ARCHEOLOGICKÝ ÚSTAV AKADEMIE VĚD ČESKÉ REPUBLIKY
V BRNĚ

PŘEHLED VÝZKUMŮ
40 (1997-1998)

ISSN 1211-7250
ISBN 80-86023-18-4

BRNO 1999

PŘEHLED VÝZKUMŮ 40 (1997-1998)

Vydává:	Archeologický ústav AV ČR Brno Královopolská 147, 612 00 Brno E-mail: ps@isibrno.cz
Odpovědný redaktor:	PhDr. Jaroslav Tejral, DrSc
Redakce a příprava pro tisk:	Mgr. Balázs Komoróczy, Ing. Petr Škrdla, Richard Zatloukal
Na titulním listě:	Mikulčice - sídliště na "Klášteřisku"
Tisk:	BEKROS
Náklad:	350 ks

Publikace neprošla redakční ani jazykovou úpravou

THE EEMIAN LITHIC ASSEMBLAGES FROM PŘEDMOSTÍ II. TECHNICAL BEHAVIOURS FROM A MIDDLE PALAEOLITHIC MICROLITHIC INDUSTRY

EEMSKÉ KAMENNÉ INDUSTRIE Z PŘEDMOSTÍ II. TECHNOLOGICKÁ CHOVÁNÍ NA PŘÍKLADĚ STŘEDOPALEOLITICKÉ MIKROLITICKÉ INDUSTRIE

Marie-Hélène Moncel, CNRS, Institut de Paléontologie Humaine, Paris

INTRODUCTION

The artefacts from the deepest layers at Předmostí II date to the Eemian and belong, by their size, to a microlithic complex. This complex is also present at a few sites in Central Europe from the same age and in travertines: Taubach and Weimar in Germany; Gánovce, Bojnice III, Kůlna (couche 11), Hôrka, Tata, from Czech Republic, Slovakia, and Hungary in the Carpathic basin (Vertes *et al.*, 1964; Gábori-Csánk, 1968; Valoch, 1967, 1977, 1984, 1996; Kaminská *et al.*, 1993). This raises the question of an intentional collection of small pebbles during forest conditions. However, it is likely that pebbles of any size were available during temperate phases, even in a dense forest context. Observations made on the Předmostí II assemblages suggest a special technical behaviour adapted to small pebbles.

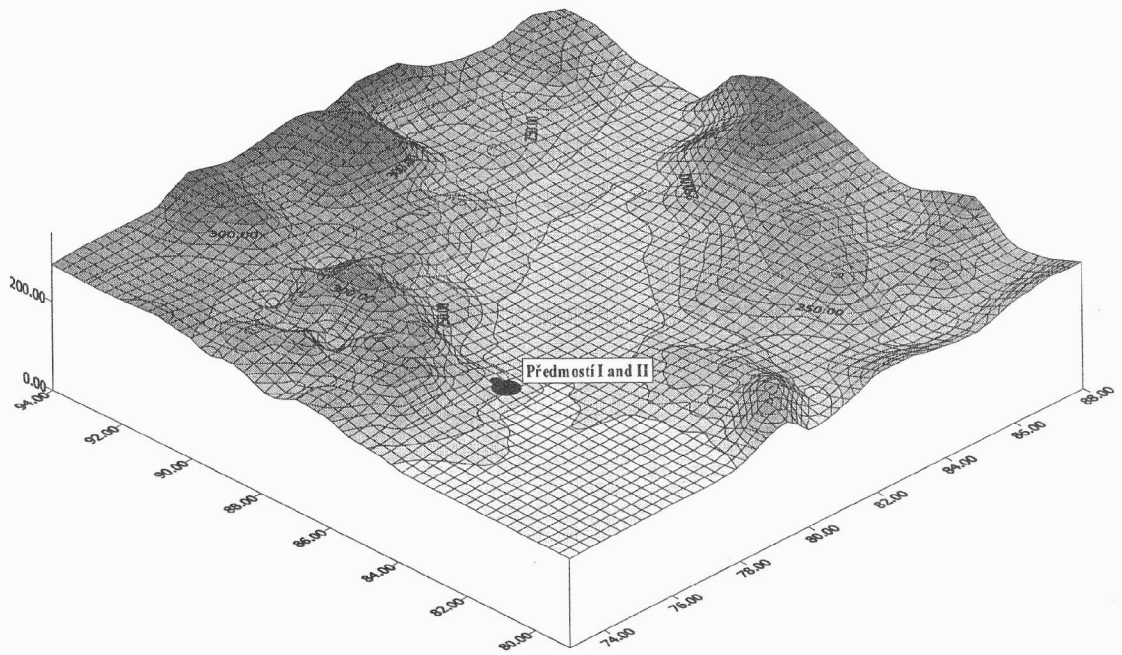

Fig.1 Geomorphological position of Předmostí in relationship to the southern entrance of the Moravian Gate. After P. Škrdla and M. Lukáš.

PŘEDMOSTÍ II

This site has been known for its Gravettian layers since the end of the last century (Absolon et Klíma, 1977; Svoboda, 1991, 1994; Svoboda *et al.*, 1994; Svoboda *et al.*, 1996). New excavations from 1989 to 1992 concentrated on zone II and discovered two Middle Palaeolithic layers (Svoboda, 1991, 1994; Svoboda *et al.*, 1994).

Three sedimentary units are present :

-lower unit (layers 12 and 11): loess from the Saalian phase, without archaeological remains.

-middle unit (layers 10 to 5): Eemian soil with a brown-red level and a black level (Tchernoziom) at the top. Middle Palaeolithic artefacts have been collected in the brown-red level and black lenses in the top of the sequence (level 9 at the bottom, level 8 above).

-upper unit (layers 4 to 2) : Weichselian loess with Gravettian layers in the upper part of the sequence.

By TL and ISRL dating, the age of the Middle Palaeolithic layers is probably older than 90 000 BP (Frechen *in* Svoboda *et al.*, 1996). Palynological studies show an interglacial stage for the middle unit (*Abies alba*, cf. *Betula*, cf. *Fraxinus*, *Pinus sp.*, *Tilia sp.*) with large forests (Svobodova *in* Svoboda *et al.*, 1996).

MIDDLE PALAEOLITHIC LITHIC ASSEMBLAGES (excavations 1989-1992, levels 9 and 8)

Table I : Lithic assemblages of the Eemian layers from Předmostí II (excavations Svoboda, 1989-1992)

	level 9 (lower)	**level 8** (upper)
whole globular pebbles	34	19
flat pebbles	22	4
quartzite		
broken pebbles	11	12
flakes	42	50
pebble tools	4	4
cores	-	5

quartz		
broken pebbles	16	9
flakes	88	173
cores	10	9
pebble tools	6	2

flint and radiolarite		
broken pebbles	6	4
flakes	18	24
cores	7	2
pebble tools	1	-
TOTAL	**265**	**335**

Raw materials and hypothesis on collecting zones

In the two assemblages, humans were collecting pebbles from the Bečva river near the site (Svoboda *et al.*, 1996). Due to recent human disturbance of the deposits, it is difficult to establish whether this was a real choice of the pebbles or an opportunistic collection. The most frequent rocks are quartz, then quartzite and some flint and radiolarite or other kinds of stones of the same family (Svoboda *et al.*, 1996). As time progressed, flint and radiolarite (good quality stones) seem to have been less used, to the benefit of the quartz and quartzite portion of the assemblage (Table II).

Table II: Raw materials of the lithic assemblages from Eemian Předmostí II. Excavations 1989-1992 (Svoboda, 1996).

	level 9	**level 8**
quartz	118-49,2%	201-48%
quartzite	28-11,6%	48-14,5%
flint	21-8,7%	19-5,7%
radiolarite	9-3,8%	9-2,7%
others	64-26,7%	55-16,6%

Technical behaviour and tools in layers 9 and 8

- Whole pebbles in quartz and quartzite : hammers or raw material stocks ?

* Globular pebbles

Thirty-six whole pebbles belong to layer 9 and fifteen to layer 8. They have an oval morphology in the great majority and are thick, except for two pebbles from layer 9 (one irregular pebble and a long oval-rectangular pebble). Quartzite is the most frequent in level 9 (27 in quartzite and 9 in quartz). In level 8, 8 pebbles are in quartz and 7 in quartzite.

Two size groups can be distinguished :

-small size : less than 30-40 mm, long and oval, 20 pieces in quartzite in level 9, 4 in level 8 (a natural import is not probable).

-big size : 80-90 mm long, 20-90 mm large, 12-35 mm thick, 14 pieces in level 9 (both quartz and quartzite) and 11 in level 8.

The quartz pebbles are bigger. Only one of them shows percussion marks.

