SUMMARY
MIDDLE PALAEOLITHIC IN MORAVIAN CAVES

The publication presents the doctoral thesis defended by the author at the Masaryk University in Brno in 2003. The number of tables and plots to the original text was reduced, and a limited number of new references and notes added as an update.

1. DEFINITION OF THE THEME

1.1. Temporal definition

The temporal definition comprises the conventionally determined limits of Middle Palaeolithic; from the geological perspective it is understood as the period from the beginning of Riss (OIS 8) to the end of Würm pleniglacial A (OIS 3), i.e. between 250,000 and 40,000 with possible overlappings, especially into the EUP complex. This entire period may be generally divided into three spaces of time according to geological epochs, i.e. into older – Riss, middle – Eem and younger – Würm.

The sources of material under analysis were the collections from Moravian cave localities. For the end of the oldest period we only have finds from layer 14 in the Kůlna Cave available. The successive period of Eem is again represented by the Kůlna Cave where the Taubachian series of strata 11 overlaps through to Würm anaglacial. A scarcity of further localities is offset by both the size of the Kůlna collection and the existence of one important open-air site of Předmostí II – Hradisko u Přerova (*Svoboda – Ložek – Svobodová – Škrdla 1994; Svoboda – Škrdla – Ložek – Svobodová – Frechen 1996*). We have most information relating to the period of Older Würm into which we may put down the collections from all Moravian caves with Middle Palaeolithic layers. To the very beginning of the Würm glacial era we rate the collections from the caves of Šipka, Čertova díra and Švédův stůl. The Micoquian series of strata 7c to 6a then includes the period of the developed pleniglacial A. For this period we may follow the issue of Middle Palaeolithic settlement both in its horizontal (regional) and vertical (temporal) plane.

1.2. Geography of the middle Palaeolithic localities in Moravia

The Moravian Karst (*Fig. 2*) is the largest karst terrain of Moravia. This region is a part of Drahanská Hill Country, and is formed of Devonian limestones that create a stripe 3 to 5 km wide and approximately 25 km long. In the south near Brno it abuts on the remnants of Jurassic limestones (Švédské šance, Stránská skála etc.). The streams of Punkva, Křtinský potok, Jedovnický potok and Říčky drain off the Karst into the Svratka catchment area, simultaneously dividing the Moravian Karst into northern, central and southern parts. The characteristic features of the Karst are deep valleys and canyons with angle of slope up to 70° (*Czudek 1994*, 15); these were not suitable for settlement. In the northern part there is one of the most important Palaeolithic localities of the Central Europe – the Kůlna Cave. It is to be found in an open valley on the very edge of the Karst territory. The second important site is the Švédův stůl Cave situated in a rather narrow valley in the southern part of the Karst. The finds from other caves (Drátenická, Výpustek, Balcarka, Křížova or Pekárna[1]; *Valoch 1960*; *1965b*; *1999a*) are sporadic and do not make a more complex elaboration possible. However they can be worked with within the context of landscape utilization, unfortunately without a chronological classification.

Another archaeologically important karst area of Moravia that already falls into the Carpathian system is the karst region near Štramberk (*Fig. 4*) formed by Tithonian limestone (*Prosová 1952*, 417). The area is a part of the flysh range of the outer Western Carpathian Mountains, and from the regional division perspective it falls into the Štramberk Hill Country. From the macroregional point of view it forms a part of the rugged terrain of the Podbeskydská Upland reaching the 500 to 600 m elevation above sea level. In the northern direction the terrain quickly slopes down to the Moravian Gateway with 250 to 300 m elevation. Archaeological localities are tied to the limestone hill of Kotouč to the SW of the town of Štramberk. On its northern side the Kotouč Hill is divided by a short valley into the western part with the highest peak and the eastern part exceeding the height of 500 m. From the Kotouč Hill several caves were described (*Prosová 1952*), two of which – Šipka and Čertova díra – contained Middle Palaeolithic series of strata with a relatively rich industry and numerous palaeontological finds. The Šipka Cave remains preserved whilst Čertova díra has perished because of exploitation of limestones at the beginning of the 20th century.

2. METHODOLOGICAL APPROACHES

The selected collections of chipped stone industry were elaborated according to a unified key (Appendix No. 1 to 3). The finds were recorded into a database programme with a unique identifier attached to each of them (an inventory number of the Anthropos Institute of Moravian Museum, Brno). These database files were a source for the analysis of relations among the individual objects within the collection of stone artefacts. The analysis was aimed at the definition of the process of both blanks and tools production with special focus on the raw materials used. It was able to define the method of exploitation of the raw materials, the way of supplying the locality, and thus to define the distribution model.

For the purpose of correlation of the lithic industries with the other finds a due attention has also been paid to the reconstruction of the spatial distribution of artefacts, preferably according to stratigraphic units (in the case of Kůlna Cave). A chronostratigraphic position of the studied layers and a reconstruction of the natural environment with a stress laid on the hunted fauna have not escaped attention either.

The results have formed an important background for the determination of the economic strategy, the character of mobility of the population, the function of the locality etc.; these were the basis for the consequential synthesis of information according to both vertical and horizontal structures outlined. This chapter is directly continued by an evaluation of the knowledge obtained within the context of European finds, with the aim to determine whether some of the observed phenomena manifest themselves in an analogical manner in other places as well.

2.1. The character of input information

2.1.1. The Kůlna Cave

As a part of this thesis it has only processed the finds from the research of K. Valoch between 1961 and 1976 (*Valoch 1988b*) and the salvage research from 1995 to 1997 (*Valoch 2002a*). The processed collection comes from the entry space up to the rock shelf in the 19–20 bands (i.e. sectors A–D, K, L; *Fig. 5*). The layers found here have a clear mutual stratigraphic relation, thus enabling the tracing of development stages without the risk of drawing an incorrect inference on the correlation of layers between the entry and inner parts of the cave.

The finds are recorded within a network of squares 1 × 1 m but the squares are often joined; thus the density of the objects can only be followed with an approximate accuracy of 16 m^2. A more precise capturing of the spatial structures is carried out within the salvage research of K. Valoch between 1995 and 1997 in the O–N/III–4 squares (*Valoch 2002a*). Within the scope of the research more attention has been paid to the stratigraphic position which was closely observed and documented. Great reserves are hidden in the taphonomic analysis of the osteological material which has not been completed in its entirety for the time being.

2.1.2. The Šipka Cave

Materials from the cave date back to the excavation by K. J. Maška carried out at the end of the 19th century. This makes their information value very limited. Maška has endeavoured after the most precise capturing of a stratigraphic position. For this reason his excavation was organized in bands to enable him to make continuous revisions of the stratiraphy (*Fig. 6–8*). Unfortunately the greater part of information on the spatial distribution of the artefacts has not been preserved, and most of the objects lack a more precise stratigraphic position (*Fig. 53*). Moreover a later geological survey has shown that the geological processes in the cave were much more complex. Within the cave it has been elaborated only finds with information about the layer or a spatial localization. The excavation diaries also capture interesting spatial structures, only without any drawing documentation. Within the thesis it has been used for spatial distribution reconstruction bearing in mind their limited information validity.

2.1.3. The Čertova díra Cave

What has been stated about Šipka applies to the Čertova díra Cave (*Maška 1886a*; *1886b*; *1888a*) as well. Nowadays the cave does not exist any longer; for its reconstruction we may thus only proceed from the sources of the period – Maška's diaries (*Fig. 10*) and latter notes of scientists who visited the cave (*Fig. 9*; *Skutil 1952*; *Prosová 1952*). It is solely due to dating of the individual profiles and a relatively precise verbal description that we may carry out a more precise localization of some of the stratigraphic knowledge (*Fig. 11*).

2.1.4. The Švédův stůl Cave

For an evaluation of the character of input information we primarily have a publication that elaborates the research of this cave between 1953 and 1955 (*Klíma 1962*). The sediments in this cave were probably rather disturbed by the preceding works but the stratigraphic sequence in the foreland of the cave was still undisturbed as it was covered by the sediments from M. Kříž's excavation (*Klíma 1962*, 17). It is clear from the published text that within the scope of the excavation method of the period the stratigraphic issues were the main to be pursued. Sediments were excavated in auxiliary bands and therefore all artefacts found *in situ* were apparently correctly placed into the established strata (*Fig. 12*).

Much worse information is at our disposal for the solution of horizontal relations of the finds. The mentioned methodology of the research brings about only a general quantitative view of the density of the finds.

2.1.5. The Drátenická, Výpustek, Balcarka and Pekárna Caves

From these caves we have sporadic finds at our disposal that were hived off from find collections on the basis of a morphological resemblance to Middle Palaeolithic tools. There is virtually no information about their both horizontal and vertical position (*Valoch 1965b*; *1999a*).

2.2. Petrography

The classification of raw materials in the Middle Palaeolithic collections was based on a macroscopic evaluation that has subsequently been made more precise by means of a binocular microscope using a non-destructive method. This one is based on water immersion which, to a certain degree, eliminates an adverse interception of light rays on the surface of a stone artefact, and which thus enables an evaluation of the inner attributes of the material with non-patinated pieces (structure, fossil, minerals contained in rock materials etc.).

2.2.1. An overview of Moravian raw materials

Within the Middle Palaeolithic settlement of Moravia the following stone raw materials have been successfully identified:

Silicites
- Erratic silicite ("flint" *sensu lato*)
- Radiolarite
- Cretaceous chert (spongolite)
- Chert of Olomučany Type
- Chert of Krumlovský les Type (*Přichystal 1984*)
- Cherts of Baška formation
- Chert of Býčí skála Type
- Silicite of Němčice Type (*Oliva 2000*; *Neruda – Válek 2002*)
- Cherts from Stránská skála
- Cherts of the flysh formation
- Non-distinguished cherts (Moravian Jurassic cherts)

Silica minerals
- Quartz – I.
- Rock crystal, smoke rock crystal, citrine (*Plch 1977*; *Staněk – Plch 1980*; *Přichystal 1989*; *Valoch 2004*).

Clastic siliceous rocks
- orthoquartzite of Drahany
- orthoquartzite – black colour

Other raw materials
- Greywacke – I.
- Porcelanite
- Siltstone, agglomerate, sandstone

2.2.2. Sources of raw materials (*Fig. 13*)

A: Northern part of the Moravian Karst
B: Svitava River valley
C: Central part of the Moravian Karst
D: Brno region (*Valoch 2002b*)
E: Region of Drahanská Vrchovina
F: Region of Krumlovský Les (*Oliva – Neruda – Přichystal 1999*)
G: Region of Českomoravská vrchovina (*Valoch 2004*)
H: Region of Dolnomoravský úval (Morava river valley)
Ch: North Moravia – Oder catchment area
I: Pass fo Vlára
J: The flysh zone of North Moravia

2.3. Technology

The technological analysis of the Middle Palaeolithic collections is based on a detailed description of an object according to predetermined criteria, which were chosen in such a way as to capture possibly all important characteristics that specify ranking of the object into the operating scheme. Within the description of the object several problems have occured; these have to be explained beforehand in the interest of understanding of the system described in the next chapters.

This particularly relates to attributes describing the morphology of the artefacts, especially blanks (see Appendix n. 2). The greatest problem may be considered their placing into the production chain, i.e. whether to classify the object as the product of a preparation, exploitation or repreparation of the core. This issue comes into the fore especially with objects produced by discoid method with which it is very difficult to distinguish the individual stages of the core reduction. This follows from the overall character of the method, as with an ideal exploitation of the core it is not necessary to carry out preparatory and reparatory steps for a repeated forming of a suitable shape. To solve this problem it should be used, in my oppinion, a more general analytical description that follows from a combination of morphological attributes. Such system is adequately universal and ables to obtained data with the same hierarchical level.[2] For the determination of the type of an object its morphology was preffered (sidestruck blank, blank with lateral cortex etc.). For objects defined as cortex blank, blank without cortex other details seem to be redundant. The objects without other more marked morphological features for which there are no terms of the same hierarchic level were ranked among objects defined like this.[3]

Another morphological attribute defining the character of the described object was the determination of the percentage of cortex on the object, or the establishment of the number of scars on the dorsal surface. The percentage of cortex is expressed by groups of 25 per cent, and the number of scars was counted without retouch and scars emerging from abrasion of the impact edge. A problem was encountered with e.g. blanks with a core side as the scars or cortex may also be present on a surface that is not visible from the dorsal side with a plan view. In these cases both the scars and the cortex were included to those on the dorsal side as if they were directly visible because from the morphological perspective this is still the dorsal side.

A classic example of determination problems is the establishment of criteria for blades, especially in Middle Palaeolithic collections. As a primary attribute I have used the metric criterium in combination with the orientation of an axis of the object. A classic aspect ratio was thus confronted with the orientation of the object. To wit, in some cases the maximum dimensions of the blank with no regard to the striking platform orientation made it possible to classify an artefact as a blade, but with an orientation of the object with respect to the striking platform, the measurements have changed and the aspect ratio then corresponded to a flake.

