

BOBAN TRIPKOVIĆ  
Faculty of Philosophy, Belgrade

## OBSIDIAN DEPOSITS IN THE CENTRAL BALKANS? TESTED AGAINST ARCHAEOLOGICAL EVIDENCE

*Abstract.* – Finds of obsidian artefacts on sites distant from the presumed primary source have often received a romantic note in the history of archaeology, manifested in the idea about local exploitation as a form of procurement and archaeologists' search for as yet undetected deposits of this raw material. In due course, such concepts have found their way into Serbian archaeology as well. The main objective of this contribution, therefore, is to reconsider the current knowledge about obsidian in the central and north Balkans, to test how well founded the idea about the use of local sources is, as well as to indicate some possible directions for future research.

*Key words.* – obsidian, Neolithic, central and north Balkans, chipped stone industry

### SOURCES AND DISTRIBUTION ZONES. ROLE AND IMPORTANCE OF OBSIDIAN

Since the beginning of the twentieth century, when the importance of obsidian for the prehistory of Europe only began to be recognized, obsidian studies have taken on an increasingly interdisciplinary character and now constitute a discipline in its own right. Interest in this raw material has been reinforced by its exotic origin and the small number of potential sources, mostly limited to the areas of past volcanic activity. The formation of obsidian mainly depends on conditions that are not directly connected with those leading to a volcanic eruption. Central to its formation is the lava containing over 65 percent silica and a specific rhythm of its cooling.<sup>1</sup> As a result, obsidian deposits are restricted to a small number of locations. In the Near East, Anatolia and Europe – areas showing wide cultural contacts in the Neolithic and Eneolithic (Chalcolithic) as the period of the widest and the most significant distribution of obsidian finds – its natural occurrences are limited to few locations (Fig. 1):

**1. Central and east Anatolia.** A few significant sources of obsidian are known to have been exploited and the raw material distributed over great distances through an exchange network.<sup>2</sup> In recent times new deposits have been detected, but the research still being

in its initial stage, their role and importance in the life of prehistoric communities are as yet unknown.<sup>3</sup>

**2. The Aegean.** Obsidian deposits occur in the islands of Antiparos, Giali and Melos, but Neolithic populations exploited only the high-quality obsidian from Melos, some 100 km off the coast of mainland Greece.<sup>4</sup> The obsidian from Antiparos is of exceptionally low quality and was not used in the Aegean; the obsidian from Giali, being of inferior quality, was used for tools only in the islands in the proximity of the deposits, where easy access and regular supply was possible.<sup>5</sup>

**3. The Central Mediterranean.** Obsidian sources occur in the islands of Palmarola, Pantelleria, Sardinia

---

\* I am thankful to my colleagues Vera Bogosavljević-Petrović, Josip Šarić and Vesna Dimitrijević for their comments on the original version of this text and helpful information; all responsibility for the ideas and conclusions herein proposed is, of course, entirely mine.

<sup>1</sup> Cann, Dixon & Renfrew 1969: 580.

<sup>2</sup> Renfrew & Bahn 1991: 325–326; Cann, Dixon & Renfrew 1969: 588.

<sup>3</sup> Özdoğan 1994.

<sup>4</sup> Renfrew, Cann & Dixon 1965: 225; Torrence 1986; Perles 2001.

<sup>5</sup> The obsidian from the island of Giali containing white spherulites is aesthetically pleasing and was used particularly during the Bronze Age not only for knapping tools but also for carving vases and seals (Betancourt 1997; Warren 1969: 135–136)

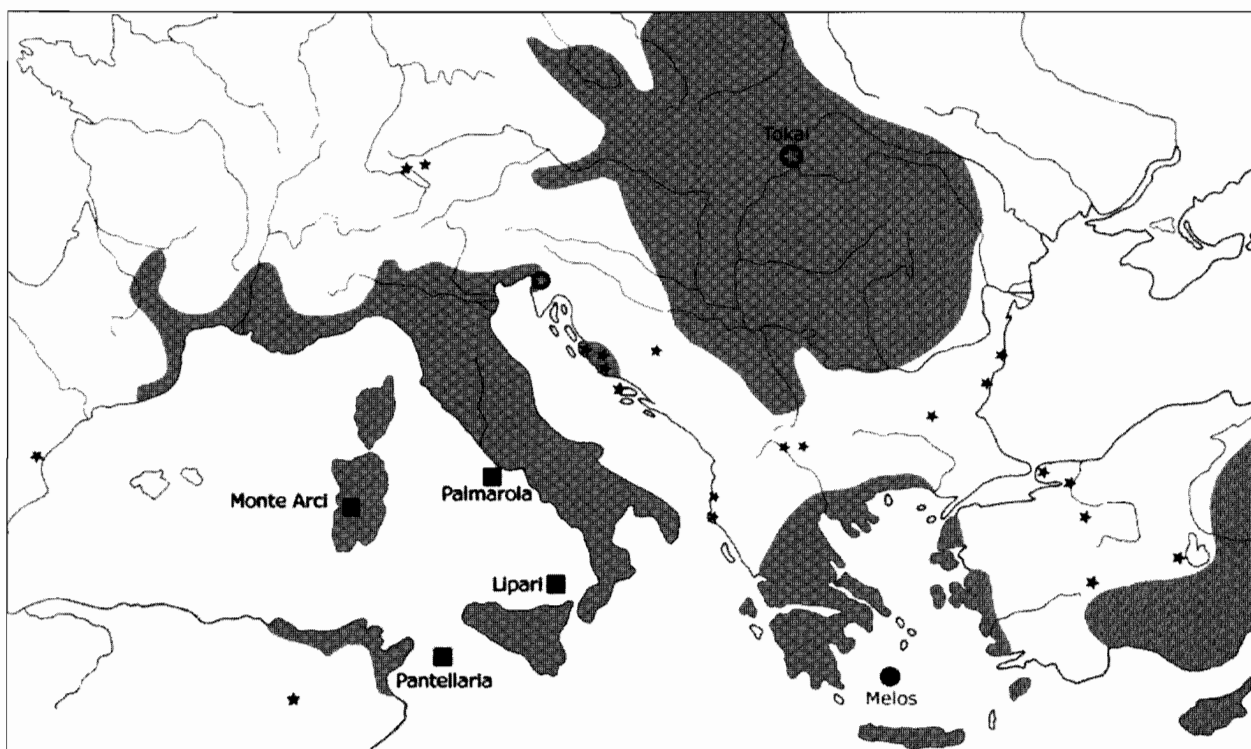


Fig. 1. Obsidian sources (■ ● ☆) and distribution zones in Europe and Anatolia;

★ – non-characterized obsidian (after Willms 1983)

Сл. 1. Извори и зоне дистрибуције ојсидијана у Европи и Анадолији. ■ ● ☆ – извори ојсидијана;

★ – некарактерисани ојсидијан (према Willms 1983)

and the Lipari. These obsidians are widely found in the central and west Mediterranean, but their distribution zones are different. Thus the best-quality obsidian from the Lipari is found throughout the region, while that from other sources was channelled towards the narrower or wider source area.<sup>6</sup>

**4. The Carpathian Basin.** Deposits occur in southeast Slovakia and northeast Hungary, in the Tokaj–Prešov area. Obsidian from both sources is found in the same territory but, being of better quality, the Slovakian is much more frequent.<sup>7</sup> Interestingly, characterization of certain pieces has not shown the chemical composition specific to the known Carpathian deposits, which has led to the assumption about some as yet undetected sources.<sup>8</sup>

In all obsidian distribution zones, regularity in artefact concentrations is observable: the highest occur in areas adjacent to a source and their frequency tends to decrease as the distance from the source increases. Generally speaking, that would mean that populations regulated their need for a lithic industry mainly at the level of the availability of resources. In terms of indi-

vidual sites, however, such a generalization would certainly need to be modified given that the aforementioned regions have yielded relatively frequent sites where the obsidian component is not proportional to the distance from the source. Such situations only show that the procurement and use of obsidian was sometimes motivated by reasons other than strictly practical and that its value may have been defined and maintained in different ways.

Given the number of studies dealing with obsidian in the past hundred odd years, its importance and role can best be judged from the epithets applied to it by archaeologists. Speaking of the deposits and distribution of obsidian in the Late Neolithic of the Carpathian Basin, K. Biró describes it as the »Hungarian most famous raw material«.<sup>9</sup> In order to explain its role and value R. Tykot

<sup>6</sup> Tykot 1996: 42–43.

<sup>7</sup> Biró 1988: 272; Biró 1998a; Williams-Thorpe, Warren & Nandris 1984: 194–195.

<sup>8</sup> Biró, Poszgai & Vladár 1986: 272; Biró 1998a: 71.