The two assemblages show a size variability in the pebbles supply, especially in the case of quartz and quartzite. In level 8, the whole pebbles seem to be more homogeneous than in level 9. The quartzite pebbles are the smallest and the largest pebbles.

* The quartzite whole flat pebbles

Twenty-two flat pebbles in level 9 and 4 in level 8 have been recovered from the excavations. All are made of quartzite. The morphology is oval or rectangular. Only two of them carry percussion marks or a small removal on a edge. The dimensions vary from 30 mm to 110 mm for one of the largest. However, the majority lie between 30 and 60 mm. The thickness is always lower or equal to 10 mm. The thickness and the flat morphology seem to be the first element of choice of these pebbles by humans, before the size.

- *The quartz pebbles treatment*

The colour and the aspects of the quartz artefacts lead us to estimate a minimum number of pebbles carried to the site, entire or in the form of flakes (Table III). The assumed number is 30 pebbles for level 9 and 20-25 pieces for level 8.

Table III: Total of quartz artefacts in the layers 9 and 8

	Level 9	**level 8**
broken pebbles	10	9
pebble tools	6	2
debris	6	7
cores	10	9
flakes <10 mm	9	18
flakes 10-15 mm	15	20
flakes >15 mm		
all cortical flakes	20	33
cortical flakes	9	11
flakes with cortical back	13	30
cortical platform flakes	13	29
flakes without cortex	9	25
	(with 11 tools, 17,1%)	(11 tools, 8,6%-6,3% series)
Total	120	173

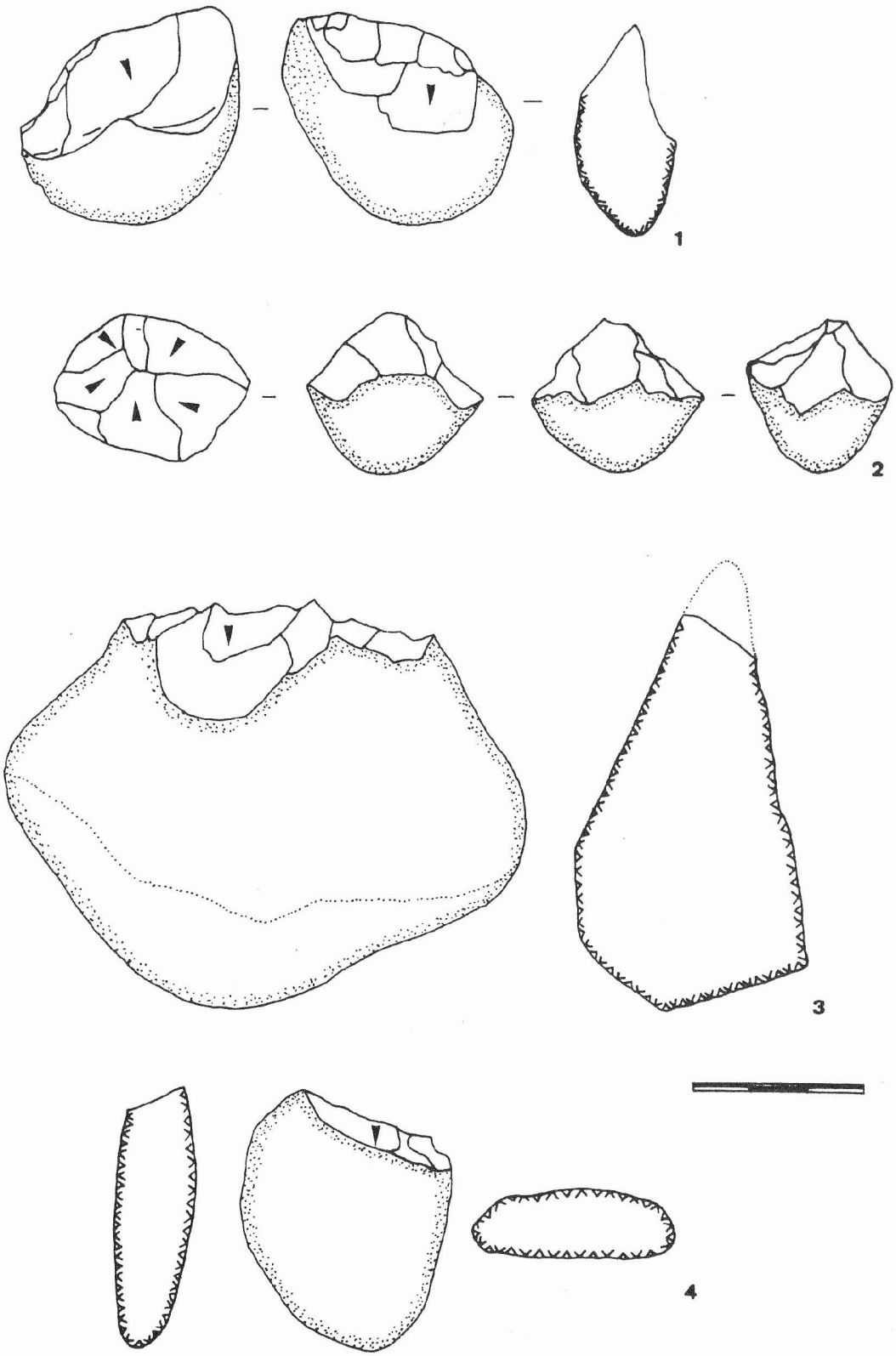

Fig.2 : Quartz and quartzite pebble tools from the lower level 9
n°1,2 : quartz, n°3, 4 : quartzite

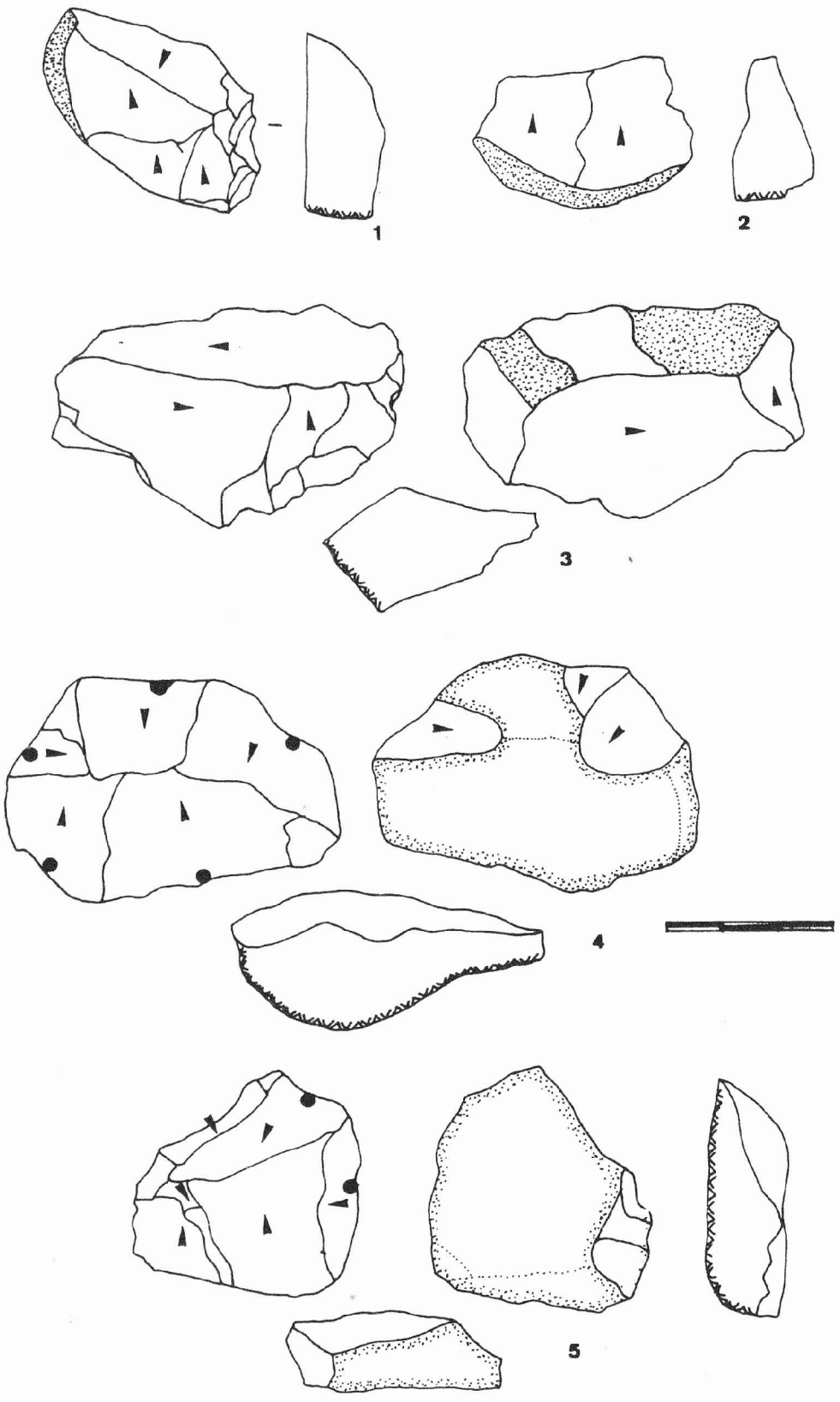

Fig.3 : Quartz artefacts from the lower level 9
n°1, 2 : flakes with a cortical back and/or a cortical platform, n°3, 4, 5 : core on a quartz pebble

