

ARCHAOMETRIC ANALYSIS OF THE OBSIDIAN ASSEMBLAGE FROM HODONI/HODONY (BANAT, ROMANIA)

HODONI/HODONY (BÁNÁT, ROMÁNIA) LELŐHELYRŐL SZÁRMAZÓ OBSZIDIÁNOK ARCHEOMETRIAI VIZSGÁLATA*

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Abstract

Hodoni “Pocioroane” is one of the archaeological sites discovered near the village of Hodoni/Hodony, ca. 25 km north of Timișoara, in the Romanian Banat. The excavations carried out at “Pocioroane” have yielded traces of superimposed Neolithic settlements and a medieval cemetery. This paper considers 113 obsidian artefacts recovered during the excavations carried out between 1985 and 1991 in the Vinča C2 and Tisza culture layers and features. The obsidian artefacts are represented by waste flakes, bladelets, exhausted cores and a few retouched tools two of which show utilisation marks. The artefacts have been characterised by LA-ICP-MS and XRF methods at the CNRS laboratory of Orléans University (France) indicating a Carpathian I provenance.

Kivonat

Hodoni “Pocioroane” lelőhely egyike a Hodoni/Hodony község határában feltárt régészeti lelőhelyeknek, kb. 25 km-re északra Temesvártól a romániai Bánát területén. A “Pocioroane” lelőhelyen végzett ásatások újkőkori település és középkori temető nyomait hozták felszínre. Ebben a tanulmányban 113 obszidián eszközt mutatunk be, amelyek az 1985 és 1991 között végzett ásatásokból kerültek elő, a Vinča kultúra C2 fázisából és a Tisza kultúra rétegeiből és objektumaiból. Az obszidián leletegyüttest megmunkálási hulladéknak értelmezhető szilánkok, mikropengék, elhasznált magkövek és néhány retusált eszköz képviseli, amelyek közt két darabon használati kopásnyomok voltak felfedezhetők. Az eszközökön LA-ICP-MS és XRF vizsgálatokat végeztünk az Orléans-i Egyetem (Franciaország) CNRS Laboratóriumában. Eredményeink szerint a vizsgált obszidiánok a Kárpáti I (szlovákiai) típusba sorolhatók.

KEYWORDS: CARPATHIAN OBSIDIAN SOURCES, CHARACTERIZATION ANALYSES, ROMANIAN BANAT, VINČA AND TISZA CULTURES

KULCSSZAVAK: KÁRPÁTI OBSZIDIÁN FORRÁSOK, GEOLÓGIAI LELŐHELY AZONOSÍTÁSI VIZSGÁLAT, BÁNÁT (ROMÁNIA), VINČA ÉS TISZA KULTÚRÁK

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Introduction

The archaeological site of Hodoni “Pocioroane” is located ca. 500 m west-northwest of the confluence of the Lercici and Caran Rivers, 25 km north of Timișoara in the Romanian Banat. Its geographical coordinates are 45°53'48"N-21°05'32"E. The Lercici River flows just north of Hodoni/Hodony. “Pocioroane” is located on a fluvial terrace some 100 m a.s.l. at the south-eastern edge of the village (Fig. 1). At least eight archaeological sites were known around Hodoni in the 1990s (Drașovean et al. 1996, 7); more sites were discovered in 2014 a few hundred metres south of the previous ones (Rogozea 2015, Muscalu 2016).

The first excavations were carried out at “Pocioroane” in 1959, 1960 and 1976 (Moga & Radu 1977). More trenches, among which is one (Trench 7) crossing the entire site from northeast to southwest, were opened between 1985 and 1991 (Fig. 2). The excavations yielded Neolithic Vinča and Tisza culture traces of occupation and a medieval cemetery that the excavators attributed to the 10th–11th centuries AD (Drașovean et al. 1996).

This paper is concerned with the sourcing of the obsidian assemblages recovered during the “Pocioroane” excavations carried out in 1985, 1987, 1988 and 1991, with the objective of framing the results into the wider picture of the exploitation and circulation of obsidian in this part of the Balkan Peninsula and the Carpathian Basin during the Neolithic.

Archaeological context

The results of the excavations carried out at Hodoni “Pocioroane” in 1985-1991 are contained in a volume published in 1996 (Drașovean et al. 1996). The first chapters provide a description of the location, excavation trenches (S) into which the site has been subdivided, pits (G) and habitation structures (L). The excavations covered an area of ca 700 m² (Drașovean 1996, 4 and Fig. 3).

According to the authors, the Neolithic Vinča layer was found just below the Tisza culture occupation ca. 25–45 cm beneath the topsoil (Drașovean 2009, 262). The Vinča horizon has yielded 13 circular or oval pits of different sizes and depths, some of which contained chert and obsidian artefacts, a few polished stone and bone tools.

The Vinča horizon has been attributed to the C2 aspect of the culture due to the typological characteristics of the pottery assemblage.

According to the most recent chronological time-scale (Whittle et al. 2016), the Vinča C period is dated to ca. 4850–4550 cal BC. Two radiocarbon dates have been obtained from Hodoni Pit 4, attributed to the Vinča aspect, from which come also 5 obsidian artefacts. The dates are 5880±60 BP (Deb-1963: 4904–4553 cal BC 2σ) and 5870±60 BP (Deb-2018: 4897–4551 cal BC 2σ) (Drașovean 2013: Table 1).

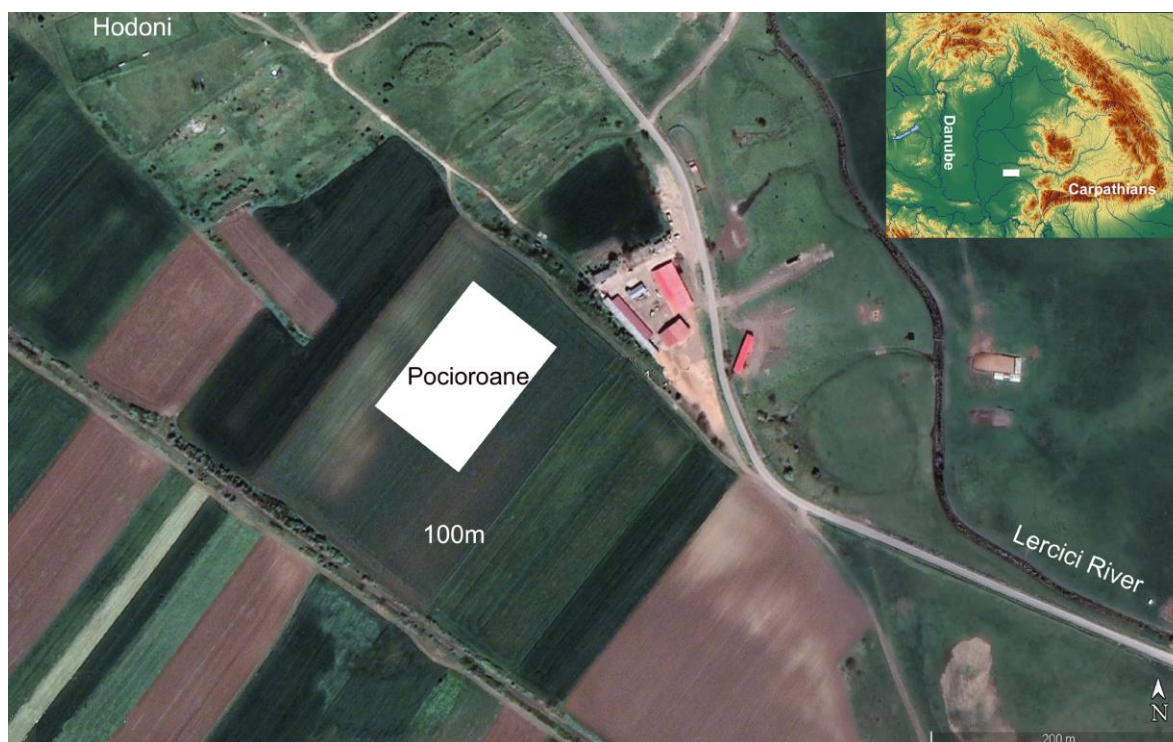


Fig. 1.: Hodoni “Pocioroane”: Location of the archaeological site (drawing by P. Biagi).

1. ábra: Hodoni (Hodony) “Pocioroane”: A régészeti lelőhely elhelyezkedése (grafika: P. Biagi).

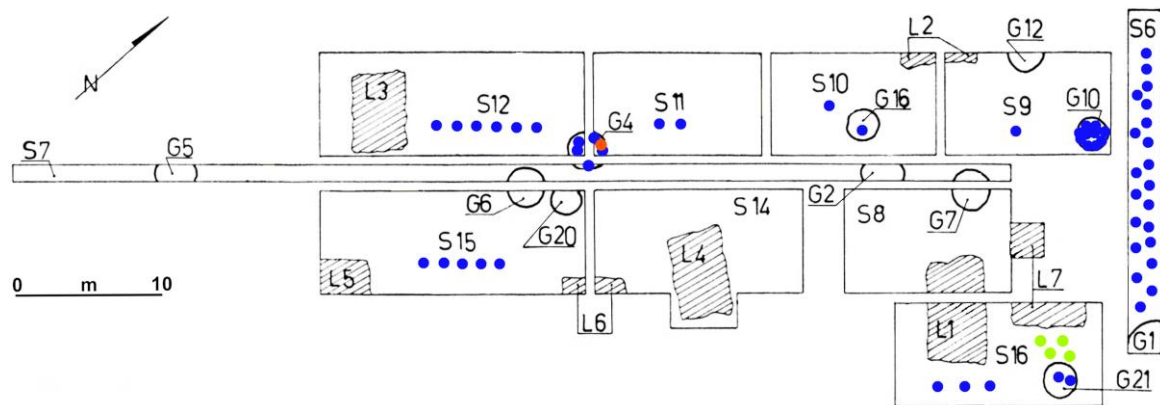


Fig. 2.: Hodoni “Pocioroane”: Distribution of the excavation trenches and archaeological features (S-trenches, G-pits, L-houses) and of the Vinča (blue dots) and Tisza obsidian artefacts (green dots), with known location, uncovered during excavation. The red dot in Pit 4 shows the location of the radiocarbon dated samples (drawing by P. Biagi, after Draşovean 1996, Fig. 3).

