



Book Reviews

THE ARCHAOMETALLURGY OF IRON EDITED BY JIŘÍ HOŠEK, HENRY CLEERE AND L'UBOMÍR MIHOK *Prague Institute of Archaeology. 2011. 318 pp, 112 figs, 32 plates ISBN 978-80-87365-41-0 hb, €19*

This volume includes some nineteen papers which cover various aspects of early ironworking in Europe. The geographical coverage includes Britain, France, Denmark, Norway, Poland, the Czech Republic, Hungary, the Ukraine and Russia. Some of the papers specifically address evidence for prehistoric iron production although many focus exclusively on post-Roman examples.

The volume opens with Cleere's extended essay on the life and work of Radomir Pleiner who played such a pivotal role in the development of archaeometallurgy in Europe. The following section provides overviews of some recent ferrous archaeometallurgical research in Norway, Denmark, Poland, the Czech Republic and Hungary. Bielenin's review of the enormous slag blocks associated with slag pit furnaces in Poland highlights the fundamental failure of experimental archaeology to achieve the same sorts of results implied by the archaeological record (in particular the separation of iron bloom from smelting slag). Earlier replicative experiments had produced a mixture of slag and iron and had led many to postulate a refining stage, despite the absence of any material evidence. Orzechowski reviews the evidence for a subset of Polish slag-pit furnaces with a subsidiary pit and speculates on their role in the smelting of iron. Jouttijärri and Voss offer a reinterpretation of the earliest Danish iron smelting furnaces. They argue that these were effectively slag-pit furnaces and link their origins to similar furnaces identified in southern Germany (although the later predate the Danish examples by three centuries or more). Gömöri summarises recent fieldwork in Hungary ahead of motorway construction. This has yielded no evidence for iron smelting in the Roman period but has demonstrated production in both the late Avar period (*c* AD 750 to *c* AD 850) and the Arpad period (AD 895 to AD 1000). Evidence for broadly contemporary iron production in the Czech Republic is reviewed by Souchopová and colleagues. Espelund's review of Norwegian iron smelting includes a rather radical (if slightly implausible) suggestion that some bloomery iron smelting may have occurred in two steps: in the first, an iron-rich slag was produced which was subsequently re-smelted and with a second step to obtain a bloom and a 'normal' slag.

The next section contains seven papers looking at the fabrication of iron, primarily through the metallography of ferrous artefacts. The value of Stránský's paper on a hollow ring is doubtful: earlier investigations cited by Stránský had shown that corrosion had left no original metal and the ring itself now appears to be lost. The paper by Mihok and Kotigoroshko includes the examination of slag and swords from a Dacian hillfort (first centuries BC and AD). The simplistic equation of iron-poor slags with smelting and iron-rich slags with smithing is puzzling and ignores the morphological evidence that all of these slags are probably the product of smithing. A thorough examination of Anglo-Saxon iron knives from rural sites in Britain provides Blakelock and McDonnell with information which compliments earlier data from cemeteries and urban centres. Differences in the technologies used to fabricate the knives are noted and possible explanations are explored. Unfortunately the chronological differences between the available urban, rural and cemetery assemblages make any definitive explanation rather elusive. The exploration of putative settlement hierarchies is explored by Hošek and Meduna who show similar knife manufacturing technologies are visible in assemblages from an

urban site and a rural cemetery in early medieval Bohemia. Voznesenskaya outlines the development of knife fabrication technologies in early medieval Shestovista (an Old Rus settlement on the Dnieper) and links these to Slavic and Scandinavian influences. The nature of the iron used for some of the earliest plate armour is explored by Williams through the examination of Milanese armour of the late 14th and early 15th centuries. This shows that some attempt was made to harden the armour through quenching but in most cases that this had relatively little effect, as the original stock metal usually contained low levels of carbon. One of the longest and perhaps most successful papers in this volume is that by Dillmann on the use of iron to strengthen French later medieval cathedrals. Large quantities of iron tie-rods, chains and other elements are found in the Gothic cathedrals of Picardy. Dillmann and colleagues have sampled this structural iron and, through the chemical analysis of the tiny slag inclusions, have proposed criteria for the distinction between iron made by the direct and indirect processes. The direct process is the bloomery process that was widely used until the later medieval period while the indirect process is used to denote the production of first cast iron in a blast furnace and the refining of this to malleable iron in a forge. Dillmann thus shows that structural iron was an integral component of at least some French Gothic cathedrals from the moment of their construction.

The following three papers review the role of ferrous metallography in archaeology in Russia and France. In a pair of papers, Zavyalov and colleagues trace the history of metallography in Russian archaeology and review current research. This includes the sobering revelation that despite the examination of thousands of samples, the development of smithing technology from the 13th to the 15th centuries 'still remains unclear'. Fluzin and colleagues demonstrate the vitality of research into the manufacture and use of iron in France. Their review shows the value of genuinely multidisciplinary research which has looked at iron from prehistory to the Middle Ages. This has exploited archaeological and scientific evidence to provide insights into the technological, economic and social impacts of iron.

The final two papers explore the role of experimental approaches to understanding the nature of early ferrous materials and the technologies used to produce them. Crew and colleagues describe a series of experiments devised to explore issues raised by earlier excavations of medieval furnaces in Wales. The size of the excavated 14th-century furnaces at Llwyn Du, Gwynedd, and the size of the blooms indicated by written sources led Crew to build a larger than usual furnace. This was provided with a stronger than usual blast of air and resulted in the production of a lump of cast iron rather than a bloom. The final paper by Lang explores the physical properties of composite ferrous artefacts. Steel and iron have often been combined together — the steel often used for cutting edges while much of the body of the artefact (especially swords and knives) was made from plain iron. Physical tests on replicated iron-steel composites showed that these were stronger than plain iron. Lang proposes that the decline of composite ferrous artefacts occurred once steel became more widely available and the effects of quenching and tempering were better understood.

The papers are of rather variable quality and give the impression that they are the product of a conference proceedings (although this is not stated). This volume appears, at least in part, to have been produced in homage to the work of Radomir Pleiner but, as is common with many *festschriften*, these do not always hang together. The disparate nature of the contributions do reflect Pleiner's interests: he published two seminal volumes (in English) on European iron smelting (2000) and iron smithing (2006) which are the current standard works. As these volumes cover all of Europe from the earliest use of iron to the end of the bloomery process, the contributors to the volume reviewed here have had few restrictions placed on them. While some of the individual papers provide genuinely useful information (some of which supplements and updates Pleiner's syntheses), the distances between the papers (and not just their geographical

separation) mean that the volume is never more than the sum of its parts. Some of the individual contributions are further constrained by less than eloquent English translations, lenient editing, sloppy typesetting and limited proofing.

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References

Pleiner, R., 2000. *Iron in Archaeology: The European Bloomery Smelters*. Prague: Czech Institute of Archaeology

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