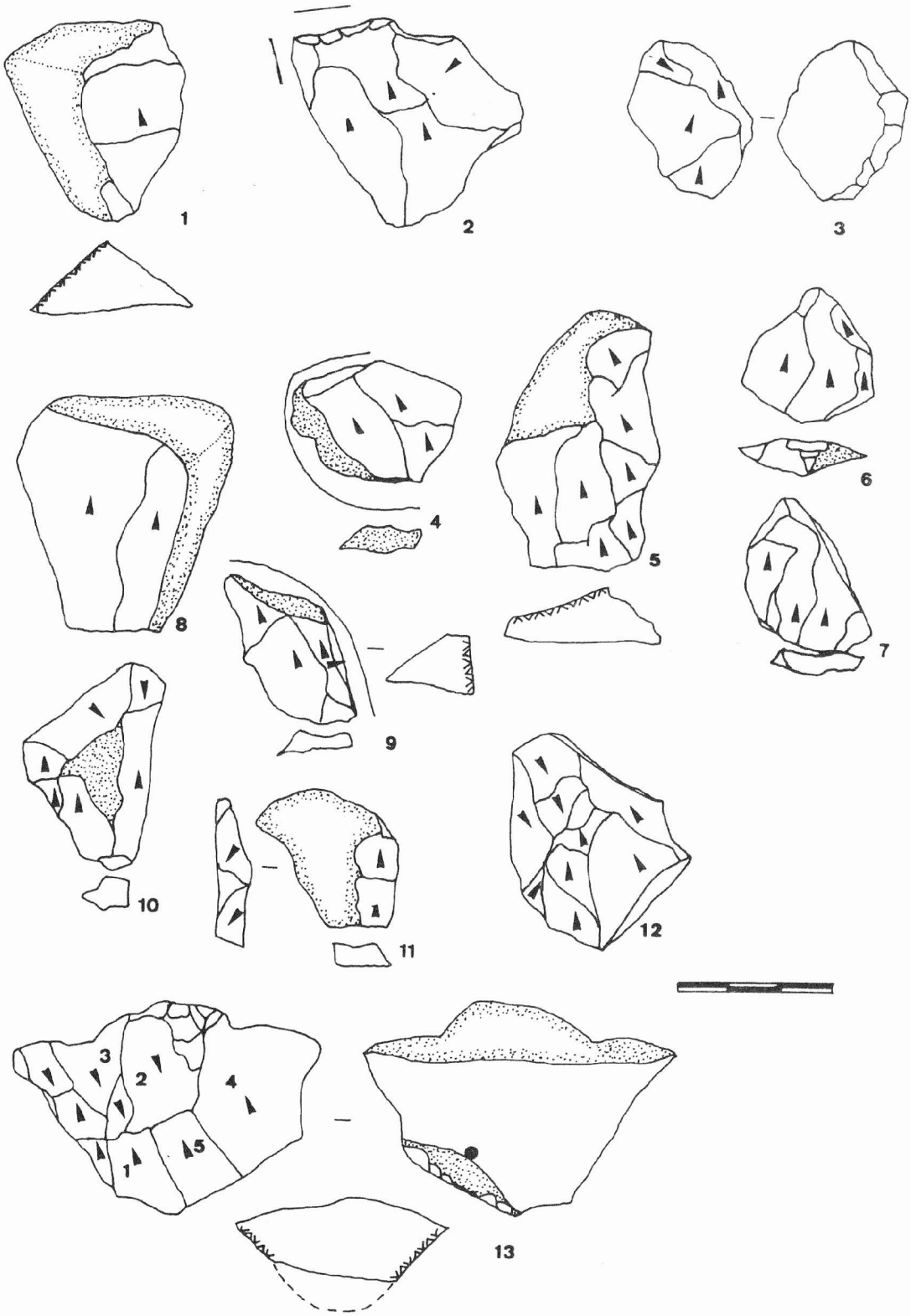

Fig.4 : Quartzite flakes from the lower level 9 (n°1, 2, 3) and the upper level 8 (n°4 to 13)
n°1, 4, 5, 8, 9 : flakes with a back, n°2, 3, 7, 12 : flakes without cortex, sometimes with a back, n°6 : flake with a cortical platform, n°10 : flake with cortical patches, n°11 : cortical flake with a back, n°13 : flake with a part of an opposite debitage face with cortical patches

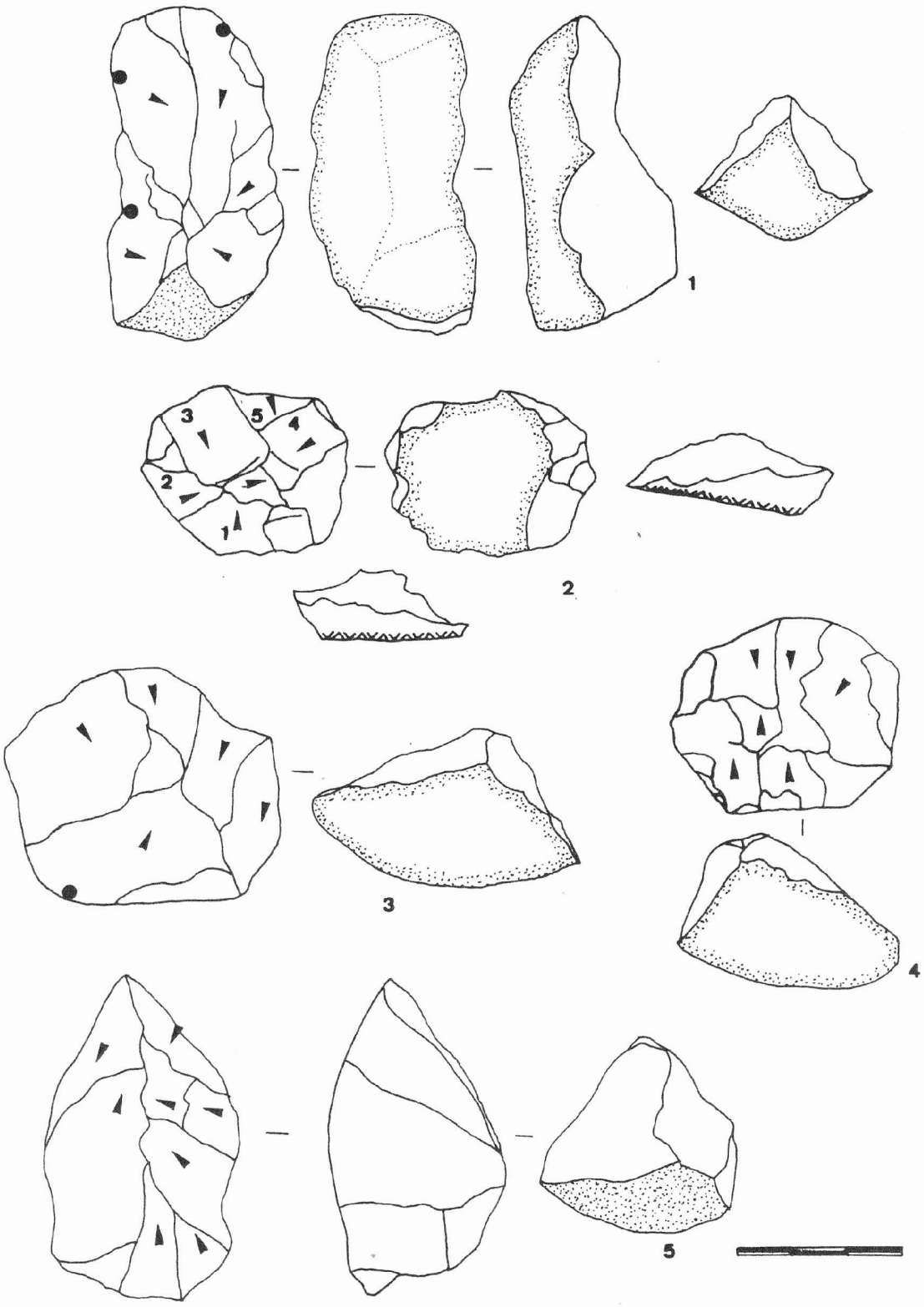

Fig.5 : Quartz and quartzite cores from the upper level 8
n°1, 2 : quartzite, n°3 to 5 : quartz

