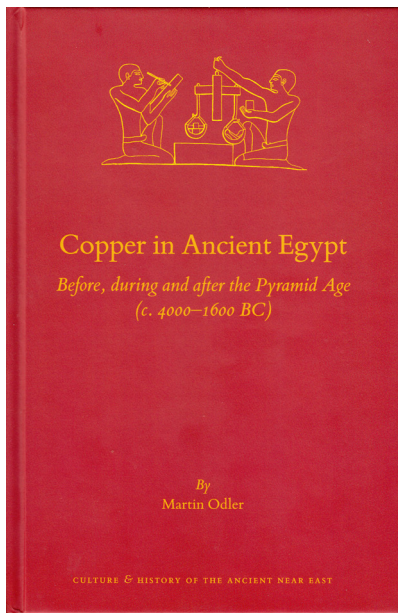


Reviews



Martin Odler, 2023, *Copper in Ancient Egypt: Before, During and After the Pyramid Age (c. 4000–1600 BC)*, Culture and History of the Ancient Near East, Book 132, Leiden: Brill, ISBN: 9789004524088, pp. 810, + xviii, figs 310, A\$395.

by Christopher J. Davey

The first English scholarly book on ancient Egyptian metallurgy was published in 1927. It was written by Major Herbert Garland and Charles Bannister, Professor of Metallurgy, University of Liverpool and ran to 214 pages. The book under review illustrates the growth of the field, it focuses on copper only prior to the New Kingdom, but still has 810 pages including 140 pages of bibliography, 40 pages of indexes and 310 figures, plus 48 pages of front matter, and there are an additional 40 tables online at <https://doi.org/10.6084/m9.figshare.22293871>. An online version of the book is also available.

The author studied at Charles University, Prague, and has been involved in fieldwork with the Czech Institute of Egyptology, Faculty of Arts, Charles University at Abusir and at Sabaloqa in the Sudan, and with joint Polish-Slovak mission at Tell el-Retaba. Dr Martin Odler is currently the Marie Skłodowska Curie Fellow, Newcastle University; School of History, Classics and Archaeology. His earlier published research (Odler 2016) contains much detailed analysis and is the kernel for this book.

In the Preface Odler explains that the ‘objective of the monograph is to present a narrative, a synchronic and diachronic reconstruction of the development and changes of the *chaîne opératoire* of copper and copper alloy artefacts based on the preserved evidence’ (p. xiv). The evidence considered includes texts, iconography and

metal artefacts and their scientific analyses. He observes that ‘copper was always “foreign” to the Egyptians’ (p. xvi) because it was not sourced from the Nile valley, but he does not speculate on the implications that this may have had for technological innovation in ancient Egypt. While the book should be of interest to Egyptologists and everyone interested in Archaeometallurgy, he acknowledges that the ‘design and cost’ of it will largely limit it to academic and professional libraries (p. xviii).

The subject is defined and outlined in the Introduction. It considers copper and its alloys from when they first appear in Egypt during the Badarian period in the fourth millennium BC until the end of the Second Intermediate Period. The discussion brushes past issues of archaeological theory and concludes that ‘the main research question of the monograph must be expressed in a different manner, as a practical one: we know that ancient Egyptians used copper, but how?’ (p. 23). This is refreshingly blunt.

The adoption of such a practical approach leads to a chapter discussing *chaîne opératoire*, a methodology that seeks to identify the stages or processes of production. More specifically, ‘these steps involve everything from the procurement of the ore to the use and reuse of objects made of that ore’ (p. 24). The activities involved may relate to non-copper-based materials and artefacts, although I do not agree that metalworking ceramics were no different to other ceramic vessels (n. 8 p. 28); the application of heat by potters and metalworkers was fundamentally different in character and intent. The discussion about the origin and nature of *chaîne opératoire* is useful as it acknowledges that modern categorisations will be very different from those practised in antiquity.

The monograph is based on two large databases, one containing archaeological and archaeometallurgical data and the other, textual and iconographic material. Their nature and background are discussed, but little detail is given. There is a brief introduction to archaeometallurgical methods, non-invasive and invasive. The British Museum is mentioned a couple of times to have contributed the most significant number of analyses, an indication that the study of ancient Egyptian artefacts focusses on material held outside the country. Chapter Two concludes with ethno- and experimental archaeology. Experiments by Stocks on a New Kingdom smelting furnace and those by Verly and Rademakers on Middle Kingdom installations at Ayn Soukhna are mentioned, but John Merkal’s replication and operation of a New Kingdom smelter at Timna and the reviewer’s pioneering experiments with crucibles depicted in numerous Old Kingdom tombs are not, although the paper publishing that latter work is listed in the bibliography.

