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The ancient metallurgy of the Delice valley

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The Delice valley lies in the Halys basin and was the homeland of the Hatti people, a culture absorbed into the Hittite Empire. The textual and archaeological evidence indicates well-developed metallurgy after the 16th–15th century BC under the Hittites, and, dating even earlier, a wealth of Early Bronze Age (EBA) metal artefacts has been recovered from the region (dating especially to the second half of the third millennium BC). However, our knowledge about the ores used, the locales of production and the technologies employed at the beginning of metallurgy in north-central Anatolia is far from complete. For example, neither archaeological nor geological research has been conducted to identify the ore deposits exploited during the Bronze Age or to associate particular archaeological sites in north-central Anatolia with these ores.

The scope of our project, which is sponsored by the BIAA and generously funded by the ITU Research and Science Council, is to identify possible sites of metallurgical production, to locate possible resources relevant to metallurgy and to characterise chemically the metallic resources of the Delice valley in north-central Anatolia. By examining petrographic and isotopic data from resources as well as establishing isotopic data for metal artefacts from a case site (Resuloğlu), the project aims to construct a model of the relationship between ancient societies and their environment in terms of the manipulation of local metal resources.

This research derives data from both the Delice Valley Survey Project (DVS) and the excavations at Resuloğlu. The DVS, initiated in 2016 under the direction of Bülent Arıkan with a team of archaeologists, archaeometallurgists, geologists and geomorphologists, focuses on establishing a better understanding of the use of raw materials in the region and how the Bronze Age settlement systems relate to the use natural resources, the exchange of finished goods and the long-term environmental impacts of technological production.

Systematic excavations targetting the Hatti settlements are relatively rare and thus work at Resuloğlu is significant in terms of the assessment of ancient societies in north-central Anatolia. The site has been excavated systematically for more than 15 years under the direction of Tayfun Yıldırım; it is one of just a few Hatti sites providing valuable evidence for the EBA settlements and metal assemblages of the region. Located on a hilltop in the western part of Çorum, the site dates to the late EBA II–III (c. 2500/2400–2100/2050 BC). Discovery of both the settlement and adjacent cemetery makes Resuloğlu an exceptional case-site by which to study the social, cultural and economic setting of highland communities during the latter half of the third millennium BC. Ongoing archaeometric research on the metal assemblage has identified gold, silver, electrum and lead, along with copper and its binary (ex. arsenical copper) and ternary alloys (ex. copper-arsenic-tin alloy).

By combining data from both the DVS and the Resuloğlu excavations our project seeks answers to the following questions. Where are the ore deposits of north-central Anatolia located, particularly within the Delice valley between Sungurlu and Çorum? Were there sites for processing ores? Which ores might have been used for the manufacture of the metal assemblages recovered from the EBA settlements of the region, particularly that of Resuloğlu?

This year, our fieldwork consisted of intensive pedestrian survey between the villages of Üçoluk and Karaevliya, where a number of copper mineralisations have been investigated. The DVS area was photographed to produce high-resolution imagery. Elemental analysis of the Resuloğlu metal corpus was evaluated and 40 samples were sent to the Central Laboratory of the Middle East Technical University for lead-isotope analysis. Polished sections from each copper occurrence were prepared and petrographic studies are in progress. Similarly, XRD analyses are ongoing.

This project forms an essential component of the holistic study encompassing the DVS and the Resuloğlu excavations. We are optimistic that the results, together with those of the survey and the excavation, will have a capacity building effect on protohistoric metallurgy studies. The research area is one of the richest regions in terms of ores, and this research will enable us to build a database of the physical and chemical signatures of the metal deposits, which may then be used to trace the source of finished metal artefacts found in archaeological contexts. The results will bring much-needed momentum to research on Hatti culture and its development.

A representative sample of Resuloğlu metal artefacts.