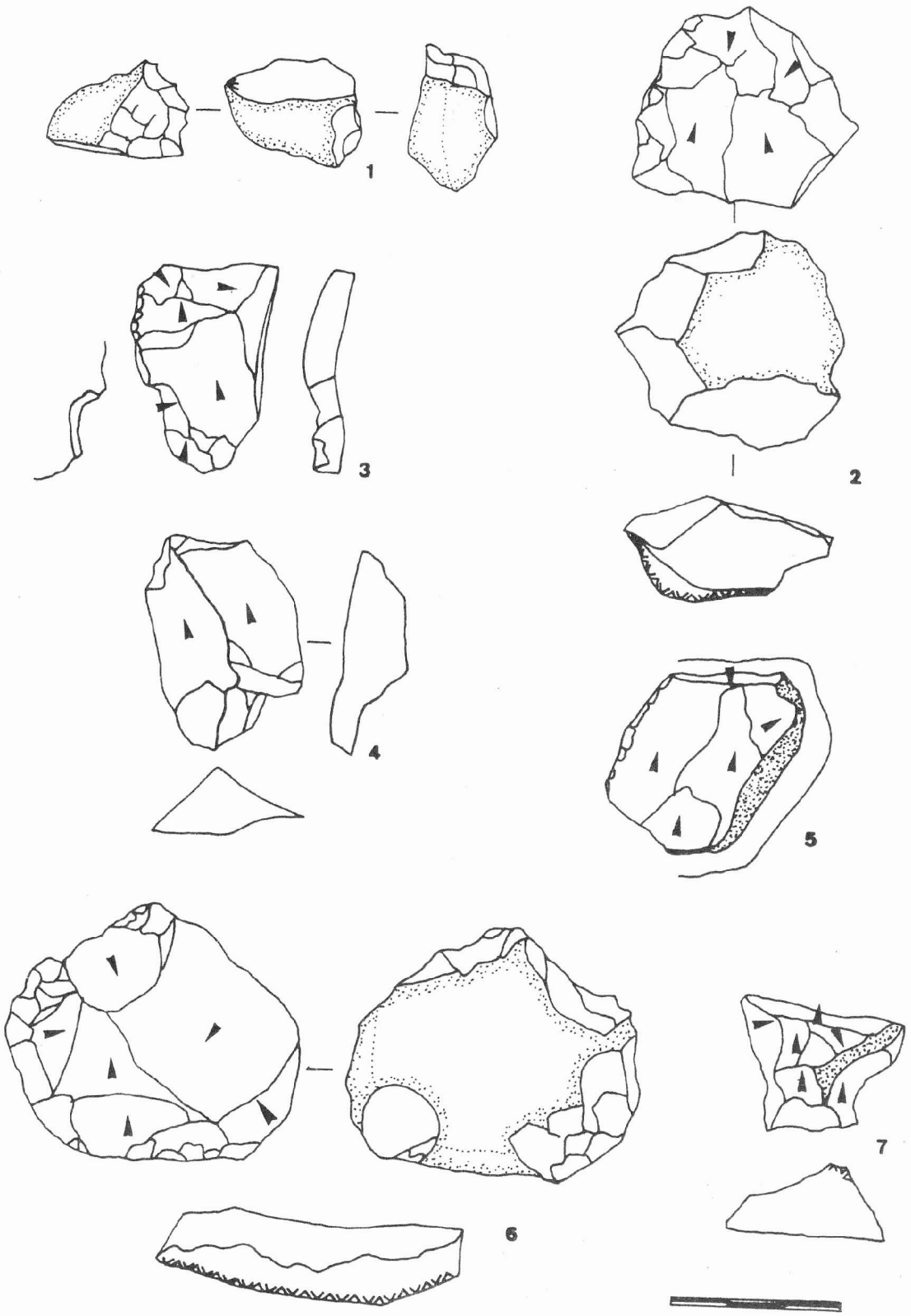

Fig.6 : Flint and radiolarite artefacts from the lower level 9 (n°1 to 4) and the upper level 8 (n°5 to 7) n°1 : flint flake, 2 : radiolarite core, 3 and 4 : radiolarite falkes, n°5 : radiolarite flake, 6 : flint core, 7 : radiolarite flake

* Broken pebbles

The number of broken pebbles is 10 in level 9 and 9 in level 8. There are half-pebbles and fragments. Some of them could be core fragments. The size varies between 30 and 60 mm, 15-60 mm for level 8. Only one piece in level 9 shows percussion marks on the broken face.

* Pebble tools and the question of shaping

Six pieces in level 9 and two in level 8 seem to be pebble tools. But except for two pieces, there is no evidence for the use of the cutting edges (fig.2). They are very fresh and the removals are very deep. They could be simple cores and this hypothesis has to be considered. Shaping of the pebbles of this raw material may occur but its importance is without doubt very limited. The question of an emic distinction between shaping and debitage on quartz pebbles is in any event not certain. The activity could be organised to obtain all of the following: micro-choppers (similar function as the flake tools because of the very small size of the pebbles), choppers giving flakes for tools, and cores. The cores could be also retouched after use. The size of the "choppers" is 25-50 mm long and 15-35 mm thick. The pebble morphology is oval or quadrangular. The cutting edge is prepared by unifacial removals, rather than bifacial. Little edge work is the most frequent charàcteristic and the pebbles keep their original shape. The flat faces of the pebbles rather than the convex faces are used as striking platforms.

* Debitage activity

The flakes resulting from shaping or debitage are difficult to distinguish, especially if the products of the two activities are considered as equal for subsistence behaviours, used unretouched or retouched, or associated with small choppers (some of them perhaps being both tools and cores).

+ The flakes : the exploitation aims

More than 75% of the artefacts are flakes in both levels. The size of most of them is between 20 and 40 mm long. Ten per cent are less than 10-15 mm long and 25%, less than 20 mm. Only some of them are more than 40 mm long to 75 mm. Five kinds of flakes can be seen in the series : totally cortical flakes (first generation flakes), flakes with a cortical back (lateral, proximal or distal), flakes with a cortical back and a cortical platform, flakes with a cortical platform, flakes with a cortical face more and less large, and flakes without cortex (fig.3).

The smallest flakes (less than 10-15 mm long) are very varied: thin, thick, large, with or without cortex. The 20 flakes from the first generation show the use of the flat parts of the pebbles, the natural edges, without preliminary treatment, and a striking platform. The beginning of the debitage uses the pebble's potentialities.

Most of the flakes show a cortical back which is a part of the pebble side or a part of the platform. Sometimes, the cortical platform is linked to the cortical back. The platforms are large, thick, and with an open angle. The flake sections are triangular or trapezoidal, asymmetrical, and with facets. The cortical back position on the flake indicates a "pebble slice" debitage technique of the pebble thickness or its cross-section, using the natural cortical

side. The size of the flakes with a convex cortical back ("orange slices") is often less than 40-50 mm. This indicates the selection of small pebbles. On the upper face, the debitage axes of the previous flake are unipolar or centripetal. The flake cross-section suggests the idea of a pebble debitage procedure working through the pebble volume according to surfaces and pebble edges (cores with two debitage surfaces and an angle more or less open). Large cortical patches remain throughout the debitage. Percussion points are far from the core edge in order to keep the debitage face convexities and to obtain thick flakes. The flakes are in general short, especially those with a cortical platform.

The cortex removal action seems to be very slow, using first the cortical edges as a striking platform without preparation. Debitage and cortex removal are linked. The aim is to produce thick, asymmetrical, flakes with a back (pebble cortical side or platform) opposed to a cutting edge. The flakes are very irregular and the platforms are varied (cortical or not with one or two facets). This debitage mode is not far from the choppers' shaping. It is likely that the flake assemblages, especially the entirely cortical flakes, come from debitage and shaping. The core sizes and the chopper sizes are moreover similar.

+ The flake tools

In level 9, there are 11 tools on flakes, i.e. 17% in the flakes assemblage. All kind of flakes are used, even debris. The side-scrapers are the most frequent tools. They are simple. Retouching is located on the part of the cutting edge, opposed to a back. They do not modify the flake shape and even depend on it. They are rather small, except on some thick flakes with a scalar retouch. The tool number and the tool types are the same in level 8. There are in addition only two bifacial tools, like those in Micoquian or Szeletian cultures.

+ Cores and the debitage methods

Some artefacts could be refitted to each other in level 9. In three cases, two flakes are conjoining, showing the cortical pebble side. A flake is also joined to a pebble fragment, indicating a "slice debitage".

