ANTHROPOLOGIE * XXI/2 * 1983

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MESOLITHIC DWELLING STRUCTURES IN THE ROCKSHELTER HEŘMÁNKY I, NORTH BOHEMIA

With the contributions of E. Růžičková and E. Opravil

ABSTRACT. — During the earlier Holocene phases, several evolutionary trends can be observed, leading to more intensive exploitation of restricted regions and to a more effective adaptation to their environment. Studies of the Mesolithic settlement in the Polomené Mts., North Bohemia (Svoboda, 1977 and 1979) are based on comparison between two ecologically different regions: a rocky highland with numerous sandstone canyons and rockshelters, and a depression with open-air sites, perhaps filled with ancient lakes. In the Heřmánky I rockshelter, traces of two habitation structures were found. The raw materials and the technological patterns of the stone industry suggest relations to the sites of the depression, but slight variations, caused by certain activity differences, may be traced.

KEY WORDS: Dwelling structures — Mesolithic — Bohemia — Rockshelter.

In 1979, the Regional Museum in Česká Lípa in collaboration with the Anthropos Institute of the Moravian Museum, Brno, organized further excavations in the Heřmánky I rockshelter at Dřevčice, in the interior of the rocky highland. The fieldwork concentrated on the western part of this 24 m long, 4.5 m deep and up to 4 m high rockshelter, where the Mesolithic layer (3) was located in 1978 (Svoboda, 1979). This layer is formed by the filling of two partially superimposed depressions (huts, features A, B), dug into the sandy subsoil, partially eroded and subsequently covered in several places by thin sandy deposits and by the later occupation layer.

FEATURE A (SECTIONS EF-KL)

The length of this shallow feature is about 4 m and the breadth exceeded 2.5 m. The northern part is attached to the backwall of the abri, while the southern, exterior part, is eroded and partially disturbed by later prehistoric occupations. The superposition of the feature B could be documented in the western part of the structure. In places where the outlines are well preserved, as in the eastern part, cumulations of larger sandstone blocks, having probably helped to establish the construction, were observed (section KL). Further construction details were found in the SE margins of the feature: two post-holes about 15—20 cm deep and of 20—25 cm in diameter (sections GH and IJ). Their position respects a ledge in the rock wall, so that the poles could have been laid against it and the whole space easilly roofed. If this conception is correct, the heigth in the central part of the hut would reach up to 3 m.

In the central part, slightly excentrically, a fireplace formed by red-burned circular space with the diameter of about 40 cm was located. It is of the flat type, lying directly on the sandstone rock. Within the hearth and in the space around it, a cu-

mulation of stone industry, charcoals and red-burned sandstone pieces was observed. Further finds, altogether 30 pieces of the stone industry, were scattered in other parts of the structure.

The artifacts are made of flint (22 pieces, 3 of them burnt in fire), dinas quartzite (2 pieces), quartzite of the "Bečov-type" (4 pieces) and of the "Stvolínky-type" (1 piece) and of a metamorphed sedimentary rock. The cores are not present, thus no detailed technological observations have been possible. There were 9 non-retouched flakes, 4 blades and 9 fragments. Two pieces belonging to the same crackelled pebble of a metamorphed sediment were found at a distance of about 35 cm. Typologically, the following tools are represented: 1 retouched microlith, 1 bilaterally retouched blade, 2 notches, 1 micro-side-scraper and 2 retouched flakes.

