

reigns of ninth century rulers. From an historiographical point of interest, Karlsson shows in Chapter Eight that the scholarly interest in the imperialism of Ashurnasirpal has been misplaced, since it is Shalmaneser who was the chief architect of the Assyrian empire in terms of territorial expansion and ideological expression; though this point has largely been made by Shigeo Yamada in his 2000 study, *The Construction of the Assyrian Empire*. Curious too is the omission of the antiquarianism evident in the reigns of Shamshi-Adad V and Adad-nirari III from the discussion of the individual ideologies of Assyrian kings in Chapter Eight.

Mattias Karlsson closes his work with a short, four-page chapter that, despite being entitled 'Conclusion of the study' (pp. 327-330), would be best described as a defence. Here, Karlsson takes aim at earlier scholars, labelling them 'naïve' (p.326) and 'haughty' empiricists and reduces them to a blind Rankean idealists who think the 'texts should speak for themselves' (p. 329). Karlsson goes on to defend his approach by reiterating the value of critical theory for understanding the relations of power. This is an odd way to close a study and such statements could be seen to betray his own naïvety of the nature of contemporary empiricism.

As I stated at the beginning of this review, Mattias Karlsson's *Relations of Power* is a useful addition to the study of Assyria in the ninth century. However, had Karlsson taken an historical approach to this study, far more could have been made of the interesting and important observations littered throughout. There is a simple reason for this: the historical method answers questions, the structuralist and theoretical approach, as employed here, makes observations. Those interested in state ideology deserve to find out *why* it was that the Assyrian rulers of the long ninth century expressed the relations of power the way they did. Karlsson's study, though detailed, will leave them wanting in this regard.

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Benjamin W. Roberts and Christopher P. Thornton, eds, *Archaeometallurgy in Global Perspective: Methods and Syntheses*, New York: Springer 2014, 861 pp, 28 Chapters, Index ISBN 978-1-4614-9017-3 Hard Cover AUD 216

Reviewed by David Saunders

I review this volume from the perspective of a metallurgist who has now ventured into the field of archaeometallurgy. For me it has been a long career journey - from blast furnaces to the application of fracture mechanics in structural management and using computer codes, electron microscopes and neutron diffraction. From a practical metallurgist's view, I wished to see if this volume actually took me into the field of archaeometallurgy and provided me the 'global perspective' that allows me to undertake new research into ancient metal artefacts and, further, to be able to contextualise the many journal articles published on the study of ancient metallic artefacts.

Of course, as a 'new player' in this field (the uninitiated? - this volume p3) I have to ask why yet another volume on archaeometallurgy? Does this volume add new perspectives to the seemingly vast number of published works? Significant and ongoing archaeometallurgical research is promulgated in *Der Anschnitt* volumes, proceedings of conferences such as the Archeometallurgy In Europe (AIE), and the Beginnings of the Use of Metals and Alloys (BUMA), conferences on specific sites (e.g. UCL Timna Conference) and specific subjects (e.g. The Archaeology and Anthropology of Mining) and, of course, significant articles and monographs by technical experts such as Renfrew (1986), Muhly (1973) and more recently Weeks (2003) and Golden (2010). To this must be added the significant number of scientific journals that publish archaeometallurgical research. The AIE and BUMA conferences now tend to have a regional focus and so the current volume significantly differs from these conferences in that it attempts to present a global archaeometallurgical perspective, albeit incomplete. As discussed by Roberts and Thornton, (**Chap 1**) pp 1-2, the genesis of this volume from yet another archaeometallurgy conference is itself interesting in that it became more than a record of a significant conference of the Society of American Archaeology, SAA, and while [the] 'volume was never meant to be encyclopaedic or entirely definitive; it is meant to be an educational guide for the teaching of archaeometallurgy to an uninitiated audience'. I suspect this was not the intent of the original conference. It was, as Killick (2015: 298) says, 'archaeometallurgists talking to fellow archaeometallurgists'.

