The impact of iron technology on the economy of the Aegean and Cyprus from 1200-850 BCE

Volume I: Text

Thesis submitted for the degree of Doctor of Philosophy in Archaeology

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Abstract

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The thesis investigates the development of ironworking industries in the Aegean and Cyprus during the Early Iron Age, covering the crucial years from the twelfth to the ninth centuries BCE. It advocates for a move away from pan-Mediterranean models that rely on a centre of 'innovation' from which the technology radiated to new regions via itinerant craftsmen. It argues instead for the development of models based on region-specific cultural and economic factors that influenced iron production and use. This comparative method reveals that the iron industries of the Aegean and Cyprus developed along separate trajectories.

This thesis shows that iron objects were locally produced in the Mycenaean sphere during the Late Bronze Age. The Aegean did not depend on itinerant craftsmen from Cyprus to stimulate ironworking, but it was instead a local tradition that continued through the end of the palatial period in the Peloponnese. Iron spread throughout the Aegean in the ensuing century, with each region adapting objects to iron according to how it was valued. In the Peloponnese, iron was suitable for practical implements immediately, while Attica, Crete, Euboea, and the islands emphasised a high value ornamental purpose in mortuary display. By the 10th century, the standardisation of burial rituals during the Protogeometric integrated iron into general use across the Aegean. It became a widely produced,

moderately valued metal for daily use implements like tools, as well as a regular part of mortuary display.

In Cyprus, ironworking sprang up rapidly across the island, and without a Bronze Age tradition. It began as part of a package that included the arrival of Urnfield-type goods from the Aegean, iron being the more appropriate than bronze for items such as knives, daggers, fibulae, obeloi. Iron was applied in two spheres immediately, to tools of practical use and to high value mortuary display items. Local production due to the lack of ore sources in favour for a copper-smelting by-product method remains debatable, but Cypriot smiths were capable of mass-producing a series of knives. The iron industry did not disrupt but developed alongside the Early Iron Age investments made in the copper industry.

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Abbreviations

BA Bronze Age
EBA Early Bronze Age
MBA Middle Bronze Age
LBA Late Bronze Age
EIA Early Iron Age

EB Early Bronze Age Anatolia
OAC Old Assyrian Colony
OHK Old Hittite Kingdom
MHK Middle Hittite Kingdom
HEP Hittite Empire Period

EC Early Cypriot
MC Middle Cypriot
LC Late Cypriot
CG Cypro-Geometric
CA Cypro-Archaic
CC Cypro-Classical

EH Early Helladic
MH Middle Helladic
LH Late Helladic
EM Early Minoan
MM Middle Minoan
LM Late Minoan

SMyc Sub-Mycenaean
SMin Sub-Minoan
EPG Early Protogeometric
MPG Middle Protogeometric
LPG Late Protogeometric
EG Early Geometric
MG Middle Geometric
GA Greek Archaic
GC Greek Classical

Tbl. Table
Fig. Figure
*All dates are BCE unless otherwise specified

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Chronologies of the Aegean, Cyprus, and Anatolia

From the chronologies of Yalçın 1999; Lemos 2002; Easton 2002; Keswani 2004; Dickinson 2006; Iacovou 2008

Chapter 1. Introduction

This thesis addresses questions regarding the development of ironworking in the eastern Mediterranean at the end of the Bronze Age (BA) and into the first few centuries of the Early Iron Age (EIA), a period comprising roughly 1200 to 850 BCE. Although the creation of iron industries was a pan-Mediterranean phenomenon in this period, local factors such as prior metallurgical skill, access to resources, and economic and political circumstances meant that ironworking manifested differently across the regions. For this reason, a singular model to explain how ironworking developed is problematic. Instead, I will limit the scale to only two key regions, the Aegean and Cyprus, but draw in data from relevant regions including Anatolia, the Levant, and the Balkans. The investigation presents a comparative study of iron objects and discusses the unique features of how the ironworking industries developed in both regions.

Before embarking on this endeavour, this introductory chapter addresses the key questions, problems, and debates in the field of ancient ironworking, as well as how this study addresses these issues. The first part of this chapter presents my specific research questions, followed by an outline of the aims of the research. As this study is one of many in the cacophony of voices on the topic, attempts will be made to explain how this research differs from what has come before, and why we should still engage with the topic. Next will be a presentation of several key ideas in early ironworking that I will challenge throughout the thesis. Rounding off this first part is a review of the data and methods that I will employ in my study. Discussions on early ironworking date back to the early 19th century, so the second part

of this chapter covers a brief history of how the topic arose, as well as the key theories on its development. Closing this introduction is a summary of the following chapters.

