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SECRETS OF IRON - FROM RAW MATERIAL TO AN IRON OBJECT

TAJNE ŽELJEZA - OD SIROVINE DO ŽELJEZNOG PREDMETA

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analysis, it can be shown that a similarity in the content and ratio of micro-impurities is observed between the metal of the forge products from Istya 2 and Staraya Ryazan. Thus, there is every reason to consider the settlement of Istye 2 as a source of raw materials for such a large production center as Staraya Ryazan.
The work was supported by the Russian Science Foundation (grant number 19-18-00144).

Szilvia Gyöngyösi, Zsuzsa Bánóczy, Péter Barkóczy, Géza Szabó:
Specialized iron production in Roman period

Mining and metallurgy were managed in a centralized way in the Roman Empire according to the sources for this period. The Pannonian territory was mainly supplied with smelted and processed iron raw material from the Majdan mountains. This area was used for iron production until the early Iron age. The raw material was used and processed locally adjusted to the local needs. Square based iron prisms such as slabs, which were found and excavated at more deposits in South Transdanubia, raise interesting questions. Similar slabs were found in 1880 in the vicinity of Hrvatska Dubica, Croatia. Aleksander Durman supposed the origin of slabs was the Roman Age. The length of the slabs is approximately 20 cm and the weight of these is between 11 and 15 libras, equal to 2.6-4.91 kg. All of these slabs are forged. Syrian effects on the production and the slabs themselves are assessed based on the other artefacts found near the place of the deposition. Two places are known in Pannonia, next to the Danube (Intercisa-Dunaújváros) and next to Kapos river (Dombovár, Regöly) where similar iron prisms were found. However, these slabs have heavier weight: 5.4-10 kg. Iron smelting and metallurgy strongly depend on the raw material and the technique. The technology was necessarily traditionalist in all its details due to the quality assurance. Therefore, the metallography of these slabs has a great importance in the research project of the slabs. An investigation of the Pannonian slabs reveals that more pieces of bog iron were forged together to build up the prisms. The microstructure of the slabs is heterogeneous as in the case of bogs. Mainly ferrite and perlite built up the microstructure, where Widmanstätten ferrite was also discovered. All estimated properties of the slabs show that these slabs as raw materials proved a standard quality for the manufacturing of iron tools.

Evgeny Vodyasov, Olga Zaitceva:
Recent research on iron-smelting sites in the Altai Mountains (South Siberia)

The report will present the first results of our project on the ancient iron metallurgy of the Altai Region. The earliest Altai iron-smelting furnaces are dated to the 4th and the 5th centuries AD, while in the 7th and the 8th centuries AD an inexplicable “sud-

den" disappearance of all the smelting sites (!) occurred in the Altai Mountains. Three types of furnaces existed in Altai at that time: box-shaped linear furnaces, shaft furnaces, and semicircular furnaces with a curved C-shaped back wall. The box-shaped linear furnaces with a large number of holes on each of the longitudinal walls were the largest ones in North and Central Asia in 400-600 AD.

We conducted comprehensive geoarchaeological research on the unique box-shaped furnaces at the Kuyahtanar iron-smelting site in 2018-2019. A series of non-destructive procedures were carried out: aerial photography, creation of 3D terrain models, and magnetic surveying. The report will also present the results of excavations.

In order to find the ore sources for the ancient metallurgy, we examined the mountainous regions of Altai and discovered large early medieval mines. The results of the XRF analysis of ore from different metallurgical sites show that, with a high degree of probability, the discovered mines were the actual ore sources.

The research was supported by Russian Science Foundation (project no. 18-78-10076).

Matija Črešnar, Branko Mušič, Barbara Horn, Jaka Burja:

Cvinger near Dolenjske Toplice: an Early Iron Age iron-production centre and a new wave of interdisciplinary research

The prehistoric complex of Cvinger near Dolenjske Toplice occupies a limestone hill between the modern towns of Meniška vas and Dolenjske Toplice in the Dolenjska/Lower Carniola region (SE Slovenia). It consists of a hillfort, three tumulus cemeteries, and an iron-smelting area. The settlement holds a strategic position, which enables visual control of the surrounding lowlands, with key routes running across this landscape. The first occupational phase of Cvinger can be dated to the Late Bronze Age (Ha B). After a hiatus, the hillfort was resettled in the Late Hallstatt period, most probably in the late 6th century BC and remained inhabited until the end of the Late Hallstatt period, i.e. until the end of the 4th century BC.

The history of research into the archaeological complex at Cvinger is lengthy and goes back to the end of the 19th century. The most recent research campaign started in 2014. In the first step of our research, airborne laser scanning (ALS) was utilized in order to build the base documentation of the site and the broader area around it. The identified features were then studied by large-scale multi-method geophysical measurements (magnetic method, low-frequency electromagnetic method, electrical resistivity tomography, and magnetic susceptibility of surface layers), as well as an intra-site surface collection and trial trenching.

One of the key areas for understanding Cvinger is definitely the Branževec iron-smelting site, which is to date the largest of its kind in the region. Therefore, intensive research was focused in and around this zone, but also in other parts of the complex