Ancient Egyptian words for metals and metalworkers are examined in Chapter Three. An introduction to copper-arsenic alloys used during the Old Kingdom prompts the suggestion that there may have been different names for

copper with impurities, copper with low concentrations of arsenic, and copper with high concentrations of arsenic (p. 68). Two hieroglyphic signs for metal are identified to be the ‘drop’, similar to X3, and N34, a crucible. This section may have been more useful if it had summarised the history of the interpretation of hieroglyphic ideograms relating to metal, referencing Maspero (1902), Erman (1919) and Junker (1958), amongst others, before presenting further arguments. Contrary to note 71, p. 89, when in 1985 I suggested that N34 was a crucible I was not ‘following’ anyone. Gardiner’s sign list and identification of N34 as an ingot were universally accepted in England at the time, and my suggestion was based on the identical shape of the ideogram, the profiles of the crucibles depicted in tomb scenes and those found at Tell edh-Dhiba‘i that I had published. When Professor Boyo Ockinga (2005) listed Gardiner’s sign N34 as an ingot U30A, he was following Junker (pers. comm.). The words *bd3.t* and *bd3.ty* for crucible and metalworker are discussed with illustrations of signs as they occur.

Under the heading *Expeditions*, the prospecting for, and mining and initial processing of copper is addressed. The logistics of mineral procurement expeditions are briefly reviewed from the Egyptian perspective, with the suggestion that such ventures were undertaken from the late fourth millennium, when the evidence indicates that they occurred less than once a decade to any one region. There is little recognition of local prospecting, mining and processing of minerals in these areas until the Middle Kingdom. The chapter considers regions radially, Eastern Dessert, Nubia, Sinai etc, for each period in turn, Predynastic and Early Dynastic, Old Kingdom, Middle Kingdom and Second Intermediate. This is a little confusing as the earliest metalwork in Egypt is found at the site of Maadi and was probably the result of trade with the more distant Wadi Arabah, so it appears at the end of the Predynastic section, well out of chronological order.

The summaries of evidence for each region do provide useful overviews clarifying the current knowledge. There is, for example, no evidence connecting the Wadi Faynan, Jordan, with Old Kingdom Egypt (p. 131). Those wanting a definitive explanation for the pyrometallurgical operations at Ayn Soukhna will be disappointed. It is still not clear why smelting took place there when there were contemporary smelters in Sinai. Chapter Four ends with an acknowledgement that lead isotope data is limited, especially for ore deposits, and ore samples from datable archaeological contexts, so that many conclusions are only tentative. This is considered to be the ‘gravest’ problem in current Egyptian archaeometallurgical research (p. 153).

Chapter Five on the administration of copper resources by the Egyptian state gives rise to much conjecture, because of the limited evidence available and because the distinctive characteristics of metalworking, which set it apart from Nile valley rural production, are not considered. Copper was not then a commodity because its

value depended upon work of a small number of skilled artisans and the application of other resources, such as charcoal.

The role of the Treasury and the officials in charge are discussed in relation to titles, weights and measures, and ‘sealing’. The two known units of weight are not well understood during the Old Kingdom, but can be better quantified in later periods. There are numerous weighing scenes in tomb images and most of them show the weighing of the fabricated metal objects, not the raw material. The reason for this is not clear, but is consistent with Odler’s observation that the weight of Old Kingdom metal vessels appears to have been standardised. The central administration of metals is important for Odler because he believes that the distribution of metalwork in Egypt during this period was only amongst elites, who depended upon royal patronage. The chapter concludes with a comment on tomb looting, which included the removal of copper objects. Over time, this may have changed the distribution of copper in ancient Egyptian society.

