



## Petrography of blueschist stone tools in Hungary

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Intensive microscopic petrographical investigation of Hungarian Neolithic polished stone tools started nearly 10 years ago. The first blueschist tools have been found out last year from Hungary. This the first mention of blueschist stone tools from the territory of recent Hungary.

Nearly 1000 stone tool samples were looked over from the whole country. 26 of them from 13 localities (all from NE-Hungary) showed blueish shade of colour so they may be blueschists at first sight. Macroscopically the polished stone tools are made of fine-grained blueschist and very difficult to distinguish from those made of greenschist (and fine grained amphibole schists). In many cases there are a lot of green or greenish coloured minerals in the blueschists, moreover the texture of these rocks are similar. Macroscopically the blueschist stone tools have blueish black, dark greenish blue or in some cases dark blueish (-blackish) green colour, with or without thin white or whitish bands or in some cases lenses, parallel to the well or very well appeared foliation.

7 blueschist stone tools were selected for polarising microscopic investigation to prove the macroscopic determination and to make more precious characterisation of the rocks.

Selected rock materials showed little differences in main mineral content determined in thin section.

3 type of blueschists could be distinguished by petrographical microscope.

In the first group of rocks relict clinopyroxene preserved. These pyroxenes are augites and show typical pre-tectonical characters. Alteration reached about 60 % of the whole amount of augite and produced badly crystallised brown hornblende, small amount of very finegrained titanite, zoisite-clinozoisite and pumpellyite and few tremolite. Most of finegrained titanite has been formed from ilmenite. Mozaic like aggregates of slightly elongated equigranular crystals of epidote form wavy bands and lenses around relict, cracked pyroxenes. Remaining places are filled with mostly wavy laths and bunches of blue amphiboles. Two other little bit different samples from Felsővadász could be ranked to this group too. In all four blueschist samples traces of relict magmatic texture (ophitic and intergranular) are visible.

In the samples of second group garnetbearing blueschists are present. Relicts of magmatic minerals are missing, only weakly preserved pseudomorphs after pyroxene consisting of medium and finegrained mosaic crystals of

chlorite, white mica, quartz, albite and few titanite are visible. Mostly large, big euhedral blue amphibole gives 30-50 % of the whole rock. Angular spaces between them are filled by medium grained isometric, mosaic crystals of albite, quartz, white mica and epidote. Euhedral mainly medium grained garnet is scattered evenly in the rock.

The third type of selected rocks is represented by only one sample. This rock suffered very strong greenschist facies metamorphism. Only more or less rounded large crystals of former plagioclase remained partly unaltered. Most of these grains transformed mainly to actinolite, albite, chlorite and sericite. Polycrystalline aggregates of wavy extincting quartz and albite with scattered small actinolite laths and needles in them appear in form of wavy bands and lenses. Some large pale green or almost colourless amphibole crystals with darker core were also detected. These large lenslike aggregates and grains are surrounded by strongly oriented wavy bands of mineral assemblages rich in amphibols (tremolite, actinolite, brownish hornblende and very few greenishblue-green amphibol). Some of the almost colourless and greenishblue amphibols may have composition close to glaucophane or riebeckite, so we were describing this rock among blueschists, in spite of the present mineral content on the basis of which this rock is an actinolite schist.

In the Carpathian-Pannonian region blueschist stone tools are rare, because there is only one occurrence (Sugov Valley and surroundings) where blueschist occurs on the surface in large area and in big quantity.

Distribution blueschist stone tools within NE-Hungary shows well defined regularity: moving away from the supposed source territory i.e. to the south, the frequency of occurrence and the ratio of blueschist to other rock types decreases.

Petrographical similarities (the same mineralogical composition, particularly the presence of pyroxene and garnet in the same textural position both in the stone tools and the outcrops) and the closeness of the supposed source area strengthen the identifying of the blueschists from geological outcrops of the source area (Sugov Valley and surroundings) with the blueschists from stone tool findings.

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