2. ábra: Hodoni (Hodony) “Pocioroane”: Az ásátási szelvények és a megfigyelt régészeti objektumok elhelyezkedése, az ismert kontextusú obszidián leletekkel (kék: Vinča, zöld: Tisza kultúra). A 4. sz. gödörben a C-14 vizsgálattal datált minták vörös ponttal jelölve (grafika: P. Biagi, Draşovean 1996, Fig. 3 nyomán).

The Tisza culture horizon consists of one layer with pit features and remains of rectangular habitation structures, three of which were in a good state of preservation (Draşovean 1996: Fig. 4). The Tisza complex yielded a very rich ceramic assemblage, a few chert and obsidian artefacts, a few polished stone tools, mainly axes and adzes, bone and antler implements. This horizon is undated. Unfortunately, the authors have not provided any information regarding the excavation methods, the way the archaeological material was recovered, or the presence/absence of archaeozoological and archaeobotanical remains.

Materials and methods

The obsidian assemblage

From the excavations carried out at Hodoni “Pocioroane” between 1985 and 1991 we have been given for study 113 obsidian artefacts, 109 of which come from the Vinča and 4 from the overlying Tisza settlement. Of those attributed to the Vinča horizon 21 come from Trench 6, 1 from Trench 9, 9 from Pit 10 in Trench 9, 1 from Trench 10, 2 from Trench 11, 6 from Trench 12, 5 from Trench 15, 3 from Trench 16, 2 from Pit 21 in Trench 16. Moreover, 5 artefacts from Pit 4 in Trenches 11 and 12 and 1 piece from Pit 16 in Trench 10 have been published (Draşovean 1996: Plate I, n. 18–20, 22, 23; Plate III, n. 12) but not given for analysis. The location of 53 artefacts was not marked on the bags or the pieces. The obsidian artefacts presented in this paper come from the archaeological layers and

a few pit fills. Twenty were recovered from 80–90 cm of depth (**Appendix – Table 1**).

The obsidian assemblage from the Vinča site consists of 6 microcores made from small volcanic obsidian “bombs” (**Fig. 3/11, 12; Fig. 4/3, 10, 11, 14**), 1 bladelet core (**Fig. 4/13**), 10 decortication pieces (**Fig. 3/7; Fig. 4/1, 2**), 3 plunging bladelets (**Fig. 4/6, 9**) and 6 retouched tools among which are 2 end scrapers (**Fig. 3/2; Fig. 4/4**), 1 truncation (**Fig. 4/7**), 1 transverse scraper (**Fig. 4/12**), and 1 retouched bladelet (**Fig. 4/5**). The presence of cores, decortications and technical pieces indicate that the raw material was imported as corticated nodules and the artefacts were knapped within the site or somewhere close to it. The blanks were detached by indirect percussion. The number and percentage of bladelets with trapezoidal cross-section (37: 36.63%) is higher than those with triangular cross-section (19: 18.81%). The presence of tools with traces of wear shows that some artefacts have been utilised for woodworking (**Fig. 3/2, 8**). The diagrams of **Fig. 5** have been developed by measuring 56 complete, unretouched artefacts. They show the microlithic character of the assemblage (microliths 40: 71.42%, normoliths 15: 26.89%, macroliths 1: 1.79%). The absence of hypermicroliths is most probably due to the excavation and recovery techniques which did not involve water sieving with a 2 mm mesh.

The Tisza site yielded only 4 artefacts, among which there are 1 decortication bladelet (**Fig. 3/7**) and 1 crested microflakelet (**Fig. 3/10**).



Fig. 3.: Hodoni “Pocioroane”: Obsidian artefacts from the Neolithic Vinča (n. 1–6, 11–13) and Tisza horizons (n. 7–10): HD-1 (n. 1), HD-2 (n. 2), HD-3 (n. 3), HD-4 (n. 4), HD-10 (n. 5), HD-6 (n. 6), HD-7 (n. 7), HD-5 (n. 8), HD-9 (n. 9), HD-8 (n. 10), HD-12 (n. 11), HD-11 (n. 12), HD-9 (n. 13). CW=cut wood, SW=scrape wood, H=hafting (photographs by E. Starnini).

3. ábra: Hodoni (Hodony) “Pocioroane”: obszián leletek az újkőkori Vinča és Tisza kultúra horizontjából. Használati nyomok: CW= vágás, fa anyagon, SW=kaparás, fa anyagon, H=nyelezés (fotó: E. Starnini).

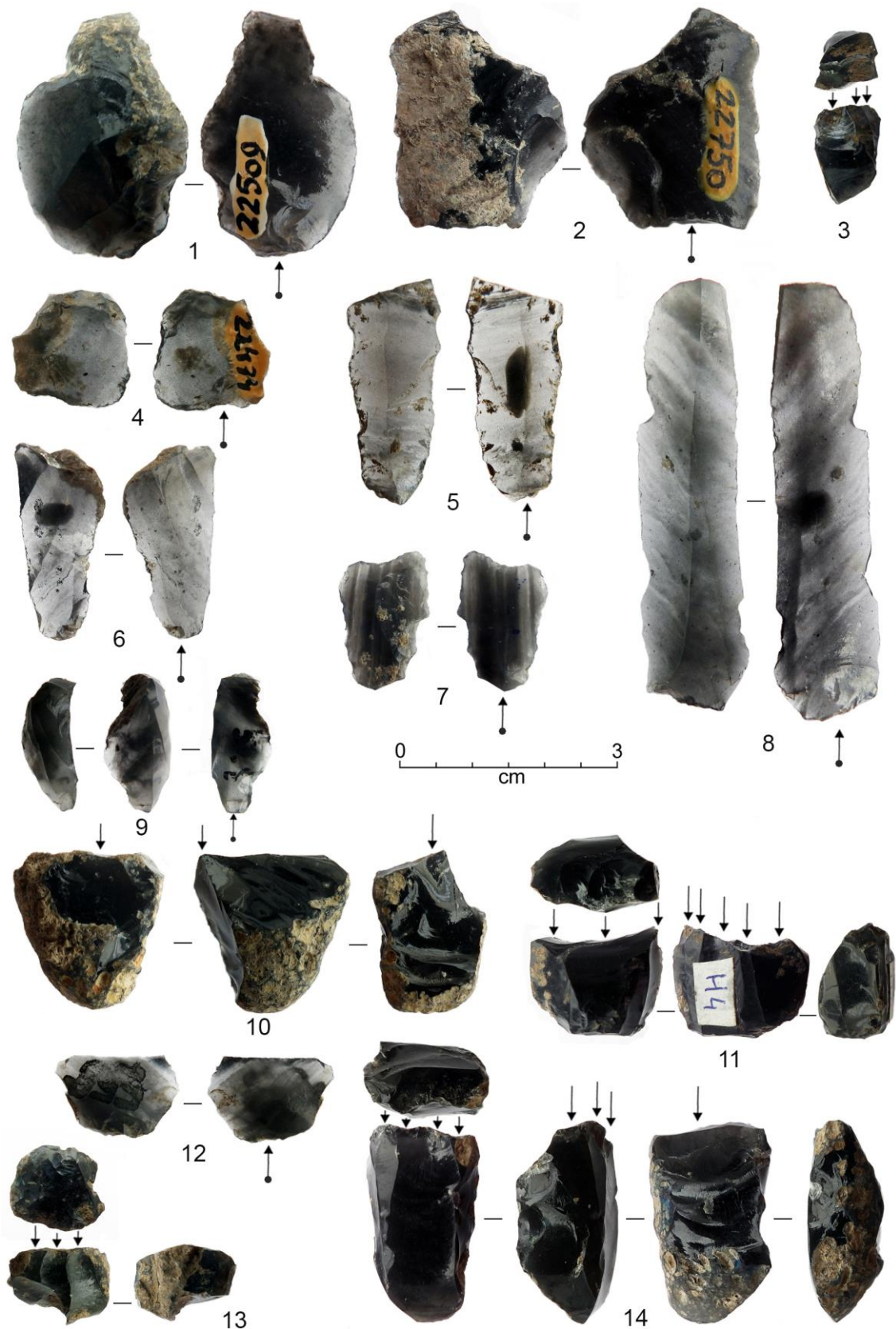


Fig. 4.: Hodoni “Pocioroane”: Obsidian artefacts from the Neolithic Vinča horizon: HD-17 (n. 1), HD-18 (n. 2), HD-14 (n. 3), HD-22 (n. 4), HD-96 (n. 5), HD-104 (n. 6), HD-111 (n. 7), HD-85 (n. 8), HD-84 (n. 9), HD-72 (n. 10), HD-71 (n. 11), HD-81 (n. 12), HD-15 (n. 13), HD-27 (n. 14) (photographs by E. Starnini).

4. ábra: Hodoni (Hodony) “Pocioroane”: obszidián leletek az újkőkori Vinča horizontból (fotó: E. Starnini).

