
The Chrysokamino Metallurgy Workshop and Its Territory by Philip P. Betancourt

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This is an exhaustive study of a small Minoan copper working site, and farmhouse in the vicinity, on an isolated and windswept headland on Crete, excavated between 1995 and 1997, to which 32 scholars, scientists, and students from a variety of different disciplines have contributed. 22 chapters and 14 appendices, over 432 pages, cover all aspects. Production quality is exceptionally high. There is some repetition and disconnection, and the more important matter is difficult to excavate from the background of a detailed description of everything. Betancourt's overviews of the workshop [179–189] and the survey [257–278] are helpful; an executive summary of the results that mapped the project aims (stated on 18) would also have been useful.

Study of the natural environment of the site reveals that there is no trace of copper ore in the rocks here, and available evidence suggests there probably never was. Rather (as with other copper smelting sites in other times and places), foreign ore, perhaps from Laurion and Kythnos (note the caution on 145) and probably already prepared for smelting [144], was brought in by ship [41–42], perhaps as ballast [180]. This site was probably chosen for smelting because of the presence here of one or more other things needed to make metal from ore: of the possible things suggested, fuel (perhaps including olive press-cake), flux, and naturally directed wind (providing a draft for the furnace and removing toxic fumes) are the most convincing [142–145, 186]. It is established that the bowl furnaces used at Chrysokamino were probably small (≈ 44 cm. max. diameter), that output was correspondingly small and perhaps seasonal, and that there was great chemical and temperature variability (up

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to 1200° C) between different firings [183–189], but that knowledge of how to mix local materials to make refractory clays just for smelting purposes already existed [112–113]. Muhly's chapter on the history of early metallurgy [155–177] puts the site into a wider context and highlights its significance: Chrysokamino reveals the use of an experimental smelting technology that points towards shaft furnaces and pot bellows, and therefore stands at the threshold between the Early and the Middle Bronze Age.