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Obsidian use in the Palaeolithic in Hungary and adjoining areas

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Abstract

Obsidian occurring in secondary geological position in the northeastern corner of the Carpathian Basin is a decisive type of raw material for the Palaeolithic cultures of Hungary and adjoining area. In this paper a short survey is given on obsidian use, period by period and according to archaeological cultures; the extent of obsidian use, and the distance of archaeological sites from the geological sources which is an important help in delineating the action radius of the given communities.

It is a universally accepted archaeological commonplace that going back in time the action radius of individual communities (nuclear family, hunting or trading team, clan) is getting smaller. We can draw a circle of immediate access supporting the communities extending over hundreds of kilometres in the Upper Palaeolithic, several dozens for the Middle Palaeolithic (Markó and Péntek 2003–2004. 166.) and within ten for the Lower Palaeolithic, at least where the contact areas can be demonstrated. Hungarian experiences seem to support the general observation, not as a rule but as a tendency: in the course of time, the lust for adventures in the subsequent communities seems to grow, to explore and exploit larger and larger territories and access more sources of commodities.

As the consequence of the instrumental analysis of obsidian tools and local obsidian varieties we have a possibility to form a preliminary notion on the circulation of raw materials and, equally important, the direction and intensity of contacts between the cultures and communities. Obsidian, as a chipped stone raw material was popular till the universal spread of metallurgy.

Keywords: geological sources, Lithotheca, chronology, obsidian in Hungarian UP, Orography

Introduction

The Carpathian Basin is an almost 300 thousand square kilometres large closed geographical unit in the heart of continental Europe, in east-western direction almost in the middle. The central 92 thousands square kilometres of this basin is the territory of modern Hungary. It is a low-lying plain at 90–100 meter average elevation dissected by 800–1000 meter high mid-mountains and lower hills. According to scientific results, the intra-mountain basin offers, due to its varied geological endowments and morphology, suitable conditions for habitation in all phases of the Middle and Late Pleistocene.

During the cold peaks (Last Glacial Maximum), i. e. the highest extent of the permanent ice sheet the southern limit of the terrestrial ice cover was relatively close. The mountainous arch was tempering or delaying the global climatic effects in the Ice age, as well as nowadays. In the internal parts of the basin, multidisciplinary research (geomorphology, pedology, botany, vertebrate palaeontology, malacology etc.) delineated varied climatical niches, with varied vegetation, connected to each other in a mosaic-like pattern. The late Pleistocene vegetation was taiga forest alternating with steppe and it "… was one of the major destinations of the migration of Upper Würmian reindeer herds and the Upper Palaeolithic hunters pursuing them" (Sümegi 2005, 259.).

The basin or at least a part of the basin was inhabited by the Palaeolithic communities in variable intensity.

On the transdanubian mid-mountain area are built up of limestone and dolomite, the open calcareous tuff/freshwaterlimestone pools were popular long term living space in the Lower (Vértesszőlős)

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and the Middle Palaeolithic (Tata). These small basins of 8–10 metres diameter, built up by tepidwater springs, surrounded by 1–2 metres high, almost vertical walls were concentrated in the north-eastern corner of Transdanubia.

Caves were used regularly and for long periods for human habitation in the Middle Palaeolithic. By the Upper Palaeolithic, they were mainly used as temporary shelters with special functions (e. g. fur depot) only.

Hunters of the Upper Palaeolithic period were specialised on hunting herding herbivores living on the cold, dry steppe. They found their optimal settlement areas on the foothill slopes on loessy riparian terraces, on the lowland, ice-age relict surfaces protruding from the Holocene sediments.

The communication between remote regions and the interior parts of the basin was possible mainly along the river valleys and the low passes (800–900 m a. s. l.) even during the glaciation periods. Immediate contacts with distant communities for desirable raw materials or other prestige items can be demonstrated. The surplus population of the large Upper Palaeolithic centres could also move and, for shorter or longer periods, settle here using the same routes. Cultural effects can be proved from northwest, raw materials basically from the north and east.

This land, surrounded by the arc of Carpathians and the Alps, with different genesis and 2000–2500 meter high peaks, accommodated a fortunate wealth of lithic endowments, a wide selection of raw materials for the production of stone artefacts.

Raw Material Sources

The raw material acquisition strategies of Palaeolithic communities in Hungary changed with different periods and cultures. For most of the time, people collected the pebbles that accumulated in great variety within the river drifts. At the same time they were able to extract hydrothermal siliceous rock cropping out in the form of thick, homogeneous banks. They were also able to recognise and collect blocks and nodules lying in secondary geological position.

We can take it for granted that in selecting the location of Upper Palaeolithic open-air campsites, one of the decisive factor was the availability and abundance of accessible raw materials. Apart from variations in subsistence strategies rendered feasible by several ecological niches, there was a rich variety of various raw materials at strategic points where sites of a given culture or a specific chronological phase within the cultural unit seem to concentrate.

The most popular raw materials are Mesozoic siliceous rocks: Jurassic radiolarite, Cretaceous flint, and eruptive/igneous and postvolcanic/hydrothermal rocks produced in several geological periods like felsitic porphyry in Trias or hydroquartzite in Myocene. The northeastern corner of the Carpathian Basin, dissected today by modern political boundaries, is the land of obsidian (fig. 1).