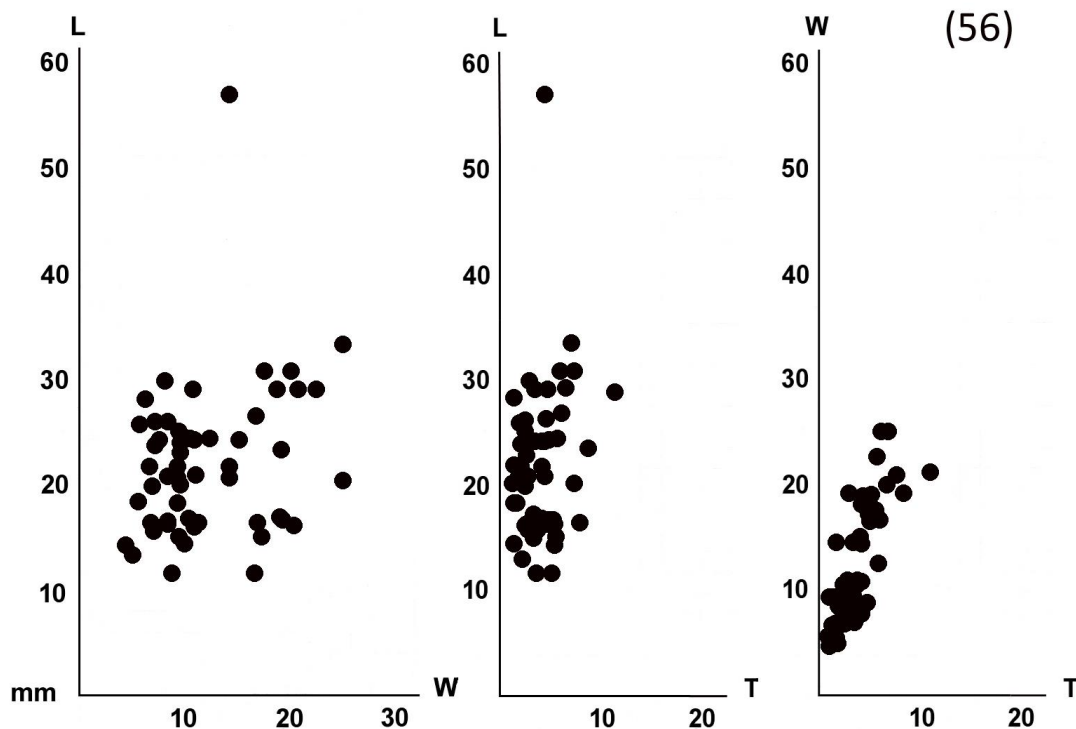


Fig. 5.: Hodoni “Pocioroane”: Dimensional diagrams of the complete, unretouched artefacts from the Neolithic Vinča horizon (drawing by P. Biagi).

5. ábra: Hodoni (Hodony) “Pocioroane”: az újkőkori Vinča horizontból származó teljes, retusálatlan eszközök méret diagramja (grafika: P. Biagi).

The characterisation methods

Two analytical methods were used at the IRAMAT/Centre Ernest-Babelon (CNRS, Orléans) for sourcing the obsidian artefacts (Astruc et al. 2021a, 2021b). The first is based on Laser Ablation Inductively Coupled Plasma Mass Spectrometry (LA-ICP-MS) and the second on a non-destructive X-ray fluorescence (XRF) approach. Out of the 113 obsidians from Hodoni, 79 artefacts were analysed: 66 by LA-ICP-MS in 2020 and 13 by XRF in 2010 (**Appendix – Tables 1–2.**).

Laser Ablation Inductively Coupled Plasma Mass Spectrometry analysis (LA-ICP-MS)

Laser ablation was carried out with a Resonetics RESolution M50e ablation device. This is an excimer laser produced by argon fluoride at 193 nm wavelength and operated at 5 mJ and 10 Hz. A dual gas system with helium (0.65 l/min) released at the base of the chamber, and argon at the head of the chamber (1 l/min) carried the ablated material to the plasma torch of an Element XR mass spectrometer from Thermo Fisher Instruments (Gratuze 1999, Chataigner & Gratuze 2014, Palumbi et al. 2014). This mass spectrometer offers the advantage of being equipped with a three-stage detector: a dual

mode (counting and analogue modes) secondary electron multiplier (SEM) with a linear dynamic range of over nine orders of magnitude, associated with a single Faraday collector which allows an increase of the linear dynamic range by an additional three orders of magnitude. This feature is particularly important for laser ablation analysis of lithic samples, as it is possible to analyse major, minor, and trace elements in a single run regardless of their concentrations and their isotopic abundance. The measurements are carried out in peak jumping acquisition mode, taking four points per peak for counting and analogue detection modes, and ten points per peak for Faraday detection. Automatic detection mode is used for most of the elements; only sodium, silicon, aluminium, and potassium are systematically detected with the Faraday detector. Silicon is measured on the 28 isotope and is used as an internal standard. A total of 38 elements were recorded. As most of the encountered isobaric interferences could be resolved by working on non-interfered isotopes all the measurements are carried out in low-resolution mode.

Ablation time was set to 45 seconds: 20 s pre-ablation, so that potential surface contamination

could be removed, and 25 s collection time. Spot sizes were set to 100 μm . Blanks were run every 15 to 20 samples. From one to two different areas were randomly analysed per sample to check for heterogeneity but, as the relative standard deviation between ablation spots in obsidian are usually below 5% for most of the elements, only one area was sampled for the majority of the artefacts. However, if during analysis element spikes due to the presence of inclusions were observed, a second ablation was carried out. With our analytical parameters the scanning time necessary to measure the 38 selected isotopes is about 2.5 seconds that is approximately 25 seconds per sample if we take into account the delay between each scan.

Calibration was done by using three reference standards glass materials: NIST610, Corning glass B and D, which were run periodically every 15 to 20 samples to correct for instrumental drift. ^{28}Si is used as an internal standard to normalise the measured signal for each element and the final percentage composition is calculated from the response coefficient (k) defined from the reference material (Gratuze 1999).

X-Ray Fluorescence analysis (XRF)

A qualitative X-ray fluorescence (XRF) approach was used for the 13 artefacts analysed in 2010. The instrument used was the Bruker ARTAX portable $\mu\text{-XRF}$ spectrometer. X-rays were generated with a tungsten tube operating at 45 kV and 0.8 mA. Analytical parameters were as follows: acquisition time of 1200 s, no beam filter, beam collimator diameter 1.5 mm, and energy domain for elemental analysis 0–50 keV. The net signals measured for eleven minor and trace elements present in obsidian: K, Ca, Ti, Mn, Fe, Rb, Sr, Y, Zr, Nb and Ba were systematically recorded.

Geological samples, from sources located in Italy, Hungary, Slovakia and Greece, and archaeological samples were analysed conjointly. The net signals measured for each element were plotted using simple binary diagrams after normalization by the La tungsten X-ray. Source attribution was made by comparing directly the net normalised X-ray fluorescence signals of the artefacts with those of geological obsidian samples without needing to determine the real composition of the artefacts. It is however possible to obtain absolute concentration by using classical linear regression. For each element the linear regression coefficients are calculated using the net measured signal on different obsidian reference samples analysed with both methods and their known concentration values.

However, it should be remembered that the results obtained with the XRF technique are very sensitive to surface conditions (alteration, encrustations,

roughness, irregularities) as well as the thickness of the artefact (the minimum thickness to have reliable measurements is about 3 mm).

The XRF data (normalized raw counts) allow the separation of the objects into different groups. According to the results obtained on geological samples with our analytical protocol, it was observed that some sources can be directly identified, without any doubt, by using XRF measurements while others show systematic overlap, which may prevent their secure identification. This method allows however a good discrimination of all the Mediterranean (Lipari, Sardinia, Palmarola, Pantelleria, Melos and Giali) and Carpathian (1, 2E and 2T) sources.

Only the results obtained using LA-ICP-MS are presented in **Appendix – Table 2.**

Results

The obsidian outcrops nearest to Hodoni, located less than 300 km as the crow flies, are those of the different Carpathian obsidian deposits (Biró 2006, Kohút et al. 2021) referenced as C1 (environs of Viničky, Mala Bara, Cejkov and/or Kašov in south-eastern Slovakia), C2E and C2T (near Mád and Tolcsva in the southern and central ranges of the Tokaj Mountains in north-eastern Hungary) and C3 (near Rokosovo in western Ukraine). The other Mediterranean obsidian sources (Palmarola, Lipari, Sardinia, Melos, Antiparos, Giali or Sakaeli-Orta) are located between 850 and 1150 km from Hodoni.

For the 13 artefacts analysed using XRF, direct comparison between the signal measured for the artefacts and that measured on the obsidian geological samples shows that all the artefacts match the composition of the C1 Carpathian obsidian source (**Fig. 6.**).

For the LA-ICP-MS data (**Appendix – Table 2.**), we use the discrimination factors $\log(\text{Sr}/\text{Nb})$ and $\log(\text{Zr}/\text{Nb})$ vs $\log(\text{Cs}/\text{Nb})$ proposed by Orange (Orange et al. 2016) for Mediterranean and Carpathian obsidian sources, applied to the Carpathian 3 source by M. Kohút (Kohút et al. 2021). According to these factors (**Fig. 7.**), the remaining 66 obsidian artefacts from Hodoni are also from the Slovakian sources referenced as Carpathian 1.

According to the literature Carpathian obsidian C1, from the Zemplin Hills sources in eastern Slovakia, was a better-quality material, both in terms of block size and knapping properties. It usually predominated among the lithic obsidian assemblages and was more widely distributed than the Carpathian obsidian C2 from the Tokaj Mountain sources in north-eastern Hungary (Milić 2016).

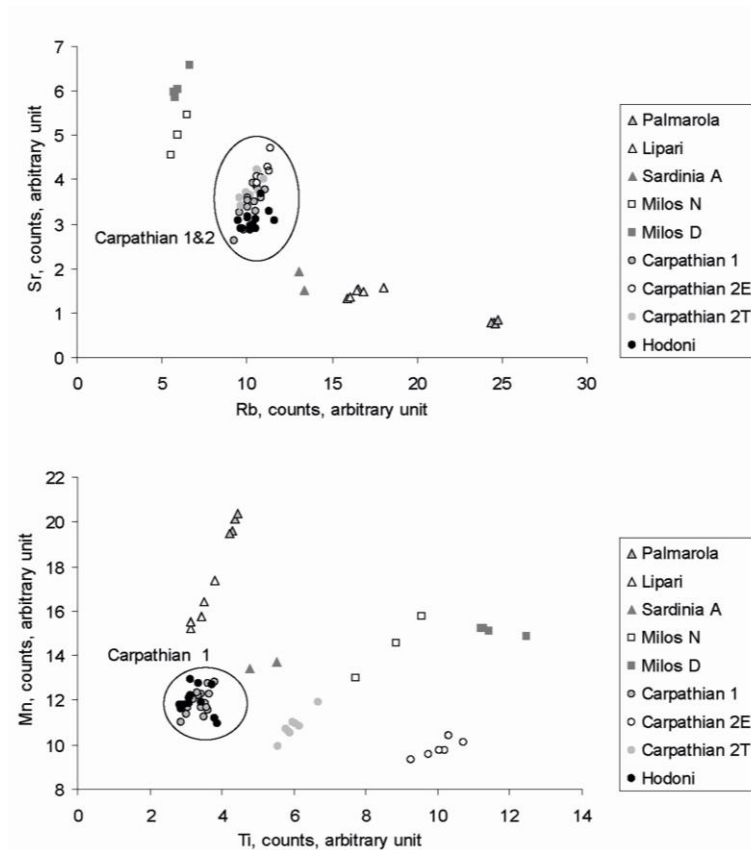


Fig. 6.: Hodoni “Pocioroane”: Distribution of the obsidian artefacts analysed using XRF according to their rubidium (Rb) and strontium (Sr) (top) and titanium (Ti) and manganese (Mn) XRF signal intensity (counts number, arbitrary unit). Comparison with the XRF signal measured on geological obsidian originating from Lipari, Palmarola, Sardinia (A), Melos (N & D), and Carpathian 1, 2E & 2T outcrops (drawing by B. Gratuze).