1.1 The aims of this thesis

One approaches the topic of early ironworking with caution. It has been considered for the better part of two centuries, specifically questions of when, where, and how iron developed. The evidence considered revolves around three types: studies on the object types and distributions, textual analysis of early references to iron, and chemical and metallographic analysis of the metal artefacts and their production waste products (Waldbaum 1999, 27). Yet, with the myriad of studies, there is at times a sense that little progress has been made in the last couple of decades; we rely largely on the same material and textual evidence, and few additional metallographic analyses and studies of production data have been added to the mix. I was asked by a colleague in the early days of this thesis, 'Hasn't the question of iron origins already been solved?' Of course not! The foremost aim of this thesis is to demonstrate that there remain many unresolved questions regarding early ironworking, and that value may be generated by revisiting 'old' data; that is, iron objects excavated in the last two centuries that repeatedly appear in early ironworking literature over the 20th and early 21st centuries CE. To effectively use such data, this thesis will attempt three tasks: ask new questions of the material, challenge dominant models, and attempt a new approach to the data.

1.1.1 Research questions

This thesis addresses five research questions:

1. How are the early ironworking industries in the Aegean and Cyprus similar, and how do they differ?

   Both regions present us with very different economic and political circumstances at the end of the BA, with equally alternative trajectories in the EIA. Cyprus is characterised by stability and continuity, whereas the Aegean by disruption and regeneration. Yet, ironworking developed in both regions. How do these factors alter the use of iron, and how do they affect the growth of the industry?

2. What is the relationship between Cyprus and the Aegean in the development of iron?

   The relationship is often framed as one region giving the technology to the other through exported/imported iron items and the presence of itinerant craftsmen in each region. Usually, Cyprus is the donor and the Aegean the receiver in these models. Is this model justified considering that 1) Iron objects in the Aegean appear in the BA, whereas in Cyprus the earliest date to the 12th century, and 2) Iron objects appear in both regions contemporaneously?

3. What is the relationship between the early copper and ironworking industries?

   Specifically, does the strong copperworking industry attested to in Cyprus promote ironworking, or does it hinder it? Do they rely on the same network,

or operate in isolation? Cyprus had a strong, arguably internationally dominant, copper export industry, whereas metal production did not traditionally dominate the Aegean economy to nearly the same extent.

4. Under which types of social and political circumstances does an ironworking industry develop?

   Some theories argue that political fragmentation stimulates local industries, while others suggest that an iron industry required strong centralised urban administration to exploit the resources, share the knowledge, and scale the production. The Aegean and Cyprus present us with alternative scenarios to explore these opposing points.

5. Can we develop a model that accounts for a BA ironworking industry?

   Contrary to popular belief, I argue that, in at least one region, Anatolia, a continuous ironworking industry had been producing iron consistently since the EBA. I also argue that a fledgling iron industry might have existed in the LBA Aegean. How do we integrate these BA circumstances into a model for the early days of ironworking?

1.1.2 Challenge dominant models

In the study of ironworking there is a dominant model developed by Snodgrass in his article *Iron and Early Metallurgy in the Mediterranean* (1980), with additions made several

years later.[1] Since its debut, this model remains the most influential macro-model on the development and spread of iron technology across the Mediterranean during the period 1200-900 BCE. These are pivotal centuries because they mark the rise of a metal's economy centred on iron rather than copper production and distribution. Snodgrass encapsulated this transition in three broad stages for the development of iron technology:

Stage 1: In the BA, iron was rarely produced, usually from meteoritic iron sources, and used only for prestige purposes on small ornamental or ceremonial objects. This stage originates in Mesopotamia in the 3rd millennium, but spreads westward to Anatolia, Cyprus, and the Aegean into the late 2nd millennium.

Stage 2: In this transitional stage, iron begins to be used for utilitarian objects due to increasingly controlled and reliable smelting techniques that produced workable wrought iron. Bimetallic objects are common and represent the transitional nature of the industry in this period.

Stage 3: Upon satisfying the above, a region enters the full Iron Age when the number of iron objects predominate over bronze for utilitarian objects and iron becomes the basis of the metal economy.

