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# Raw materials of polished artefacts from two Lengyel sites in Lower Austria

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*Abstract:* Lengyel sites in Lower Austria are not so rich in polished artefacts as those in southern Moravia. So far, there have been published no modern data on polished artefact rock composition from Lower Austria. The article brings petrographic determination of a few axes, hammer-axes and a whetstone based on a study of thin sections, measurement of magnetic susceptibility and a microprobe analysis. The raw material spectrum includes metamorphic rocks of the greenschist group, garnet amphibolite and jadeitite for the axes and hammer-axes, an arkose sandstone for the whetstone. Similar raw materials have been described from Lengyel localities of the adjacent part of southern Moravia and some of them give evidence on a long distance motion of stone raw material or ready-made implement in the Neolithic of Europe.

*Key words:* Lower Austria, Lengyel settlement, polished artefacts, petrography of raw material

## Introduction

Northern Lower Austria represents besides southern Moravia, Burgenland, Pannonia and western Slovakia an important part of Central Europe with extensive Lengyel settlement in the Neolithic. Geological basement is very similar to that in southern Moravia: eastern margin of the Bohemian Massif, the Alpine - Carpathian Foredeep, the Ždánice - Waschberg Unit and the Vienna Basin. The Alpine - Carpathian Foredeep and Vienna Basin with their soft Tertiary sediments could not provide useful rocks for production of polished artefacts. Similarly, Tertiary sandstones and Mesozoic limestones of the Ždánice – Waschberg Unit were polished for Neolithic artefacts only exceptionally. The Bohemian Massif, on the other hand, is built of hard metamorphic and igneous rocks that are suitable for such production.

We have already relatively good knowledge on polished raw materials used in the Neolithic (including important Lengyel localities) in southern Moravia (Přichystal, 2000). Up-to-date information on polished raw materials used in the Lower-Austrian Neolithic is almost missing. Hence our contribution brings new petrographical data on raw materials used at two important Lengyel sites situated above the Kamp valley (Kamegg) or close to it (Strass im Strassertale), in the easternmost part of Waldviertel near its border with Weinviertel or Wienerwald.

## Archaeological background

Kamegg (the district of Horn) is a settlement of early Lengyel culture (Moravian Painted Ware I a - b) dating to the first half of the fifth millennium BC. Its centre lies at 275 m above sea level and 25 m above the Kamp river. Besides remains of settlement (houses, pits) there was found a circular enclosure of two ditches. The both ditches are V-shaped and inside each of them was a palisade. The outer ditch has a diameter about 144 m, its maximal width is 4 - 6 m and depth up to 3 m. The inner ditch with a diameter 76 m has a width up to 8 m and depth 3,5 - 4 m. Excavations in 1981 – 1991 showed the inner ditch was interrupted by four entries and the same situation can be supposed for the outer ditch. The monument was not finished because the outer ditch in its southwest part was dug only as shallow segments (Trnka, 1994). After their function the both ditches had been refilled by a younger settlement of the same culture with numerous finds of pottery, stone tools, animal bones and also some female ceramic figurines ("idols").

b) Strass im Strassertale (the district of Krems-Land) is again an early Lengyel site that chronologically corresponds to the Moravian Painted Ware Ia and is situated at 312 m above sea level. Archaeological excavations unearthed remains of settlement pattern and a circular enclosure of two ditches as well. The V-shape ditches have diameters 77 and 57 m with a width of about 2 m and remaining depth approximately 2 - 2,5 m.

## Petrographic investigation

Seven stone polished artefacts from both localities were investigated using a binocular microscope for preliminary determination and a kappameter to ascertain magnetic susceptibility. In addition to it, four thin sections wereprepared and studied under a polarizing microscope. It is necessary to take into account that the determination under a binocular microscope is only preliminary but we could not prepare thin sections from all artefacts.