In recognition of the historical value embedded in the direction and intensity of raw material circulation, Hungarian research has recently devoted considerable efforts to the study of all lithic raw materials suitable for the production of chipped and polished stone implements.

Following some important but sporadical characterisation studies the regular provenance studies were started after the foundation of the comparative raw material collection: Lithotheca (Biró and Dobosi 1991). The Archaeological Department of the Hungarian National Museum is the centre and the coordinator of this work, recording not only the raw material samples but also the analytical documentation and the results. In collaboration with centres of natural scientific research both in Hungary and the neighbouring countries we are creating a collection and database of core data for raw material provenance studies. Its proper investigation can only be fruitful by coordinating collaboration on an international level. Given this knowledge we can follow the activity circles of prehistoric communities, the direction of contacts, speed of the spreading of goods, technical and intellectual innovations as well.

Obsidian Sources in Europe and in the Carpathian Basin

As the ancient auctor Plinius senior (Plinius XXXVI. 196, who died at 79 AD in the eruption of Vesuvius) mentioned, an Aethiope soldier Obsius lent his name to this attractive shiny-black raw material. Its first mentioning in the historical sources was preceded by scores of thousand years of recognition and use. Its excellent qualities and applicability as a raw material for stone artefacts had already been recognised by the fortunate lower, middle and

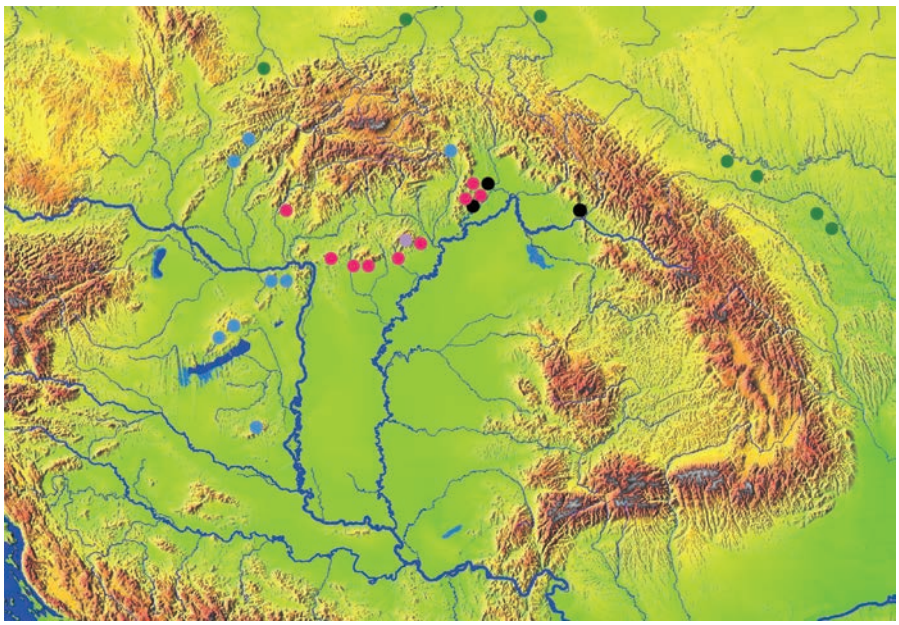

Fig. 1　Map of the Carpathian Basin with the lithic raw material sources

Blue dots: Jurassic radiolarite, green dots: Cretaceous flint, red dots: eruptive/igneous and postvolcanic rocks produced in several geological periods, black dots: obsidian

late Palaeolithic communities living close to the primary or secondary geological sources of this precious commodity.

Obsidian is a real 'international' raw material. Due to its specific attributes obsidian was a success-story for Prehistoric cultures and nowadays, that is for modern Archaeology as well. Among the raw materials for chipped stone, it has been investigated first, as a man-made artifact, typologically and functionally.

The instrumental identification of the Palaeolithic obsidian artefacts, piece by piece will be a long process due to the quantities involved (Biró 1984). Grouping of obsidians can be made macroscopically on the basis of their physical properties. Characterisation studies were further realised by microscopy, as well as various physical and chemical methods effectively.

Recently, non-invasive techniques are preferentially used like PGAA (Prompt Gamma Activation Analysis) for the multi-elemental (major and trace elements) geochemical fingerprinting not only of obsidian, but that of the most popular rock types widely used in Central European prehistory. This analysis can serve as a basis for the identification of the geological sources of raw materials, "… can provide indispensable information on the provenance of valuable archaeological objects…in principle suitable for analysing various kinds of pieces without destruction and without any residual radioactivity" (Kasztovszky and Biró 2006. 301).

The measurements are made in the Isotope Institute of the Central Research Institute for Physics, Budapest. in close collaboration with the Hungarian National Museum (Biró, Kasztovszky, Markó 2005: Fig. 5.).

Mapping the source regions and the archaeological distribution of obsidian already allows us to delineate the intensity and the general directions of obsidian transport in the Palaeolithic. Research results on the distribution of individual types of obsidian will only add up to shades within the general image, making our knowledge more accurate.

Obsidian is known from several volcanic regions in Europe, some of them still active. Among them, the obsidian of Iceland and the Canary Islands had no role in European Prehistory.

Greek islands: Situated in the Aegean Sea, the most famous source of obsidian is Melos, lying closest to the mainland. Its utilisation had a great importance in the supply of the Cycladic civilisations.

