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THE VARIABILITY OF (PALAEO-)LITHICS: SOME FACTS, SOME IDEAS

ABSTRACT: The strongest bond between raw materials, technology and typology can be observed in the Lower Palaeolithic. This is certainly a paradox because we would expect exactly the opposite – the gradual development of technology should go hand in hand with the refinement of raw material selection. Leaving aside trivial phenomena, such as rough choppers in the Pavlovian mammoth bone heaps, the differences in raw materials between formal tools can always be explained in other ways than simply ergonomics. Sometimes it is the case that a particularly sightly raw material is typical only of a single phase of a culture, namely of that which puts the major emphasis on the formal aspect of tools. The extent to which local materials are extracted, treated and distributed is a function not only of their quality and abundance, but also of a whole series of purely cultural factors, whatever their meaning may be.

KEY WORDS: Raw materials – Chipped industry – Palaeolithic – Bohunician – Sickle segments – Bronze Age

The aim of this paper is not to present a systematic introduction to the questions of lithic raw materials in the Palaeolithic. It is rather a random collection of facts, interesting issues and anomalies, which author has noticed in connection with the problem of kinds of rock used for the chipped industry, and their possible interpretations. Some of them may be applied to facts, which will come to light in the following papers of this Special Issue.

True, Lower Palaeolithic industries tend to adapt themselves to the type of material that is locally present and easily available (Villa 1994: 55, Wymer 1994). However, there is clear evidence of selectivity in raw material use from the first industries in Africa, siliceous rocks that produce sharp edges (flint *s. lato*, quartzite or quartz) were preferred for small tools, while heavy-duty tools used to be made of softer kinds of rock (basalt, limestone etc.). This pattern is observable in the Oldowan and Acheulean in Africa (Clark 1975: 628, Leakey 1971), in Europe (Isernia, Terra Amata; Villa 1983), but most distinctively in the Near East. All layers of El-Ubeidiya retain the same pattern over a half million of years, namely that flakes and polyhedrons are made almost exclusively of flint, spheroids of limestone and bifaces of basalt, but also of limestone and flint. In Gesher Banat Yaacov, on the other hand, limestone is completely absent

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(Goren 1981). However, this variability starts to fade away from the Middle Acheulean and everything is then made of flint, even though the sites themselves are situated next to basalt deposits. According to the author "it is evident that the choice of flint, limestone, eolithic limestone and basalt was dependent neither on the availability of raw material, nor on the characteristics of its fracture mechanics" (Goren 1981: 198). But it can hardly be denied that spheroids were made of limestone because they were edgeless tools.

In Europe are hand axes made usually from flint or quartzite, according to accessibility of raw materials in surrounding areas. Manufacturing these so-called universal tools from raw materials, which provide an acute edge would be important mainly if a biface would have the added the benefit of being a highly efficient core for the manufacture of cutting flakes (Andrefsky 1994: 22). Therefore we tend to expect the same raw material as with small tools. The truth probably lies in the fact that the hand axe still has a second, symbolical "added benefit", which is most distinctive in Africa and in the Near East. By this I mean the famous biface floors, which can hardly have any functional significance from a practical point of view (*Figure 1*). The exceptional role of hand axes is also associated with the fact that they exhibit the highest grade of elaboration among all Lower Palaeolithic artefacts, and were made with a sense of symmetry, often so thin and sharp along the whole edge that it was at the expense of their practical purpose. An example, which has frequently been cited in connection with this kind of rock, is a biface of coloured quartzite (*Figure 2*) from the funeral site at Atapuerca – Sima de los Huesos (Carbonell, Roura 2012: 26). Most of the raw materials in Lower Palaeolithic sites come from a distance of up to 5 km, that is from a day's walk (Lumley 2010: 113), but to obtain some special kinds of rock it was necessary to cover a distance of nearly a hundred kilometres and cross several rivers (Clark 1975: 628, Tavoso 1978). In Caune de l'Arago, for example, splendid points and side scrapers were manufactured of such red jaspers (Lumley 2010: 196). In our Lower Palaeolithic we do not come upon such imports; instead we can rather observe the opposite that is a lack of interest in better materials, even though these are readily available – as good as on the spot. At the Cromerian site of Stránská skála in Brno only second-rate varieties of local Jurassic cherts were used (Valoch 1987); on sites in the neighbourhood of Krumlovský les the local chert has been overlooked and the majority of tools are made of quartz pebbles (Valoch 1992).

