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PALEOENVIRONMENT. THE STONE AGE

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LITHIC RAW MATERIAL EXPLOITATION IN THE SIBIRYACHIKHA FACIES, THE MIDDLE PALEOLITHIC OF ALTAI*

The assemblages of the Sibiryachikha facies of the Middle Paleolithic stand out in terms of their production technology and typology among the other contemporary lithic assemblages of Gorny Altai. In this study, the role of raw materials in the development of characteristic features of the Okladnikov and Chagyrskaya caves' industries is determined. The proximity of sources of the raw material used has been established, and the main principles of its exploitation (quality and availability) have been confirmed. For the Sibiryachikha facies of the Middle Paleolithic of the Altai, these principles were implemented through selection of easily-accessible good-quality stones and less accessible high-quality materials—Cambrian-Ordovician Zasurye jasperoids. The latter were used selectively, and the quality of raw materials was important for secondary working of stone tools in the Sibiryachikha assemblages. Increase in the proportion of artifacts made of Zasurye jasperoids in the later assemblages of the Sibiryachikha facies is not associated with the introduction of new techniques, and may reflect the increased availability of this high-quality material and the development of adaptive skills of the ancient population.

Keywords: *Middle Paleolithic, Gorny Altai, Sibiryachikha facies, petrographic analysis, raw materials exploitation.*

Introduction

A distinguishing characteristic of the Gorny Altai region is the absence of a single universal high-quality raw material, such as flint in the industries of Europe and the Near and Middle East. In these conditions, ancient humans employed several varieties of the available lithic raw materials. The main selection criterion was quality, by which is meant: 1) technological opportunities for the use of stone material including the size of pieces, hardness of rock, and its suitability for various reduction techniques; and 2) useful properties such as durability of the cutting edge and friability.

The quality of lithic raw materials is mainly controlled by two geological factors (Derevianko, Kulik, Shunkov, 2000). The first factor is represented by the rock-formation conditions in the region, which determine petrographic composition and the structure of the rocks. All Paleolithic sites of the northwestern and

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central Gorny Altai are located within the Anui-Chuya structural-formational zone (Kuznetsov, 1963); therefore its separate tectonic blocks (Charysh-Inya, Talitsa, Anui) had a common geological history as parts of a single sedimentary basin from the Ordovician to the Devonian inclusive. In the conditions of the shallow marine shelf of the Siberian continent, this resulted in the formation of one-type terrigenous and terrigenous-carbonate deposits, including aleurolites, sandstones, and up to gravelstones and conglomerates, as well as organogenic limestones of the carbonate platform that flanked the Siberian continent from westward like a barrier reef (Elkin et al., 1994). Shallow marine sedimentation conditions reflected on the flyshoid character of some terrigenous rocks which are characterized by alternation of clay and sandy layers of thickness from several millimetres up to 20–25 cm. At the same time, heterochronous but similar sandstones, aleurolites, and sandy shales differ little in their petrographic composition and appearance. Their similarity is exacerbated by the lateral facies variation and general weak regional metamorphism (the greenschist facies), in view of which pebbles are mostly indistinguishable in terms of their age attribution, so that only petrographic varieties can be determined.

The magmatic phenomena are also close in time within the entire Anui-Chuya structural-formational zone: unlike sedimentary rocks, Devonian effusive rocks and their tuffs are more individual in terms of their composition and appearance, owing to which they sometimes can also be distinguished in pebble materials. This also involves the polychronous (Devonian – Permian) Talitsa granitoid massif in the same-name block along with its satellites in the Anui-Chuya and Charysh-Inya blocks, in the contact aureole of which biotite and cordierite hornstones formed at the expense of substantially clay terrigenous rocks of different ages.

The second factor determining the quality of lithic raw materials is intensive tectonic activity throughout the geological history of Gorny Altai. It has been found that tectonic faults played a key role in formation of the pre-Cenozoic basement structure, especially during the late Paleozoic and Mesozoic Eras. The distinguished Anui-Chuya structural-formational zone is restricted by the Charysh-Terekta deep fault and northeastern shear zone in the south and in the west, and by the Sarasin-Kurai zone of deep faults in the east. In the northwestern part of Gorny Altai, the Charysh-Terekta deep fault forms three equal branches delimitating the Anui, Talitsa, and Charysh-Inya zones (blocks). The northern branch is the Bashchelak fault striking north-northwest, along which the Anui zone links up with the Talitsa zone, the middle branch is the northwest-striking fault along the boundary of the Talitsa and Charysh-Inya zones, and the southern branch limiting the Charysh-Inya zone from southward is the east-west trending fault along the Tigirek Ridge, which goes under the general name of the Charysh-Terekta fault. All faults are accompanied by displacements, thick schistosity and shear zones, and fractures of lower order, often diagonal with reference to the average trend of faults, with the resulting formation of numerous smaller tectonic blocks (Elovich, Perfilyev, 1962).

Such powerful tectonic activity throughout the Paleozoic and Mesozoic affected all regional rocks by repeated brecciation and foliation, and facilitated their endogenous variation so that subsequent silification implied transformation of sedimentary rocks into quartzitic metasomatites, often diagnosed as quartzites and microquartzites. As a result of the same silification by effusive rocks, jasperoids or intermediate quartzitic and chalcedonic metasomatites formed. In other cases, endogenous variation manifested itself in epidotization and chloritization with the changing structure of rocks. Obviously, these processes inevitably changed the degree of uniformity and strengths of rocks, which directly influenced the quality of lithic raw materials. In addition, activation of tectonic movements over the Paleozoic faults at a later time and new growth of Cenozoic faults that have formed the present relief of Gorny Altai (Dobretsov et al., 1995) caused intensification of rock breaking and rock fracturing, often in a hidden, potential form that manifested itself upon rock exposure. Fracturing facilitated erosion and had a significant impact on the size and shape of fragments that turned into pebble materials. Thus, development of cross-bedding cleavage fractures determined occurrence of sparry and parallelepiped sedimentary rock fragments, which were the preferable lithic raw materials in terms of technology. At the same time, hidden fracturing of the rock, which manifested itself in stone processing, considerably deteriorated the quality of even very good raw materials by impairing their technological characteristics.

Geological and petrographic studies of the lithic industries of Paleolithic sites in the northwestern and central Gorny Altai have established that the pebble materials of the nearest stream flows were their basic raw materials. The results of studying the Paleolithic assemblages of the region have revealed various approaches of the most ancient population to selection and use of different types of raw materials (Prirodnaya sreda…, 2003).

Sibiryachikha facies of the Altai Middle Paleolithic

The Sibiryachikha facies of the Middle Paleolithic in the Altai has been distinguished by the industries of two key sites: Okladnikov Cave and Chagyrskaya Cave. Both caves represent karst cavities on the banks of the Sibiryachikha (Okladnikov) and Charysh (Chagyrskaya)