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THE BULGARIAN OBSIDIAN: MYTH OR REALITY? THE VIEW OF GEOLOGISTS AND ARCHAEOLOGISTS

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There are very few obsidian artefacts from prehistoric settlements in Bulgaria - *sensu lato* Neolithic till Bronze Age (Eneolithic). On the contrary, such artefacts are numerous in the countries surrounding (European Turkey, Romania, Greece, Hungary). We have tried explain this general absence of such artefacts in Bulgarian settlements.

It seemed interesting to compare two generally divergent approaches, the geological and the archaeological. We decided to look for the existence of obsidian in the territory of Bulgaria, and organised a study trip to the main paleovolcanic regions located in the south and south-eastern parts of the country (Fig. 1): the Dambalak (Eastern Rhodopes), as well as the Bulgarovo and Rossen paleovolcanoes (the latter actually under the Black Sea). According to geologists obsidian exists as nodules in these areas, as the paleovolcanoes produced acid conditions favourable for the production of obsidian or glassy rocks.

1 - The region between the villages Garvanovo - Tatarevo, Haskovo district

The area explored is located to the west of the village of Tatarevo (Fig. 2), on the right bank of the Banska river. It is found on the north-eastern periphery of the Borovishki volcanic area (Priabonian - Lower Oligocene) which belongs to the Eastern Rhodopian volcanic region (Harkovska *et al.* 1989). The region was formed by association of pre-caldera volcanic rocks and volcanoclastics, and post-caldera volcanic rocks and volcanoclastics (Harkovska *et al.* 1997). The particularity of both types of rocks is the high content of K2O. The pre-caldera volcanic rocks are represented by fine porphyric latites, high-K-rhyolites, and high-K-basaltic andesites. The post-caldera volcanic rocks are described as trachyrhyolites, trachyrhyodacites, high-K-rhyolites and the associated with them perlites (Yanev *et al.* 1989; Panteva 1996).

The transition between the trachyrhyolites from the core and the perlites of the perlites' periphery of the trachyrhyolitic vault in the vicinities of Tatarevo is made by the change of layers of perlites and trachyrhyolites (Yanev *et al.* 1989). The perlites' periphery occurs about 300 m wide. The perlites are black in colour merging from greenish, gray to white, as we have observed *in situ*. The latter are more hydrated. None of the previous authors mentions the presence of true obsidian nodules. The perlites analysed from Tatarevo show that during heating their loss of water is no more than 3%.

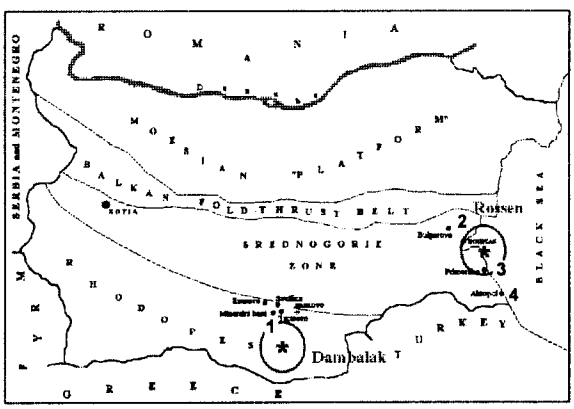

Figure 1. Localisation of the different visited places. 1. Tatarevo - Garvanovo (Haskovo district); 2. Bulgarevo; 3. Cape "Kupriya" and quarry "Primorsko"; 4. Ahtopol (Bourgas district).

