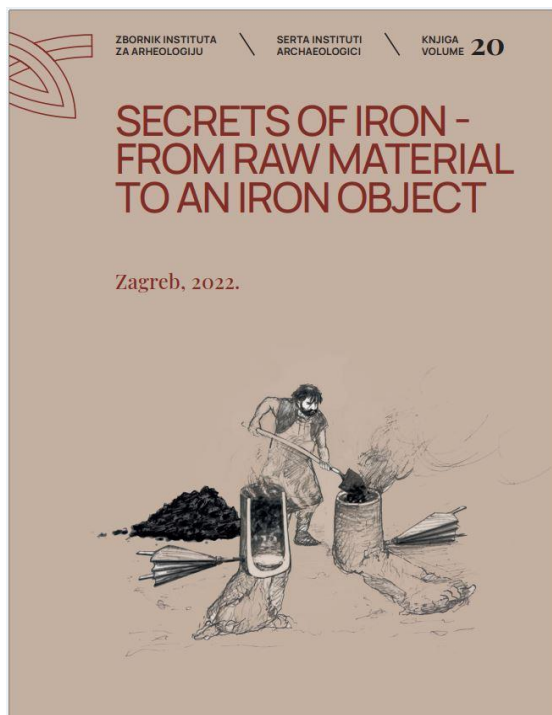


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Review: Secrets of Iron – From Raw Material to an Iron Object. Proceedings of the 7th International Conference of Medieval Archaeology of the Institute of Archaeology Zagreb, 10th – 11th September 2020.

Editors: Tajana Sekelj Ivančan; Tena Karavidović; Tatjana Tkalčec; Siniša Krzrnar; Juraj Belaj

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The book contains 16 studies from the presentations of the international scientific conference entitled “*Secrets of Iron – From Raw Material to an Iron Object*” which was organised by the Institute of Archaeology in cooperation with the Archaeological Museum in Zagreb in 2020. The topics of the conference and the book were mainly related to the medieval archaeology but at the same time, they covered multiple historical periods from the early Iron Age up to the Modern Age.

The majority of the papers focus geographically on East-Central Europe and a wide range of aspects is represented: in terms of the contemporary professions, mining, iron metallurgy, including metal production and processing.

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Hungarian experts participated in the conference and in the reviewing process of the book. The opening presentation of the conference was held by János Gömöri (Hungarian Academy of Sciences, VEAB Group on Industrial Heritage). Furthermore, he also assisted in the reviewing process of the book. Béla Török (Archaeometallurgical Research Group of the University of Miskolc) participated in the reviewing work of the book.

The series of the studies start with two methodological research. *Sandra Rončević* presents an interesting overview about the advanced instrumental analytical methods used during the chemical profiling of archaeological samples alongside with the advantages and disadvantages of the different analytical methods. The author points out the importance of the selection of an appropriate method for compositional analysis with several crucial questions: like the costs of the investigations, whether the analytical methods are invasive or not or how much sample is required for the chosen analytical methods? Beside this, the importance of the multi-method approach (the combination of different analytical methods) in analysing the artefacts from early iron-production was highlighted in this paper and also very well represented in the second study written by *Ivan Nemet* and *Tena Karavidović*. The examined early-iron production remains were unearthed at Okuje site (Turopolje region, Croatia) and were analysed by using a combination of plasma spectrometric methods with X-ray fluorescence (XRF) and electron microscopy (SEM-EDS). The whole process was supplemented by principal component analysis and hierarchical cluster analysis. The study proved that this method, along with an extended elemental signature, is useful for identifying sub-groups within visually similar slags.

The following studies cover the topics of non-invasive methods of sites with remnants of iron production activities, geological studies of ore sources, excavations of different iron smelting sites, technological studies and technological transfer.

The paper, written by *Branko Mušič* and his co-workers, presents geochemical examinations of an iron-smelting area in the complex of Cvinger, Southeast Slovenia. The aim of this article is to examine the possibility of effective use of geophysical prospecting for the discovery of iron-smelting centres in the examined territory. The next study, written by *Branko Mušič*, *Barbara Horn* and *Tajana Sekelj Ivančan*, is also interesting since they present the results of magnetic prospecting of the late antique and early medieval iron production sites in the Podravina Region, Northeast Croatia. The authors identified the former bloomery iron production site on the basis of their magnetic properties.

