Early Medieval Iron Production in Podravina - NW Croatia

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The unsystematic but intense superficial survey of the area (ca. 300 km²) around the city of Novi Vinodolski (NW Croatia), was made by local amateur archaeologist Ivan Zvijac, Toretic. Aside from other excavations made by archeologists from different local and national institutions based on his data, in the year 2008 was excavated the first iron production workshop (Urje Volarić, br. 2008 = Sonda 1) under the leadership of the archeologist from the national institution (Dr. Taja Sekej Ivaroš, Archaeological Institute Zagreb). In the next years further sites with iron production traces was explored by the same team. In the 2010 start the cooperation with archaeologist starting a specialisation in the topic of iron archeology (I. M. H.). The no budget or low budget nature of the research (very common in south-eastern Europe) and the absence of experienced scholars in the former Yugoslavia countries pushed the development of research methods in the macroscopic analysis, based on methodology developed in France-Essonnes arche-metalurgica mile, (eg. Escherich, Serreis 1991, Escherich et al 2007) and into no laboratory research. The almost regular continuity of excavation gave the opportunity to develop documenting methods on the field survey, excavation and past excavation work.

One of the most important methodological improvement was the introduction of the total collection of the slag on excavation (even if is more than twice of material) instead of traditional “sampling” on site with “big amount” of slag. In Podravina in 2010 started the total collection of “metallic” slag and after 2012 the whole dump. The sites with partial collection are marked by (*).


The sites

The part of Podravina a region where the iron was produced is a flatland of former river meanders frequently flooded by the river Drava. The sites with ironworking debris are mostly on the lower edge of these dunes or little hills. From the data of field survey is very probable the production was carried out from the pre-roman/early period through the roman and early medieval (EMG) and maybe high medieval period. The excavation was pointed to early Roman and late iron age sites but discovered also some probably early roman furnaces debris.

How much slag is a lot of slag?

Even if you have not a remarkable remain of furnaces or smithy oven is the slag and other waste one of the ways to get the possibility to compare the different iron workshops.

The simplified documenting protocol is consist of: 1. collect all material per stratigraphic unit; 2. wash all material with water (toothbrush can be used); 3. dry it, 4. divide material per major categories (smelting slag, smelting ash, defined slag, furnace wall, core, other); 5. weight it (every piece and write in a paper notebook so you can draw the most interesting pieces); 6. take pictures of all material (together but divided per categories); 7. pick up the material for the catalogue (=singular description, measurement, picture, analysis); 8. put the unnamed material back in the bag or box.

At the beginning is always hard to distinguish the different categories (and also later is not always easy) but there is always very useful category: a undefined category. Don’t forget, the first half tone is always the hardest.

Pictures and tables

1. The first group (until 2015) of sites with slag in Podravina and their position on the map before the regulation of the Drava river.
2. The cumulative weight of macroscopic/morphologic analysis divided per site (numbers).
3. The portion of the material in the site.
4. The cumulative weight of macroscopic/morphologic analysis divided per trench (percent).
5. Urje slag, dumps (cumulative) compared with other early medieval sites.
6. Urje smithy dumps compared with antique and early medieval smithy debris in Sisak and Osijek.
7. Map of analyzed dumps in Slovenia and Croatia (full dot) and other sites mentioned (empty dot).
8. Reconstruction of the workshop organisation on the Urje - Site I.
9. Construction of the furnace wall (Urje - Site E).
10. Ideal reconstruction of the smelting process - man number of tapping slag (Urje - Site E).
11. Smallest and biggest complete tapperd slag (Urje - Site E).

Detailed analysis and conclusions on the workshop organisation on the Urje - Site I.

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The data analysis and especially the site organisation are still in progress.