Chapter Six turns to ‘the professionals working with ... metals, their social standing, and institutional connections’ (p. 213). It is deemed that there are sufficient mentions of Sokar to designate him to be ‘the deity of the metalworkers and a metalworker of the ancient Egyptian “pantheon”, thus an early precursor to the Greek god of crafts, metalworking in particular, Hephaistos’ (p. 215). Metalworkers’ social status and standing are investigated through title and tomb. There is little Predynastic evidence, but many metalworker titles appear during the Old Kingdom and there are some metalworkers’ tombs. It is hard to assess the significance of the data and there is no attempt to do so. The titles generally relate to overseers who may not have had metalworking skills. Grave 4964 at Badari is described (p. 238), it was uninscribed and contained a man buried with a crucible, but the fact that the crucible had been used many times until it was unusable is not mentioned. The practical implications of the metalworking craft seem to be generally overlooked. In this case it is significant that the person was not buried in a tomb bearing his title, but with his tools of trade, two hammerstones and a dilapidated crucible, revealing who he was and what he had accomplished. The available data, an awareness of the structure of Old Kingdom society and an appreciation of the risks and intricacies of the metalworkers’ craft, could provide the basis for a coherent account of the metalworkers’ status.

Chapter Seven on workshops includes images or drawings of most of the metal workshops portrayed on the tomb walls of the period. The categories of text are mentioned, as are the possible types of building that the workshops may have been in, but the processes depicted pass without comment. One reason for this may be the issue of interpretation. It is acknowledged that some scholars believe the images to be ‘works of art based on “pattern” books with only a loose connection to reality’ (p. 258),

while this reviewer is cited to be one who believes them to be 'realistic'. The paper that is referenced here, Davey (2012), presents an approach that is not so simplistic. Even the casual observer can see that no two scenes are exactly alike. I identified the essential technical details that are consistently depicted in the scenes and offered explanations for the variations. Those who advocate a pattern book origin need to do likewise and then explain why the pattern book images had no relationship to reality. Odler makes a valid point that the tomb artists 'lived amongst other craft specialists and were inevitably familiar with the processes involved in the production of pigments, metal tools and other objects' (p. 259). He attributes some of the many misinterpretations to the two-dimensional nature of the scenes. With some justification he refers to the servant statue of a metalworker using a blowpipe and a crucible, which I published (2009), as a reliable illustration of the melting process. Later in the chapter, he also includes drawings and photographs of the crucible type depicted in the Old Kingdom tombs. The recently discovered crucible found on a Second Dynasty floor at Elkab is mentioned with a photograph and drawing (pp. 270, 278). Bitter experience has taught me to never speak about these crucibles without a replica to hand, as people normally cannot appreciate the three-dimensional nature of this asymmetric object from two-dimensional drawings.

Archaeological evidence for workshops, including furnaces, crucibles and ingots, from Maadi, Elephantine, Elkab, Heit el-Ghurab, Buhen, Balat, Kahun, Tell el-Daba and Ayn Soukhna, are described. A discussion about copper with impurities and copper alloys claims that arsenical copper has 'been seldom studied' (p. 303). That may be true for ancient Egypt, but work on Andean cultures (Lechtman 1999), European cultures (Budd 1993) and ancient Near Eastern metallurgy, has produced a large body of work on copper and arsenic. Indeed, Hauptmann suggests that 'the spread of arsenical copper marks the beginning of extractive metallurgy' (2007: 30). Odler favours the view that the alloys were the result of the intentional addition of arsenic to copper, but the form of arsenic added and the process used 'remains to be answered satisfactorily' (p. 305). Tin bronze is common from Dynasty 12, and arsenic contents diminish thereafter. There is a brief description of metal working techniques focussing on the hammering processes, but not on pyrometallurgy. The Reisner Papyri found in Tomb 408, Naga ed-Deir, and partially published by William Simpson are described. They account for metal tools being used at a ship building facility, and provide information that may illustrate tool dimensions and the organisation of their manufacture and repair.

There are three chapters reflecting on the products of the metalworking industry. This has been Odler's principal research for several years, and so it draws on his own publications and his large database. The first chapter deals with artisan's tools, the second studies tools for display,

including weapons and objects associated with personal adornment, such as mirrors, and the third chapter, covers ritual objects. The analysis identifies tool kits for specific crafts or procedures and investigates the metrological properties of the objects to establish whether they were the result of state-controlled production. The sample size under consideration is 2,700 archaeological contexts. Tomb images of activities involving the application of metal implements are referenced and distribution maps are also included. These chapters are well illustrated and form a reliable introduction for anyone studying pre-New Kingdom Egyptian metal artefacts.

