Supplementary material

to the paper

QUARTZ AND QUARTZITE AS LITHIC RAW MATERIALS IN THE HUNGARIAN PALAEOLITHIC (AM 2019//2 65-84)

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V. T. Dobosi and I. Gatter (1996) carried out the mineralogical investigation of the little archaeological collection of the Hungarian National Museum containing 14 rock crystal artefacts. The substantial advantage of fluid inclusion studies is that this method does not damage the investigated objects. The main goal of the investigation was to get information regarding the genetic conditions of mineral formation and thus indirectly of the possible source localities. The investigated artefacts are stemming from several archaeological assemblages of Palaeolithic sites. They were recovered partly from excavations, from authentic artefact-bearing layers, partly were found as stray finds. Most rock crystal artefacts can be related to the Upper Palaeolithic, more specifically to the elder and younger phyla of the Gravettian entity. The samples with fluid inclusions can be allocated most probably to "Alpine type" quartz veins, from the epithermal or mesothermal environment. In the immediate neighbourhood of Hungary, the potential geological source could be the Central or Eastern Alps.

After the publication of the above mentioned fundamental paper, some stray finds turned up and were also published; these will be listed in the following in their approximate chronological order.

In August 1988 within the framework of the cooperation between the University of Illinois at Urbana-Champaign and the University of Miskolc an excavation led by B. Adams and Á. Ringer was carried out at Sajóbábony–Méhésztető (Fig. 4, RC-11) at the eponym site of the Bábonyian industry. During the excavation, a rock crystal artefact came to light too (Adams 2000, 175). It should be noted that both the lithic assemblage from the surface collection and the excavation contains artefacts with pronounced Upper Palaeolithic, likely Aurignacian characteristics.

K. Zandler described a mesial fragment of a side-scraper with bifacially retouched straight working edge and a flake from the Andornaktálya–Alsó-hilltop site (Fig. 4., RC-1) (Zandler 2006, 41-42, 2012, 18-19). In the environment of Eger, this is the only known site where this rare but tractable raw material occurs. Unfortunately, the site cannot be identified. According to V. T. Dobosi, it can be identical to the site of Andornaktálya–Szukszer-hill (Fig. 2., Q-3) (Dobosi 2005, 61). This site has an Upper Palaeolithic (Aurignacian) surface lithic material (Zandler 2006, 22).

S. Béres described (Béres 2001) a small end-scraper made of rock crystal from the Upper Palaeolithic site Megyaszó–Szelestető (Fig. 4., RC-9), which belongs to the elder Gravettian entity containing some Aurignacian components. The radiocarbon date of the site is 27,070±680 BP (Dobosi 2000, 80). The basis of the end-scraper ("grattoir mince") of 20×24×8 mm dimensions was eliminated and the sharp fringe was retouched. The distal end was retouched in its whole width with a regular, fan-like retouch. At the right lower corner of the artefact the original crystalline surface can be seen, the wrinkle of which is perpendicular to the axis of the tool, so that the direction of the blank removals was parallel to the longitudinal axis of the crystal. As a probable source of the artefact, as in the case of the above-mentioned artefact of Sajóbábony–Méhésztető, V. T. Dobosi suggests (Dobosi 2009, 119) the sites Rousměrov and Bobrůvka in the Czech Republic, known from the paper of K. Valoch (Valoch 1989).

On the excavation in 1996 led by V. T. Dobosi and K. Simán at the Hont–Parassa III. (Orgonás) (Fig. 4., RC-6) Gravettian site, three rock crystal fragments came to light (Dobosi & Simán 2003, 27). The 14C radiocarbon analysis of the charcoal sample taken was carried out in Debrecen in the laboratory of ATOMKI. Based on this analysis, the age of the site is 27,350±610 BP. The assemblage of the site shows great typological similarity to the materials of the sites of Bodrogkeresztúr–Henye-hill and Megyaszó–Szeles-hilltop.

In May 2015, field surveys were carried out by A. Markó, K. Zandler, and the author, in the Ipoly Valley. At the site of Ipoly-völgy 1 (Fig. 4., RC-5), an unretouched rock crystal microblade was found. According to the typological characters of the other surface artefacts, the site can be attributed to the Late Gravettian entity.

Gy. Lengyel published (Lengyel 2001) a rock crystal flake stray find from Emőd–Tehéntánc-lane (Fig. 4., RC-4), which can be found in the collection of the Herman Ottó Museum in Miskolc. The Palaeolithic age of the

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plunging (“outrepassé”) flake is indicated by a short end-scraper found in the vicinity. The technological characteristics, described in detail by the author confirm this assumption.

In 2004, from the surface collection of the author of this paper, a burin of uncertain age got into the collection of the Hungarian National Museum. The artefacts stem from Kozárd–Fehér-oldal (Fig. 4., RC-8), from the eponym geological site of the Upper Miocene „Kozárd Formation” (Hámor 1985, 159, 1997). V. T. Dobosi determined the raw material of the artefact macroscopically as rock crystal. The artefact belonged to a small chipped stone assemblage. Among the artefacts, only one characteristic tool, a “rabot” (“grattoir épais”) can be emphasized, which is well known from the Palaeolithic (Demars & Laurent 1992, 48), but even the occurrence in the Neolithic cannot be excluded. The importance of the find is dual, on the one part till now there is no known Palaeolithic site in the vicinity, on the other part the occurrence of rock crystal as raw material is not documented in the Hungarian Neolithic (T. Biró 1998).

S. Béres in his paper dealing with the Palaeolithic of Dömös village, located on the right side of the Danube in the Danube Bend, mentioned a surface stray find, a large burin made of rock crystal from the vicinity of Dömös–Pattantyús site (Fig. 4., Q-3) (Béres 2011). In the paper there are neither details nor a drawing of the artefact, so the cultural affiliation cannot be ascertained. The Palaeolithic relation of the site is up to now unclarified, the field research aiming at the localization of the site was negative (Dobosi 2005, 66, 2006b). Unfortunately, according to the kind verbal reference of V. T. Dobosi, the raw material of the artefact is not rock crystal.

Quartzite as a lithic raw material in the Hungarian Palaeolithic

Among the sites, foremost the classical sites will be described in the generally accepted chronological order, after which the assemblages of the caves and rock shelters will be introduced. In the end, the open-air sites will be discussed in the chronological order of the related relevant publications.