The number of cores is 10 for level 9 and 9 for level 8. They are on pebbles and flakes. Cores are abandoned with two opposite faces, limited by a peripheral ridge (fig.5). The core cross-section is pyramidal or bipyramidal and the angle of the ridge is sometimes open. One of the two faces is more or less cortical, convex or with the natural facets from the pebble, and seems to be the striking platform. The removals are small, centripetal, and occur just on a portion of the core. Their position, their angle, and their number seem to be linked to the necessity to create a suitable platform, according to the natural morphology of the pebble. When the pebble has an adequate shape with flat faces, the striking platform remains cortical. The opposite face is convex or pyramidal with abrupt facets and no cortex. The removals are unipolar or intersected, short or long. The debitage axes never converge at the core centre. The core section is therefore never symmetrical. The removals on the core faces suggest that the pebble is exploited in its volume, without preparation during the core reduction. As the exploitation progresses, angles change from open at the beginning to more closed at the end. This explains what we see on the abandoned cores. The bulb traces are deep, testaments to percussion points far from the core ridge. It is therefore possible to maintain the platform angles throughout and to product thick flakes with large and thick platforms. The last flakes are sometimes short with a hinge.

One of the cores in level 9, with two opposite faces, has been exploited on a final face, orthogonal to the two others. The removals are laminar or short, on the half periphery of the core section like on prismatic blade cores.

Production does not seem to be well controlled in its size and morphology. However, the systematic use of the pebble edges is sought for asymmetrical and thick flakes. The position of the flakes and the debitage angles seem to be the keys for the processing system for pebbles without preliminary preparation.

Cores sizes are between 40 and 65 mm long for level 9 and 30-50 mm for level 8. The thickness is 15 to 25 mm. The selection of pebbles for the choppers is directed towards smaller pieces than for the cores.

- *The quartzite pebbles treatment*

Flake refittings are very rare for the quartzite artefacts. We propose the hypothesis that a lot of artefacts are missing. The possible number of pebbles is 70-80 for level 9 and 40 for level 8. The pebbles in the assemblages are oval, globular, or sometimes flat. Their size is less than 50-60 mm according to the present assemblage.

The number of pebbles does not allow an estimate of the duration of the human occupation. It just indicates a large collection of pebbles and a small quantity of artefacts abandoned on the site after the humans' departure (flakes and debris exported after some production of debitage at this spot or production outside and the importation of the flakes). The number of pebbles is higher for quartzite than for quartz but the number of flakes is the lowest (Table IV). This fact reflects a paucity of flakes, perhaps because of the quality of the raw material. The good quality of this raw material leads to frequent collection for an important use. Further, the high quantity of this raw material in the river or simple human choice for unknown reasons are also explanations for the large amount of quartzite pebbles.

Table IV: Total of quartzite artefacts in the layers 9 and 8

	Level 9	**level 8**
broken pebbles	11	12
pebble tools	4	4
cores	-	5
flakes <10-15 mm	11	9 (2 with cortex)
flakes >15 mm		
all cortical flakes	6	9
cortical flakes	9	6
flakes with a cortical back	10	4
flakes with a cortical platform	-	4
flakes with no cortex	7	11 (3 with a back)
	(4 tools, 12,5%)	(4 tools, 8%)
Total	57	50

* Broken pebbles

Eleven pebbles are broken in level 9 and 12 in level 8. They show a fragmentation of very small pebbles, oval (20 mm long), and some big pebbles (90-100 mm long). The thickness is sometimes 10 mm or between 10 and 25 mm. Some fragments come from very long pebbles. Some broken pebbles show percussion marks on the edges. None seem to be core fragments.

* Pebble tools

Pebble tools are rarely made of quartzite (only 4 pieces for each layer). The size average is often 50-60 mm, between 45 and 90 mm long for level 9, and between 50 and 110 mm for level 8. The thickness is on average between 40 and 50 mm for level 9 and 10 and 30 mm for level 8. The choice goes towards oval or flat pebbles for the smallest pebble tools, triangular or quadrangular for the biggest ones (fig.2). The thinnest or the narrowest edge of the pebble is used first. The treatment is rather short and simple, more often unifacial, using the natural morphology of the pebble. One set of removals is made in the great majority of cases. There is only one bifacial tool in each assemblage (a convergent cutting edge for one pebble tool in level 8). Use marks on the cutting edge of these tools leads us to believe in the reality of choppers made of quartzite. Sometimes, percussion marks on the cortical faces of the chopper suggest that the pebble has been used before the shaping or had two different functions during its life.

* The flakes : the production aims, hypothesis for the rules of debitage production

Flakes with and without cortex attest to the exploitation of quartzite pebbles. However, no cores were collected in level 9. In situ core reduction is therefore impossible to assert, unless cores became fragments after knapping. As for the quartz, the flakes come, no doubt, both from the debitage activity and the shaping activity (fig.4). The entirely cortical flakes, i.e., the first flakes, could come either from cores or choppers, as the pebble tool removals are in general small.

The great majority of flakes measure between 10 and 40 mm, the remains of a small-sized production sequence, even though there are also some large flakes (between 50 and 110 mm long). Retouched products measure between 20 and 40 mm long and some pebble tools have a similar size average, lower than 50 mm. The fewer largest flakes could be carried to the site, maybe obtained on the river beaches from very big pebbles. The flakes without cortex are smaller and the shape is sometimes curved.

The technical patterns evidenced on quartzite flakes indicate a similar treatment as on the quartz. The great majority of the flakes had to be produced from a pebble edge and the striking platform is often not prepared. The platforms are thick and wide, cortical or not. Some flakes with a back lead to an estimate of the core size between 30 and 60 mm.

Debitage surface is exploited, in the majority, by intersected removals. The flakes sometimes indicate the use of one or two debitage faces (convex or pyramidal), orthogonal or with a closed ridge. The angle of the striking platform depends on the exploitation stage of the core. No preliminary flaking is necessary on the pebble with this kind of treatment. The cortical, flat sides of the pebbles are used at first. The core progressively turns in the hands. The use of the arrises and the ridges between the cortical sides and the debitage face allows one to maintain the convexity of the debitage face and to guide the removals. The production

aims seem to be again asymmetrical, wide and thick flakes, with a back. At the end, cores could become pebbles fragments.

Quartzite flakes are less retouched and more often used in a rough state (few percussion marks on the cutting edges). Only four tools are visible in each layer, on all kinds of blanks (two side-scrapers and two points). The retouching is thin, small, sometimes scaled, and on the cutting edge opposite to the back when its exists. They do not modified the flake shape but rather use it. The retouching is limited to a small part of the edge. The retouch is invasive in one case in level 8.

* Cores

There are five cores and they are found only in the assemblage of level 8 (fig.5). They measure between 30 and 60 mm. They are rather smaller than the few choppers. All of them show two opposite faces and one of them is highly cortical. Some small removals prepare a limited striking platform or the cortical sides of the pebble are used without preparation. One of the surfaces is without cortex and the cross-section is convex or pyramidal. Removals are intersected, abrupt, and not directed towards the core centre. At the end of the debitage sequence, striking platforms seem to be more and more open and the cores are then abandoned. In one case, some removals have been produced at the end of the sequence from a facet of the debitage face. This feature also suggests the hypothesis that burin shaping occurred.

- Flint and radiolarite pebbles treatment

** Flint*

In level 9, flint artefacts have different colours, brown, pink, black, grey, and blue. They indicate the use of a great number of pebbles of this kind of stone. On the site, only some pieces of each pebble would occur, i.e., the remains of the exportation of flakes after in situ knapping. The importation of some flakes from an outside camp is also possible. There are 16 artefacts, composed above all of pebbles fragments, flakes, 3 cores, and only one bifacial tool (fig.6).

In level 8, the number is only 10 (9 flakes and 1 core). The evidence for on-site debitage production is unsure for this assemblage. The flakes could be imported with a core, as a raw material stock. The core is however exhausted.

The size of the flakes is between 10 and 40 mm long. They are cortical, with a back or are pebble slices. Platforms are wide and thick, facetted for the largest flakes. Removals are unipolar or centripetal. There is just one denticulate on a small part of a flake in level 8. In level 9, there are only one tool on a pebble fragment (denticulate) and a bifacial point. The bifacial retouch is thin and invasive. The bottom of the tool is broken (reason of the abandonment?).

Three pieces are without doubt exhausted cores in level 9. One is on a flake, the two others on pebbles. The core-on-flake shows a few removals, hinged, with retouch on a part of the ridge (side-scraper ?). The other cores show two opposite debitage faces separated by a ridge. The size is about 40-45 mm long and 20 mm thick. One of the faces is very cortical with abrupt removals. The opposite face is covered by removals which do not converge

towards the core centre. The cross-section is bipyramidal. The products obtained are short and probably with a back.