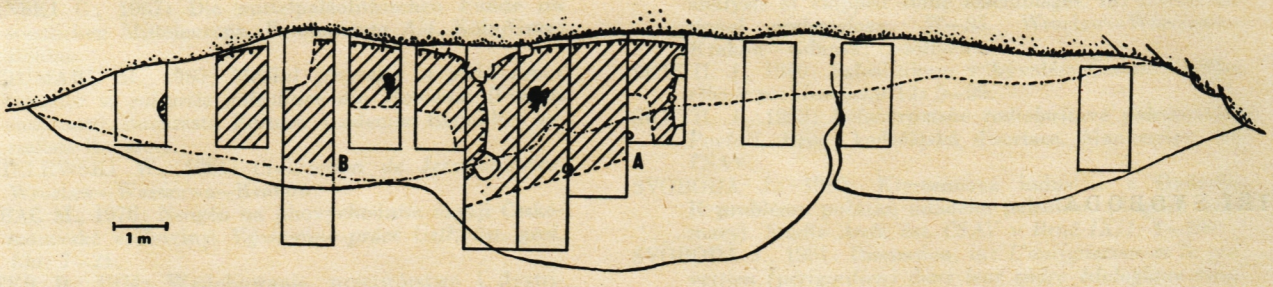


FIGURE 1. *Heřmánky I, plan of the rockshelter indicating the features A and B.*

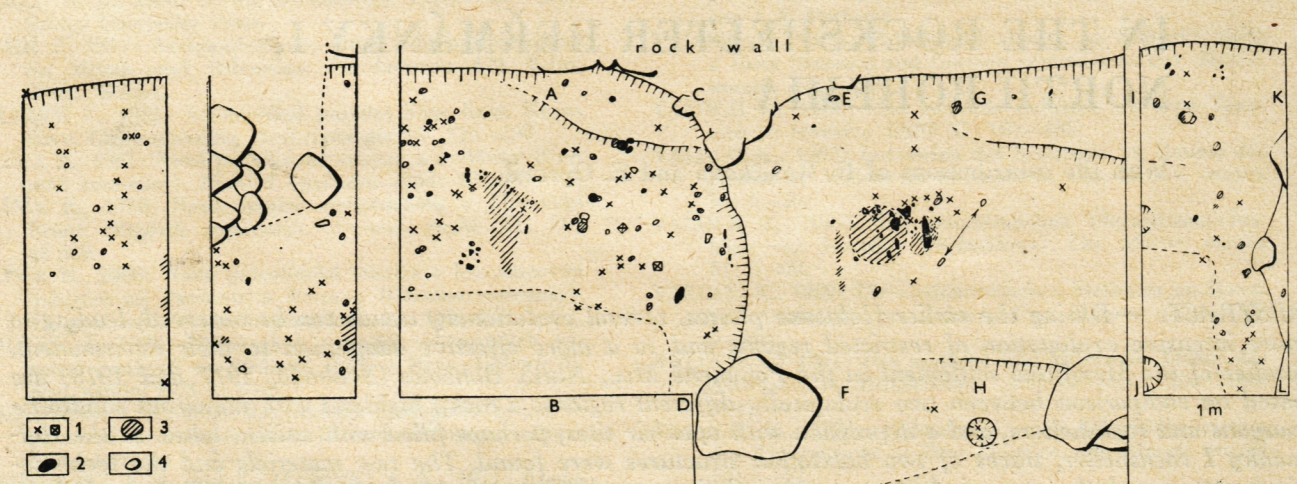


FIGURE 2. *Heřmánky I, detailed plan of the features A and B. 1 — stone artifacts, cores; 2 — charcoals, 3 — burned sand and sandstone; 4 — sandstone blocks.*

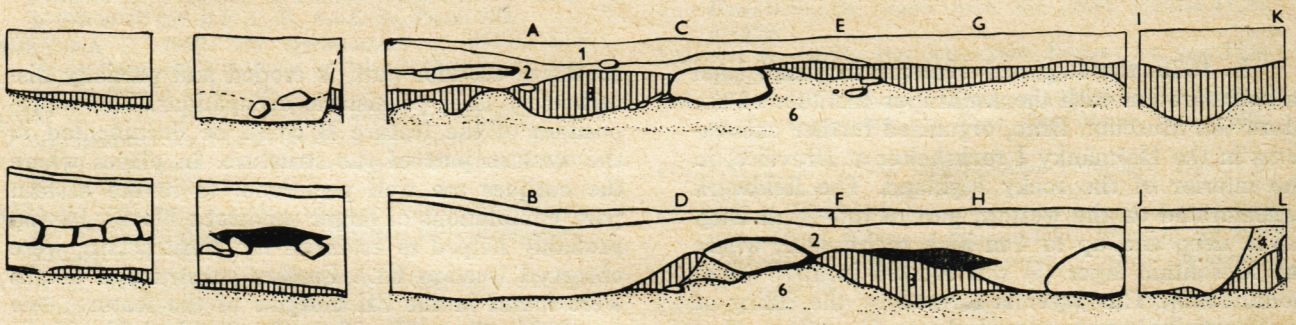


FIGURE 3. *Heřmánky I, longitudinal sections AK and BL, levels 1—6. Archaeological levels: 1. Grey powdery sand, containing objects from the Early New Ages, and artifacts in secondary depositional context. 2. Brown sandy loam layer, containing prehistoric pottery (Neolithic, Bronze Age and later), animal bones and stone tool industry. 3. Ochreous sand with Mesolithic stone artifacts, burnt sandstone pieces and charcoal. Sterile levels: 4. Yellow sand of eluvial origin. 5. Brownish-yellow sand, forming a slope deposit (not in the picture). 6. White sterile sand gradually grading to the rocky subsoil.*

Most of the charcoals were collected and analysed by E. Opravil in Opava (palaeobotany) and J. Evin in Lyon (radiocarbon dating). The following species were recognized by the palaeobotanical analysis: Abies alba, Tilia sp., Acer sp. and Picea, suggesting, after E. Opravil, a moist period of Atlantic or later age. The presence of Abies would indicate rather more recent periods. Also the Lyon laboratory supplied a later date: Ly-2245: 3820 ±210 BP. This date corresponds nor to the Mesolithic, nor to any of the later occupations of the rockshelter. The stratigraphic evidence (Svoboda, 1979) shows that the Mesolithic layer is separated by an erosive and a sedimentary period from the overlying occupation, including the Early Neolithic. Although J. Evin does not exclude the influence of roots on the dating, it is also possible that some charcoals could have penetrated into the sandy Mesolithic layer in the vicinity of places where it is disturbed by the later occupations, and influence the average dating.

FEATURE B (SECTIONS AB-CD)

This structure is situated in the westernmost part of the rockshelter. Its length is 6.5 m, breadth exceeded 2.5 m. The location at the rock wall is similar to feature A. The exterior (southern) part of the feature is disturbed by the later prehistoric layer, sunk in this area into the subsoil, so that no construction details of the Mesolithic structure could be recognized. However, the general location of the feature corresponds to the same rock ledge as in the case of feature A and suggests also a similar reconstruction. The western and eastern flanks of this shallow pit are well conserved. In some places at the rock wall the cultural layer is interrupted by the destruction of big sandstone blocks.

The hearth is not so well preserved as in the neighbouring structure and the red-burned spaces and charcoal finds were recognized in several areas. The most important of them which is located in the middle of the eastern part of the structure with a longitudinal axe is of about 70 cm. It lies directly on the rock and it probably represents the rest of a flat type hearth. The finds of the stone industry, charcoals and burned sandstone were more dense and also more regularly dispersed than in feature A, and thus no important cumulations were recognized. Single non-determinable bone fragments were also found.

The stone industry (altogether 89 pieces) is made of the flint (65 pieces, 30 of them burnt in fire), dinas quartzite (4 pieces), the "Bečov-type" quartzite (7 pieces), the "Stvolínky-type" quartzite (6 pieces), a metamorphed sediment (1 piece) and others (5 pieces). The cores are represented by 2 unidirectional specimens and one core-like artifact. There are 39 non-retouched flakes, 2 pointed flakes, 8 blades and 30 fragmentes. One bigger fragment of a metamorphed sedimentary rock was also found. Typologically, the triangular microlithic point of the TE type (after Kozłowski, 1980) is the most important specimen. The tool-kit is completed by a short end-scraper, a borer, a bilaterally retouched blade and a partially retouched blade.