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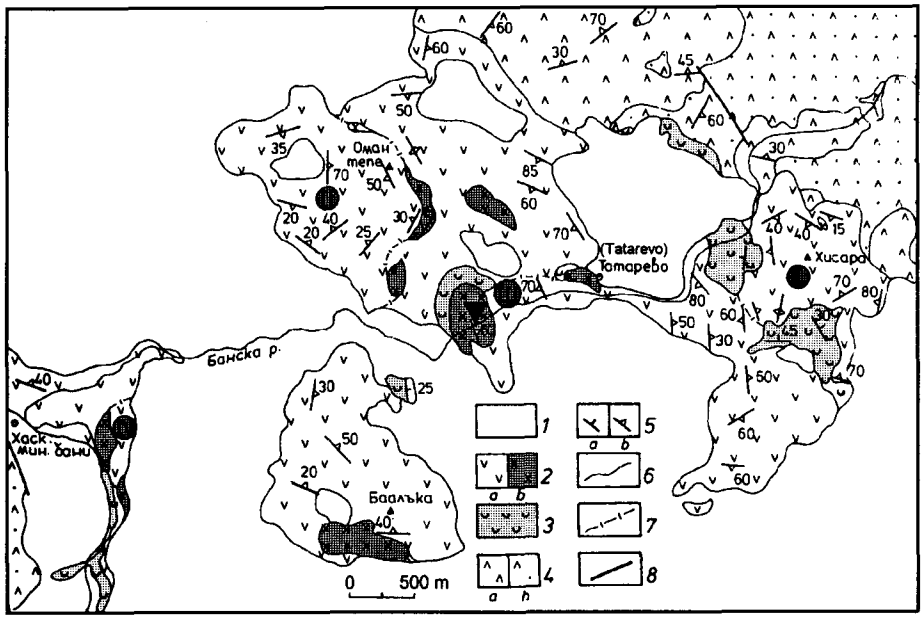

Figure 2. Paleogen acid volcanics, from the region of Tatarevo village and Haskovo mineral springs. ▼ visited place. (after Panteva 1996). 1. Quaternary; Paleogene volcanic: 2. rhyolites, trachyrhyodacites, trachydacites (a) and perlites (b); 3. volcanomictic conglomerates with an acid tuffaceous matrix; 4. latites (a) and latitic agglomerates (b); 5. stratification (a) and flow structures in the volcanics (b); 6. geological boundaries; 7.probable boundaries between the acid extrusion; 8. faults; I. Hisara dome; II. Oman body; II and IV. endogene domes, according to Yanev *et al.* (1989).

2 - Quarry "Bulgarovo", Bourgas district

This quarry is located about 12 km to the north-west of the town of Burgas (Fig. 1). It is situated in a small volcanic formation of a linear type – Bulgarovo paleovolcano (Mezosoic, Late Cretaceous; Staniszeva-Vasileva 1982). In the geological profile, there is a complex of lava flows of different thicknesses. The flows are often zonal as for example the third zone consists of pillow lava, and the last one is hyaloclastic. The rocks have high K. Borisov (1963) called them Bulgarites.

A hyaline zone 5 to 30 cm thick was observed in the periphery of the pillow lavas layer. The cement from volcanic glass from hyaloclastic zones and the hyaline periphery sometimes contains a perlite structure. Thus this lightly coloured volcanic glass - or obsidian - occurred as a very thin layer, archaeologically not suitable for use. Up till now, the presence of obsidian here has never been mentioned.

3 - Cape "Kupriya" and quarry "Primorsko"; Primorsko, Bourgas district

The area is situated in the southernmost part of the Upper Cretaceous Rossen palaeovolcano of the

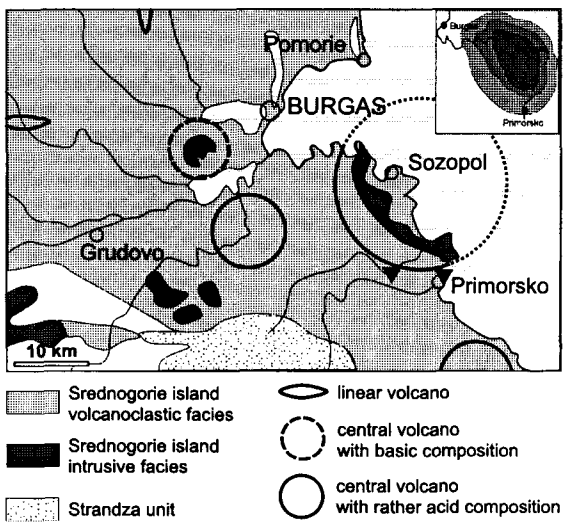

Figure 3. Detail of the geology in the Primorsko region, and localisation of quarry "Primorsko" and cape "Kuprija" (▼) (after Dabovski *et al.* 1989).
In frame, the schematic structure of the Rossen paleovolcano. From dark grey to light one: caldera, ring-like caldera intrusion, eroded soma. (after Harkovska *et al.* 1989).

