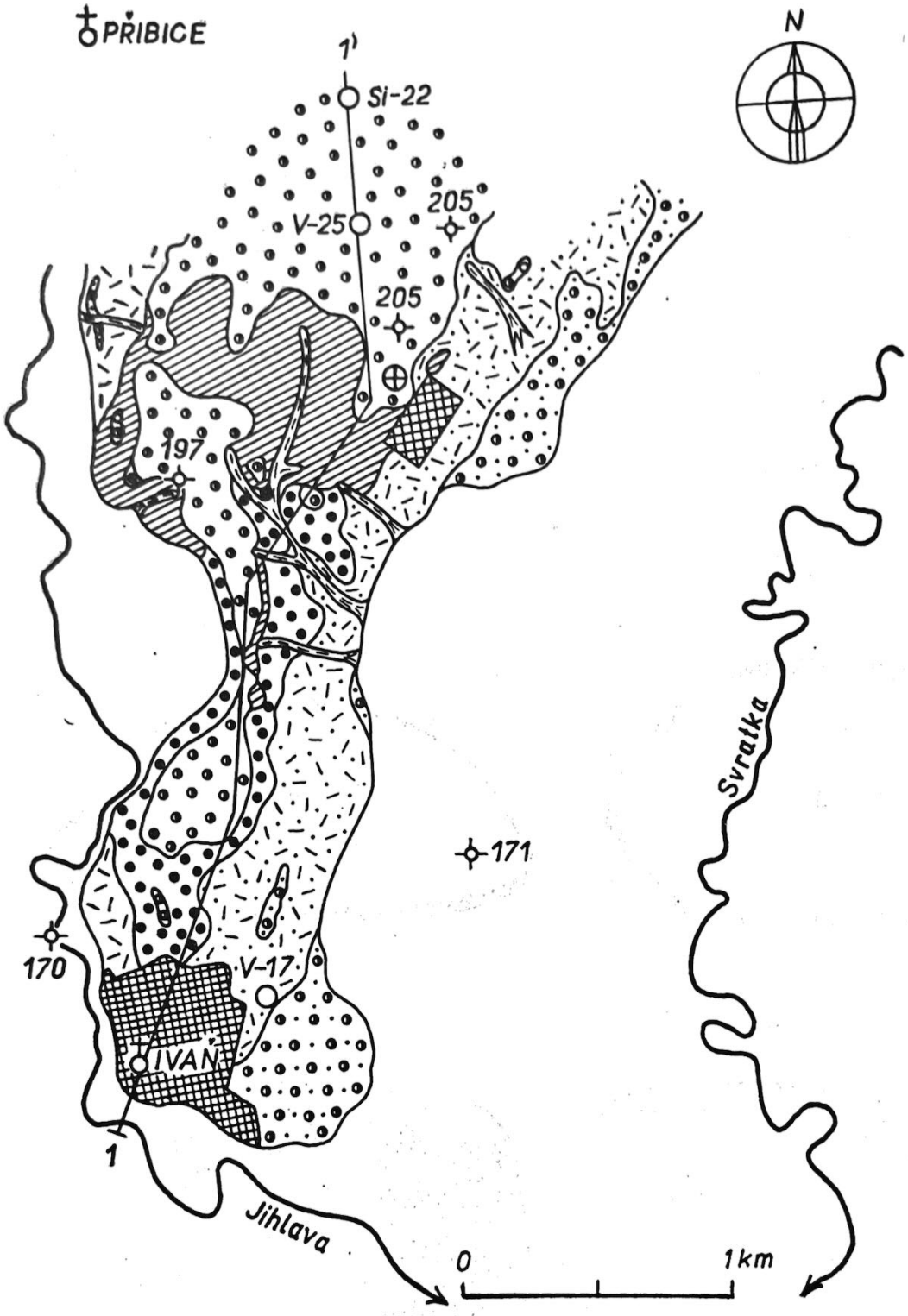

FIG. 6

FIG. 6 & 7.