RESULTS OF THE SURVEY IN THE DLOUHÝ DŮL VALLEY

During the 1979 season some futher localities were excavated in the close vicinity of the Heřmánky I rockshelter. They are concentrated in the same area between the elevations of Vlhošť (613.3 m) and Husa (448.6 m) with the main E—W axis of the Dlouhý důl Valley. This rocky canyon, still relatively wett, is formed by steep sandstone cliffs with 2—3 floors of rockshelter formations. The archaeological survey helped to reveal two more indications of the Mesolithic settlement in the highland, forming the closest background to the Heřmánky I site, and two negative cases.

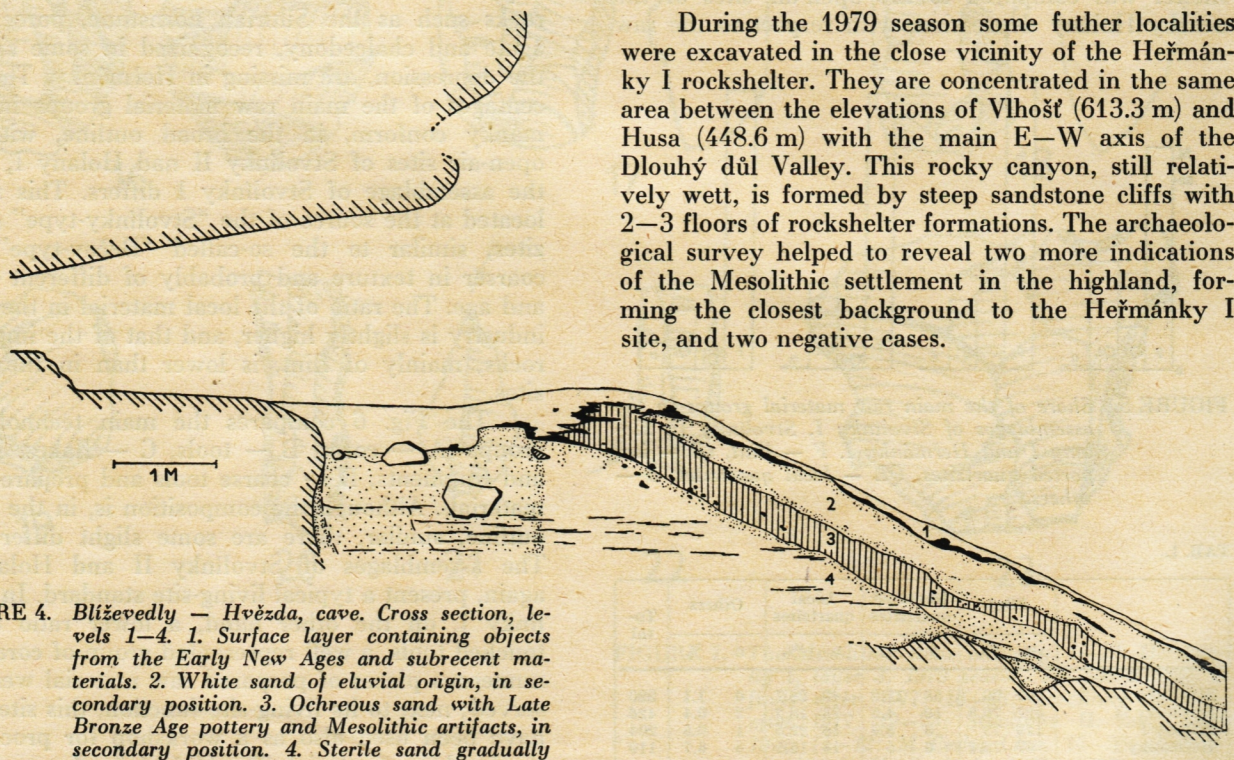


FIGURE 4. *Bliževedly — Hvězda, cave. Cross section, levels 1—4. 1. Surface layer containing objects from the Early New Ages and subrecent materials. 2. White sand of eluvial origin, in secondary position. 3. Ochreous sand with Late Bronze Age pottery and Mesolithic artifacts, in secondary position. 4. Sterile sand gradually grading to the rocky subsoil.*

Dřevčice-Heřmánky II. This long rockshelter is located in the northern rock wall of the Dlouhý důl Valley. The excavations revealed a brown loam layer interstratified with more sandy deposits about 60 to 150 cm thick. Positions of charcoals and red-burned sand helped to indicate the cultural origin of the layer; however, only very few atypical sherds were found.

Dřevčice-Heřmánky III. The rockshelter is placed in the upper floor of the same cliff, above the Heřmánky II locality. Its filling is formed by yellow sterile sand of eluvial origin, containing some Late Middle Age sherds in its uppermost disintegrating parts.

Dřevčice-Heřmánky, open-air site. 6 Mesolithic artifacts were found on the slope of a small elevation surrounded by sandstone cliffs, in places where the Dlouhý důl canyon gets extended.

Bliževedly-Hvězda I. This site is located further to the west in the southern wall of the same valley. It is a small cave of pseudokarstic origin with the deposits preserved at its entrance. The lower part of the section (layer 4) is formed by eluvial sands of different colour and granulation. In the interior of the cave this sand is ochre, while in the exposed exterior part it becomes white. Single charcoals penetrated probably from the upper layer (level 3). This level, preserved in the sloping secondary position outside the cave, is formed by ochre sand with charcoal accumulations. In the lower part of this layer four flint artifacts were scattered (2 flakes, 2 fragments; 2 of them burnt in fire), and from the middle and upper parts the total of 72 sherds, 3 bone fragments and 1 quartzite flake was collected. While the four flint artifacts belong probably to the Mesolithic, the pottery shows (after J. Muška) that the cave was occupied during the Late Bronze Age (Reinecke BD—HB). The following layer (2), also in a sloping secondary position, is formed by sterile white sand of an origin analogical to the layer 4. The surface layer (1), affected by the recent pedogenesis, contained pottery of Late Middle Age and of subrecent origin (after F. Gabriel).