Quartzite at the classical open-air Palaeolithic sites in Hungary

Vértesszőlős (Fig. 3., Q-17)

The site is situated in the southern part of the Gerecse Mountains (Komárom-Esztergom County, Transdanubia). It was excavated between 1963 and 1968 with the leading of László Vértes; it is till now the single authentically excavated Lower Palaeolithic site in Hungary. The artefacts embedded partly in calcareous-tufa, partly in loess, came to light from an undisturbed settlement area. Based on the different natural scientific (faunistic, botanic) methods, the age of the site is dated in the period reaching from the Mindel interstadial of the second Central European glaciation to the end of this glaciation. Depending on the applied methods the radiometric chronology scatters within broad limits (Dobosi 2006a, 1). From the point of typological and technological characteristics of the huge assemblage the data published by L. Vértes and V. T. Dobosi are relevant (Vértes 1990; Dobosi 1990a). The latter author also dealt with the spatial distribution of the artefacts within the site (Dobosi 1990b).

Regarding the percental ratio of the quartzite the precise details are not known, but either way, it was the dominant raw material. The majority of some 8,890 diagnostic pieces were made of quartzite pebbles which likely originate from the allochthonous terraces of the Által-ér streamlet. The main characteristics of the Vértesszőlős industry are that all the tools were made of pebbles and nearly all tool types are small-sized. The largest tool has a length of 40 mm; the average length of the tools is 24.03 mm.

Among the tools 5,819 artefacts are standardized (typical) and 3,071 are non-standardized (atypical). Among the manufactured tools, L. Vértes distinguished more than 80 tool types, including unretouched artefacts and fractured ones too. When L. Vértes described the different types, the only descriptive criteria were the existence of some morphological series. Following this logic, he inserted the non-standardized tools between the tools and the debitage. He considered possible the incidental technological debitage character of a part of these non-standardized tools. Among the defined tool types the choppers and chopping tools are dominant; their number comes out to 2,145 artefacts. The technological analysis of these tools was carried out by Sz. Szőke (Szőke 2004; Farkas-Szőke 2008). The chipped stone assemblage contains different side-scrapers, even the so-called „Tata side-scrapers” are known.

C. van Riet Lowe made the first attempt to make a systematic grouping of the pebble industries of Uganda. The classification system elaborated in relation with the Kafuan industry, contains the types of hemiliths (broadways, straight splitted pebbles), ortholiths (longways, straight splitted pebbles) and plagioliths (crossways, oblique splitted pebbles) (Tieu 1991, 16, Fig. 4). The work, published in 1952 formed the base of the descriptive system of L. Vértes (Vértes 1965). In the Tata assemblage, beside the above-mentioned types, pyramidal tools, halved and quartered pebbles, hemiliths, ortholiths and plagioliths also occur. Among the tools, the so-called proto-hand axes can also be found (Tieu 1991, 63).

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Regarding the stone assemblage, L. Vértes made several technological observations which, even based on our recent terms and knowledge about bipolar-on-anvil technique, can still be considered relevant. His remarks proof unambiguously, that although due to the lack of technological knowledge he could not verify, he did suspect the existence of the bipolar-on-anvil technique (Vértes 1990, 534-535).

Tata–Porhanyó-quarry (Fig. 3., Q-15)

The site is situated in the southern part of the Gerecse Mountains (Komárom-Esztergom County, Transdanubia). It was the first open-air Palaeolithic site excavated in Hungary, in 1909-1911 by Tivadar Kormos (Kormos 1912). Thereafter László Vértes excavated the site which resulted in a monograph of international recognition (Vértes 1964). The largest part (91.3%) of the 2,318 stone artefacts stemming from the excavation of L. Vértes is made of siliceous pebble; the smaller part (7.2%) was made of quartzite pebble, the remaining 1.4% of different other raw materials (Vértes 1964, 138).

In her paper published in 1983, V. T. Dobosi dealt in detail with the technological aspects and with the possible Hungarian and international relations of the so-called „Tata industry". The majority of her statements and conclusions are till now relevant. Regarding the raw material consumption of the site, she reevaluated the 2,431 artefacts stemming partly from the excavation of L. Vértes, partly from the heritage of I. Skoflek, and established a higher quartzite ratio of 12% (Dobosi 1983, 24).

The newest excavations were carried out by the leading of V. T. Dobosi and J. Cseh in 1995-2001. The details of these excavations were published by V. T. Dobosi (Dobosi 2003). In her paper, the author mentioned that the percental ratio between chert (siliceous pebble) and quartzite changes, the quartzite ratio of 7.2% given from L. Vértes in 1964 will be higher, as she wrote it already earlier. In her paper in 2008 J. Kisné Cseh mentioned only 25,590 inventoried artefacts (Kisné Cseh 2008,35), in the paper of V. T. Dobosi in 2013 the corresponding number is 47,242 artefacts (Dobosi 2013, 20).

The essential reason for this variance is the significant difference regarding the excavations of L. Vértes in 1959. In this paper the rise of the quartzite ratio is only briefly mentioned, exact numbers are not given. Based on the Th-230/U-234 analysis of the travertine layers, the approximate chronometric age of the site is about 116-70 ka. It corresponds to the two warm interstadials (Brørup és Odderade) in the early Weichsel glaciation correlating with the oxygen isotope substages (OIS) 5a-5c. Detailed technological analysis of a part of the Tata assemblage and review of the problematic of the so-called microlithic industries can be found in diverse papers of M.-H. Moncel (Moncel 2001a, 2001b, 2003, 2004). Based on its technological characteristics and comparative studies of several microlithic industries from the OIS 11 to 4-3, such as Vértesszőlős in Hungary, Kůlna and Predmosti II in the Czech Republic or the Pontinian complex in Italy, the assemblage seems to belong to a specific tradition (Moncel 2003, 117).

Érd (Fig. 3., Q-6)

The site is situated in the Fundoklia Valley of the village Érd (Pest County, Transdanubia). The excavation of this Middle Palaeolithic site was carried out by Veronika Gábori Csánk in 1963-1964. On the site, she could distinguish two culture-bearing layers. The upper layer could be subdivided into five occupation levels. This is a clear indication that different communities of the same cultural entity returned to the site several times. On every occupation level, there is a definitive quartzite industry, 76.2% of all the artefacts are made of quartzite. From the huge assemblage, containing some thousands of artefacts, only 808 selected tools were studied thoroughly. Three-quarters of them were made of quartzite, but the most finely elaborated tools were made of raw materials of better quality (Gábori Csánk 1967, 1968, 1984). Foremost V. Gábori Csánk dealt with the technological analysis of the tool production, which resembles the characteristic pebble-slicing method of the so-called „Pontiniano-Moustérian/Pontiniano-Charentian" industry. In her opinion, the industry of the site belongs to a cultural complex of a large range, to the „La Quina type Moustérian (Charentian)" or „South-East European Charentian" facies. As possible parallelism to the industry of Érd, besides the classical Italian Pontiniano sites, she mentioned first of all the assemblages of the Krapina cave and of the lower layer of the Veternica cave in Croatia, the C layer of the Betalov spodmol cave and the „quartzite Palaeolithic" of the lowermost layer in the Špehovka cave in Slovenia (Brodar 1938; Malez 1958). Among the sites, belonging to the so-called „Alpine Mousterian", she referred to the quartzite assemblages of the well-known cave sites in Austria, the Repolust-Höhle, the Drachenhöhle-bei-Mixnitz and the Badl-Höhle. She found it conceivable that there was a cultural connection between the Mousterian industry of the Southern Alps and the industries of Pontiniano technique (Gábori Csánk 1971, 39).