Asia Minor: Western and Central Anatolia had a key role in the so-called Neolithisation process, i. e. the spread of productive ways of subsistence. Several sources at various parts of the large peninsula were used; in the Caucasus, literally mountains of high quality volcanic glass crop out, serving for raw material for Armenian settlements since the

Lower Palaeolithic.

Italy: Obsidian was formed during several periods of the Pleistocene due to active volcanism in the western basin of the Mediterranean Sea.

"In Western Europe obsidian workable by prehistoric men was recognised only in four volcanic complexes, located in the Italian islands…" (Bigazzi *et al.* 2005, 1) Obsidian is so common at Sardinia, Palmarola and Lipari islands that it is used currently in road construction.

According to recent provenance studies, the distribution limit of the Italian obsidian was extended to prehistoric sites of the Central Balkans region.

Carpathian basin: Separating obsidian in the Carpathian Basin as "Carpathian", is not correct on a strict scientific basis: not in the Carpathes and not from the Carpathian local geological stage (Early Miocene). The distinctive name, however, was used in the first successful fingerprinting studies and we prefer to keep it respecting tradition. The not exactly correct but accepted terminology is in use for more than thirty years in technical literature and gives an approximate geographical orientation to the localisation of the sources.

At the North-Eastern parts of the Carpathian Basin in the interior volcanic arch along the main ridges of the Carpathes three centres of obsidian occurrence are know in a circle of 60–80 km radius; due to current political boundaries, from the territory of three countries (Slovakia, Hungary, Ukraine). It can be collected mostly on the surface, sporadically from primary geological strata (fig. 2).

In Slovakia (Carpathian 1) : the source of obsidian is the eastern margin of the mountains built of so-called Zemplen rhyodacite: (Tokaj hill: at 158 m a. s. l., on the western margin). It is of excellent quality, the product of volcanic processes 15–16 million years before our times. It is claimed to be a primary geological source with obsidian nodules embedded in rhyolite tuff.

Fig. 2 Obsidian sources in the Carpathian Basin

In Hungary, at the southern parts of the Tokaj-Presov Mts. there are two sources separated by a few kilometres from each other, products of eruptions dated 9–10 million years from present. They are marked C2T and C2E: Carpathian 2, varieties Tolcsva and Erdőbénye, respectively. They are secondary sources with obsidian nodules which can be collected from the surface.

In the Ukraine, obsidian was found on the hilly region surrounding the first ranges of the Northeastern parts of the Carpathes. It can be assigned to the easternmost member of the internal volcanic arch along the Carpathes, i. e., the Vihorlat-Gutin Mountains. They were probably formed in the fourth orogenic phase in the formation of these mountains, roughly contemporary to the Hungarian obsidian-forming events. The primary geological source is located between Rokosovo and Malyj Rakovec in rhyolite tuff (Rácz 2008. 48–49).

The three source regions can be differentiated on the basis of formation date, geochemical features as well as physical qualities like colour and transparency.

Grouping of obsidians can be made macroscopically on the basis of their physical properties. Characterisation studies were further aiming at microscopy, by various physical and chemical methods effectively.

Archaelogical Chronology

The Palaeolithic cultures in Hungary fit well on a wider scale into the system of European, more specifically, Central European chain of events (fig. 3).

In the cultural units separated on typological and/or chronological grounds, we can basically recognise general characteristics of the given period.

It is a universally accepted archaeological commonplace that going back in time the action radius of individual communities is getting smaller and smaller. We can draw a circle of immediate access supporting the communities extending over hundreds of kilometres in the Upper Palaeolithic, several dozens for the Middle Palaeolithic and within ten for the Lower Palaeolithic, at least where the contact areas can be demonstrated. Hungarian experiences seem to support the general observation, not as a rule but as a tendency: in the course of time, the lust