FIGURE 1: Melka Kunturé – Garba I, Ethiopie. Biface pavement, Late Acheulian. After Chavaillon, Chavaillon (1980: 157).

FIGURE 2: Hand axe made of coloured quartzite from the burial site Atapuerca – Sima de los Huesos. After Carbonell, Roura (2012).

The rule that most raw materials come from a distance of up to 10 km, that is from a day's walk also applies to the Moravian Middle Palaeolithic. Yet it cannot be said that the variation in lithic assemblages is primarily due to the availability of lithic raw material. Evidence of this is provided by the Kůlna Cave, which accommodated two different cultures – the Taubachian and the Micoquian (Valoch 1988). The location of both these complexes in relation to various mineral deposits is of course the same; but the former one is dominated by spongolite (47%) and quartz (34%) and in the latter one the predominance of spongolite is much more distinctive (6–10 to 1 by layer; Neruda 2001: Tab. 1, 2005). The question remains, how is this connected with smaller extent of the Taubachian industry. It is, however, notable that the spongolite component of Taubachian industry is more microlithic, and that this culture is in general typical for its small-sized artefacts (Valoch 1988, 2003). The well-known fondness of Neanderthal people for pretty stones (see jaspers of Fontmaure; Lorblanchet 1999, Pradel 1967; *Figure 3*) and curious products of nature is also evident in Kůlna. Multicoloured chalcedonies and rock crystals (*Figure 4*) are present in bifacial forms typical of the Micoquian. Such tools are usually more transferred ("curated" in the Binfordian sense), which has been explained in the spirit of neo-functionalism as a manifestation of in-depth planning. This seems a little bit exaggerated because every child pays more attention to nice objects rather than to other objects, having no clue of planning.

A notable exception to this is the case with the Taubachian layer where bifacial tools, strange to this culture, are made exclusively of porcellanite from SE Moravia (65 km), which otherwise virtually does not occur here (Neruda 2001: 18). In this case we could take into consideration a primary intrusion from a different cultural environment (Eemian Micoquian was detected e.g. in Bojnice III in Slovakia that is in the same direction from Kůlna as the porcellanite outcrops: Neruda, Kaminská in press).

The extraneous character of certain typological patterns was also determinant for distinguishing the Bohunician from the Szeletian context (Oliva 1979: 55, 1984). I found that nearly all bifacial leaf points (as

FIGURE 3: Bifaces made of jasper, Fontmaure, France. After Pradel (1967).

FIGURE 4: Flat biface made of citrine, Kůlna Cave, Micoquian. Photo by P. Neruda.