M. Mottl in her paper dealing in detail with the „Alpine Palaeolithic" as well as some other authors brought the quartzite assemblages of the Drachenhöhle bei Mixnitz and the Badl-Höhle in connection with the „Olschewian" (Central European Aurignacian II.) (Mottl 1975, 36). In the archaeological assemblage of the Repolust-Höhle, containing 1,700 chipped stone artefacts, 62% of the artefacts were made of quartz and quartzite. M. Mottl

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determined the assemblage as a typical flake industry belonging to the Western European Clactonian-Tayacian complex and the „Alpine Palaeolithic" (Mottl 1951, 1975). Based on several posterior studies, the industry is a specific undefinable Middle Palaeolithic industry (Brandl et al. 2011).

The fundamental technological analyses of the assemblages of Érd were attached to Zs. Mester and Marie-Hélène Moncel (Mester 2004, 2012; Mester & Moncel 2006). Based on technological investigations of 23 exhausted quartzite cores three basic debitage methods were determined: discoid debitage with bifacial modality (with two knapping surfaces), discoid debitage with unifacial modality (with one knapping surface) and lastly Quina debitage. Despite these facts, it cannot be excluded that besides the freehand knapping the bipolar-on-anvil technique was also applied. However, the excavation brought no anvils to light.

According to V. Gábori Csánk the 14C radiocarbon date of 44,300±1400 (GrN 4444), gained from a charcoal sample stemming from the „e" occupation level of the upper layer is in accordance with the geochronological situation (Gábori Csánk 1970, 6; Vogel-Waterbolk 1967, 119). Very similar 14C radiocarbon dates have been yielded from some Western European Charentian sites, for example for the two late Mousterian layers of La Quina 35,250±530 (GrN-2526), which lies directly above the „Charentian" layer (Vogel-Waterbolk 1967, 119) and for some Eastern European Moustérian sites, such as Molodova I > 44,000 (GrN-3659.), and Molodova V > 40,000 (GrN-4017.) (Gábori Csánk 1970, 6; Vogel-Waterbolk 1967, 119).

Use of quartzite in cave sites and rock shelters

In the archaeological assemblages of caves and rock shelters discussed in the standard monography of L. Vértes (1965), there are only limited data regarding quartzite artefacts. The author had given the sites in alphabetic order as follows below. Büdöspest cave (Fig. 2., Q-20): five artefacts, Jankovich cave (Fig. 3., Q-1): two artefacts, Lambrecht Kálmán cave (Fig. 2., Q-23): seven artefacts, Puskaporos rock shelter (or Puskaporosi cave, recently known as Herman Ottó cave.) (Fig. 2, Q-21): two artefacts (The occurrence of two flakes was mentioned by P. Szolyák in his paper dealing with the Upper Palaeolithic cores of the cave (Szolyák 2008-2009, 236)), Subalyuk cave (Fig. 2., Q-19): three artefacts, Szeleta cave (Fig. 2., Q-22): three artefacts (Vértes1965, 276-346).

Excluding the Jankovich cave (Gerecse Mountains, Transdanubia), all other cave sites are located in the Bükk Mountains (North East Hungary).

Lambrecht Kálmán cave (Fig. 2., Q-23)

In 1953, an excavation was carried out by L. Vértes and with the collaboration of Dénes Jánossy palaeontologist in the cave (Vértes 1959). The small excavated lithic assemblage contains eight artefacts, among them four artefacts, which were made of quartzite. The first quartzite artefact is a formless tool, delimited by fairly sharp breakage lines; its function is uncertain. It can be considered mostly as a high end-scraper. The working edge shows insecure splintering traces. The tool was made of greasy, having unctuous lustre, translucent white quartzite. The dimensions are 65.7×29 mm. The second quartzite artefact has an irregular triangular shape. On the thick base, there are the remains of the original pebble cortex. Both the dorsal and the ventral face are irregularly embossed; both edges are zigzaggy, meeting at a well enough defined point. The raw material is white, opaque quartzite. The dimensions are 45.7×52.5 mm. The third artefact was regarded as side-scraper, with a regular equilateral triangular shape. Its base is the slightly curved pebble surface. The left lateral side edge is blunt. The right lateral side edge is the actual scraper edge. The raw material is coarse-grained, yellowish-white quartzite. The dimensions are 63×72 mm. The fourth artefact is a flake of quadrangular shape. Its raw material is white, greasy quartzite. L. Vértes made a well-founded comparison with several lithic assemblages, mostly belonging to a "quartzite Mousterian" industry. Concerning the quartzite flakes found in the Lambrecht Kálmán cave, L. Vértes noted, that they are all atypical, made by Clactonian technique (Vértes 1965, 315).

M. Gábori (1960) dealt with the quartzite artefacts of the Lambrecht Kálmán cave, which he regarded as an industry of the cave Pre-Mousterian ("Prämoustérien"). On the bases of corresponsive palaeontological evidence and sedimentary analyses, he suggested a possible date of the industry to the Riss-Würm interglacial (Gábori 1960, 58).

Kiskevély cave (Fig. 3., Q-4)

From the lower, the „Mousterian" layer of the Kiskevély cave (Pilis Mountains, Transdanubia) Vértes reported side-scrapers made of quartzite and siliceous pebble. In his opinion, these tools, together with the artefacts of the Szelim cave should be regarded as the same as of the Tata industry (Vértes 1965, 112). At the same time, in the part of the monography, dealing with the natural scientific and archaeological data of the cave sites, one can find only the following information about the cave: „elaborated flakes, made mainly of pebbles … 60 (pcs. PA)". In the enumeration of the several tools, he did not refer to the quartzite raw material (Vértes 1965, 313). V. Gábor

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Csánk in the appendix of her doctoral thesis dealing with the Jankovichian industry described the archaeological assemblage of the „Mousterian" layer of the cave. In this layer, besides the numerous quartzite flakes, a simple side-scraper with a curved working edge made of quartzite occurs as well (Accession number: 70-51-24) (Gábori Csánk 1986, Table XI.:11). In her opinion, the rough-and-ready elaborated artefacts made of quartzite pebbles of this layer are near to the industry of the lower layer of Érd.