[11] See *Cyprus and the Beginnings of Iron Technology in the Eastern Mediterranean* (Snodgrass 1982) and *The coming of the Iron Age to Greece: Europe's earliest bronze/iron transition* (Snodgrass 1989).

I will refer to Snodgrass' model throughout the thesis because there are several components that I will challenge along the way. The first challenge is that several Mediterranean regions did not follow the three stages of development. Certainly, some regions are exemplary in their adherence to the model. In the Aegean, iron's gradual replacement of bronze from the 12th to 10th centuries BCE in grave deposits is well-documented (Snodgrass 1980, 348, 250, tbls. 10.2, 10.3; 1996; Catling and Catling 1980; Catling 1996; Morris 1989: 508-512; 1999, 211, fig. 6.2). Yahalom-Mack and Eliyahu-Behar's (2015) project *Reconstructing Ancient (Biblical) Israel* demonstrates that iron in the Levant was used for ornamental objects and jewellery initially but applied to utilitarian purposes by the late 12th century, and was systematically produced to replace bronze items in the 10th to 9th centuries. Cyprus, however, bypassed stage 1, and several components of stages 2 and 3 took place simultaneously (Chapters 5 and 6). Anatolia simply bucked the trend by producing all types of iron throughout the entirety of the BA (Chapter 2).

To this end, I also challenge Snodgrass' idea that BA iron production was rare, that iron sources primarily came from meteorites, and that only small ceremonial and ornamental objects were produced. This is controversial, with many refusing to accept the idea that BA smelting capabilities existed (Waldbaum 1980, 88–90; Limet 1984, 191; Yalçın 1999, 181). Excavations in the 2000s by the Japanese Institute of Anatolian Archaeology at Kaman-Kalehöyük provide us with evidence for almost 1000 years of continuous iron production thought the BA (Chapter 2). This means that, when developing a model for ironworking in the Aegean, we need to consider how to integrate the fact that BA iron smelting took place in a region to which it was closely tied through trade relations. While iron production in the BA

Aegean focused on jewellery, specifically bezel rings, production was regular enough to suggest that at least a few workshops in the Peloponnese and Crete could work smelted iron (Chapter 3).

Another concept worth challenging is the emphasis on a singular origin for ironworking. The typical narrative is one where a region or kingdom innovated ironworking and shared it with the rest of the Mediterranean via itinerant craftsmen travelling in the wake of the collapse of the BA palace-driven economy. Anatolia and the eastern region of Armenia have long been favourites for the initial production of iron (Gowland 1912, 281; Friend 1926, 862; Wertime 1980, 17; Pleiner 2000, 14; Maddin 2010, 204), as well as Assyria (Turner 1895, 3; Richardson 1934, 558; Pleiner 1969, 46–47), the Levant (Goguet 1761, 1:161; Evans 1900, 219; Muhly 1980, 51), and several other locations. Although once considered only a bridge for spreading iron (e.g. Desborough 1972, 315–18; Waldbaum 1978, 71–72; Muhly 1980, 47–53), Snodgrass (1971, 219, 229, 1980, 340–55) identified Cyprus as the cradle for iron experimentation in the Mediterranean and the first location to achieve a full iron economy, with the impetus coming from Aegean colonists. Many key scholars promptly followed suit (Waldbaum 1980, 88; Tylecote 1987, 271; Wertime 1980, 17), suggesting that Cypriot smiths purposefully (Sherratt 1994, 85) or accidentally (Gale et al. 1990; Sherratt 2003, 44) invented iron smelting and shared it with neighbouring regions.

I argue that the data does not indicate an innovative event for iron, but long-term development across several regions that experimented with and shared technological developments (Chapters 2-3). What we see in the EIA is a particularly expansive phase, one fuelled by growing consumer interest (Chapters 4 and 6) as much as, if not more than, any

major technological innovations. After all, in the first few hundred years of ironworking, the product was not superior to bronze in terms of hardness, strength, and durability (Pickles and Peltenburg 1998, 67; Williams 2003, 8), so we should not assume that, once invented, it would be gladly accepted and that increasingly sophisticated techniques would follow (Alexander 1983, 29). As Tylecote (1992, 66) pointed out, products of the early bloomery process were quite heterogeneous, and that several key processes such as carburisation[2] and quenching[3] were still applied inconsistently into the Roman period. Also, some regions were slower to adopt iron for general use despite being well connected to Mediterranean maritime exchanges in the EIA. For example, iron became the dominant metal only in the 10th century (Iron IIA) in the Levant (Yahalom-Mack and Eliyahu-Behar 2015, 290, 300–302) and the 7th-6th centuries in Egypt (Leclant 1956; Pleiner 2000, 14). Instead, I will argue that a sound methodology for studying iron requires consideration of the specific social, economic, and political factors in each region that encourage the adoption of iron (see below and Chapter 7).