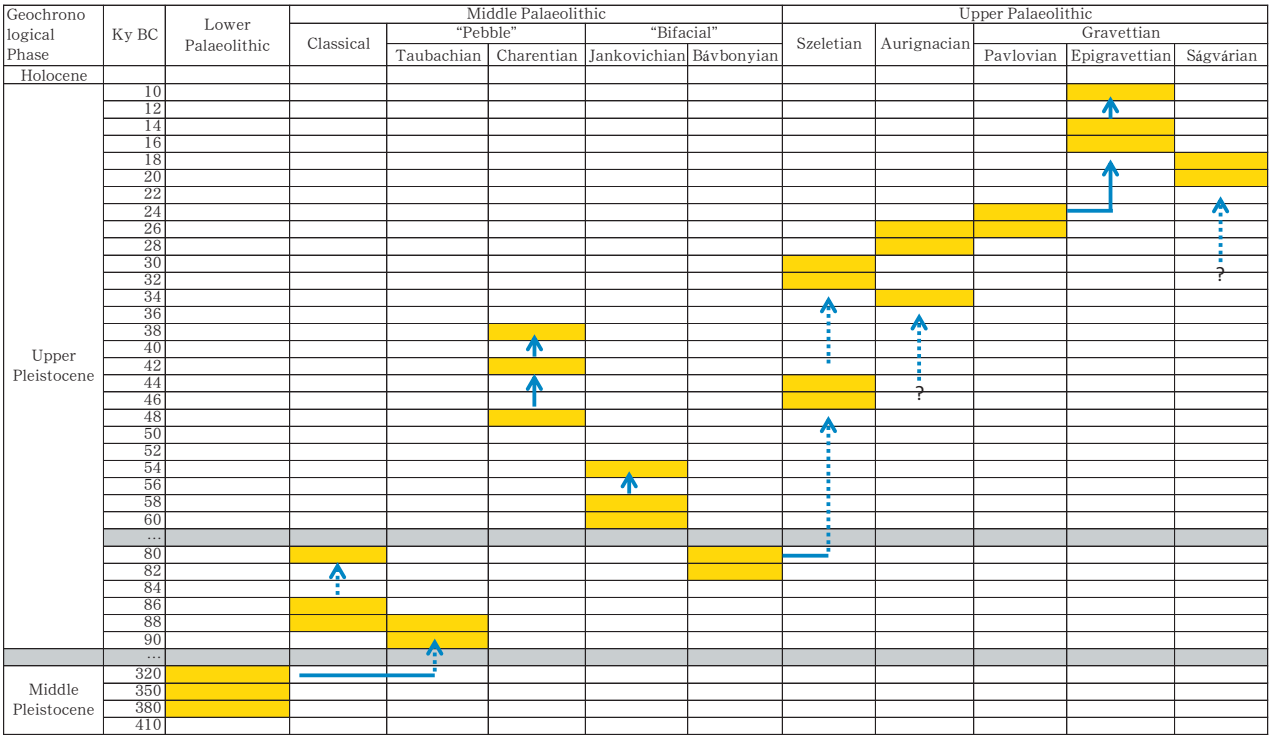

Fig. 3　Palaeolithic chronology in Hungary

for adventures in the subsequent communities seems to grow, to explore and exploit larger and larger territories and access more sources of commodities.

The raw material use of the so far only authentic Hungarian Lower Palaeolithic site, Vértesszőlős is supporting the general experience that the raw material procurement strategy of the Lower Palaeolithic industries is based on local resources. On the obsidian region, no authentic Lower Palaeolithic site is known, and sorroundings of the Vértesszőlős site are not obsidian sources.

So in Hungary, the Lower Palaeolithic utilization of obsidian is not attested so far.

This raw material was spotted in the inventory of most Middle Palaeolithic and all Upper Palaeolithic cultures of the region.

Middle Palaeolithic: Based on tool-making traditions the Hungarian Middle Palaeolithic is rooted in three large cultural units (Dobosi 2000a, 51.).

The separation of the technical and technological characteristics, (using core – flake – pebble technology, respectively, with selection of different preferred raw materials) their settlement strategies, and hunting specialisation (cave bear, mountain goat, or mammoth.) is seemingly very different.

1. Mousterian culture in the Western European sense was located, at the cave on the southern fringes of the Northern Mid-Mountain area (Mester 1994).

2. Middle Palaeolithic of bifacial / Acheuléan tradition, from the last third of the Riss/Würm interglacial until the first cold peak of the Würm glaciation.

3. Middle Palaeolithic industries utilising pebble-form raw materials were rooted in Lower Palaeolithic with pebble-manufacturing tradition.

– South-East European Charentien (Érd and related small assemblages).

– Taubachian (Tata and related small assemblages) (Ringer–Moncell 2002. 196.).

The mobility of *Homo neanderthalensis* was essentially increased compared to the previous periods. The raw material basis is also seemingly extended (Markó and Péntek 2003–2004, Tab. I.). Certain pieces of raw material lumps or finished tools reached as far as several hundred kilometres already in the Middle Palaeolithic (Gábori-Csánk 1993, 105.). As obsidian is eminently distinguishable, we can take the data on Middle Palaeolithic distribution granted (fig. 4).

Food was also collected from larger areas: the cave settlements contain bone remains of lowland animals.

Knowing the geographical endowments and the authentic sites of the Palaeolithic period in Hungary, the route of the direct or indirect transport leading

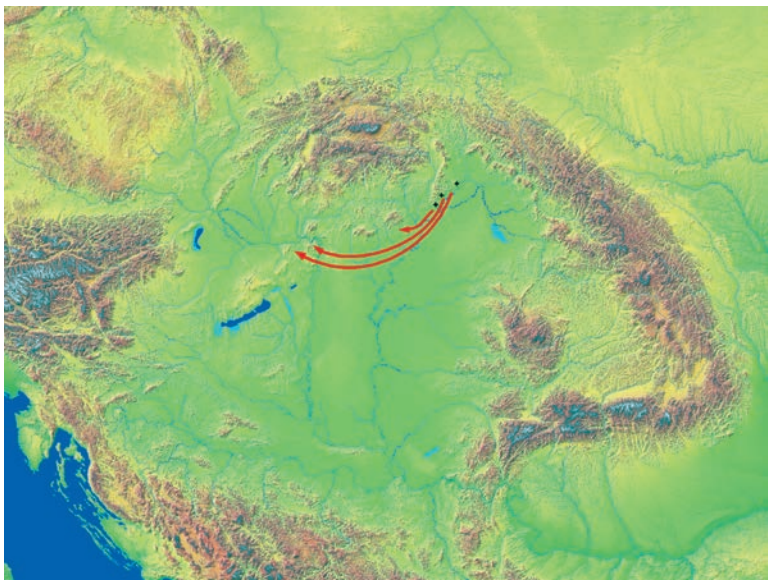

Fig. 4　Map of the Middle Palaeolithic obsidian finds

from the well-known north-eastern geological sources to Eastern Transdanubian cave sites must have run along the southern margin of the North-Hungarian Mid-Mountain range along the contact zone towards the lowlands, the Great Hungarian Plains (Simán 1993: 249.).

