

Microstructural and compositional study of Late Iron Age (La Tène) pottery from the Mureş Valley (Transylvania, Romania)

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At Orosia and Cuci villages, located along the Mureş River in Transylvania (Romania), Late Iron Age (La Tène) pottery sherds stamped with a 'double-lyre' motif were discovered. At Orosia there was a small settlement, whereas at Cuci only a two-chamber kiln (containing also pottery) was found. To compare the composition, technology and raw materials, 23 sherds (15 from Orosia and 8 from Cuci) were investigated by polarized light optical microscopy, X-ray powder diffraction and scanning electron microscopy coupled with energy dispersive spectrometry.

The sherds have a dark brown to dark grey colour and are coated with a dark grey or black slip. The texture is more or less oriented, and the structure varies from semifine to coarse. The clasts are basically the same for all samples: quartz, K-feldspar, plagioclase, muscovite, carbonate, pyroxene, amphibole, as well as ceramoclasts, lithoclasts (andesite, basalt, micaschists, quartzite, silicestone, limestone, rare volcanic tuff) and Fe-concretions. Chemically, the matrix is Si-Al-rich, with variable amount of K, Fe, ±Ca.

The sherds from Orosia consist of a carbonate-rich illitic matrix (type A) or an illitic matrix without carbonate (type B). Optically, the matrix is highly birefringent. The carbonate inclusions are partly decomposed. The 1 and 0.45 nm X-ray diffraction peaks of illite/muscovite are strong and narrow for all type A and for a part of type B sherds. A sintered ceramic body but no vitreous phase is seen in the secondary electron images.

There are two types of Cuci sherds: type A (carbonatic, highly birefringent, similar to the Orosia type A samples) and type C (non-carbonate, with an opaque matrix, due to a high content of Fe-phases, most likely spinel). The X-ray diffraction peaks of illite/muscovite are very weak. A vitreous mass with some minerals relics is seen in the secondary electron images.

The thermal changes e.g. the sinterization, the incomplete destruction of the clay minerals and muscovite crystalline structure, and the partial decomposition of carbonate indicate ~800–850 °C firing temperature for the sherds of type A (Orosia and Cuci) and B (Orosia). A higher temperature (~900 °C) is inferred for the type C sherds (Cuci), based on the extensive vitrification of the matrix, the destruction of the clay minerals and muscovite structure and the formation of spinel.

The composition of the matrix in the sherds of type A indicates carbonate-rich illitic clay (mudstone) as a raw material, for which the Neogene (Sarmatian and Pannonian) marly clay and clay cropping out nearby would be a good candidate. For the type B and C of sherds, it is possible that small occurrences were quarried. The local alluvia of the Mureş River could have served as tempering material for all samples.

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