1 — calcareous sandy clays, 2 — gravel formed mainly of sandstone, calcareous sandstone and limestone pebbles (1–2 Miocene, Baden), 3 — fluvial sandy gravels, younger gravel and sand cover (in older publications K. Zapletal's B-Terrace), Günz, 4 — fluvial gravels and sandy gravels of Mindel sandy gravel terrace, 5 — fluvial sandy gravels of unstratified Riss terraces, 6 — slope loams, 7 — deluvioaeolian sediments (irregular alternation of slope sediments, loess and windblown sands), (6–7 Pleistocene unstratified), 8 — deluviofluvial sediments Holocene humous clay and sand washrain with an admixture of gravel from disturbed fluvial accumulations), 9 — flood deposits on the flood-plain of the rivers Jihlava and Svratka, 10 — made-up grounds, 11 — the Paleolithic site, 12 — boreholes, 13 — elevation points, 14 — direction of profil line, 15 — deflection of profil line.

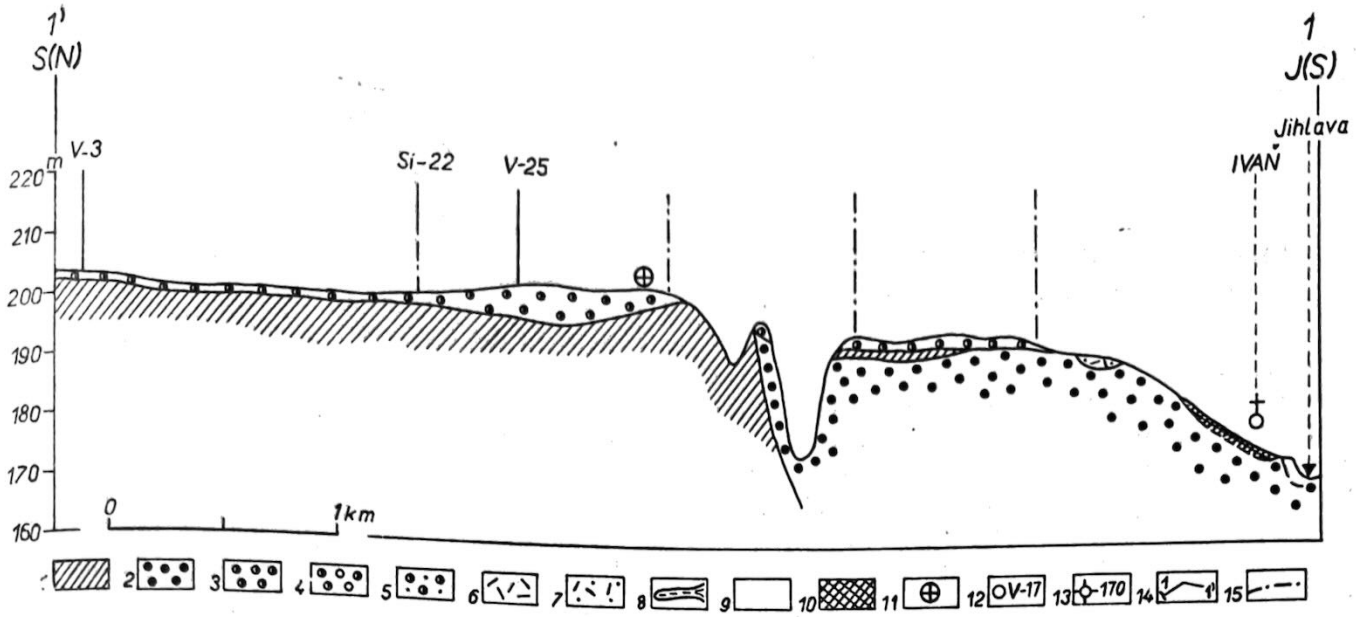

FIG. 7

A substantially larger amount of braunlehm plasma is preserved here compared with the surface parts, concentrated in coatings of mineral grains and rock fragments, but in places filling the whole space between them. It is this that makes the composition considerably denser than that of the overlying bed.

The coatings formed by braunlehm plasma are themselves often finely bordered by dark coloured manganolimonite. The soil material contains large braunlehm concretions. No traces of the activity of soil fauna were found.