Tool kits for carpenters, and the textile and leather trades, are well represented in the archaeological record, while stone workers and quarrying tools are less so. The numbers of weapons of each type also differ. It is suggested that variations may arise from the popularity of an object type, or for some other reason, such as the recycling of metal. Many objects are unprovenanced, and even more have not been scientifically analysed. In the cosmetic tool kit for example, mirrors are well distributed from Kerma in the Sudan to the Delta, and are the most frequently analysed, whereas razors are more concentrated around Memphis and only fifteen have been analysed.

Although the distinction is not made in this volume, most of the copper vessels depicted in the Old Kingdom melting and casting scenes fall into the chapter on *Ritual Tools*. Metal components of furniture and boats, statuary and musical instruments are also included in this chapter. No consistent metallurgical picture emerges for these objects, and comprehensive compositional analyses and metallographic information is generally lacking.

The penultimate chapter attempts to put Egyptian copper metallurgy into an Eastern Mediterranean context. The origin of the technology is considered without any clear picture forming. The social status of metalworkers is discussed without any reference to itinerant people inhabiting remote regions where metal resources and the technology to process them were to be found. Parallels in weights and measures are also discussed. The comparison of metal artefacts provides a potentially more fruitful field of study, especially when examining different approaches to challenges, such as the hafting of axes and adzes. While there is regular representation of non-Egyptian weapons in Egypt, Odler found that the reverse was not true. As with so many issues, it is concluded that more archaeometallurgical analyses are required before connections can be identified (p. 583).

The conclusions are formed around two tables: one listing for each period the contemporary ore deposits, smelting sites, melting and production sites, artefact locations, use, textual and iconographic evidence, and changes and locations; the second lists technological choices made by ancient Egyptians compared to those made elsewhere in the Eastern Mediterranean. The text offers a lucid summary of the findings. The tentative character of the

evidence is acknowledged; ‘this monograph could pose many questions, but answer only a few’ (p. 595).

The book often misinterprets my work on Egyptian crucibles. On page 280 note 99, there is an unusual statement that ‘C.J. Davey’ has an ‘opinion’ that open crucibles were not used in Egypt. Why, one wonders, should anyone care. It is certainly odd, as I have published several ancient Egyptian open bowl crucibles (1985). The paper quoted to support this assertion, Davey & Edwards (2007), expresses no such opinion. What that paper does do, amongst other things, is draw attention to the fact that crucibles of the shape depicted in the Old Kingdom tombs have a failure pattern that leaves a fragment that is shaped like a broken open bowl crucible. In fact, the shape is exactly like the crucible fragment from Elephantine depicted in Figure 101 (p. 554), so rather than being an open bowl crucible, it would appear to be a fragment of the earliest known typical Old Kingdom crucible. The way the Elephantine crucible was published implies that the excavators thought it to be typical of those represented in Old Kingdom tombs. Archaeometallurgists have generally failed to engage with these common Early Bronze Age crucibles, meaning that they are seldom recognised. An exception was Israeli archaeologist Itzhaq Beit-Arieh (1985) who identified such objects in the Sinai. While moulds and bellows from this collection are mentioned by Odler (pp. 288–91), the crucible fragments are not.

It is understandable that, in a field of study of this magnitude and the preparation of a volume of this scope and size, that some material may be overlooked and some things will slip through. Remarkably, little has, but the indexes for example are of variable accuracy.

We are indebted to Odler for presenting an outstanding collection of data, which has brought to light much hitherto unnoticed material, and for formulating that data into chronological, geographical and process relationships. He addresses many rarely considered topics associated with the organisation of ancient metallurgy, and highlights the need for more evidence. No serious investigation of Egyptian metalworking henceforth can neglect this book. While it has identified words associated ancient Egyptian copper metallurgy, it has not considered the texts associated with the Old Kingdom tomb metalworking scenes, nor the technological details of the scenes themselves. These questions, amongst many others, are open for further attention, which will benefit from this monograph.

The book does encourage those responsible for museum collections, such as myself, to have ancient Egyptian metalwork analysed. The initiative would be significantly promoted by the availability of the author’s database, because it would offer some guidance and incentive. Indeed, the publication of research increasingly requires that all associated data be made openly available, according to the FAIR principles (Findable, Accessible, Interoperable, Reusable). As this book demonstrates,

until there is more accessible data and reliable analyses, the history of copper in Egypt will be assailed by many uncertainties.

Christopher J. Davey
University of Melbourne, and
Australian Institute of Archaeology
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