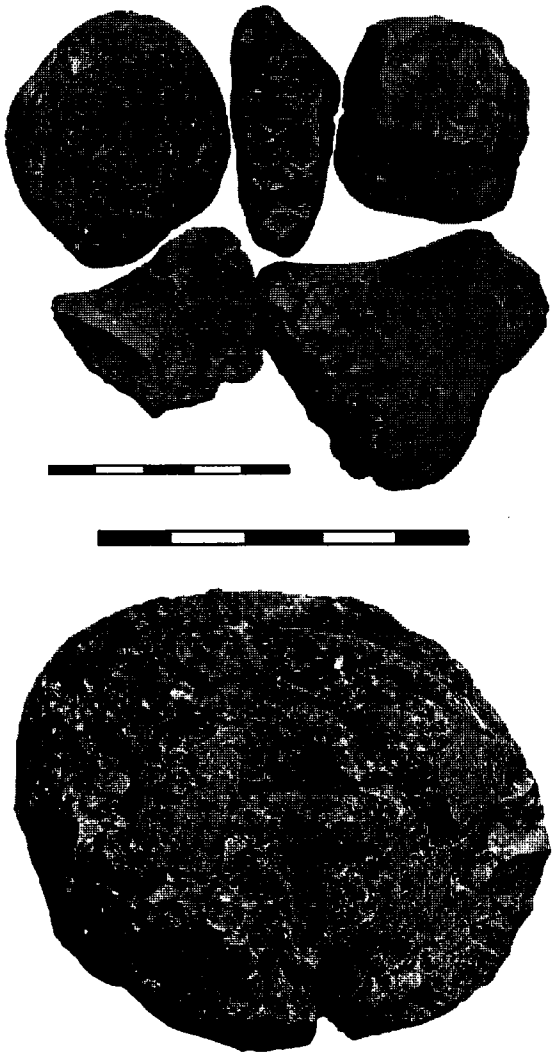

Figure 4. Obsidian nodules from the cape "Kupriya".

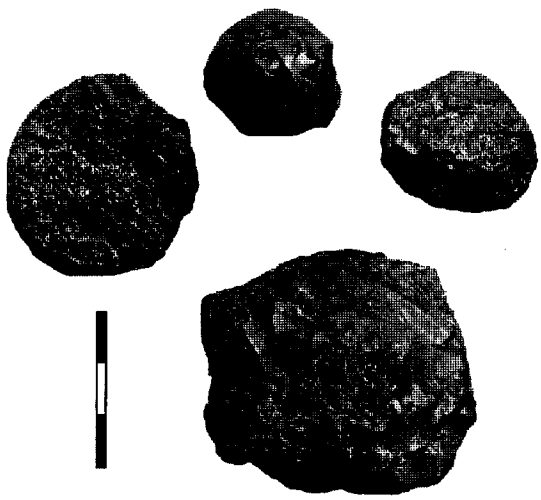

Figure 5. Obsidian nodules and blocs from the quarry "Primorsko".

Eastern Srednogorie volcano-intrusive area (Harkovska *et al.* 1989). The outer zone appears to be the probable base of the strongly eroded soma of the palaeovolcano (Fig. 3). It comprises volcanic rocks, volcanogenic- sedimentary bodies of the so-called Bourgas group (Petrova *et al.* 1980), belonging to Upper Cretaceous. The volcanic rocks comprise basalts, high-K basaltic andesites, K-trahybasalts, and K-trahyandesitobasalts (Harkovska *et al.* 1989).

3.1 - Cape "Kupriya"

Georgi Bonchev described (1900, 1908) obsidian for the first time in Bulgaria, only in one place - cape "Kupriya" - near the village with the eponymous name on the Black Sea coast. The outcrop is on the seashore within a band 2-3 m wide. The author describes the obsidian as having a black tarry colour and glassy surface and with uneven perlites' cracks. According to him, pearls as big as human fist and eggs could be found there. Microscopic analysis shows that it is a typical glass (Fig. 4).

