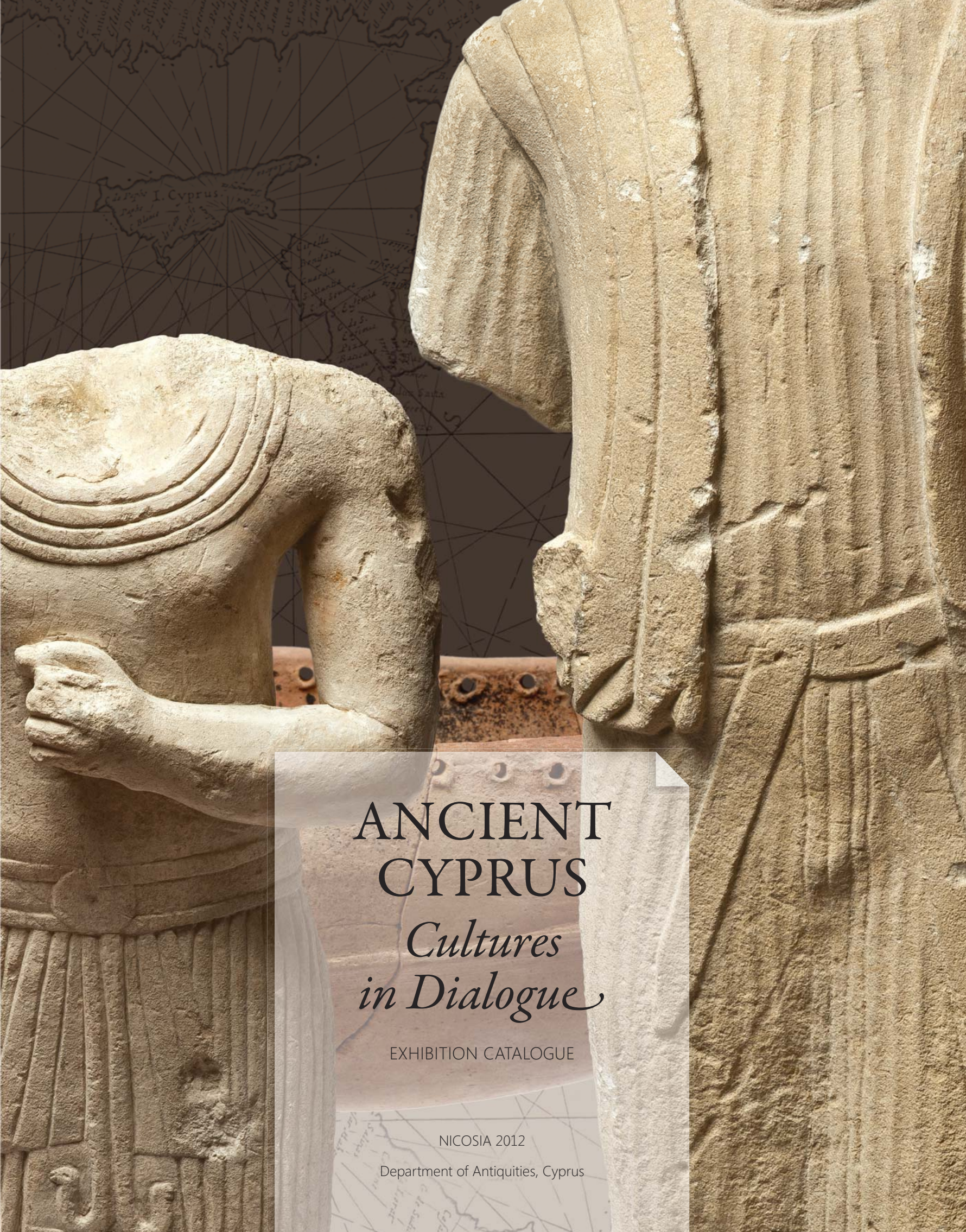


The background of the cover is a composite image. It features two large, weathered stone statues of ancient figures, likely from the Hittite or Assyrian periods, shown from the waist up. The statue on the left is seen from the side, wearing a garment with a wide, patterned belt. The statue on the right is more frontal, wearing a long, pleated robe. In the upper left corner, there is a faint, historical map of Cyprus with various place names and a grid of lines. The title text is overlaid on a semi-transparent white rectangular area in the center.