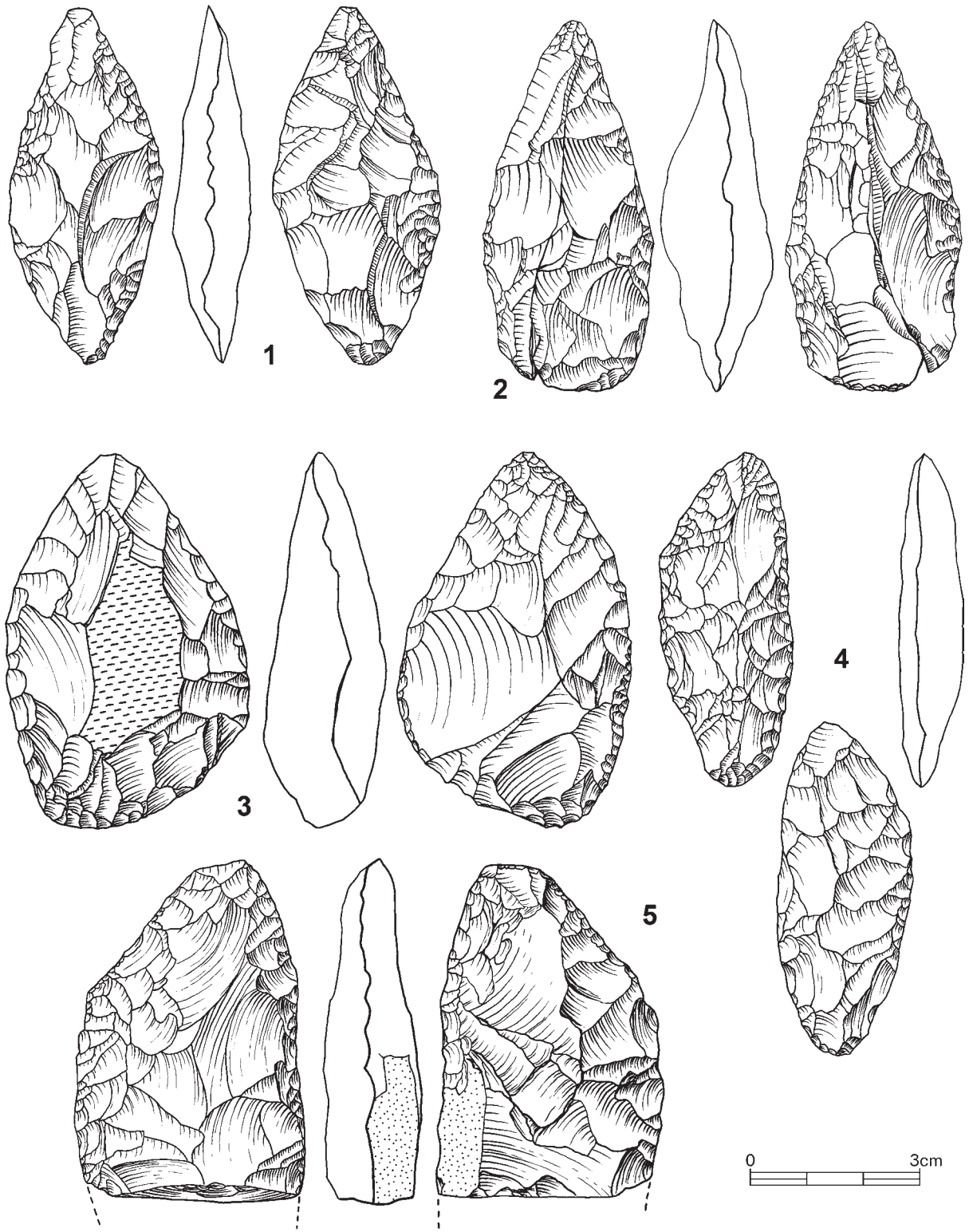

FIGURE 5: Szeletian-types of lithics from the eponymous Bohunician site at Brno-Bohunice. 1–2, 4, chert of the Krumlovský les III (?)-type; 3, spongolite; 5, erratic flint (det. A. Přichystal). Drawing by T. Janků.

a *fossile directeur* of the Szeletian) are made of raw materials which are common to this culture (spongolite, Krumlovský les-type chert, radiolarite; see also Nerudová *et al.* 2011: 45; *Figure 5*), whereas the other tools were manufactured mainly of Jurassic chert from Stránská skála. Moreover, the Szeletian types are absent in all stratified assemblages from this particular source. This finding is still valid despite various later modifications. An expert analysis of the collection from Líšeň-Čtvrtě, made by A. Přichystal, has shown that only two out of the 31 specimens stored in the Anthropos Institute (Inv. Nos. 8466–8496) may have been manufactured from the Stránská skála chert (Oliva 1988: 7). Svoboda (1990: 203) relates that from among 63 bifacial foliated points six pieces are made of the aforementioned raw material and another six are not specified. This insignificant shift is probably caused by a fusion with the collection of P. Ondráček which, in contrast to the assemblage from the Anthropos Institute, comes from various places within the area of Líšeň. From the tract of land called "Křížova zmola" in the same locale, after all, comes also the most elaborate leaf point made of the Jurassic chert from Stránská skála (*Figure 6*). This is a proof that the reasons that Bohunician bifacial points were made of imported raw materials were not of technological nature. That is why I hypothesised that leaf points and strongly retouched side scrapers are accidental cultural borrowings from the Szeletian. During the next phase of the Bohunician, this tradition continues with the production of the Jerzmanowice points (i.e. with only partial flat retouch) that were made by applying flat retouch to thin blade blanks of the local Stránská skála-chert, typical of the Bohunician method of para-Levallois core reduction. Tostevin and Škrdla (2006), however, found out that bifacial leaf points were manufactured (or only repaired?) directly on eponymous site at Brno-Bohunice. From the point of view of purely archaeological thinking it may lead to rejection of the above-mentioned hypothesis, whereas from a palaeoethnological point of view it may, by contrast, be a proof thereof. We have namely evidence of mutual contact between both of these techno-complexes, without which no transfer of typological patterns could take place. Rejecting the hypothesis on acculturation, moreover, does not explain in any way the above-mentioned differences in raw materials.

