

WEBB, J.M., and D. FRANKEL – *Ambelikou Aletri. Metallurgy and Pottery Production in Middle Bronze Age Cyprus*. (Studies in Mediterranean Archaeology, 138). Paul Åström's Förlag, Uppsala, 2013. (30 cm, XX, 245). ISBN 978-91-7081-250-7. ISSN 0081-8232. € 76,-.

Ambelikou Aletri (hereafter *Aletri*) has long been the only site of the Prehistoric Bronze Age (Middle Cypriot I, ca. 1900 BC) that produced some limited evidence for the actual mining and extraction of copper. Excavated by a team under the (remote) direction of Porphyrios Dikaios in 1942, two areas and ten restricted trial trenches revealed fragmentary wall sections and some stone foundations, along with much debris (Dikaios 1946). Some 250 m distant from the excavations, in modern mining shafts explored during the 1940s, workers found groundstone (mining) tools and pottery (Red Polished III sherds, 19th century BC) at a point some 19 m deep inside a mine shaft (Stoa 2) and 2 m deep inside another shaft (Keklimenos 1) that was accessible only from Stoa 2. No formal excavations were conducted in these shafts, but it seemed apparent to anyone who visited the mining operation that the artefacts were *in situ*. From this it has long been assumed that seams of quality copper ore were being exploited nearly 4000 years ago, deep inside mines near Ambelikou.

Dikaios never produced a final report on these excavations, and in the early 1980s Robert Merrillees (1984) took the first steps in what would prove to be a long journey to publish such evidence as existed in the storerooms and amongst the relevant records of the Cyprus Museum in Nicosia. Beyond his 1984 report, which treated the site's topography, history of excavations and the discoveries in the mines, Merrillees was unable to complete the project as planned, and in 2004 transferred responsibility for the publication to A.-E. Dunn-Vaturi, then of the Louvre Museum. In turn, Dunn-Vaturi was unable to finalise the project and in 2010 Webb and Frankel were invited to take it over; they were given full access to all the material collected previously by Merrillees, Dunn-Vaturi and their various collaborators. In exemplary and very timely fashion, after a three-week stint in the Cyprus Museum in 2011 when over 200 pottery and stone artefacts from *Aletri* were drawn, photographed and studied, Webb and Frankel — and their collaborators — were able to finalise this long-awaited and surprisingly informative volume, more than one could hope for after a seventy-year hiatus.

The full history of the excavations is presented in Chapter 1, along with its chronological placement (based on two more recently recalibrated radiocarbon dates), which falls somewhere between the late twentieth and early nineteenth century BC. In Chapter 2, George Constantinou and Ioannis Panayides discuss the mining geology of Cyprus, with special reference to *Aletri*, the ridges and hills around which are composed mainly of igneous rocks, in particular the Upper Pillow Lavas with their metal-bearing ores. The copper sulphide mineralisation in the Ambelikou area is what first brought the Hellenic Mining Company there in 1942, at which time they found a small deposit of cupreous pyrite on *Aletri* hill and proceeded to mine it (uncovering the Red Polished sherds and mining tools). Such sedimentary rock as exists in this specific area includes a highly porous limestone containing many 'solution cavities' filled with rain water; in some places these cavities overflow as springs that almost certainly supplied nearby settlements, both ancient and modern.

Equally important for the present publication, certain marl outcrops in the area, when mixed with sand and silt from alluvial deposits, or with residual red soils, were in the past and to some extent continue to be used for producing pottery, especially large vessels and *pithoi*.

The brief Chapter 3 draws extensively from Merrillees' 1984 report on the ancient mining and earlier fieldwork at *Aletri*, reproducing plans of the modern mining operations and trial trenches, and adding a colour image of a Red Polished III sherd found inside the Keklimenos 1 shaft. Also included is the description of a rock-cut chamber tomb at the unknown location *Theotokos*, which probably lay to the east of Ambelikou village (*Aletri* lies to its west), and which contained Red Polished and Drab Polished pottery of the same type excavated at *Aletri*.