6. ábra: Hodoni (Hodony) “Pocioroane” lelőhelyről vizsgált obszidián eszközök XRF vizsgálattal mért elemeloszlása (Rb, Sr, Ti és Mn) összehasonlítva a következő geológiai lelőhelyről származó mintákkal: Lipari, Palmarola, Szardínia (A), Mílosz (N & D) és Kárpáti 1, 2E & 2T (grafika: B. Gratuze).

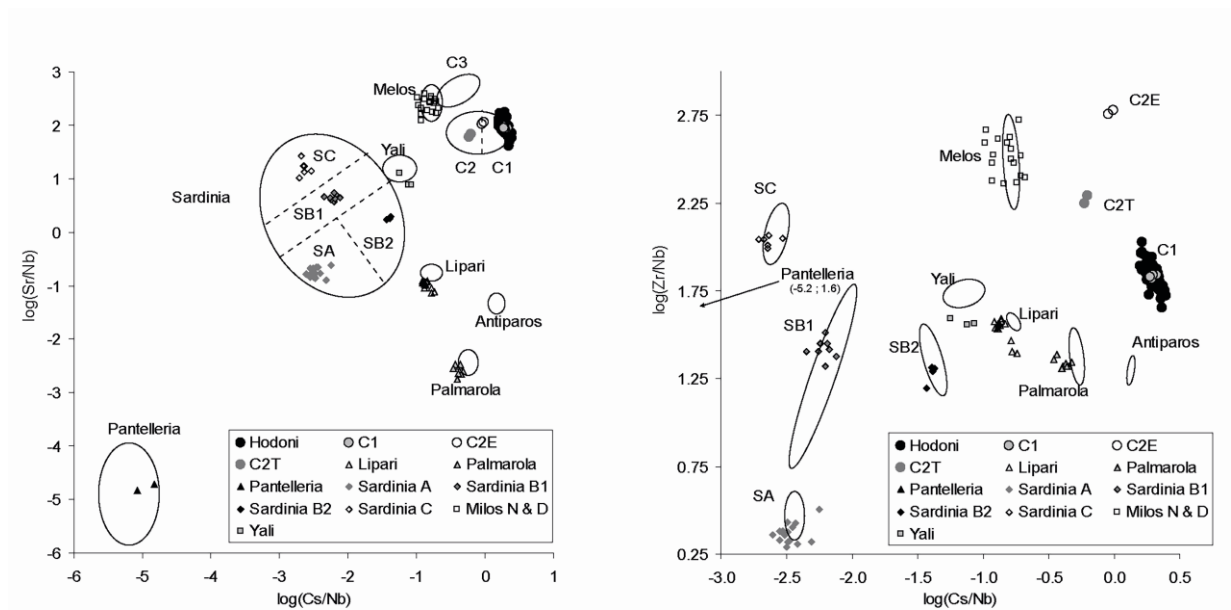


Fig. 7.: Hodoni “Pocioroane”: Distribution of the obsidian artefacts analysed using LA-ICP-MS according to their $\log(\text{Sr}/\text{Nb})$ vs. $\log(\text{Cs}/\text{Nb})$ (on the left) and $\log(\text{Zr}/\text{Nb})$ vs. $\log(\text{Cs}/\text{Nb})$ (on the right). Adapted from Orange et al. (2016) and Kohút et al. (2021). Comparison with the same ratios measured by LA-ICP-MS at the Orléans facilities, on geological obsidian originating from Lipari, Palmarola, Pantelleria, Sardinia (A, B1, B2 & C), Melos (N & D), Yali and Carpathian 1 & 2 outcrops (drawing by B. Gratuze).

7. ábra: Hodoni (Hodony) “Pocioroane” lelőhelyről vizsgált obszidián eszközök LA-ICP-MS vizsgálattal mért elemeloszlása, bal oldalon $\log(\text{Sr}/\text{Nb})$ vs. $\log(\text{Cs}/\text{Nb})$ érték, jobb oldalon $\log(\text{Zr}/\text{Nb})$ vs. $\log(\text{Cs}/\text{Nb})$ érték szerint. Orange et al. (2016) és Kohút et al. (2021) adatainak figyelembevételével. Az Orleans-i műszerközpont mérései a következő geológiai lelőhelyekre terjedtek ki: Lipari, Palmarola, Pantelleria, Szardínia (A, B1, B2 & C), Mílosz (N & D), Yali és Kárpáti 1 és 2 nyersanyagforrások (grafika: B. Gratuze).

Discussion and conclusions

The study of the obsidians from the Neolithic Vinča site of Hodoni “Pocioroane” has shown that the raw material employed for making artefacts was carried to the site as nodules, more precisely small corticated volcanic “bombs”, and that the manufacture processes took place within or very close to the settlement. Most cores are exhausted, which means that they were exploited even to detach very small blanks. This fact emphasises the importance of obsidian, which was imported from a long distance. Although the assemblage examined is rather small, all stages of the operational chain are represented. This is shown, apart from the exhausted microcores, by the occurrence of technical pieces, among which are decortications, core maintenance products among which are plunging blades and finished artefacts, mainly bladelets, which were later retouched into tools. The characteristics of the platforms and percussion bulbs of the artefacts show that they were obtained by indirect percussion. Though the finished implements are few, two were used for woodworking. This indicates that obsidian was employed for everyday activities.

At another Romanian site, the cave of Cheile Turzii in Transylvania, where all the sediments of the 2003 and 2004 seasons were water-sieved at 1 mm, dozens of shatters were recovered. They helped to interpret the activities carried out at the site, and the role played by obsidian, and to estimate the degree of post-depositional disturbance (Biagi & Voytek 2006). The soil screening techniques employed at Hodoni are not described in the excavation report (Draşovean 1996). Tiny pieces (shatters and debitage microlithic debris) are missing from the Hodoni analysed sample and their occurrence is never mentioned from all of the Romanian Neolithic sites so far analysed (Biagi et al. 2007a, 2007b).

Despite the number of Romanian Neolithic sites from which obsidian has been characterised and analysed (Boroneanţ et al. 2018, 2019), the data at present available from Vinča culture and other Middle Neolithic contexts are few (Glasswork et al. 2015; Boroneanţ et al. 2018). In particular, the detailed study of the Miercurea Sibiului/Szerdahely (Transylvania) lithic assemblages has shown that changes took place in raw material procurement and tool manufacture between the Early (Cris) and Middle (Vinča) Neolithic and Chalcolithic periods, especially as regards the non-obsidian material (Biagi 2015, 257). However, Carpathian I obsidian, in the form of volcanic “bombs” (Nandris 1975) has been always preferred throughout all these periods, most probably because of its availability and better knapping qualities, though its circulation peak seems to have been reached during the Middle Neolithic (Sherratt 1982).

Hodoni “Pocioroane” is one of the very few Balkan sites from which a reliable number of obsidian artefacts have been retrieved and systematically analysed and archaeometrically sourced. Though only a few comparisons are available, we can extend our observations to Gorzsa, a Hungarian site located in the floodplain of the Tisza River, where excavations have been carried out between 1978 and 1996 and 846 obsidian artefacts have been recovered (Starnini et al. 2007, Bonsall et al. in press). Gorzsa is a very important and well-excavated Late Neolithic Tisza culture tell which is more or less contemporaneous with Hodoni (Horvát 2005). Also, at Gorzsa most obsidian artefacts have been characterised as coming from the C1 source. Moreover, the artefacts from this site show all the technological reduction sequences starting from the raw material blocks, and the employment of the indirect percussion technique for the production of blanks (Bonsall et al. in press).

The new data presented here, confirm once more how important is the study of obsidian in the general context of the archaeology of the Balkans and how it can contribute to the interpretation of the economy of the Neolithic sites in the region.

Contribution of authors

Elisabetta Starnini Writing – Review & Editing, Supervision. **Paolo Biagi** Resources, Conceptualization, Writing – Original draft. **Bernard Gratuze** Writing – Original draft, Formal analysis, Investigation.

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Appendix - Table 1.: Hodoni “Pocioroane”: Most important characteristics, provenance, chronological and cultural attribution of the studied obsidian artefacts. Abbreviations: column Condition: fr = fragment. For those used in column Description and Typology see Laplace 1964 (original by P. Biagi and E. Starnini).