As a result, I will challenge the centrality of Cyprus as the primogenitor of ironworking in the eastern Mediterranean at the end of the BA. The argument for Cyprus was bolstered in the late 1970s and 1980s by metallographic analyses of Cypriot iron specimens indicating that their smiths were the first to experiment with advanced heat treatments, including carburisation, quenching, and tempering to increase the strength and durability of iron products (Fig. 1).[4] While I agree that these studies do indicate that advanced techniques took

[2] The addition of carbon via charcoal or carbon monoxide to harden the wrought iron, thereby forming the iron-carbon alloy called steel. Mild steels contain a maximum of 3% carbon, while true modern steels contain around 8%.

[3] The rapid cooling of iron-carbon alloys by plunging them red-hot into cold water or brine to harden them.

[4] For metallographic studies on Cypriot iron items see Tholander (1971) (Idalion knives), Blomgren and Tholander (1976) and Tholander (1979) (Hala Sultan Tekke wire), Stech et al. (1985) (Palaepaphos Skales knives), Åström et

place in Cyprus,[5] I question if our dataset is large enough to claim that Cyprus is alone in advancing such techniques. Analyses of the 12th century Mt. Adir pick in Israel (Davis et al. 1985), and BA items from Kaman-Kalehöyük in Anatolia (Akanuma 2005; 2006) suggest that other regions worked on such techniques as early as, if not earlier than, Cyprus (Chapter 7). As noted by Tylecote (1992, 66–68, 71), advanced techniques were not evenly applied even in later periods when they were well established. In the Roman period, when smiths could achieve high levels of carburisation and quenching, their application remained patchy. Items made from unevenly carburised metal continue as late as the Middle Ages (Pleiner 2006, 196). Without a larger comparative data set, we may be dismissing the technical achievements of neighbouring regions too hastily.

1.1.3 Attempt new approaches to the data

With these challenges in mind, how do we approach early ironworking in a novel way? The material is certainly not an easy one to study. Iron is an unstable metal and, when exposed to air and water, rusting or oxidisation severely diminish the preservation of the artefact. We must be cautious of conclusions based on quantitative analyses of iron due to poor preservation rates. Sometimes, little more than traces of rust remain, and who knows exactly how many iron objects leave no trace in situ? Quite often, the object shape and type are indiscernible, and frequently items like arrowheads, pins, and obeloi are found fused together

al. (1986) (iron items from Amathus, Idalion, and Lapithos), and Lang (1989, 1991) (unprovenanced dagger from Cyprus).

[5] McConchie (2004, 31, 94) accuses previous investigators of misreading photomicrographs and therefore of presenting a misleading role for Cyprus in the development of ironworking techniques.

in an iron mass. Many are not preserved well enough for publication and therefore often go completely unreported in early site reports. Ironically, iron ore in the form of hematite and magnetite is one of the most ubiquitous metals across the globe, including the Mediterranean in key regions cited in this study such as Anatolia, the Caucuses, northern Iran, the Levant, and the Aegean, although sources are distinctly absent on Cyprus (Fig. 2).

As mentioned earlier, one of the key methods for studying iron is through quantitative and typological analyses of items, usually from burials. Waldbaum's seminal study *From Bronze to Iron* (1978) is exemplary in this respect. She listed all iron artefacts in regions throughout the eastern Mediterranean from the LBA-EIA, leading to several key observations on each region, such as the breakdown of theories of Philistine and Hittite iron monopolies, and a rejection of Cyprus as the sole innovator in the development and adoption of iron (Waldbaum 1978, 68, 71). Many new finds have since come to light in the regions studied by Waldbaum;[6] however, due to the limitations of preservation mentioned above, I want to avoid region-wide quantitative comparisons and narrow my scope to individual regions.

The method that I will employ is a comparative contextual approach. I will examine only two regions within the EIA iron metal complex and delineate exactly how these regions adopted and adapted iron. I will consider issues regarding iron on three levels:

1. *Typologically:* Which types of objects were converted to iron and when? How do they connect to the wider Mediterranean metallurgical complex? Can typologies be created?

