Studies on Romanian prehistoric bronze artifacts at ATOMKI Debrecen

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Compositional studies on ancient bronze artefacts and on the possible provenance of their copper and tin contents are performed all around the world. For South-Eastern Europe, Balkan Bronze Age artifacts have been studied in relation to the compositional pattern of ancient mines from Serbia and Bulgaria\(^1\).

We decided to start a similar investigation on Bronze Age bronze artifacts found on Romanian territory and to compare the results with already published data on old regional mines – Austria, Hungary, Romania, Serbia, Bulgaria. A series of 30 samples from 12 Bronze Age copper-based objects\(^2\) – sickles, celts, knives, small ingots (fig. 1) – belonging to Santana (votive deposit), Spalnaca (foundry deposit), Drajna de Jos (votive deposit) and two native copper samples from Balan (Eastern Transylvania) and Rudabanya. Santana, Spalnaca and Drajna de Jos deposits (fig. 2) have been studied by micro-PIXE at ATOMKI.

The results\(^3\) showed that trace elements like cobalt, selenium, bismuth, mercury and brome as well as indium and silver could be possible indicators of certain metal sources. More specifically, mercury has been identified in a Hungarian native copper sample and lead a Transylvanian source. Bismuth has been detected in a set of Drajna sickles, partly superposed with a set containing mercury; this suggests partly use of remelted Alpine and maybe also Hungarian copper (and probable commercial links with the region).

Micro-PIXE can describe the local composition of the objects, the local inhomogeneity in their structure and put in evidence the presence of trace elements in the copper (Sb, Co, Ag, Se). Averaged over a sufficient area, they can give an accurate global composition of the material. We can suggest possible sources for some items, mainly for early objects made of impure copper, less for later bronzes, due to remelting.

References

Bibliography


