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Obsidian Track

While studying ancient trade and exchange, the important role is played by the raw material sourcing. Collections of artefact obsidian are characteristic particularly for regions of Europe and Asia. Mapping and provenance analysis are combined to study not just scale of exchange in ancient societies on the Caucasus. They also indicate directions of exchange – ancient trade routes.

In this paper we gathered data on 52 obsidian finds from the Lower Dnieper valley and the Circum-Azov Sea region. Over half items (29) are found in stratigraphic conditions in the course of excavations. The others came from surfaces of sites.

Stratified sites include:

- Palaeolithic (Telmanovskaya) –1 item;
- Mesolithic (Gvozdovka) – 1 item;
- Neolithic (Rassypna 6 – 6 items, Ust'-Bystaya – 2 items, Semenivka 1 – 1 item, Rassypnaya 1 – 1 item, Frontove-1 – 1 item, Kyrove – 1 item, Novochevshiy – 1 item, Shkhancherenkhabl – over 1 item) – 16 items;
- Eneolithic (Mukhin II burial, m.5, b.9) – 1 item;
- Bronze Age (Liventsivka fortress) – 11 items.

Surface materials include Lysa Gora – 16 items, Kyrpichnoe – 2 - 3 items, Kamyana Mogyla – 1 item, Zhukovskoe VIII – 1, Novy Egorlyk – 1, Borovske – 1, Kamyana Mogyla – 1.

Neolithic sites overwhelmingly dominate the pattern. Comparing the archaeological contexts, we can easily demonstrate that obsidian-containing contexts share some common traits (flat-bottomed vessels, ornamented by a short denticulate stamp and incised lines, with separate and stepping imprints of stamp, outer “collar” at a rim, trapezes with flattened dorsal surface, bifacially treated points and probably appearance of the first copper artefacts). They are dated to the final Neolithic mostly.

In 1960-ies obsidian was studied by comparison of light diffraction parameters. The obsidians from Frontove 1 (Crimea) and from several sites in Northern Caucasus (khutor Vesely, Meshoko, Yasnevaya Poliana, Skala) were studied in this way. Since 1980-ies the new method was applied. It consists in comparison of absolute

concentrations of chemical elements in a sample. This method was introduced by R.S. Badalyan and others. Today, high-precision data on obsidian composition help to define characteristic traits of different flows of rhyolite lava. Modern LA-ICP-MS analysis is carried out by stationary and portable equipment. Thanks to efforts of P. Biagi and B. Gratuze some samples from the Azov Sea region were studied in the laboratory of Marseille University.

LA-ICP-MS analysis was applied to 7 samples out of 52. The selected samples were from Lysa Gora – 6 items and Semenivka – 1 item.

Semenivka 1. A multi-layered settlement is situated on the terrace under the hill Krucha on the right bank of the Molochna River. The site was excavated in 1991-1992. Obsidian is represented by proximal part of a blade that was found in the layer of the Late Azov-Dnieper culture. LA-ICP-MS analysis showed that raw material had come from Cappadocian outcrop Göllüdağ (compositional group Göllüdağ 5). Radiocarbon dates for this horizon are 6360±70 BP (5351±83 Cal.BC). An upper layer is attributed to the Serechny Stog culture and is dated to 5525±70 BP (4371±69 Cal.BC). Thus obsidian entered the region between 5300-4300 years cal BC.

Lysa Gora. The site is situated on the left bank of the Konski Vody river. This territory was called Velyky Lug prior to flooding by the Kakhovka artificial lake. Today hundreds of sites are destroyed by active erosion. The bank at Lysa Gora is filled by chipped stone finds (there are several thousands of them). In 1988-2015 obsidians were found there. The collection includes 15 fragments of blades and a single flake. The application of GPS helped us to precisely define the location of samples recovery. 6 samples (including flake) were subjected to LA-ICP-MS analysis. The results revealed several sources of raw material: 4 items – Syunik 3, Armenia, 2 – Baksan, Kabardino-Balkaria, 1 flake – from unknown outcrop.

Late Neolithic horizons with obsidians on sites of the Azov region, Crimea and the Circum-Caspian region are attributed to various archaeological cultures: Azov-Dnieper (Semenivka 1), sites of Frontove 1, Rassypnaya 6 type, Donetsk and the Lower Don (Ust'-Bystraya), Dzhangar (Dzhangar, Tu-Buzgu-Khuduk 1). Obsidian finds mark the routes of wide exchange net in the space between the Caucasus, Caspian Sea and the Lower Dnieper valley.

There were two zones of finds: an import zone and a contact zone. The contact zone includes sites where production waste (flakes, chips) were found. The sites along the

Egorlyk river (Rassypnaya 6, Zhukovskaya 8) can be placed in this zone. Obsidian entered the import zone in a shape of blades and ready-made tools.

There are some common traits in the topography of the sites with obsidian. Often they are situated close to wide swampy areas – Velyky Lug, Molovchny Liman, Manych depression, Sarpinska lowland. Mostly obsidian is found on the sites of multiple frequentations. They are situated on the high younger terraces of the small rivers. The settlement is multi-layered (Mesolithic-Eneolithic). The obsidian is found in the Neolithic-Eneolithic layers.

Synchronously the Shulaveri-Shomutepe and Leyla-Tepe cultures developed in the Caucasus. Their rapid expansion was accompanied by a rise of obsidian utilization. The early sites contained 45-57% of obsidian, developed sites – 84-87%. The main strategy of obsidian exploitation is based on Multiple model - Alikemektepesi (Syunik 3), Mentesh Tepe (Syunik 3, Chikiani, Gutansar, Arteni 3), Leyla-Tepe (Baksan, Syunik 3). That's why, obsidians from various sources are often found together also in the more distant sites.