[6] Later lists of iron objects may be found in Sherratt (1994), Waldbaum (1999), Yalçın (1999), Zimmerman (2001), Lemos (2002).

2. *Contextually:* Which context is iron found in? Who had access to iron? What did they use it for? Can we discern function, meaning, and value?

3. *Industrially:* What evidence is there for iron production? How would an industry work relative to other metal industries? How would the new industry organise and embed into society?

The underlying assumption is that each region at the end of the BA and into the EIA underwent different social, political and economic circumstances that made the experience of iron development unique to them, and that such local experiences must be delineated before we can consider building a pan-Mediterranean model. The goal is to build a profile of what their burgeoning iron industries looked like and to understand how they embedded within society.

Thinking in terms of the *chaîne opératoire* will be a useful exercise. The production, use, and eventual disposal of iron objects required specific technical processes and social acts. This method considers all the steps from resource acquisition (prospecting, mining, smelting, smithing), to exchange (local or export markets), use and deposition (settlement and burial contexts). Some of these steps might have required only a reconfiguration of existing structures, while in other cases completely new processes were required. For example, mining and smelting of iron ores might have required new networks to be organised, whereas smithing might have been integrated into existing bronze foundries. Some of these steps are better represented archaeologically than others, but I will consider what the material tells us about as many of these facets as possible.

The regions that I will compare are the Aegean from the latter half of the 4th millennium to the mid-9th century, and Cyprus roughly from the 13th to the 10th centuries. This period covers the initial development cycles of their iron industries, which take place at different paces in each region. In some respects, the 10th/9th centuries cut-off is arbitrary as ironworking techniques and uses continued to develop long beyond this period; however, when considering a manageable scope for this thesis, they make sense because important cultural changes in terms of burial, state formation, and foreign relations took place in both regions. The production of iron objects also reached a certain threshold in terms of numbers by the end of this period to confidently say that a sufficiently robust and long-term industry had been established.

The Aegean and Cyprus were selected for several reasons. First, they are both central to several models on the origins of ironworking. The Aegean features in most models for the spread of iron technology since the late 18th century. Occasionally, it was suggested that the ancient Greeks were responsible for inventing ironworking (e.g. Wilkinson 1837, 1:59). For the most part, the Aegean is on the receiving end of the relationship with a more technologically advanced region that had already made the transition to iron at the end of the BA. The role of the Aegean in most models for the spread of ironworking is that of the initial stop-over point on its entry into the Mediterranean (Friend 1926, 863). Current scholarship suggests that a rapidly increasing demand for iron in the 8th to 6th centuries BCE spurred on a search for raw iron ore sources that resulted first in maritime prospecting, and then permanent colonial foundations. Muhly (2008, 68) sums up the current view on Greek iron ore exploration as an "obsession", while Morris (1992) characterises ore exploration as the prime motivation for

relationships between the Aegean and the rest of the Mediterranean. Although such views may indeed be an over-exaggeration (e.g. Graham 1971, 44; Sherratt 1993, 917), the situation remains confused as scholars attempt to discern the motivations for colonial foundations at sites with evidence for ironworking, such as Pithekoussai in the Bay of Naples (Muhly 2008, 71). Other factors to consider are the relationship between the Greeks and Phoenicians in the search for ore and the spread of the technology, and the question of when the Greeks began exploiting local sources in north-eastern Boeotia, Euboea, and Laconia (Graham 1971, 44; Drews 1976, 28; Bassiakos 1988; Muhly 2008, 69).

In contrast to the Aegean, interest in the role of Cyprus in early iron metallurgy is relatively new. Myres and Ohnefalsch-Richter (1899, 22–23) at one time suggested Cyprus as the originator of ironworking, which they based in part on the abundance of early iron pieces, but erroneously assumed that Cyprus had "considerable masses of iron ore of fair quality". Cyprus continued to be considered one of the slowest regions in the eastern Mediterranean to take up the new technology (Wainwright 1936, 21) until Lorimer's publication *Homer and the Monuments* (1950, 69, 115, 268) shifted the conversation to Cyprus and the east. Lorimer and others (e.g. Müller-Karpe 1962, 63, 65) believed Greek smiths were incapable of producing the earliest iron swords in the Aegean, so they must have imported the objects from Cyprus, where iron swords were produced at an early date. Several agreed, but felt that the high number of iron knives in Cyprus with parallels in Aegean SMyc and PG tombs made a more compelling argument than the swords (Desborough 1965, 223; 1972, 315–16; Snodgrass 1971, 229–30, 341; 1981, 133). Due to its geographic location and cultural connectivity, others felt that Cyprus was one of the routes by which the earliest iron objects in the Aegean and the