Within the microscopic elements from the obsidian pieces from the same outcrop A. Kunov (1992 - unpublished data) observes typical volcanic glass with unpronounced bulbous perlites' cracks and rare glomeroporphyry from plagioclase. The obsidian glass is included in the greenish to brownish mass of weakly clayey volcanic glass, porphyry and glomeroporphyry from plagioclase and into the higher quantities of porphyry pyroxene, veins and clusters of carbonates. In another microscopic element the quantity of the plagioclase, pyroxene, and carbonate is greater. The rock from the opposite side microscopically has a spilite-like structure, with plagioclase microliths in the major mass, with a porphyry generation from plagioclase and pyroxene, with carbonate clusters. In some places epidote develops on the plagioclase.

3.2 - Quarry "Primorsko"

The quarry is situated few kilometres to the west of the town of Primorsko. It is in a formation of volcanic rocks, probably trachybasalts and basaltic trachyandesites according to the geological map, with reddish to greyish colour. Occasionally small spots of black obsidian glass appear. In one part of the quarry there is a lava flow of black trachybasalts or basaltic trachyandesites in which there are no macroscopic traces of porphyries or rock generation minerals. Among them different intensity black, bright nodular obsidian glass with dimensions from a few millimetres to 4-5 cm. is unevenly distributed. Most of the rocks have cracks and deposited calcite has been observed in cracks and on surfaces. In the core of some nodules,

the material is more coarse grained and mat (Fig. 5).

There is no known data about the chemical composition of the obsidian and the rocks both from the cape "Kupriya" and the quarry. Archaeologically speaking, the size and the quality of these obsidian are not suitable for flaking.

4 - The lighthouse on the seashore near the town of Ahtopol

Guided by the personal communication of I. Nachev we visited the rocks near the lighthouse of Ahtopol (volcanic rocks of the Bourgas group; Petrova *et al.* 1980). These are reddish to gray-greenish rocks (most probably with trachybasalts to trachybasaltic andesites). We found a small cliff with little and unevenly dispersed black volcanic glass. Sometimes obsidian nodules reach 2-3 cm in diameter.

5 - Other evidences for obsidian

Georgi Bonchev in his "Contribution to the petrography of the Eastern Rhodopes" (1908) mentions about presence of a black strip (band), which constitutes the occurrence of rhyolites to the north of Ajhedin and river Arda. It is composed of black perlites.

A number of research publications about the Rhodopes (Goranov 1960; Goranov *et al.* 1960.; Yanev 1989) describe bodies with perlites which have black colour. In the chemical analyses of different perlites from Bulgaria presented by these and other authors, none shows presence of volcanic glass with no or little content of water. The character of the different compositions of volcanic occurrences and especially the great number of perlites and the presence of volcanic glass shows, that there is a possibility of finding new (possibly larger) occurrences with obsidian.

In 1997 Y. Yanev *et al.* describe andesitic obsidian from the Oligocene volcano Dambalak in the Eastern Rhodopes. Briefly the story of this description is the following: Stefka Vassileva (History Museum, Department of Earth Sciences in the town of Kardzali) found a piece of obsidian, which is now on exhibition in the Museum. This single piece comes from the