Büdöspest cave (Fig. 2., Q-20)

In his candidate (PhD degree) dissertation, Zs. Mester made some important statements concerning the archaeological assemblage of the cave (Mester 1994, 75-76. and Table XV.). He described the occurrence of three tools made of quartzite, a massive, triangular, pic-like, pointed flake with triangular cross-section (Accession number: Pb/961 9/V., it was inventoried as inverse chopper), a side-scraper with finely elaborated curved working edge made on an elongated pebble-slice (Pb/962 12/V), furthermore a fragment of the point of a perfect, classical biface (Pb/1066 12/V.). The assemblage of the lowermost layer, the F stratigraphic unit is composed dominantly of quartzite flakes (Mester 1994, Fig. 3.2.2.5), there are numerous artefacts of small or middle-sized dimensions. This fact refers to significant tool production. For the F stratigraphic unit containing 145 artefacts, a quartzite ratio > 40% had given. The same fact was mentioned by Zs. Mester in his paper dealing with the revision of the Palaeolithic sites of the Bükk Mountains (Mester 2001, 30). Here the author strengthens again the markedly high percental ratio of the quartzite raw material in the lowermost stratigraphical unit. He refers to the existence of similar stone assemblages in a 2/b layer of the Szeleta Cave (Mester1994, 83) and the 5th layer of the Lambrecht-Kálmán cave (Vértes 1953). At the same time V. Gábori Csánk mentioned the existence of an old Middle Palaeolithic industry with quartzite tools in the lowermost layers of the Kiskevély and Szelim caves, and in this connection suggested the thought of the existence of an elder "quartzite horizon", datable to the late Riss/Würm (Gábori Csánk 1994, 87). Regarding the radiometric age of the Büdöspest cave, there is only one, uncertain 14C radiocarbon date gained on a charcoal sample> 37,000 (GXO 198) (Kretzoi & Vértes 1965: 138; Gábori Csánk 1970, 4).

Diósgyőr-Tapolca cave (Fig. 2., Q-9)

A. Saád carried out excavations in the cave in 1932-1934. On an area of 4 m^2 in the middle of the cave, he found waste products and tools in large quantities. The quartzite tools that came to light from the lower, brownish layer were interpreted by A. Saád to belong to the Szeletian industry, and he assumed the presence of the Mousterian industry too. The two layers of the cave, containing leaf-shaped points were associated by L. Vértes with the late, evolved phase of the Szeletian industry. The site was regarded as a workshop (Vértes 1965, 143-144) by him. He did not mention the quartzite tools found under the Szeletian layer, following the report on the excavations.

In 1973 a rescue excavation was carried out by M. Hellebrand with the contribution of A. Saád (Saád & Hellebrandt 1974). In the interior part of the cave, there were no undisturbed layers, so they opened up two trenches on both sides of the cave entrance. Quartzite artefacts came to light in both tranches, mainly from the lower layers. Besides some flakes showing traces of elaboration, and retouching, the assemblage also contains typical tools, side-scrapers, borers and burins. The layers excavated in 1973 belong in faunistic point of view to the Varbó and Subalyuk phase (the second half of the Riss-Würm interglacial), climatically they represent a cooler phase (Hellebrandt et al. 1976). The archaeological material of the II/5. layer was classified by the authors as belonging to the „Mousterian" in a wider sense, which is analogous to the „quartzite Mousterian" material brought to light from the Lambrecht Kálmán cave (Vértes 1959). That little assemblage, however, did not support technological or typological analyses. The quartzite Mousterian material of the I. and J. layers of the Veternica cave in Croatia may be regarded as a possible analogy to the industry as it contains quartzite tools that are from the typological and technological point of view similar to those of the Diósgyőr–Tapolca cave (Malez 1974).

The material of the II/5. layer was also compared to the material of Taubach–Ehringsdorf industry that belongs to the Eemian interglacial. The porphyrite tools are technologically most comparable to the Taubachian porphyrite tools (Hellebrandt et al. 1976, 33). Thereafter Á. Ringer excavated the cave in 1988. He opened up an area of 3.0×2.0 m to a depth of 4.5 m at a distance of 18 m from the entrance. He found loessy strata, which was articulated with buried open-air soils, well comparable with the filling of the cave. According to the expectations, the lowermost Taubachian layers were found at a depth of 4.1 m to-4.3 m. According to Á. Ringer the archaeological material belongs to the Taubachian industry, which chronologically corresponds to the Emiliani 5d stage (Recently generally accepted to be correlated to the MIS 5e stage (Moncel & Rivals 2011)) (Ringer 1993, 2001, 80). From the technological point of view the industry is similar to the Taubachian industry of the 11th layer of the Kůlna cave (Valoch 1995; Moncel & Neruda 2000) and to the materials of the Slovakian sites Gánovce, Bojnice and Hôrka–Ondrej (Valoch 1984; Bánesz 1991; Kaminská et al. 1993). During the analysis of the complete assemblage of the cave, Á. Ringer and M.-H. Moncel described in detail the Taubachian

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character of the assemblage (Ringer & Moncel 2002, 2003). The lithic raw materials included "hyalin quartz and quartz-quartzite" (Ringer & Moncel 2003, 162), a part of those artefacts are tools made on a flake (Ringer & Moncel 2003, 163. Table 2.). The quartz and quartzite flakes covered by cortex indicate stone knapping on the spot.

It should be noted, however, that the terms used by authors are inaccurate, and cannot be interpreted unambiguously.

Szeleta cave (Fig. 2., Q-22)

In his candidate (PhD degree) dissertation Zs. Mester mentioned nine white quartzite flakes (five with original pebble cortex) among the artefacts of the upper clastic layer of the dark-brown strata. Based on the flakes brought to light in the upper layer (2/b.), the industry could not be defined, but it resembles the industry of the lower layer at the Büdöspest cave. The composition of the industry of the 5th layer of the Lambrecht-Kálmán cave is also similar: five quartzite flakes, two felsitic porphyry flakes and a hornstone flake (Vértes 1953). Following V. Gábori Csánk, the author also mentioned the possible existence of a „quartzite horizon" in Transdanubia (Mester 1994, 84).