This significant volume is presented in roughly two parts; eleven papers deal with archaeometallurgical research methods, including nine on metallurgy, mining and experimental metallurgy methods and two other papers, one on conservation of metallic artefacts (**12**) and the other on enthoarchaeological research (**9**); and sixteen papers that focus on the current state of archaeometallurgical

study in loosely defined geographic regions – the ‘Global Perspective’.

The editors (1), p4, make much of the emphasis, apparent in many of the papers, viz. the ‘anthropological theories of technological behaviour and the social effects of/on technology’. It is interesting, then, to look at the departments of organisations with which the authors are associated. Twenty-three are associated with archaeology/anthropology/history departments, four are associated with materials science departments and others are associated with departmental laboratories or with government/museum laboratories. This in many ways attests to Killick’s view, (2) p11, that ‘archaeometallurgy is one of the most interdisciplinary of all branches of historical enquiry’. While the introductory chapter does not define ‘archaeometallurgy’, this volume demonstrates that archaeometallurgy uses technical data in the context of synthesised data from archaeological reports and papers. The sixteen (ethno)archaeological papers are largely presented in the context of four ‘conclusions’ from the original SAA conference, (1) p2. They are more nuanced discussions on the mechanisms of technological transfer, studies of a multiplicity of crafts, the need for proof of ‘Childean associations’ between production and elite dominance, and use of holistic study methods. Is this specialisation in its own right or is it, as I see it from reading this volume, ‘archaeometallurgy as archaeology’? (Killick 2015).

The ‘technical’ papers cover mines and mining (7), extraction of metals from ores (2), metallurgical ceramics (6) and slags (5), properties of metals (3) and their microstructures (4) in sufficient detail to provide the reader with the background to understand the metallurgy of prehistoric mining, smelting and metalworking. Much of this information is adaptation of undergraduate metallurgy (perhaps less-so, materials science) taught for current industrial practice. I find it a little difficult to see this as anything more than just metallurgy. The chemistry does not change with time and the formation of alloys and deformation modes likewise do not change, as discussed by Muhly (1988: 2). However, our ability to understand metallic microstructures, ceramics and chemistry of slags does change. Physical metallurgy, physics and other fields allow such progress. Archaeometallurgy rightly draws on these fields. In this regard the papers dealing with chemical and isotope analysis (10) and provenance determination (11) summarise recent analytical methods that allow greater rigour in analyses using much less destructive analytical methodologies. In their paper on experimental archaeometallurgy (8) p184, Heeb and Ottaway discuss experimental processes that ‘inform us of the multitude of choices open to prehistoric miners and smiths throughout the entire operational sequence’ of mining, smelting and fabrication. The paper stresses that technical and contextual feasibility are the overlay of modern knowledge about ancient metallurgical processes. Much discussion on lead isotope ratio analysis (LIA) follows in

many of the archaeometallurgical papers. It is sufficient to note here that the uniqueness of a LIA signature of an ore body is often equivocal and increasingly problematic, thus provenancing methodologies require further refinement or different approaches. Additionally, the ability to undertake compositional analysis (trace elements) of large numbers of artefacts and ore samples leads to problems of ‘big data’. As Pernicka notes, (11) p 263, ‘the more data we produce, the less (apparent) clarity we have’. This problem is discussed by Pollard and Bray (10), pp 234-5, and Bray et al (2015) elaborate a methodology to create a ‘history’ of an individual artefact using the large corpus of legacy data, contra Pernicka, above.

The sixteen archaeological/archaeometallurgical papers are regionally grouped, by the Editors, into New World (13, 14 & 15), European & Mediterranean (16, 17 & 18), Southern and Eastern Africa (19), Asian (20, 21, 22, 23, 24 & 25) and Eurasian Steppe/East Asia (26, 27 & 28).