Chapters 4 and 5 present, respectively, the excavations in Areas 1 and 2 at *Aletri*, and the various units within them. These are accompanied by some excellent reproductions of early site photographs, various plans, sections and profiles of the different areas, and superb drawings of the most important 'Units' (rooms), in particular Area I, Unit I (figure 4.17) and Unit II (figure 4.19), and Area 2 Units I-III (figure 5.21). From these plans, it is hard to understand why the authors are so adamant that '... neither the remains in Area 1 nor those in Area 2 constitute complete buildings' (p.36), although it is certainly possible, as they argue, that some of these rooms may have formed part of larger, 'industrial' (metallurgical, pottery-producing) complexes. Indeed, the architecture of Area 2 — on two levels that may represent the remains of ancient terracing — is quite distinct from that of contemporary domestic structures: Units I, II and III in the lower area seem to have formed a single complex identified as a pottery workshop, whilst Units IV, V and VI in the upper area are argued to be a series of work spaces associated with the production of copper (pp. 55-56).

Chapter 6 on the pottery is by far the most detailed: some 100 whole or nearly whole vessels and 11,700 sherds were examined, over 90% of which were of Red Polished III ware in a range of shapes (jugs, juglets, large and small bowls, and *pithoi* being the most numerous of the whole vessels). Much smaller numbers of Drab Polished and Red Polished Coarse wares make up most of the remainder; it is notable that no White Painted wares (elsewhere regarded as a hallmark of the Middle Cypriot period) were found. Detailed description of the different types of vessel, by ware, follows, along with a lengthy catalogue arranged by area (pp. 98-115), and sixteen full-page figures of new, meticulously fine drawings of the various types of vessels found. Figure 6.16 (p. 84) is a detailed colour plan of the pottery workshop in Area 2, showing the location of 39 cutaway-mouthed jugs — which the authors argue were produced in the workshop — and other items (pottery, spindle whorls, figurines, stone vessels and tools, two basins) found in Units I-III of Area 2.

The ground stone assemblage receives similar treatment in Chapter 7, in total 109 artefacts dominated by rubbers, pounders and querns and followed in descending amounts by grinders, mortars and hammerstones. There is a marked difference in the numbers of stone tools found in Areas 1 and 2, which forms one key element in the authors' interpretations of the distinctive activity areas. The grinding and crushing tools found in Unit II of Area 1, for example, likely belonged to a copper workshop where slag was crushed and ground to remove copper prills for remelting and casting

(workshop plan in figure 7.6, p. 137). In Area 2, Units IV and VI contained a groundstone assemblage that was also likely associated with copper working, whilst Units I and III produced burnishers and small pounders likely linked to pottery production. The groundstone assemblage overall is presented with detailed description of the different tool and artefact types, followed by a seven-page catalogue and ten figures of drawings and colour photographs.

Chapter 8 presents the small finds: a picrolite pendant and figurine head; a plank figurine and three small Red Polished figures/fragments; spindle whorls and loomweights; sherd burnishers and disks; some archaeometallurgical paraphernalia (a well-known ceramic crucible, two clay moulds, a 'blowpipe nozzle' [not a tuyère], a fragment of furnace lining, a copper needle and blade fragment, some lumps of ore, flux and slag); a bone pin or needle and a piece of shell; and some fragmentary mudbricks. The blowpipe nozzle and especially the furnace fragments suggest that copper smelting was also carried out at *Aletri*.

Chapter 9 presents the results of (portable) EDXRF analyses of 149 artefact samples from Areas 1 and 2 at *Aletri*, including different varieties of Red Polished and Drab Polished wares, figurines, spindle whorls, mudbricks, one of the clay moulds, the blowpipe nozzle and hob fragments. Principal Components Analysis (figure 9.1, p. 190) indicates that most of these objects — excepting the Drab Polished pottery and the more highly decorated Red Polished juglets and bowls — were produced (and consumed) locally, perhaps on some level of specialisation beyond the household. The authors suggest that the presence of both utilitarian and finer imported wares may point to a 'complex' set of intra-island interconnections, perhaps conducted in part by sea and likely built around the distribution of copper ores from *Aletri* (see further below).