The bifacial and classical Moustérian industries of the Bükk Mts. consumed obsidian from both Carpathian sources. The distance between the C1 and C2 sources is not significant.

Following the caves of the Eastern and Southern parts of the Bükk Mts., further to the West, in the Cserhát Mts. we can also find Middle Palaeolithic industries with bifacial roots. The distribution area towards the West surpassed a major geographical barrier, the river Danube already in this period. The connection is documented by the spreading of other „Long distance" raw materials as well (Szeletian felsitic porphyry).

Upper Palaeolithic: Following the division of the so-called 'Pavlov convention' introduced in 1996 (Mussi and Roebroeks 1996), Hungarian localities belonging to the Upper Palaeolithic can be divided into three large cultural and several chronological units. The Upper Palaeolithic utilisation of obsidian is seemingly expanding compared to the previous period.

The *Early Upper Palaeolithic* Period is represented by two cultural units:

－Szeletian culture with leaf-points and

－Aurignacian culture with split base bone spearheads.

Procurement of obsidian in the caves (Bükk mountains) obtained from the geological sources of 70–80 km distance and on the open air sites (Eger, Acsa) obtained from the geological sources of 100–150 km could not be very difficult.

The time span of the *Middle and Late Upper Palaeolithic Period* is filled by finds of the Gravettian Entity.

Apart from general similarities encountered in this period there appear to be at least three archaeological groups separable into several chronological horizons.

The older phase of the Gravettian entity, between 28–26 000 years (MUP) is usually mentioned as the first Golden Age in the European prehistory. In Hungary this period is represented by the Pavlovian. This cultural phylum is characterised by long distance raw material acquisition and, consequently, the period of extensive immediate contacts. The potentials of raw material acquisition were seriously influenced by the fact that this culture expanded from the Pavlov-Willendorf base quarters towards the east, mainly along the river valleys having a West-East or North-South direction.

Obsidian on the Palaeolithic and Mesolithic Settlements

One of the richest settlement of this period, Bodrogkeresztur, is located in the north-eastern part of Hungary at the southern margin of the 'obsidian land'. It is a general function settlement, with balanced raw material distribution. It has an abundant

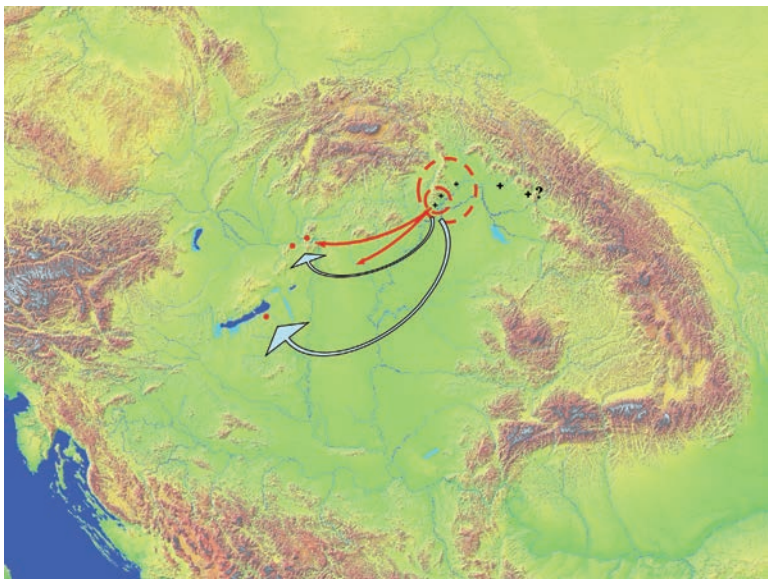

Fig. 5 Map of the Epigravettian (red line) and Ságvárian (blue line) obsidian finds

and variable fauna, and proofs of local tool production. Of the lithic assemblage, comprising a total of 3–4 000 pieces, 23–27 % was made of obsidian. Most of them originated from C1 Slovakian sources (Dobosi 2000b, 65–66.).

The Bodrogkeresztúr finds, rich in types as well as raw materials allowed a special series of functional analysis. In a comparison with recent working tools 260 tool types assigned to conventional archaeological tool types (end-scrapers and burins) were investigated, including those made from obsidian and silex respectively.

The angle of burins and end-scrapers working edge were put on the vertical axis of a graph, the horizontal axis shows the possible hardness of the worked substance on the Mohs scale.

It is noteworthy that in the case of similar types made of obsidian and silicites, respectively, that the angle of the working edge is always steeper for obsidian and therefore it was more brittle and more prone to damage during use.

The choice of raw material was extended by time but the basic skills remained the same. Most of the small metal tools today serve for specific tasks that did not even emerge in prehistory. The dozens of conventional Palaeolithic tool types were probably used for a more limited number of functions; however, the ratio of morphological tool types can reflect tool-working traditions (Dobosi and Homola 1989 Tab. I–II.).

This examination, similarly to the traceological results reminds us that conventional archaeological typology is help for archaeology first, and not always match well to the supposed, practical functions.

On the western slope of the same mountain, at Megyaszó (Dobosi and Simán 1996), the ratio of the obsidian is the same, but there C2 obsidian type is prevalent.

