

Book Reviews

Miljana Radivojević, Benjamin W. Roberts, Miroslav Marić, Julka Kuzmanović Cvetković and Thilo Rehren, eds. *The Rise of Metallurgy in Eurasia: Evolution, Organisation and Consumption of Early Metal in the Balkans* (Oxford: Archaeopress, 2021, xvii and 676pp., 89 tables, 408 colour and b/w figures, ISBN 978-1-80327-042-5, eBook: ISBN 978-1-80327-043-2)

This is the volume that the community of researchers studying the beginnings of southeast European metallurgy has been waiting for a long time. Since Colin Renfrew's foundational studies on the independence of southeastern European metallurgy and the emergence of social inequality (Renfrew, 1969; 1978), intensive interdisciplinary research has significantly increased our knowledge of the beginnings of the technology of metallurgy. However, still little is known about its social context. Renfrew's highly influential model—in particular the link between the rise of the elite, the emergence of specialized artisans, and the control of long-distance trade in metal products, based primarily on the wealthy cemetery at Varna—has determined the interpretation of early metallurgy for decades, and new interpretations questioning the links between metallurgy and the emergence of social inequality have emerged only in the last decades (Kienlin, 2010). These opposing interpretations have in common that they relate history-shaping phenomena on a macro-regional level without delving into the details and local histories. Nevertheless, the devil is in the detail.

This is why *The Rise of Metallurgy in Eurasia's* massive volume is a refreshing example of twenty-first-century multidisciplinary archaeology. The most important result of the project is a more detailed understanding of the beginnings of

metallurgical technology and its social context. This is done in small steps, starting from the description of excavation observations and building on well-documented field data, which can be accessed and verified by anyone thanks to the open access volume and online appendices. A freely accessible database is now a basic requirement; however, a major debt of twentieth century archaeological research is that its publication is frequently delayed. This volume meets this modern requirement to a large extent, which is indeed a model to be followed.

The volume consists of five main parts and fifty-three chapters; the individual parts could even be separate volumes. The first introductory part provides a comprehensive overview of the research topic and the project's background (Chapters 3–6) and clearly formulates the research questions to be answered (Chapter 2). Their main goal is to map the origins of metallurgy, prior technological knowledge and its *chaîne opératoire*. It is unusual to read such a personal retrospective on the research on the beginnings of metallurgy in the Balkans as the one in the first chapter, but it reflects well how the authoritarian academic life worked in the second half of the twentieth century—not only—in the former Yugoslavia and then in Serbia.

For me it is particularly exciting to read how the different opinions of the team members on some particular issues are

expressed in the volume. Chapter 3 reviews the current knowledge of the development of metallurgy and its social context from the Neolithic to the end of the Copper Age. This chapter and the concluding fifth part of the volume go beyond the direct research object of the project, the metallurgy of the Vinča culture, in both space and time, placing it in a broader context. The absolute dating of the period after the end of the Vinča culture has undergone a significant transformation in the last ten years, but this is little reflected in the volume, although it is of particular importance for the interpretation and outlining of long-distance relationships. For a volume of this size, minor errors are inevitable—fortunately few in this case—but the misplacement of sites on maps and the confusion of the Neolithic and Copper Age horizons of the Carpathian Basin and Central Europe, and their interpretation are especially disturbing.

The multidisciplinary project *The Rise of Metallurgy in Eurasia* focused on the research of two crucial sites, Belovode and Pločnik. These sites have a long research history: the Pločnik hoards and the pieces of evidence of early copper smelting in Belovode brought them to the forefront of research (Šljivar et al., 2006).

In the framework of the project, in 2012–13, extensive geophysical surveys and small-scale excavations were carried out at these sites. The results of the excavations are presented in detail in the second and third parts, which could also be used as an independent excavation monograph. The evaluation chapters for each find type are included in the fifth part. Within the second and third parts, landscape, the results of geophysical surveys and excavations, findings of local metallurgy, pottery, typochronology based on correspondence analysis, ceramic technology, figurines, stone and bone tools,

archaeozoological, and archaeobotanical remains are described in different chapters, all along the same lines. From a structural point of view, perhaps the place of the radiocarbon measurements' presentation is not ideal (Chapter 37) since there are already repeated references to the absolute dating of numerous phenomena in several chapters in the second and third parts, but the primary data are only given in the fifth, summary part. Regarding the other chapters, I believe it would have been appropriate to include them in a chapter on the excavation results and finds of the sites. Regardless, radiocarbon measurements confirm the early dating of the beginnings of metallurgy (Borić, 2009) around 5000 cal BC. Although both sites have been subject to significant earlier excavations, the details of their results are still unpublished, excavation observations dating back to the early twentieth century are sometimes undocumented, and, in the case of Pločnik, a significant part of the site has since been destroyed. Thus, a detailed publication of the finds from the trenches excavated within the project is of relevance not only to those interested in metallurgy but also in other aspects of the period.

The geophysical surveys are an essential basis for reconstructing the size of the investigated settlements and the number of their inhabitants and, thus, the social context in which the technology of metallurgy took shape. Based on the number of buildings, around 1,440–1,600 people occupied Belovode's 33 ha and 1,250 people occupied Pločnik's 26 ha, making these settlements much smaller than previously assumed but still significant in size (Chapters 9 and 24). This is roughly consistent with the demographics estimated from the mathematical models (Chapter 40).

The pottery and typochronology of the Vinča culture have long been a central

issue in the research of the Neolithic in southeast Europe. The perception of ceramics has changed a lot since the traditional culture-historical approach; however, research into the southeastern European Neolithic still struggles with the challenge posed by copious ceramic finds. The sheer volume of pottery alone presents enormous challenges in processing and publishing. The processing of sherds certainly requires statistical methods and a strong selection during publication. This selection is inevitably subjective and illustrates the author's interpretation. In this field, the emergence of online publications represents a huge opportunity. The online database of excavation data (Appendix A) includes basic data on pottery, which is a huge step forward for researchers working on ceramics.