COMPARISON BETWEEN HEŘMÁNKY I AND THE OPEN-AIR SITES

The stone industry from the Heřmánky I rockshelter was compared to the open-air sites of the nearby Holany depression, with respect to the raw material used *(Fig. 5, Tab. 1)* and to the technological patterns *(Fig. 6, Tab. 2)*.

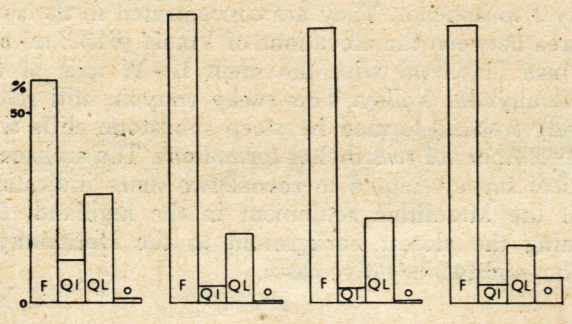


FIGURE 5. *Share of the main raw material groups in the assemblages of Stvolínky I, Stvolínky II, Holany I and Heřmánky I. F — flint, QI — imported quartzites, QL — local quartzites, o — others.*

TAB. 1.

	Flint		Imported quartzites		Local quartzites		Others		Total
	n	%	n	%	n	%	n	%	
Stvolínky I	307	59	58	11.2	149	28.7	6	1.1	520
Stvolínky II	327	76.8	19	4.5	78	18.3	2	0.4	426
Holany I	149	73	8	3.9	46	22.5	1	0.5	204
Heřmánky I	87	73.1	6	5	18	15.1	8	6.7	119

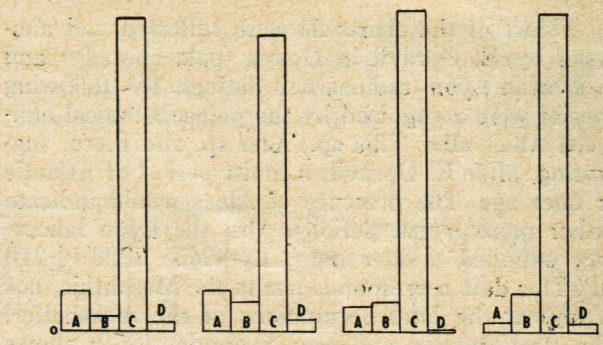


FIGURE 6. *Share of the main technological groups in the assemblages of Stvolínky I, Stvolínky II, Holany I and Heřmánky. A — cores, B — tools, C — flakes, blades and fragments, D — coarse tools and raw materials.*

TAB. 2.

	A		B		C		D		Total
	n	%	n	%	n	%	n	%	
Stvolínky I	55	10.6	20	3.8	432	83	13	2.5	520
Stvolínky II	46	10.8	33	7.7	334	78.4	13	3	426
Holany I	13	6.4	16	7.8	174	85.3	1	0.5	204
Heřmánky I	3	2.5	12	10.1	101	84.9	3	2.5	119

Generally, the study of the raw materials present in the region shows that there must have been far-reaching exterior contacts within a radius of about 80 km. The Heřmánky I assemblage can be characterized by intensive use of the flint of the nordic origin, by contacts with the quartzite sources in the Holany depression (Stvolínky), but also by importations of quartzites from NW Bohemia. Rare rocks such as the Silurian hornstone, porcelanite, agate and chalcedony, recognized in some sites of the depression, are missing in Heřmánky. The percentages of the main raw material groups in Heřmánky conform, in the broad outline, with the open-air sites of Stvolínky II nad Holany I, while the assemblage of Stvolínky I differs. This site is located at the source of the "Stvolínky-type" quartzites, similar to the so-called "Bečov-type", but coarser in texture and probably of different origin and age. The ratio of the local material in the stone industry is slightly higher, and that of the imported rocks, mainly of flint, is lower than in the other sites.

The *Fig. 6* compares the main technological groups (A — cores, B — tools, C — flakes, blades and fragments, D — coarse tools and prepared raw material). Although the composition is, in the broad outline, similar, there are some slight differences. The assemblages of Stvolínky II and Holany I, again, present a typical living-site standard. In Stvolínky I, on the other hand, a lower ratio of retouched tools, a well represented group of cores and numerous pieces of prepared raw material were observed; next to its living-site function, this site must have been used also as a workshop for processing the local raw material. The Heřmánky I assemblage