One theme that comes through in many of the papers, e.g. of Golden (21), Thornton (23), Courcier (22) Kienlin (17) and Lehner and Yener (20), is the role that geography and geology (distribution of mineralisation deposits) play in the development of metallurgical ‘traditions’. As the authors discuss, similarities in these traditions can be discerned over significant geographical regions, the Black to Baltic Sea, Keinlin (17) the Eurasian Steppe Doonan et al (26) and down into SE Asia White & Hamilton (28) while in other cases relatively confined regions such as Mesoamerica, Hosler (14). It would appear that the model of ‘metallurgical provinces’ proposed by Chernykh (1992), briefly discussed by Golden (21) p 562 and Courcier (22) pp581-2 provides a way of understanding the complexity and diversity of metallurgical endeavour and at the same time allowing for some ‘commonality’ (through adoption and adaptation). Clearly the ‘metallurgical provinces’ often have significant influences on the development of metallurgical ‘trajectories’, Bray et al (2015: 204-5). These influences, as discussed by many of the authors, arise from internal political and social organisation (class and status), religious perception of metals and metals as burial items. The editors of this volume, (1) p5, suggest ‘the ‘metallurgical province model’ is perhaps the most influential theory on ancient metal production since Childe’. The papers in this volume clearly show coherence with this model although the model would seem largely descriptive, Chernykh (1992: 7-25).

Many of the papers move the discussion of metallurgical development based on evolutionist assumptions to purposeful indigenous development and diffusion of knowledge. As Kienlin (17) p448 states ‘we cannot rely on inevitable “progress” and geological conditions as a guide to the development of early metallurgy anymore. The early use of copper and the subsequent development of metallurgy was the result of technological choices drawing upon and embedded in the respective groups’ cultural and social texture’. The papers of Hosler (14) and Lechtman (15) discuss the ‘feel’ of metals (that is

their ability to be shaped, to provide colour for adornment and to create sounds of instruments, while Roberts (16), Kienlin (17), Courcier (22) and Doonan et al (26) discuss at length kinship and 'tribes' as vehicles for the transmission of metallurgical knowledge. This takes the discussions into the domains of collective memory and of indigenous landscapes, significantly different from the 'industrial' and/or Marxian-framed views of metallurgy (e.g. of V.G. Childe and T. Wertime). Indeed, many of the papers approach metallurgy from social/political or religious/status perspectives trying to establish whether the capabilities of metallurgy were developed to produce utilitarian or prestige items, Golden (21), whether it was family groups or specialists who produced these items, Thornton (23 p688), and if metallurgy falls under the control of politics or chiefs on Inka political elites, Lechtman (15 p409). In this regard, the paper of Iles and Childs (9) on ethnoarchaeological and historical methods provides the background to the 'post-processual' approaches of European and North American archaeometallurgy that frames much of the discussion in the papers of this volume.

The 'archaeological' papers show that there is no single societal feature associated with metallurgical endeavour. For example, this is discussed in the context of the development of distinctly different metallurgical capabilities and technologies on the Iranian Plateau Thornton (23) and in Southern India Gullapalli (25). Many papers in this volume present a challenge to the 'industrial' view of metallurgical development in India (24, 25) and the New World, Ehrhardt (13), Hosler (14) and Lechtman (15). Lehner and Yener (20) re-casts the perception of Anatolian metallurgy as a 'land bridge' through which metallurgical know-how travelled to one of 'regional development' where indigenous development probably occurred and where differences in tradition were the result of the geography of the highland regions of Anatolia and Mediterranean plains.

Another feature of the papers are the discussions on metallurgical fabrication technologies, casting e.g. Dolfini (18) pp486-95, and Courcier (22) p610, the use of oxidic, sulphidic and arsenic copper ores in Anatolia and the Levant and fahlore ores of the European Alpine regions Kienlin (17) pp458-62. Intentional use of 'alloying' elements such as arsenic and tin are discussed across many of the Chapters of this volume. Additionally, papers discuss the use of forging and hammering to create artefacts, which are, in modern times, placed in typological groups, that provide, or appear to provide, evidence of transmission of metallurgical knowledge, e.g. Dolfini (18), Courcier (22), Linduff and Mei (27) pp798-800, White and Hamilton (28) pp836-42.

Most of the archaeological papers attempt to address the vexed problem of indigenous development of metallurgy, appropriately taking the discussion outside modern political borders. It would seem that the holistic/ethnoarchaeological approach allows a balanced discussion that brings

together typology, geography and social interaction. Those of Kienlin (17), Linduff and Mei (27) and White and Hamilton (28) clearly bring this to the forefront of current research and for future research. Metallurgical development is discussed in terms of the evidence for 'innovation', 'adaptation' and 'adoption', (1) p2.