Szelim cave (Fig. 3., Q-16)

The cave is situated on the Kő-hill near Tatabánya (Komárom-Esztergom County, Transdanubia). The excavation of the cave had started in 1932 by the palaeontologist I. Gaál, and after the initial successes, had continued by him in 1934. Despite numerous publications, the archaeological material was not studied systematically. At the end of the 1950s, L. Vértes analysed the stone assemblage of the cave and the results were published (Vértes 1958). In his opinion, the excavation of the cave was not professional, and therefore some artefacts were lost during the excavations, the assignment of the remaining artefacts to the layers is problematic. From the D layer, two shapeless quartzite fragments were mentioned. In the material of the E layer, there are several hundreds of quartzite flakes, partly unworked, partly transformed into tools. Among the artefacts, there is a narrow, elongated blade (Vértes 1958, 10. and Taf. I. Fig. 1.), and there are also typical tools, mainly side-scrapers. Two of the latter were described in detail and their drawings were published too (Vértes 1958, 10. and Taf. I. Fig. 4-5.). L. Vértes regarded the industry as Middle Palaeolithic and brought it concerning the so-called „Alpine Palaeolithic" (Or otherwise „Alpine Mousterian", „Pebble-Mousterian"). As possible parallelism of Érd, the quartzite assemblages of the cave sites in the Austrian Alps (Repolust, Mixnitz) were also discussed by V. Gábori Csánk (Gábori Csánk 1971, 39).

In his paper dealing with the Mousterian industries of Hungary, L. Vértes discussed the artefacts of the Szelim cave again and the drawings of two artefacts, a blade („primitive Handspitze") and a side-scraper („Spaltenschaber"), were published (Vértes 1959, 36., Abb. 2, Fig. 1., Abb. 2, Fig, 3.).

In his standard monography, L. Vértes mentioned again the presence of two quartzite fragments from the D layer of the cave, and many quartzite fragments and pebbles, choppers and chopping-tools from the material of the layer, assigned as E5 (Vértes 1965, 346). In relation with the E1 layer he did not mention quartzite tools, but a part of the listed side-scrapers certainly refers to the artefacts published in 1958, however this time without the denomination of the raw material. According to L. Vértes, concerning their elaboration and raw material, these tools completely correspond to the tools of Tata (Vértes 1965, 110-111). In her monography, V. Gábori Csánk mentioned significant similarities between the assemblage of this site and that of Érd (Gábori Csánk 1968, 250-251).

In her doctoral thesis dealing with the Jankovichian industry, V. Gábori Csánk describes an old, pebble/quartzite Mousterian industry from the E strata of the Szelim cave, mostly from the E5 layer, which corresponds partly to the material of Érd and partly that of Tata. In the appendix, in the description of the material of the E layer, there are two massive backed knives (couteau â dos), one side-scraper with Érd and Tata character, a side-scraper with a straight working edge and some flakes. Several flakes are mentioned with E1 layer designation (Gábori Csánk 1986).

The absolute age of the cave is not known; the leaf-shaped side-scraper or a bifacial Volgograd-knife (Königsaue-knife) (Gábori Csánk 1986) found probably in the B2 layer, listed in the Transdanubian Szeletian or Jankovichian industry (Vértes 1965, 159; Gábori Csánk 1984, 18) could be a terminus ante quem in this relation.

Quartzite as a raw material in the assemblages of some Hungarian open-air sites

The Bükk Mountains (Borsod-Abaúj-Zemplén County)

K. Zandler and S. Béres performed the revision of the archaeological assemblages of three open-air Palaeolithic sites located in the Bükk Mountains (Zandler & Béres 2011). In connection with the finds collected by J. Korek at the site, Csokvaomány-Határ-hilltop (Fig. 2., Q-5) L. Vértes mentioned quartzite tools, among others also a

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„rostro-carinated" tool. This uncommon term designates objects that are both beaked (rostrate) and keeled (carinate). This tool type occurs in the assemblage of Vértesszőlős (Dobosi 2013) and also in the Tata assemblage (personal notification of A. Markó).

L. Vértes qualified the quartzite tools as finely worked. Unfortunately, in the collection of the Hungarian National Museum at the time being only the finds stemming from the field survey of L. Vértes in 1952 can be found. In the collection from the I. terrace, there is a quartzite blade and two flakes, a quartzite flake and a waste piece stem from the II. terrace, and two quartzite flakes and a chunk stem from the III. terrace. In these assemblages, no quartzite tools can be found. According to the authors of the paper the common characteristic of the assemblages that both Middle Palaeolithic and Upper Paleolithic types are present. The bifacially worked leaf-shaped tools which are asymmetric to the longitudinal axe, with rounded or obliquely truncated basis are typical forms characteristic to the Micoquian industry, which occur on Bábonyian sites both in the Bükk Mountains and the Cserhát Mountains (Ringer 1982; Markó & Péntek 2003-2004). Among the Upper Palaeolithic tool types carinated and nosed end-scrapers, Aurignacian blades, other worked or unworked blades can be found, which also occur in the material of different Szeletian sites.

The Sajó Valley and Bodrog Valley (Borsod-Abaúj-Zemplén County)

In 2001, Á. Ringer and Zs. Holló published the results of rescue excavations at Sajószentpéter– Margit-kapu-lane (Fig. 2., Q-18), near Miskolc, which was carried out in 1990-1993 (Ringer & Holló 2001). During the excavations, several artefacts came to light from five vertical layers that have Upper Palaeolithic, Middle to Upper Palaeolithic transitional and Middle Palaeolithic character. The material of the Gravettian settlement, found in a depth of 0.6-0.8 m under the recent surface turned out to be the richest. According to the authors, based on the preliminary analysis of the artefacts, the Palaeolithic industry laying in the greyish forest soil, parallelable to the Arcy-Stillfried B interstadial (ca. 32,200–28,300 BP), belongs to the Pavlovian, prevalent in Central and Eastern Europe. Two finds can be considered as significant: a blunted blade made of felsitic porphyry and a characteristically elaborated Gravettian-point. Based on these finds Á. Ringer correlates the first and second layers of the site with the 4th to 6th layers of the Szeleta cave („evolved Szeletian"). He suggests also that in the 1. layer an industry was found which is identical to the Gravettian industry of the Arcy-Stillfried B palaeosoil laying beneath. In their Table 1, reviewing on the raw material utilization of the archaeological material containing 320 artefacts, there are 21 flakes made of quartzite listed, with a percental ratio of 6.56% (Ringer & Holló 2001, 64).

In 1988, Á. Ringer collected stray finds and thereafter excavated the Miskolc–Rózsás-hill site (Fig. 2., Q-14). The surface collection contains 441 chipped stone artefacts, whereas the excavation resulted in 60 artefacts. In 2001 another excavation was carried out, which yielded further 173 artefacts. In the publication of the archaeological material, in Table 2, discussing the raw material distribution, quartzite raw material is mentioned from both the excavation and the surface stray finds. In the table, there are 28 quartzite artefacts listed from the excavation assemblage containing 222 artefacts, and 17 artefacts from the surface collection of stray finds, containing 368 artefacts. There is no information about the character of the quartzite artefacts. However, there is a reference to the fact, that during the free-hand knapping quartzite hammer-stones were applied. Based on typological and technological considerations, the authors listed the archaeological material of the site into the Late Glacial period, during which period Magdalenian-Epimagdalenian and Gravettian-Epigravettian industries were present in Hungary (Ringer & Lengyel 2001).