Melléklet – 1. táblázat: Hodoni (Hodony) - “Pocioroane”: a vizsgált obszidiánok legfontosabb adatai, származási hely, kronológiai és kulturális besorolás. Rövidítések: fr = töredék, illetve Laplace 1964 nyomán. •

Number	Year	Condition	Measures LxWxT (mm)	Description and Typology (Laplace 1964)	Use wear traces	Cross-section	Cortex (%)	Platform	Weight (g)	Culture	Excavation data	Characterisation	Obsidian source	Inv. N°	Figure
HD-1	1985	Complete	21x9x2	Microbladelet		Trapezoidal	No	Dihedral	0.55	Vinča C2	Trench 6, Square 10 -0.90 cm	XRF	Carpathian 1	22251	3/1
HD-2	1985	Complete	32x15x4	Long End Scraper (G1)	Scrape wood	Trapezoidal	No	Pointed	2.32	Vinča C2	Trench 6, Square 10 -0.90 cm	XRF	Carpathian 1	-	3/2
HD-3	1985	Complete	27x17x6	Core flakelet		-	No	Dihedral	2.38	Vinča C2	Trench 6, Square 10 -0.90 cm	XRF	Carpathian 1	22353	3/3
HD-4	1985	fr mesial	(21)x9x3	Retouched microbladelet (L1 prox [Smd dx])		Triangular	No	Missing	0.59	Vinča C2	Trench 6, Square 10 -0.90 cm	XRF	Carpathian 1	?????	3/4
HD-5	1985	Complete	29x11x3	Bladelet	Hafted, Cut wood	Trapezoidal	No	Dihedral	1.28	Vinča C2	Trench 6, Square 10 -0.90 cm	XRF	Carpathian 1	?254?	3/8
HD-6	1985	fr mesial	(20)x11x3	Microbladelet		Trapezoidal	No	Missing	0.82	Vinča C2	Trench 6, Square 10 -0.90 cm	XRF	Carpathian 1	-	3/6
HD-7	1991	Complete	38x12x3	Decortication bladelet		-	75	Pointed	1.15	Tisza	Trench 16, layer	XRF	Carpathian 1	-	3/7
HD-8	1991	fr proximal	(20)x5x2	Microbladelet		Triangular	No	Dihedral	0.18	Tisza	Trench 16, layer	XRF	Carpathian 1	-	3/5
HD-9	1991	fr proximal	(15)x7x2	Microbladelet		Triangular	No	Dihedral	0.23	Tisza	Trench 16, layer	XRF	Carpathian 1	-	3/13
HD-10	1991	Complete	23x12x4	Crested microflakelet		Trapezoidal?	No	Pointed	0.94	Tisza	Trench 16, layer	XRF	Carpathian 1	-	3/10
HD-11	1985	Complete	20x17x13	Subconical Microcore on volcanic bomb, one prepared platform		-	50	Prepared	4.48	Vinča C2	Trench 16	XRF	Carpathian 1	22601	3/12
HD-12	1985	Complete	33x28x17	Prismatic Microcore on volcanic bomb, one prepared platform		-	80	Prepared	17.55	Vinča C2	Trench 16	XRF	Carpathian 1	22473	3/11
HD-13	1985	fr proximal	(17)x10x3	Microbladelet		Trapezoidal	No	Dihedral	0.36	Vinča C2	Trench 16, Square 17	XRF	Carpathian 1	-	3/9
HD-14	1985	Complete	9x10x14	Prismatic Microcore, one prepared platform		-	No	Prepared	1.47	Vinča C2	Trench 16, Pit 21	LA-ICP-MS	Carpathian 1	-	4/3
HD-15	1985	Complete	11.5x14.5x9.5	Prismatic Microcore, one prepared platform		-	5	Prepared	1.65	Vinča C2	Trench 16, Pit 21	LA-ICP-MS	Carpathian 1	-	4/13
HD-16	1985	Complete	33x25x7	Flakelet		-	10	Pointed	4.17	Vinča C2	?	LA-ICP-MS	Carpathian 1	2273?	
HD-17	1985	Complete	31x20.5x7	Decortication flakelet		-	25	Dihedral	3.53	Vinča C2	Trench 12	LA-ICP-MS	Carpathian 1	22509	4/1
HD-18	1985	Complete	28.5x22.5x6	Decortication flakelet		-	60	Dihedral	3.81	Vinča C2	?	LA-ICP-MS	Carpathian 1	22750	4/2
HD-19	1985	Complete	22.5x26.5x6	Flakelet		-	No	Dihedral	2.87	Vinča C2	?	LA-ICP-MS	Carpathian 1	22189	
HD-20	1985	Complete	29x18.5x4	Decortication flakelet		-	60	Dihedral	2.21	Vinča C2	?	LA-ICP-MS	Carpathian 1	-	

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Appendix - Table 1., cont.

Melléklet – 1. táblázat, folyt.

Number	Year	Condition	Measures LxWxT (mm)	Description and Typology (Laplace 1964)	Use wear traces	Cross-section	Cortex (%)	Platform	Weight (g)	Culture	Excavation data	Characterisation	Obsidian source	Inv. N°	Figure
HD-21	1985	Complete	17x19x5	Microflakelet		-	No	Dihedral	1.45	Vinča C2	Trench 12	LA-ICP-MS	Carpathian 1	22510	
HD-22	1985	Complete	15.5x15.5x6	Short End Scraper? (G3?)		-	No	Dihedral	1.17	Vinča C2	?	LA-ICP-MS	Carpathian 1	22474	4/4
HD-23	1985	Complete	16.5x20.5x7.5	Microflakelet		-	5	Thinned	1.99	Vinča C2	Trench 10	LA-ICP-MS	Carpathian 1	22606	
HD-24	1985	Complete	31x17.5x6	Decortication flakelet		-	90	Pointed	3.15	Vinča C2	Trench 15	LA-ICP-MS	Carpathian 1	22611	
HD-25	1985	Complete	28.5x21.5x11	Flakelet		-	No	Thinned	5.45	Vinča C2	Trench 12	LA-ICP-MS	Carpathian 1	22777	
HD-26	1985	fr distal	(18)x18x5	Flakelet		-	No	Missing	1.60	Vinča C2	Trench 12	LA-ICP-MS	Carpathian 1	22457	
HD-27	1985	Complete	24x14.5x9.5	Bladelet core on volcanic bomb, one prepared platform		-	20	Prepared	4.18	Vinča C2	Trench 14	LA-ICP-MS	Carpathian 1	-	4/14
HD-28	1985	Complete	17x19x3	Microflakelet		-	No	Dihedral	1.16	Vinča C2	Trench 14	LA-ICP-MS	Carpathian 1	22678	
HD-29	1985	Complete	23x19.5x8	Decortication flakelet		-	100	Pointed	2.91	Vinča C2	?	LA-ICP-MS	Carpathian 1	-	
HD-30	1985	Complete	20.5x14x2	Microflakelet		-	No	Pointed	0.73	Vinča C2	Trench 11	LA-ICP-MS	Carpathian 1	22736	
HD-31	1985	Complete	21.5x8.5x4	Microbladelet	Triangular	-	50	Pointed	0.82	Vinča C2	?	LA-ICP-MS	Carpathian 1	22451	
HD-32	1985	Complete	16x10.5x2.5	Microflakelet		-	No	Thinned	0.42	Vinča C2	Trench 15	LA-ICP-MS	Carpathian 1	22763	
HD-33	1985	Complete	14.5x10x2.5	Decortication microflakelet		-	100	Dihedral	0.29	Vinča C2	?	LA-ICP-MS	Carpathian 1	22777	
HD-34	1985	Complete	16.5x8.5x5	Decortication microflakelet		-	75	Thinned	0.60	Vinča C2	?	LA-ICP-MS	Carpathian 1	22222	
HD-35	1985	Complete	15.5x7x3.5	Microflakelet		-	No	Dihedral	0.31	Vinča C2	Trench 12	LA-ICP-MS	Carpathian 1	22736	
HD-36	1985	Complete	12x8x3.5	Hypermicroflakelet		-	No	Thinned	0.30	Vinča C2	Trench 15	LA-ICP-MS	Carpathian 1	22752	
HD-37	1985	fr mesial	(9)x21x3	Microflakelet		-	No	Missing	0.68	Vinča C2	?	LA-ICP-MS	Carpathian 1	22452	
HD-38	1985	fr distal	(9.5)x(13)x3	Decortication microflakelet		-	50	Missing	0.55	Vinča C2	Trench 11	LA-ICP-MS	Carpathian 1	22624	
HD-39	1985	Complete	15x9x3	Microflakelet		-	No	Prepared	0.47	Vinča C2	?	LA-ICP-MS	Carpathian 1	-	
HD-40	1985	fr proximal	(7.5)x7.5x1	Hypermicroflakelet		-	No	Thinned	0.03	Vinča C2	Trench 15	LA-ICP-MS	Carpathian 1	-	
HD-41	1985	Complete	23.5x7x2	Microbladelet	Trapezoidal	-	No	Facetted	0.46	Vinča C2	Trench 15	LA-ICP-MS	Carpathian 1	2221?	
HD-42	1985	Complete	23x9.5x2.5	Microbladelet	Trapezoidal	-	No	Facetted	0.52	Vinča C2	Trench 15	LA-ICP-MS	Carpathian 1	22469	
HD-43	1985	Complete	28x6.6x1.5	Bladelet	Trapezoidal	-	No	Dihedral	0.34	Vinča C2	?	LA-ICP-MS	Carpathian 1	225??	
HD-44	1985	Complete	26.5x8.5x2.5	Bladelet	Trapezoidal	-	No	Dihedral	0.54	Vinča C2	?	LA-ICP-MS	Carpathian 1	22254	
HD-45	1985	Complete	20x7x2.5	Microbladelet	Trapezoidal	-	No	Dihedral	0.40	Vinča C2	?	LA-ICP-MS	Carpathian 1	22298	
HD-46	1985	Complete	18x6x1.5	Microbladelet	Trapezoidal	-	No	Thinned	0.14	Vinča C2	Trench 12	LA-ICP-MS	Carpathian 1	22751	
HD-47	1985	Complete	14.5x4.5x1.5	Microbladelet	Trapezoidal	-	No	Missing	0.10	Vinča C2	?	LA-ICP-MS	Carpathian 1	22259	
HD-48	1985	Complete	13x5x2	Microbladelet	Triangular?	-	No	Thinned	0.15	Vinča C2	?	LA-ICP-MS	Carpathian 1	22256	
HD-49	1985	Complete	16.5x7x2.5	Microbladelet	Trapezoidal	-	No	Dihedral	0.31	Vinča C2	?	LA-ICP-MS	Carpathian 1	-	
HD-50	1985	fr proximal	(19.5)x7.5x1.5	Microbladelet	Trapezoidal	-	No	Dihedral	0.25	Vinča C2	?	LA-ICP-MS	Carpathian 1	22221	
HD-51	1985	fr proximal	(16)x6.5x1.5	Microbladelet	Trapezoidal	-	No	Dihedral	0.18	Vinča C2	?	LA-ICP-MS	Carpathian 1	22506	
HD-52	1985	fr proximal	(14)x7.5x2.5	Microbladelet	Trapezoidal	-	No	Dihedral	0.30	Vinča C2	?	LA-ICP-MS	Carpathian 1	22210	
HD-53	1985	fr proximal	(17).5x8x2	Microbladelet	-	-	30	Dihedral	0.30	Vinča C2	?	LA-ICP-MS	Carpathian 1	-	
HD-54	1985	fr proximal	(14)x9.5x2.5	Microbladelet	-	-	No	Dihedral	0.29	Vinča C2	?	LA-ICP-MS	Carpathian 1	22507	
HD-55	1985	fr proximal	(14)x6.5x2	Microbladelet	Triangular	-	No	Dihedral	0.21	Vinča C2	?	LA-ICP-MS	Carpathian 1	22508	
HD-56	1985	fr mesial	(12.5)x7x1.5	Microbladelet	Trapezoidal	-	No	Missing	0.16	Vinča C2	?	LA-ICP-MS	Carpathian 1	22757	
HD-57	1985	fr mesial	(13)x6x2	Microbladelet	Trapezoidal	-	No	Missing	0.16	Vinča C2	?	LA-ICP-MS	Carpathian 1	22006	
HD-58	1985	fr distal	(17)x7.5x2.5	Microbladelet	Trapezoidal	-	25	Missing	0.44	Vinča C2	?	LA-ICP-MS	Carpathian 1	22489	
HD-59	1985	fr distal	(22)x6x2	Microbladelet	Triangular	-	No	Missing	0.30	Vinča C2	?	LA-ICP-MS	Carpathian 1	22503	
HD-60	1985	fr distal	(17.5)x6.5x1.5	Microbladelet	Trapezoidal	-	No	Missing	0.23	Vinča C2	?	LA-ICP-MS	Carpathian 1	22419	

