THE CARPATHIAN 3 OBSIDIAN•

A KÁRPÁTI 3 OBSZIDIÁN

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Abstract

The territory of the westernmost part of present-day Ukraine (Transcarpathia) has been a densely inhabited area in almost all periods of human history. In the region of Transcarpathia, currently more than 100 Palaeolithic sites are known, most of them known from surface collections. Early petroarchaeological studies commenced in Transcarpathia with the activity of V. Petrun' and by the discovery of Middle Palaeolithic settlements and workshops around Rokosovo and Maliy Rakovets and the description of the local obsidian sources. Obsidian was one of the most important raw material for prehistoric stone tools. In the Carpathian Basin we know three separete sources of Carpathian obsidian (C1 – from Slovakia, C2 - from Hungary and C3 – from Ukraine), the aim of the present work is to introduce the Carpathian 3 obsidian from Transcarpathia.

Palaeolithic communities in the recent territory of Transcarpathia were primarily using local raw materials for the production of their tools. In the volcanic raw material regions of the Transcarpathian Palaeolithic two raw material types of volcanic origin played a dominant part in the production of stone artefacts: glassy dacite from Korolevo and Carpathian 3 type obsidian from Rokosovo.

Kivonat

Az emberiség története folyamán a mai Kárpátalja területe, Ukrajna legnyugatibb régiója, mindig is lakott vidék volt. Jelenleg több mint 100 paleolit régészeti lelőhelyet ismerünk a megye területén, ezeknek a legnagyobb része felszíni jellegű. A legkorábbi petroarcheológiai vizsgálatok Kárpátalján V. Petruny nevéhez fűződnek, aki számos középső paleolit telepet és műhelyt fedezett fel Rakasz (Rokosovo) és Kisrákóc (Maliy Rakovets) környékén, továbbá leírta a helyi obszidián-forrásokat. Az obszidián az őskori kőeszközök egyik legfontosabb nyersanyaga. A Kárpát-medencében összesen három különálló forrását ismerjük a kárpáti obszidiánoknak (C1 – Szlovákiában, C2 – Magyarországon és C3 – Ukrajnában), jelen munka célja abban rejlik, hogy bemutassa a Kárpátalján előforduló kárpáti 3 obszidiánt.

A mai Kárpátalja területén élő paleolit közösségek elsősorban a helyi nyersanyagokat használták az eszközeik elkészítéséhez. Kárpátalja paleolitikumában a vulkáni nyersanyagrégióban két magmas eredetű kőzet szolgált elsődleges nyersanyagként a pattintott kőeszközök előállításához: a királyházi üveges dácit és a rakaszi kárpáti 3 obszidián.

KEYWORDS: OBSIDIAN, TRANSCARPATHIA, PALAEOLITHIC, RAW MATERIALS

KULCSSZAVAK: OBSZIDIÁN, KÁRPÁTALJA, PALEOLITIKUM, NYERSANYAGOK

Introduction

The territory of the westernmost part of present-day Ukraine (Transcarpathia) has been a densely inhabited area in almost all periods of human history (**Fig. 1.**). In the region of Transcarpathia, currently more than 100 Palaeolithic sites are known, most of them known from surface collections.

Early petroarchaeological studies commenced in Transcarpathia with the activity of V. Petrun' and by the discovery of Middle Palaeolithic settlements and workshops around Rokosovo and Maliy Rakovets and the description of the local obsidian sources (Petrun' 1972). Obsidian was one of the most important raw materials for prehistoric stone tools. In the Carpathian Basin we know three separate sources of Carpathian obsidian (C1 – from Slovakia, C2 - from Hungary and C3 – from Ukraine), the aim of the present work is to introduce the Carpathian 3 obsidian from Transcarpathia (**Fig. 2.**).