technology were imported from the east in the 12th century (Maddin et al. 1977; 1990, 174; Maddin 1982, 311; Waldbaum 1978, 71–72; 1980, 69–98; 1982, 325–44). Many continue to envision this role for Cyprus (Pleiner 2000, 14; Mazarakis Ainian 2006, 194; Dickinson 2006, 119; Andreyev 2013, 426), whereas others believe it to be the homeland of the essential smelting and smithing techniques required to produce early iron, which then spread to the Aegean and the rest of the Mediterranean (Stech-Wheeler et al. 1981, 266–67; Tylecote 1987, 271; Kassianidou 1994; Sherratt 1994; Crielaard 1998, 191).

The second reason for comparing these two regions is to track the effect of local factors on ironworking trajectories. Both regions experienced this period of transition in unique ways, which would likely be reflected in the development of their iron industries. Cyprus did not experience the 13th century destructions seen in the Aegean, yet both regions demonstrate a good deal of cultural and population continuity from the LBA through the 12th to mid-11th centuries. Notable sites like Tiryns and Mycenae exhibit rebuilding (Taylour 1981, 10–11; Kilian 1988, 135; Maran 2002). Several key sites in both regions witnessed continuity or expansion: Enkomi, Paphos, and Kition in Cyprus, and Athens, Argos, Asine, Korakou, Kanakia on Salamis, Lefkandi, Perati, and Dhimini in the Aegean (Sherratt 1998, 300, 304; Webb 1999, 287; Dickinson 2006, 60–61; Middleton 2010, 71–83; Papadopoulos 2017, 978, 983). Both regions experienced a decrease in trade with the Near East, as well as with one another, yet contact never ceased, and elite elements of display continued but in new forms that placed greater emphasis on metallurgy rather than foreign materials, like ivory, amber, and faience, decorated with Near Eastern motifs (Sherratt 1994, 67–68; Voskos and Knapp 2008, 673). Both regions also experienced key cultural changes in the mid-11th century, signalled by new pottery

wares, Proto-geometric in the Aegean, and Cypro-Geometric in Cyprus. Rutter (1992, 70) and Dickinson (2006, 76–77) refer to this change in the Aegean as a sort of final decline, characterised by a declining population, colonisation, site abandonments, reduced foreign exchange, and a decrease in elaborately painted pottery which was replaced by regional Protogeometric wares. For Cyprus, this period was more positive. It witnessed a standardisation and mass production of its new Cypro-Geometric wares, renewed contacts with the Levant, and new forms of mortuary rituals emphasising competition, display, and hierarchy (Manning 1998, 40; Hemary and Iacovou 1999, 154; Janes 2010, 135, 152; Iacovou 2008, 634).

The third reason for choosing these regions is their close relationship at the start of the EIA. This relationship has been variously framed. For Cyprus, the Aegean is the source of a 12th century Mycenaean invasion, an LBA consumer of their copper exports, and of EIA Greek colonization leading to material culture integration or hybridisation. For the Aegean, Cyprus is a vital link with the Near Eastern kingdoms, their traders being responsible for access to luxury goods like gold, faience, and ivory. In the later part of the EIA, Cyprus will be the first stopover and a key point of departure for the western expansion of Phoenician trade networks. Such a relationship provides many opportunities for sharing technological developments.

1.2 A brief history on the study of ironworking

As mentioned earlier, the study of iron carries a weighty history. This brief chapter reviews some of the key historic and theoretical points in the study of ironworking.

The first great debate regarding the origin of ironworking revolved around the question of whether it developed before or after copper and bronzeworking. While this hardly seem contentious today, this debate occupied historic and metallurgical circles right up the end of the 19th century. The prevailing doctrine relied on historic readings of the biblical *Book of Genesis*, which identifies the first man to master the metallurgical arts as Tubal-Cain, an eighth-generation descendant of Adam and Eve, who is referred to as the "forger of all instruments of bronze and iron."[7] It was believed, therefore, that ironworking was practised as early as all other metals and known since the Creation. This belief held fast in literature from the late Medieval period through Humanist and Enlightenment scholarship. A few detractors arose in the 18th century among the antiquarian researchers, particularly in France, including the great Montfaucon (1722, 3:37), Comte de Caylus (1752; 1761, 1:239–40), Goguet (1758), and Potter (1722, 20–21). They relied on ancient sources such as Homer, Hesiod, Pausanias, and Plutarch, as well as their own investigations of early bronze and iron objects, to argue that bronze was in use before iron. Nevertheless, these arguments could not gain support until the dominant Biblical narrative eroded.