ANCIENT CYPRUS

*Cultures
in Dialogue*

EXHIBITION CATALOGUE

NICOSIA 2012

Department of Antiquities, Cyprus

ANCIENT CYPRUS: *cultures in dialogue*

Exhibition organized by
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Editors:
Despina Pilides
Nikolas Papadimitriou

Department of Antiquities, Cyprus
Nicosia 2012

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Natural resources and the importance of copper

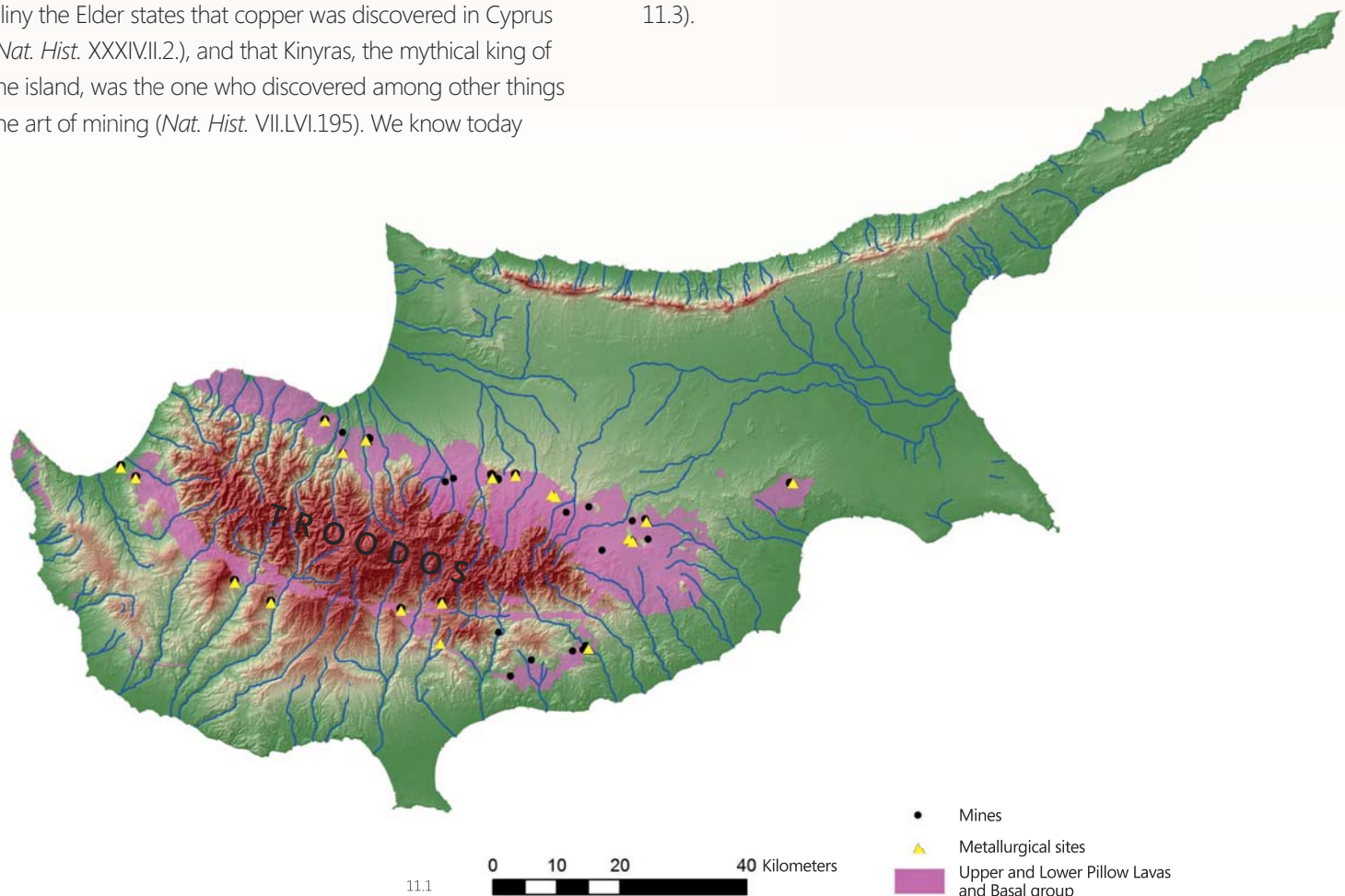
Vasiliki Kassianidou
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The exploitation of Cyprus' mineral wealth and other natural resources, such as the forests, formed the basis of the island's economic prosperity from prehistoric times until late Antiquity. The mountain range of Troodos, which covers more than a third of the island, includes in its periphery some of the richest copper ore deposits in the Mediterranean (Constantinou 1992, 332) (Fig. 11.1). Located relatively close to the surface, the deposits are easy to mine, and they are also easy to spot because they are covered by colourful iron and manganese oxides (the ochres and umbers) (Fig. 11.2). These minerals were also extensively exploited in Antiquity, as indeed in modern times: from the earliest prehistory until today they were used as pigments for wall paintings and in pottery production (Constantinou 1992, 364-365). Other minerals related to the copper deposits, such as chalcantite (the copper sulfate), were used extensively in Antiquity for the preparation of medicaments (Michaelides 1996, 144).

