

Fragment of an iron bloom from the Pannonian tumulus of Regöly (Hungary) - the inception of iron working in the Carpathian Basin?

Béla Török^{1*}, Péter Barkóczy², Géza Szabó³,

¹ Institute of Metallurgy, University of Miskolc, Hungary

² Institute of Physical Metallurgy, Metalforming and Nanotechnology, University of Miskolc, Hungary

³ Wosinszky Mór Museum, Szekszárd, Hungary

* Corresponding author and speaker: bela.torok@uni-miskolc.hu

Abstract

According to our current knowledge, the fragment of a presumed iron bloom was found in the tumulus of Regöly, between Lake Balaton and the Danube in Hungary. This may be the earliest example of iron working in the Carpathian Basin (last third of the 7th century BC), and it raises several questions from both a historical and a technological point of view. From the end of the 7th century BC in the south-west of present-day Hungary, in Croatia and Slovenia, and in the area from the Danube to the Adriatic Sea, there were archaeological groups of related material cultures of eastern origin (Regöly, Kaptol, Martijanec). According to Herodotus, these can be identified with various tribes of the Sigynnae. According to their origins, they were probably Medes, later known as Illyrians and Pannonians. The discovery of the Regöly bloom fragment raises the possibility that the most ancient iron metallurgy and ironworking technology were directly brought to the Carpathian Basin by this population migrating from Asia Minor.

The goal of our archaeometric case study is multifaceted: our first aim is the characterization of the presumed iron bloom fragment, to see what kind of processing we are dealing with, and the second to see if the bloom fragment can be linked in any way to the iron objects found at the site. To answer these questions, examinations with optical microscopy (OM) and scanning electron microscopy (SEM-EDS) were carried out on the iron objects and the bloom fragment. Metallographic analysis of the latter revealed a highly specific microstructure, which indicates with certainty that it is not a primary product coming directly from the bloomery furnace, but a secondary or even tertiary product (prefabrication). In the case of the bloom fragment, traces of jumping and slag inclusions were also examined. The results of the metallographic analyses of the Regöly bloom fragment were compared with the microstructures of other iron blooms samples found in Hungary, such as a fragment of iron bloom from a Celtic workshop-type site (Bükkábrány, 4th-3rd century BC). A direct link between the examined iron objects and the iron bloom fragment as a possible raw material cannot be confirmed, however, at the same time, the iron artefacts, fragments of which were found at Regöly, might easily have been made from the basic material represented by the iron bloom (ingot) fragment. Nevertheless, although the Regöly find does not provide evidence for the technology of iron smelting in the Carpathian Basin in the 7th century BC, it gives evidence for iron forging from a semi-finished product.

Keywords: iron, bloom, Carpathian Basin, optical microscopy, SEM-EDS