Such undermining came from the pivotal publication by Reverend Hodgson entitled *An Enquiry into the Era when Brass was used in purposes to which iron is now applied* (1822). Although the Genesis story did not fit with the Greco-Roman sources that presented metallurgical learning as a series of stages,[8] its authority made it difficult to dismiss outright. To reconcile these traditions, Hodgson chose to separate the Biblical accounts into prediluvial

[7] Gen. 4:22, (*Holy Bible: English Standard Version* 2002).

[8] Homer, Hesiod (WD II.109-201), Lucretius (5.1241-1307), and Plutarch present a world where bronze was in use before iron, and that metals were worked in a series of stages.

and postdiluvial, thereby acknowledging the Biblical version but creating a blank slate on which to write a new history of metallurgy. Although not without controversy, the discordant seeds were sown, the consequence of which was that the later 19th century witnessed an increased interest in writing metallurgical histories that relied on new strategies that, like Hodgson, placed a greater emphasis on non-Biblical sources.

Initial 19th century research was interested in establishing the order in which metals were discovered. In the one camp were mostly metallurgists who argued that iron preceded copper because methods of acquiring iron were the simpler of the two, iron ore being readily reduced in a wood or charcoal fire.[9] As Forbes (1950, 415–16) notes, these metallurgists underestimated how difficult it was for prehistoric smiths to reduce iron. In the other camp were archaeologists who argued that bronzeworking developed first and that iron was uncommon during the BA, and was primarily used for adornment (Rawlinson 1862, 1:120, 124).

Archaeologists leveraged the increasing numbers of excavated iron finds as evidence for their argument. Finds include the controversially dated Dynasty IV iron from the Cheops Pyramid at Gizeh (Vyse 1837, 1:275–76),[10] as well as iron finds in Egypt that were assigned an early date from Abusir, Esneh, and Saqqara (Maspero 1883, 296; 1891, 105), Schliemann's (1875; 1880, 604) iron from excavations at Troy, the publication of finds from Nimrud in the British Museum (1890, 130), and Petrie's (Petrie 1902, 2:33, pl. ii,10) iron from Abydos. It is to

[9] For the main proponents, see Wilkinson (1837, 1:8), Napier (1856, 134, 147), Percy (1864, 874), Day (1877, 5), Beck (1884; 1891), and Ledebur (1895, 6). Gowland (1899, 304) admits uncertainty as to which came first in his earlier work, but later will side with the archaeologists.

[10] Montelius (1888, 18, 1890, 31) rejected Maspero's (1883, 296) early dating of this piece of iron, in part because the early date for iron in Egypt hindered his attempt to synchronise Egyptian and European chronologies.

this debate that we can attribute the suggestion that the source for the earliest worked iron was from meteorites (Lyell 1863, 292), supported by Egyptian texts that used the term *bi̯3-ni̯-pt*, translated as stone of heaven or of the sky (Cooper 1868, 402–3), which became a very popular theory in the early 20th century (e.g. Gsell 1910, 47; Ball 1914, 204; Wainwright 1914, 178, 1932, 15; Sayce 1928, 226–27). It was supported by the nickel-rich contents from Götze's (1902, 423, fig. 356) analysis of an EBA iron mace head from Troy II, Treasure L.

1.2.1 Key theories on the origins of iron smelting

With the sequence of metalworking sorted by the turn of the 20th century, questions focused on how iron smelting developed. Although meteorites might have provided the initial exposure to working iron through cold-hammering, they did not pave the way for the development of ancient iron industries (Pleiner 2000, 12). Obtaining iron through the processes of smelting ores has a trajectory of its own, which archaeologists to this day seek to define through various theories. It is, therefore, of great interest for those studying ironworking to address why the methods took so long to develop.[11] By the time it appeared in earnest around 1200 BCE, working bronze, tin, zinc, and arsenic had already existed for 1000 years, copper smelting for almost 2000 years, and working gold, silver, and lead even older. Consequently, most theories present ironworking as a sudden discovery or innovation that existed outside of the evolution of metals. Each innovative event pivots on a specific

[11] The evolution of metalworking begins with working minerals, ores, and ochres like hematite, azurite, and red oxide for cosmetics and decorative paints. Next came the exploitation and heating of naturally occurring metals like copper, gold, and silver, followed by the use of smelting for copper and cupellation for silver and tin to extract metals from ores, and then experiments with alloying metals such as copper with arsenic and tin (Tylecote 1992).

motivation: accidental discovery, invention by necessity, or was advantageous to certain segments of society.