In Chapter 10, Myrto Georgakopoulou and Thilo Rehren present the disappointing results of XRD analysis (along with a metallographic study of polished sections using a reflected light optical microscope) of what were first identified (in 2001, by Sven van Lokeren) as samples of metallurgical slags or ores, then held in the Cyprus Museum. All five samples (excepting possibly one of almost 40 wt% CuO) may now be identified as geological materials (manganese, iron-copper, iron [hydr]oxides with associated host rock). In other words, they are rocks, with no sign of human treatment. It remains unclear if these were intended for metallurgical use, or simply formed part of this rocky, mineral-rich landscape.

Many readers will want to begin and end with Chapter 11: 'Ambelikou *Aletri* in Context', which is where Webb and Frankel present their own views on the significance of the site and its finds. The array of domestic or household evidence — from spindle whorls and loomweights, to cooking pots, baking pans, basins or mealing bins and hobs for the hearth, coupled with the fact that the site was extensive enough (3 hectares) to accommodate both domestic and special-purpose buildings, leave little doubt that *Aletri* was a permanent settlement as well as an industrial complex.

Equally significant is the evidence of a pottery workshop (Area 2, Units I-III), alluded to by Dikaios in 1946 but long since overshadowed by the site's archaeometallurgical remains. This is the only such installation thus far known from Prehistoric Bronze Age Cyprus: Unit II is most likely what Dikaios surmised, a 'primitive' kiln, whilst Unit III was

a 'drying area' and Unit I a space for preparing clays (figures 11.7-8, pp. 214-215 show the proposed layout and reconstruction of the workshop). Other objects or materials that corroborate this identification include several unfired 'blocks of clay', small stone pounders and grinders (used for preparing clay or temper); stone burnishers (for treating the surface of vessels); and a 'dog cockle' and metal blade fragment (for scraping or burnishing). One distorted bowl and a cutaway-mouthed jug whose rim was split during firing also suggest pottery manufacture in this area. Finally, the authors argue that many if not all of the 39 medium-sized cutaway-mouthed jugs found in Unit I represent the last kiln load, stacked and ready for distribution. Having considered further the scale, context and variability in pottery production at *Aletri* (pp. 217-219), Webb and Frankel suggest that limited, part-time specialisation — whether a permanent community operation or a seasonal or itinerant one — offers the most apt model to explain the array of evidence from Area 2.

Webb and Frankel preface their discussion of the evidence for a metallurgical industry and workshop at *Aletri* with a detailed and informative treatment of the richly endowed mineralogical landscape around the site, including the type of coppers ores (almost certainly sulphidic) exploited during the Prehistoric Bronze Age (pp. 201-206). However, the frequent reference to the site of Pyrgos *Mavrorachi* in this discussion is puzzling to me, not least the following (p. 204): 'The evidence for the smelting of copper sulphide ores in Middle Cypriot workshops at Pyrgos should put an end to the argument that technologies for the roasting and smelting of sulphidic copper ores were not available at this time'. One can accept that sulphidic ores were roasted at Pyrgos (Giardino 2000: 23; Kassianidou 2008: 254), but the state of the excavations at this site cannot put an end to any argument. As Kassianidou (2008: 254) also mentions, the so-called smelting furnaces at Pyrgos are simple depressions lined with plaster (an inappropriate, non-refractory material that melts at temperatures above 900°C), which lack any evidence of slagging and in any case are too large for any known type of smelting furnace (Kassianidou suggests they were more likely pot-stands). She also emphasizes the paucity of demonstrable evidence for metallurgical activities at Pyrgos (one non-diagnostic crucible fragment, one large stone anvil), excepting the scattering all over the 'industrial area' of small, irregularly-shaped pieces of slag, which themselves indicate limited understanding of the temperatures and mixture of ore and flux required to produce a 'good slag'. To these, the excavator would add two clay moulds, one blowpipe nozzle, and possible crucible fragments. Elsewhere, Webb and Frankel (p. 207) note that the excavators at Pyrgos have identified an 'industrial building or industrial quarter' with evidence of ore beneficiation, roasting, smelting, melting and finishing: none of this evidence has been published in a coherent, stratigraphic manner. Based on the published excavation reports from *Mavrorachi* (most recently Belgiorino et al. 2012), it is not only difficult to gauge the scale of (Early Cypriot? Middle Cypriot?) production at the site, but also hard to give credence to the reported range of metallurgical activities (washing, smelting, casting) there. Because it remains unclear how these reputed archaeometallurgical finds were associated stratigraphically with the actual structures and the well-dated pottery (Muhly 2002: 81), the role and function of this crucial site in Cyprus's

early metallurgical history continues to be obscure: it certainly needn't be used to corroborate the much better documented evidence from Ambelikou *Aletri*.