In the variability of raw materials in the other Upper Palaeolithic cultures we do not find any manifestations of foreign typological patterns. In the Gravettian/ Pavlovian industries from Dolní Věstonice, which were made prevailingly of flint, there are archaic and strongly formalised side scrapers from the Krumlovský les chert and spongolite. These, however, may come from the remnants of an earlier habitation, which became visible in some places below the Gravettian layer and was never distinguished from it (Absolon 1945: 23, Oliva 2000).

The evaluation of Gravettian industries has shown that the distribution of raw materials did not follow the standard "down the line" model. The nearer sources were exploited to a minimal extent and the highest representation has the erratic flint, irrespective of the distance to his sources. With a growing distance from the outcrops, the treatment of the flint does not become more sophisticated and not even the absolute quantity is reduced. The most distant sites along the slopes of the Pavlov Hills belong to the richest ones and the mass influx of the northern flint continues right into Lower Austria (Oliva 2000: 220). The procurement of the flint was thus in some way established, and perhaps generated by the groups coming from the exploitation areas during the social gatherings, hunting trips or seasonal migrations. At the other end of these chains stood the local demand for whole nodules of the appreciated flint. Rocks of considerably distant origin were then processed in settlements from the stage of little pre-treated cores,

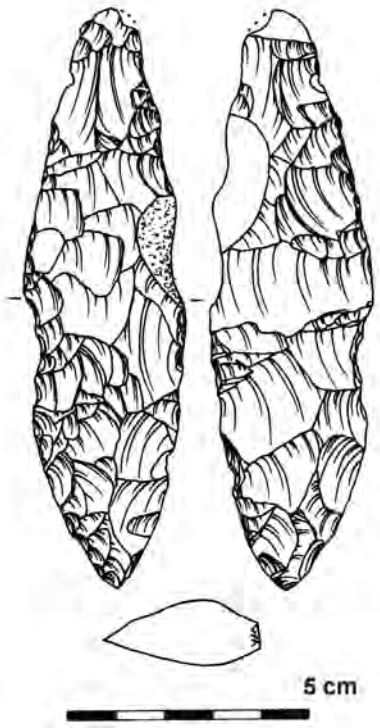

FIGURE 6: Leaf point of Stránská skála-chert. Líšeň-Křížova zmola. After Nerudová, Přichystal (2001).