<sup>9</sup> Biró 1988.

makes use of the metaphor »black gold« as the most appropriate term.<sup>10</sup> These metaphors coined by members of the archaeological community in fact contain paradigms of understanding obsidian in a cultural context wherein it is seen either as an exotic, highly prized and prestigious commodity<sup>11</sup> or as a raw material intended for everyday use only.<sup>12</sup>

These paradigms stem from an approach imposed by obsidian studies themselves, through looking at obsidian in isolation from specific chronological or cultural contexts and a simplified understanding of its role as remaining unchanged over time. Such an approach, however, is not in correlation with some basic analytical parameters – the continuity and extent of use. Namely, once it came into use in an area, obsidian remained in use, with varying degrees of frequency, almost to the end of prehistory. The fact that in some areas this continuity means tens of thousands of years is a major obstacle to understanding obsidian and the attitude of prehistoric communities towards this raw material. Therefore a prerequisite for understanding its role is to perceive its exploitation, processing and distribution according to specific cultural and historical sequences, and particular local contexts.<sup>13</sup> Analysis of the sociohistorical context of its use in the Neolithic has led to the conclusion that its role cannot be seen as simple. It may have been manifold: the utility value was emphasized through the quality and technical characteristics facilitating the processing of the raw material; its economic value was defined through exchange where obsidian represented both the means and the end; its social value was defined through conveying the message about unknown lands and different times.<sup>14</sup>

The widest distribution of obsidian takes place during the Neolithic; obsidian finds occur widely around a source, sometimes at a distance of nearly one thousand kilometres. If prehistoric communities did not have direct access to one of the nearest sources, the mechanism of procurement was limited to their participation in an exchange network, where multiple interactions arise naturally: between man and a raw material/artefact, man and the environment, and man and man. In that sense, the importance of obsidian, as a means of cultural integration of distant territories, is indisputable. On the other hand, in the history of archaeology obsidian finds on sites distant from the presumed primary source have often received a romantic note, manifested in the idea about local exploitation as a form of procurement and archaeologists' search for as yet undetected deposits of this raw material.<sup>15</sup> In due course, they have found

their way into Serbian archaeology as well. The main objective of this contribution therefore is to reconsider the current knowledge about obsidian in the central and north Balkans, to test how well founded the idea about the use of local sources is, as well as to indicate some possible directions for future research.

### OBSIDIAN IN THE CENTRAL BALKANS: THE ISSUE OF ITS ORIGIN

Obsidian finds in the central Balkans were first observed as early as the late nineteenth and early twentieth centuries, when Neolithic sites began to be excavated.<sup>16</sup> Its source was usually looked for in Melos, one of the Cyclades or, as it was believed at the time, in the Bükk Mountains in Hungary.<sup>17</sup> Today, some hundred years later, a detailed study of the obsidian finds has not been made yet. The accumulated evidence has served merely to mark out the approximate zone of their distribution.<sup>18</sup>

During the Early and Middle Neolithic obsidian artefacts are found mostly on settlement sites in the Danube Basin (Fig. 2). And yet, in the flint industry of Starčevo settlements they occur in low percentages and can by no means be regarded as a relevant feature of the Starčevo culture (Table 1). Lack of statistical analyses has little influence on this inference, because recent research shows that the presence of obsidian is weak even on the sites whose chipped stone industry has been studied in detail.<sup>19</sup> Only on two sites is this percentage relatively high (Golokut – 18.51 %, and Livade – 6.45 %), which, as the author himself observes, is likely the result of an unrepresentative sample.

The occurrence of obsidian in the central and north Balkans changes to an extent in Late Neolithic and

<sup>10</sup> Tykot 202.

<sup>11</sup> Gopher, Barkai & Marder 1998; Balkan-Atli *et al.* 1999; Ammerman & Polglase 1993; Renfrew & Bahn 1991.

<sup>12</sup> Özdoğan 1994.

<sup>13</sup> Tripković 2003; Tripković: forthcoming.

<sup>14</sup> Трипковић 2001; Tripković: forthcoming.

<sup>15</sup> Kunov *et al.* 2003.

<sup>16</sup> For a detailed history of archaeological research into Neolithic sites in the central and north Balkans, see Srejšević (ed.) 1988.

<sup>17</sup> It is certain today that the island of Melos is the main source of obsidian in the Aegean, but it is also certain that the source of obsidian for Central Europe is the Tokaj–Prešov region rather than the Bükk Mountains. The misapprehension has stemmed from associating the name of the Bükk culture with obsidian sources.

<sup>18</sup> Chapman 1981; Greif 1995; Willms 1983.

<sup>19</sup> Шаріћ 1992; Šarić 2002.

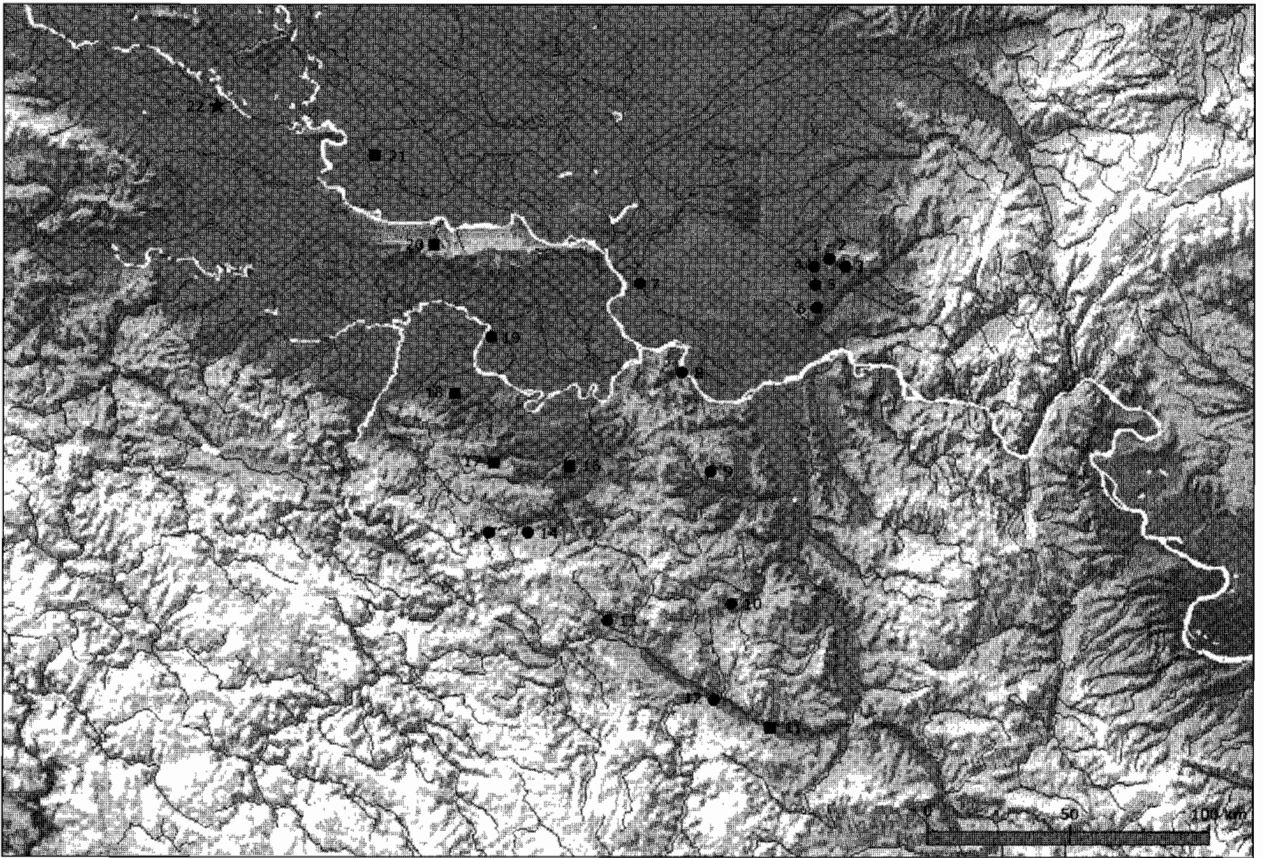


Fig. 2. Sites with obsidian finds in the central and north Balkans;

■ – Starčevo culture; ● – Vinča culture; ★ – Sopot–Lengyel culture;

1) Mesić Kanal; 2) Westrand; 3) Kozluk; 4) At; 5) Potporanj Granice; 6) Potporanj; 7) Opovo; 8) Vinča; 9) Selevac; 10) Divostin; 11) Blagotin; 12) Divlje Polje; 13) Trsine; 14) Petnica; 15) Anatema; 16) Livade; 17) Simića Strana; 18) Popovića Brdo; 19) Gomolava; 20) Golokut; 21) Donja Branjevina; 22) Šamatovci

Сл. 2. Локалитетни са налазима обсидијана на централном и северном Балкану;

■ – старчевачка култура; ● – винчанска култура; ★ – сопошско-ленђелска култура;

1) Месић канал; 2) Вестранд; 3) Козлук; 4) Ати; 5) Потпоранје границе; 6) Потпоранј; 7) Опово; 8) Винча; 9) Селевац; 10) Дивостин; 11) Благодин; 12) Дивље поље; 13) Трсине; 14) Петница; 15) Анатема; 16) Ливаде; 17) Симића страна; 18) Поповића брдо; 19) Гомолава; 20) Голокути; 21) Доња Брањевина; 22) Шаматовци

Vinča times. The distribution zone expands and the finds tend to concentrate on sites in the Tisa Valley, the south Banat and the Morava Valley (see Fig. 2).<sup>20</sup> By comparison with Starčevo settlements, there is also a significant change in the number of obsidian finds. Their proportion in the chipped stone industry now varies drastically from total absence to exceptionally strong presence (Table 2). On some south-Banat sites (Potporanjske Granice, Potporanj, At) significant assemblages of obsidian finds were collected as early as the first half of the twentieth century.<sup>21</sup> On the site of Belo Brdo at Vinča, in the period represented by the layer of occupation at a depth of 9–7 m (Vinča A–B1),

obsidian accounts for almost 70 percent of its chipped stone industry. Then it abruptly decreases and in the overlying levels, above 5 m, obsidian is almost absent from the settlement.<sup>22</sup>

<sup>20</sup> Greif 1995: 102.

<sup>21</sup> The lithic assemblages were not obtained by systematic excavation, but the number of obsidian finds is by no means negligible (Milleker 1938: 131).

<sup>22</sup> Срејовић & Јовановић 1957: 257; Радовановић *et al.* 1984; Трипковић 2001. At Vinča, the youngest obsidian artefact is recorded at a depth of 3.8 m; above that point, in later layers, no obsidian finds have been reported (Willms 1983: 338).