This volume is an extensive overview of archaeometallurgy and, while claiming to be a global perspective, it still has not covered all aspects of the 'global perspective' – what a massive publication that would be! Instead we may recognise that this volume deals with the emergence of metallurgical capabilities principally covering the period 5,000 – 1,000 BCE in the European/Asian geographic regions from which we gain a significant summary of current thinking in archaeometallurgy. Additionally, the volume presents significant studies of New World metallurgy and African metallurgy Killick (19).

From a 'Global Perspective' the lack of discussion of, ancient Egyptian and Cypriot copper metallurgy and Anatolian (Hittite) iron is rather obvious. In the case of Cypriot copper metallurgy, there would be value in discussing this in the context of Anatolian metallurgy and also Cyprus as a significant supplier of copper in the Late Bronze Age and Roman period. While noting the comments by Killick (19) pp 509-10, the lack of any discussion of Egyptian use of metals, in particular copper, I regard as a significant omission, in the light of the new work of Marouard and Tallet (2014) dealing with exploitation of copper in the Sinai and Romer (2007: 110, 128ff, 164ff) on the use of copper in the Early Dynastic period; see also Ogden (2007).

The volume is well presented with clear maps, showing the sites and geographical regions, and appropriate illustrations of subjects under discussion. The strength of the publication is the subject detail provided by the experts in their fields and the extensive references, most of which are accessible to those who work in this field. One major criticism I have of this volume, noting the Editors' Introduction (1), is that it lacks a unifying view of archaeometallurgy, despite best attempts to present 'archaeometallurgy in global perspective'. The volume is a collection of papers by the world's experts in their respective fields but there is no final chapter that draws the papers together in terms of the 'global perspective' and what this actually means for the future of archaeometallurgy. It is difficult to bring together the significantly diverse geographical regions such as the Europe/Asia sweep and that of the New World, but it is important to discuss the 'global perspective' of archaeometallurgy from both scientific and anthropological perspectives. For example, LIA and trace element studies are only now being applied to a much wider geographical sweep than that of Europe/Steppe/ Mediterranean. Despite problems of characterisation of some ore sources, the global perspective is their wider application to new geographical regions of study; see for example the discussion by Weeks (2003: 199-202). Additionally, there are many comparisons that

can be made of sites across the world in terms of how metals are viewed in a socio/religious context and perhaps more could be made of the ‘metallurgical provinces’ of Chernykh, something that could be discussed in the global perspective now that we have better quantitative methodologies and data to enable extension of the model.

This volume is without doubt a valuable resource. However, it is a difficult and rather long read, and so many, I suspect, will only read those chapters of particular interest. For those who are prepared to read through this substantial compilation of papers a sense of interconnectedness can be garnered. Europe-Asian geographical regions are connected in some way by human movement, migration or conquest. This means, of course, that knowledge is also interconnected. In the case of the New World there is perhaps a less clear sense of ‘wide sweep’ interaction but certainly the papers that deal with this geographical region suggest the movement of metallurgical knowledge by trade (etc). ‘Political’ boundaries would, it seems have had some influence on whether a technology was always shared.

Finally, as I asked at the beginning of the review, does this volume add new insights to the already significant corpus of material on archaeometallurgy? I would have to say that it probably does not, particularly if one is familiar with the extensive literature available to most researchers. What it does provide, however, is an up-to date summary of archaeometallurgical work making it a good text book. It certainly brings new researchers in archaeometallurgy up to date with knowledge. The volume retains the strong dichotomy between ‘hard’ and ‘soft’ sciences, such as metallurgist vs. ethno-archaeologist as discussed by Killick (2008: 296ff) and also Killick and Fenn (2012: 569). Nine chapters provide significant discussion of analytical methodologies. The archaeometallurgical papers provide holistic ethno-archaeological discussions of ancient metallurgy, but they do not provide detailed physical analysis of metallurgical objects (or typological groups) or metallurgical discussion of the objects, with the exception of Lechtman (14), and Courcier (22). While not discounting the ‘use[s] of rich data to engage with central issues in archaeology and anthropology’, Killick and Fenn (2012: 596), it is important not to lose sight of significant technical developments, e.g. neutron-beam technologies, including diffraction and tomography, and significantly improved mass spectrographic techniques (etc) that can be brought to bear on archaeometallurgical studies. The first section of this volume is therefore an important summary by which archaeologists can become cognisant of such developments because it is these, coupled with numerical methodologies, which allow more quantitative data to be extracted from the site and material record. I am not certain that sound data becomes out of date, (1) p4; it may be re-analysed or combined with other data to build a much richer picture of the development of ancient metallurgy.