At the same time, along the western margins of the Tokaj-Prešov Mts., in the middle reach of the Hernád-valley (Hidasnémeti), and much closer to the better quality Carpathian 1. obsidian sources, K. Simán found surprisingly low amount of obsidian. Beside the dominant hydrothermal silicites, obsidian appeared as an accessory element: '*The other raw materials are presented by some pieces that altogether make only 1% of the total find material. They are mesolocal* [*regional*] (*obsidian – Carpathian 2…*)' (Simán 1989: 13).

Obsidian in reasonably small quantities can also be regarded as a mesolocal raw material in the Sajó-valley. On the Sajószentpéter site dated to the Denekamp interstadial, only the presence of obsidian was mentioned (Ringer 1993). On the Pavlovian sites lying further than 100 kms from the geological sources of obsidian, the occurrence density is seemingly symmetrical. In the lithic assemblage of the exploitation and workshop site of Püspökhatvan, radiocarbon dated to 27 700 BP, beside the dominating local hydroquartzite comprising 95% of the total assemblage, there are three obsidian flakes that provide evidence for long distance transport (Csongrádi-Balogh and Dobosi, 1995: 43).

Fig. 6　Mogyorósbánya, tools of the Ságvárian (pebble-gravettian) culture

In increasing distance from the obsidian sources, the ratio of obsidian is decreasing. At the Hont settlement, lying at a distance of 200 km from the sources, it is only 3% (Dobosi and Simán 2003).

In the Late Upper Palaeolithic period (by the end of the Upper Palaeolithic as well as the Pleistocene Period), we can find two cultural units, different both in the utilisation of raw materials as well as their typological characteristics. One of them is the Epigravettian, or Younger Blade Industry phylum: probably in genetical connection with the Blade Industry of the Pavlovian phylum, but separated from the latter by a hiatus of several thousand years (fig. 5)

The Epigravettian people were great explorers: raw materials from a surprising distance were located on the settlements of the Danube-Bend region, radiocarbon dated to around 16–17 000 BC (Dobosi 2006). Real long-distance procurement of raw materials such as Prut flint, coming from over 600 kms and rock crystal from the Alps, together with obsidian coming from a distance of 300 km as well as special raw materials (quartz porphyry) of the Eastern part of the Bükk Mts. were located in the environs of Pilismarót, on the right – western – bank of the Danube in considerable quantity.

As in Northern Hungary obsidian is a local raw material its occurrence on the North-Hungarian localities of this culture is expected to be considerable. On the northern margin of the Great Hungarian Plain, we discovered a small concentration of Epigravettian satellite sites. 120–130 kms from the obsidian sources, we can find a ratio of 2.5–3% of obsidian (Dobosi 1993).

In the Late Palaeolithic, partly contemporary to the Epigravettian cultures, a new cultural unit had emerged, named after its first (eponym) site Ságvárian culture (fig. 6).

A characteristic feature of the industry, revived from a latent tradition, is its pebble technology that determined the typological and metrical features of the industry. Obsidian noduls of suitable size could be collected from its (distant) secondary sources that fit well to pebble-working technologies.

The richest and largest settlement of this culture is Mogyorósbánya, in the northeastern corner of Transdanubia, on the loess-covered hilltop. The Würmian terrace, extend over a small valley coming from the mountains to the floodplain of the Danube, is an ideal place for a hunting camp. After the excavation in 1999, the ratio of the typical tools was found to be, among 6100 worked objects 7%, of the pebble-derivatives alone, 3%.

On average, 300 km far from the obsidian sources, the ratio of obsidian extends to nearly 5%.

^{14}C date: 19 930±300 BP. (Dobosi 2002).

The valuable material of the only-known "obsidian land" in Middle-Europe was found on the out-of-the-basin sites as well (fig. 7).

–in Austria, the environs of Wachau. Its world-famous sites include Willendorf, Kamegg, Aggsbach, Krems.

–in the Czech Republic, the surroundings of the Pavlov hill were ancestral areas of the Older Gravet-

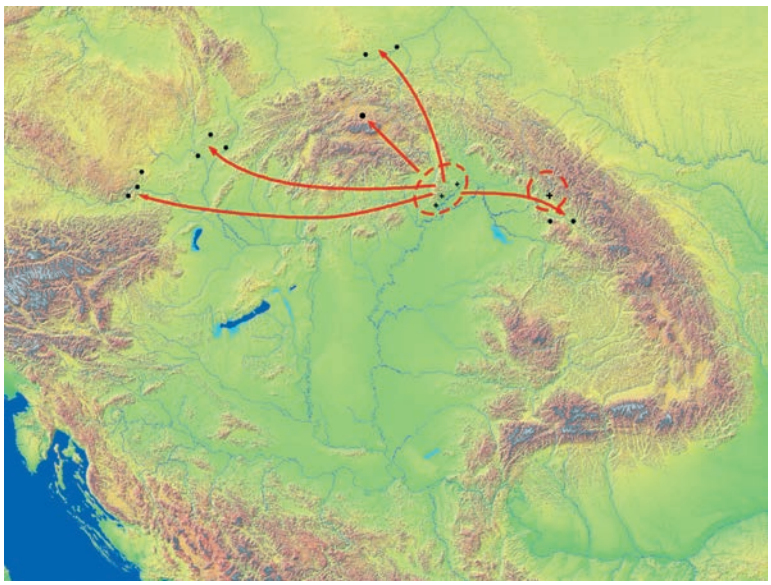

Fig. 7　Upper Palaeolithic obsidian use outside Hungary

tian Culture: the eponym Pavlov site in Moravia as well as the famous Dolni Vestonice site, with its burials and extremely early ceramics, finally, Milovice, known for a mammoth-hut.