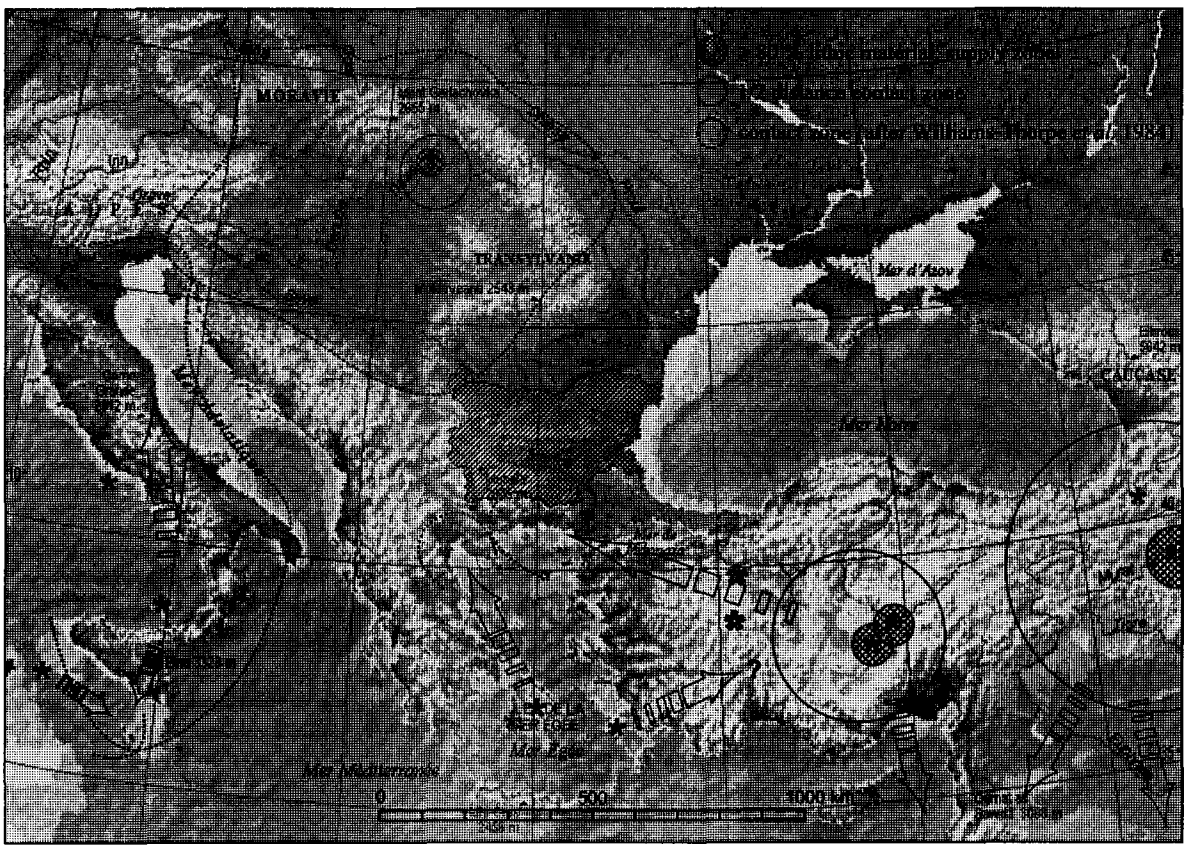

Figure 6. Geographical widespread of obsidian sources (asterisks) in South and Southeastern Europe, and Anatolia. (Data after Dpt. of Chemistry and Biochemistry, Numazu College of Technology (web site); Renfrew *et al.* 1966, 1968; Williams Thorpe *et al.* 1984; Willms 1983).

western foothills of the Dambalak volcano within the locality 'Strelbishteto' (south of the Momchilgrad - Raven road and the river Kidikdere). The authors of this article made micro-drill quantitative and infra-red spectroscopic analyses. The maximal quantity of loss (LOI) reaches 0,79%. In the article the geological profile of the region where this piece of obsidian has been found is described. The authors reach the conclusion that the origin of this obsidian is connected with the andesitic lava of the Dambalak volcano.

It is important to note that one of the authors of this article Y. Yanev, as well as other volcano scientists (R. Ivanov, P. Marchev, A. Harkovska, etc.), know the volcano Dambalak in detail. So far, neither of them nor any other Bulgarian geologists produced any data about obsidian. Theoretically speaking one isolated piece could provide important evidence of long distance exchanges, if it were found in the vicinity of another potential source of a raw material. But without any geological proof no archaeological evidence of exploitation could be inferred.

From another point of view concerning Eastern Bulgaria, we still have to consider the availability of potential outcrops during Neolithic times over a wider area since the Black Sea level was then some 10-12 m lower than today.

The geographical position of Bulgaria between the East European obsidian outcrops and the Near Eastern ones is right in the middle of their distribution range of artefacts (Fig. 6). But few obsidian artefacts are known from Bulgarian prehistoric sites; the most well known is a blade found in a Varna grave. On the other hand we find the distribution of another kind of prestigious artefact, namely blades and implements, made of high quality flints from the North-East Bulgaria.

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