In her paper dealing with the Palaeolithic of the Bodrog river valley, V. T. Dobosi mentioned the Palaeolithic finds derived from field surveys of L. Vértes in 1963 in the environment of Tarcal-Bodrogkeresztúr near the Tokaj Mountains (Northeast Hungary). Among these artefacts there is a surface stray find from the vicinity of the benchmark of Bodrogkeresztúr–Kavicsbánya-lane (Fig. 3., Q-3).: it is a weakly elaborated flat flake of 42×34×9 mm dimensions made of fine-grained quartzite. Between Bodrogkeresztúr–Kavicsbánya-lane and Bodrogkeresztúr–Dereszla localities (Fig. 3., Q-2)., there was another stray find, with an atypical chopper-like elaboration on a splitted quartzite pebble of 36×24×10 mm dimensions (Dobosi 1974, 24). The age and the cultural affiliation of the stray finds are unknown.

In the raw material distribution of the assemblage that came to light during the corroborant excavation in 1970 at the site Tarcal–Citrom-quarry (Fig. 3., Q-14)., the quartzite artefacts were referred in the „others" raw material category. In the description of the tools, there is an artefact with N° 6. serial number, which is a double side-scraper, a pointed "gigantolith" tool, the edges elaborated with abrupt chopper-retouch are curved, at the point, there is bifacial elaboration. Its raw material is fine-grained quartz; its dimensions are 122×75×54 mm (Dobosi 1974, 12). The description of the reconstruction of the tool production was reviewed in connection with the technological observations regarding the chipped stone assemblage (Dobosi 1974, 19. ff.). By all means, it is necessary to emphasize that this reconstruction of tool production should be regarded anyway as the very first refitting study in Hungary.

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A. Markó, based on technological consequences deducted from refitting exercises, processed the stone assemblage, containing 410 artefacts, of the Upper Palaeolithic site Tarcal–Citrom-quarry (Fig. 3., Q-14). (Markó 2011c). The site is located on the Fekete-hill, situated on the western side of the Kopasz-hill (Tokaj Mountains). During the corroborant excavation carried out by V. T. Dobosi in 1970, a relatively small stone assemblage came to light. Based on Table 1, concerning the raw material types of the site, 11 quartzite artefacts came to light (2.68%) during the excavation from the flake concentration III. of the segment A. In Table 2, containing the refit groups performed by A. Markó, there is an entry with the serial number 12, flake concentration III (Accession number: Pb. 71/103), which is characterized by „8 removals of flakes (flaking), transversal fragment" (Markó 2011c, 85, Table 2.). It is the most important refit group, supplying the most information, which came to light as a closed assemblage during the excavation. According to the author, the detachment served for the shaping of a pre-core. The initial piece might have been an oval, loaf of bread like, coarse-grained quartzite pebble, which is characterized by the presence of quartz veins and breakage surfaces. This very characteristic raw material occurs only in this artefact concentration. Based on the refittings, it was concluded, that some detachments are missing from the excavated material.

In the series of the deducted consequences, made partly based on the refittings, important common characteristics and differing peculiarities were recognized concerning the relation of the assemblages of the sites Tarcal and Szob-Ipoly-part. A common feature is the utilization of andesite and quartzite. At the same time, on the Tarcal site the shaping, the formation of the pre-cores alludes to a stoneworking technology demanding more planning. In the assemblage of Szob, the refit-series is longer. In one case, it was possible to reconstruct the whole processing of the core, from the decortication of the pebble to the abandonment of the core. At the same time, at Tarcal the refit groups containing only a few artefacts are characteristic, generally, there are no blades or flakes fittable to any core and in effect, there are few traces of the knapping on the spot.

The surroundings of Eger (Heves County)

The investigation of the raw materials of stone tool production has a tradition of decades in the Hungarian Palaeolithic research. The paper of V. T. Dobosi published in 1978 can be regarded as the first significant milestone. Samples were taken from assemblages of open-air Palaeolithic and Mesolithic sites published earlier. The published paper summarizes and reviews the results of microscopic investigations of thin sections made from the taken samples (Dobosi 1978). The paper also describes the raw material distribution of 14 sites based on earlier publications.

Quartzite as raw material occurs at the following sites: Demjén–Hegyeskő-crag (Fig. 2/Q-6): 18 artefacts (7.5%) (Dobosi 1976), Demjén–Pünkösdtető (Fig. 2., Q-7): 10 artefacts (10.0%, Dobosi 1976), Eger–Kőporos-hilltop (Fig. 2., Q-10): 44 artefacts (Vértes 1951), Ostoros–Rácpa I and II (Fig. 2., Q-15, Q-16): 12 artefacts (9%, Dobosi 1972, 58), Sajóbábony (Fig. 2/Q-17): five artefacts. The numbers in brackets represent the percental ratios in the total assemblages.

The assemblages of the Demjén–Hegyeskő-crag, Eger–Kőporos-hilltop és Ostoros–Rácpa I and II sites were classified based on the standard monography of L. Vértes to the so-called "Eger-industry", a Mesolithic industry containing rough tools of large dimensions ("grobgerätiges Mesolithikum", Vértes 1954, 1965, 216-221).

On the Demjén–Pünkösdtető site, in the referenced paper under the name Demjén–Pünkösd-hill, a small sondage was opened up by V. T. Dobosi in 1975, but no culture-bearing layer was found.

However, on the near Demjén–Hegyeskő-crag site during a rescue excavation, a part of a Neolithic settlement was unearthed.

In the 1990s, V. T. Dobosi revised the material of the Eger–Kőporos-hilltop site and based on typology and raw material usage she correlated it mainly with the lower and upper culture-bearing layers of the Suba-lyuk cave and with the Bábonyian industry. In the revised material she did not mention quartz or quartzite. According to her observations, the leaf-points and side-scrapers are of Middle Palaeolithic character, but the high end-scrapers and nosed end-scrapers reflect some Aurignacian influence. She regarded the industry as a unified, homogeneous part of the Middle to Upper Palaeolithic transition (Dobosi 1995, 51-54).

Based on our recent knowledge, the interpretation and the cultural labelling of the above-mentioned sites is somewhat different: in the assemblages of the sites Eger–Kőporos-hilltop and Ostoros–Rácpa, Szeletian leaf-points and numerous Upper Palaeolithic, Aurignacian and/or Gravettian artefacts can be found along with the Middle Palaeolithic tools of Micoquian-Bábonyian character. Furthermore, Neolithic or Chalcolithic chipped stone artefacts occur in all assemblages. Nowadays these sites are rather interpreted to be heterogeneous than transitional.