Sample 3: The mineralogical, petrological and mechanical composition of the soil skeleton and microskeleton is again similar to that of samples 1 and 2; the rock fragments are, however, more heavily corroded. All these primary components are thickly bordered with braunlehm plasma, which is orange in colour, strongly birefringent, pervaded by hairline cracks and with a definitely fluidal texture in places *(Plate IV, Fig. 1)*. Near the surface of these borders it is also possible to observe fine granulation, changing in places to slight earthification. The flocculated sections are divided from the peptized plasmatic matrix by narrow interstices. Earthification has affected only the coating zones, so that it does not reveal the mineral grains and rock fragments. The soil material contains numerous braunlehm concretions of large dimensions; their colouration is rusty to dark brown, they have smooth circular or elliptical outlines, and contain numerous small silicate grains *(Plate IV, Fig. 2)*. Secondary pseudogleying is intensive here and is indicated both by the presence of pseudogley concretions and by manganolimonite coatings. The pseudogley concretions are irregularly distributed throughout the soil material, have irregular radiate outlines, rusty brown colouration, and the soil material on their edges is somewhat bleached. Brown-black manganolimonite coatings are attached to the periphery of the borders formed by braunlehm plasma, both in the peptized and the flocculated form. This fact and that of the manganolimonite filling the small interstices within the plasmatic part indicate that pseudogleying took place here not only after the end of the development of this soil, but also after subsequent granulation and earthification processes, and therefore corresponds to one of the later damp climate oscillations.

On the basis of these micromorphological qualities and of a comparison with equivalent soils in the territory in question, the soil can be typologically defined as lightly granulated to slightly earthified ferreto with indications of secondary pseudogleying.

2. STRATIGRAPHICAL EVALUATION

From the circumstance that the substrate probably belongs to the Günz, and from a correlation with analogous occurrences in the same area, it follows that this ferreto-type soil was formed during one of the warm periods of the Cromer interglacial (G/M).

After reaching its climax stadium (maximal release of clay in the form of braunlehm plasma, formation of large braunlehm concretions, etc.), it was slightly granulated and earthified (drying and slight cooling) and subsequently affected by pseudogleying (damp oscillation in the closing stages of the interglacial). In the later phases of the climatic cycle it was gradually subjected to heavy mechanical destruction and apparently slightly enriched at a considerably later date by the products of new sedimentation (increment of allochtonic component demonstrated by the presence of at least two generations of plagioclases).

Since there is no clear knowledge of ferreto-type soils from the younger warm periods, similarly as with terra rossa type soils or braunlehm, one is justified in assuming that the formation of these "red soils" falls within the paleopedologically im-

portant period of the transition from Early to Middle Pleistocene, or earlier. In the case of the relict torso of ferreto-type soil at Přibice, the bottom limit can be put on the time of origin by the known age of the substrate. *L. Smolíková*

THE GEOLOGY OF THE IMMEDIATE VICINITY OF THE SITE PŘIBICE I

The site is in the central part of the Dyje-Svratka Graben, on the south-east edge of the Carpathian foredeep, north-east of Ivaň. It lies on a headland which protrudes into the confluence of the Rivers Jihlava and Svratka. From a geological point of view it is formed by Miocene gravels and limestone sandy clays. These strata probably belong stratigraphically to the Baden (classified on the basis of the geological general map of Brno, J. Kalášek et al. 1963). The quaternary sediments (see map) are represented by fluvial sands and gravels, deluvioaeolian and deluviofluvial sediments. In areas affected by intensive human activity there are made-up ground.