Site	Chipped stone industry	Obsidian	Reference
Golokut, Vizić	27	18.51 %	Šarić 2002
Blagotin, Trstenik	2349	0.08 %	Šarić 2002
Livade, Kalenić	31	6.45 %	Šarić 2002
Simića Strana, Čučuge	45	2.22 %	Šarić 2002
Popovića Brdo, Zablace	933	0.32 %	Šarić 2002
Donja Branjevina, Deronje	838	0.47 %	Šarić 2002

Table 1. Proportion of obsidian in the chipped stone industry of the Starčevo culture

Significant obsidian assemblages have only been recovered from a few Vinča sites. On some well-explored sites such as Divostin, Selevac or Gomolava, the structure of chipped stone industry does not reveal a marked tendency towards the procurement and use of this raw material. At Divostin, in the layer corresponding to the culture's final phase only 17 obsidian pieces have been found, which accounts for no more than about 1 percent of its chipped stone industry, while Gomolava has yielded only two finds. It is only at Selevac that the procurement of obsidian is more dynamic, varying over time but never exceeding 5 percent of the chipped stone industry in a single building level. It is clear therefore that obsidian does not form part of the usual cultural picture in the central Balkans, and that large assemblages known from south-Banat sites or Vinča are as a rule absent from many well-investigated sites. It is conspicuous, however, that variations in the frequency of obsidian occur between sites that share the same environment and belong to the same cultural variety, and therefore cannot be ascribed simply to the site's remoteness from the raw material source.

The frequency of obsidian finds on some Vinča sites is not without significance for it directly suggests the possibility of local supply and the presence of obsidian deposits somewhere in the central Balkans. It is even more significant in that it occurs in a territory which, after the detection of Carpathian and Aegean deposits, has from force of habit been perceived as a zone lacking such sources. Thus the use of local obsidian deposits during the Neolithic suggested by some archaeologists and geologists in the second half of the twentieth century has passed relatively unnoticed in the scholarly community. These suggestions were usually expressed in a hypothetical form, but in a few cases possible obsidian sources were identified:

– In an analysis of the raw-material structure of chipped stone industry from the site of Banjica it has been suggested that its few obsidian finds probably came

from Avala, a nearby mountain of volcanic origin, where obsidian is presumed to be associated with local rhyolitic veins.<sup>23</sup> The site of Banjica belongs to the Vinča culture and is generally dated to a period of the late Vinča-Turdas to Vinča-Pločnik phases.<sup>24</sup>

– On the site of Ilića Brdo near the village of Čučuge, obsidian has been found and its source detected at the bottom of Mt Cer.<sup>25</sup> The settlement belongs to the Vinča culture and is generally dated to the period of the Gradac to Vinča-Pločnik I phases.

– On the site of Simića Strana near the village of Čučuge obsidian finds have been reported and attention drawn to its deposits in the valley of the Onjeg, a small local stream on the slopes of Mt Rudnik.<sup>26</sup> The settlement belongs to the Starčevo culture.

– From a detailed study of the raw-material structure of the Early and Middle Neolithic chipped stone industry J. Šarić infers (pointing also to the presence of obsidian pebbles in the Onjeg) that in some areas of the central Balkans obsidian may have occurred in the form of smaller deposits which are now inaccessible or had already been exhausted during the Neolithic.<sup>27</sup>

The data and assumptions about local occurrences of obsidian are very inspiring, especially in the light of evidence confirming that the central Balkan uplands (e.g. Avala and Rudnik) harboured exploitation centres for various important raw materials in the Neolithic.<sup>28</sup> The dynamic of Neolithic communities, where mobile economies and impermanent settlement continued to

<sup>23</sup> Симић & Костић 1961: 68.

<sup>24</sup> Тодоровић & Пермановић 1961.

<sup>25</sup> Анђелковић-Деспотовић & Решић 1992: 96.

<sup>26</sup> Жеж 1998: 34, gives notice that the information about obsidian deposits in the Onjeg valley comes from S. Čitaković, a geologist with the Nemetali mine. In the following years, the archaeologist Željko Jež has occasionally found obsidian pebbles himself (personal communication).

<sup>27</sup> Šarić 2002.

<sup>28</sup> Chapman 1990: 41.

Site	Obsidian	%	Reference
Vinča	1488	Up to 69.5 %	Radovanović et al. 1984
Divostin	17	0.7 %	Tringham 1988
Selevac	No data*	Up to 5 %	Voytek 1990
Gomolava	2	0.8 %	Kaczanowska & Kozlowski 1986
At	517	No data	Milleker 1938
Potporanjske Granice	3677	33.5 %	Milleker 1938
Potporanj	1126	No data	Milleker 1938
Mesić Kanal	90	No data	Milleker 1938
Kozluk	20	No data	Milleker 1938
Westrand	2	No data	Milleker 1938
Opovo	1469**	over 6 %	Tringham <i>et al.</i> 1992

Table 2. Proportion of obsidian in the chipped stone industry of the Vinča culture;

\* – almost 8000 flint artefacts discovered; \*\* – total number of knapped artefacts

play an important part, undoubtedly enabled visual control of a vast territory, the recognition of the environment's resource potentials and the exchange of the acquired knowledge and experience.<sup>29</sup> Human recognition of accessible obsidian deposits may have come as a result of some of these practices. It should be noted, however, that the chemical elements in the composition of an obsidian deposit occur in a proportion which is specific to a single source and therefore differentiates it from any other source in the world. Therefore characterization and comparison of finds (deposits and artefacts) identifies the origin of each artefact and establishes a reliable connection between the extraction site and the place of the artefact's final deposition.<sup>30</sup> As the only reliable method, it has been applied to certain obsidian finds from the central Balkans; in all cases, the results directly point to the Carpathians as their source.<sup>31</sup>

Generally speaking, the data obtained by characterization in a way discourage any further search for local sources, suggesting that the dilemma »local origin or import« is definitively resolved. Viewed merely from the aspect of the technique of analysis, however, it should be remembered that it is based on a small sample and that the results obtained relate to the analyzed samples rather than the complete assemblages from these sites. Characterization of larger numbers of samples practised for other cultural zones (the central and west Mediterranean) has shown an extensive circulation of obsidian where the proximity of one source does not rule out its procurement from other sources.<sup>32</sup> This adds weight to the dilemma about the possible existence of local deposits and requires further reconsideration. Was, then,

obsidian from some as yet unidentified local source in use in the central Balkans?

## ARCHAEOLOGY AGAINST GEOLOGY

In areas adjacent to a source, obsidian is normally a predominant or significant component in the raw-material structure of chipped stone industry. It is, therefore, the central Balkan zones of volcanic activity that may be expected to yield a larger number of obsidian finds. The geomorphology of the central Balkans does not contradict that possibility, the mountains being mostly of volcanic origin and particularly prominent in the western and eastern portions of present-day Serbia.<sup>33</sup> Analysis of the frequency and distribution of obsidian shows, however, that its source might have been either in the south Pannonian Plain (Great Hungarian Plain), which is incompatible with the region's relief and geological past, or much farther north, in the Carpathians, as indicated by the characterized samples.

<sup>29</sup> Kaizer & Voytek 1983; Chapman 1981; Bailey 1997.

<sup>30</sup> Renfrew & Bahn 1991: 314.

<sup>31</sup> Obsidian subjected to characterization, according to the published data, comes from the sites of Vinča (4 pieces), Potporanj (1), Potporanj/Kremenjak (1), Selevac (2), Divostin (1), Veliki Popović (10), Banjica (1), Grnčar Bara (1), Beljin-Ravnice (2), Balta Sarata (1) and Ruginosu (1). No further information about the characterized pieces has been offered (Williams-Thorpe, Warren & Nandris 1984, fig. 8; Greif 1995: 89).

<sup>32</sup> Tykot 1996.

<sup>33</sup> Петровић 1982: 40.



That a strong obsidian component in the lithic assemblages from Neolithic sites does not necessarily implies its local origin is shown by many sites in the south Banat. Their chipped stone industry is largely based on obsidian, but their location in an eolian relief and non-volcanic mountains rules out the possibility of local sources.<sup>34</sup> On the other hand, sources south of the Sava and Danube rivers would certainly have moderated drastic variations in the frequency of obsidian in the central and north Balkans. They would even have prevented the sites in that region, mostly with little or no obsidian, from being in an inferior position to those in south Pannonia. Accordingly, if the small number of known sites and, generally, an inadequate degree of investigation may account for the lack of obsidian of local origin in some areas (e.g. east Serbia), such an explanation cannot be applied to sites in the Iron Gate area (including those of a Mesolithic date), where obsidian is limited to one or few pieces,<sup>35</sup> or in the Južna (South) Morava Valley or Kosovo, where obsidian has not even been registered in the Neolithic.<sup>36</sup>

That obsidian may be a little more frequent in the areas of volcanic activity is shown by the site of Selevac near Smederevska Palanka, gravitating towards the Kopaonik–Rudnik zone of volcanic relief, and Vinča near Belgrade, situated at its northern edge. To the inhabitants of these and nearby settlements most of the necessary raw materials were available in a broader settlement area and they indeed were obtained mostly within 50 km.<sup>37</sup> Consequently, potential obsidian deposits on the nearest volcanic formations, for example on Rudnik, Bukulja, Kosmaj and Avala, might have been exploited, if they were known. At Selevac, however, the frequency of obsidian never exceeds 5 percent, and on the adjacent sites is even reduced to isolated finds. Obsidian is much more frequent at Vinča, but its presence is strictly limited to the initial phases of occupation. From about 70 percent, its proportion in the chipped stone industry abruptly decreases and in later periods becomes reduced to isolated finds or is completely absent.