Obsidian implements were found in the Kulna cave, North of Brno as well (Valoch 2009. p. 32.).

They are notable not only on the strength of the large distance (360 km from the sources). This site is considered to be the easternmost representative of the Western-European Magdalenian culture where two cultural traditions meet: in the Gravettian common raw material (obsidian) and the Magdalenian lithic tradition.

Further pieces of obsidian were reported from Uhersko Hradiste (on the western side of the White Carpathes).

In Poland, outside the watershed area of the Carpathes a few Upper Palaeolithic sites also yielded a low number of (typically 1–2) obsidian: In Krakow, at the upper reaches of the Wisla basin, Oblazowa cave, the famous site of the Palaeolithic boomerang, (to the North of the Tatra Mts., Bialka valley)

In Ukraine, current analyses indicate the presence of all Carpathian obsidian types on the Upper Palaeolithic localities, from local/regional acquisitions.

In Romania: on the territory adjacent to Transcarpathian Ukraine and Eastern Hungary: at North-Eastern part of Romania, Maramures and Oas regions, a number of Upper Palaeolithic sites were reported to contain obsidian (Bitiri 1972, 136). As all the three source regions are easily accessible from here, the exact origin of the pieces needs further investigations. By the way, the availability of local obsidian here, though not proved, cannot be totally refuted yet.

In V. Chirica's report we are informed of obsidian tools in certain habitations in Moldavia (Chirica 1989, 139). The connection between the Prut-valley and the Carpathian basin was reciprocal: flint from East to West, obsidian from West to East.

New, unpublished date: G. Paál geologist collected some chipped stone tools made of obsidian in the Partium, near Oradea (Cris-valley) in Gravettian context (HNM archives I. 1/2011, 2/2011).

In South-Eastern Slovakia, complete lithic assemblages based almost exclusively on obsidian appear. Although in Hungary we have no evidence of such intensive utilisation, the growth is apparent both in quantity and distance. In the Early Upper Palaeolithic, the ratio of obsidian found on the Aurignacian sited in the upper third of the valley of river Hernád (Hornad) can reach 20% (Kaminska 2001, 85.).

The Gravettian period, heyday of obsidian use.

Cejkov site is in the centre of the Slovakian obsidian region.

The complex of sites from here are known for more than eighty years. Many scholars and many seasons of excavation were consecrated to the study of the locality. The site basically belongs to the younger phylum of the Gravettian entity, with characteristic tool types: blade end-scrapers, slender and more bulky retouched blades. On this site we can

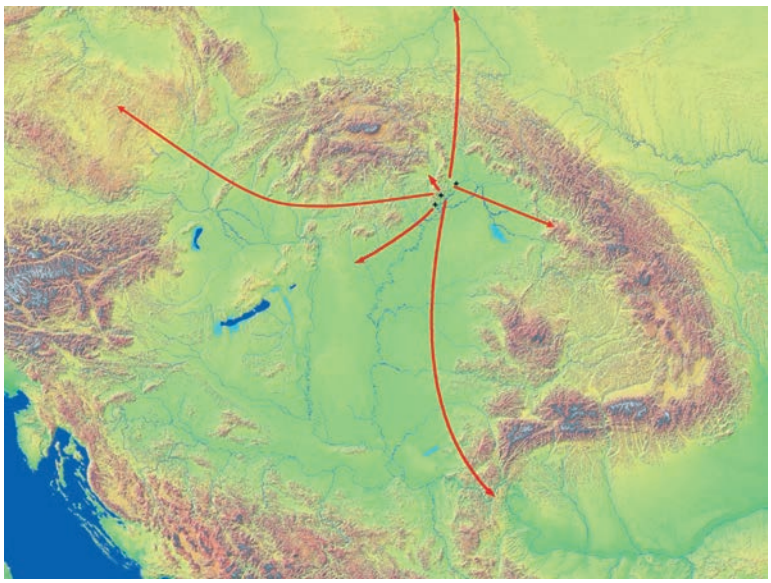

Fig. 8　Mesolithic obsidian use

expect long habitation. In respect of chronology, the site can be dated to the Epigravettian period, following the last cold peak of the Würm glaciation (Kaminská and Tomásková 2004.).

In the case of workshops planted on the geological sources of raw materials it is a general observation that the ratio of the locally exploited raw material will typically surpass 90%. On the basis of the type spectrum, however, Cejkov is not a simple workshop settlement. The settlement surface is literally covered at some places with obsidian debris, but antler- and bone tools, characteristic of general function settlements are also present. The quantity of finished tools exceeded the needs of a regular community. Probably, they were producing tools for exchange as well; the control over the excellent quality source had numerous advantages.

Located in a distance of a few kilometers from here, Kasov was spotted on the basis of surface finds. Its intensive study was started in the beginning of the 1930-s and continued by L. Bánesz (Bánesz 1969). The extent of the settlement is 5 000 square meter. It had two cultural layers, among them, the upper－Epigravettian was richer. 44 000 worked pieces were found here comprising 9% retouched tools. ^{14}C date; 18 600±390, the ratio of obsidian is 82% (Kaminska 2001, 99).