This approach was a basis for the metric sub-group of data in the database. During the length measuring the striking platform has identified itself with the X axis (*Fig. 14A*). For the subsequent analyses I have also used the system of dimension groups which were based on the comparison of the area of the object with concentric circles with interval of 2 cm in diameter. Thereby it is possible to arrive to a more exact establishment of the surface area of an artefact, and at the same time to make an easier provision for the length-width aspect in the combined graphs. The dimension of the striking platform and the angle between striking plarform and the ventral surface represent other group of the metric data (*Fig. 14B*).

Cores were classified in a relatively easy manner as it turned out that the most important technological subtleties and issues were not unambiguously describable by the database system (see Appendix 1). Probably the most subjective issue is the ranking of cores into the production process stages, especially in the case of discoid cores where it is practically impossible to distinguish between stages of preparation and exploitation. From the opposite side of the operating scheme there is a very vague boundary between small exploited cores and core remnants. The decisive criterium was whether the exploitation surface within its dimensions was still capable of a follow-up exploitation or not. In case the exploitation surface bore signs of unsuccessfull chipping in the form of terminations, such cores were ranked into the core remnants category. Nevertheless such criterium established this way is burdend burdened with a rather great subjective mistake.

The above issues were the main ones in need of a detailed qualification for the purpose of creating a unified system of description.

2.4. Typology

The typological analysis used for the description of retouched tools from the Kůlna Cave stems from Middle Palaeolithic system that has identified 63 types (*Bordes 1961*). A number of modifications were included in the form of sub-types (cf. notches, bifaces). However a modern application of this system encounters a number of problems, especially with processing of the industries of bifacial cultures of Central and Eastern Europe (*Marks – Chabaj eds. 1998*, 5–6). Their essence is the stuffiness of the system for the classification of objects that show attributes of several types even within the boundaries of one typological class. This fact is especially prominent with side scrapers where we may find a range of objects classifiable e.g. as bifacial side scrapers with thinned back, ventral offset scrapers etc. (*Neruda 2000*). It is obvious that for the description of these a system using analytical methods for the classification of tools would be more suitable. Such systems, though, clash with the problem of compatibility with other descriptive systems that bear marked individual traits. In future it will surely be suitable to carry out a similar experiment with a classification system of an analytical character that will, for instance, bear a likeness to the code used for the description of silimar industries from Crimea.

The recorded industries often contain a quantity of bifacial objects that are likewise difficult to describe by means of the Bordes system. The typological classification of the bifacial constituent of Micoquian for the German material was carried out by G. Bosinski (*1967*) who has precisely defined the individual types. The main bifacial types established by Bosinski were integrated into Bordes traditional system as sub-types under the typological number 63 (see Appendix 2). A more precise differentiation of the individual sub-types of bifacial backed knives has not been made as their definition is lacking in a general consensus, and the question arises whether an establishment of the individual groups on this basis is indeed sufficiently evidential.

3. ANALYSIS OF THE SITES

3.1. Kůlna – layer 14

The processed collection of artefacts from layer 14 comes from a depth pit in D2 sector (Valoch 1988b) that stretches at the toe of the rock step dividing the cave into an entry and central part (*Fig. 16*).

Layer 14 occurs in the basal part of the documented profile (*Valoch 1988b*, 164, abb. 61; *Fig. 17*). It consists of a dark brown soil with abundant detritus and huge boulders. Pursuant to natural science analyses this layer may be paralleled with the end of OIS 6, or with the beginning of the last interglacial as a maximum (OIS 5e). Rather than forming a continuous archaeological layer the artefacts were loosely scattered in the sediment.

There are only a few animal bones coming from the small investigated area, and it is practically impossible to draw any broader ecological and economical conclusions. From among fauna there were relatively big animals identified, i.e. an elephant, a horse, a rhinoceros and a bear (*Valoch 2002a*, Tab. 1; *Musil in Valoch et al. 1969*). From the perspective of a deliberate manipulation K. Valoch states broken bones and one piece of mammoth tusk that could have been used as a soft hammer (*Valoch 1970*, 37).

The operating scheme (for data see *Tab. 2–16*; *Graph 1–3*) of the stone tool production may be concluded as follows: as early as in the initial stages the production of blanks has occured according to two technological principles. The first one was processing of raw material on the site, mainly through the method of extraction of blanks from the prepared cores. These were either volumetric (subprismatic, polyhedral) or planar (Levallois). Because of a small number of objects, and with no possibility of refittings it is practically unfeasible to make a strict distinction of both concepts, and the subprismatic cores might have been a basis for a further Levallois way of core reduction. The production of tools made use especially of blanks with a small amount of cortex or with a totally absent cortex. From the perspective of raw materials used it was mainly spongolite and a high-quality orthoquartzite of the region of Drahanská Vrchovina that formed the main economic basis for the production of tools.

An alternative, totally different way of handling the raw material could have been represented by the method of direct shaping (fasonage), which might be related to the production of pebble tools that were found on this site in small numbers. However the question remains whether these shapes are not in fact a result of some other activity rather than intentional products during the manufacture of tools. A statement like this would also relate to the fact that there were none other types of tools produced by this method, and therefore even in case of an intentional use it has not played a more important economic role in the manufacturing process. There was a preference of river pebbles that were initiated by several strokes into the form of choppers. Their connection to greywacke pebbles surely was not based on the quality of the raw material but on the morphology, as globular forms from other raw material (e.g. quartz) suitable for the production of choppers are practically not findable in the vicinity of the Kůlna Cave.

3.2. Kůlna – layer 11

The finds from interglacial sediments come from the entrance of the cave up to the rock step that elevates the level of the terrain by approx. 10 m in sectors E–F. Therefore sectors A–D (*Fig. 23*) were the only ones to be analyzed. During the research the stratigraphic series of strata 11 were localy divided into 4 sub-strata 11a–d, and we have palaeolithic finds at our disposal from horizons 11a, c–d (*Valoch 1988b*).

A preference of stratigraphical issues and the character of finds horizons are the reasons why the settlement structures of layer 11 have only been identified by means of indications (*Fig. 23*). The captured settlement was concentrated in the space of the entry part of the cave, i.e. in front of the rock step, in band 19–20.

Out of the richest layers 11 and 11c there were 20 animal species identified (*Musil 2002*, 69). The number of minimum individual index (NMI) is not available, but R. Musil states that the greatest number of bones came from horses. Obviously it is necessary to take into account an important share of cave carnivors in the creation of this faunistic community.[4]

The technology of processing and utilization of the osteological material has already been suprisingly well developed. For the purpose of his monograph K. Valoch has already hived off the bones which bore signs of human manipulation and the use in the manufacturing process (*Valoch 1988b*, Abb. 48–51; *Fig. 26*).

To a certain degree the operating scheme is similar to the previously described manufacturing process in layer 14 (for data see *Tab. 17–35*; *Graph 4–8*). The production of stone tools is divided into two concepts – the so-called direct shaping of the tool (fasonage), although this is only supported by choppers and chopping tools and some sporadic bifaces, and the concept of blanks extracted from prepared cores that is absolutely dominant in the collection.

Second way of the production is represented by many variants of the core reduction but in all cases these are volumetric cores of the sub-prismatic type (in some cases with a changed orientation of exploitation surfaces in the final stages of exploitation) and of the discoid type *sensu lato* that dominate in this collection. Within the frame of the discoid method we may differentiate various types from discoid cores *sensu stricto* with non-hierarchized surfaces, through sub-discoid cores with several variants – with hierarchized surfaces, discoid unifacial and discoid with a changed orientation. The occurence of discoid cores with transverse fractures or analogical natural surfaces that are in some cases markedly reminiscent of chopper forms is of interest. The cores were exploited with a maximum endeavour after effectiveness so that even cores of very small dimensions have been preserved. The principles of exploitation of the individual types of volumetric cores sometimes take turns even on a single piece, and in some cases their unambiguous interpretation is therefore difficult. The choice of method was dependent on technological needs influenced by an endeavour after the maximum effectiveness of exploiting every piece of raw material. On the other hand, the method seems to have been totally independent of the kind and quality of the raw material.

For the production of tools blanks with a smaller quantity of cortex on the surface were used more likely, i.e. blanks from the exploitation phases of core reduction were preferred, albeit indistinctively. The preference of high-quality raw materials against poorer quality variants is similarly indistinctive.

Industry from hard animal materials too acceded to manufacture of tools in the form of soft-hammers, which provided a whole range of advantages in the creation and reparations of scraper retouch. Their quantification and degree of usage will no doubt be a subject of another research.[5]

3.3. Kůlna – layer 7c (Micoquian)

The finds horizon 7c stretches on a larger area than the finds from series of strata 11; it takes up practically 1/2 of the cave's area. At that time both the entrance of the cave and its centre from band 19–20 to the north has been used. Layer 7c petered out in sectors E and F, so that according to our knowledge we have no evidence of the settlement of G and H sectors.

In the entry part of the cave layer 7c covers the underlying sediments of the last interglacial and the Würm anaglacial, whilst in sector E the sediments of this layer stretched direct on the rock (*Valoch 2002*). At the first sight it is important that the geological stratum is not thick, and therefore it had to be formed in a relatively short period of time (conf. with layer 11). Also its character was quite different from the under- and overlying strata, and so it was possible to distinguish this layer quite precisely. Therefore it may be stated that the stratigraphic position of the finds is fairly accurate. We may also assume that even post-deposition processes have not altered the possible spatial structures.

The position of hearths, the density of finds and special situations that are reminiscent of organic material deposits, in some cases probably of non-utilitary significance (*Fig. 34*) yielded basic information about the spatial distribution of human activities. The determined structure is relatively simple with two concentrations in the central part of the cave.

The big fauna shows both warm and cold features with the coexistence of deer, horse, mammoth and reindeer (*Musil in Valoch et al. 1969*, 13–14). Mammoth is prevalent in the fauna with rhinoceros and reindeer in the background (*Musil 2002*, 68). From the perspective of the number of minimum individuals mammoth bones are found most often, there is an abundance of hare and reindeer bones but the estimate of the number of minimum individuals is one off in both cases (*Zelinková 1998*, Fig. 2–3). An important constituent of the osteological material is a collection of objects that show traces of human impact on the hard animal materials (*Valoch 1980a*).

Operating scheme

The raw material was brought to the site in an already prepared form. The regional sources prevail, and a special part was played by the spongolite from the alluvial terraces of the Svitava River. In the further process of manufacturing the brought pieces were quickly formed into the required shape and then exploited, presumably solely by the method of discoid reduction of the core. Flakes were mostly chipped off by hard-hammer of quartz, and greywacke pebbles were probably used too; these may influence the value of a more frequent use of soft-hammer. The essential thing is that the exploitation was aimed at obtaining much more standardized blanks with a small amount of cortex and/or without cortex. These blanks were mostly shorter and broader, which again corresponds with the attributes of discoid debitage. A majority of such blanks entered into the manufacturing process of tools, mostly scrapers, notches and denticulates, and also blanks without retouch were often used as is indicated by a high percentage of edges with microfractures or local retouches.

Another manufacturing method captured in the material from the entry is the fasonage method which was proven by two bifaces produced from a distant chert of the Krumlovský les type. From a hitherto performed analysis it is not obvious to what extent has their shape been modified on the site. This issue will require an elaboration of the chips and small blanks with a focus on the morphology of the striking platform. The analysis carried out so far indicates a higher percentage of simple facetted striking platforms that may come from the reduction of bifacial forms. However the angle of these striking platforms culminates at the region of 100°; this rather indicates chipping from cores than from bifaces with which the angle should be more open. New analyses of refittings of bifacial tools indicate that even striking platforms with a 100°angle may emerge with a specific way of reduction of the thickness with a bifacially retouched tool (*Nerudová – Neruda 2004*; *Nerudová 2009*). A reconstruction of the manufacturing procedures of the direct shaping method will therefore be a subject of another, more focused analysis.[6]

The entire method of production proves characteristics of a manufacturing specialization and standardization, and in this respect it edges nearer to technological and economic attributes comparable to Upper Palaeolithic collections.

3.4. Kůlna – layer 7a (Micoquian)

During the period of forming of layer 7a the Kůlna Cave has been populated on its largest area. Finds were captured practically in all sectors, although in a varying density. Within the thesis the finds from the entry part of the cave have been elaborated, i.e. sectors A–D, K and L (*Fig. 38*).

From the geological point of view layer 7a is of loess origin, brown and dark grey coloured. For this layer we undoubtedly need to figure on a longer period of time for sedimentation than for layer 7c, and thus also for a possible longer interval of finds dating.

An analysis of spatial zoning of the cave within layer 7a is very complex as there were more factors contributing to the emergence of its content that are difficult to differentiate from one another. The individual concentrations observed are mutually exclusive (they do not overlap in space) and they differ in the function. This would indicate a one longer episode of occupation, or rather a repeated use by one group of people (*Fig. 38*).

Analyses of fauna remains are still rather preliminary. From the quantitative point of view mammoth and reindeer are more represented than horse and rhinoceros. Small numbers of individuals in relation to the total number of bones found are surprising (cf. mammoth). It follows from the analysis of the mammoth and reindeer ratio that contrary to layer 7c the economic importance of reindeer increases (*Zelinková 1998*; Fig. 2, 3).