The only core from level 8 measures 50 mm long and 13 mm thick. It is like those of level 9. The debitage face is very flat at abandonment, showing no possibility of continuing reduction.

* *Radiolarite and other kinds of stones of the same family*

The diversity of colours testifies to the collection of many pebbles. But only a few flakes remain at the site. Four pieces in level 9 could be considered as cores or core fragments (exhausted cores ?). One is on a flake, with centripetal removals. The other ones show two opposite faces or three orthogonal debitage faces with residual cortex. The cross-section is convex or pyramidal. The removal axes are unipolar or centripetal. One of them shows a back on a side, which is never used as a striking platform. One core is retouched by scaled retouch, invasive and abrupt. The core size is between 35 and 50 mm.

The core from level 8 is very small (less than 30 mm). It is without cortex and one face is very flat with intersected removals. They are often guided by the core ridges.

The other artefacts are flakes. Eleven have a size between 10 and 80 mm long. The great majority are, however, between 20 and 40 mm long. The thickness is 5 to 20 mm. They have a wide and thick butt, i.e., a back. Some removal negatives are unipolar and centripetal. The flakes also indicate that quadrangular pebbles have been selected, as with quartz and quartzite pebbles.

Two flakes are retouched (25 to 35 mm long). They are a side-scraper near a notch and a transversal side-scraper with small retouches.

In level 8, 17 pieces are flakes and there are three pebble fragments. The size is between 20 and 45 mm long. Some of the flakes have cortex and/or a back. The technical patterns are similar to those from the lower level. The existence of flakes with distal and lateral backs provides an estimate of the size of some cores: less than 25-40 mm. The pebble is exploited by slices, along a cortical ridge, on two or three debitage faces.

Four flakes are retouched. Three are side-scrapers with marginal retouch opposite to a back. One piece could be a point on a triangular flake with an unilateral retouch.

Flint and radiolarite, very good quality stones, are rare; selection (as a special activity), the low quantity in the river, export of these good pieces, and import of only a few pieces are possible reasons for this. Nevertheless, the flint and radiolarite pebbles could be collected near the site. The pebbles are exploited with two debitage faces limited by a cutting ridge. The cortex is still invasive. The removal slope shows that the debitage is conducted in the volume of the pebble, without preliminary flaking. Cortical faces are used as striking platforms and the cortical sides for producing thick flakes with a back. The size of the flakes and the pebble fragments suggest a collection of small pebbles. No shaping activity is attested for these rocks.

Artefacts between level 8 and the Gravettian layers

Only 15 pieces have been collected in layers located on the top of the units. Some of them have been collected from a place outside of the main excavation. They look like the artefacts from the two Middle Palaeolithic layers. Their positions may indicate a movement of

the level 8 assemblage. Short occupations after the deposit of level 8 could be a possibility as well. Four artefacts are in quartzite, ten in quartz, and one in grey flint. They are flakes, pebble fragments, and perhaps a core.

EEMIAN INDUSTRY FROM PŘEDMOSTÍ II : general patterns and comparison

The size of the collected pebbles and their use

The dimensions of the raw material blanks, which were selected by the occupants of the site, may be studied through the whole pebbles. In the lower layer, the quartz and quartzite pebble assemblages show the same dispersal of values, between 20 and 110 mm for the length. The thickness divides the globular pebbles (15-30 mm) from the flat pebbles (5-10 mm). However, two groups of pebbles can be distinguished by the size: small pebbles from 20 to 30 mm and big pebbles from 40 to 90 mm. The largest selection seems to bear on sizes between 40 and 80 mm long (fig.7). The pebble tools stay within the same values, 25 to 70 mm, with a group from 25 to 40-50 mm. They are, however, the smallest pieces in the assemblages. The abandoned cores measure more than the choppers (from 40 to 70 mm). The smallest pebbles seem to be reserved for shaping.

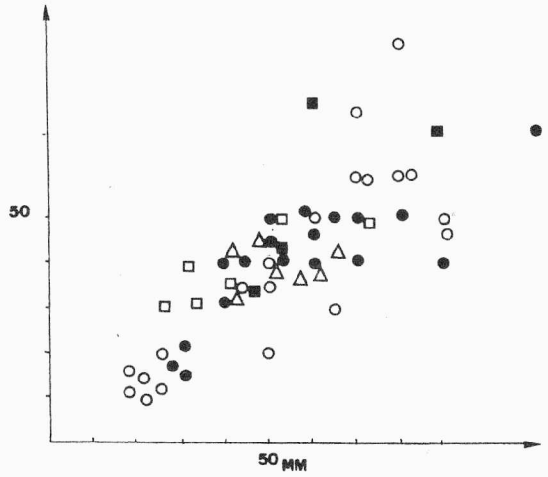

Fig.7 : Size of the whole pebbles, pebble tools and cores in the lower level 9
white rounds : oval pebbles, black rounds : flat pebbles, white squares : pebble tools, white triangles : cores

The flakes with a curved cortical back (i.e., the side of a pebble) confirm the selection of pebbles between 40 and 70 mm long for the exploitation of quartz and quartzite debitage. Thus all of the flakes could be produced from the present cores. The few artefacts in flint and radiolarite have similar values, but no pebble is present in the assemblages.

For the upper level, the pebble size is the same (40-110 mm long, 30-50 mm thick). The flat pebbles measure between 35-60 mm (less diversity than in level 9) and the thickness is 5 to 10 mm. The smallest pebbles, however, seem to be less numerous in this assemblage. Most of choppers measure between 30-50 mm long, thus among the smallest pebble population. The cores are also within the smallest population, a consequence of exhaustion or

selection of small pebbles for the debitage activity as well. The cortical flakes indicate a collection of 40-70 mm pebbles for the debitage. In consequence, it is not sure whether prehistoric people were making a mental distinction between "debitage" and „shaping."

A real difference in the size of the pebbles is not visible between the two levels. The dimensions are varied; even a great quantity of pebbles measure 20 to 50 mm long. This last pattern shows a preferential choice for small blanks which do not excluded some bigger pebbles. The latter remain rather intact (hammers ?). Pebble tools are within the average size. Small pebbles seem to be chosen for the debitage activity, according to observations made on cortical flakes. They are also reserved for the rare shaping activity.

Collection of small pebbles is indeed a behavioural pattern of the two human occupation phases in this site. The two assemblages have a microlithic tendency. The presence of some rare, large pebbles may be another proof of a voluntary selection of numerous small blanks.

Treatment of rocks and behavioural patterns of the human occupations

The three principal kinds of rocks used by the prehistoric humans seem to be processed in the same way. Nevertheless the quality for their treatment is not the same. The shaping activity seems to have been at a small scale, only on quartz and quartzite pebbles. The choppers are simple and some of them could be cores (no use marks), combined artefacts (tools with the cutting ridge and cores for removals), especially those made of quartz. Some pebble tools are micro-choppers, with the same size as the flake tools (fig.8, 9). They could be complementary elements for activities based, above all, on debitage.

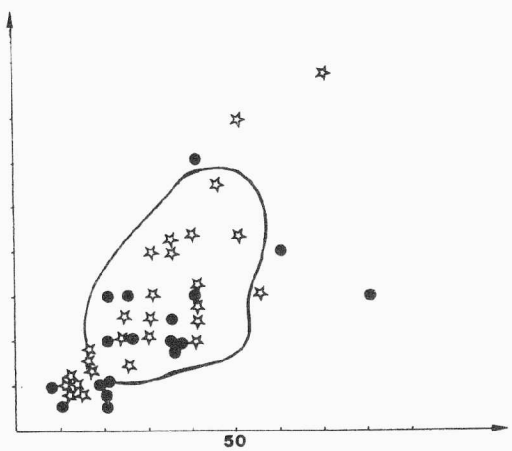

Fig.8 : Size of the flakes in the lower level 9 stars : quartzite, black rounds : flint and radiolarite, black stroke : quartz

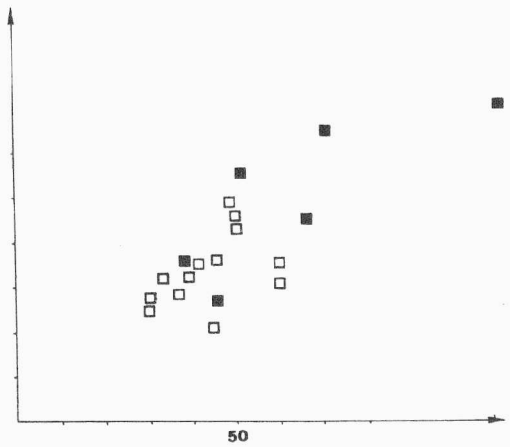

Fig.9 : Size of the pebble tools and cores in the upper level 8 white squares : cores, black squares : pebble tools

As far as we know, cores and flakes indeed show a dominant debitage activity during the two occupations, even if some of the flakes come from shaping. The debitage aims are thick and short, asymmetrical flakes with a back and are often cortical. The platforms are wide and thick and either cortical or plain. Few flakes are retouched. Most of the tools are side-

scrapers with a small, scaled retouch, marginal or high, and limited to a part of the flake. The tools are on quartz blanks or sometimes flint and radiolarite blanks. Several debitage faces, orthogonal or opposite, are exploited by unipolar or centripetal removals. The pebble is used in its volume without preparation (fig.10). The striking platforms are unprepared or very rarely prepared. We can use the term "slice debitage," although not all of the flakes use a large part of the pebble thickness. This kind of behaviour could perhaps explain the small number of cores in the excavation, which are exploited until fragmentation (quartzite for example).