On the settlement surface, several concentrations of finds could be observed. The smaller ones (mainly comprising tools: living area, and concentration of hundreds of flakes: workshop area. The ratio of obsidian was 80%. The site is somewhat younger than Cejkov, it can be assigned to the Epigravettian culture.

With increasing distance from the sources, the ratio of obsidian is gradually decreasing. In the Szepesség (Spis) region, lying 70-80 kms from the sources, it is around 50%, at Nitra (in the distance of 250-280 km) only a few pieces of obsidian was found in the same period.

After the end of the Ice Age the gradually improving climate rearranged the ecological conditions in the Carpathian Basin, life conditions were changing rapidly The short period between the Late Pleistocene and the arrival of the first productive communities is the Mesolithic. This period is represented by a few settlements, although the long-neglected research of the Hungarian Mesolithic took a strong swing recently. Their tool kit fits well into the general tool type spectra of the European Late Mesolithic communities. The low number of sites and finds are not statistically relevant.

In the late Mesolithic, basically regional raw materials were used; however, we now have data indicating that obsidian was also known in this period.

On the Late Mesolithic sites of the Northern Alföld region, "It is noteworthy that Carpathian type obsidian has only a subordinated role in the raw material structure of the site Jásztelek I. Only 5 pieces of the inventory consisting of altogether 1325 pieces were made of obsidian" (Kertész 1994, 29-30).

In Slovakia, the intensive use of local obsidian is continued in the Mesolithic period as well.

Some of the sites yielded 1-2 obsidian flakes,

Fig. 9 Nyirlugos, neolithic hoard

same as the Breslaw locality in Bohemia. The low number of the recovered obsidian artefacts does not necessarily indicate regular connections; they are better interpreted as curiosities.

In the border region of Romania and Transcarpathian Ukraine, the north-western corner of the territory formerly known as Partium there is another Mesolithic centre with regional/local raw material utilisation.

The most distant obsidian pieces were found at the Iron Gate on the Romanian-Serbian border, at the world famous basic site Lepenski Vir and the other mesolithic sites along the Danube gorges (fig. 8).

At the close of the 7th millennium BC the first communities with productive economies, tilling the land and herding animals arrived to the Carpathian Basin from southeastern direction, the Balkans and Asia Minor. The related groups of Körös-Starcevo culture occupied the valleys of Tisza and the left side tributaries (Horváth 2003, 100).

In younger phases of Neolithic period „…obsidian from north-east Hungary and south-east Slovakia was traded over large distances, to Thessaly and northern Italy and even as far away as Denmark" (Bácskay－Biró 2003, 119).

Our most valuable and attractive obsidian find is also dated to the late Neolithic period. The hoard find of Nyírlugos was found to the South of the obsidian sources, at a distance of a hundred fifty kilometres (fig. 9).

The carefully processed cores were the hidden stock of a travelling tradesman a marvellous proof for active obsidian trade in prehistory. The large cores were probably used to make extra-large prestige blades. The tools for everyday practice on the settlements and the grave goods are not so representative objects.

Raw materials suitable for the production of chipped stone tools including obsidian preserve their privileged role until the general use of metal implements. After one and a half thousand years of internal development, the first steps of metalworking were acquired, i. e., cold hammering of panning gold and copper ore. By the spread of the metal tools, the gradual decrease in the use of chipped stone tools was started. Though they are used still in the Bronze Age, in Europe, their importance is lost.

A specific after-life for obsidian was observed in Hungary, in the first decades of the 20th century (AD!). Shepherds herding animals outdoors at the Hortobágy (the westernmost fringe of the steppe) used obsidian even for kindling fire: the last practical use of this raw material. The obsidian, obtained from Prehistoric settlements just below the current surface, was called 'crow-flint'.

Today, far from its golden millennia, obsidian is mainly preferred by mineral-collectors and jewellers as an attractive decorative stone.

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ハンガリーおよび近隣の地域における黒曜石の利用

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要　旨

カルパチア盆地北東端に二次的な地質学的堆積物として産する黒曜石は，ハンガリーおよび近隣の地域の旧石器文化にとって極めて重要な素材である。本稿では考古学的文化の諸時期の黒曜石の利用とその程度，所与の共同体の活動範囲の輪郭を描くのに重要な手助けとなる産地から遺跡地までの距離などについて概略を述べた。考古学においては時代を遡るほど個々の共同体（核家族，狩猟活動/交易集団，氏族）の活動範囲は次第に狭くなっていくことが一般に了解されている。後期旧石器時代には 100 km をはるかに超える交流の範囲を描くことができる。中期旧石器ではこうしたことは数十の例，前期旧石器では 10 例未満を示すことができる。ハンガリーの例は一般的にこの傾向を支持できるようである。時代の流れに沿って，後の時代の共同体は未知の領域への強い欲求の展開により，いっそう広い領域への探索，資源利用，有用材を求めて広い地域を利用するようになる。黒曜石製石器と地域の黒曜石の変異の分析結果は，石材の流通についてある程度の概念を与えることができ，同じく重要なことであるが，共同体の直接的あるいは間接的な方法による交流の方向と強度を明らかにしている。打製石器の素材として黒曜石は金属器が普及するまで広く利用されたのである。

キーワード：石材原産地，石材資料目録，編年，ハンガリー上部旧石器時代の黒曜石，山岳研究