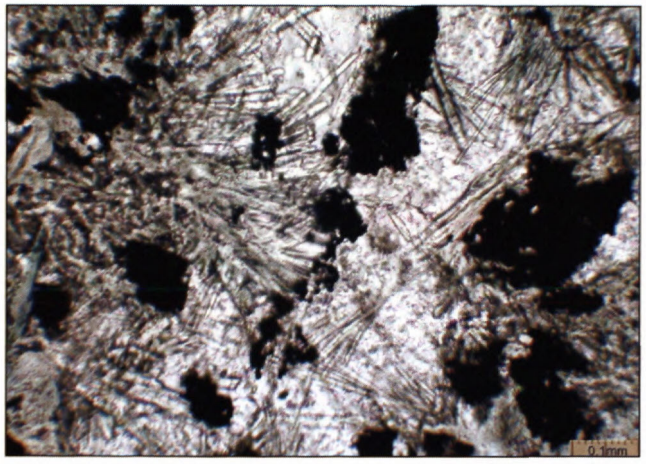

*Fig. 1 Actinolite greenschist, axe-hammer, Strass 11, plane-polarized light.*

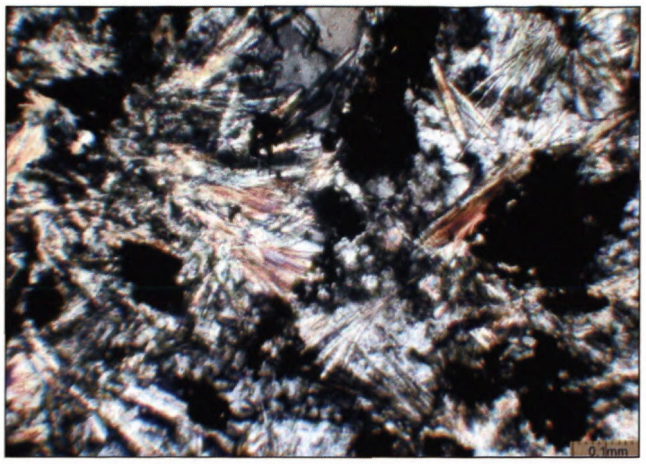

*Fig. 2 Actinolite greenschist, axe hammer, Strass 11, crossed polars*

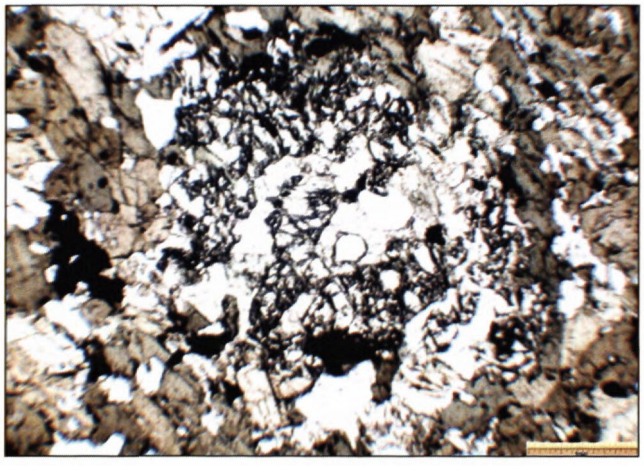

*Fig. 3 Garnet amphibolite, axe-hammer, Strass 8, plane-polarized light.*

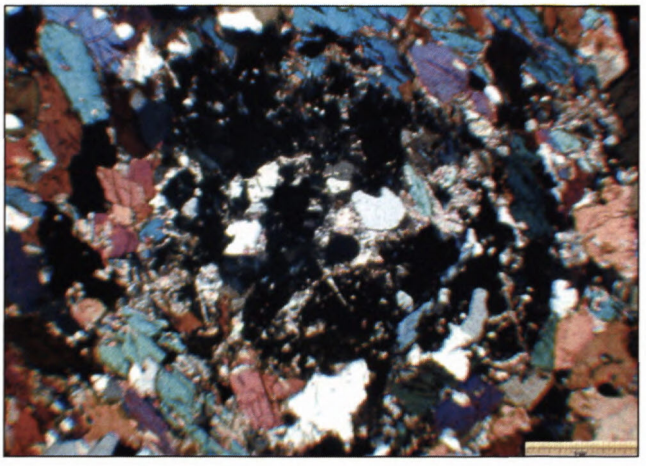

*Fig. 4 Garnet amphibolite, axe-hammer, Strass á, crossed polars*

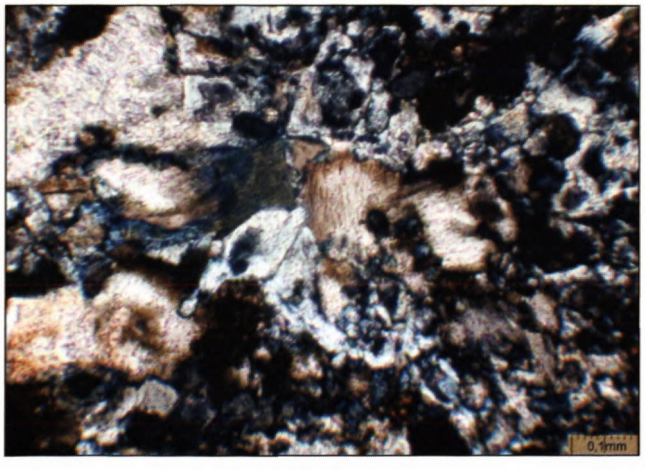

*Fig. 5 Jadeitite, axe with pointed back, Kamegg 793, crossed polars.*

a) Metamorphic rocks of the greenschist group represent the most distributed raw materials because they were used for 4 artefacts (Kamegg 1024, 124, 584, Strass 11). They have distinct schistosity usually with alternation of light and dark thin stripes (polyschematic structure). As is magnetic susceptibility concerned, the artefacts Kamegg 1024 and Kamegg 124 have the same values (0,27 – 0,31 x $10^{-3}$ SI), the axe-hammer Strass 11 has substantially higher value 3,52 – 3,56 x $10^{-3}$ SI and the axe Kamegg 584 is from this viewpoint totally different (21,2 – 22 x $10^{-3}$ SI). On the basis of thin section prepared from the axe-hammer Strass 11 we can describe the rock as an actinolite greenschist with a substantial content of opaque mineral. Similar rocks prevail at Moravian Lengyel sites with the Moravian Painted Ware of the older stage (e. g. Těšetice – Kyjovice, MPW Ia) and the question of their provenience has not been solved unambiguously till now. There are no occurrences of such rocks in two basic geological units of the eastern margin of the Bohemian Massif (the Moldanubicum and Moravicum). One of the most important sources of actinolite greenschist is supposed to be extracted in prehistoric times in NE Bohemia (the Železný Brod Crystalline Unit and its equivalents). Actinolite greenschists from the Železný Brod Crystalline Unit have magnetic susceptibility very similar to our artefacts Kamegg 1024 and Kamegg 124 excluding the axe Kamegg 584 with its very high susceptibility. We have to suppose probably another provenience for the greenschist

with high magnetic susceptibility (Kamegg 584). Such magnetic susceptibility corresponds very well to the values of greenschists from the Želešice body (the southern termination of the metabazite zone of the Brno Massif in Moravia).

b) Garnet amphibolite (a part of the axe-hammer Strass 8) is a dark green coarse-grained rock with no schistosity. Porphyroblasts of rose garnet have diameter of about 2 – 3 mm. Next to it, the rock consists of pleochroic amphibole, plagioclase feldspar, chloritized biotite and opaque mineral. Magnetic susceptibility of the rock is about 0,30 – 0,34 x $10^{-3}$ SI. The rock has its provenience in the NW area of Strass, i. e. in the Varied Group of Moldanubicum.