The operating scheme of layer 7a may be reconstructed relatively precisely on the basis of the objects found (for data see *Tab. 52–67*; *Graph 14–18*). Raw material was brought to the site in a slightly modified form so that its main working proceeded from the phase of removal of cortex. As early as during these phases we may hive off two main directions of working. The first one is the method of direct shaping (fasonage) applied mainly in the production of choppers and some bifacial artefacts (e.g. a biface, *Fig. 9: 2*) from slightly modified blocks of raw material (a further use of the method will only project into the working of blanks from exploitation of core). For the production of choppers greywacke was chosen practically exclusively. According to the character of the retouches carried out it is obvious that soft-hammers were used in the manufacturing process. Their existence is corroborated in the form of boht bone and mammoth tusks fragments with traces of the impact of lithics at the extremities (*Fig. 11*).

The second method of tool production was based on the extraction of blanks from a core. Such concept was practically independent of the quality of raw material and it was only practised on raw materials from proximal sources.

There were two basic principles of core exploitation in use. The dominant method was the exploitation from both discoid cores sensu stricto and sub-discoid variant with hierarchized (non-interchangeable) surfaces A/B. Second variant is added by unifacil cores with natural convexity of the striking platform.

Another basic principle practised in exploitation of blanks was also a volumetric method of core exploitation characterized by a parallel principle of chipping. These were both the so-called subprismatic cores with which a simple parallel chipping was used without technological subtleties of guide edges and reparations of surfaces, and the more developed types, represented by crest blanks, secondary crest blanks, which are the typical products of the Upper Palaeolithic prismatic core reduction strategy.

Hitherto unresolved is the issue of presence of the so-called Quina method that combines the principles of discoid core with parallel chipping within individual series of blanks. In the collection of layer 7a there are pieces with a changed orientation and several parallel scars that may be both representatives of prismatic cores with a changed orientation and the Quina type cores. For a more precise codification it will be necessary to carry out refittings focused at the given method because this is the only procedure that may adequately codify its existence.

Although Neanderthal people do not seem to have suffered from a scarcity of raw material at the time of forming of layer 7a, a marked feature of the collection of cores is their great "exploitation rate". In other words, an exploitation of one core was mostly very intense, and for this reason it is difficult to make a more precise determination of especially the preparatory and exploitation procedures. The follow-up refittings that will surely be possible to carry out within the production object in sectors B/C will no doubt bring valuable knowledge of the early stages of core reduction.

The blanks emerged by these methods entered probably independently into further working for tools. As has been already stated, the selection of blank was rather dependent on the quality of raw material than on the morphology of a piece although the utilization of blanks without cortex or with a small amount of cortex was prevalent. The blanks were modified by a simple retouch or a bifacial retouch stemming from the principles of the direct shaping method (fasonage). Backed knives and plan-convex bifaces often have an asymmetrical cross section that is related with a requirement of a suitable angle for the creation of a functional retouch (*Boëda 1995*). An interesting feature of the collection of tools is a great number of types that combine more characteristics of Bordes descriptive system, which makes them difficult to classify. So far it is not clear what made Neanderthal people create objects with a similar function by such differing methods, and mainly with a differing degree of exerted energy.

3.5. Kůlna – layer 6a (Micoquian)

The cultural layer 6a covers practically the same area of the Kůlna Cave as the underlying layer 7a. According to the original finds diaries of K. Valoch layer 6b is an equivalent of layer 6a in the central part of the cave. Within the thesis I have again elaborated only the finds from the entry part of the cave to the rock shelf in the 19–20 bands (*Fig. 46*).

Layer 6a is formed by brownish-yellow loess with abundant fine debris. Lithologically it was different from the underlying layer 7a that shows a temperature oscillation within stadial climate a marked oncoming of which is observed from the formation of sediment of layer 7b. Layer 6a (and 6b)[7] is a product of aeolian sedimentation in a dry environment that corresponds to a typical stadial.

The captured spatial zoning of the cave is very simple, or we do not have proofs of such complexity furnished as in the preceding cases. Practically the entire cave within the layer 7a extent has been populated.

For the purposes of reconstruction of economic behaviour it is mainly macrofauna that is important to us. From this point of view an analysis of fauna from the interior part of the cave is more confirmative (*Zelinková 1998*), and it has been quantified. It is evident from the overview that, equally to layer 7a, in this period too the economy is based mainly on the hunting of reindeer, and the percentage of its representation in the collection and in the ratio to mammoth already comes close to the Magdalenian situation (especially in the determination of the number of minimum individuals; *Zelinková 1998*, Fig. 3). Admittedly it is not possible to talk about a real specialization, but in comparison to layer 7a there is a marked quantitative increase in favour of one species. Mammoth is also amply represented, both by individual bones and specimens. The game fauna was clearly supplemented also by horse and rhinoceros that appears on a number of Middle Palaeolithic sites in Europe. The authoress estimates the remains of bear to 3–4 individuals (within the area under research), but the question of hunting of this carnivore is insolvable.

Operating scheme (for data see *Tab. 68–86*; *Graph 19–23*)

The area of Velký and Malý Chlum Hill(s) was mostly used for the supplying of the site with raw material, and an important role was also played by the cherts of the Moravian Karst. A similar structure is known from other Micoquian layers. The transport proceeded mostly in the form of tested blocks and nodules, as the cortex removal stage of the manufacturing process manifests itself rather markedly as against other collections.

The main manufacturing method was an exploitation of discoid cores that produced flakes with partial cortex, without cortex, and sidestruck flakes. An Upper Palaeolithic method of a prismatic core may be considered a parallel manufacturing procedure; however in my opinion it is not yet adequately consolidated. The proportion of debitage with parallel exploitation, blades from preparatory and repreparatory stages of the production process, same as a higher representation of striking platform abrasions is somewhat discrepant from the cores found which do not adequately illustrate the independence of the prismatic method of core exploitation. The situation is even more complicated by the fact that in the debitage we have both preparatory and exploitation stages corroborated and the cores concerned would be easy to differentiate. One interpretation reckons that the originally leptolithic prismatic cores were reshaped into other types – mostly discoid – by a further process of exploitation. However this seems to be improbable with regard to the technological setup of the cores found.[8] Another possibility is a transfer of the cores after preparation steps to another site, either within the cave or outside of it. In this respect the area of entry part of the cave could be considered as an atelier.

Another identified method of blanks production for tools is a direct shaping of the tool (fasonage). Because of a limited number of artefacts of this type it is relatively difficult to make a more precise specification of manufacturing processes. As most of the classified bifaces are made of the main raw material – spongolite – it may be assumed that this method could have been totally independent, same as it could have been a part of core exploitation, from which it would have used suitable blanks for the final creation of a tool by an ambilateral working. For a summarizing evaluation it will be necessary to carry out an analysis of the layer from the entire cave.

Contrary to other comparable layers the preparatory and manufacturing stages of the production process manifest themselves much more markedly as against a smaller number of cores in wastes (confer with the possible atelier function of the entry part of the cave – see above). A majority of blanks fall into the metric categories "c" and "b", the cores culminate in "c" and "d". As the tools are mostly represented in the metric classes "c" and "b", we may assume that blanks with a small amount of cortex were used in the main.

On the raw material side the utilization of blanks was guided by relatively simple principles. Spongolite was regularly used most; it dominates throughout the collection. Because of a higher usage of blanks with cortex it may be surmised that this factor was not the main one in the selection of a suitable blank. In case of scrapers it obviously was not even the morphology of the blank as quite often also fragments of blanks and waste were used as well. Only with Upper Palaeolithic types we observe a certain effort to standardize blanks that leads towards the use of formal types of blanks without cortex.

3.6. Švédův stůl

The cave occurs on the right bank of the Říčky watercourse that forms a main axis of the karst valley in the southern part of the Moravian Karst. The cave is situated only 11 m above the bottom of the valley, but there are easily accessible open areas to the north and east that could have been a basic stage of economic strategies. Švédův stůl is a medium-sized cave with a NNE oriented entry. The roof of the cave is formed by diagonally deposited flat slabs of limestone (*Klíma 1962*, 19). The original entry was wound to the east. The length of the cave moved around 26 m.

The research of B. Klíma (*1962*, 33) has differentiated 15 geological layers. Layers 10–14 that are interlocked with variously developed soils (*Fig. 51b*) are attached to the Middle Palaeolithic period. Originally the layers have had a detailed chronological division from Riss-Würm interglacial (layers 13, 14) through Old Würm (12) to the end of "W 1–2" (layers 10–11). More recently some research workers presume that the entire complex falls into the warm oscillation at the beginning of the Würm glacial (i.e. *Valoch 1996a*, 55).

Regarding the spatial zoning of the cave we practically have none more precise details available. The head of the research has stated that the main population was situated in the entry and central, widest part of the cave. The main point of the human activities was probably the hearth "c" found in layer 11 (*Klíma 1962*, 36).

There is a rich fauna originating from the cave; however it comprises both the human contribution from the hunted animals and a considerable gathering of bones by hyenas.

For the reconstruction of the operating scheme (for data see *Tab. 88*) we have a scarce background material. Because of a small amount of fine blanks it is possible to assume that the cave was a place for manufacturing of tools for working of organic material at quartering and portioning of meat. Therefore we do not have the entire operating chain preserved, and this also explains the small amount of industry. The preserved finds fully conform to the Middle Palaeolithic standard of the discoid method. However a cultural correlation is impossible because of the small number of finds and an absence of significant types.

3.7. Šipka

The Šipka Cave is located on the northern slope of the Kotouč Hill at the elevation above sea level of 440 m, i.e. about 130 m above the Sedlničky Brook valley (*Fig. 6*). The entrance, 8 m wide and 3.8 m high, opens to the north and its arch and dimensions were probably similar to the entrance into Čertova díra.

K. Valoch has occupied himself with a correlation of Prošek trench (*Kukla 1954*) with finds horizons (*Valoch 1965*), and he succeeded in identifying Maška layers with a stratigraphy captured in a more complex manner. He has also tried to date Middle Palaeolithic horizons of dark soils. On the basis of the compared data we may perhaps correlate Maška Middle Palaeolithic horizons with layers 6 to 8, which are defined in Prošek stratigraphical sequence (*Fig. 54*).[9]

Structures are mostly tied to the main Middle Palaeolithic layer III, and for this reason they are described jointly, although it is possible that Maška has made an incorrect or imprecise stratigraphical classification of some structures (*Fig. 53*).

So far there have only been lists of species carried out without detailed taphonomic analyses that would elucidate the ways of handling a hunted animal and thus enable the establishment of hunting strategies, the degree of specialization, ways of processing, consuming etc. (*Musil 1965*; *Musil 2002*).

The operating scheme (for data see *Tab. 89–108*; *Graph 24–26*) of the Šipka Cave is relatively simple. A distinct relation between the applied method and the raw material has not been captured. The economy of production is based mainly on the working of blanks chipped from the prepared cores. In the analyzed part of the collection all cases had to do with a volumetric principle of exploitation represented mainly by the discoid method with various sub-variants. On the basis of debitage we have to admit also the prismatic principle of core exploitation which does not markedly show itself in the collection of cores. It is possible that both methods were applied simultaneously according to requirements. Several tools indicate the knowledge of the method of fasonage.

3.8. Čertova díra

Nowadays the cave is non-existent. Its vaulted entrance was oriented towards the west or north-west. Originally it was 4 m wide and 1.3 m high, and after Maška's research it was 5 m high and 8 m wide which is a condition that is closer to the situation from the time of Middle Palaeolithic population. It follows from a detailed description of the Cave's shape (*Prosová 1952*, 434)[10] that it was morphologically divided into two parts (*Fig. 9*).

The stratigraphical situation was largely similar to the conditions in the Šipka Cave, including all problems ensueing from the period character of implementation of the research (*Valoch 1965*, 14).

The spatial models ascertained are described in a schematic manner as if they were from one Middle Palaeolithic layer, although it is probable that all the structures were not simultaneous (*Fig. 59*).

The main differences in the composition of species as against the Šipka Cave are found with the even-toed ungulates among which species like reindeer, rock goat and elk appear. On the other hand, deer that appears practically on all lists from the Šipka Cave is missing here.

Operating scheme (for data see *Tab. 109–125*; *Graph 27–32*)

Raw material brought mainly from vicinal sources was processed on the site from the initial phases of core exploitation. This was done by means of two methods, discoid and subprismatic. Both represented a volumetric concept of core reduction. The selection of methods was guided by the shape of the processed raw material rather than by special technological and morphological requirements. The chert of Baška formation was mainly used for the production of tools; this is logical because of its easy availability and abundance on the site. Other raw materials, though less represented, also show a high percentage of utilization. Especially products without cortex or with a small amount of cortex were preferred.