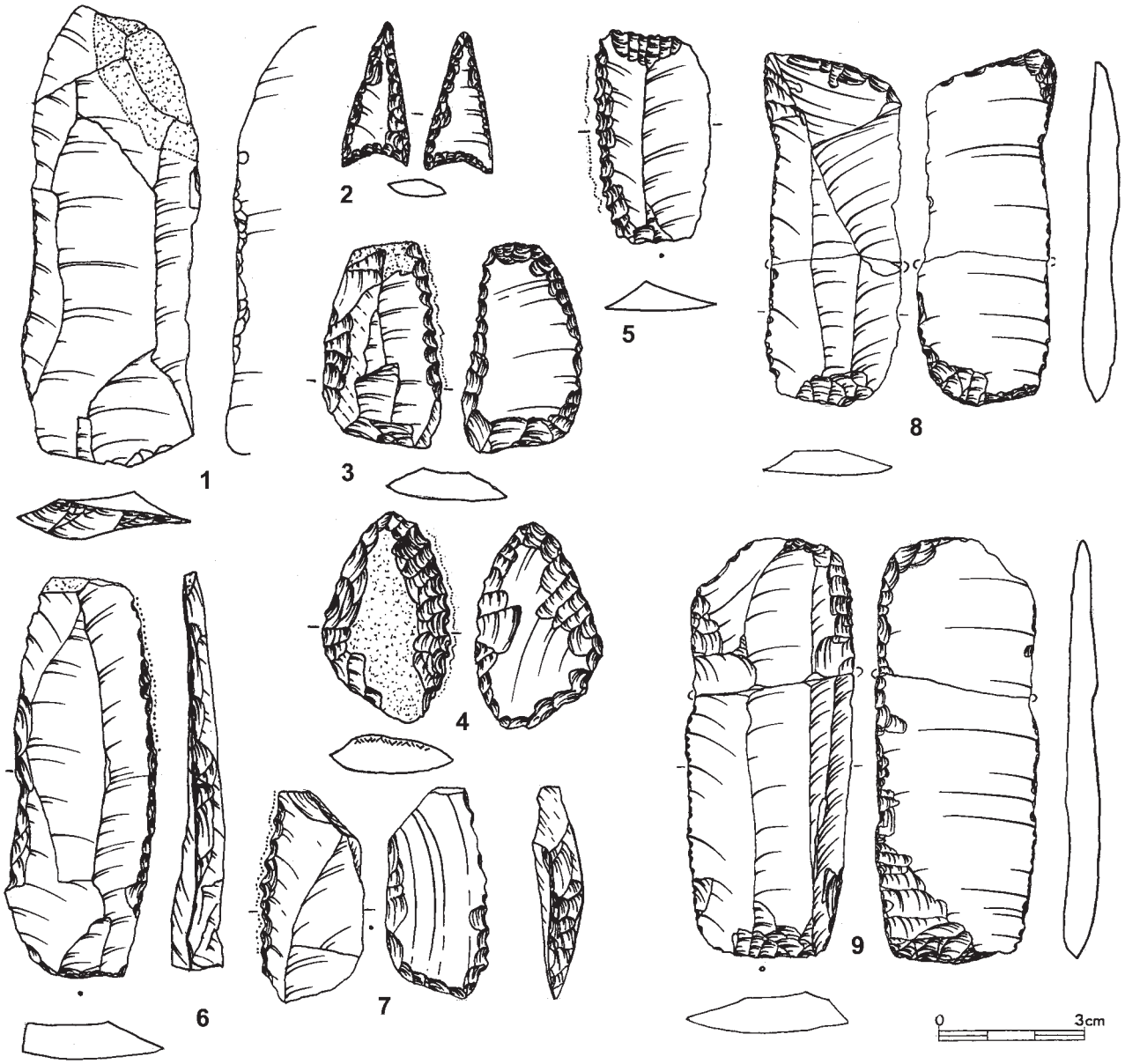

FIGURE 7: Sickle blades of Krumlovský les-chert and Krumlovský les-chert breccia from the Early Bronze Age. 1–5, Šatov, distr. Znojmo (settlement of Únětice Culture); 6–7, Blučina (hill-fort of Únětice Culture); 8–9, Šumice (Věteřov group rondeloid). Drawing by Z. Nerudová.

so that we need not assume the existence of extractive workshops (indeed, we do not know any).

Compared to the Pavlovian, the Magdalenian way of using the imported raw material is more economical. It was probably the hunters themselves who may have brought it from their expeditions, and they also may have selected the transported semi-finished products and finished tools. Even the geographic location of the Moravian Karst, encompassing the majority of Moravian Magdalenian sites, confirms that the Magdalenian hunters were rather left to their own resources (Oliva 2002). The area is relatively remote from communication routes along river valleys, near which the Gravettian hunters settled several thousands of years ago. The movements towards the north may have paralleled the summer movements of reindeer herds to the plains of

southern Poland. Non-reduced cores or cortical flakes of distant materials do not occur any more. However, we do not identify any workshop sites on deposits of the dominant northern flint in North Moravia. Magdalenian habitation is known from as far as Poland more to the north, where most sites exhibit a well-advanced lithic production. On Moravian mineral deposits, on the other hand, we can find well-established workshops with many pre-cores and blade cores, whose products, however, have not been distributed in any way (Býčí skála Cave in the Moravian Karst, Bečov in NW Bohemia).