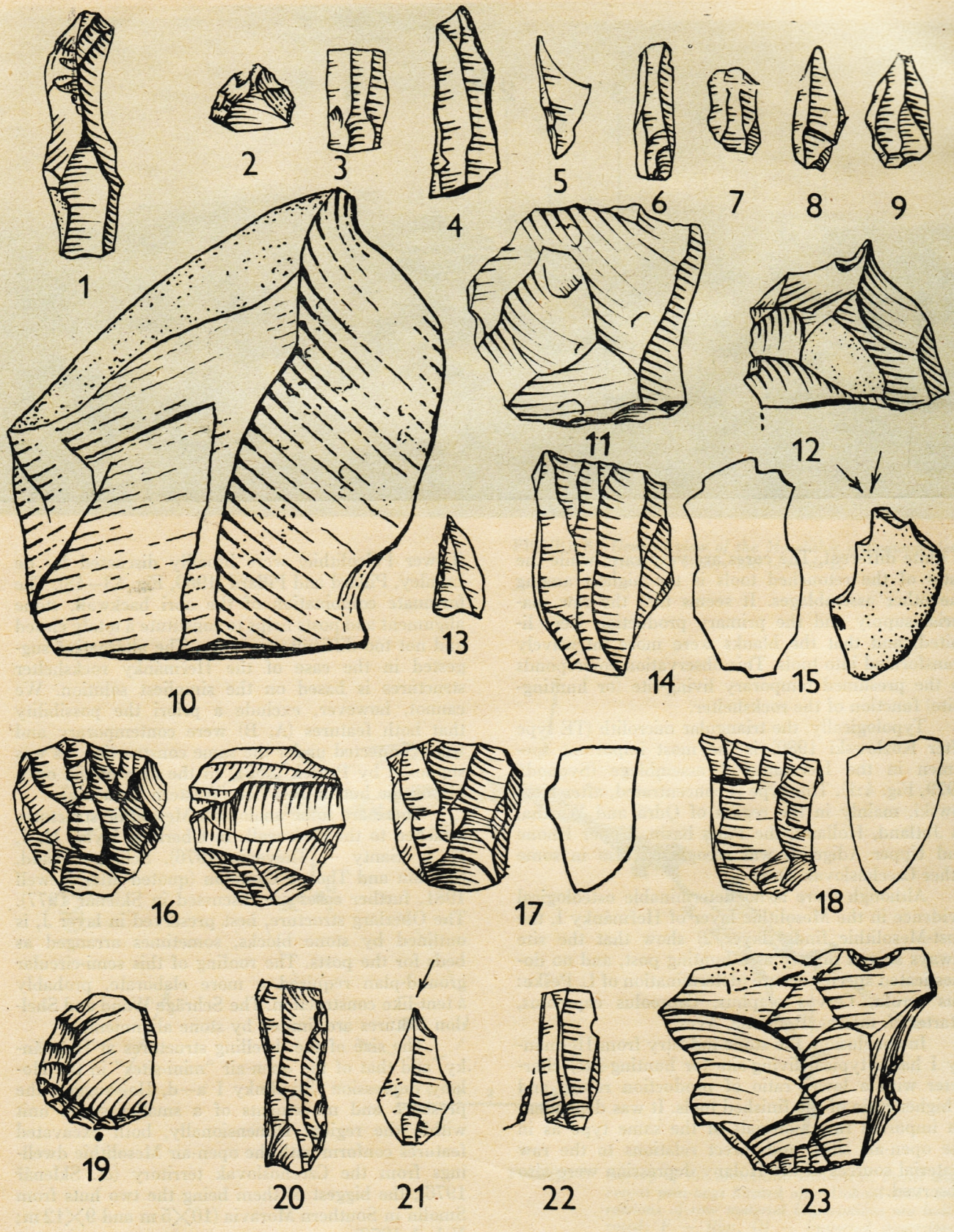
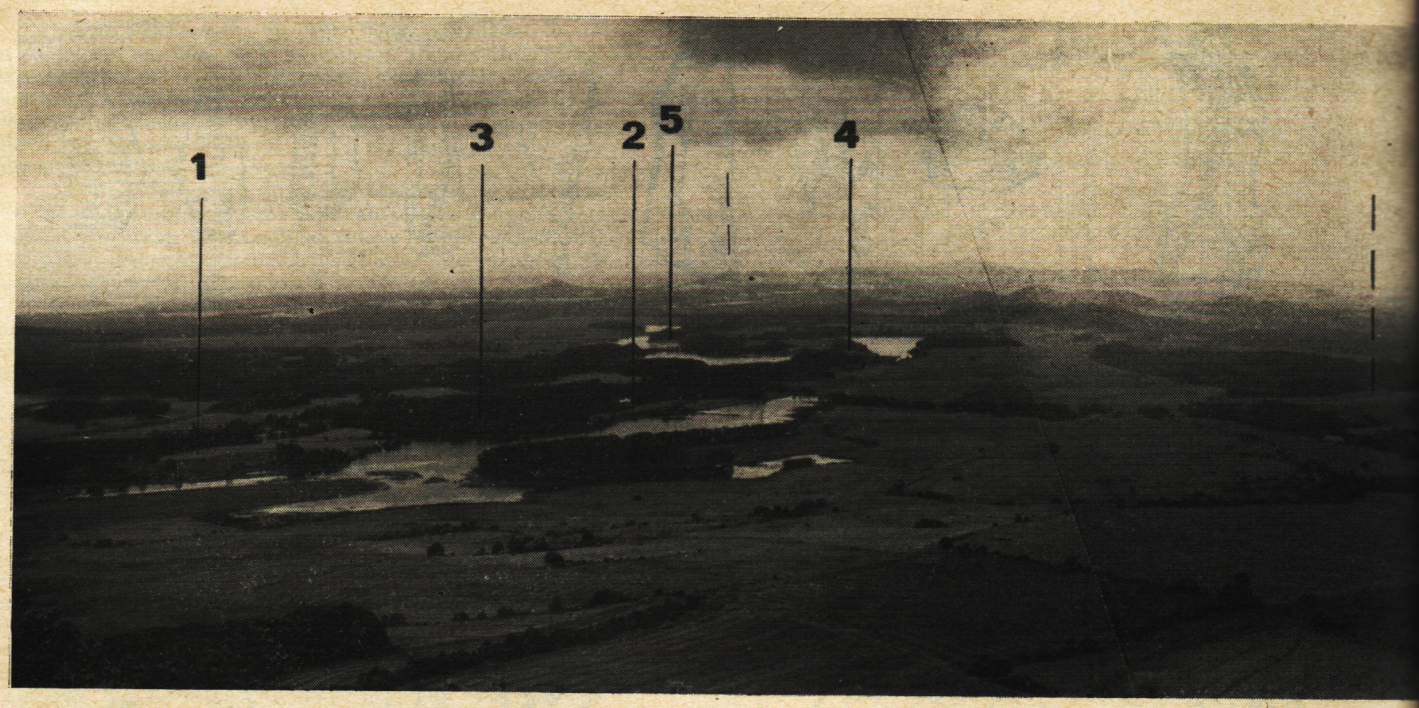