At this point it seems interesting to draw attention to the sites of Banjica, Simića Strana and Ilića Brdo, explicitly presumed to possess obsidian from local sources. From a monograph on Banjica follows that obsidian participates in its chipped stone industry with »a few small pieces«,<sup>38</sup> and this proportion does not seem to alter in subsequent excavations.<sup>39</sup> It may be inferred therefore that obsidian does not exceed a few percent at Banjica. The settlement sites of Simića Strana and Ilića Brdo are in the village of Čučuge near Ub and likely

to have exploited the same obsidian source, if there was any. The lithics from Simića Strana result from a survey, and among the collected artefacts only one obsidian blade is reported, or a total of 2.22 percent.<sup>40</sup> The situation at the site of Ilića Brdo is somewhat different. Its raw-material structure cannot be deduced with precision from the published report, but it makes an important reference to »a large number of flint tools, cores and flakes« and »a few larger obsidian cores«.<sup>41</sup>

It is certain that the lithic assemblages from central Balkan Neolithic sites confirm neither a source exploited in an organized manner nor the raw material distributed further to other settlements through an exchange network. But, on the other hand, they do not negate the possibility of a local origin for some finds, especially because the discovery of obsidian pebbles in the brook Onjeg and the detection by geologists of obsidian deposits on Mt Cer must not be ignored. A solution to this dilemma probably lies in the elucidation of »regularity« in obsidian distribution; in the Neolithic it primarily depends on the quality of the raw material, its suitability for tool production and the utility of the tool itself. That is the case in the Carpathian Basin where the Slovakian better-quality obsidian was much more in use than the second-class Hungarian; that is the case in the central Mediterranean where the best-quality obsidian from the Lipari had the widest distribution. In the Aegean, the low-quality obsidian from Antiparos was not used, and that from Giali, also hardly suitable for tools, was barely used in the Neolithic. Consequently, if the knapping of obsidian produces inadequate tools, its use will be of local significance and on a negligible scale, or such obsidian will simply not be used at all.

The frequency of obsidian finds, on the other hand, is not a reliable method for marking out the raw material's source area. Their frequent presence needs not necessarily be understood in terms of a nearby source, just as isolated finds need not necessarily be an import.<sup>42</sup> From a geological and archaeological perspective,

<sup>34</sup> Бугарски 1989: 30–32.

<sup>35</sup> Радовановић 1992:288–289; Шарић 1997: 178.

<sup>36</sup> Глишић 1968.

<sup>37</sup> Воутек 1990: 440–444; Tringham 1988: 205.

<sup>38</sup> Тодоровић & Цермановић 1961: 50–52.

<sup>39</sup> In her monograph *Predmeti od kosti, roga i kamena*, S. Perišić published only 10 flaked stone artefacts without specifically referring to obsidian (1984: 10).

<sup>40</sup> Жеж 1998: 34; Шарић 1999: 166; Šarić 2002: 15.

<sup>41</sup> Анђелковић-Деспотовић & Решић 1992: 96.

<sup>42</sup> Šarić 2002: 22.

obsidian deposits somewhere in the central Balkans are by all means possible, but that implies:

– a deposit of limited quality, which was not exploited or was exploited only to an extent; regardless of the intensity of exploitation, such obsidian is completely absent from the exchange network and its finds are restricted to sites near the source, or

– minor primary occurrences whose size does not lead to intense cultural manipulation; by virtue of its exclusivity, such obsidian is included in the exchange network along with other prized commodities, but is manifested only in isolated finds and, possibly, specific contexts.

There is yet another possibility for the sites with a small number of obsidian finds. It concerns the capacity to recognize the raw material itself and amounts to the question: is macroscopic identification of obsidian always enough? In most cases it certainly is, because obsidian's glassy structure and colour allows easy recognition, sometimes even its association with a particular source.<sup>43</sup> But this is not a rule, because it has been shown in practice that some volcanic glasses and other raw materials of a predominantly siliceous composition and darker colour can be mistaken for obsidian.<sup>44</sup> Misidentification of obsidian is possible and it poses a problem mostly for sites with isolated finds, that is, if the finds were recognized as obsidian before the development of obsidian studies. There are even examples that the characterization of »obsidian« carried out in order to identify the source has contested the original identification.<sup>45</sup> With no intention to imply that characterization of finds from some Vinča and Starčevo sites might show that obsidian is absent or poorly present, we shall make use of a few examples to simply call attention to the possibility of confusing obsidian with some other raw materials.

In addition to obsidian, finds other volcanic glasses are known from the central Balkans. Such artefacts were found on the site of Trsine near Čačak and they were not in association with obsidian.<sup>46</sup> The site yielded only local raw materials, and the source of the volcanic glass was identified in the settlement's immediate vicinity.

A few artefacts greatly similar to obsidian have recently been discovered at Vinča.<sup>47</sup> During the last excavation campaign (2003), in Vinča D layers, which had not yielded obsidian thus far,<sup>48</sup> a flake was registered whose transparency and colour may be indicative of obsidian, but also of »smoky« quartz; similarly to obsidian, the latter is of good quality but, by contrast, it certainly is of local origin. In this particular case macroscopic identification was not sufficient.<sup>49</sup>

Perhaps the best example is offered by the Vinča settlement at Banjica near Belgrade. Obsidian finds from this site with its five occupation layers were reported sporadically and in low percentages by comparison to the rest of the chipped stone industry.<sup>50</sup> On the floor of House 6 in Level 3 a few »obsidian pieces« were discovered. However, macroscopic analysis by petrologists showed that the material, at least in the case of two end-scrapers, was »siliceous rocks of a predominantly opalian composition«.<sup>51</sup>

### CULTURAL AND HISTORICAL CONTEXT OF THE USE OF RAW MATERIALS IN THE CENTRAL AND NORTH BALKAN

The possibility of obsidian sources or the use of imported obsidian in the central Balkans need not necessarily be assessed only through comparing the frequency of obsidian and the region's geological past. The answer may be found in a roundabout way, through analyzing the contents that directly indicate the potential for the procurement of obsidian. Were the Neolithic settlements in the central and north Balkans involved in an exchange network? Is the employed range of raw materials dominated by imported or local products? Can a settlement showing a clear tendency to rely on local resources be expected to yield obsidian as a known »local« resource? What is the relation between obsidian and other kinds of imported or local raw materials? In this respect, it is important that the whole problem may be viewed in the context of a site whose chipped stone industry shows no evidence of obsidian.

The chipped stone industries of the Vinča and Starčevo cultures show artefacts manufactured both from local and imported raw materials, occurring in varying ratios (Table 3). The use of local resources as a rule takes place as confirmation of man's familiarity with the local environment, but the intensity of their use and

<sup>43</sup> The obsidian from the islands of Giali and Pantelleria is identifiable macroscopically.

<sup>44</sup> Šarić 2002: 23; Williams & Nandris 1977: 216.

<sup>45</sup> Biró, Poszgai & Vladár 1986: 270.

<sup>46</sup> Богосављевић-Петровић 1991: 7.

<sup>47</sup> The latest phase of excavation at Vinča has been going on since 1998. It is directed by Dr. N. N. Tasić on behalf of the Archaeological Committee of the Serbian Academy of Sciences and Arts.

<sup>48</sup> Radovanović *et al.* 1984: 14, Fig. 6.

<sup>49</sup> I would like to thank V. Bogosavljević-Petrović for imparting this information to me.

<sup>50</sup> Тодоровић & Цермановић 1961.

<sup>51</sup> Babović 1984: 166.



Site	Chipped stone industry*	Availability of raw materials	Mode of procurement	Obsidian
Opovo	Chert, chalcedony, opal	No resources in the immediate vicinity, supply zone at a distance of 30–45 km	Direct access and/or exchange	over 6 %
Vinča	Siliceous rock varieties	Deposits in a wider area around the site	Transport from a distance**	up to 69.5 %
Gomolava	Flint, radiolarite	No nearby deposits, the nearest at a distance of 40 km	Use of secondary deposits and transport from considerable distances	0.8 %
Divostin	Chert, flint	Primary deposits within 25 km, secondary deposits in nearby streams	Exploitation of deposits and collecting of river pebbles	0.7 %
Selevac	Various cherts, chalcedony	Primary deposits within 45 km, secondary deposits in the form of fluvial deposits	Locally obtained raw materials, mostly from stream deposits	up to 5 %
Divlje Polje	Opal, light white stone, chalcedony	In the surrounding area	Extraction from deposits, collecting of fluvial deposits	–
Trsine	Magnesite, opal, flint	Sources in the immediate vicinity, the farthest at a distance of 20 km	Exploitation of deposits, collecting of stream deposits	–
Petnica	White opal varieties	No data	Exploitation of local deposits***	–
Anatema	Magnesite, jasper, low-quality brown flint	In the surrounding area	Locally obtained raw materials	–

Table 3. Comparative review of the most frequent raw materials in the Neolithic of the central and north Balkans, the availability of deposits and the percentage of obsidian in lithic assemblages (Vinča – Kaczanowska, Kozłowski & Pawlikowski 1984; Babović 1984; Gomolava – Kaczanowska, Kozłowski & Pawlikowski 1986: 15; Divlje Polje – Bogosavljević-Petrović 1992: 9–12; Petnica – Radovanović 1985; Trsine – Bogosavljević-Petrović 1991: 6–10; Divostin – Tringham 1988: 204–205; Selevac – Voytek 1990: 440–441; Opovo – Tringham, Brukner & Voytek 1985: 438–439; Tringham et al. 1992; Anatema – Mihailović 2001.); \* predominant raw materials, obsidian excluded; \*\* presumed from the variability of raw materials and the predominance of blades within the assemblage; \*\*\* presumed from the continuous exploitation of the same raw materials from the Neolithic to Iron Age.

their proportions in the chipped stone industry mostly depended on the quality of raw materials and the possibility of obtaining alternative, better-quality raw materials. The chipped stone industry of the Vinča settlements at Divlje Polje, Trsine, Petnica, Divostin and Anatema is based on local resources. Is it indicative that this fact is also manifested in the total absence or negligible presence (Divostin) of obsidian? The current archaeological evidence from the sites of Belo Brdo at Vinča and Opovo, where most raw materials were supplied from distant areas, reveals no similarity to the aforementioned sites. Therefore, in solving the problem of the origin of

obsidian in the central and north Balkans it is not irrelevant that it is on those sites that obsidian constitutes a significant portion of their lithic assemblages.