4. MIDDLE PALAEOLITHIC IN MORAVIA

4.1. Settlement structures

Despite a long-term interest in Neanderthal "culture" we have to admit that regarding the issues related to the utilization of landscape we still have large gaps, and that this condition is mainly caused by the status of research which was mostly focused on karst regions where the spatial identification is simpler. For this reason it seems that a majority of Middle Palaeolithic localities, especially those with a complex stratigraphy, are found in caves. If we work only with sufficiently confirmative collections we are to a degree stunned by the fact that out of all karst regions in Moravia only two have been utilized – the Moravian Karst and the Štramberk Karst, where there are four caves with collections of Middle Palaeolithic inventory capable of statistical evaluation (Kůlna, Šipka, Čertova díra, Švédův stůl)! Besides these there are only sporadic finds from the cave environment that indicate their episodic utilization (Drátenická, Výpustek, Pekárna, and Balcarka Caves). As the main Middle Palaeolithic stations, especially from the younger phase, originate from caves, a general opinion prevails that the caves have been preferentially selected for settlement. A number of Middle Palaeolithic cave localities are surely negatively influenced by the character of karst regions in this country. These mostly occur past the main watercourses, which create natural waterways in Moravia, and are characterized by deep and sharp valleys that do not offer suitable conditions for settlement. It is probable that in case of a suitable geomorphology the rate of populated caves would have been higher.

On the other hand new researches of open locations show that the utilization of non-karst regions was much more intense than it has seemed to be up to now, but their identification is, and will keep too be, very difficult. With a view to a relatively intense sedimentation of loess in the territory of Moravia the Middle Palaeolithic layers are covered by a quite thick overlying stratum that in most cases excludes a detection of a site by surface prospecting. It is therefore inevitable to indicate the possible potential locations by indirect corroborations. A combination of a suitable geomorphology of the terrain with the presence of raw material sources proves to be the best. In such regions it is possible to reckon on a more stable settlement, i.e. with settlement structures at the level of settlements-ateliers-hunting stations (the region of Krumlovský les, the Oder basin, the Svitava River catchment area, the region of Uherské Hradiště, Moravian Gateway). In regions with less suitable conditions for population but providing important raw material sources we have to assume a system of exploitation places, workshops, short-term processing sites etc. (the region of Czech-Moravian Highlands – rock crystal, smoke rock crystal; Moravian-Slovak borderland – radiolarite). A certain corroboration of this theory is the research of raw material region near Krumlovský les, where a number of Middle Palaeolithic layers containing archaeological material was successfully found, frequently in superpositions with a younger, most often Szeletian settlement (Vedrovice Ia, Vedrovice IIIb, Jezeřany IV, Moravský Krumlov IV); (*Neruda – Nerudová – Oliva 2004*). Bořitov region appears to be an analogical area where a number of sites of apparently Micoquian age is found; spongolite, which has primary outcrops in this area, has been exploited here (*Oliva 1987a, 1991*; *Oliva – Štrof 1985*).

For the time being the reconstruction of Middle Palaeolithic settlement areas is at its beginning. The greatest problem is the time correlation of the background materials found. Our knowledge is still rather incoherent, especially for the period of Riss *sensu lato* (OIS 8–6). Some unique finds of handaxes are put into this period; they are related to Lower Acheuléen, but their classification into Old Micoquian (Bohuslavice, Polanka n. Odrou, Určice, Předmostí II, Kadov) also cannot be excluded. If we concede their dating into Riss, on this basis we are then able to state several regions into which the settlement of the older phase of Middle Palaeolithic has concentrated. The northernmost enclave is the region between Ostrava and Opava with finds of handaxes in Bohuslavice (*Svoboda et al. 1991*) and Polanka n. Odrou. Another settlement region could be the Přerov–Prostějov area blanked by a discovery of a handaxe from Určice-Dlouhé Kluče[11] on the one hand and stratified finds of handaxes from Předmostí II – Hradisko, although these have not come down (*Knies 1929; Absolon – Klíma 1977*) and the reconstruction of the original situation is complicated[12]. The most evidential stratified corroboration of settlement is layer 14 in the Kůlna Cave of the Moravian Karst that falls within the end of the Upper Riss glacial (OIS 6). It is a small collection of approx. 100 pieces of chipped industry in the context of fauna. The discoveries from the Brno vicinity which most often come from the loess profiles (a chert core from Brno-Modřice; Brno-Židenice – Malá Klajdovka and Brno-Židenice – Nová hora[13]) are obviously related to this region. A small collection of chipped industry from the Moravský Krumlov locality IV-1 (layer 3) dated by the OSL method to 151,400±13,800 BP for the time being will presumably be somewhat older. Some finds from the brickyard in Moravský Krumlov may be of similar age (*Valoch – Dvořák 1956*); at least one flake was situated on the base of the profile underneath the interglacial soil. Also some surface finds from the region of Krumlovský les (Vedrovice, Jezeřany, Maršovice, Dolní Kounice, Pravlov and others) are likely to originate from this period. Sporadic finds indicate an expansion in the westerly direction too, into the area of the Czech-Moravian Highlands (unifacial handaxes of quartz: Hrotovice-Mstěnice, *Oliva 1990*; Modletice, *Svoboda 1996*). The southernmost enclave is the Znojmo region in which the settlement is probably supported by a handaxe from Kadov (*Skutil 1964*), Božice (*Kovárník 2001*) and several quartz artefacts from Miroslav-Kašenec open-air site.

Our knowledge of the subsequent Eem interglacial period (OIS 5e) is not much better. Again, the key locality is the Kůlna Cave with the complex of strata 11, that have yielded a numerous inventory of chipped stone industry and osteological material, and where we can also identify possible spatial structures. The collection found is related to Taubachian although it is not located on the typical travertine sedimentary deposits. We may count on these with another stratified locality, Předmostí II – Hradisko, that is located near Přerov in Moravia (*Svoboda et al. 1994, 1996*; *Moncel – Svoboda 1999*). On this site a collection of chipped stone industry has been successfully discovered in a soil that forms a part of a mighty loess bank. In the Eem period this probably was an outcrop of mineral water.

According to the OSL dating the Moravský Krumlov IV locality, layer 2, would also fall within this period; this site may be characterized as a shop for working of the local chert (*Neruda – Nerudová – Oliva 2004*). The chipped stone industry is supplied out by not numerous restes of fauna. Because of a minimum quantity of tools capable of a typological evaluation it is difficult to make a more precise classification of the industry, but the discovered scrapers suggest a belonging to the sphere of Middle Palaeolithic industries with bifacial tools, in this case to Micoquian. These three localities determine the main known settlement units in the period of the last interglacial. Moreover, the finds from the Kůlna Cave suggest that from the point of view of raw material in this period we have to allow for a population of other regions with occurence of raw materials – north Moravia with erratic silicite, east Moravia with sources of porcelanite and radiolarite and with the utilization of rock crystals from the Czech-Moravian Highlands. Some raw materials have obviously necessitated a focused excursion into regions entirely beyond the known settlement areas; then it is possible to consider even formation of settlement structures with sites of varying functions. A certain indicia to this sense is represented by a workshop for processing of the local veinous quartz near the village of Němčice in the distance of approx. 5 km from Kůlna (*Neruda – Válek 2002*).[14]

This phenomenon is further deepened in the subsequent old Würm glacial period. The most complex area is represented by the Moravian Karst. During this period the caves of Kůlna (layers 9–6a), Švédův stůl, Pekárna have been populated; some sporadic finds come from the Výpustek Cave and apparently also from the Drátenická Cave. Thus we have both stable settlement sites and stations oriented towards another function corroborated. In this period there seems to be a boom in the utilization of the Moravian Karst. The complex of workshops and base camps near Bořitov in the Svitava River basin where the local cretaceous chert was exploited (Bořitov, Býkovice, Ráječko, Černá Hora, Boskovice) perhaps also belonged to the system of Micoquian settlement of the Kůlna Cave. If these stations are concurrent, probably with layer 6a, they represent a proof of formation of settlement structures in this region. The Czech Moravian Highlands where rock crystal and smore rock crystal could have been obtained were economically tied to it. The Middle Palaeolithic age is assumed with the surface sites of Suky II, Kněževes, Netín, Sklené I, perhaps also Rousměrov and Bohdalec (*Valoch 2004*). Within the framework of raw material exploitation the finds of the Brno region are also related to the Moravian Karst region. This is corroborated by the stratified discovery of hearth from Brno-Maloměřice (*Valoch 1969*), a surface find of bifacial backed knife from Troubsko (*Skutil 1957*), Horákov I (*Oliva 1987*; *1989*). The second layer of the Moravský Krumlov IV-3 site (layer 1) would also fall within this period of time.

In the NE direction the younger phase of Middle Palaeolithic is evidenced by finds in the Vyškov region (Vyškov – brickyard, Vyškov-Dědice (*Musil – Valoch 1956*). Contacts towards north Moravia are perhaps corroborated by discoveries in the surroundings of Hranice na Moravě. The today non-existent Hlavicova Cave has contained a fauna that would correspond to the older phase of Würm glacial although the chipped industry is rather capable of classification as Early Upper Palaeolithic.

Another important settlement unit has been the region in north Moravia, in the surroundings of the Šipka and Čertova díra Caves, or, on a broader scale, in the Oder River basin (*Valoch 1965)*. The character of the mentioned caves more or less assumes an existence of other stations. The nearest and culturally related could be the Bílov surface site on the left bank of the Oder River.

The analysis of raw materials from the Kůlna Cave suggests a possible Micoquian population in the region of east Moravia (Uherský Brod, Moravian-Slovakian borderland) with possible contacts reaching as far as the territory of Hungary.

4.2. Spatial structures

The main trends of development of the spatial structures in the caves are probably best traced on the strength of the data from the Kůlna Cave which contains a sufficient stratigraphic sequence. At the same time, in all periods the cave has provided practically the same conditions so that, to a certain degree, with all studied layers we may assume its similar utilization.

The situation from the end of Riss, which is represented by layer 14, does not provide any details we could rely upon for the purpose of reconstruction. During the research it has already been clear that this was rather a finds horizon without real relations among the finds capable of being captured.

The first possibility of reconstruction is provided by series of strata 11 captured in the entry part of the cave. The discovered proofs are indicative of a very simple organization with two hearths, probably with differing functions. Both manufacturing and non-manufacturing activities were apparently concentrated in their vicinity. In the northern part close to the right wall a waste zone could have occured. The entire structure is largely simple and it represents a sort of model case within the framework of critical theories by P. Pettitt (*1997*). This is evidently supported also by the fact that in the case of series of strata 11 a projection of several stages of settlement is involved. From the development point of view there is an interesting fact that the inner part of the cave is not populated, although the rock shelf which circumscribes the norther part of the settled area would not have presented an unsurpassable obstacle for a man, and from the point of view of defence function it would have provided a great advantage.[15]

Much more complex structures are shown by the settlement of the Kůlna Cave towards the end of Middle Palaeolithic, within Micoquian population. The most prominent characteristic common to all three layers is the settlement of practically the entire cave (sectors E–H) with important places in the central part. However the importance of the entry part remains unchanged.

Within layer 7c we do not have proofs of a more complex subdivision of the cave yet, although some indicia suggest that differentiated spaces were already being hived off for manufacturing and consumer activities, and places with possible non-utilitary practices have appeared.

The most complex structures are shown by layer 7a within the framework of which we may identify manufacturing objects, waste zones and spots of a possible non-utilitary importance rather unambiguously. However in the case of this layer we have to take into account the projection of several occupations, albeit short-termed. Even so we might perhaps think of a more complex layout of the space as a proof of development of thinking ad organization of the tribe. Certain analogies to these phenomena may also be found in the Šipka or Čertova díra caves, but from the methodological point of view these caves do not provide sufficiently confirmative information for more unambiguous conclusions. An analogy from the Abric Romaní Cave in Spain catches the development tendencies within the two mentioned layers much better. Layers 7c and 7a in the Kůlna Cave have a similar dating as layers "I" and "Ja" from the above cave, and they show some common characteristics both in the quantitative ratio and in the completeness and complexity of the operating schemes (*Vaquero 1999*, 495). Methodological procedures used within the research make it possible to carry out refittings with a precise spatial situation, and consequently to use statistical methods which illustrate the described development tendencies. Whilst in the more or less uniphase layer I complete operating schemes are not exemplified and concentrations are not mutually linked by re-assemblies, in layer Ja we observe more complete operating chains, and artefacts and cores are displaced within the settlement area (*Vaquero 1999*, 502). This is considered to be a proof of more complex and differentiated manufacturing activities (structures) in the locality. I suppose that with certain limitations it will be possible to apply these procedures also for the material from Kůlna so that the mutual analogy will become even more obvious.

Comparisons of complexity of the spatial zoning of settlement unit with Neanderthal people and modern sapients undergo rather intense efforts at resolving. It is often pointed out that the Middle Palaeolithic structures are products of short-term, repeated occupations by small groups of Neanderthal people who formed very simple structures that are practically identical with the ones left behind by Pleistocene beasts of prey (*Pettitt 1997*, 219). The general conclusions of Pettitt's work are surely correct although it is impossible to fight off an impression that the concluding formulations are a sort of expedient manipulation intended to invoke a discussion of a new quality. The thing is that he seems to have somewhat omitted certain aspects which predetermine the character of spatial zoning, both on the archaeological and biological level.