FIGURE 7. *The Mesolithic stone industry. 1—12: Heřmánky I, layer 3, 1979 season. 13—15: Holany I, finds after 1977. 16—18: Stvolínky I, finds after 1977. 19—23: Stvolínky II, finds after 1977. (1—12: M Česká Lípa, 13—23: Anthropos Inst.). Cf. Svoboda 1977; 1979.*



is quite different. The cores are very rare, while the ratio of the retouched tools is the highest among the other assemblages. It seems that the raw material supply and the primary production were limited, and that the blanks were more intensively transformed into tools. This observation corresponds to the presumed temporary living-site (or hunting--site) function of the rockshelter.

Typologically, the triangular microlith (TE type after Kozłowski 1980) is the most important specimen in the Heřmánky I assemblage (Svoboda 1979, Fig. 4:1). This type is concentrated, after Kozłowski, mainly in the region of Odra and Wartha, in Jutland, Holland, the Paris basin, Upper Rhone and Upper Adige. It was recognized also in some other Czechoslovak sites.

Although there is no determinable osteological evidence in the Mesolithic layer of Heřmánky I, the post-Mesolithic finds (layer 2) show that the site always served mainly as a hunting post, and no domesticated species occure (determination of L. Peške: Sus scrofa, Cervus elaphus, Capreolus capreolus, Martes cf. martes, Rodentia, Aves).

In conclusion, the stone industry from Heřmánky I has a typical living-site (or hunting-site) character with a lower ratio of production refuse and a higher ratio of the finished tools. It was dependent on imported raw materials of the same type as in the open-air sites, and direct relations to the raw material sources of the Holany depression were also observed.

DISCUSSION

The possibilities in reconstructing huts in conjuction with the rock wall, in a situation similar to Heřmánky I but on a different evolutionary level (Lower Paleolithic) were broadly discussed by de Lumley, Pillard and Pillard (1969, Fig. 43—48). The fortunate combination of the abri backwall, stone alignment and posts helps to constitute a totaly closed and not too difficult structures. The alternative suggested in the case of the Heřmánky rockshelter structures is based on the simpliest solution. We cannot, however, exclude a priori the possibility that both features (A, B) were contemporary and were connected under the same construction, as was supposed by Prošek (1951) in the case of the open Mesolithic hut in Tašovice (Western Bohemia).

There are some analogical Mesolithic structures attached to the rock wall: in Oberlarg, layers H, J, K, L (Santy — Thévenin 1976), Schräge Wand, Sheldon and Thorpe Common (quoted after Newell 1981, further cases are discussed in Sklenář 1977). The Oberlarg structure, best preserved in layer J, is outlined by stone blocks, sometimes arranged as beds for the posts. The roofing of this semi-circular ground-plan required a more elaborate, probably a tent-like construction. The Schräge Wand and Sheldon features are limited by stone alignments.

The size of the dwelling structures at Heřmánky, and that of the open-air "mini-sites" in the Holany depression (Stvolínky I a—d, IIa) suggest the presence and movements of a smaller social unit within the region. Dimensionally, both excavated features conform with the open-air Mesolithic dwellings from the Czechoslovak territory (cf. Sklenář 1976), the biggest of them being the two huts from Smolín in Southern Moravia (10×5 m and 9×12 m; Valoch 1978).

We still lack evidence about the rhythm and direction of movements in the Polomené Mts. region and about the form of human adaptation to its two ecologically different parts. J. G. D. Clark (1954) suggested a basic winter-summer dichotomy in the

FIGURE 8. *General view of the Mesolithic settlement, view from the Ronov hill towards E.*