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Fig. 1.: The current territory of the Trancarpathian region

1. ábra: Kárpátalja mai területe

Fig. 2.: The Carpathian 3 obsidian from Rokosovo village, geological sample

2. ábra: Kárpáti 3 obszidián Rakasz település környékéről, geológiai minta

Methods

Systematical field surveys have been conducted to Transcarpathian regions since 2006. The primary macroscopic analysis of the samples was followed by petrographic thin section analysis. Chemical analysis of samples was performed using ICP-OES and ICP-MS, PGAA and SEM-EDX methods (Kasztovszky et al. 2008).

Results

International petroarchaeological research has integrated Transcarpathian obsidian, occurring in the region around Rokosovo and Maliy Rakovets, under the name Carpathian 3 (C3) obsidian in 2008 (Rosania et al. 2008).

Occurrence: At the upper reaches of Silskiy stream, to the North of the village Rokosovo and to the South of Maliy Rakovets, the Upper Tertiary Sin'ak Formation comprises obsidian blocks and bombs in an agglomerate type tuff of acidic composition (**Fig. 3.**) (Matskiv & Kuzovenko 2003). The area forms the central part of the Vinohradiv Mountains (Velikiy Sholes) in the Vihorlat-Gutin volcanic range. The size of the blocks currently available varies between a few cms to several dozens of cms. It can be collected in substantial quantities on the eroded surface and the stream valleys even today.

Macroscopic description: The blocks are typically encrusted in their natural form with light or dark cortex, resulting from interaction with the environment. The surface is often porous, weathered (**Fig. 4.**). The fresh fractures are black, glassy, with macroscopically observable mineral grains. The fracture is conchoidal. It is non-transparent, even in thin flakes.

On the basis of recent field surveys we can say that the Carpathian 3 obsidian has two sub-types. The difference can be observed both in macro- and microscopic level. In the first case, the fresh broken surface is black, with glassy lustre, occasionally with oriented grey stripes. The other version is grey on fresh broken surface, with dull lustre and a subordinate amount of darker stripes. In the matrix we can observe spherolitic forms with naked eye, emerging as brown entities in microscopic thin section surrounding some crystallites. This feature is very rarely observed for the black version of C3 obsidian.

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Fig. 3.: The Carpathian 3 obsidian in an agglomerate type tuff

3. ábra: Kárpáti 3 obszidián agglomerátumos tufában

Fig. 4.: The Carpathian 3 obsidian from Rokosovo village, archaeological sample

4. ábra: Kárpáti 3 obszidián Rakasz település környékéről, régészeti minta

Microscopic description

In thin section the texture of the rock is vitroporphyric with clear fluidal character formed by the unidirectional movement of the lava flow. In the matrix, alternating stripes of light and less frequently dark phases can be observed. The texture of the rock abounds in microlithes (crystallites), surrounding spectacularly the phenocrysts grouped frequently in aggregates (**Figs. 5-6.**). Torn inclusions of plagioclase, monocline pyroxene, amphibole and biotite comprise maximally 5-10 volume% (**Fig. 7.**). Accessory minerals observed include magnetite and zircon. The plagioclase crystals are often twinning and zoned, their size may reach 2 mm. At some places they contain glass inclusions and certain resorption can be observed in the crystals (**Figs. 8-9.**).

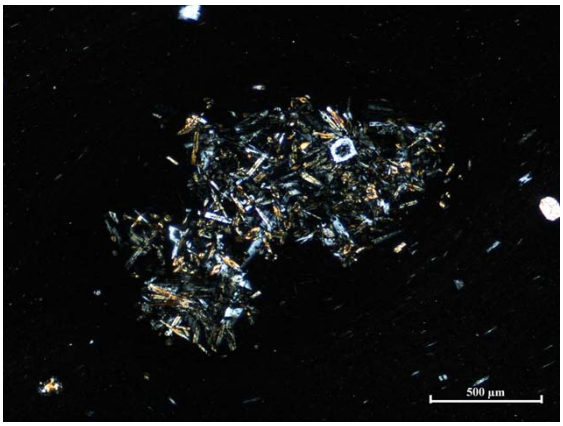

Fig. 5.: Thin section microscopic photos (XN) of C3 type obsidian – aggregate

5. ábra: A kárpáti 3 obszidián mikroszkópi képe vékonycsiszolatban (XN) - aggregátum