Contrary to the usual character of Palaeolithic sites in the environment of Eger, the archaeological assemblage of the Andornaktálya–Zúgó-lane site (Fig. 2., Q-4) contained a large amount of obsidian and erratic flint artefacts.

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To clarify the suggested connection with Polish archaeological sites and/or geological sources, excavations were carried out in the summer of 2002 and 2004 by the University of Miskolc and the Jagello University in Cracow, by the leading of Á. Ringer and Janusz K. Kozłowski. The lithic assemblage was analysed and published (Kozłowski-Mester 2003-2004). The raw materials from the site are quite variable. The raw materials were analysed macroscopically and set apart in ten different raw material groups. Among these, there is raw material, a very characteristic in the Palaeolithic of the southern foothill region of the Bükk Mountains. It is fine-grained and its colour is generally light grey or light brown, in the patinated state it is white. O. Kadić (Kadić 1938, 153) after the determination of A. Vendl called it quartz with chalcedony binder and regarded it as silicified sandstone. After the recent classification of K. T. Biró, this raw material will be called as Mátraháza-Felnémet type opal (also known as menilite or liver opal). The primary geological source is located on the Tó-hill near the settlement of Egerbakta. Among the so-called „other" raw materials, there are the quartz and quartzite also. In the assemblage of the site, there is a splintered piece (pièce esquillée) made of fine-grained quartzite (Kozłowski-Mester 2003-2004, 126 and Fig. 11:45). There is some uncertainty regarding the raw material of this artefact since the liver opal/menilite (Egerbakta type rock is also referred to as quartzite (Kozłowski-Mester 2003-2004, 120). It is also questionable whether the statements made in relation with the operational sequence (chaîne opératoire) of quartzite, refer to the raw material orthoquartzite or quartzite in the "other raw materials" group (Kozłowski-Mester 2003-2004, 118).

K. Zandler in his thesis dealing with the archaeological assemblages of the Palaeolithic sites in the vicinity of the town Eger reviews in much detail and partly refines the earlier published data (Zandler 2006). In Table XIX., comparing the raw materials of the sites with leaf-shaped tools, quartzite is mentioned in the lithic assemblages of the following sites:

1) Eger–Kőporos-hilltop (Fig. 2., Q-10) (14 artefacts, 0.63%): two hammer-stones, 55×51×39 mm (Accession number: Pb 48/204.) and (78)×61×35 mm (Accession number: Pb 48/303.); five quartzite flakes without elaboration; a raw material chunk (from the excavation of L. Vértes in 1948); two flakes (collected by F. Legányi in 1952 and 1954); a flake (in the collection of the Dobó István Museum in Eger with a dating of 1955. VIII.); a flake (with a date of 1957.07.08 in the Dobó István Museum in Eger); a side-scraper with curved working-edge, its left edge is retouched, on the dorsal face cortex can be observed, the butt is plain, hard hammer-stone was applied, the dimensions are 83×55×24 mm; a hammer-stone, both ends were used, 81×61×36 mm (from the collection of S. Béres).

2) Egerszalók–Kővágó-lane I. (Fig. 2., Q-11) (four artefacts, 0.64%): a retouched flake, its left edge is retouched, the butt is plain, it was detached with hard hammer-stone, 62×70×17 mm (from the surface collection of S. Béres Sándor and K. Zandler); a chopper, its dimensions are 42×32×20 mm; a broken hammer-stone, 111×71×50 mm (from the collection of S. Béres); a quartzite pebble chunk.

3) Ostoros–Rácpa I. (Hálás-hilltop) (Fig. 2., Q-15) (seven artefacts, 0.48%): a splintered piece, 34×33×9 mm; a hammer-stone, 75×58×37 mm (from the collection of S. Béres); three hammer-stones, 57×50×35 mm (Accession number: Pb 68/83.), 64x66x35 mm (Accession number: Pb 68/88.) and 67×51×38 mm (Accession number: Pb 68/89.); a quartzite flake.

4) Ostoros–Rácpa II. (Fig. 2., Q-16) (one artefact, 2.38%): bifacially worked knife with a straight natural back ("couteaux â dos naturel"), the edge is curved,76×43×23 mm (from the collection of S. Béres).

5) Csokvaomány–Határ-hilltop (Fig. 2., Q-5) (the surface collection of L. Vértes): eight quartzite flakes.

In the appendix further data regarding the occurrence of quartzite at sites without leaf-shaped tools can be found:

1) Andornaktálya–Gyilkos (Fig. 2., Q-1) (From the collection of S. Béres.): flake core, 48×73×60 mm; a quartzite flake.

2) Andornaktálya–Rózsa-hill (Fig. 2 Q-2) (District II. terület, collected by L. Fodor in 1967, partly in the collection of the Dobó István Museum in Eger.): four flakes without further elaboration; two hammer-stones.

3) Andornaktálya–Rózsa-hill (Fig. 2., Q-2) (From the field survey of V. T. Dobosi on 15.05.1973-): a quartzite flake.

4) Andornaktálya–Szukszer-hill (Fig. 2., Q-3) (Andornak I. B area, collected by L. Fodor in 1967.): two quartzite flakes.

5) Andornaktálya–Szukszer hill (Fig. 2., Q-3) (G-H area, collected by L. Fodor in 1967.): two quartzite flakes.

6) Andornaktálya–Szukszer hill (Fig. 2., Q-3) (Collected by L. Fodor in 1968.): a quartzite flake.

7) Demjén–Hegyeskő-crag III. (Fig. 1/Q-6) (From the excavation of V. T. Dobosi in June 1974.): two quartzite flakes.

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8) Demjén–Pünkösd-hill (Fig. 2., Q-7) (From the excavation of V. T. Dobosi in 1973.): a hammer-stone, 52×37×27 mm. Accession number: Pb 74/89.; four flakes.

9) Demjén–Pünkösd-hill I. (Fig. 2., Q-7) (Stray find from the field survey of V. T. Dobosi on 05-6.06.1973.): a flake.

10) Demjén–Pünkösd-hill II. (Fig. 2., Q-7) (Stray finds from the field survey of V. T. Dobosi on 06.06.1973.): three quartzite flakes.

11) Demjén–Pünkösd-hill II. (Fig. 2., Q-7) (Stray find from the tranch A, from the field survey of V. T. Dobosi on 06.06.1973.): a quartzite flake.

12) Demjén–Pünkösd-hill II. (Fig. 2., Q-7) (Trench C, from the excavation of V. T. Dobosi in June 1973.): a quartzite flake.

13) Demjén–Pünkösd-hill (Fig. 2., Q-7) (Eger-Pünkösd-hill, from the collection of S. Béres.): a flake; a hammer-stone, 72x53x32 mm.