The products are thick and the size is between 15 and 40 mm long, often 30 mm long (fig.8). Only some large flakes are separate from the series and could be brought to the site after their removal from the core. The small size of the production corresponds to a collection of little pebbles, estimated to 40-50 mm long according to the cores and the slice flakes. This observation is similar for the intact pebbles and the pebble tools (fig.9).

Quartzite pebbles seem to be more exploited than quartz pebbles or other kinds of stones in the site. The number of quartzite flakes is, however, very low, as is the number of flint and radiolarite flakes. It is known that quartz fragments when struck and produces a lot of flakes and, above all, debris with one blow. But a different importance could exist between the three families of stone in the minds of the prehistoric men. The quartzite would be preferred for its quality and because it is the most frequent high-quality rock in the river near the site. The number of pebbles is high and the number of flakes is low, possibly a consequence of an outside use. The quartz is the second most-used stone, because of its lower abundance in the river. But its quality is also lower. A lot of flakes occur in the site. The flint and the radiolarite are the best quality rocks, maybe less numerous in the river but always used, imported or exported.

MICROLITHIC INDUSTRIES AND THE TAUBACHIAN

Microlithic industries already exist in old periods but remain rare (Vertesz̈öllös, Bilzingsleben in Central Europe or in Italy) (Burdukiewicz *et al.*, 1979; Mania *et al.*, 1980; Dobosi, 1983, 1988). The greatest frequency of such assemblages during the last interglacial, beginning around 125 000 BP (dates of Tata from Brörup are actually older, Schwarcz *et al.*, 1982), suggests to D.Collins in 1969, then to K.Valoch, the idea of creating a cultural group named the Taubachian (Valoch, 1984). The scarce human remains, a brain cast in Ganovce and teeth in Taubach, show that these original industries have been made by Pre-Neandertals (Ložek, 1954; Prošek, 1958; Valoch, 1996).

The environmental conditions could involve the most frequent production of small artefacts. The forest context, the temperate climate, good places for living near water springs, (archaeological layers in travertines), river beaches, or caves (Kůlna) could explain a specific behaviour adapted to the special climatic conditions. Wood work, which is easy in a forest context, could be an aspect of the main activities of these people (small stone tools used to work numerous wooden tools). The remains of wooden pieces are present in German travertine sites. In most of these sites, the mammals belong to large-sized species. Sometimes there are only two species of the following: Rhinoceros, Elephants, Bison stags, Mammoth (Tata), Deer, and Horses, (Gábori-Csánk, 1968; Patou-Mathis, 1993). The specialised activity of butchery is also possible to explain the technical patterns. But, with the diversity of species in some cases, a specialised butchery activity cannot be the only explanation for the small size of the lithic industry. Small flakes could be as suitable as other types of pieces for all kinds of activities. Wooden tools could be well adapted to a diversified exploitation of what the

environment provides. It is possible indeed that during a temperate period the meat supply was more limited. The human groups could develop a special food behaviour, explaining the kinds of lithic blanks. Other kinds of lithic assemblages can exist during the same period in the same country.

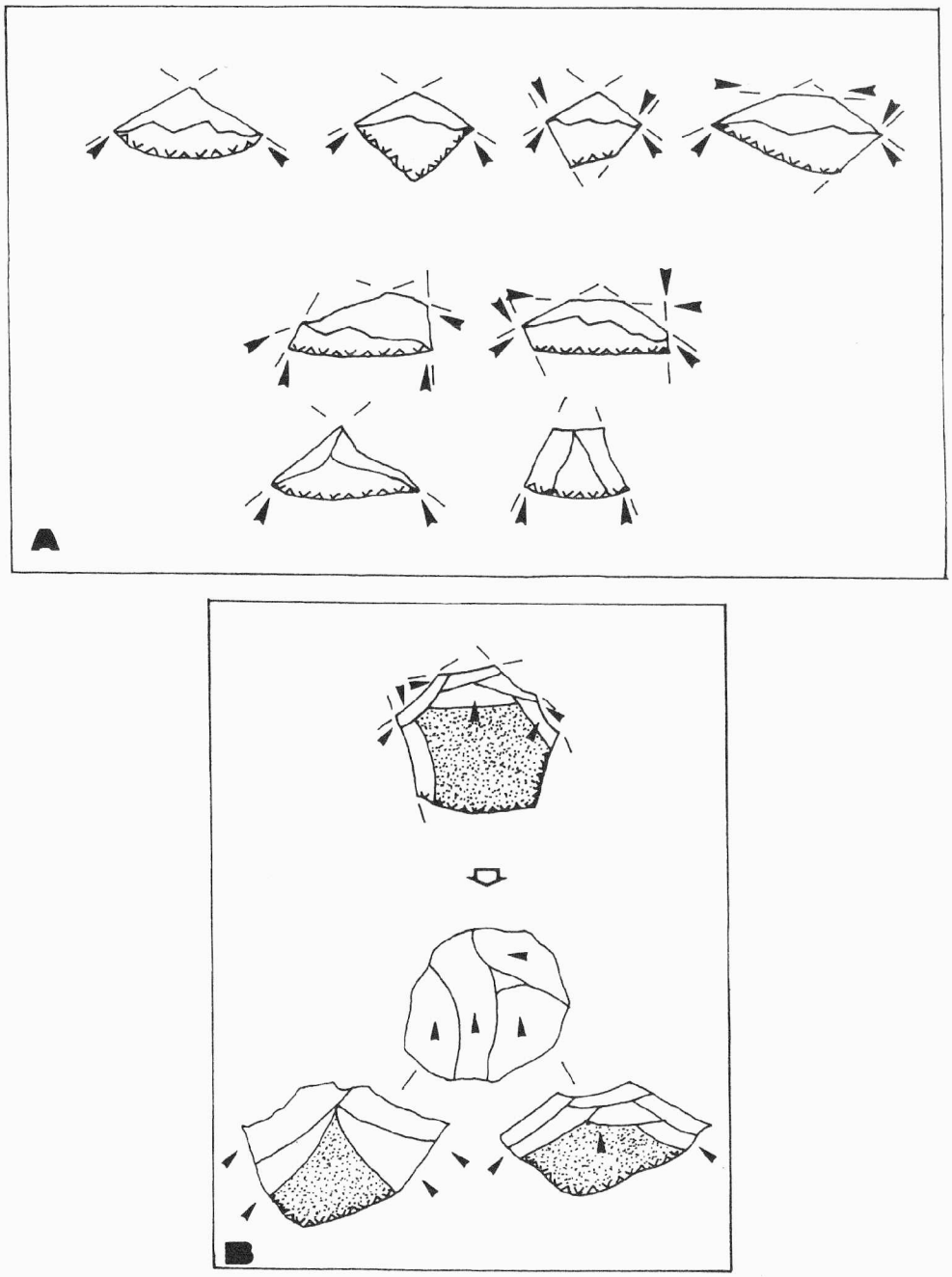

Fig.10 : Schematic drawings of the different kinds of cores in the Middle Palaeolithic Předmostí II assemblages
A : abandoned core sections
B : hypothesis for the pebble debitage
black arrows and strokes : debitage axes and debitage faces

A brief comparison of the Předmostí II assemblages with Taubachian sites demonstrates common points in the pebble sizes, collected near the occupation place for most of the rocks used (Valoch, 1987), and in the debitage rules, which do not use a preparation of the pebble and produce pebble slices along cortical edges. The pebbles become fragments or small irregular discoidal cores. Taubach is the only site to show the practice of the Levallois method (Schafer, 1981; Valoch, 1984). The site of Předmostí II, except perhaps for some quartzite pebbles, does not show pebble fragmentation but a real debitage sequence designed to obtain cortical, wide, thick, and asymmetrical flakes. The medium size is around 15-35 mm long. This kind of debitage can perhaps explain the lack of tools on flakes. The natural cutting edges of the flakes could be employed in a rough form, without retouching. The production is rather controlled for function. The tools are side-scrapers, with scalar retouch, marginal or high. The points have retouch which does not change the shape of the flake. The flat retouch or the bifacial retouch is exceptional, like in Kůlna level 11, (Valoch, 1995). The debitage rules used in Předmostí II are the closest, as far as we know, to those of the Kůlna level 11 in Czech Republic (Valoch, 1988) but also to those of Erd in Hungary (Gábori-Csánk, 1968).