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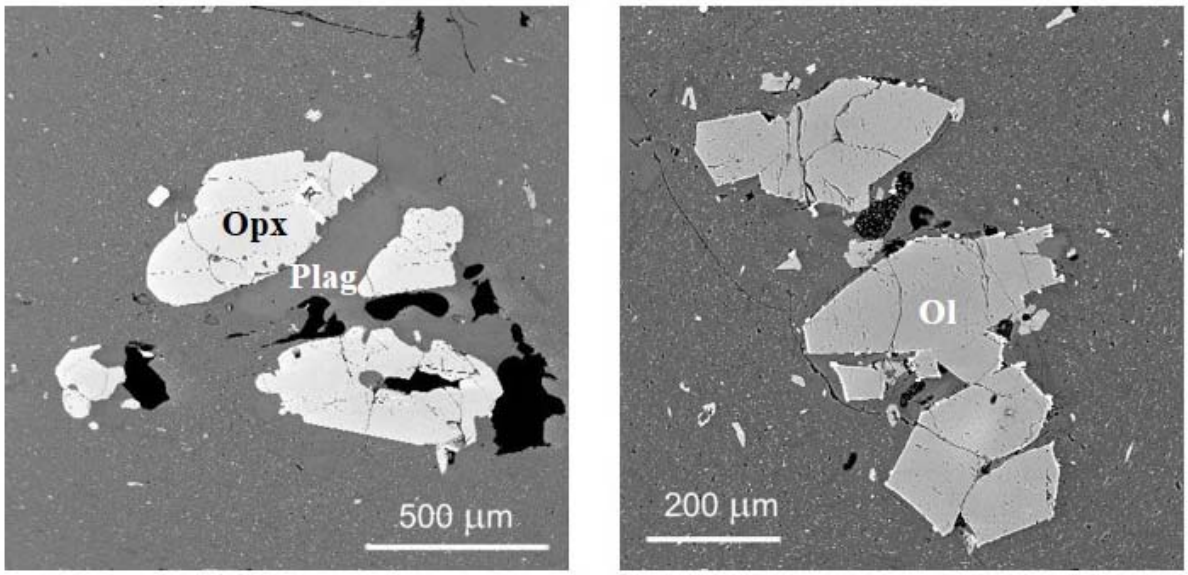

Fig. 6.: Back-acattered elektron image photos of C3 type obsidian – aggregates
6. ábra: Aggregátumok a kárpáti 3 obszidiánban (visszaszórt elektronkép)

Fig. 7.: Thin section microscopic photos (1N) of C3 type obsidian – aggregate in the fluidal type of matrix
7. ábra: A kárpáti 3 obszidián mikroszkópi képe vékonycsiszolatban (1N) – aggregátumok a fluidális alapanyagban

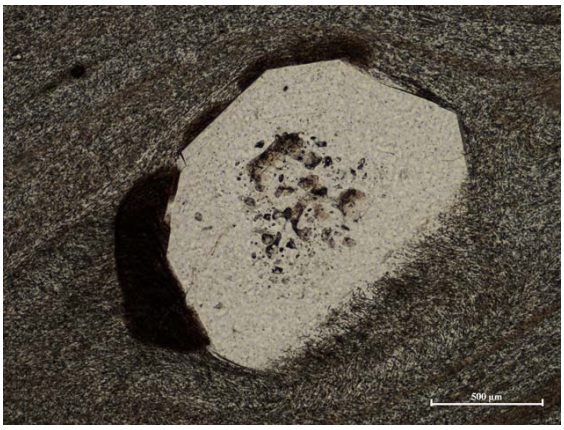

Fig. 8.: Thin section microscopic photos (1N) of C3 type obsidian – plagioclase phenocryst with glass inclusions and certain resorption
8. ábra: A kárpáti 3 obszidián mikroszkópi képe vékonycsiszolatban (1N) – üvegzárványos plagioklász fenokristály rezorpciós szélekkel

At some places in the thin section we can observe the mineral grains and inclusions disintegrating parallel to the orientation of the fluidal movement and the grains floating apart. The inclusions were probably formed in the deeper regions of the magma chamber.