While his words do not tie all aspects of the current volume together, I feel David Anthony (2007: 435-7) says much about the interconnectedness that is so important to the discussion of metallurgy in the global perspective. ‘The steppe world was not just a conduit, it also became and innovating center, particularly in bronze metallurgy and chariot warfare. The chariot-driving Shang kings in China, Linduff and Mei (27 p789 etc) and the Mycenaean princes of Greece, contemporaries of the opposite ends of the ancient world at about 1500 BCE shared a common technological debt to the LBA herders of the Eurasian Steppe’. We might be about to enter even more exciting times as the interconnectedness of the pre-historic and early historic world is better understood through archaeological and archaeometallurgical studies. This volume most likely points to the next phase of the ‘global perspective’ of archaeometallurgy.

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Eric H. Cline, *Three Stones Make a Wall: The Story of Archaeology*, with illustrations by Glynnis Fawkes, Princeton and Oxford: Princeton University Press, 2017, ISBN-13: 978-0691166407, USD25

Reviewed by Christopher J Davey

Popular histories of archaeology tend to be coffee table books with many coloured images. Professor Cline's *Three Stones Make a Wall: Story of Archaeology* has returned to a nineteenth century format with high quality line drawings and an apparently undocumented text. If the reviews on Amazon are any indication, the modern generation appears to be quite partial to that arrangement, although it is probably the readability and relevance of the text that garners much of the support. The book however is far from being undocumented as nearly the last quarter comprises Notes, Bibliography and Index; interestingly the notes are identified by phrases from the text rather than superscript numbers so that the reader does not know from the text that there is a related note or reference. One suspects this to be a publisher's dictate rather than an author's choice.

The occasion for the book is said to be the increasing level of 'deliberate looting and destruction'. Cline explains, 'I hope that the material I have included in this book will remind us all of where we have come from and the fascination that it holds and will encourage a wide public audience to help protect our inheritance before it is too late' (xvii).

The book has nineteen chapters arranged approximately chronologically each dealing with a stand-alone 'account of the field's "greatest hits"', to quote Jodie Magnes' dust-jacket review, and there are four excurses about archaeological processes. The 'hits' include the tomb of Tutankhamun, Pompeii, Troy, Egypt, Ur, Yucatán Peninsula, European Prehistoric Caves, Near Eastern Neolithic, Mycenae, Akrotiri, Uluburun, Olympia, Rome, Megiddo, Dead Sea Scrolls, Masada, Ebla, Petra, Palmyra, Moche Sites, Tenochtitlán, US Sites Hunley (submarine) and Chaco Canyon. The Terracotta warriors, Ötzi, the bog bodies and the Sutton Hoo ship are mentioned in the chronology and conservation excurses. Cline expresses the view that the people in the stories 'are united by one goal that links them all – the desire to understand the human story, from its deepest past to the rise (and collapse) of its civilizations. Taken together, they are our story' (xix). This is open to question.

The arrangement makes for an uncomplicated treatment of the subject, which should get popular acceptance, but it is not really the story of archaeology. For example, Frederick Catherwood appears as a co-discoverer of the sites on the Yucatán Peninsula (68-79), however he did not undertake that work as a novice. He had had an earlier life in Egypt copying ancient tomb art with a group that had been encouraged by William Gell and included John Gardner Wilkinson and Joseph Bonomi.