In the case of the sites Eger–Kőporos-hilltop, Ostoros–Rácpa (in the thesis of K. Zandler its name is Ostoros–Rácpa I. (Hálás-hilltop)) the given data are in slight contradiction to the somewhat higher number of quartzite artefacts published earlier (Vértes 1951; Dobosi 1972, 1978). Although it is not easy to explain the variances, it seems most likely, that the Mátraháza-Felnémet type opal (the geological source is Egerbakta – Baktai-lake), not occurring in the earlier publications at all (Felnémet type opal in the thesis of K. Zandler) are also referred to as quartzite. Due to its similar texture, it is easy to mistake this Mátraháza-Felnémet type opal for orthoquartzite. As-it was mentioned above, orthoquartzites have not undergone metamorphosis, it is composed of usually well-rounded quartz grains cemented by silica.

The chronological classification of the quartzite artefacts occurring on these sites with several Palaeolithic and even the Neolithic industries, cannot be ascertained. The frequently mentioned term „hammer-stone" is too ambiguous, not a culture-specific term at all, and their function is not clear, not interpreted.

K. Zandler in his thesis dealing with the archaeological assemblages of the Palaeolithic sites in the environment of the town Eger reviewed the Palaeolithic sites located at Egerszalók-Kővágó-lane (I and II) (Fig. 2., Q-11, Q-12) along with their research history (Zandler 2006). In the framework of the Polish-Hungarian research program, an excavation was carried out in 2006 at the site of Egerszalók-Kővágó-lane II. The main target of the excavation was to clarify with stratigraphical observations whether the surface material, showing the characteristics of various stone industries, produces a single homogeneous unit (Mester 2010, 41). In the archaeological material of the site, the quartzite plays an unimportant role (Kozłowski et al. 2009, 418). A core edge flake („éclat débordant") made of fine-grained quartzite stems from the recurrent centripetal Levallois-debitage (Kozłowski et al. 2009, 418). Among the artefacts listed in the Szeletian industry, there is a partially bifacial elaborated pointed side-scraper („racloir convergent (ou pointe)") made on a sub-triangular quartzite flake (Kozłowski et al. 2009, 437 and Planche 14, Fig. 2.).

In the framework of the above referenced Polish-Hungarian research program, an excavation was carried out in 2009 at Eger-Kőporos-hilltop (Fig. 2., Q-10). The main goal of the excavation was to try and solve the stratigraphical and chronological problems of the site (Mester 2010, 41). They wished to gain sedimentological and micromorphological data regarding the stratigraphy of the site, which was set up by L. Vértes, who excavated the site in 1948, and Á. Ringer who performed a rescue excavation in 2003 near to the site, on the slope above the vitric tuff mine (Mester 2010, 50).

Regarding quartzite as a lithic raw material, the publication presenting the site and the results of the excavation serve with some valuable information. In the Initial Upper Paleolithic assemblage with macroblades, there were 139 artefacts listed altogether: 12 cores, 49 blades and blade fragments, 21 blade-like flakes („éclats laminaires"), 49 retouched tools and 8 flakes. In this assemblage there is a flake-core with two knapping surfaces and posterolateral preparation („avec préparation postérolatérale") (Kozłowski et al. 2012, 435), a steep retouched convex end-scraper with one retouched side-edge (Kozłowski et al. 2012, 437. and Planche 8, Fig. 2.), a simple end-scraper made on blade of middle-sized dimension, with convex, symmetric working edge (Kozłowski et al. 2012, 437. and Planche 8, Fig. 8.) and another piece with oblique working edge (Kozłowski et al. 2012, 439. and Planche 8, Fig. 15.). Furthermore, there is a simple end-scraper with retouched side-edge (Kozłowski et al. 2012, 439. and Planche 9, Fig. 7.). In the assemblages of the site belonging to other chronological horizons, there is no occurrence of quartzite.

The Danube Bend (Komárom-Esztergom County)

Mogyorósbánya is one of the most important Upper Paleolithic sites in Hungary (Fig. 3., Q-9). Between 1984 and 2009 nine excavations were performed by the leading of V. T. Dobosi during which the till now biggest,

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continuous, undisturbed Upper Palaeolithic settlement surface was excavated. The surface area of the connected trenches reaches 400 m^2 The number of artefacts that came to light is approaching 7,000, out of which 8% are classifiable tools. Among the raw materials used in the 4,771 macroscopically analysed artefacts, the siliceous pebble is dominant (3,493 artefacts, 73%). Quite high is the quartzite ratio (325 artefacts, 7%), which is the second most frequent raw material. A rock crystal flake came also to light.

According to V. T. Dobosi, the material of the site belongs to the „Ságvárian" culture. Its main characteristic is the intensive usage of the pebble as raw material. The 14C radiocarbon age of the site is: Deb-1169: 19,930±300 and similarly Deb-9673: 19,000±250 (cal. 21,050–20 140) (Dobosi 2011).

The study of the archaeological material from the Upper Palaeolithic Szob site (Danube Bend) (Fig. 3., Q-13) was performed by A. Markó (Markó 2007b). On the site, discovered by A. J. Horváth, S. Gallus, the archaeologist of the Hungarian National Museum and M. Mottl, an assistant of the Hungarian Royal Geological Institute excavated in 1936. Among the artefacts that came to light from the „lower layer", there is a quartzite blade, flakes, chips and raw material chunks. Thereafter M. Gábori performed excavations on the site in 1962 and 1964-1965, but only preliminary reports were published regarding the stone assemblage. During the excavations altogether 554 stone artefacts came to light. The most frequent raw material is quartzite with 188 pieces (33.94%). Based on the refittings, some 15-20 cm long, oval or hemispheric (dome-shaped) pebbles were used. The largest technological category of artefacts is the flakes of small dimensions, flakes and raw material chunks, the only retouched artefact is a notched blade. Beside these artefacts four pebble-slices, a blade with natural back and a geometric fragment can be regarded as tools. The paper reviews also the raw material distribution (Markó 2007b, 16, Table 5.). Based on typological analyses, the author regards the site as the fourth occurrence of the so-called „Pebble Gravettian" or „Ságvárian" beside the other sites Ságvár, Madaras, Mogyorósbánya, and chronologically connects it to the upper layer of Ságvár. In the assemblage 31 refitting-groups, containing 136 artefacts were found by the author, which is 24.55% of the total material of 554 artefacts (Markó 2011b, 10 and 21-22, Table 1.). Among quartzite, there are 11 refitting groups (that is 35.48% of all refitting-groups), which contain 44 artefacts (32.35% of all refitted artefacts). These numbers correlate well with the occurrence of quartzite in the assemblage (33.94%). Among the quartzite refit groups, the refitting-scheme of a core made of an oval quartzite pebble with six refitted flakes (15. refitting-group) represents the classical pebble-slicing method (Markó 2011b, 15, Fig.4.).

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