The supply of larger quantities of obsidian to the central Balkans is certainly related to the operative mechanisms of exchange. This may also be seen from the finds of imported raw materials or artefacts such as those manufactured from *Spondylus*, a mussel of Mediterranean or Black Sea origin.<sup>52</sup> During the Starčevo

<sup>52</sup> Seferiades 1995; Todorova 2000.

and Vinča cultures artefacts made of *Spondylus* shells are imported into the central Balkans, but with varying intensity.<sup>53</sup> They are not a characteristic feature of the Starčevo culture, occurring as individual finds and on few sites. The situation changes during the Vinča culture, when such finds become part of the standard cultural picture and occur in large numbers on some sites.

It is not irrelevant that the most intense distribution of obsidian in the central and north Balkans coincides with the widest spread of the exchange network, as additionally evidenced by the presence of other kinds of exotic goods. Therefore, an explanation for the low frequency of obsidian in the Starčevo culture resides in understanding the geographical and historical background of its occurrence and the relationship between central- and north-Balkan Early Neolithic communities and the neighbouring, Carpathian, cultures. Namely, as a raw material of exotic provenance, obsidian was obtainable either through direct access to a source or through participating in exchange. The direct access option is likely to be dismissed because at the time the Starčevo culture emerged and lived the north of the Carpathian Basin with its obsidian deposits had not yet been Neolithized and no traces of Neolithic outposts have been discovered in their vicinity. In that period, the sources were beyond the reach of the Neolithic cultures and it seems much more likely that they obtained obsidian through contacts with Mesolithic communities in the Middle Tisza Valley which were familiar with and employed this raw material.<sup>54</sup>

The circulation of obsidian in the central Balkans was at its peak in a period of intense contacts with the cultures of the Carpathian Basin. It may be seen from the exchange of exotic goods, but also from the appearance of the Tisza pottery on Vinča settlement sites in the southeast Pannonian Plain.<sup>55</sup> The most serious obstacle to accepting the idea about a local origin of obsidian, however, is a discontinuity in its use. It is observable not only from the shift in its occurrence from isolated finds in the Starčevo culture to a very high frequency at the beginning of the Vinča culture, but also from drastic oscillations marking the Late Neolithic. After the initial phases of the Vinča culture (Vinča A–B1), when obsidian occurs in large quantities on some sites, it seems reasonable to expect that cultural continuity should also be manifested in the continuous use of best-quality raw materials such as obsidian. By contrast, in later Vinča phases, when chipped stone industry depends mostly on local resources, obsidian is not in use any more. Therefore it seems almost impossible that obsidian deposits, if

there were any around a settlement, were not known and exploited.

The lack of imported obsidian in the central Balkans south of the Sava and Danube rivers in the Vinča-Pločnik phase certainly does not imply the region's isolation or expulsion from the exchange network. In the past decade a systematic study of the excavated assemblages, archaeological prospecting for surface finds and the collecting of lithics have provided ample data about the complex relationship between large settlements in the valleys of major rivers and a series of smaller Neolithic outposts on the fringe of mountain massifs. They have been interpreted as an indication of the interdependence of Vinča settlements at regional level, from outlying extraction or production sites in the vicinity of a raw material source to large and long-lived Neolithic centres in agricultural areas at lower altitudes.<sup>56</sup> To judge from their frequency, raw materials such as white opal (chipped stone industry) and light white stone (chipped and polished stone industries) were extracted from primary deposits, providing a significant supplement to the use of pebbles collected from riverbeds.<sup>57</sup> Their presence on a number of settlement sites in a wider or narrower area around the source and their significant proportions in the relatively invariable range of raw materials used in that period confirm the assumption about an organized procurement, processing and exchange of raw materials at regional level.<sup>58</sup>

Some of these raw materials were in use sporadically even in the previous period, and it is interesting that they sometimes occur in association with obsidian. For instance, it has been observed that on Starčevo settlement sites south of the Sava and Danube rivers light white stone and obsidian are relatively often found in association.<sup>59</sup> Both raw materials usually account for a very low percentage of the chipped stone industry. The presence of light white stone flakes on

<sup>53</sup> Dimitrijević & Tripković 2003.

<sup>54</sup> Kertész 1996; Makkay 1996.

<sup>55</sup> Chapman 1981; Garašanin 1979.

<sup>56</sup> Bogosavljević-Petrović 2001b; Богосављевић-Петровић 1998.

<sup>57</sup> Богосављевић-Петровић 2001a: 143.

<sup>58</sup> VoYTEK 1990; VoYTEK 1996: 291; Богосављевић-Петровић 1998.

<sup>59</sup> Šarić 2002: 23. The terms used interchangeably are magnesite, diatomaceous earth, porcellanite, soft white stone, white stone of different origins etc. For more details about the presence of this raw material in chipped and polished stone industries, see: Антоновић 1997; Антоновић 2001; Богосављевић-Петровић 2001a; Šarić 2002.

some of these settlement sites has been explained by the process of polished tool production where they occur as by-products.<sup>60</sup> It is unclear, however, whether this association of obsidian with light white stone is to be seen as interdependence. Extensive studies of the raw-material structure show that light white stone was not a prominent characteristic of Starčevo sites in the central Balkan Neolithic. Its use in chipped and polished stone industries is much more intense in the later stage of the Vinča culture,<sup>61</sup> when obsidian is no more found in the central and north Balkans.<sup>62</sup> In that period (latter half of the fifth millennium BC), Late Vinča settlements obtained most of the necessary raw materials in their immediate surroundings, by extracting from nearby deposits or collecting from secondary stream deposits. For that reason, at this point obsidian and light white stone cannot be seen as interdependent, even on the sites where their association has been attested.

From the analyzed data it is clear that obsidian reached the central Balkans from the Carpathians by exchange. Why is it, then, that it does not occur in the later phases of the Vinča culture? Could that, as in the case of the Starčevo culture, be explained by the geographical and historical context where the control of access to resources plays the most important part? In the Carpathian Basin, at a time when obsidian ceases to play a part in the raw-material structure of Vinča settlements, a cultural and territorial reconfiguration is taking place, affecting, among other things, the exploitation and exchange of this raw material. It has been observed that after the end of the Bûkk culture in the north Carpathian Basin, the amount of obsidian drastically decreases on Tisza sites in Pannonia, occurs in low percentages in southeast Pannonia and almost entirely disappears on Vinča settlement sites south of the Sava and Danube rivers.<sup>63</sup> The territorial expansion of the Lengyel culture and new settlement in the vicinity of the Carpathian sources should undoubtedly be seen as factors initiating the coming change. The new settlements are specialized sites for the extraction and processing of obsidian, and they are directly responsible for the diverted route of its distribution.<sup>64</sup> Obsidian is now mostly directed towards other Lengyel settlements, especially towards Transdanubia, where it occurs in larger quantities for the first time. From that point onwards, the changed socioeconomic setting and the introduction of a new obsidian route are reflected in the significantly reduced amounts of obsidian in the Tisza culture area and southeast Pannonia. Thus most Vinča communities, especially those to the south of the

Danube and the Sava, are denied the opportunity to procure it through the exchange network functioning for centuries. For central- and north-Balkan communities it certainly does not entail the end of involvement in the interregional exchange network. Exotic raw materials and artefacts, the procurement of which is not affected by the changes in the Carpathian Basin, continue for a long time to form part of the usual cultural picture both in Pannonia and in the central Balkans.<sup>65</sup> Only obsidian is missing. It remains to be seen if, and to what extent, Vinča communities of the period were able to obtain obsidian via the Sopot–Lengyel settlements between the Sava and the Drava. Some of the latter, such as Šamatovci near Osijek (Croatia), are very rich in obsidian, and extensive cultural and commercial contacts between the two cultures form part of the traditional interpretation of their relationship.<sup>66</sup> There is no doubt, however, that the progressive use of other raw materials, copper above all, and the introduction of new technologies now render obsidian less attractive as a raw material than it was before.

#### **OBSIDIAN DEPOSITS IN THE CENTRAL BALKANS? WHY AN AFFIRMATIVE ANSWER IS NOT ENOUGH.**

There are many volcanic mountains in the central Balkans, but the adjacent sites have yielded no obsidian; the characterized obsidian finds suggest a Carpathian origin, but the sample is not representative; geologists have drawn attention to »local« sources, but sites show little or no obsidian. These statements constitute a sort of double evidence and in fact have no bearing to the solution to the dilemma. It has been shown, however, that the dilemma is not as obvious when it comes to understanding the dynamic of the cultural and economic setting in the Carpathian Basin. Obsidian disappears from central Balkan settlements at a time when new territorial and economic relations begin to be established

<sup>60</sup> Šarić 2002: 20.

<sup>61</sup> Antonović 2003: 20–21; Antonović 1997; Богосављевић-Петровић 2001a; Bogosavljević-Petrović 2001b: 37.