It is true that in most cases we indeed work with palimpsests of multiple settlements, so that the found structures might appear more complicated than they have really been within one phase of settlement. A confrontation level adverting to the fact that Neanderthal spatial structures practically do not differ from animal ones is somewhat misguided. However we have to realize that for the purpose of defining Upper Palaeolithic structures we often use open localities, and these require a more complex arrangement of the environment in such a way as to fulfil general demands for survival. By this I mean constructing of sufficiently big shelters to protect from weather as well as systems of hearths as sources of heat, social communication, manufacturing activities etc. Together with other function-oriented spaces man thus creates a more precisely defined living space that is separated from the surrounding terrain. However in the course of studying Middle Palaeolithic settlement structures we still mostly work with cave localities which themselves sufficiently define the areas of settlement sites. The necessity of constructing an additional shed inside of a cave is not as acute as with open sites. In this respect the cave structure appears to be much simpler. The cave thus becomes a single, universal shed for the entire group. This hypothesis is corroborated by open Middle Palaeolithic sites like Ripiceni-Izvor (*Paunescu 1988*) or Molodova I or V (*Černyš 1965*), with which we positively submit the development of a more complex zoning in relation to the utilized space.

If we compare the complexity of settlement structures of open and cave sites inhabited by anatomically modern humans in the Upper Palaeolithic period (e.g. Gravettian, Magdalenian) we can see that the cave structures are again much simpler than the open space ones (e.g. Ettioles). Not even the caves and abri of the present day hunters and gatherers are especially complex from this point of view (*Galanidou 2000*; *Vaquero 1999*, 503). And in all cases there is the unifying element of a basic division into a waste zone and a zone usually situated near hearths on which either manufacturing or other activities are carried out.

From the biological perspective separation of waste and active zones is a general principle that essentially does not testify to cultural "forwardness". A classification of spatial strategies as quasi-animal and quasi-human has no practical significance. It is a general biological and thus also human nature, which has also been documented among modern hunters-gatherers (*Vaquero 1999*, 503).

4.3. Technological development of lithic industry

4.3.1. Variability of the discoid method

One of the results of the analysis of Middle Palaeolithic collections from Moravian caves is the ascertainment that practically at all sites and in all periods the discoid method of exploitation of blanks has been used, and that this method has undergone a certain development, at least in Moravia. The main development criterion has proved to be its variability.

The existence of the discoid method as an opposite to the Levallois method of core exploitation has already been distinguished by F. Bordes (*1950*, 22; *1961*, 16). However a really systematic definition has been produced in the break-through work by E. Boëda, who has used 6 attributes for the codification of this method (*1993*, 393–396). Particularly the finds from the Kůlna Cave which were used as a basis of the definition have shown a certain degree of variability described by the author in three modifications (*Boëda 1993*, 396; *1995*, 71). More recent research have shown that in some cases the variability was even greater, and there were also cores the morphology of which was reminiscent of Levallois recurrent centripetal cores (*Slimak 1998–1999*, 86).

To have a look at the discoid cores from series of strata 11 first, apart from the classical discoid cores with interchangeable (non-hierarchized) surfaces (discoid cores *sensu stricto*) and variants with interchangeable surfaces (discoid unipolar cores) there are also types, especially with pebbles, on which the striking surface has not been modified (discoid unifacial, then convergent types, with which only a part of the core has been used instead of utilizing its entire perimeter, and the types we could perhaps label as discoid cores with a changed orientation (it is possible to pass two dividing lines through the core). In some cases the latter ones bear marks of a parallel exploitation so that from the typological perspective these cores surpass the original definition so markedly that it is a problem to relate them to the discoid method proper. Within the thesis it has done so because these cores still adhere to the volumetric concept of exploitation. New technological studies carried out on similarly dated and culturally classified sites bear evidence of the fact that in the central European environment this is not a narrowly regional and exceptional phenomenon. Practically the same type variability of discoid cores may be found e.g. on the sites of Předmostí II – Hradisko (*Moncel – Svoboda 1998*, Fig. 15; *Moncel 1998*, Fig. 10A), Tata in Hungary (*Moncel 2001*, Fig. 9, 11), and according to illustrations of the industry also at the other Taubachian localities e.g. in Slovakia (*Kaminská et al. 2000*, Fig. 46, 47). From the more distant sites the already mentioned locality of Mauran (*Jaubert 1993*) would probably most agree with this scheme. Variability of the discoid method in the Fumane Cave, albeit great, shows certain differences from the Taubachian series of strata in the Kůlna Cave. Within the primary operating scheme (cores from a block of raw material) Peresani has hived off 5 types of discoid cores yielded by some common, but also different blanks (*Peresani 1998*, Fig. 7), yet only in some cases he has stated a reorientation of exploitation surfaces of the discoid cores. The cores are formed by a somewhat different way, but still according to the main volumetric paradigm of the discoid method, with the aim of obtaining morphologically predetermined blanks (*ibidem,* 134). However in the Kůlna Cave the variability of the method perhaps even exceeds its boundary and it seems that the reasons are different from just obtaining predetermined shapes of blanks.

The aspect in view will be eclipsed in comparison to the variability of discoid debitage in the Micoquian series of strata within the Kůlna Cave. There is a phenomenon occurring here which we also find in a figurative meaning in other aspects of human behaviour. It is a certain degree of standardization. The degree of variability of this method has already been caught rather precisely in its main features in the work that has defined it (*Boëda* 1993), and corroborated later by the same author in a study analyzing the operating scheme exclusively on this site. These are the following variants (*Boëda 1995*, 71):

1. Each of the surfaces is mutually interchangeable at every moment of the operating sequence (this is a classic example in accordance with the definition);
2. Each of the surfaces retains its individual function during the entire operating sequence;
3. The functions of both surfaces alternate.

Observation of orientations of the discoid cores surfaces has shown that in the Micoquian layer 7a the second type was prevalent (*Tostevin 2000*, 107). The etalon variant is rather exceptional. Although it is also possible to find variants (especially among core remnants) which deviate from this framework, thus in a measure enlarging the degree of variability, it has been regarded as very important that generally the number of variants decreases, and in this respect there is also a transition to a higher degree of standardization in the form of more predetermined blanks of greater dimensions. This is an important change in the technologic scheme between Taubachian and Micoquian.

But what has been a mover of such changes? Was it a cultural tradition or have some other factors played their role? An important phenomenon influencing the dimensions of the industry and the choice of a method is considered to be quality (*Andrefsky 1998*, 147) and size of the raw material (*ibidem,* 96). It is obvious that from a raw material of small dimensions we will not produce a greater debitage. However it may not hold good that big blanks will be produced from big pieces of raw material. For the solution of these issues the Kůlna Cave is especially suitable as it offers input data of the same validity. The raw material possibilities utilized were practically the same so that the character of the worked raw material, as e.g. dimensions and quality, may be excluded as the main mover of these changes (for Central Europe cf. *Moncel 1999*, 9). The initial conditions for Taubachian and Micoquian have been the same; thus we have to seek for the differences of manifestations somewhere else.

We have already mentioned that the industry and thus also the cores were small in Taubachian. I presume that the main reason is hidden in the effort for the most effective utilization of the raw material. The discoid method is possessed of all prerequisites for this. Its advantages inhere in the fact that by chipping of the desired blank we in fact give a shape to the future exploitation surface. With a right manner of exploitation we practically do not need to "waste" the raw material during both preparatory and reparatory procedures. Due to this we are capable of making use of almost the entire volume of the processed piece of lithic raw material (*Boëda 1993*, 395). Therefore the regular forms emerging e.g. from pebbles practically do not require any ancillary procedures to maintain the convexity of the exploitation surface. This however requires a high-quality raw material, which is a prerequisite the raw material sources in the vicinity of the Kůlna Cave (utilized most often) do not fulfill save for exceptions. The low quality of the raw material is potentiated by the very intense exploitation of the individual pieces. To maintain suitable angles for exploitation of debitage we have virtually two resources – subsequent preparations of the shape, which was practically impossible because of small cores, or a change of orientation within the same principles. This second solution is the characteristic attribute of the Taubachian processing of raw material. The maker of the industry has adapted himself to the character of the source, not the other way round. He has reacted to the problematic aspects of exploitation in an expedient manner. This approach to the utilization of raw materials in the wider sense of the word has already been stated above (hunting).

The answer to the question why is the industry characterized by small dimensions is clearly hidden in this aspect. It is probably related to the general effort for the most effective and intense utilization of all possible sources of raw materials. From this point of view it is not surprising that also poor quality raw materials of small initial dimensions were used. The relatively low energy demand factor in obtaining them was of importance. The essential technological requirements posed by the Taubachians on their tools could correlate with such use of raw materials. Some authors are of the opinion that a great part of lithic tools has been used up for processing of organic material and mainly easily workable wood (*Moncel 1998*, 30).

The makers of Micoquian industry have chosen a different approach. Their way of using raw material sources and economic strategies corresponded with the fact that they have started to prefer a more distant source of high quality stone raw material to a more nearby but poor quality one. This is apparently also reflected in the form and size of the blank starting to play a more important role. The reason for this may be both a reaction to the change of ecosystem and a different degree of macroregional and microregional mobility.

In the case of the two compared cultures within the Kůlna Cave it definitely seems that, at least in this sphere, in both instances a human decision is involved which probably stems from customs and economic strategies. Their changes then are also an outcome of a cultural adaptation to the changes of ecosystem.

4.3.2. Method of parallel exploitation

In the 1980s the question of existence of blade products in Middle Palaeolithic collections comes to the fore. A blade, formerly understood as a "fosile directeur" of Upper Palaeolithic, acquires a somewhat different importance. It ceases to be understood as a proof of changes between various groups of people but starts to be accepted only as a product of one of the possible methods of core exploitation (*Moncel 2001*, 45). In Europe the methods of obtaining blade products were tied to two main concepts – the planar Levallois and the volumetric non-Levallois ones. We will not deal with the issue of blade

Levallois cores for which we have no proofs from Middle Palaeolithic in Moravia, but will be interested mainly in localities where the volumetric blade method co-exists with classic Middle Palaeolithic methods. These may again be divided into two main groups according to their co-existence with the Levallois method or the discoid method of core exploitation. We will be more interested in the second mentioned relationship as we have shown in the previous chapter that the discoid method is the most characteristic way of exploitation of blanks in Moravia in during the Middle Palaeolithic period.

It is again especially the Kůlna Cave which enables us to observe the development of the parallel chipping methods in a stratigraphical sequence. The first proofs of the parallel chipping of core have already been exemplified in layer 14. Apart from several cores also a rather big blade of spongolite has been preserved. A scarcity of finds prevents us from a more precise defining of the entire production sequence, but from the finds preserved I would classify it as a subprismatic method the characteristic attribute of which is a simple parallel chipping from suitably shaped blocks of raw material. The form of the initial raw material virtually has not required a modification of the guide edge as it is known to us from Upper Palaeolithic collections. The exploitation surface is located only on a part of the processed side. In case of layer 14 this method co-exists with the Levallois recurrent method; according to the preserved cores it could also have produced blades, in this case the Levallois ones.

In the Taubachian collection we are encountered with virtually the same type of cores, although the Levallois method is not exemplified in it, and is replaced by the discoid method. A greater number of finds enables us to make a more precise reconstruction of the relation of both methods. In compliance with the preserved finds it seems that the method of parallel volumetric chipping is especially applied in the initial phases of core preparation (refitting of the quartz initial core), and mainly as a technological resource within the reparation of heavily exploited discoid cores. To wit, there were several cases when the cores either underwent reparation, especially because of fractures, or were "re-exploited" because of small dimensions. Owing to an intensive exploitation most of the cores are very small so that the main attributes of the preceding procedures are wiped off, and this markedly confines the precise codification of the importance and independence of this method. However let us recall that an emergence of such procedures is not totally exceptional. A parallel chipping within the framework of the discoid method is a part of the definition of the "Quina" method based on the material from the Scladina Cave in Belgium (*Bourguignon 1998*).[16] A virtually analogical utilization of this method has been recorded e.g. at the Champs Grand site on the Loire River (*Slimak 1999*; *Moncel 2001*, 43).

The characteristic attribute is the use of a number of parallel strikes especially at the edge of the discoid core, whereas after the chipping of the series a re-orientation of the exploitation and striking surface has occured in conformity with the principles of the discoid method. When the exploitation was carried out properly, the reparatory phase of the core processing was not necessary. In case a transverse fracture of a discoid core has occured so that with a small volume of the material it was practically impossible to continue the discoid exploitation, the parallel chipping presented an ideal technological resource. This method has not played the same qualitative role as the discoid one; this is especially reflected by the fact that the products capable of being labelled as blades only appear in a negligible percentage here, and even then it is impossible to consider their preferential usage. Apparently for this reason too we do not observe a more advanced technology of core preparation chipped this way. The finds however indicate an important fact that within the volumetric method it was indeed no problem to change the working procedures according to requirements, and that within the rather non-leptolithic discoid debitage there could have been a method to emerge or to be accepted the products of which were blades.

The increase of both the quantitative and qualitative representation of leptolithic methods arrives in a great part of Europe at the turn of isotopic phases 5 and 4, especially in the northern parts of Europe, within which the territory of our country falls as well. The reasons are sought in climatic degradation and changes of ecosystems that correspond with this phenomenon (*Otte 1994*, 187). In the territories with a more continental climate these changes occur somewhat later, at the turn of phases 4 and 3 (*Moncel 2001*, 44).