Miljana Radivojević and her colleagues add further vital data to their earlier results on the rise of metallurgy (Radivojević et al., 2010), which, together with the other results of the excavations, acquire their true significance in the archaeological context. This enabled the research team to formulate a new model, supported by excavation data, comparable to Colin Renfrew's theory of the social background of metallurgy.

At Belovode, every step of the *chaîne opératoire* of metallurgy could be documented. Pločnik is somewhat different, as only secondary metal production activities, such as smelting, refining, and hammering/thinning, were found. However, we cannot ignore (as the authors themselves emphasized) that in the case of both sites, only a small trench was excavated. The data from previous excavations are still not known in comparable detail. Whether these metallurgical (and other craft) activities are truly uniform throughout the settlements remains questionable. A direct link between the two settlements may be

indicated by the fact that, based on archaeometallurgical studies, one of the Pločnik chisels could have been made from raw material smelted at Belovode.

In addition to reconstructing the technology of metallurgy, a significant new result of the project, and one that will shape future research, is the examination of cross-craft relationships, primarily the possible pyrotechnological link between pottery production and metallurgy (Chapters 14, 29, and 43). The topos of a link between the pyrotechnology required for black burnished or graphite painted pottery and metallurgy has long been a theme in archaeology. Silvia Amicone's well-structured research clearly refutes the previous idea that pottery is the pyrotechnological basis of metallurgy (Chapters 14, 29, and 43). In contrast, the close relationship between the development of technologies, and a back-and-forth, cross-fertilising relationship can be seen in Belovode and Pločnik. In my interpretation, this means the open flow of information within the community, the lack of specialization in craft activities, and the refutation of secret knowledge—at least at the level of individuals. Similarly, the analysis of ground and abrasive stone tools (Chapters 16, 31, and 45) contributes to our understanding of the interrelations between craft activities. A workshop for manufacturing stone tools was excavated at Pločnik, whose tools could have been used in hammering and thinning metal objects.

The volume's most significant conclusion is that simple smelting conditions, the hole-in-the-ground technology, must have been common knowledge among Vinča communities and required cooperation. Finds related to metallurgy were ubiquitous at Belovode, so, at most, we can speak only of community-level specialization, not individual or household-level.

This paints a fundamentally different picture of technological knowledge and the organization of society. It does not imply social inequality, but the importance of cooperation is clearly visible. Vinča communities may have passed on their technological knowledge, and this flow of information is reconstructed in the direction of the Kodžadermen-Gumelnița-Karanovo VI communities in present-day Bulgaria.

From this point on, the task of future research is to reconstruct how this technological knowledge survives or is transformed in the next period after the abrupt end of the Vinča culture. After all, the period after 4450 cal BC is the heyday of the mass production of copper artefacts, with extensive formal variety. However, not enough is known about the communities of this period in present-day Serbia. We also know little about how the knowledge of metallurgical technology was integrated into the life of communities Bulgaria during the same period.

Overall, the result is an impressive and convincing volume that will be indispensable in the following decades for research into the Neolithic and Copper Age of southeast Europe, as well as the beginnings of metallurgy. I am sure that Borislav Jovanović, to whom this volume was dedicated, would read it with appreciation.

REFERENCES

- Borić, D. 2009. Absolute Dating of Metallurgical Innovations in the Vinča Culture of the Balkans. In: T. L. Kienlin & B. W. Roberts, eds. *Metals and Societies: Studies in Honour of Barbara S. Ottaway (Universitätsforschungen zur prähistorischen Archäologie 169)*. Bonn: Dr. Rudolf Habelt, pp. 191–245.
- Kienlin, T. L. 2010. *Traditions and Transformations: Approaches to Eneolithic (Copper Age) and Bronze Age Metalworking and Society in Eastern Central Europe and the Carpathian Basin* (BAR International Series 2184). Oxford: Archaeopress.
- Radivojević, M., Rehren, T., Pernicka, E., Šljivar, D., Brauns, M., & Borić, D. 2010. On the origins of extractive metallurgy: New evidence from Europe. *Journal of Archaeological Science*, 37(11): 2775–87.
- Renfrew, C. 1969. The Autonomy of the Southeast European Copper Age. *Proceedings of the Prehistoric Society*, 35: 12–47.
- Renfrew, C. 1978. Varna and The Social Context of Early Metallurgy. *Antiquity*, 52 (206): 199–203.
- Šljivar, D., Kuzmanović-Cvetković, J., & Jacanović, D. 2006. Belovode – Pločnik: New Contributions Regarding the Copper Metallurgy in the Vinča Culture. In: N. Tasić & C. Grozdanov, eds. *Homage to Milutin Garašanin*. Belgrade: Serbian Academy of Sciences and Arts, pp. 251–66.

ZSUZSANNA SIKLÓSI

Eötvös Loránd University, Budapest, Hungary

Iza Romanowska, Colin D. Wren and Stefani A. Crabtree. *Agent-Based Modelling for Archaeology: Simulating the Complexity of Society* (Santa Fe: The Santa Fe Institute Press. 2021. xiii and 429 pp., numerous illustr., pbk, ISBN 978-1-947864-25-2)

Agent-based modelling, or ABM for short, is a popular computational simulation technique widely used by several disciplines. By contrast, despite its long-term use and recent growing interest, it remains niche in archaeology. Two main reasons

explain this state of affairs. Firstly, there is a relatively widely shared incomprehension—and thus reluctance—among many archaeologists about what modelling and simulation entail. Secondly, they may have a general difficulty in assessing a technique