



## Contact-thermic hornfels: seldom stone raw material type of the lengyel culture implements (site Svodín, central Slovakia)

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During last several years the number of characterized raw material types used in the Neolithic/Aeneolithic on the territory of the Slovak Republic for tools/weapons and decorative/ornamental/symbolic stone implements as well as the bases, crushers ao. construction has significantly increased. It is the result of concentrated effort of several authors. The present-day knowledge is synthesised in paper by Hovorka and Illášová (2000), which represents some of results of the national scientific projects.

Among the raw material types used for the above mentioned main categories of implements construction, those of very local, distant and very distant and/or unknown occurrences of given sources were described as well (l. c.). The use of the raw material of described type used by the Neolithic/Aeneolithic communities, has not been known till now in the central European room.

Contact-thermic hornfels we have documented from the site Svodín (approx. 30 kms to the SE of town Nitra), which represents one of the hugest settlements of the lengyel culture people. Systematic archaeological excavations of the given site were carried out by Němejcová-Pavúková in the past (1971-1983). Mentioned author published (1995) problematic of roundels and determined there four cultural-typological horizons. In more than 150 skeletal graves rich inventory namely of polished stone implements have been collected. Implements of chipped type from the discussed site were studied and published (with contribution by Němejcová-Pavúková) by Kaczanowska and Kozłowski (1991).

In the set of polished stone implements we have found four small (up to 6 cms long) completely preserved, flat, non bored axes of ash-gray color of identical morphology (shape) made of just the same raw material type. On polished surfaces of axes slightly developed lighter irregular "fields" are observable. By naked eyes observation the raw material type used generally appears as submicroscopically grained, generally aphanitic, extremely hard. On surfaces none products of weathering are observable. Surfaces are fresh-looking, shiny.

For identification of the raw material under consideration we used thin sections for polarizing microscope study as well as polished thin sections studied by means of electron microprobe. Composition of substantial

phases of individual axes is presented in paper by Hovorka et al. (in print).

Thin sections image of the discussed stone raw material type is simple. Given rock is composed of two main phases: clinopyroxenes and plagioclases. Characteristic is their very fine-grained (less than 0,1 mm diameter) nature. In detail spatial distribution of the Cpx and Plg is uneven - the rock under consideration has spotty character. Individual spots have no sharp delimitations. In thin sections studied generally clinopyroxenes prevail over plagioclases (60 vs. 40 per cents). Except of clinopyroxenes and plagioclases in accessory amount we have identified apatite, titanite and pyrite.

Thin sections and microprobe studies should be summed up in the following. The dominant mineral in given rock type is clinopyroxene of diopsidic composition (following classification of pyroxenes proposed by Morimoto et al. 1988). They bear of nonzonal, or in places slightly zonal chemical composition. In studied set of thin sections in few of them we have found two generations of clinopyroxenes: the first generation forms even grained massive matrix (together with plagioclases) of the studied rock. The younger one is present in the form of thin (0,1 mm) veinlets filled up by clinopyroxene of the younger generation. Clinopyroxene aggregates filling up mentioned veinlets represent product of mobilization of the given rock mineral association due to late magmatic/postmagmatic fluid activity. Cpx II is significantly greater (up to 0,3 mm) in places forming fan-like aggregates. The limits of such clinopyroxene veinlets are not sharp. Optical properties of Cpx I and Cpx II are comparable.

Plagioclase crystals are distributed within prevailing clinopyroxene aggregate, or they are present in the form of irregular nests. They are mostly of fresh, nonzonal and non twinned appearance. Their anorthite content is high, reaching An 85. In association with An high plagioclases, clinopyroxenes with highest Mg content are documented.

After realisation of above specified laboratory studies we conclude the problematic as follows:

- a) all 4 axes has more-or-less identical shape, size, and are made from the just same raw material type, the most probably from one rock-block,

- b) the raw material of the given axes originated by metamorphic recrystallization, the most probably of volcanoclastic rocks of basic volcanics with an admixture of carbonate material (increased CaO content),
- c) based on above statement we suppose elaboration of discussed axes just on the place of their discovery, e. g. in site Svodín,
- d) raw material of discussed 4 axes from the petrological point of view belongs to the category of contact-thermic hornfels originating in the internal part of the contact-thermic aureole (or within xenolith) of rock of appropriate composition within lava flow (or subvolcanic body),
- e) huge complexes of Late Tertiary volcanics of the central Slovakian province we consider to be the geological unit of the contact-thermic hornfels origin,
- f) mentioned rock type has not been described yet in geological literature in the country,
- g) keeping in mind possible way of origin of the raw material type it is possible to consider a block of contact thermic hornfels as block to be fallen out of the surrounding volcanic rock environment. The river Hron valley seems to be the most probable place of the raw material find by the lengyel culture people occupying site Svodín,
- h) based on above aspects we consider transport of raw material block on "a distance of one or several days walk".

Taking into account the presence of lengyel culture axe found on the site Svodín made from the atol-like

almandine + clinopyroxene eclogitic rock the given site also from the point of raw materials used in the Neolithic belongs to the unique ones. Such characterization is based on occurrences of axes made from two contrast raw material types: high pressure eclogitic rocks on one side and high-temperature contact-thermic hornfels on the other one.

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