The finds from the three Micoquian layers in the Kůlna Cave and from the Mousterian layer in the Čertova díra Cave suggest that the development in Moravia does not markedly differ from the stated situation. From the old Würm we have a porcelanite core from Čertova díra at our disposal. Conceptually it rather falls within subprismatic cores as these have been defined for Taubachian, the distinction being that this core occurs in the initial stages of exploitation and has markedly bigger dimensions. It seems that on the same piece of raw material both parallel chipping and a discoid way of volume reduction coexist, but their mutual relation cannot be clearly assessed. One porcelanite blade found at the same locality is virtually morphologically identical with, for example, Gravettian blades. It is quite long and not too wide, with a distinct abrasion of the striking edge. With regard to the stratigraphic position of the porcelanite core it is probably Middle Palaeolithic although through its character it entirely deviates from the frame defined by the other finds. Virtually nothing specific can be said about the further character of this method. However there is an interesting fact that the exploited porcelanite blades or elongated flakes were probably taken away and processed outside of the site which would mean that this type of blank has started to play a more important role than before.

In layer 7c from the Kůlna Cave the method of parallel chipping has been corroborated by cores to a virtually negligible extent. The greatest number of prismatic cores and a high-quality blade debitage comes from layer 7a, which also shows the highest percentage of utilization of blades for tools. From the uppermost Micoquian layer 6a we are only aware of just one core, again from the entrance to the cave, but the elaboration of the complete layer will apparently show that even in this case the prismatic method is present much more markedly. It is exactly this layer from which the most demonstrative example of a blade core manufactured on a handaxe (*Fig. 49: 5*) originates, and even the blanks show marks of an advanced leptolithic method. The importance of blade chipping of cores in this layer is related especially to the possible genetic linkage to the development of early Upper Palaeolithic cultures, e.g. Aurignacian.

If we now take a glance at the proportion of blade debitage in the collection as compared to flakes, from the perspective of the observed blanks the most leptolithic appears to be the collection from Šipka but this detail is not sufficiently evidential because of the finds situation (There are more tools than debitage elaborated, is it indeed a random choice?). Within the Kůlna Cave the debitage from layer 14 is the most blade-like; apart from simple cores with a parallel exploitation it could have also produced blades by Levallois method of recurrent bidirectional cores. The fact that the proportion of blades used for tools (as against flakes) is even higher than with the unused debitage is also of interest.

The smallest proportion of blade-likeness as well as the use of these products for tools appears in layer 11. Within its scope we notice that the blade/flake ratio virtually does not change even with unused and used blanks. The low representation of blades is not surprising, especially because of the morphology and dimensions of the cores.

The results obtained by an analysis of Micoquian technology in the Kůlna Cave are interesting and rather difficult to interpret. Observation of the mentioned ratio in the overall debitage shows a direct relation between the increase of the blade index (ILam) and the chronological position. However this trend is not reflected in the case of debitage used for tools where it is almost reversed, and it culminates in layer 7a from which we have the best evidenced Upper Palaeolithic method of a prismatic core exploitation (both core and blade). For the time being it is difficult to explain this phenomenon but it does not have to be connected only with the increase of the blade method; it may also be a reflection of a certain change within the discoid debitage.

So far it does not seem that the blade debitage would play any conclusive role within the collections but the situation will probably be even more complicated, especially if we take into account the character of industries in the region of Lysická Depression (Bořitov, Rájec, Ráječko, Doubravice, Černá hora etc.; *Oliva – Štrof 1985*) where blade cores apper within the context of bifacial backed knives, although with a small amount of blade debitage. Admittedly these may be mixed collections, but even in the future it is necessary to allow for a possibility that these phenomena are related to some development or acculturation mechanism we are hitherto unable to explain in a definite manner. An important prerequisite for the elaboration of this issue is the dating of horizon 6a in Kůlna, implementation of refittings of the industry from this layer, possibly finding of open sites with a co-existence of bifacial method and blade cores in order to present a definite proof of their contemporaneity.

4.3.3. Method of direct shaping (fasonage)

One of the important phenomena, which characterize some cultures of Middle Palaeolithic, is the bifacial or surface unifacial modification of tools that appears to a greater or smaller extent from the Lower Palaeolithic period to the Bronze Age. Leaving out surface finds of sporadic handaxes that are badly dateable and a unique small handaxe from layer 14 in the Kůlna Cave (*Fig. 21: 4*) we will take a brief glance at the development of the use of the direct shaping method for tools in the middle and upper phase of the Middle Palaeolithic period.

The chronologically confirmative objects come from the stratified collection from Taubachian layer 11 in Kůlna (*Valoch 1988b*, Abb. 47; *Neruda 2000*; *2002a*; *b*). This is a collection of a small number of surfaced artefacts (5 pcs) all of which – with one exception – are made of porcelanite imported from a 60 km distance. As yet it is impossible to compare the morphology of these objects with younger collections although they are indicative of this method of production of tools as being used also within the context of microlithic industries of the Middle Palaeolithic period. Analogies for this statement also come from other localities of Central Europe. The dating of a fragment of a leaf point from the Předmostí II – Hradisko site (*Svoboda et al. 1996*, Fig. 11: 6) is specified as an interglacial period. In Bohemia the use of bifacial tools has likewise appeared in Taubachian context at the Ládví site in Prague-Ďáblice. A number of bifacial small handaxes, one bifacial backed knife and a leaf point (*Valoch 2001b*, Abb. 22, 24) were found here. In Slovakia a surface retouch appears during the last interglacial period e.g. in Gánovce (*Bánesz 1990*). From Poland too some scarce bifacial tools come from the Biśnik Cave (*Cyrek 2002*), both from the Eem interglacial within the Piekary type industry context (horizon A1, *ibidem,* e.g. Tablica XXIV) and also the subsequent Würm anaglacial into which we put the Taubachian industry (horizons B/C, D; *ibidem,* e.g. Tablica XVII). Bifacial retouches applied on the surface fall within the same period, for example at the Hôrka-Ondrej site (area A) in Slovakia (*Kaminská 1990*, Pl. 1; *Kaminská et al. 2000*, Fig. 37, 38).[17] These are not mostly the collections characterized by the application of the direct shaping of tools but it is indicated that, to a certain degree, the advantages of bifacial chipping have been used in the prevailing majority of Middle Palaeolithic facies (cf. *Bordes – Sonneville-Bordes 1970*).

This method attains a dominant standing in the earlier phase of Middle Palaeolithic when the use of bifacial retouch becomes a characteristic feature of Micoquian industries and a marked morphological variety of usage occurs (*Neruda 2000*). The development from Taubachian small-shaped industries to collections with bifacial tools may especially be observed in the Kůlna Cave. A distinctive advent of this tooling constituent is observed in layer 9b (*Valoch 1988b*, Abb. 38) in which typical bifacial tools appear; this layer is classified as Micoquian on the grounds of these tools. Micoquian especially develops in layers 7a–6a (*Valoch 1995*). The finds in Švédův stůl (*Klíma 1962*) and Šipka (*Valoch 1965*), which are connected with Moustérian, are capable of a time correlation. The development of these industries likewise occurs in the neighbouring countries. There are sort of centres of Micoqian: in Germany – these are divided into four sub-groups of chronological importance (*Bosinski 1967*); in Poland, especially in the Krakov-Częstochowa Jurassic area (Micoquian: *Kozłowski – Kozłowski 1996*; EUP industry with leaf-shaped points: *Bluszcz – Kozłowski – Foltyn 1994*); in Hungary in the Bükk Mountains region (Szeletian, Babonyian – e.g. *Allsworth – Jones 1986*; *1990*; *Ringer 1989*; *1990*; *1995*; *Ringer – Kordos – Krolopp 1995*; *Simán 1995*) and near Balaton (Jankovičian – *Gábori-Csánk 1990*). Analogical but less distinctive collections are found in Austria and Slovakia.

A massive occurence with a strong technological and typological impact is mainly related to Micoquian and Szeletian. It is exactly the bifacial constituent of the lithic industry that forms a basis for the hypothesis concerning a genetic kinship of these two cultures. Let us ask the question, then, what are the characteristics of the direct shaping method (fasonage) in these cultures at the Middle/Upper Palaeolithic transition?

From the typological point of view both cultures show a number of similarities, as well as significant differences (*Graph 50*). The dominant types of Micoquian are handaxes, bifacial backed knives and bifacial scrapers. However none of these types exceeds 35 % of the tooling constituent. All these types in various quantitative representations are determined in the consecutive Szeletian collections where they form a supplementary constituent to the dominant leaf-shaped points (among bifacial tools). In my opinion the significant typological difference is due to variability with which the use of bifacial retouch appears. We are especially encountered with the bifacial retouch in Micoquian, in the form of special types of scrapers (type La Quina) which sometimes assume the tools morphology which is difficult to classify according to the traditional Bordes typological system (an analysis of attributes that would capture both the shape and the technological aspect of the tool would be more suitable for their description). These are especially the shapes of simple or déjéte side scrapers; in the described cases these are prepared with the use of either bifacial or unifacial surface retouch. Out of these especially the type of side scraper with a thinned back is prominent; this type has often shown a shape similarity to bifacial backed knives. The scraper mentioned is usually pointed, with its dorsal side often formed by a surface retouch from both edges, and the common feature with bifacial backed knives is the back, most often natural. It is only differentiated from bifacial backed knives by its unifacial sharp edge. There were also forms with a bifacially modified edge found; the edge would enable a classification of a bifacial backed knife but the back was thinned as with a scraper. The morphology and the use of these two objects have obviously been very silimar.

This typological variability (*Graph 50*) of the use of bifacial retouch is diminished in Moravian Szeletian in favour of leaf points which attain a dominant position among bifacial tools (up to over 60 %). Particularly the constituent of “special” scrapers is dimished; on the other hand the leaf scrapers’ representation is more distinct. This probably has a connection with reutilization of unsuccessful or broken leaf points for scrapers. We can point out this typological trend to be the most important aspect for a cultural classification with a substantial chronological importance. In other words, while determining the cultural classification we have to work with the ratio of tools in the entire collection, not to rely only on the occurence of the leading types. Bifacial backed knives of Micoquian type in Szeletian collections (e.g. a station in the cadastral area of Jezeřany) are a characteristic example. New researches of the palaeolithic open-air site of Moravský Krumlov IV (*Neruda – Nerudová – Oliva 2004*; *Neruda – Nerudová eds. 2009*) have shown that bifacial backed knives may also be a result of unfinished forming of a leaf point by means of a specific method, which reflects the initial shape and quality of the stone raw material (*Neruda – Nerudová 2005*; *Nerudová 2009*).

The change of the typological spectrum consequently points at certain changes occuring during the transitory period. One of these apparently is the change of function that may also be corroborated by means of technology. Micoquian bifacial tools usually have an asymmetrical cross section with a scraper-like retouch in the functional part (*Boëda 1995*, Fig. 2; cf. shapes in *Fig. 64*). Blocks of raw material with cortex or frost surfaces that are mostly modified only on a part of their surface (54 %) are used as blanks for the production. Scrapers are often manufactured on flake blanks. The find from the Königsaue site in Germany (*Mania – Toepfer 1973*) suggests that bifacial objects too have been modified for a better grip with the aid of organic materials transformed by destilation. One of the two finds of birch resin has a bifacial tool impressed on its surface. The temperature at which the shape of the resin has been modified was around 350 °C (*Grünberg 2002*, 16).

In Szeletian, on the other hand, pieces retouched on their entire surface prevail and make the determination of the blank used uneasy (*Fig. 65*). As the dominant raw material mainly occurs in the form of pebbles, it is obviously necessary to assume that the raw material first had to be modified into the form of massive flakes or suitable fragments (blocks) the shapes of which were more suitable for the fasonage of bifacial objects (a special method for chert of Krumlovský les Type cf. *Neruda – Nerudová 2005*, Fig. 11). The cross section of the majority of objects, and especially the leaf points, is symmetrical with a smaller number of scraper-like modifications of the sharp edge. Especially with leaf points the scraper-like retouch is only represented by 2 % of objects. All this confirms another functional orientation than the one assumed with the typological analysis (scrapers). In Szeletian the individual functions are apparently more markedly associated with a certain type than in Micoquian, during which various types were used for the same work operations so that a typological variability on one object is a logical conclusion. However for a solution of this question it is inevitable to use trasologic analyses that are the only ones capable of determining the real function of a tool (*Soressi – Hays 2003*). Tracing of work marks on the tools from the Babonyian site of Sajóbábony-Méhésztető has suggested that bifacial objects were not utilized as projectiles or point tools (*Ringer – Adams 2000*, 123). Such function could rather be assumed with leaf points in Szeletian, but from Moravian collections we do not have proofs of fractures that would imply such use (*Nerudová 2003*; *Šajnerová-Dušková 2009*).

The metric similarity of bifacial objects from both cultures in terms of length-width index (*Graph 51*) is of interest too although this fact may reflect the sizes of the initial raw materials in Moravia, and it might not have a serious technological-cultural importance. On the contrary, however, it may be related to a similar strategy of selection of the blanks for production.