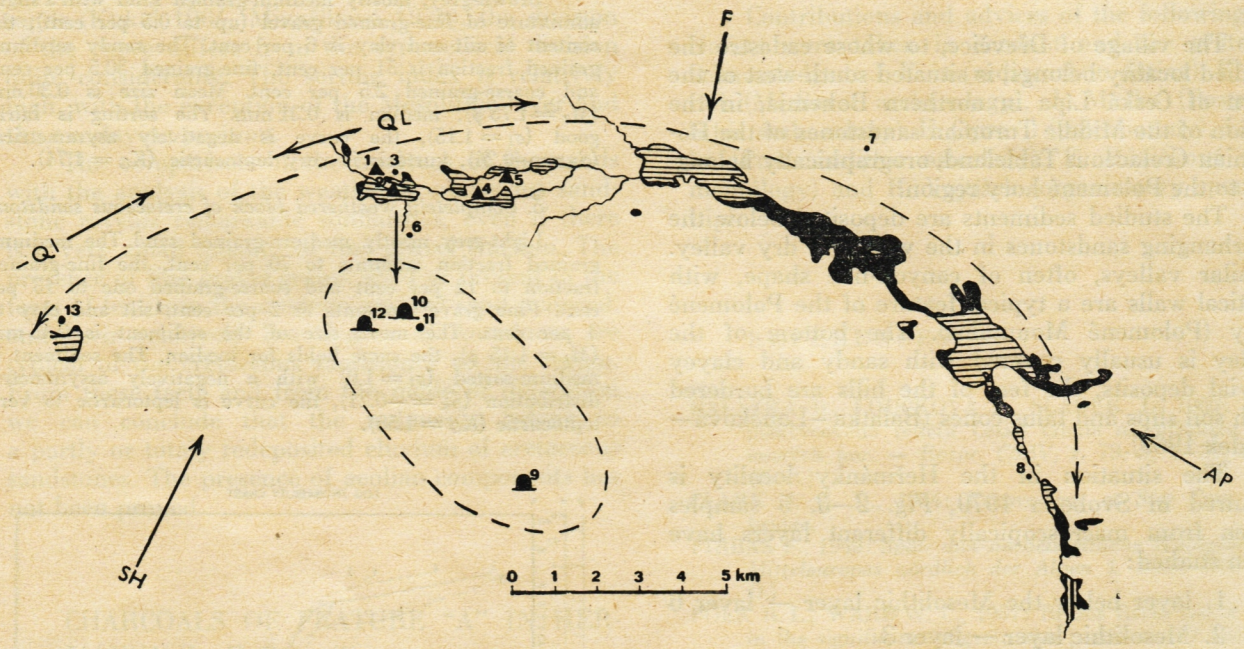


FIGURE 9. *Survey of the Mesolithic settlement. Fossil and recent peat-bogs located after Dohnal 1961. Directions of raw material importations are indicated: F — flint, QI — imported quartzites, QL — local quartzites, AP — agate and porcelanite, SH — silurian hornstone. 1 — Stvolínky I, 2 — Stvolínky II, 3 — Stvolínky III, 4 — Holany I, 5 — Holany II, 6 — Litice, 7 — Provodínské kameny, 8 — Doksy, 9 — Zátyní, 10 — Heřmánky I, 11 — Heřmánky, surface site, 12 — Bliževedly-Hvězda, 13 — Úštěk.*

Vertically hatched — fossil peat-bogs, horizontally hatched — recent fish-ponds, black — recent peat-bogs.

Mesolithic settlement movement. The groups, economically dependent on the red-deer herds, would concentrate in low and sheltered areas in winter and disperse into the highland during the warmer part of the year. The view of P. A. Mellars (1976) is similar: apart from the dependence on the red-deer herds movements, he argues by the needs in food-sharing and protection from predators in winter, and by the more dispersed and more abundant food resources in summer. Some research results among the recent hunting-gathering populations (Eskimo, Kung Bushmen) show that the size and organization of the social units is variable in relation to the season and to the food resources (Lee 1972). Thus it is possible that the seasonal changes in social structure would cause the presumed microcyclic movements in the Polomené Mts. region.

The choice and definition of a meaningfull region (cf. Price 1981, 223), with respect to the societies and environments differing in time, seems to be one of the essential parts of investigation. It is not excluded that the macro- and microcyclic dichotomy is one of the determining changing factors in the Upper Paleolithic and Mesolithic evolution.

PETROGRAPHIC CHARACTERISTICS OF THE SEDIMENTS AT THE HEŘMÁNKY I LOCALITY *(by E. Růžičková)*

The village of Dřevčice, to whose cadastre the studied locality belongs, is situated south-west of the town of Česká Lípa in northern Bohemia, in the region of the Middle Turonian sandstones of the Bohemian Cretaceous Tableland, orographically belonging to the Polomené hory region.

The studied sediments are deposited below the overhanging sandstones in the wall of a dry valley. Similar valleys, often of canyon-like shape, with vertical walls are a typical feature of the Polomené hory (Polomené Mountains). The bottom of the valley is usually covered with sandy and clayey fluvial deposits, the feet of the hills are bordered with soil slips and talus cones (Balatka—Loučková—Sládek 1969).

The situation in the Heřmánky locality is pictured in Svoboda 1979, *Fig. 2—3.* 5 samples taken from macroscopically different layers have been studied:

1. layer below the Mesolithic layer — layer 6
2. Mesolithic layer — layer 3
3. layer from the overlying deposit — layer 4
4. sandy slope deposits — layer 5
5. weathered block of cretaceous sandstone

All samples have been subjected to granulometric analysis (parameters according to Folk — Ward 1957) and the arenaceous fractions were studied under a binocular microscope so that we might judge the shape and surface of the individual particles. Description of the samples:

1. Layer below the Mesolithic layer

Light-grey, in higher positions greyish light-brown, prevailingly fine-grained sand. The content of fine-grained sand fraction is 70 per cent, of medium-fine grains 25 per cent, while the silt and clay content is 5 per cent. The presence of coarse sand and gravel fractions is entirely of accessorial characters. Mean size of the sediment is 0.18 mm ($M_z = 2.45\ \varphi$), similarly as the median. It is a well sorted sediment ($\sigma_1 = 0.46$), the granulometric curve is showing positive asymmetry ($S_k = 0.29$) and is leptocurtic ($K_G = 1.28$).

2. Mesolithic layer

Light rusty-brown medium-grained sand, with an admixture of clay (7 per cent) and fine gravel (up to 1 per cent). The medium-grained fraction represents 53 per cent, fine grains 32 per cent and coarse grains 4 per cent. Mean size of the sediment is 0.29 mm ($M_z = 1.29\ \varphi$), the same applies for median. The standard deviation $\sigma_I = 1.48$ shows a weak sorting of the sediment with positive asymmerty of the curve ($S_k = 0.28$). The curve is very leptocurtic ($K_G = 2.31$).

3. Layer from the overlying deposit

Light-grey, with a hue of brownish-pink, prevailingly medium-grained sand with a higher silt content (19 per cent) and with a slight admixture of fine-grained gravel (0.5 per cent). In the sandy fraction prevails the medium-grained (47 per cent) and fine-grained (30.5 per cent) sand over the coarse grained fraction (2.5 per cent). Mean size is 0.14 mm ($M_z = 2.83\ \varphi$), median is 0.25 mm. The standard deviation is very low ($\sigma_I = 2.40$), the curve is very positively assymmetric ($S_k = 0.58$), the kurtosis is very leptocurtic ($K_G = 2.31$).