<sup>62</sup> Tripković 2001.

<sup>63</sup> Williams-Thorpe, Warren & Nandris 1984: 187; Sherrat 1987; Takács-Biró 1991: 34; Biró 1998a; Biró 1998b.

<sup>64</sup> Takács-Biró 1991: 34; Biró 1998a; Biró 1998b.

<sup>65</sup> Dimitrijević & Tripković 2003.

<sup>66</sup> Regenye 1996: 167–168; Benac 1990; Dimitrijević 1968: 59–61; Dimitrijević 1969: 53–54; Dimitrijević 1979: 298.

in the Carpathian Basin, with the exchange network, originally orientated towards central and southeast Pannonia, somewhat ebbing away.

What appears to be the conclusion?

Minor primary occurrences of obsidian in the central Balkans, as originally presumed, are not to be ruled out. The fact, however, must not be overlooked that reliable identification of sources is possible and that the deposits registered so far are not the only ones. Still, a definitive answer is expected to be provided by geology, while archaeology may considerably contribute indirectly, by characterizing as many samples as possible and by prospecting for artefacts whose chemical composition would not match any known source. Considering that such obsidian finds have been registered in certain areas, the discovery of as yet unknown sources may certainly be expected. Experiences from Hungary, Romania and Turkey are quite instructive in that respect, and such discovery is the objective to be pursued in the future. And yet, regardless of the final outcome, the question: Are there obsidian deposits in the central Balkans? Should

doubtless be rephrased into the only one of interest to archaeology: Which obsidian deposits were known to man and how extensively were they exploited? From the cited examples it may be seen that the availability of resources and Neolithic man's awareness of it were not the exclusive motive for their exploitation. The quality of a raw material, mainly measured in terms of its suitability for tools, determined the intensity of exploitation of certain resources. Let us remember that in the central Mediterranean, the Aegean and the Carpathian region good-quality obsidian (from the Lipari, Melos and Slovakia) was predominantly in use in contrast with that of poorer quality or with obsidian that was not even exploited (Antiparos). Hence we undoubtedly should accept that possible obsidian deposits in the central Balkans were either unexploited or exploited on a negligible scale by Neolithic communities. Such a picture cannot be modified significantly by future research; it may be modified to an extent only for poorly investigated areas such as east Serbia, a prospect contradicted by the finds from that area and west Bulgaria.<sup>67</sup>

---

<sup>67</sup> ШПарић 1997; Gatsov 1993.

BIBLIOGRAPHY:

**Ammerman, A. A., Polglase, C., 1993.** – New Evidence on the Exchange of Obsidian in Italy, in C. Scarre & F. Healy (eds.) *Trade and Exchange in Pre-historic Europe*, Oxbow Monograph 57, Oxford: Oxbow Books, 101–107.

**Анђелковић-Деспотовић, З., Рецић, М., 1992.** – Археолошка ископавања неолитског локалитета Илића Брдо у селу Чучуге, *Зборник Народног Музеја XIV–I*, Београд, 93–102.

**Antonović, D., 1997.** – Use of Light White Stone in the Central Balkan Neolithic. *Starinar* 48, 33–39.

**Antonović, D., 2003.** – *Neolitska industrija glačanog kamena u Srbiji*. Beograd: Arheološki institut.

**Бабовић, М., 1984.** – Петрографске анализе камених сировина из збирке Одсека за праисторију Музеја Града Београда, у: С. Перишић, *Предмети од кости, рога и камена*, Београд: Музеј Града Београда, 165–177.

**Bailey, D. W., 1997.** – Impermanence and Flux in the Landscape of Early Agricultural South Eastern Europe, in J. Chapman and P. Dolukhanov (eds.) *Landscapes in Flux: Central and Eastern Europe in Antiquity*, Colloquia Pontica 3, Oxford: Oxbow Books, 41–58.

**Balkan-Atli, N. et al., 1999.** – Obsidian: Sources, Workshops and Trade in Central Anatolia, in M. Özdoğan (ed.), *Neolithic in Turkey*: Istanbul: Arkeoloji ve Sanat Yayinlari, 133–145.

**Benac, A., 1990.** – Vinča et les cultures contemporaines à l'ouest de l'Yugoslavie. *Vinča and its World*, in D. Srejović and N. Tasić (eds.), Beograd: SANU, 17–24.

**Betancourt P. P., 1997.** – The Trade Route for Ghyali Obsidian, in R. Laffineur and F. P. Betancourt (eds.) *AEGAEUM 16*—Proceedings of the 6<sup>th</sup> International Aegean Conference/ Philadelphia, Temple University, 18–21 April 1996, Liege: Universite de Liege, 171–175.

**Biró, K., 1986.** – Electron beam microanalyses of obsidian samples from geological and archaeological sites. *Acta Archaeologica Academiae Scientiarum Hungaricae* 38, 257 – 278.

**Biró, K., 1988.** – Distribution of lithic raw material on prehistoric sites, *Acta Archaeologica Academiae Scientiarum Hungaricae XL*, Fasciculi 1–4, Budapest: Academiai Kiado, 251–274.

**Biró, K., 1998a.** – *Lithic implements and the circulation of raw materials in the Great Hungarian Plain during the Late Neolithic Period*, Budapest: Hungarian National Museum.

**Biró, K., 1998b.** – Stones, Numbers – History? The Utilization of Lithic Raw Materials in the Middle and Late Neolithic of Hungary. *Journal of Anthropological Archaeology* 17, 1–18.

**Biró, K., Pozsgai, I., Vladár, A. 1986.** – Electron Beam Microanalyses of Obsidian Samples from Geological and Archaeological Sites, *Acta Archaeologica Academiae Scientiarum Hungarica* 38, 257–278.

**Богосављевић-Петровић, В., 1991.** – Камена окресана индустрија са неолитског насеља Трсине, *Зборник Радова Народног Музеја XXI*, Чачак: Народни Музеј, 5–36.

**Богосављевић-Петровић, В., 1992.** – *Окресана камена индустрија са насеља Дивље Поље*. Краљево: Народни Музеј.

**Богосављевић-Петровић, В., 2001a.** – Винчанска кремена индустрија Проблем употребе и дистрибуције сировина са освртом на долину Западне Мораве, у: Н. Тасић, Е. Радуловић (ур.) *Археолошка налазишта Крушеваца и околине*, Крушевац–Београд: Народни Музеј Крушевац и Балканолошки институт САНУ, 139–150.

**Bogosavljević-Petrović, V., 2001b.** – New Results of the Study of Chipped Stone Industry of the Vinča Culture, *Viminacium* 12, 35–50.

**Бугарски, Д., 1989.** – Вршац, у *CP Србија IV*, Београд: Књижевне новине, 30–37.

**Cann, J. R., Dixon, J. E., Renfrew, C., 1969.** – Obsidian Analysis and the Obsidian Trade, u D. Brothwell and E. Higgs (eds.) *Science in Archaeology*, London: Thames and Hudson, 578–591.

**Chapman, J., 1981.** – *The Vinča culture of South-East Europe: Studies in chronology, economy and society*, BAR International Series 117, Oxford: British Archaeological Reports.

**Chapman, J., 1990.** – The Neolithic in the Morava-Danube Confluence Area: A Regional Assessment of Settlement Pattern, in R. Tringham and D. Krstić (eds.) *Selevac: A Neolithic Village in Yugoslavia*, Monumenta Archaeologica 15, Los Angeles: The Institute of Archaeology, University of California, 57–213.

**Dimitrijević, S., 1968.** – *Sopotsko-Lendelska kultura*. Zagreb: Filozofski fakultet, Arheološki institut.

**Dimitrijević, S., 1969.** – *Neolit i eneolit u Slavoniji*. Vukovar: Gradski muzej.

**Dimitrijević, S., 1979.** – Sjeverna zona. *Praistorija jugoslavenskih zemalja II – neolit*, Sarajevo: Centar za balkanološka istraživanja, 229–362.