The next study was written by *Tomislav Brenko* and his colleagues. Their paper provides new data on soil characteristics and new evidence for possible bog iron ore formation of the area in Podravina Region (Northeast Croatia). The position of the possible bog iron ore formations was indicated by a previous archaeological excavation. *Vladimir I. Zavyalov* and *Nataliya N. Terekhova's* paper deals with the ore sources of the Ryazan Principality (Russia). The authors highlighted in their study that the discovered ore occurrences were located near to the major medieval craft centres. Presumably, these ore layers were easily accessible to the former miners. However, the authors successfully determined the characteristics of the ore used by the medieval ironmakers of Ryazan. The next study written by *Ladislav Lazić* and *Aleksandar Durman* presents the mining and metallurgy in the Mount Trgovi and Northwestern Bosnia. The main objective of the research was to show the importance of iron production and trade in the examined territory, which led to the emergence of settlements and the constructions of roads. The paper also gives a short description of the technology of iron production. *Tena Karavidović* and *Ivan Drnić* in their study present the analysis of findings related to iron production from two Iron Age Sites (Gornje Pokupje and Sisak-Pogorelac, Croatia). The objectives of the research were to understand the activities carried out at the sites and to determine the potential of local iron production at that time in the Pokuplje region (central Croatia). This paper contributes new data to the study of iron metallurgy within the region paving the way for more intensive future research. The article by *Aleksandra Bugar* presents the results of the archaeological excavations at the Okuje Site which is located in Turopolje, south of Zagreb. The author points out the traces of metallurgical activity. According to the author, this area is probably at the edge of a workshop complex where metallurgical waste was disposed. The study also contains a short summary of the chemical analysis of the waste.

Ivan Valent's article aims to present a preliminary interpretation of the slag from the Study Archaeological Collection of the Koprivnica Town Museum and the newly conducted excavation in the River Drava Basin. Besides this, the author discusses the type and the intensity of metallurgical activities within the Iron Age and Antiquity.

The next study written by *Brigitte Cech* deals with the production of iron in Hüttenberg (Carinthia, Austria). Ferrum Noricum was known for its high-quality steel in the ancient times, and the researchers assume that Hüttenberg was the centre of production of this famous steel. The author presents in her paper the steps of the excavation which was carried out in Schemlach/Eisner. This was a highly important industrial site (from the 1st century BC until the 4th century AD) and at the

same time clear evidence of a settlement was also found. In the following paper, the results of an interdisciplinary research were presented by *Ana Konestra* and her co-authors. The research was carried out at Podšilo bay in Lopar on the island of Rab (northeastern Adriatic) where the remains of iron smelting has been detected in a Roman rural site. Another interesting paper can be read about metallurgical site of Pržanj, near Ljubljana. The interdisciplinary study was written by *Daša Pavlovič* and *Jaka Burja*. They present the results of mineralogical and chemical analysis of 22 iron slag, ore and furnace lining samples from the examined territory. The following article by *Silviu Oța* discusses the iron processing at Caransebeș (Romania) in the Early Modern Age. The use of the discovered workshop started from the 14th century and operated until the integration of the territory into the Habsburg Empire. However, the article focuses only on the 16th and 17th century. Based on the results of the excavation, the author assumes that the common use iron objects like nails, spikes, horseshoes were produced here.

A very unique study is written by *Damir Doračić* and his colleagues which shows the technological analysis and conservation process of an early medieval double-edged sword accidentally discovered at the quarry at Bojna-Brekinjova Kosa in Sisak-Moslavina (Croatia). After the restoration and conservation of the weapon, metallographical examinations were carried out in order to reconstruct the manufacturing techniques and trace the potential source of iron used for the sword. The authors established that the blade was pattern-welded and constructed from nine pieces.

The last paper, written by *Gašper Oitzl* discusses a significant progress in ironworking technologies in Slovenian territory between the 14th and 16th centuries. In this process, foreign ironworking masters, presumably originated from Italy, played an important role in the implantation of new technologies.

The studies presented in this book are interdisciplinary and show the readers various approaches and sub-topics with different methodology of the discussed subjects, for instance, archaeological excavations of preserved furnaces and workshops or discussions on long-term iron production and knowledge transfer. The value of the interdisciplinarity is very clearly represented not only in the individual papers but in the whole volume as well. The authors of the book present new findings and because of this, it can be useful to the professionals concerned, not only in the country of the publication, but also internationally. The book's target readers are scholars and researchers dealing with archaeology, history of ironmaking and processing, but it is also recommended for students and PhD students concerned in this topic.

Overall, the subject of the book is specialized but the different approaches of the various topics mean that it would be of interest to humanities and technical-scientific specialists who are not directly worked with this field.

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