Chemical composition

The analysis of two representative samples yielded 70.40% and 70.94% weight% SiO_2 (with LOI 0.4% and 0.3%, respectively). Consequently, the raw material was assigned to rhyolitic obsidians.

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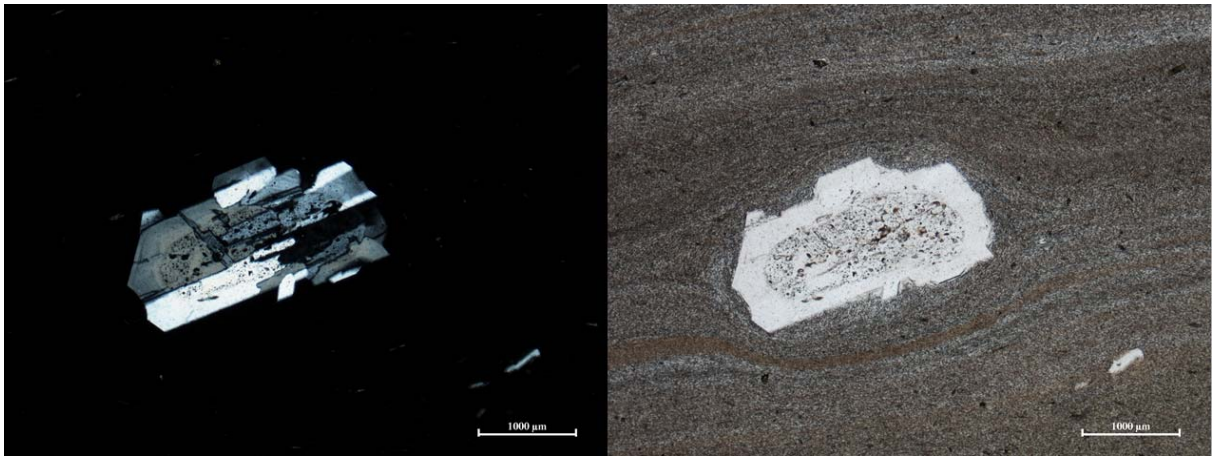

Fig. 9.: Thin section microscopic photos (1N and XN) of C3 type obsidian – zoned plagioclase phenocryst with glass inclusions

9. ábra: A kárpáti 3 obszidián mikroszkópi képe vékonycsiszolatban (1N és XN) – zónás plagioklász fenokristály üvegzárványokkal