In his well known work *Natural History*, written in the 1st c. AD, Pliny the Elder states that copper was discovered in Cyprus (*Nat. Hist.* XXXIV.II.2.), and that Kinyras, the mythical king of the island, was the one who discovered among other things the art of mining (*Nat. Hist.* VII.LVI.195). We know today

that Pliny's statement is incorrect: copper production in Cyprus begins several millennia later than in other areas of the Eastern Mediterranean, such as Anatolia and the Balkans. Nevertheless, it indicates the importance of Cyprus as a source of copper for the Roman Empire and throughout Antiquity. Pliny (*Nat. Hist.* XXXIV.2-4) uses the words *Aes Cyprium* (Cypriot copper), to describe pure copper metal. The term for copper was later abbreviated to *cuprium* which, sometime between the 3rd and the 4th c. AD, became *cuprum*, with the variant *coprum* from which the western European words for the metal are derived.

Modern studies show that copper was rightly associated with Cyprus in Antiquity. Impressive remnants of the ancient copper industry, including immense heaps of copper slag, a waste product of the smelting process, have been recorded in 40 different locations in the foothills of the Troodos. It has been estimated that they amount to 4 million tons of copper slag, all of which was produced before the 8th c. AD (Figs 11.1, 11.3).



The Chalcolithic period

The first metallic objects appear in the Chalcolithic period. They are made out of *native* copper, in other words metallic copper found as such in nature which was mechanically worked. It is rather astonishing that the earliest copper artefacts from Cyprus date only from ca. 3500 BC, when the earliest copper objects in Anatolia date to the end of the 9th millennium BC. Equally surprising is the fact that the total number of Chalcolithic copper artefacts known to date from Cyprus is less than twenty. The repertoire consists mainly of awls (cat. no. 52), pins and ornaments such as spiral beads and pendants (cat. no. 194) (Peltenburg 2011a).

The Early and Middle Bronze Age

In the Bronze Age there are significant developments in metallurgy. The Early and Middle Cypriot periods are characterized by a marked increase in the known number and types of metallic objects, which apart from tools (cat. no. 56), now include weapons (cat. no. 54) and personal objects (cat. no. 53) (Balthazar 1990). This rise in numbers is due to an increase in the availability of copper, which was the result of the development of extractive metallurgy, i.e. the production of metals from ores through the process of smelting. Because Cypriot ores are sulphidic, the process of extracting the metal is complicated. Once the method was mastered, sometime around the beginning of the 2nd millennium BC, Cyprus began to produce and export significant amounts of copper.

The evidence for the production of copper in the Early Cypriot period is indirect and comes in the form of stone moulds, used to cast boat and tongue-shaped ingots (cat. no. 48) and flat axes with perforated butts which are also believed to have been used as ingots (Frankel & Webb 2001, 35-36). They are extremely important, as they indicate that metal was already cast into standard shapes, presumably for the purpose of exchange, either in local or foreign markets.

Recent excavations have shown that it was in the Middle Cypriot period that the foundations of the Cypriot copper industry were established (Kassianidou 2008). The earliest



11.2



11.3

direct evidence for copper mining dates to this period and consists of pottery and stone tools recovered from ancient shafts in the mine of Ambelikou. At the nearby settlement of Ambelikou-*Aletri*, stone tools, ores, a double-sided mould and a crucible were recovered, all of which attest to metallurgical activity. Written sources suggest that Cyprus, which is called *Alashiya* in the texts of its neighbours, had at this time started to export copper to the East. Some of the earliest references to copper from *Alashiya* come from Mari, in modern day Syria, and date to the first half of the 18th c. BC (Knapp 2011, 250).