THE GEOLOGICAL POSITION OF THE SITE

Of the quaternary sediments the most important for judging the age of the Paleolithic site is the gravel and sand cover (Syrovice-Ivaň terrace, see H. Seichterová, J. Demek 1963, J. Linhart 1960, K. Zapletal's B-terrace, 1927), lying in the denudation relicts on the surface of a headland projecting towards Ivaň. The maximum depth of the fluvial sandy gravel is on the site at bore V —25, 5.8 m. The base of the fluvial accumulation is at a mean distance of 30 m above the River Jihlava and 29 m above the River Svratka. The average size of pebbles is from 8 to 14 cm. Maximum 25 cm pebbles were found on the northern of Ivaň. They are characteristic of the filling of throughs cut in the younger gravel and sand cover. Such throughs are known on the Rivers Dyje and Svitava also. From a lithological point of view the pebbles are formed of quartz, quartzite, silicides, brownish-yellow and dark grey hornstones. There are smaller amounts of crystalline slate, light igneous rocks, greywacke, and sandstones. Limestones appear as accessories. (The association of heavy minerals, expressed in percentages, is as follows: amphiboles 35.4 %, anatas 0.5 %, andalusite 0.8 %, the epidote group 0.5 %, garnets 27.8 %, rutile 5,1 %, sillimanite 1.2 %, staurolite 1.2 %, turmaline 0.5 %, zircon 26.0 %, disthene 1.0 %, accessories: monazite, apatite, olivine; per 100 grains c.: invert minerals 15, leukoxene 2). Characteristic of the association of heavy minerals in the younger sand and gravel cover was a higher content of rutile and zircon, which are present in the younger fluvial accumulations and terraces mostly as accessories.

To the North and North-West of Ivaň and Přibice the depth of the younger sand and gravel cover increases to 10—20 m, so that its surface lies 40 to 45 m above the rivers. In the broader vicinity of the site ferretos occur on the surface of this fluvial accumulation in various degrees of preservation. The thickness of the soil horizon exceeds 2 m in places, including the underlying carbonate horizon. Strong reddish-brown colouration of the original substrate is typical of this soil type, together with the weathering of most of the pebbles. The less weatherproof rocks disintegrate to sand in this soil profile. In the basal part of ferreto there is usually a fawn to beige coloured carbonate horizon. It is further apparent from survey in the broad vicinity (A. Zeman 1974a, A. Zeman et al. 1977) that the younger gravel and sand cover consists of 4—5 strata, separated by fossil soils and thin layers of sandy clay. This means that the gravel and sand cover originated in the course of several sedimentation periods. This makes correct stratigraphical attribution very difficult. It follows from stratigraphical research based on paleontological finds from the Brno vicinity that most of the younger gravel and sand cover is from the Early Pleistocene. According to Z. Jaroš and K. Zapletal (1928) the debris cone on the edge of Stránská skála lies on the B-terrace. Further evidence of the B-terrace belonging to the Early Pleistocene is provided by K. Zapletal (1934). R. Musil (1965) confirms Jaroš and Zapletal's 1928 view that the debris cone on the periphery of Stránská skála has a B-terrace substrate — younger gravel and sand cover. On the basis of a study of older publications on this problem, his own research and correlations with the broader vicinity, A. Zeman (1974b) inclines towards this view also. The surface of the younger gravel and sand cover was lowered during the Middle and Late Pleistocene by many successive deflations, solifluctions and wash-rain. During these processes the ferretos were removed from the surface of the younger gravel and sand cover on most of the territory. We may assume from the relation of our site to the territory, where the surface of the fluvial accumulation was reduced only minimally after the end of sedimentation, that the surface of the younger gravel and sand cover was, in the Přibice area which we are interested in, denuded by 2—8 m. There appeared on the surface stone paving 20—30 cm thick, formed mostly by pebbles of quartz, quartz gneiss, quartzite and silicides. The uneven surface is levelled in places with thin layers of wind-blown sand. The surface of the quartz pebbles in the stone pavement is characterized by a light brownish-yellow patina. In this zone mechanically heavily disturbed ferreto relicts were preserved, with a carbonate horizon in places.

The advanced degree of denudation on the surface of the younger gravel and sand cover on the Přibice I site is shown by the accompanying geological map and profile. It shows that the place where the paleolithic tools were found lies on the denudation relict of an Early Pleistocene fluvial accumulation. From its relation to the relicts of Mindel and Riss terraces on the headland near Ivaň

and the finds of ferreto relicts we can conclude that the surface on which the site itself lies was formed in the course of the Mindel.

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