4. Sandy slope deposit

Brown-grey, mostly medium-grained sand with a slight admixture of fine-grained gravel (up to 0.5 per cent), the content of silt and clay is 6 per cent. The sandy medium-grained fraction is 51 per cent, fine-grained 30.5 per cent, and coarse-grained 2.5 per cent. Mean size is 0.30 mm ($M_z = 1.75\ \varphi$), median is 0.31 mm. The sorting is fairly good ($\sigma_I = 1.15$), the curve is negatively asymmetrical ($S_k = -0.24$), kurtosis is very leptocurtic ($K_G = 1.74$).

5. Completely weathered block of cretaceous sandstone

Light-grey, mostly medium-grained sand. The medium-grained fraction amounts to 70 per cent, the fine-grained fraction to 12 per cent and coarse-grained one to 13 per cent. Fine gravel amounts to 2 per cent, silt and clay to 3 per cent. The mean size of the sediment is 0.45 mm ($M_z = 1.15\ \varphi$), the same holds for median. The sediment is medium-sorted ($\sigma_I = 1.0$) with a negatively assymmetric distribution ($S_k = -0.21$), the curve is leptocurtic to very leptocurtic ($K_G = 1.59$).

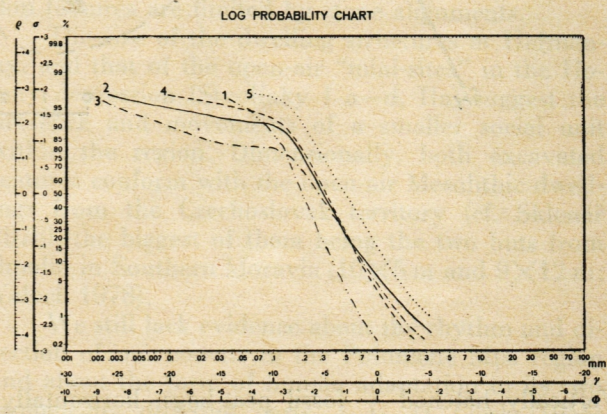


FIGURE 10. *Heřmánky I, logarithmic granulometric curves. Petrographical samples 1—5.*

The sandy fraction deprived of the fine clayey-silty fraction through decantation was studied under binocular microscope. The sandy fraction is formed exclusively by quartz, prevailingly colourless, transparent, occasionally pinky or greyish. The grains are angular, rarely subangular, only the larger grains of the coarse sandy and gravel fraction are almost semi-oval. The fine grains are very lustrous, the lustre of the larger grains is lower, and they are often slightly turbid. Aeolization of the surface cannot be proved. In layer No. 6 the quartz is more or less coloured by limonite to a light-yelow hue, at places we can see light-rusty coating. In the cultural layer (No. 3) the quartz grains are partially or wholly coated with clayey minerals of rust-coloured or light-brownish hues. The matted surface of the non-coated parts of the grains is presumably the result of chemical weathering. In this layer there are numerous fine carbons and fine quartz grains cemented into larger agglomerates.

CONCLUSION

The genesis of the sediments cannot be determined unequivocally according to the granulometric analyses, since the sorting index, grain-size and roundness depend not only on the way of the transport and sedimentation, but very substantially also on the parent rock. Although the average granularity of all samples is within the limits of eolian sands (Kukal 1964, Minaříková 1970), the division of the curve differs from the symmetrical division quite considerably. The sorting index is relatively high, with the exception of the Mesolithic layer and the overlaying position.

The comparison of the analyses of the sands with the analysis of the weathered cretaceous sandstone reveals remarkable similarities, even if there is a very small amount of fine gravel fraction. The presence of fine gravel grains, shed or present in the form of lentils in the medium-grained sand material, and their relatively low degree of roundness are typical of the cretaceous sandstones of this region. From these facts and from the mode of deposition we can conclude that the sediments belong to a partly or totaly redeposited eluvium of cretaceous sandstones. The presence of aeolian components has not been proved.

CHARCOALS OF FEATURE "A" IN HEŘMÁNKY *(by E. Opravil)*

Two trenches of feature "A" (layer 3) in Heřmánky revealed fragments of charcoals, the biggest of them exceeding 3 cm. In the samples subjected to analysis the following timber species were identified:

Trench "B" — fir (Abies alba) 2 fragments,
— maple (Acer sp.) 2 fragments,
— lime-tree (Tilia sp.) 1 fragment.
Trench "D" — spruce (?) (cf. Picea excelsea) 7 fragments.

It is impossible to distinguish unequivocally the small spruce fragments from larch-tree in which parts with the medulla (vascular cylinder) have not been preserved; the dispersed occurance of double dots on the radial walls of the trachei do not suffice for detecting larch-tree with certainity.

The charcoal comes without doubt from the slopy growth in the given area, formed by maple, lime and fir with occasional spruce (although the presence of larch-tree cannot be ruled out unequivocally), in the valley inversion. The absence of red-pine suggests that in those times the slope was more humid than today, correspoding to the more humid Atlantic climate of the period; red-pine was evidently limited to dry rocky sites. Very interesting is the presence of fir; if its carbons were not transfered from later layers, than we should count with the duration of the Mesolithic in this locality till the Early Atlantic, at least. In the earlier (Boreal) periods the presence of fir over the wider territory of central Europe has not been proved unequivocally (Opravil 1976). In the Early Atlantic fir appears in our territory only very sporadically. It appears more profusely in the Later Atlantic (Holocene phase, according to Firbas 1949).

ACKNOWLEDGEMENT

Contributions and advices of the following specialists were taken in account and are gratefully acknowledged: J. Evin (radiocarbon dating), F. Gabriel (Medieval archaeology), J. Muška (Postmesolithic archaeology), E. Opravil (paleobotany), L. Peške (Postmesolithic osteology), E. Růžičková (sedimentology) and B. Vojtíšek (organizatory sponsorship).

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