Appendix - Table 1., cont.

Melléklet – 1. táblázat, folyt.

Number	Year	Condition	Measures LxWxT (mm)	Description and Typology (Laplace 1964)	Use wear traces	Cross-section	Cortex (%)	Platform	Weight (g)	Culture	Excavation data	Characterisation	Obsidian source	Inv. N°	Figure
HD-61	1985	fr distal	(12.5)x6.5x1.5	Microbladelet		Triangular	No	Missing	0.14	Vinča C2	?	LA-ICP-MS	Carpathian 1	22232	
HD-62	1985	fr distal	(13.5)x7.5x2	Microbladelet		Trapezoidal	No	Missing	0.20	Vinča C2	?	LA-ICP-MS	Carpathian 1	?????	
HD-63	1985	fr distal	(13.5)x6.5x2	Microbladelet		Trapezoidal	No	Missing	0.20	Vinča C2	?	LA-ICP-MS	Carpathian 1	?????	
HD-64	1985	fr distal	(10)x5x1.5	Microbladelet		Trapezoidal	No	Missing	0.09	Vinča C2	?	LA-ICP-MS	Carpathian 1	??306	
HD-65	1985	fr distal	(12.5)x7x1.5	Microbladelet		-	No	Missing	0.10	Vinča C2	?	LA-ICP-MS	Carpathian 1	22232	
HD-66	1985	fr distal	(14)x11x3	Microbladelet		Trapezoidal	No	Missing	0.52	Vinča C2	?	LA-ICP-MS	Carpathian 1	-	
HD-67	1985	fr distal	(17)x7x2	Microbladelet		Trapezoidal	No	Missing	0.33	Vinča C2	?	LA-ICP-MS	Carpathian 1	-	
HD-68	1985	fr distal	(16)x5.5x1	Microbladelet		Triangular	No	Missing	0.09	Vinča C2	?	LA-ICP-MS	Carpathian 1	22502	
HD-69	1985	fr proximal	(14)x17x2.5	Microflakelet		-	No	Dihedral	0.42	Vinča C2	?	LA-ICP-MS	Carpathian 1	22132	
HD-70	1985	Complete	14x12.5x2.5	Microflakelet		-	No	Thinned	0.20	Vinča C2	?	LA-ICP-MS	Carpathian 1	-	
HD-71	1987	Complete	17x19x12	Prismatic microcore on volcanic bomb, one prepared platform		-	No	Prepared	4.68	Vinča C2	H4	LA-ICP-MS	Carpathian 1	-	4/11
HD-72	1987	Complete	21x20x16	Microcore on volcanic bomb, one prepared platform		-	50	Prepared	8.11	Vinča C2	?	LA-ICP-MS	Carpathian 1	-	4/10
HD-73	1987	Complete	20.5x25x7	Flakelet		-	No	Dihedral	1.75	Vinča C2	?	LA-ICP-MS	Carpathian 1	-	
HD-74	1987	Complete	24.5x11x3.5	Microbladelet		Triangular	25	Pointed	0.85	Vinča C2	?	LA-ICP-MS	Carpathian 1	501	
HD-75	1987	Complete	24x11x3.5	Decortication microbladelet		-	75	Dihedral	0.72	Vinča C2	?	LA-ICP-MS	Carpathian 1	556	
HD-76	1987	Complete	22x9x2	Microbladelet		Triangular	No	Dihedral	0.33	Vinča C2	?	LA-ICP-MS	Carpathian 1	530	
HD-77	1987	Complete	24x7.5x2.5	Microbladelet		Triangular	No	Dihedral	0.44	Vinča C2	?	LA-ICP-MS	Carpathian 1	526	
HD-78	1987	Complete	27x6x2.5	Bladelet		Triangular	No	Dihedral	0.39	Vinča C2	?	LA-ICP-MS	Carpathian 1	511	
HD-79	1987	Complete	16.5x11.5x4	Microflakelet		Trapezoidal	No	Missing	0.77	Vinča C2	?	LA-ICP-MS	Carpathian 1	522	
HD-80	1987	Complete	21x10.5x2.5	Microflakelet		Trapezoidal	No	Dihedral	0.51	Vinča C2	?	not analysed	nd	???	
HD-81	1987	Complete	11.5x16.5x5	Transversal Scraper (R1 tra[Smd])		-	No	Dihedral	0.67	Vinča C2	?	not analysed	nd	556?	4/12
HD-82	1987	Complete	22x6.5x1.5	Microbladelet		Trapezoidal	No	Missing	0.25	Vinča C2	?	not analysed	nd	?517	
HD-83	1987	fr distal	(16.5)x9x1.5	Microbladelet		-	No	Missing	0.21	Vinča C2	?	not analysed	nd	5??	
HD-84	1987	Complete	17x8x4.5	Plunging microbladelet (core tip?)		-	25	Pointed	0.50	Vinča C2	?	not analysed	nd	52?	4/9
HD-85	1988	Complete	57x14x4.5	Blade		Triangular	No	Dihedral	3.85	Vinča C2	Trench 9 -0.40 cm	not analysed	nd	-	4/8
HD-86	1988	Complete	26x6x2	Bladelet		Trapezoidal	10	Thinned	0.38	Vinča C2	?	not analysed	nd	644	
HD-87	1988	fr proximal	(10.5)x13x2	Microflakelet		-	No	Dihedral	0.28	Vinča C2	?	not analysed	nd	-	
HD-88	1988	fr proximal	(20.5)x19x6	Flakelet		-	No	Dihedral	2.28	Vinča C2	-0.60 cm	not analysed	nd	-	
HD-89	1988	fr distal	(13)x9.5x2	Microbladelet		Trapezoidal	No	Missing	0.32	Vinča C2	Trench 9, Pit 10 -0.80 cm	not analysed	nd	646	
HD-90	1988	fr proximal	(17)x8.5x2	Microbladelet		Triangular	No	Pointed	0.32	Vinča C2	Trench 9, Pit 10	not analysed	nd	663	