If we compare the representation of raw materials used for the manufacture of bifacial objects (*Graphs 52, 53*) we will find out that the Szeletian collections come out from other raw material sources although they also utilize some common raw materials. Nevertheless these may come from secondary sources which are tied to the gravelous sands of the Svitava River. This river has markedly enlarged the area of their occurence. The differences stand out especially with imported foreign raw materials the pattern of which is very diverse. Imports from as far as 170 km, or quartz porphyry from the Bükk Mountains region that would represent an even more distant contact (*Nerudová 1997*, 84) may be regarded as an Upper Palaeolithic element of Szeletian. In Micoquiaen we deal with imports from the distance of up to 45 km. The origin of one silicite that is used in the Kůlna collections remains a certain problem; for its precise determination it will be necessary to use petrographical analyses. Our colleagues from Hungary have confirmed that it possibly came from the Bükk Mountains region (*Oliva 2000*, 62) but we have managed to find a raw material of very similar macroscopic properties within 5 km from the Kůlna Cave (*Neruda – Válek 2002*).

The comparison of the economy of raw material utilization for bifacial tools interferes with a difficult comparability of the data from both cultures. We have far more sites in various regions and with a varying strategy of usage of raw materials available from Szeletian than from Micoquian. Nevertheless it follows from the matched sites which have comparable locations to raw material sources that the nearer and high quality resources are utilized in particular the other raw materials being only supplementary in this respect. A change of raw material structure may be related to the change of the settled area which has occured during the development of Szeletian (a departure from karst regions).

4.3.4. Distribution models

The evaluation of distribution models is an inseparable and important part of the economic behaviour studies of the hunter-gatherer populations. A rather revolutionary study of utilization of raw material sources in Aquitaine (*Geneste 1985*; *1988*) has influenced a number of works which try to compare models from various regions with exactly this region that represents a certain primary standard of a distribution model for the Middle Palaeolithic period.

A rather simple but effective methodology was gradually codified to unify the used data which makes interregional and intercultural comparisons markedly easier. On the other hand a rather mechanical assessing occurs especially with the distance factors that often constitute the main diversification attribute. To this a varying importance tends to be attached, especially in connection with a varying degree of mobility of the population. This creates a mosaic effect as practically every region has its specific regularities which influence the selection of a raw material source and the principles of supplying. It is especially this fact we are encountered with in case of evaluation of the distribution models in Moravia which are considered somewhat atypical – especially within the Taubachian series of strata of Kůlna Cave– just because the regional raw materials prevail over the local ones (*Féblot-Augustins 1997*, 113–114). But in case of layer 11 this is indeed due to the spreading of raw material sources in the Cave's surroundings rather than to a subjective and cultural choice. My personal assumption is that especially the strategy of utilization of raw material areas is a greatly regional matter influenced by the local conditions, and we have to be very careful upon the statement of a supraregional importance of the phenomenon in view. It is certainly logical that the distribution models have to appear differently in Poland on the sources of high quality flint, than e.g. in Moravia with a very diversed pattern of low quality raw materials scattered on a large area.

In the chapter on the character and development of the technological processing of lithic industry it has been called attention to the differences between Taubachian and Micoquian. In this chapter on the distribution models we will likewise focus mainly on the comparison of these two cultures within the Kůlna Cave series of strata as we can work with collections that have the same initial conditions. The distribution models from the other sites are influenced by further factors which make the interregional analyses difficult.

The results of the distribution analyses show that the Taubachian hunters utilized a broad range of raw materials, whereas the proximity of the raw material may have played a more important role for them than its quality. Although the utilization of resources up to 10 km prevails (almost 90 %), it is likewise possible to state that local and also poor quality raw materials were largely represented, and especially e.g. a low quality quartz was processed by the same method and with the same intensity as spongolite of an incomparably better quality. Just due to these facts we can assume that the quality of the raw material has not played such an outstanding role. I consider the tie to proximal resources to be a characteristic feature, and the diversities from Western European sites adverted to by some foreign colleagues ensue from the status of the then knowledge.[18] The maximum distance of import is considered the second substantial difference. In Western Europe this value fluctuates around 100 km, whilst for Taubachian the values of up to 200 km to the source of silicites of the Kraków region are stated (*Féblot-Augustins 1997*), but this phenomenon is related to a wrong interpretation of data in the literature as we do not have such import corroborated. Yet there is another fact remaining – a unique silicite of a hitherto unclear origin has been found in the Taubachian series of strata in the Kůlna Cave. Preliminary this has been labeled as type of "Němčice" because some finds suggest a possible source region within a 5 km distance from the cave, in the surroundings of the Němčice village (*Neruda – Válek 2002*). Its existence has been pointed out by M. Oliva; after the comparative studies carried out he also suggests the possible origin of this silicite in Hungary so that we could state an import from as far as 300 km distance from the cave. For the time being I am personally inclined to its more proximal, i.e. Moravian origin, so that the Taubachian distribution model would be quite comparable with the Western European ones, e.g. from Aquitaine as mentioned above (also from the point of view of other attributes defined by Geneste (*1988*, 63).

In Micoquian the situation is somewhat different. During the pleniglacial era certain changes of the supply strategy have occured. The most marked change is the decline of importance of the local resources in favour of one main raw material – spongolite, and possibly cherts of the Moravian Karst as a supplementary raw material. In all cases these are mainly raw materials of higher quality. Thus the main difference may be considered the change of strategy which is focused on the quality of the raw material although it originates from a greater distance. Another, less obvious fact is that also the diversity of raw material used is diminished. Layer 7a is comparable to layer 11 but this similarity is rather based on a common function (a long-term settlement) than a cultural similarity. Layers 7c and 6a differ more markedly from the Taubachian collection (much like the collections from Šipka and Čertova díra Caves in which the raw materials show an even smaller variety).

Another important attribute is a largely diminished action radius indicated by the imported raw materials. In layer 7c there still were comparable proofs in the form of radiolarite and glacigenous silicite. In layer 7a the glacigenous silicite is missing the most distant raw material being radiolarite. The smallest action radius is proven for layer 6a in which it does not exceed 50 km. The maximum import distance in Micoquian again depends on the origin of the above mentioned Němčice Type silicite. It is true that in Micoquian contacts for greater distances would not be so surprising as comparable data appear in Hungary, e.g. within the Jankovičian culture context, and some raw materials corroborate a direct contact existing between Moravia and Hungaria (*Simán 1991*, 55–56).

We can deem the economy of processing and acquiring of raw material in Micoquian is less opportunistic and shows some progressive attributes of standardization and a purposeful utilization of only certain, suitable parts of the utilizable resources, even at the cost of greater logistic demands. It seems that towards the end of the Middle Palaeolithic period the Neanderthal behaviour has been similar to the one known to us at the beginning of Upper Palaeolithic.

4.4. Industry from hard animal materials

Industry from hard animal materials counts among the finds that surpass the original concepts of the differences between Middle and Upper Palaeolithic. It appears that from the last interglacial the processing of animal skeletal remains has already developped in such a way that we might talk about the emergence of the first formalized tools.

The first attempts at their identification fall within the end of the 19th century when some researchers tried to push them ahead in connection with numerous finds of remains of fauna in the Šipka Cave (J. N. Woldřich; cf. *Absolon 1932*). Simultaneously, however, a criticism appeared to admit the possibility that the Neanderthal people could have used bones as tools although in the case of the Šipka Cave such proofs were not available (e.g. *Maška 1888b*). A positive identification has occured in the context of the research in the Kůlna Cave in the Moravian Karst; out of a collection of animal skeletal remains there were objects set apart the surfaces of which have shown traces of use-wear, a designed shaping, and possibly also proofs of their non-utilitary usage (*Valoch 1988b*, Tabelle 21). Some objects were correctly identified as soft hammers, i.e. objects which have been used further on in the production process. Surprisingly it was found out that practically identical objects have originated both from Micoquian layers and the older Taubachian series of strata.

Manipulations with skeletal remains that could bear upon their tooling usage can be divided according to two criteria – formative modifications and marks on the surfaces.

From the point of view of formative modification some objects show marks, probably of retouches, which could have formed the bone fragments into the desired shapes. This statement may be distorted by the activity of beasts of prey like hyenas on the osteological material, as virtually identical "working" marks come from their dens. One of those who have pointed out this fact was e.g. Binford in his criticism of finds from the Cueva Morín site (*Binford 1981*, 55). A counterargument that the corroborated modifications of bones by hyenas only come from smaller animals will apparently not hold up as new researches of an Upper Pleistocene hyena den in a small cave of Bois Roche (Charente, France) show that hyenas are capable of making similar "retouches" even on bones of animals as big as bovids (*Villa – Bartram 1996,* 4). At the same time it was revealed that in some cases these were whole series of fragments reminding of retouch. We consider some of these objects tools (*Valoch 1997a*, 82) but we also have fragments of big mammoth bones at our disposal, and these strikingly evoke the material from Upper Pleistocene hyena dens (*Valoch 1980a*, Bild 4–8; cf. *Villa – Bartram 1996*). In the light of these facts it will be inevitable to solve the issue of formative modification of bones in the Kůlna Cave by means of taphonomic and microscopic analyses prior to enabling a more exact statement regarding modifications. The finds from the German Salzgitter-Lebenstedt site suggest a possible existence of shaping with the aid of grinding (*Gaudzinski 1999*). A similar artefact (a rib ground down on both ends), albeit not with such a markedly sharpened surface (*Fig. 40: 6*) was found in Kůlna too in layer 7a (*Valoch 1988b*, Abb. 23:3). K. Valoch adverts to its similarity to Gravettian finds from Moravia (*Valoch 1997a*, Fig. 2:5, p. 82). Again, it will be possible to take up a definite standpoint only after the microscopic analyses. By all means it seems that in the future we will have to take into a serious account the fact that bones with formative modifications e.g. in the form of points have existed as early as in the Middle Palaeolithic period. Currently the points from bovidi, fish and bird bones from the Blombos Cave site in South Africa are best corroborated but we already associate these with anatomically modern humans (*Henshilwood et al. 2001*, 434).

The marks on the surfaces of objects are somewhat more confirmative. From the point of view of industry codification the most important appear to be impacts on flat bone fragments which are the results of retouching of edges of stone tools. Such pieces are interpreted as soft hammers. These objects have been captured in the Kůlna Cave again in all studied layers. The working marks of this type are capable of a relatively easy differentiation from hyena picks, due to a transversal cross section of the notch, which is V-shaped, as opposed to pick, which is U-shaped (*Chase 1990*, 443). These are no exceptional pieces as is exemplified by the finds from virtually the entire territory of Europe – La Quina in France (*Martin 1907–1910*), the Ghiacciaia Cave in northern Italy (*Bertola et al. 1999*, Fig. 3) or the Barakajevskaja Cave in the northern Caucasus; due to the large number of the remains found up to 5 types of working marks emerging in relation with the production of lithic industry have been successfully hived off (*Filipov – Lioubine 1993*, 300–302).

Besides these objects of an unquestionable utilitary importance there are bones and antlers appearing ever more often with marks that rather fall within the category of non-utilitary manifestations, but it is again absolutely inevitable to evaluate these by means of experimental and microscopic methods (cf. *d'Errico – Henshilwood – Nilssen 2001*).

4.5. Non-utilitary manifestations

From the Riss period we have almost no corroborations we could include into this category although in this context we have to mention two objects originating from Bečov I site, layer A-III-6 which are dated back to this period. One is made of quartzite, and it was interpreted by J. Fridrich as a human head with neck and shoulders. The second one is made of metamorphosed slate with well visible grooves on its sides. J. Fridrich considers this object to be a proof of feeling for symmetry achieved by a deliberate fasonage of the raw material (*1976b*; *1982*).

Some more interesting aspects may be captured in the Taubachian collections from the Kůlna Cave dated back to the last interglacial period. In all cases these are interesting raw materials and typological forms. The usage of crystal from the Czech-Moravian Highlands is most striking.

In the upper phase of Middle Palaeolithic which is above all represented by Micoquian in Moravia the examples of functional esthetics based on the application of technical and typological form (a biface) to a raw material of an interesting colour and structure proliferate. The best examples are handaxes of coloured mosaic silicite matters. This raw material is processed by the bifacial method into the form of a handaxe, which itself represents a derivate of esthetic or artistic form. Another example is a leaf-shaped handaxe of citrine (personal information by A. Přichystal). The crystal required for the creation of this object must have been quite big, and as a manuport it must have been rather exceptional, especially if it had been modified into a bifacial form which is often associated with prestigious artefacts (cf. *Oliva 1982*; cf. Clovis type points with Indians, points from Volg etc.). Obviously with all these objects it is difficult to evaluate the degree of an esthetic experience they have represented to the Neanderthal people; strictly speaking these objects could represent no more than utilitary artefacts with the esthetic aspect emerging only accidentally.

