Tools for grinding plants from the Upper Palaeolithic sites of Kostenki and Suren: an experimental study of the appearance and characteristics of use-wear traces on grinding stones

Dmitrii Shulga[1], Natalia Skakun[2], Laura Longo[3], Alfred Pawlik[4], Jose Heredia[5], Vera Terekhina[2].

[1]Saint-Petersburg Bread Museum, 195009, Mikhailova st., 2, Saint-Petersburg, Russia, ladarsak@yandex.ru

[2]Institute for the History of Material Culture of the Russian Academy of Sciences (IHMC RAS), 191186, Dvortsovaya Embankment, 18, Saint-Petersburg, Russia, terehinavera@mail.ru

[3]University of Campania "Luigi Vanvitelli", 81100, Viale Abramo Lincoln n. 5, Italy

[4]Ricardo & Dr. Rosita Leong Hall Ateneo de Manila University. Loyola Heights, Quezon City 1108, Philippines; apawlik@ateneo.edu

[5]Experimenter, Granada, Spain, joseheredia.tallalitica@gmail.com

Traceological study of the Stone Age tools, which served for processing vegetation, has been going on for more than 30 years. However, due to the insufficiency of the available experimental base, many questions of the traceological determination of the Palaeolithic unmodified grinding stones still remain unresolved. These problems stimulated a series of our experimental works. The tasks were as follows: 1. to reveal a set of use-wear traces which are characteristic of tools for processing different types of plant raw materials. 2. to create a reference collection of grinding stones from different types of rock with a detailed description of the experiments, photographic recording of the workflow, as well as microphotography of traces at different stages of the work.

At the initial stage, our experiments were associated with a species of vegetation quite widespread in Eurasia in the Palaeolithic time – cattail (*Týpha*). Artefacts from the Suren grotto and from the Kostenki 14 site served as samples for the creation of experimental tools.

For replica tools, sandstone tiles with a flat surface (lower passive stones) and upper (active) plano-convex pebbles were chosen. Before starting the experiments, the cattail was dried and peeled. The work was carried out in a circular and reciprocating motion with strong pressure on the processed material.

After five hours of work, very distinct traces appeared on the tools: glossy spots of varying intensity with uneven boundaries, light grinding of protruding areas, crushed mineral granules on the working zones of the lower stones and rare thin shallow linear traces. Traces of abrasive contact between the lower and upper stones sometimes are poorly expressed, since there was a layer of vegetation between an active and a passive tool. Direct contact between the lower and upper stones occurred only when the upper tool slid to the periphery of the working part of the lower stone, or the plant material was wiped through allowing a pestle to be in contact with the lower stone.

The results of the experimental work revealed stable use-wear traces, characteristic of the processing of cattail, which confirmed the preliminary data of the traceological analysis of the original tools. In the future, it is planned to continue experiments on processing different types of plant materials using tools from different types of stone. The data obtained will form the database required for further detailed

traceological studies of this type of tools. When our team accumulate a sufficiently large amount of material, we will begin to spread it to the public – including, as it was previously mentioned, descriptions of experiments, photographic recording of the workflow, and microphotography of use-wear traces.