Acknowledgements

The study of the Předmostí II artefacts took place during a research programme concerning the Middle Palaeolithic lithic industries from Central Europe. The financing comes from the Natural History National Museum in Paris (France). I thank to Jiří Svoboda for access to the materials, and to Gilbert Tostevin for English corrections.

References:

Absolon K. et Klíma B., 1977 - *Předmostí. Ein Mammutjägerplatz in Mähren.* Fontes Archaeologiae Moraviae 8, Praha Academia.

Bánesz L., 1990 - Mittelpaläolithische Bleinförmige Industrie aus den Travertinefundstellen der Zips, *Slov-Archeol.*, Bratislava, 38-1, p.45-88.

Bánesz L., 1991 - Die Entwicklung der Travertine in den Nordkarpaten im Lichte archäologischer Funde, *Quartär,* Bonn, 41-41, p.45-62.

Burdukiewicz J., Mania D., Kocon A. et Weber T., 1979 - Die Silexartefakte von Bilzingsleben. Zu ihrer morphologischen Analyse, *Ethn.-Archeol. Zeitschrift* 20, p.682-703.

Dobosi V.T., 1983 - Die Knochenartefakte von Vertesszölös, *Ethn.-Archeol. Zeitschrift* 24, p.349-361.

Dobosi V.T., 1988 - Le site paléolithique inférieur de Vertesszölös, Hongrie, *L'Anthropologie*, Paris, 92, 4, p.1041-1050.

Gábori-Csánk V., 1968 - *La station du Paléolithique moyen d'Erd (Hongrie),* Budapest, Akadémia Kiado, 158 p.

Gábori M., 1976 - *Les civilisations du Paléolithique moyen entre les Alpes et l'Oural*, Académie des Sciences de Hongrie, Budapest, 235 p.

Kaminská L., Kovanda J., Ložek V. et Smolíková L., 1993 - Die Travertinfundstelle Hôrka-Ondrej bei Poprad, Slowakei, *Quartär*, Bonn, 43-44, p.95-112.

Kovanda J., Smolíková L., Ford D.C., Kaminská L., Ložek V., Horáček I., 1995 - The Skalka travertine mound at Hôrka-Ondrej near Poprad (Slovakia), *Anthropozoikum*, 22, p.113-141.

Ložek V., 1954 - Die Weichtiere der pleistozänen Travertine in Ganovce, *Anthropozoikum* IV, p.104-105.

Mania D., Toepfer V. et Vlček E., 1980 - *Bilzingsleben I. Home erectus, seine Kultur und seine Umwelt*, Veröffentlichungen Landesmuseum Halle, 32, Berlin.

Patou-Mathis M., 1993 - Les comportements de subsistance au Paléolithique inférieur et moyen en Europe centrale et orientale, *XIIIème rencontres d'Antibes, Exploitation des animaux sauvages a travers le temps, APDCA*, p.15-28.

Prošek F., 1958 - *Die archäologische Funde in der Travertinekuppe Hradok. Zusammenfassender Bericht über den Fundort Ganovce und die Reste des Neandertales in der Zips (CSR),* MS Archeol. úst. ČSAV, Praha.

Šibrava V., Fejfar O., Kovanda J. et Valoch K., 1969 - Das Paläolithkum in der Tschechoslowakei, *in Quaternary in Chzechoslovakia*, Praha, p.69-149.

Schafer D., 1981 - Taubach. Zur Merkmanalyse von Feuersteinartefakten der mittelpaläolithischen Travertinfundstelle sowie zu ihrem Verhältniss zu Technologie anderer alt-und mittelpaläolithischer Fundplätze, *Ethn.-Archeol. Zeitschrift* 22, p.369-396.

Schwarcz H.P. et Skoflek I., 1982 - New dates for the Tata Hungary archaeological site, *Nature*, 295, p.590-591.

Svoboda J., 1984 - Cadre chronologique et tendances évolutives du Paléolithique tchécoslovaque, essai de synthèse, *L'Anthroplogie*, Paris, t.88, n°2, p.169-192.

Svoboda J., 1986 - Early Human adaptations in Central Europe, *Památky archeologické*, LXXVII, Praha, p. 466-486.

Svoboda J., 1991 - Das Mittelpaläolithikum von Předmostí in Mähren. Ausgrabungen 1989-1991, *Archaeologia Austiaca* 75, p.1-10.

Svoboda J., 1994 - Das letzte Interglacial von Předmostí. Ausgrabungen 1992, *Ethnog.-archäol. Zeitschrift* 35, p.75-80.

Svoboda J., Ložek V., Svobodová H, Škrdla P., 1994 - Předmostí after 110 years, *Journal of Field Archaeology* 21, p.457-472.

Svoboda J., Škrdla P., Ložek V., Svobodová H. et Frechen M., 1996 - Předmostí II, ecavations 1989-1992, *in:* Palcolithic in the Middle Danube Region, J.Svoboda ed., *Archeologický ústav AV ČR, Brno,* Svazek 5, p.147-171.

Svoboda J. et Škrdla P., 1996 - Excavations at Předmostí II in 1992 (district of Přerov), Přehled výzkumů 1992, Brno, p.39-40.

Turq A., 1989 - Approche technologique et économique du faciès Moustérien de type Quina, B.S.P.F., t.86, n°8, p.244-256.

Valoch K., 1967 - Le Paléolithique moyen en Tchécoslovaquie, *L'Anthropologie*, Paris, t.71, n°1-2, p.135-143.

Valoch K., 1977 - Die Mikrolithik im Alt-und Millelpaläolithikum, *Ethnogr.-Archäol. Zeitschrift*, 18, p.57-62.

Valoch K., 1984 - La Taubachien, sa géochronologie, paléoclimatologie et paleoethnologie, *L'Anthropologie*, Paris, t.88, n°2, p.193-208.

Valoch K., 1987 - Raw materials used in the Moravian middle and upper Palaeolithic, *International Konferenz über Silexgewinnung und Steinwerkzeug-Rohstoff Charakterisierung im Karpathenbecken*, Budapest, 1986, p.263-268.

Valoch K., 1988 - Le Taubachien et le Micoquien de la grotte Kulna en Moravie (Tchécoslovaquie), *in L'Homme de Néandertal*, M.Otte ed., La Technique, Liège, *ERAUL*, p.205-217.

Valoch K., 1988 - *Die Erforschung der Kůlna-Höhle 1961-1976*, Anthropos, Band 24, Brno, 100 p.

Valoch K., 1995 - La variabilité typologique du Paléolithique moyen de la grotte Kůlna en Moravie, *Paléo*, supplément 1, *Actes du colloque de Miskolc*, 1991, p.73-79.

Valoch K., 1996 - Anfänge ästhetischer Empfindungen im Paläolithikum Mährens und Böhmens, *in Paleolithic in the Middle Danube Region*, J.Svoboda ed., *Archeologicky ústav AV CR, Brno*, p.273-279.

Valoch K., 1996 - *Le Paléolithique en Tchéquie et en Slovaquie*, "Préhistoire d'Europe", Grenoble, n°3, 205 p.

Vertés L. et al., 1964 - *Tata. Eine mittelpaläolithische Travertin-Siedlung in Ungarn*, Budapest 141, Akademia Kiado, series Nova, XLIII, 284.

Wagner E., 1982 - Altpaläolithische Funde aus dem mittelpleistozänen Travertin von Stuttgart-Bad Cannstatt, *Archäologische Ausgrabungen in Baden Württemberg* 1981, p.13-17.

Souhrn:

Výzkum v Předmostí II v letech 1989-1992 poskytl dvě vrstvy eemského stáří s mikrolitickou industrií (taubachien). Tato studie popisuje technologické chování těchto lidských skupin, žijících v teplém a zalesněném prostředí v okolí vodních zdrojů. Jako surovina se v okolí lokality se sbíraly převážně menší valouny křemene a křemence, zatímco pazourek a radiolarit jsou vzácné. Valounové nástroje jsou vyrobeny pouze z křemene a křemence. Valouny jsou těženy v celém objemu, bez fáze přípravy. Jádra bývají nepravidelná s dvěma pyramidálními plochami, z nichž jednu pokrývá kůra. Cílem výroby byly převážně masívní, asymetrické úštěpy. S výjimkou některých drasadel se používaly bez dalších retuší.

Kamenné industrie obou vrstev dobře zapadají do regionálního kontextu a jsou srovnatelné s jinými mikrolitickými lokalitami.