- Dimitrijević, V., and Tripković, B., 2003.** – New Spondylus Findings at Vinča – Belo Brdo: 1998–2001 Campaigns and Regional Approach to Problem. *Starinar* 54, 47–62.
- Gatsov, I., 1993.** – Neolithic Chipped Stone Industries in Western Bulgaria, Krakow.
- Garašanin, M., 1979.** – Centralnobalkanska zona, u A. Benac (ur.) *Praistorija jugoslovenskih zemalja* 2, Sarajevo, 79–212.
- Глишић, Ј., 1968.** – Економика и социјално-економски односи у неолиту подунавско-поморавског басена, у: Ј. Трифуновић (ур.) *Неолиџ централној Балкана*, Београд: Народни Музеј, 21–61.
- Gopher, A., Barkai, R., and Marder, O., 1998.** – Cultural Contacts in the Neolithic Period: Anatolian Obsidians in the Southern Levant. *ERAUL* 85: 641–650.
- Greif, T., 1995.** – Obsidian v neolitiku na območju med centralnim Balkanom in vzhodno jadransko obalo, *Balkanica XXVI*, Београд: Balkanološki Institut, Srpska Akademija Nauka i Umetnosti, 75–108.
- Жеж, Ж., 1998.** – Најстарији трагови седелачког живота на подручју Колубаре, *Колубара 3*, Београд: Републички завод за заштиту споменика културе, 27–42.
- Kaczanowska, M., Kozłowski, J.K., 1985.** – Chipped stone industry from Golokut, *Rad Vojvodanskih Muzeja* 29, Novi Sad: Vojvodanski Muzej, 27–31.
- Kaczanowska, M., Kozłowski, J.K., Pawlikowski, M., 1984.** – Raw materials analysis, in Radovanović et al. *The Chipped Stone Industry from Vinča*, Београд: Filozofski Fakultet, Centar za arheološka istraživanja, 8–18.
- Kaczanowska, M., Kozłowski, J.K., 1986.** – Gomolava-chipped stone industries of Vinča culture, *Prace Archeologiczne* 39, Warszawa–Krakow: Uniwersytet Jagiellonski.
- Kaizer, T., Voytek, B., 1983.** – Sedentism and Economic Change in the Balkan Neolithic, *Journal of Anthropological Anthropology* 2, 323–353.
- Kunov et al., 2003.** – The Bulgarian obsidian: myth or reality? The view of geologists and archaeologists, in Ts. Tsonev and E. Montagnari-Kokelj (eds.) *The Humanized Mineral World: Toward social and symbolic evaluation of prehistoric technologies in South Eastern Europe*, ERAUL 103, Liège–Sofija: Études et Recherches Archéologiques de l'Université de Liège, 71–76.
- Milleker, F., 1938.** – Vorgeschichte des Banats, *Starinar XIII*, Београд, 102–166.
- Михаиловић, Б., 2001.** – Окресана камена индустрија са локалитета Анатема. *Зборник Народног Музеја* 17–1, 37–51.
- Özdoğan, M., 1994.** – Obsidian in Anatolia: an Archaeological Perspective on the Status of Research, *Archaeometry* 94, Ankara, 423–431.
- Перишић, С., 1984.** – *Предмети од кости, рога и камена*, Београд: Музеј Града Београда.
- Perles, C., 2001.** – *The Early Neolithic in Greece. The First Farming Communities in Europe*. Cambridge: Cambridge University Press.
- Петровић, Д., 1982.** – Стари вулкански рељеф, у *СР Србија I*, Београд: Књижевне новине, 40–46.
- Radovanović, I., 1985.** – On chipped stone industries of Petnica (Valjevo–Western Serbia). *Chipped stone industries of the early farming cultures in Europe*, International Symposium Krakow–Mogilany, October 1985, Archaeologia Interregionalis, Warsav, Cracow: Warsav University, Jagiellonian University, 95 – 105.
- Radovanović, I., 1987.** – On chipped stone industries of Petnica, u J. K. Kozłowski i S. T. Kozłowski (eds.) *Chipped stone industries of the early farming cultures in Europa*, Warsaw: Wydownictwa Uniwersytetu Warszawskiego, 95–106.
- Radovanović, I., 1992.** – *Mezolit Đerdapa*. Doktorska disertacija, Београд: Filozofski Fakultet.
- Radovanović, I., Kaczanowska, M., Kozłowski, J.K., Pawlikowski, M., Voytek, B., 1984.** – *The chipped stone industry from Vinča*, Београд: Centar za arheološka istraživanja, Filozofski Fakultet.
- Regenye, J., 1996.** – Die Sopot-Kultur in Transdanubien und ihre südlichen Beziehungen, in F. Drasovean (ed.) *The Vinča Culture, its Role and Cultural Connections*, Timisoara: The Museum of Banat, 163–174.
- Renfrew, C., Cann, J. R., Dixon J. E., 1965.** – Obsidian in the Aegean, *The Annual of the British School at Athens* 60, London: The British School at Athens, 225–247.
- Renfrew, C., Bahn, P., 1991.** – *Archaeology. Theories, Methods and Practice*, London: Thames and Hudson Ltd.
- Sherratt, A., 1987.** – Neolithic Exchange Systems in Central Europe, 6000–3500 B.C., in A. Sherratt (ed.) *Economy and Society in Prehistoric Europe. Changing Perspectives*, Edinburgh: Edinburgh University Press, 320–332.
- Seferiades, M. L., 1995.** – Spondylus Gaderopus: The Earliest European Long Distance Exchange System, *Porocilo o raziskovanju paleolitika, neolitika in eneolitika v Sloveniji* 22, 238–256.
- Srejski, D., Jovanović, B., 1957.** – Pregled kamenog oruđa i oružja iz Vinče, *Arheološki Vestnik VII*, Ljubljana: Slovenska Akademija Znanosti in Umetnosti, 256–296.



**Takács-Biró, K., 1991.** – Lithic Industries in Hungary During the Existence of Vinča Culture, *Banatica* 11, 33–36.

**Todorova, H., 2000.** – Die Spondylus-Problematik heute, in S. Hiller und V. Nikolov (hrsg.), *Karanovo III. Beiträge zum Neolithikum in Südosteuropa*, Wien: Phoibos, 415 – 422.

**Тодоровић, Ј. Цермановић, А., 1961.** – Бањица, насеље винчанске културе, Београд: Музеј Града Београда.

**Torrence, R., 1986.** – *Production and Exchange of Stone Tools*, Cambridge: Cambridge University Press.

**Tringham, R., 1988.** – The Flaked Stone Industry from Divostin, u A. McPherson and D. Srejović (eds.) *Divostin and the Neolithic of Central Serbia*, Ethnology Monographs 10, Pittsburgh: Department of Archaeology, University of Pittsburgh, 203–224.

**Tringham, R., Brukner, B., and Voytek, B., 1985.** – The Opovo Project: A Study of Socioeconomic Change in the Balkan Neolithic. *Journal of Field Archaeology* 12 (4), 425–44.

**Tringham, R. Stevanović, M 1990.** – Field Research, u R. Tringham and D. Krstić (eds.) *Selevac: A Neolithic Village in Yugoslavia*, 57–213, Monumenta Archaeologica 15, Los Angeles: The Institute of Archaeology, University of California.

**Tringham, R. et al., 1992.** – Excavation at Opovo, 1985–1987: Socioeconomic Change in the Balkan Neolithic. *Journal of Field Archaeology* 19 (3), 351–386.

**Трипковић, Б., 2001.** – Улога опсидијана у неолиту: Утилитарни предмети или средство престижа, *Гласник српској археолошкој друштва* 17, 21–42.

**Трипковић, В., 2003.** – The Quality and Value in Neolithic Europe: an Alternative View on Obsidian Artifacts, in Ts. Tsonev and E. Montagnari-Kokelj *Humanized Mineral World: Toward a Social and Symbolic Evaluation of Prehistoric Technologies*, Proceedings of ESF Workshop, Sofia 3–6 September 2003, ERAUL 103, 119–123.

**Трипковић, В. (у штампи)** – Role of Obsidian in the Neolithic. A Symbolic Expression of Human Domestication? *Paper presented at XIVth UISPP Congress, held in Liege, Belgium, 2–8 September 2001.*

**Tykot, R.H., 1996.** – Obsidian Procurement and Distribution in the Central and Western Mediterranean, *Journal of Mediterranean Archaeology* 9.1, Sheffield: Sheffield Academic Press, 39–82.

**Tykot, R. H., 2002.** – Chemical Fingerprinting and Source Tracing of Obsidian. The Central Mediterranean Trade in Black Gold, *Accounts of Chemical Research* 35, No. 8, 618 – 627.

**Voytek, B. 1984.** – Microwear analysis of chipped stone artifacts from Vinca, u I. Radovanović et al. *The chipped stone industry from Vinča*, Beograd: Centar za arheološka istraživanja, Filozofski Fakultet, 54–58.

**Voytek, B., 1990.** – The Use of Stone Resources, in R. Tringham and D. Krstić (eds.) *Selevac: A Neolithic Village in Yugoslavia*, Monumenta Archaeologica 15, Los Angeles: The Institute of Archaeology, University of California, 437–494.

**Voytek, B., 1996.** – The Organization of Technology and the Study of Stone Tools: Cases from the Mediterranean Basin, *Proceedings of the XIII Congress of UISPP*, Volume 3, held in Forli, 8–14 September, 289–294.

**Шарић, Ј., 1997.** – Старчевачка кремена индустрија са локалитета Ушће каменичког потока, Књепиште и Велесница, у М. Лазивић (ур.) *Археологија источне Србије*, Београд: Центар за археолошка истраживања, 177–188.

**Шарић, Ј., 1999.** – *Кремена индустрија најстаријих земљорадничких култура на штилу Србије*. Докторска дисертација, Београд: Филозофски Факултет.

**Šarić, J., 2002.** – Stone as material for production of chipped artifacts in Early and Middle Neolithic of Serbia. *Starinar* 52, 11–26

**Warren, P., 1969.** – *Minoan Stone Vases*. Cambridge: The University Press.

**Williams, O., and Nandris, J., 1977.** – The Hungarian and Slovak Sources of Archaeological Obsidian: an Interim report on Further Fieldwork, with a Note on Tektites. *Journal of Archaeological Science* 4, 207–219.

**Williams Thorpe, O., Warren, S. E., & Nandris, J. G. 1984.** – The Distribution and Provenance of Archaeological Obsidian in Central and Eastern Europe. *Journal of Archaeological Science* 11: 183–212.

**Willms C., 1983.** – Obsidian im Neolithikum und Äneolithikum Europas, *Germania* 61(2), 327–352.

**Резиме:**

BOBAN TRIPKOVIĆ, Филозофски факултет, Београд

## ЛЕЖИШТА ОПСИДИЈАНА НА ЦЕНТРАЛНОМ БАЛКАНУ? ТЕСТ КРОЗ АРХЕОЛОШКЕ ПОДАТКЕ

Налази опсидијана на налазиштима која су удаљена од примарно претпостављеног извора су, у историји археологије, често добијала романтичарску ноту, кроз идеје о локалној експлоатацији као начину снабдевања, и кроз потрагу археолога за непознатим лежиштима ове сировине. Током времена, оне нису заобишле ни српску археологију. Стога је основни циљ овог рада преиспитивање постојећих сазнања о опсидијану на централном и северном Балкану, провера утемелености идеја о употреби локалних извора као и трасирање могућих праваца за даља изучавања.