Chronologically, the most recent, interesting bond between tool type and raw material was identified in the Early Bronze Age. Sickle segments in Moravia were manufactured solely from the Krumlovský les chert (Oliva *et al.* 1999: 310), whereas only 76% of other highly formalised artefacts, the arrowheads, (Kaňáková Hladíková 2010) use this material. Deposits of top-quality specimens in pits inside of circular ditches or together with manipulated human bones make it possible to take into consideration ritual meanings, be it in connection with agricultural work cycle or potential sacrifices. A hoard of seven blades, from which the largest ones – made of chert breccia – were broken in pieces (Oliva *et al.* 1999, Obr. 43), was found beside an assembly house in a roundel enclosure of the Věteřov type at Šumice (Stuchlík, Stuchlíková 1999). As a sickle segment from the Krumlovský les chert originally served as a knife, which was probably used for cutting to pieces the corpses of 11 anaemic children in a pit of the late Únětice culture at Blučina (*Figure 7: 6*). In a hillfort of the Věteřov culture at Frankenstein-Burgberg, inside pit No. 129 broken up skeletal remains of about seven individuals bearing cut marks were found together with serrated sickle segments made of the KL 1-type chert (No. 129/2) and of fine reddish breccia probably also from Krumlovský les (129/267). Sickle blades were quite frequently burned and probably intentionally broken in pieces (30%, in, the ceremonial centre at Cezavy near Blučina even 42%). It cannot be ruled out that these particular artefacts were endowed with a certain magical significance just because of their origin of in Krumlovský les area; it is an old mining landscape, sanctified by an age-long tradition of the place. A certain role may also have been played by the fact that these mining fields were situated on elevations, which were wooded at that time. From a spiritual point of view, such expeditions for raw materials are reminiscent of pilgrimages to sacred places in the mountains (Bowie 2008: 245). This raw material is in no way exceptional from the technical point of view, compared to the others from nearer places. Thus we observe here an energetic principle exactly opposite to that, on which *New Archaeology* was based: energetic expense (remoteness, depth of shafts, quantity of extracted stones) and dangerous work were required to enhance the "*mana*" and thereby also the desired properties (supposedly practical as well as symbolical) of the products. The condition, however, was that the origin of the raw material was identifiable – otherwise the symbolical surplus labour would come to nothing. Such artefacts then incorporated a sort of transcendental surplus value and can be referred to as iconic

To conclude, we can summarise the main facts and impressions. The strongest bond between raw materials, technology and typology can be observed in the Lower Palaeolithic. This is certainly a paradox because we would expect exactly the opposite – the gradual development of technology should go hand in hand with the refinement of raw material selection. Leaving aside trivial phenomena, such as rough choppers in the Pavlovian mammoth bone heaps, the differences in raw materials between formal tools can always be explained other ways then ergonomics. Sometimes it is so that a particularly sightly raw material is typical only of a single phase of a culture, namely of that which puts the major emphasis on formal aspect of tools (large retouched blades in the Aurignacian I using more often the *silex de Bergeracois*, fine leaf points in Late Solutrean made of coloured jaspers, etc.).

The extent to which local materials are extracted, treated and distributed is a function not only of their abundance, but also of a whole series of purely cultural factors, whatever their meaning may be. In several situations the production tended to hypertrophy, even though there was no demand for the final products. This is, for example, the case with Middle Palaeolithic quarries in Egypt where a single mining place at Nazlet Safaha 1 could provide as many as 200 thousand nodules, (Vermeersch 2005: 65) even though there are no settlements to be supplied (Vermeersch 2002: 358). Only little must have been taken away of all the industry left in place around the stopes, because almost whole cores can be refitted here; sometimes, however, only the subsequent debitage is preserved, whereas the core itself stays out. But this debitage also includes splendid Levallois blades that are not only preparation flakes and waste (Van Peer *et al.* 2010, Vermeersch 2005: Fig. 15). There are surely more such examples of excessive production, mainly of Levallois industries, from the Middle Palaeolithic, particularly in regions abundant in flint or quartzite. A complete lack of distribution was

registered with mass production of blades at the Aurignacian site of Vedrovice I in the Krumlovský les exploitation area, or with the Magdalenian workshops in Býčí skála Cave. Both of these localities were home bases rather than extractive camps. In other sites we would better consider the use of, for example, the term "workshop" for the production of leaf points (Nerudová 2009: 168), because such a high level of division of labour was reached only as late as in the Middle Ages.

I am confident that assessing the extraction, distribution and variability of raw materials only from a practical and technological point of view, which is encouraged by the modernist term "raw material economy", springs from overspecialisation of the authors and cannot give rise to plausible conclusions.

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