Appendix - Table 1., cont.**Melléklet – 1. táblázat, folyt.**

Number	Year	Condition	Measures LxWxT (mm)	Description and Typology (Laplace 1964)	Use wear traces	Cross-section	Cortex (%)	Platform	Weight (g)	Culture	Excavation data	Characterisation	Obsidian source	Inv. N°	Figure
HD-91	1988	Complete	20x5.5x2.5	Microbladelet		Triangular	No	Thinned	0.26	Vinča C2	Trench 9, Pit 10 -0.80 cm	not analysed	nd	622	
HD-92	1988	Complete	15x17x5	Decortication microflakelet		-	90	Thinned	1.36	Vinča C2	Trench 9, Pit 10	not analysed	nd	606	
HD-93	1988	Complete	16.5x18x4.5	Microflakelet		-	No	Thinned	1.02	Vinča C2	-0.60 cm	not analysed	nd	610	
HD-94	1988	Complete	26x7.5x4	Bladelet		Triangular	30	Dihedral	0.64	Vinča C2	Trench 9, Pit 10	not analysed	nd	663	
HD-95	1988	fr proximal	(16)x7x2	Microbladelet		Triangular	No	Thinned	0.27	Vinča C2	Trench 9, Pit 10 - 0.60 cm	not analysed	nd	663	
HD-96	1988	fr proximal	(31)x12.5x3.5	Retouched bladelet (L1 bil [Smd])		Triangular	No	Dihedral	1.38	Vinča C2	Trench 9, Pit 10	not analysed	nd	669	4/5
HD-97	1988	fr proximal	(15)x5.5x1.5	Microbladelet		Trapezoidal	No	Missing	0.13	Vinča C2	Trench 9, Pit 10	not analysed	nd	640	
HD-98	1988	fr proximal	(12)x9x2.5	Microflakelet		-	50	Pointed	0.27	Vinča C2	Trench 9, Pit 10	not analysed	nd	-	
HD-99	1985	Complete	24x15x4	Microflakelet		Trapezoidal	10	Dihedral	1.01	Vinča C2	Trench 6, Square 10 -0.80 cm	not analysed	nd	-	
HD-100	1985	Complete	22.5x9x2.5	Microbladelet		Trapezoidal	No	Dihedral	0.80	Vinča C2	Trench 6, Square 10 -0.80 cm	not analysed	nd	22238	
HD-101	1985	fr distal	(22)x9x2.5	Microbladelet		Triangular	No	Missing	0.80	Vinča C2	Trench 6, Square 10 -0.80 cm	not analysed	nd	nd	
HD-102	1985	Complete	25x9.5x2.5	Microbladelet		Triangular	No	Flat	0.42	Vinča C2	Trench 6, Square 10 -0.80 cm	not analysed	nd	22476	
HD-103	1985	fr proximal	(11.5)x8.5x2	Microbladelet		Trapezoidal	No	Dihedral	0.28	Vinča C2	Trench 6, Square 10 -0.80 cm	not analysed	nd	-	
HD-104	1985	Complete	24x12.5x6	Plunging microflakelet		Trapezoidal	10	Thinned	1.02	Vinča C2	Trench 6, Square 10 -0.80 cm	not analysed	nd	-	4/6
HD-105	1985	Complete	23x9.5x3	Microbladelet		Trapezoidal	No	Thinned	0.63	Vinča C2	Trench 6, Square 10 -0.80 cm	not analysed	nd	22293	
HD-106	1985	Complete	30x8x2.5	Bladelet		Triangular	No	Dihedral	0.49	Vinča C2	Trench 6, Square 10 -0.80 cm	not analysed	nd	22806?	
HD-107	1985	Complete	20x9.5x1.5	Microbladelet		Trapezoidal	No	Flat	0.33	Vinča C2	Trench 6, Square 10 -0.80 cm	not analysed	nd	-	
HD-108	1985	fr distal	(16)x9x2	Microbladelet		Trapezoidal	No	Missing	0.29	Vinča C2	Trench 6, Square 10 -0.80 cm	not analysed	nd	22505	
HD-109	1985	Complete	17x10.5x3.5	Microflakelet		Trapezoidal	5	Dihedral	0.50	Vinča C2	Trench 6, Square 10 -0.80 cm	not analysed	nd	22191?	
HD-110	1985	Complete	21.5x14.5x3.5	Microflakelet		-	No	Thinned	1.22	Vinča C2	Trench 6, Square 10 -0.80 cm	not analysed	nd	-	
HD-111	1985	Complete	18.5x11.5x2.5	Marginal Truncation (T1 conc [Ami dist])		-	No	Dihedral	0.66	Vinča C2	Trench 6, Square 10 -0.80 cm	not analysed	nd	-	4/7
HD-112	1985	Complete	18x9.5x2	Microflakelet		Trapezoidal	5	Dihedral	0.48	Vinča C2	Trench 6, Square 10 -0.80 cm	not analysed	nd	-	
HD-113	1985	fr distal	(9.5)x9.5x1.5	Microflakelet		-	No	Missing	0.13	Vinča C2	Trench 6, Square 10 -0.80 cm	not analysed	nd	22755	

Appendix – Table 2.: Hodoni“Pocioroane” (Hod): Chemical composition determined by LA-ICP-MS of the obsidian artefacts and the Carpathian obsidian C1 and C2 sources. Main oxides (Na₂O to Fe₂O₃) are expressed in weight percent and trace elements (Li to U) are expressed in parts per million (ppm, 1ppm = 0.0001 %) (original by B. Gratuze).

Melléklet – 2. táblázat: Hodoni (Hodony) - “Pocioroane” (Hod): LA-ICP-MS módszerrel meghatározott kémiai összetétel az obszidián eszközökön és Kárpáti 1 és 2 obszidián nyersanyag források anyagán mérve. A fő oxidos összetevők (Na₂O -tól Fe₂O₃ -ig) tömeg%-ban, a nyomelemek (Li -tól U-ig) ppm-ben megadva (B. Gratuze mérései).

	Na ₂ O	Al ₂ O ₃	SiO ₂	K ₂ O	CaO	Fe ₂ O ₃	Li	B	Mg	Sc	Ti	Mn	Zn	Rb	Sr	Y	Zr	Nb	Cs
C1 a1	3.29	13.6	76.9	4.32	0.84	0.79	72.3	43.7	323	5.76	219	392	25.8	200	53.1	25.7	47.7	7.57	10.5
C1 a2	3.33	13.2	77.1	4.35	0.82	0.89	73.5	42.5	317	5.54	227	401	28.7	199	53.5	25.5	48.1	7.79	10.4
C1 b1	3.23	13.5	75.7	4.30	0.83	2.14	69.9	41.7	347	5.77	229	398	32.8	193	54.8	25.0	47.8	7.58	10.2
C1 b2	3.39	13.2	76.8	4.36	0.82	1.10	74.2	41.3	333	5.24	225	382	29.2	193	54.3	24.8	48.1	7.74	10.1
C2E 1	3.45	14.6	73.5	4.77	1.22	1.91	65.9	67.3	888	7.38	840	283	39.1	222	72.9	27.7	150	9.30	9.23
C2E 2	3.58	14.1	74.1	4.67	1.17	1.83	66.2	64.0	981	6.92	852	272	36.7	212	71.8	27.5	149	9.49	9.06
C2T 1	3.52	14.2	74.7	4.57	1.03	1.60	67.9	56.4	451	6.77	451	334	45.4	200	64.7	25.9	103	10.4	8.45
C2T 2	3.58	13.8	75.3	4.54	0.98	1.44	70.1	55.4	445	6.37	452	330	45.2	199	64.4	26.1	103	10.8	8.65
Hod 014	3.25	13.9	76.5	4.31	0.90	0.89	70.3	42.5	443	6.22	256	381	27.3	194	60.7	24.4	51.7	7.42	9.93
Hod 015	3.23	13.7	74.8	4.36	1.00	2.34	37.8	40.9	1239	7.49	946	470	41.3	185	71.3	25.4	54.8	7.75	9.66
Hod 015 bis	3.13	13.0	76.9	4.03	0.91	1.68	42.9	44.7	847	6.94	478	416	30.8	178	55.3	25.9	58.5	7.71	9.51
Hod 016	3.28	13.8	75.8	4.31	0.90	1.61	69.9	42.2	399	6.18	252	402	30.6	196	57.7	25.4	50.8	7.70	10.1
Hod 017	3.31	13.8	76.4	4.36	0.86	0.98	71.7	44.0	368	6.26	236	400	27.3	201	53.5	25.6	49.7	7.64	10.6
Hod 018	3.22	14.0	76.1	4.28	0.93	1.16	64.3	40.2	403	6.19	271	371	28.0	188	63.8	24.7	53.9	7.51	9.26
Hod 019	3.29	13.9	76.4	4.33	0.87	0.95	70.6	43.5	370	6.15	235	376	25.1	196	58.7	25.7	50.3	7.55	10.1
Hod 020	3.39	13.7	76.4	4.40	0.79	1.13	76.2	46.1	313	5.59	203	413	29.3	210	48.7	26.5	45.8	7.85	11.2
Hod 021	3.31	13.6	76.4	4.44	0.82	1.12	73.3	50.5	330	5.46	215	394	29.0	204	52.7	25.3	46.8	7.68	10.8
Hod 022	3.29	13.8	76.4	4.34	0.89	0.97	68.2	43.3	363	5.96	230	394	27.1	195	58.1	25.8	49.5	7.65	10.3
Hod 023	3.26	13.6	76.2	4.28	0.88	1.44	68.7	41.3	393	5.97	256	389	30.1	191	58.6	24.7	51.1	7.61	9.70
Hod 024	3.34	13.7	76.6	4.40	0.79	0.95	75.8	46.8	304	5.80	197	409	27.0	210	48.5	25.9	44.3	7.70	11.3
Hod 025	3.27	13.9	76.3	4.25	0.90	1.03	66.7	41.1	400	6.00	247	390	29.1	190	60.0	25.0	50.9	7.50	9.78
Hod 026	3.30	14.2	76.0	4.36	0.85	0.98	73.7	45.6	320	6.13	210	413	28.1	204	52.9	27.1	47.8	7.81	11.0