A hitherto unpublished find from layer 7a in the Kůlna Cave appears to be much less utilitary. This object of an originally utilitary nature bears a number of attributes that shift its impotrance outside of this frame. The first attribute of interest is the raw material of which it is produced. It is a pebble of Jurassic limestone which could not have got into the vicinity of the cave in a natural manner. It is obvious this object was brought as a part of equipment from another location, or it was an intentional manuport. The fact that the surface is covered by a sort of red pastose matter is rather peculiar. The analyses carried out up to now rather indicate a natural process (acknowledgements for the analysis carried out by M. Galetová), but on the other hand it is interesting that none of the Kůlna artefacts has been coloured this way. On one spot of the hammerstone there is a big shell-like scar (negatif) which disturbes the coloured surface (an old one). In this respect it is interesting that the scar is a remainder of a purposefully chipped flake – it is not an unintentional blank emerging as a result of using the object as a hammerstone.

Within the context of occurence of colours there is another interesting find from the Kůlna Cave. It comes from layer 7d, and it is a number of fragments of a high quality hematite. On some flats there appear shallow grooves (?) the shapes of which resemble some motifs found on animal bones.[19]

Corroborations of cut or carved bones come virtually from all main archaeological strata in the Kůlna Cave (*Valoch 1996*). From the other cave sites similar finds are not available. The most frequent motif is represented by parallel grooves on the surfaces of bone fragments.

4.6. Reconstruction of economic strategies

A reconstruction of economic behaviour of the Neanderthal people belongs to one of the most complex, and thus also the most difficult chapters of research on Middle Palaeolithic. Because of the greatly limited possibilities to analyse the settlement structures and the dating of the individual sites we have to solve this issue by means of a mutual correlation of many aspects of human activities. Relatively good results may be obtained by a mutual connection of economies related to obtaining of food, analyses of distribution models of the raw materials and technological processes used for the production of lithic industry, all these to include the mutual correlation of spatial structures on the site. In the preceding chapters we have mentioned several times that the quality of input information from the individual spheres is quite heterogenous, and so the mutual correlation is still burdened with a considerable inexactitude that has to be overcome by means of subjective reasoning as to what could such a correlation look like in the individual cases. Thus the reconstruction to follow will rather be a working hypothesis that will have to be further tested and worked out in the future.

The main goal of the analyses of hunter-gatherer economies is their classification into the system of economic strategies. In this respect perhaps the most systematic model is defined on the grounds of ethnographic studies of L. R. Binford who characterizes the hunter-gatherer populations as either those which make use of the raw material sources at the moment of need (foragers) or those who collect raw materials for the future consumption (collectors). Binford defines these strategies on the strength of the kind of mobility applied by the gatherers: residential or logistical (e.g. *Binford 1978*; *1980*). Nowadays these models are generally accepted, although in some cases their understanding is too dogmatic (to this issue cf. *Andrefsky 1998*, 201). Binford himself suggests that in some cases we may observe transitory activities which exceed one model or the other. However it is necessary to realize that these are recent observations based on the movement monitoring of the contemporary hunter-gatherer groups, with a stress laid on activities carried out within locations with varied functional orientations. However for the time being these main characteristics are virtually unascertainable from Palaeolitic localities. Although in some cases we are capable of discerning various functions of the sites, sometimes with indications of settlement structures, we are practically unable of time correlations of these localities even within small territories, let alone such territory as e.g. Moravia. Nevertheless it follows from the above analyses that the Neanderthal populations in Moravia were familiar with a great part of the territory with various ecosystems from their own experience.

Let us try to define the function of the individual studied localities first. In their evaluation we have proceeded from the size of the osteologic material collection, the lithic industry and the complexity of spatial structures within the stratigraphic context. If we compare these data (*Table 127*) we may divide the studied sites into four groups. The occupancies of the Kůlna Cave in layers 11 and 7a appear to be a stable, long-term settlement, layers 7c and 6a of the same site represent a similar character of occupancy in a shorter horizon of time. The Šipka and

Čertova díra Caves allow for an interpretation as relative stable hunter camps. The use of the Švédův stůl Cave and layer 14 in the Kůlna Cave may be regarded as rather episodic.

The economic behaviour within layer 11 may be reconstructed as a classic example of an opportunistic approach to raw material sources. For the provision of food the Neanderthal people have used the closed forest ecosystem, apparently tied to the karst valleys, as well as the more open ecosystem on the plains of the Drahanská Hill Country, possibly also in the Svitava River basin. Supply of raw material may be characterized in the same manner. The structure of raw material is very variegated, and it exemplifies the use of both local, very proximate sources, which are of course very low quality, and also more distant sources of varying quality. But as the local raw material prevails, it seems that quality has not played a very decisive role. The degree of invested energy was probably more important. The opportunistic approach also takes a secondary effect on the character of the employed technology of chipping (cf. the chapter on the variability of the discoid method), which tries to use the mass of the raw material in the most effective manner, with the smallest losses possible. On the grounds of all ascertained data we may characterize the Taubachian economic model as opportunistic (foraging), with a relatively great degree of residential mobility (distant imports of raw materials, especially in the form of more complex tools); (cf. *Kuhn 1998*, 222), although there are some deviations occuring especially in the exploitation of rock crystal. We have mentioned previously that the hunter practices were directly related to the utilization of lithic raw material.

The models we may define for the Micoquian layers from the Kůlna Cave appear to be comparatively different. Among them we may trace certain differences which are mostly tied to the completeness of the operating schemes and minor differences in the distribution models. Generally it is possible to observe a change of orientation of the hunter economy, which is directed towards the open terrain of the Drahanská Hill Country, and according to the sources of the lithic raw material also to the Svitava River area, i.e. the zones where mainly gregarious animals appeared. Much like the diversity of species of the hunted animals diminishes to a certain degree we may also state the utilization of a smaller number of raw material sources. In this respect the specialization in one kind of raw material is much more obvious than with the huntable animals. The quality of the raw material apparently starts to play an important role, and the Neanderthal people are willing to invest more energy to obtain the raw material. In the technology of processing of the lithic raw material too an endeavour at standardization is put forth but its by-product is a greater "wasting" of raw material. Despite the impossibility to compare the Micoquian strategy to the Upper Palaeolithic type of gathering (collecting) strategy with logistic mobility, it draws nearer than in the case of the Taubachian series of strata.

The pattern of raw materials suggests a smaller range of mobility of the group. Apparently one area is used longer than in the preceding period. There is probably also a system of auxiliary localities created in more distant destinations which were used for direct supplying of the main settlement site. We can assume the existence of such stations mainly in the Svitava River area. The river is in an adequate distance to enable monitoring of the movement of gregarious animals by means of occasional observational treks from the cave. Linking to this area is also exemplified by the preference of spongolite which has its main sources here. Thus we may also assume a connection of two functions, hunter and production. As a working hypothesis we may state that the decrease of intensity of residential mobility in the case of this region is caused by the change of ecosystem and by an orientation to gregarious animals and more distant sources of raw materials.

The disproportions of the determined degree of mobility in the Taubachian and Micoquian periods in the Kůlna Cave lead to an interesting theory. Typologically Micoquian shows more characteristics for a high degree of mobility of the population (universal combined, often bifacial tools; cf. *Andrefsky 1998*, 150). However the distribution model which shows a lower degree of mobility from a macroregional perspective (smaller number of distant imports) is rather contradictory to this observation. The situation in layer 11 is virtually inverted. In my opinion this discrepancy may be explained exactly at the micro- and macroregional mobility level. The Taubachian population has probably used the individual locations for relatively long periods of time, with an evident effort to exploit as much as possible from the settled ecosystem (cf. the discoid method). Yet the Taubachians were apparently able to travel for great distances (distant imports). On the other hand, in Micoquian we have no proofs of a macroregional utilization of Moravia as a whole (at least not as distinctive as in Taubachian). How shall we explain the typological signs of mobility then? In my opinion it is related to what could be called a regional mobility, i.e. the mobility on a territory not exceeding the distance of abt. 50 km. The treks to sources of raw materials must have taken several days. Even the resources in a 10 to 20 km distance are difficult to be effectively utilized by a one-day trek.[20] With such way of supplying practically the same prerequisites are required as with populations of high mobility. I assume that in the case of the Kůlna Cave area such mobility has existed, albeit on a relatively limited territory. This may also bear a relation to the increase of population, and thus a decrease of the utilizable territory. On the other hand the contacts among groups might have become more numerous, and this might have resulted in raw materials from greater distances or tools characteristic for distant imports appearing in the inventory.

By comparison with similar sequences e.g. from Italy we can see that the kind of economic behaviour is more likely dictated by ecological conditions and predetermined by an endeavour at making the utilization of resources as efficient in terms of energy as possible (*Kuhn 1998*). At the same time the quoted author states that such changes are closely tied to the region under elaboration and the changes in its ecosystems (*ibidem*, 221). On the one hand this correlates with the knowledge obtained within the Moravian Karst region and the neighbouring ecosystems, on the other hand it suggest the fact that these models are not capable of an automatic transfer between regions, especially if we have wholes of a differing quality available.

5. CONCLUSION

Within the theme under elaboration we have tried to demonstrate that the Moravian Middle Palaeolithic materials from caves still hide an undrawn base of information many aspects of which are comparable to foreign sites.

ENDNOTES

1 To the issues of Middle Palaeolithic settlement of the Pekárna Cave; cf. *Valoch 1999b*.

2 In case it is possible to distinguish the individual stages (e.g. with the Levallois method), this may be done in a secondary manner on the basis of a morphological determination of the object.

3 However to name a blank without cortex e.g. a target blank would again anticipate an interpretation level divergent from the morphology of the object. In future it will be necessary to carry out some terminological modifications that would capture the Middle Palaeolithic chipped industries in a better way. Establishing of Czech equivalents, e.g. for blanks emerging within discoidal exploitation, appears as necessary.

4 A new taphonomic analysis of Taubachian osteological materials is in progress under the leading of E. Turner from Römisch-Germanisches Zentralmuseum, Neuwied.

5 The problem of retouchers has been analysed in the frame of grant project "Neanderthals and modification of bones – interdisciplinary analyses and cultural implications" (GAČR 404/07/0856) that finished in 2009.

6 The problem has been solved in the frame of the grant project "Bifacial tools as a base of the cultural determination" (MKČR DE07P04OMG011).

7 Hiving off layer 6b should have indicated a certain morphological difference from layer 6a, but as early as during the research their mutual relation has been stated. In some later works (*Valoch 1989*, 15) the designation 6b is used for a Gravettian collection from sector J, which is inserted between position 6 (Magdalenian) and 6a (Micoquian). However K. Valoch has again returned to the original designation based on finds diaries (*Valoch 2002a*).

8 It is necessary to figure also on an assumption that in some cases this may be a contamination from the younger layers. The interpretation stems from a sedimentological indistinguishability of horizons 6a and 6 at the cave entry itself. Because of this a contamination from Magdalenian layer 6 or even from Gravettian population of the cave comes into play. In case of tools such admixture is relatively easily distinguishable, but there might be mistakes occuring with debitage.

9 So far the outcomes of dating of bones were not published; according to the finds data preserved the bones correlate with the Middle Palaeolithic horizon. The first results were obtained from a burnt bone from a hearth near which the so-called "Šipka jaw" of a Neanderthal was found. The absolute age was determined at minimum 40 ka ^{14}C BP, but due to the absence of collagen a higher age has to be taken into account. Other samples fall within the period of time from 41 to 44 ka ^{14}C BP.

10 Prosová's sketch map (*1952*) stems from K. J. Maška's groundplan sketch published by Skutil (*1952*).

11 Nevertheless the morphology of the handaxe rather suggests a classification to Micoquian, which is for the time being supported in the younger phase of Middle Palaeolithic.

12 The reconstruction of the finds situation suggests that the finds were located in loess underneath red-brown soil, in a lower carbon position with bone fragments. The above soil may be of Eem age so that the discovery would fall within the Warth era (OIS 6) (*Svoboda et al. 2002*, 110*)*.

13 On both sites there were artefacts discovered in the soil related to the last interglacial (Eem), but some indications suggest that they come from a colder period (*Svoboda et al. 2002*, 110).

14 The site has only an indirect chronological classification as it is an open location with no possibility to obtain absolute data. The nearest dated location with a prevalence of veinous quartz is layer 11 from the Kůlna Cave.

15 However it is necessary to allow also for a possibility that the Eem sediments have been removed from the central part of the cave although I personally do not tend to this interpretation.

16 According to the current knowledge this analogy is incorrect as the Quina type method makes towards the production of entirely different types of blanks characterized by a massive base (author's note). For the time being these cores have not been hived off as an independent type within this thesis.

17 To these issues cf. *Kaminská et al. 2000*, 89–91.

18 The exact locations of the local raw material resources were unknown at that time.

19 Currently this object together with a pebble made of Jurassic limestone undergoes a series of tests which should testify to the real intentionality of the non-utilitary attributes.

20 In the then terrain without constructed roads it is necessary to reckon with longer periods of time for travelling to a certain distance. If a raw material resource is located at e.g. a 10 km crowflight distance, even nowadays a travel to such a distance within the Drahanská Vrchovina region requires almost 4 hours (the distance has to be multiplied by a 1.7 coefficient). Moreover, as hunting requires a cautious motion, normally the speed of walk will not exceed 3–4 km/h. The walk to and from the resource would then take 6 to 8 hours; in addition to that it is necessary to take into account the time required for seeking out the raw material or hunting down the animals.