Fig. 11.1. Map of Cyprus showing the pillow lava formation where copper ore deposits, ancient mines and slag heaps are located.

Fig. 11.2. The gossan layer (consisting of iron oxides and other minerals) at Mitsero-Kokkinopezoula mine.

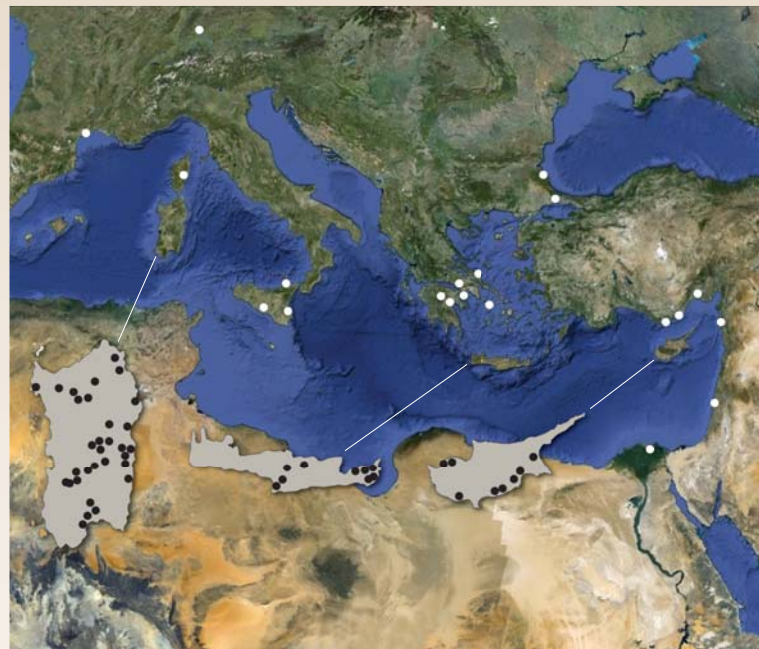
Fig. 11.3. The Late Roman slag heap at Skouriotissa.

The Late Bronze Age

The Late Bronze Age in Cyprus was a time of growth, prosperity and emerging social complexity. The prosperity of the island is believed to have been based on the ever increasing trade with the Near East and the Aegean, a conclusion which is corroborated by the plethora of imported luxury goods and ceramics found in the settlements and cemeteries of this period and the use of raw materials, namely tin, gold, silver, and lead, which are not locally available. The most important Cypriot product that was exported in great quantities was of course copper.

Practically all excavated Late Cypriot sites have yielded artefacts related to the production of the metal (Kassianidou & Papasavvas 2012). They demonstrate new developments in smelting technology, such as the use of bellows (cat. no. 45) and tuyères (cat. no. 46) which greatly improved production (Kassianidou 2011a). After smelting, the copper was cast into ingots of standard shape and weight. Although different types of ingots were used in parallel during the Late Bronze Age, oxhide ingots (cat. no. 49) were the most common and widely distributed (Fig. 11.4) (Lo Schiavo *et al.* 2009). The earliest known examples have been found in Crete and date from the 16th -15th c. BC, while the latest examples date to the 11th c. BC and have been found in Sardinia. Initially, Cyprus, Crete, and Sardinia, which produced the highest number of sites with oxhide ingots, were thought to be possible production centres. Archaeological and geological evidence, however, indicated that Cyprus was the most likely source for the ingots, something that has been recently corroborated by provenance studies (Gale 2011, 214-218). Based on Lead Isotope Analysis, all known oxhide ingots, apart from the early ingots found in Crete, were most likely produced from Cypriot copper.