c) Jadeitite. The pointed back part of axe Kamegg 793 is a dusky green (5G 3/2) aphanitic rock without foliation. Magnetic susceptibility is low (circa 0,14 x $10^{-3}$ SI, it is a small chip and does not cover the sheet of measuring apparatus). In thin section the rock has almost mono-mineral character. The prevalent colourless isometric grains have xenomorphic limitation, in places they form short-columnar shape with parallel cleavage and extinction angle between 32 – 36°. In some grains the characteristic pyroxenic cleavage or a zonal texture with darker core can be seen. All these signs correspond well to jadeite and this determination has been confirmed by microprobe analyses (analyst V. Vávra, microprobe CamScan 4-DV, Department of Mineralogy, Petrology and Geochemistry at Masaryk University). Clusters of small titanites, rarely epidote and opaque mineral represent accessories.

A few jadeitite axes connected also with the Lengyel cultural complex (the Moravian Painted Ware) have been described from Moravia (Schmidt & Štelcl, 1971). The source of jadeitite artefacts has not been reliably localised but there are no occurrences of such rocks in the Bohemian Massif. Hovorka et al. (1998) introduced a jadeitite axe from Sobotište (western Slovakia) that is in morphology again close to the artefacts of the Lengyel culture. According to the authors, occurrences of such raw material have not been recorded in the Western Carpathians and they suppose its import from a distant area, probably NW Italy. We believe in the same origin as well as is the axe Kamegg 793 concerned.

d) Arkose sandstone. The whetstone Kamegg 476 is made of light grey sandstone containing besides prevalent quartz also clasts of rose or brown feldspar and foils of biotite. The rock is partly porous and soft. Magnetic susceptibility is relatively higher (1,13 – 1,18 x $10^{-3}$ SI). Its provenience can be supposed from Permian sediments at Zöbing.

## Conclusion

Our investigation has shown that the both studied Lengyel localities in northern Lower Austria have on the one hand similar raw material composition like those in southern Moravia but on the other hand they are rather poor in polished artefacts (total number from the both sites is about 20 pieces). Besides local amphibolites and Permian arkose sandstone, metamorphic rocks of the greenschist group and jadeitite had to be imported. Recently we know two important sources of greenschists in the Bohemian Massif exploited in the Neolithic: at Želešice near Brno (actinolite-chlorite and chlorite greenschists with high magnetic susceptibility) and in NE Bohemia (greenschists of the Železný Brod Crystalline Unit and its equivalents that were influenced by a contact metamorphosis of the Krkonoše-Jizera Massif). Most of raw material from Kamegg and Strass is similar to that from NE Bohemia but in the case of greenschist with high magnetic susceptibility (Kamegg 584) we can not exclude the Želešice provenience.

As is the jadeitite pointed back axe connected, we suppose their origin out of the Bohemian Massif, very probably from the Western Alps.

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