Appendix – Table 2. cont.**Melléklet – 2. táblázat folyt.**

	Na ₂ O	Al ₂ O ₃	SiO ₂	K ₂ O	CaO	Fe ₂ O ₃	Li	B	Mg	Sc	Ti	Mn	Zn	Rb	Sr	Y	Zr	Nb	Cs
Hod 027	3.34	13.9	76.4	4.42	0.84	0.82	72.2	44.4	334	5.72	215	399	26.6	200	54.3	26.1	48.2	7.59	10.6
Hod 028	3.33	13.5	76.8	4.42	0.78	1.00	74.5	43.3	285	5.08	208	405	27.4	202	47.1	26.7	47.1	7.85	10.9
Hod 029	3.31	13.5	76.8	4.35	0.83	0.95	71.7	43.3	320	5.18	217	400	27.9	199	53.1	25.8	47.7	7.75	10.5
Hod 030	3.46	13.4	76.3	4.50	0.78	1.22	76.0	47.2	312	6.41	214	393	28.3	208	48.8	25.6	45.7	7.71	11.2
Hod 030 bis	3.32	13.8	76.4	4.34	0.86	0.96	74.9	44.0	315	6.53	223	408	26.8	202	53.4	26.6	47.8	7.95	10.6
Hod 031	3.32	13.6	76.5	4.47	0.86	1.02	73.7	43.6	334	6.15	225	412	29.0	202	54.8	26.1	48.5	8.06	10.7
Hod 031 bis	3.31	13.6	76.4	4.47	0.82	1.13	72.6	42.3	372	6.17	238	415	29.4	203	53.5	25.8	50.0	7.85	10.5
Hod 032	3.36	13.5	76.7	4.42	0.81	0.96	73.8	44.8	309	6.42	213	392	26.9	203	50.2	25.5	45.7	7.57	10.8
Hod 033	3.30	13.5	76.7	4.36	0.84	1.00	71.5	43.0	338	6.14	223	398	28.1	196	53.9	25.4	47.6	7.73	10.4
Hod 034	3.25	13.5	76.7	4.34	0.90	1.01	71.9	41.7	445	6.27	261	390	27.9	191	58.7	24.3	51.0	7.70	9.96
Hod 035	3.31	13.6	76.5	4.37	0.85	1.07	72.3	44.2	341	6.24	236	389	29.4	197	55.6	24.9	48.2	7.80	10.3
Hod 036	3.26	13.7	76.4	4.28	0.93	1.09	67.2	39.1	508	6.38	276	391	28.6	186	63.6	24.9	54.4	7.65	9.36
Hod 037	3.31	13.3	76.9	4.41	0.83	0.96	73.5	42.3	324	5.99	224	391	28.3	198	52.9	25.1	47.4	7.74	10.5
Hod 038	3.47	13.4	76.7	4.32	0.82	1.03	74.8	43.6	374	5.97	218	408	27.2	204	56.6	25.6	44.9	7.83	11.2
Hod 039	3.31	13.5	76.8	4.41	0.81	0.97	75.5	43.5	310	5.98	220	405	26.5	200	50.9	25.8	47.6	7.92	10.6
Hod 040	3.39	13.5	76.7	4.43	0.77	0.89	77.5	46.8	296	5.88	203	411	26.6	209	48.0	26.6	44.3	8.04	11.5
Hod 041	3.35	13.5	76.7	4.37	0.80	1.02	76.2	44.4	314	5.91	211	408	27.6	206	51.0	26.4	46.2	7.91	11.2
Hod 042	3.29	13.4	76.3	4.29	0.86	1.60	68.9	41.1	386	5.95	244	400	33.7	191	58.3	24.6	49.2	7.62	9.78
Hod 043	2.89	13.5	76.5	5.01	0.84	0.92	30.7	42.1	337	6.00	232	391	28.5	198	55.5	25.2	48.4	7.90	10.5
Hod 044	3.36	13.5	76.9	4.39	0.80	0.73	75.3	43.3	306	5.83	212	406	26.5	202	51.3	25.7	47.4	7.93	10.9
Hod 045	3.37	13.3	77.0	4.38	0.78	0.95	77.7	44.4	303	5.91	211	406	28.4	202	47.7	25.7	46.2	7.88	11.2
Hod 046	3.33	13.4	76.8	4.28	0.91	0.97	69.1	39.6	507	6.11	272	388	27.1	185	61.9	24.0	52.4	7.48	9.53
Hod 047	3.38	13.5	76.8	4.40	0.79	0.86	79.9	45.0	325	5.98	212	401	28.0	204	49.6	26.4	46.9	8.02	11.2
Hod 048	3.38	13.5	76.7	4.40	0.76	0.92	79.6	47.3	287	6.11	187	421	27.8	210	45.5	27.8	43.6	8.35	12.0
Hod 049	3.32	13.3	76.9	4.32	0.85	1.02	74.3	40.4	375	6.08	255	388	28.8	193	56.5	24.7	50.3	7.70	10.1

Appendix – Table 2. cont.**Melléklet – 2. táblázat folyt.**

	Na ₂ O	Al ₂ O ₃	SiO ₂	K ₂ O	CaO	Fe ₂ O ₃	Li	B	Mg	Sc	Ti	Mn	Zn	Rb	Sr	Y	Zr	Nb	Cs
Hod 050	3.31	13.3	77.0	4.31	0.79	0.98	75.8	43.6	320	5.77	218	402	29.2	196	50.4	25.4	46.6	7.90	10.6
Hod 051	3.49	13.5	76.2	4.20	0.87	1.44	70.5	41.1	284	5.80	209	378	29.7	194	64.5	24.5	45.3	7.47	10.3
Hod 052	3.19	13.4	76.8	4.72	0.77	0.89	64.8	44.2	284	6.07	207	402	26.4	203	48.0	25.8	45.5	7.89	11.1
Hod 053	3.35	13.3	77.0	4.34	0.84	0.85	72.3	41.0	372	6.02	251	375	26.9	191	56.1	23.7	50.0	7.80	9.83
Hod 054	3.32	13.3	77.1	4.35	0.81	0.85	74.5	43.7	331	5.82	220	389	26.5	196	51.9	24.5	46.8	7.67	10.6
Hod 055	3.34	13.6	76.7	4.32	0.85	0.93	74.3	42.0	364	6.17	240	396	27.4	195	56.8	26.1	50.7	7.84	10.2
Hod 056	3.34	13.4	76.9	4.31	0.84	0.91	73.8	40.9	382	5.86	247	397	27.5	190	53.4	25.1	50.9	7.59	9.92
Hod 057	3.31	13.1	77.1	4.25	0.83	1.03	73.2	41.4	397	5.83	246	391	29.3	190	56.0	24.2	47.8	7.72	10.0
Hod 058	3.40	13.2	76.7	4.38	0.81	1.23	74.0	42.9	316	5.89	234	359	28.7	194	53.1	24.7	48.2	7.75	10.0
Hod 059	3.28	13.3	77.0	4.30	0.85	0.91	72.8	40.1	364	5.70	256	377	27.9	187	56.5	24.1	49.7	7.72	9.86
Hod 060	3.33	13.5	76.7	4.28	0.84	1.00	74.7	43.1	344	5.75	228	396	27.9	192	54.1	25.8	48.4	7.69	10.1
Hod 061	3.35	13.3	77.0	4.34	0.86	0.92	71.3	40.2	379	5.81	243	381	28.1	189	57.9	24.3	50.2	7.78	9.92
Hod 062	3.34	13.5	76.8	4.27	0.84	1.00	75.5	41.0	490	5.85	232	420	27.6	192	54.7	25.9	49.1	7.66	10.1
Hod 062 bis	3.38	13.5	76.7	4.37	0.83	0.95	75.7	41.3	313	5.36	233	386	26.3	194	54.5	25.7	49.6	8.09	10.4
Hod 063	2.61	13.4	76.6	5.48	0.78	0.92	36.0	42.4	314	5.52	214	395	27.4	195	51.6	26.0	47.1	7.84	10.4
Hod 064	3.35	13.2	76.8	4.32	0.86	1.18	72.7	39.9	381	5.40	263	388	30.5	188	58.1	24.2	50.5	7.80	9.66
Hod 064 bis	3.32	13.5	76.7	4.31	0.85	0.97	74.7	39.4	418	5.50	255	396	27.8	191	56.8	25.2	51.1	7.91	9.81
Hod 065	3.31	13.3	76.9	4.48	0.83	0.89	75.3	40.9	339	5.65	228	391	27.3	194	53.5	25.3	48.2	7.91	10.4
Hod 066	3.35	13.4	77.0	4.30	0.80	0.93	73.7	42.5	314	5.33	219	393	27.5	196	51.4	25.1	47.3	7.86	10.4
Hod 067	3.37	13.5	76.8	4.37	0.83	0.82	74.7	40.6	342	5.39	235	380	26.1	190	54.6	25.4	48.8	7.61	10.2
Hod 068	3.37	13.5	76.8	4.37	0.81	0.93	71.9	42.2	326	5.26	230	393	28.1	193	53.8	25.6	48.7	7.84	10.4
Hod 069	3.35	13.5	76.8	4.34	0.81	0.94	74.0	41.9	329	5.28	227	399	27.6	193	52.7	25.4	49.1	7.90	10.4
Hod 070	3.34	13.6	76.6	4.37	0.78	1.06	76.4	44.0	300	6.00	202	415	29.0	204	46.7	26.5	45.4	7.93	11.3
Hod 071	3.25	13.7	76.6	4.30	0.86	1.00	70.7	43.0	355	6.53	232	399	27.7	195	55.2	26.0	49.4	7.70	10.2
Hod 072	3.09	13.4	76.7	4.62	0.90	0.98	70.8	39.8	389	6.16	262	376	28.5	189	60.4	24.5	51.7	7.80	9.53

Appendix – Table 2. cont.**Melléklet – 2. táblázat folyt.**

	Na ₂ O	Al ₂ O ₃	SiO ₂	K ₂ O	CaO	Fe ₂ O ₃	Li	B	Mg	Sc	Ti	Mn	Zn	Rb	Sr	Y	Zr	Nb	Cs
Hod 073	3.22	12.8	73.6	4.23	0.85	4.96	67.2	38.5	486	5.86	297	425	54.0	181	58.0	23.3	49.5	7.61	9.61
Hod 073 bis	3.27	13.4	76.4	4.34	0.90	1.34	69.5	39.3	549	6.41	265	408	29.8	188	61.3	24.9	49.9	7.61	9.49
Hod 074	3.33	13.9	76.2	4.36	0.88	1.05	77.8	42.3	361	6.34	243	389	29.7	194	56.3	26.2	49.7	7.89	10.1
Hod 075	3.28	13.5	76.7	4.34	0.87	1.01	72.3	41.5	364	6.26	243	392	27.4	193	57.4	25.0	49.8	7.58	10.0
Hod 076	3.14	13.9	76.2	5.07	0.61	0.79	61.9	45.1	355	6.77	220	396	25.5	272	38.8	26.5	48.0	7.73	10.9
Hod 077	3.28	13.9	75.5	4.35	0.80	1.92	74.0	45.5	315	6.62	209	421	33.2	205	50.1	27.2	47.7	7.87	11.1
Hod 077 bis	3.64	14.3	75.8	4.15	0.94	0.95	74.7	41.8	313	5.82	210	385	27.1	195	73.9	26.2	46.6	7.91	10.6
Hod 078	3.32	13.4	76.5	4.38	0.85	1.24	73.5	42.7	328	6.09	229	402	29.9	197	53.4	24.0	45.6	8.10	10.6
Hod 079	3.37	13.4	76.9	4.39	0.76	0.93	76.7	46.9	291	6.05	197	421	28.2	213	45.4	27.2	44.2	7.91	11.8