The largest concentrations of oxhide ingots were discovered in two shipwrecks off the coast of Anatolia. The first to have been discovered was the one off Cape Gelidonya which dates to ca. 1200 BC and was carrying one ton of Cypriot copper (Bass 1967). The most impressive, however, is the Uluburun shipwreck, which dates to ca. 1300 BC (Pulak 2008). This ship was carrying ten tons of Cypriot copper. Because of the enormous amount of metal, and the other raw materials the ship was loaded with, all of which had tremendous economic value at the time, it has been argued that it could only have belonged to a state ruler. Indeed, the best parallels for similar shipments are encountered in the diplomatic correspondence between the rulers of Anatolia, Egypt, *Alashiya* and the Near East. Of great interest are the eight letters sent by the king of



11.4

Alashiya to the Pharaoh of Egypt, discovered in the archives of Akhenaten's capital, Tell el-Amarna (cat. no. 153). In these letters, which date to the mid-14th c. BC, the king of *Alashiya* states that he has sent a total of 897 talents of copper (corresponding to 26 tons of metal) to Egypt (Knapp 2011, 250-251). The chronological span of this correspondence is thirty years at the most, fifteen years being more likely. Taking into consideration that the eight letters probably do not represent the whole of the correspondence exchanged between *Alashiya* and Egypt, then the amount of copper sent is even more striking. The Amarna texts are important for other reasons, too. In letter EA35 it is clearly stated that the copper was locally produced and that it was shipped directly from *Alashiya* to Egypt.

The importance of the copper industry for the Cypriot economy of the Late Bronze Age is shown indirectly by the need the Cypriots felt to place it under the protection of their gods. In Enkomi a male deity standing on an oxhide ingot was found (cat. no. 42) (Papasavvas 2011). Furthermore, on three four-sided bronze stands, the most characteristic objects of Late Cypriot metalwork (Fig. 11.5), ingot bearers are depicted in processions with others bringing dedications to a divinity, while miniature oxhide ingots, often bearing short inscriptions, have been interpreted as votive offerings (cat. no. 152) (Papasavvas 2009).

Copper production in the 1st millennium BC and later

The complex exchange systems of the Late Bronze Age came to an end in the 12th c. BC, as one after the other the Mycenaean and Hittite kingdoms, as well as the city states on the Levantine coast were destroyed (Ward & Joukowsky 1992). Although Cyprus must also have been affected by these

events, it never went through a 'Dark Age'. Excavations in Early Iron Age necropoleis, such as Palaepaphos-*Skales*, indicate that the elite of Cyprus enjoyed a high standard of living and still had access to exotic goods such as gold, which they deposited in their tombs together with significant quantities of bronze artefacts (cat. nos 60, 62, 63). This affluence can only have been based on the production and export of copper, which remained a valuable commodity even in the Iron Age. Indeed, based on the archaeological evidence from the mines and the slag heaps, in the Archaic and Classical periods there is a marked increase in the production of copper (Fig. 11.6) (Kassianidou 2012). Presumably much of this copper would have been exported as indirectly indicated by the few extant ancient sources, many of which are actually later in date. Local demand for metal would also have been significant. The metal would have been used to produce objects for display in the palaces, in aristocratic burials (cat. nos 234-239) and in sanctuaries but also to produce weapons and armour (cat. no. 233) for the armed forces.

By the Roman period copper production reached a truly industrial scale (Fig. 11.3). Thanks to Galen, the famous doctor who visited the island in AD 166 and briefly described his visit to the mines of Soloi in his books, we know that a *procurator* was appointed to control the mines, and that the labour force consisted of slaves (Kassianidou 2000). Recent archaeological research has shown that copper production stopped after the 7th c. AD (Kassianidou 2011b).

It was not until the 20th century that exploitation of the mineral resources of Troodos and large-scale mining were resumed. Cyprus' fame as a source of copper in Antiquity led modern prospectors from the US and Europe to come to the island looking for ore deposits which could be profitably exploited. When the mines were re-opened, modern miners came across, and thankfully mapped the remains of ancient galleries and adits, providing us with a record of ancient mines which are no longer preserved because, since the 1960s, ore deposits have been exploited by opencast mining methods (Fig. 11.6). They also collected several ancient mining tools such as shovels, ropes (cat. no. 44), baskets and ladders, which were preserved because of the burial conditions in the mines (Bruce 1937). As already in the Bronze Age, so indeed in modern times, the mining industry soon became one of the main sources of income for the island.



11.5



11.6

Fig. 11.4. The distribution of oxhide ingots around the Mediterranean.

Fig. 11.5. Four-sided bronze stand depicting an ingot bearer from Kourion (British Museum, GR 1920.1220.1).

Fig. 11.6. The modern opencast mine of Skouriotissa.