Извесно је да збирке окресане индустрије са неолитских налазишта централног Балкана не потврђују постојање извора који је организовано експлоатисан, а сировина даље кроз мрежу размене дистрибуирана до других насеља. Оне, међутим, не негирају могућност локалног порекла појединих налаза, нарочито због тога што се налази опсидијанских облутака у потоку Оњег и сазнања геолога о постојању лежишта на планини Цер не смеју занемарити. Фреквентност опсидијанских налаза, са друге стране, не представља поуздану методу за генерисање изворног подручја сировине. Њихова учестала појава не мора нужно бити схваћена кроз постојање извора у окружењу, исто као што ни изоловани налази не морају нужно представљати импорт. Из геолошке и археолошке перспективе, постојање лежишта опсидијана негде на централном Балкану је свакако могуће, али подразумева:

– лежиште редукованог квалитета, које није експлоатисано или је експлоатисано само до одређеног степена; без обзира на ниво експлоатације овај опсидијан је потпуно искључен из мреже размене, а његови налази су ограничени на налазишта у близини извора, или

– примарне појава малих размера чија величина не доводи до интензивне културне манипулације; због своје ексклузивности, овај опсидијан у мрежи размене партиципира са другим вредним робама, али се манифестује искључиво појединачним налазима и, могуће, специфичним контекстима.

Код налазишта са малим бројем опсидијанских налаза постоји још једна могућност. Она се дотиче степена препознатљивости саме сировине и садржана је у питању – да ли је макроскопска идентификација опсидијана увек довољна? У највећем броју случајева свакако јесте, јер стакласта структура и боја опсидијана омогућавају лако препознавање, понекад чак и повезивање са одређеним извором. Ипак, то није правило, јер је у пракси доказано да се нека вулканска стакла као и друге сировине претежно силицијског састава и тамније боје могу погрешно идентификовати као опсидијан. Погрешна идентификација опсидијана је могућа, и као проблем се поставља углавном код локалитета са изолованим налазима, односно ако су налази као опсидијан препознати у време када опсидијанске студије још нису биле развијене. Познати су чак и примери да је карактерисање

»опсидијана«, извршено ради утврђивања извора, негирало првобитну идентификацију сировине.

О постојању извора на централном Балкану или употреби импортованог опсидијана не мора се нужно судити само кроз поређење фреквентности опсидијана и геолошке прошлости подручја. До одговора се може доћи и посредним путем, кроз анализу садржаја који директно указују на потенцијал за набавку опсидијана. Да ли су неолитска насеља на централном и северном Балкану учествовала у мрежи размене? Да ли у употребљаваном сировинском спектру доминирају импортовани или локални производи? Да ли се, у случају насеља код кога је јасно изражена тенденција употребе локалних ресурса, може очекивати и појава опсидијана, као познатог »локалног« ресурса? Какав је однос опсидијана са другим врстама импортованих и локалних сировина?

Најинтензивнија циркулација опсидијана на централном Балкану забележена је у време када су постојале интензивне везе са културама Карпатског басена. То се, сем кроз размену егзотичних добара, уочава и у појави керамичког материјала Тиса културе на винчанским насељима у југоисточној Панонији. Највећи проблем за прихватање идеја о локалном пореклу опсидијана представља, међутим, дисконтинуитет његове употребе. Он се не види само у прелазу од појединачних примерака у старчевачкој култури до изузетне фреквентности почетком винчанске културе, већ је приметан и у драстичним осцилацијама које карактеришу касни неолит. Након почетних фаза винчанске културе (Винча А–В1), када се на појединим локалитетима уочавају велике количине опсидијана, нереално је очекивати да се културни континуитет не манифестује и континуитетом употребе најквалитетнијих локалних сировина каква је опсидијан. Насупрот томе, у каснијим фазама винчанске културе, када је окресана индустрија примарно усмерена на њену локалну базу, опсидијан се више не употребљава. Због тога, изгледа готово невероватно да лежишта опсидијана, ако су постојала у окружењу насеља, нису била позната и коришћена.

Из анализираних података директно се види да је опсидијан на подручје централног Балкана доспевао разменом из Карпатске области. Зашто, међутим, није заступљен и у касним фазама винчанске културе? Да ли се то, као у случају старчевачке културе, може објаснити географско-историјским контекстом у коме контрола приступа изворима игра најзначајнију улогу? У Карпатском басену се, у време када опсидијан више не учествује у сировинској структури винчанских насеља, дешава културно-територијална реконфигурација која, између осталог, утиче и на експлоатацију и размену ове сировине. Уочено је да се, након гашења Бик културе у северном делу Карпатског басена, количина опсидијана на локалитетима Тиса културе у Панонији драстично редукује, да се у југоисточној Панонији јавља у невеликом проценту и да готово у потпуности ишчезава из насеља

винчанске културе јужно од Саве и Дунава. Територијална екстензија лешелске културе и оснивање, у близини карпатских извора, нових насеља свакако се морају посматрати као иницијатори наступајућих промена. Нова насеља су представљала специјализоване локације за експлоатацију и обраду опсидијана и директно су одговорна за измену трајне његове дистрибуције. Опсидијан је сада усмераван претежно ка другим насељима лешелске културе, нарочито ка Трансданубији, где се сада први пут јавља у већим количинама. Од тог тренутка, измењени друштвено-економски амбијент и установљење новог опсидијанског пута рефлектују се и на подручје Тиса културе и југоисточну Панонију кроз битно умањене количине опсидијана. Највећи број винчанских заједница, нарочито оне јужно од Саве и Дунава, на тај начин је ускраћен за његову набавку кроз постојећу, вековима одржану мрежу размене. То за заједнице на централном и северном Балкану свакако не значи и престанак партиципације у интеррегионалној мрежи размене. Сировине и предмети егзотичног порекла, чија набавка није афектована променама у карпатском басену, још дуго времена представљају део уобичајене културне слике и у Панонији и на централном Балкану. Једино опсидијан недостаје. Остаје да се будућим истраживањима види да ли су, и у којој мери, винчанске заједнице опсидијан могле добављати преко насеља лешелске културе у савско-дравском међуречју. Нека од њих, на пример Шаматовци код Осиека, веома су богата опсидијаном, а значајан културно-економски саобраћај део је традиционалних интерпретација односа две културе. Несумњиво је, међутим, да прогресивна употреба других сировина, пре свега бакра, и нове технологије његове обраде, које сада ступају на историјску позорницу, не чине опсидијан више тако атрактивним материјалом.

Недостатак импорта опсидијана на централном Балкану, јужно од Саве и Дунава у фази Винча–Плочник, свакако не сведочи о издвојености или изопштености тог подручја из мреже размене. Систематска обрада постојећих збирки, површинске проспекције и прикупљање окресаних артефаката изнедрили су, током последње деценије, низ података о комплексном односу великих насеља у долинама значајних речних токова и низа мањих неолитских станица, лоцираних на ободима планинских масива. Они су интерпретирани као индикација непосредне међузависности винчанских насеља на регионалном нивоу, од постојања помоћних насеља радионичког или рударског карактера, у близини извора сировине, до великих и дуготрајних неолитских центара у агрикултурним подручјима, на нижим надморским висина-

ма. Судићи по заступљености, сировине као бели опал (у окресаној индустрији) и лаки бели камен (у окресаној и глечаној индустрији) екстраковани су рударењем из примарних депозита и представљају значајну допуну употреби облутака из речних корита. Њихова појава на низу насеља у ближој и широкој околини лежишта, и значајно учешће у релативно униформном сировинском спектру периода, потврђују претпоставку организованог прибављања, обраде и размене сировина на регионалном нивоу.

Појаве опсидијана примарног типа и мањих размера, онако како је првобитно претпостављено, на централном Балкану свакако не треба искључити. Не сме се, ипак, прећи преко чињенице да је поуздано одређење извора могуће као и да до сада евидентирана лежишта и нису једина постојећа. Дефинитиван одговор, очекује се, ипак, од геологије, а археологија може да пружи значајан допринос посредно, карактерисањем што већег броја узорака и очекивањем да се појаве артефакти чија хемијска композиција не одговара неком од познатих лежишта. С обзиром да су у неким подручјима такви примерци опсидијана уочени, у будућности се свакако може рачунати на откривање нових извора ове сировине. Искуства из Мађарске, Румуније и Турске су у том смислу довољно инструктивна и њихово откривање је циљ коме у будућности треба тежити. Ипак, без обзира на начин на који овај проблем буде решен, постављено питање »Да ли се лежишта опсидијана налазе на централном Балкану« свакако се мора преформулисати у оно једино значајно археологији: »Која су лежишта опсидијана била позната човеку и у којој су мери експлоатисана«. Из наведених примера се видело да доступност лежишта и знање неолитског човека о његовом постојању нису били искључиви разлог експлоатације. Квалитет сировине, мерен, пре свега, погодношћу за израду алатки одређивао је степен искоришћености појединих ресурса. Да подсетимо да на централном Медитерану, у Егеји и Карпатској области у употреби преовлађује квалитетнији опсидијан (са Липара, Мелоса и Словачке), наспрот коришћењу мање квалитетних сировина и оних које чак нису ни експлоатисане (Антипарос). Због тога би свакако требало прихватити да потенцијално постојећа лежишта опсидијана на централном Балкану неолитске заједнице нису користиле, или су их користиле у незнатној мери. Нова истраживања не могу, у времену које следи, овакву слику битније изменити; делимично је могу променити једино у слабо истраженим областима, нпр. у источној Србији, чему се противе досадашњи налази у овом и подручју западне Бугарске.