PROVENANCE STUDY OF ARCHAEOLOGICAL CERAMICS BY HEAVY MINERAL INVESTIGATIONS USING A MICROMINERALOGICAL COLLECTION: A CASE STUDY FROM NE HUNGARY

SZILÁGYI, V.[1], PÉTERDI, B.[2], SZAKMÁNY, Gy.[3], JÓZSA, S.[3], MIKLÓS, D. G.[3] & GYURICZA, Gy.[2]
[1] Centre for Energy Research, Budapest, Hungary
[2] Mining and Geological Survey of Hungary, Budapest, Hungary
[3] Department of Petrology and Geochemistry, Eötvös Loránd University, Budapest, Hungary
E-mail: szilagyi.veronika@ek-cer.hu

Provenance of pottery

Provenance of archaeological pottery means the sources of ceramic raw materials, and this approach helps to determine local, regional or long-distance material supply of pottery handicraft of a given ethnic group or culture. Characterization of a ceramic matrix, i.e., the clastic (clay-silt-sand) raw material type may require detailed (beyond instrumental chemical/ mineralogical methods or conventional petrography, SEM-EDS) investigations in case of common mineralogical composition or fine-grained texture. In such cases, the exact determination of heavy mineral (HM) components of the ceramic matrix provides possibility to connect it directly to the clastic raw material type (region of source) applied (MANGE & BEZECZKY, 2007; BONG *et al*., 2010; SAUER, 2013).

The knowledge on the HM assemblages of potential raw material territories is the key to the successful provenance determination. The micromineralogical collection of the Mining and Geological Survey of Hungary (MBFSZ) provides a useful database for a direct comparison of mineral species detected in archaeological pottery to phases preserved in sediments by conventional petrography or SEM-EDS. As introduced by PÉTERDI *et al*. (2021), the MBFSZ micromineralogical collection covers the surficial/near surface alluvial clastic sediments of Hungary with more than 700 localities. As a result of the continuous evaluation, qualitative-quantitative information on the overall mineralogy is being accumulated. These data are appropriate for a more exact determination of potential raw material territories, and for the localization of paste or tempering material sources.

Case study from NE Hungary (10th c. pottery from Edelény-Borsod)

Heavy mineral composition of pottery from the 10th century settlement of Edelény-Borsod is compared with geological localities of the surrounding Bódva and Sajó river sediments (20 sampling localities from the MBFSZ micromineralogical collection). The observed pottery assemblage could be characterized by a predominant petrographic group containing an opaque minerals-tourmaline-garnet-zircon-brown and green amphibole-(epidote) HM assemblage. As a result of the comparison, it can be concluded that the Edelény ceramics and the Sajó sediments [garnet-(green, brown)amphibole-orthopyroxene-ilmenite-epidote-zoisite-hematite-tourmaline] are more similar than that of the Bódva [iron oxides/hydroxides-hematite-limonite-ilmenite(-magnetite); different appearance of tourmaline and orthopyroxene, presence of blue amphibole]. Representative information on HM species ratios from the pottery material is not possible to gain due to the small sample amount (thin section size), the accidental sampling (plane of the thin section), and the limitations of thin section petrography of ceramics in determination of mineralogy (e.g., opaques). So, much more attention has to be dedicated to the qualitative comparison by the determination of major and minor-trace element composition of HM mineral species (e.g., garnet, zircon, pyroxene and amphibole) by SEM-EDS and LA-ICP-MS (JÓZSA *et al*., 2016; KÜRTHY *et al*., 2018), which data – by determining the origin of minerals – help to better characterize the source region of the ceramic raw materials.

To conclude, the existence of micromineralogical collections (e.g., at the MBFSZ) is a great opportunity for ceramics provenance studies. Although, adequate HM study of archaeological pottery requires as much amount of sample as possible, but it results in comparable and informative data on the raw material provenance. The comparison with the HM assemblages of sediment samples is not quantitative but qualitative. In addition, it requires the deliberate synchronization of determination and categorization of HM species.

References

BONG, W. S. K., MATSUMURA, K., YOKOYAMA, K. & NAKAI, I. (2010): Journal of Archaeological Science, 37: 2165–2178.

JÓZSA, S., SZAKMÁNY, Gy., OBBÁGY, G. & KÜRTHY, D. (2016): Archeometriai Műhely, 13/3: 173–190.

KÜRTHY, D., SZAKMÁNY, Gy., JÓZSA, S., FEKETE, M. & SZABÓ, G. (2018): Archeometriai Műhely, 15/1: 1–12.

MANGE, M. A. & BEZECZKY, T. (2007): In: Mange, M. A. & Wright, D. T. (Eds.): Heavy minerals in use. Developments in Sedimentology, 58: 1007–1033.

PÉTERDI, B., SZILÁGYI, V., SZAKMÁNY, Gy., JÓZSA, S., MIKLÓS, D. G. & GYURICZA, Gy (2021): Acta Mineralogica-Petrographica, Abstract Series, 11, 36

SAUER, R. (2013): In: Bezeczky, T. (Ed.): The amphorae of Roman Ephesus. Forschungen in Ephesos, 15/1: 197–212.