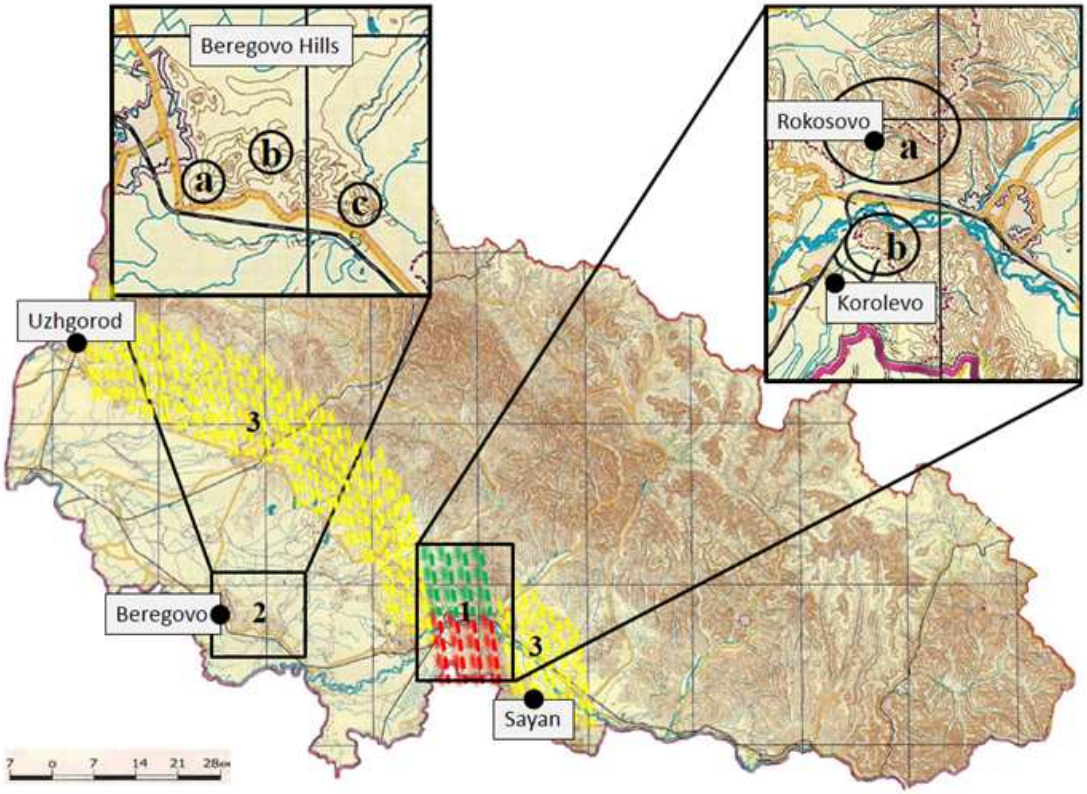

Fig. 10.: Palaeolithic raw material regions in Transcarpathia. 1: volcanic; 2: metasomatical / silicified; 3: sedimentary

10. ábra: Kárpátalja paleolit nyersanyag-régiói: 1: vulkáni; 2: metaszomatikus; 3: üledékes

Conclusion

Palaeolithic communities in the recent territory of Transcarpathia were primarily using local raw materials for the production of their tools (**Fig. 10.**). In the volcanic raw material regions of the Transcarpathian Palaeolithic two raw material types of volcanic origin played a dominant part in the production of stone artefacts: glassy dacite from Korolevo and Carpathian 3 type obsidian from Rokosovo (Usik et al. 2014).

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The Rokosovo-Maliy Rakovets sub-region

On the settlements around Rokosovo and Maliy Rakovets, stone knappers used mainly another local, glassy and volcanic material, i.e., local obsidian (Ryzhov 1999, 2003). Obsidian is a volcanic glass formed by quenching (very fast cooling) of the lava. The Transcarpathian obsidian source is unique as there are no more geological sources known in the whole territory of the Ukraine. On the source region (Vinohradiv Mountains – Velikiy Sholes) we can still find it in primary position in the form of smaller and larger blocks.

Obsidian as lithic raw material played an important role in the Palaeolithic and Neolithic periods in Transcarpathia. On the Palaeolithic settlements we can find all the three Carpathian obsidian types. So far we could not locate obsidian from more distant sources as yet. On the basis of field surveys made so far, we can support the existence of only one obsidian source in Transcarpathia, i.e., that of the Vinohradiv Mountains (Rats 2009, Rácz 2012).

In the Neolithic period, seemingly the Carpathian 1 obsidian type was preferentially used in the Transcarpathian region, as much as we can judge from present data (Potushniak 2011). The Carpathian 1 (and, to a lesser extent, Carpathian 2) obsidian was distributed over much larger area than the Carpathian 3 type, already in the Palaeolithic period. Carpathian 3 obsidian was mainly used locally in the Palaeolithic period; it is possible, though, that it was also used by the local Neolithic cultures. As C3 obsidian got established and fingerprinted (geochemically) only recently, this issue was not examined as yet (Mester & Rácz 2010). It is important to note that the Carpathian 3 obsidian have been detected in the territory of today's Romania, in the upper Palaeolithic sites, so the known spreading area of this raw material became larger (Dobrescu et al. 2018).

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