Evidence from some of the 'Units' in Area 1 indicates the grinding and crushing of slag to remove entrapped copper for melting and casting. The most striking picture, however, emerges from Unit II, with its 32 grinding and crushing stones, four large limestone mortars, a low anvil (or working platform?), two large, deep pits (for water separation of ground ore or slag from gangue?), and a stone-lined (casting?) hearth with a preserved height of at least 10 cm, containing bone ash (used as fuel, or a parting agent) (figure 11.6, p. 210). Other metalworking evidence from Area 1 includes the blowpipe nozzle, the double-sided open clay mould, two finished metal objects, and a piece of furnace wall lining as well as a fragment of furnace slag; Area 2 produced a crucible for melting copper. The furnace wall/lining fragment and piece of furnace slag also indicate — as Dikaios (1946: 245) had concluded — that copper smelting took place at *Aletri*, a few centuries before the otherwise earliest known (Late Cypriot I) copper smelting workshop on Cyprus, at Politiko *Phorades* (Knapp and Kassianidou 2008). Webb and Frankel suggest, again quite plausibly, that such smelting furnaces as existed at *Aletri* may have been operated by natural draughts. Various kinds of wind-operated furnace installations were used contemporaneously (i.e. Early Bronze Age) to extract copper from ores at smelting sites on Crete and Kythnos in the Aegean, and at Feinan in Jordan (see Hauptmann 2007: 228-232 for the latter, and note that Timna is in Israel, not Jordan, as the authors mistakenly mention, p. 207). At *Aletri*, the bulk of the evidence so carefully drawn together by Webb and Frankel, in particular the layout and contents of the workshop (Area 1, Unit II), leave little doubt of the long presumed but never so well documented archaeometallurgical credentials of the site.

In their closing sections of Chapter 11, Webb and Frankel, who are amongst the most knowledgeable scholars working on the Cypriot Prehistoric Bronze Age and thus certainly justified in offering their own interpretations of the period, nonetheless at times venture off the track. For example, although relying on a recent publication by Constantinou (2012: 7-9), to my knowledge there is no evidence, as the authors suggest, that demonstrates the existence of tin sources in and around the area of Nuzi in northern Mesopotamia. Thus, although it seems evident that tin bronzes began to re-appear in Cyprus around 2000 BC, there is no reason to argue (p. 220) that tin, cassiterite or 'tin bronze' (finished products?) were imported from Nuzi, or that 'the dynamics of tin production and distribution within Anatolia' were responsible for a renewed flow of tin to Cyprus. We simply don't know the sources of tin that came to be used at this time on Cyprus.

Regarding the site's status, at one point (p. 223), Webb and Frankel suggest that *Aletri* reveals evidence of a 'mobilised local (metals) industry', one that involves the planned use of resources, a skilled labour force dependent on local subsistence support, and a production-distribution network embedded within a more extensive system ('a larger extra-regional entity or entities') of control, demand and exchange, and one in which *Aletri*'s miners and smelters were producing copper ingots for distribution far and wide (e.g. by sea around Cape Kormakiti to the key north coast site of Lapithos). One page later (224), however, they state that the evidence from *Aletri* offers no support for the idea that these early metalworkers

may have enjoyed a privileged status within the community. If one can speculate on the nature of the local metals industry at *Aletri*, and its role in producing and distributing smelted ores in an 'extra-regional' exchange system from Katydhata to Lapithos and beyond, why can one not speculate on the metalworkers' social status?

Such minor quibbles aside, all Cypriot archaeologists, and anyone interested in early mining and metallurgy, or in the likely layout of a prehistoric pottery kiln and workshop, should be extremely grateful to Jennifer Webb and David Frankel for bringing together the evidence from a 70-year old excavation, engaging with new concepts and techniques unimaginable in the 1940s, and publishing a final report that many contemporary projects should envy.

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