1.2.2 Accidental discovery: the campfire and copper smelting by-product theories

An early accidental discovery theory on the origins of iron working is the Campfire Theory. Put simply, a piece of iron ore or hematite used in the stone ring surrounding a campfire or domestic fire was by chance embedded into the embers and reduced to metal. Alternatively, having discovered how to obtain copper from stones in a primitive furnace, ancient craftsmen would have experimented with alternative stones, one of which was iron ore. Gowland (1899, 302; 1906, 17; 1912, 237, 276–77) proposed these accidental discovery theories in part to replace another accidental discovery theory, the theory of meteoritic origins, which he rejected. The Campfire Theory is unlikely because hearth fires could not achieve temperatures high enough for periods long enough to reduce iron oxide to metallic iron. A temperature of roughly 1200-1250°C needs to be sustained for five to seven hours (Tylecote 1992, 48; Thiele 2010, 100).[12] Although very large fuel-laden open-hearth fires may achieve temperatures of 1100-1200°C, because of their open structure they do not create a reducing environment (oxygen removed) for long enough for the reduction process to take place.

[12] The temperature required to produce cast iron (also known as pig iron) is around 1,100°C, but required processes produced only in a blast furnace where the iron is alloyed with carbon to produce high concentrations between 3.8-4.7% carbon. This is difficult but not impossible to achieve in bowl furnaces through the bloomery smelting process that produces wrought iron from iron blooms (Tylecote 1992, 48–49). Although cast iron objects appeared in the 6th century BCE in the Jiangsu province in China during the late Zhou Dynasty (Tylecote 1992, 56; Wagner 1993, 335–40), in Europe the preference for wrought iron meant that cast iron products appeared only sporadically in the 14th century CE and became widespread in the 15th century CE with the introduction of the blast furnace (Tylecote 1992, 76–77).

A more modern version of the accidental discovery theory is the idea that the earliest blacksmiths developed a technique of obtaining forgeable iron as a by-product from smelting copper (Charles 1980, 165–67; Tholander 1982; Craddock and Meeks 1987, 1988; Pickles and Peltenburg 1998, 79, 90–91; Pleiner 2000, 212–13), lead (Wertime 1973, 883; Healy 1982, 83; Pickles 1988, 10), gold (Evely 2000, 2:398) or from copper matte production (Shell 1997). Potential exposure to metallic iron would have come from using iron oxide minerals, such as hematite or limonite from gossans (mineral masses), as fluxes to increase the efficiency of extracting copper from the copper sulphide ores. Adding an iron oxide flux during smelting renders the slag more free flowing and has been practised since the late Chalcolithic (Tylecote 1992, 9, 12). The molten slag separates from the copper matte, taking many gangue impurities with it, and rises to the top of the furnace due to its lower density, to be tapped or removed. The process may be repeated to increase the purity of the copper. Normally, the slag produced contained fayalite and wüstite minerals, high iron content, and few traces of copper; however, under certain conditions, when the oxygen pressure was accidentally low, the iron present reduced to metallic particles or fibres of sponge iron (Pleiner 2000, 12).

The link between iron and copper smelting dates to the earlier part of the 20th century (e.g. Herzfeld 1930, 5, fig. f, pl. 47; Richardson 1934, 575), but the theory gained favour in the 1980s and 1990s due to several analyses of LBA slags that contained high iron contents. BA copper slags containing substantial amounts of the iron oxide wüstite have been reported from northern Iran (Tylecote 1967), Timna in Israel (Tylecote 1966; Lupu 1970, 4, 21; Rothenberg 1978; Segal, Rothenberg, and Bar-Matthews 1998, 223, 233), Oman (Hauptmann 1985), and Cyprus (Schaeffer 1971, 376; Steinberg and Koucky 1982, 121; Maddin 1982, 312,

fn. 5; A.B. Knapp and Kassianidou 2008, 143). Likewise, experiments to recreate copper slags and cakes from sources at Timna produced iron as the principal impurity (Tylecote and Boydell 1978), and copper alloy artefacts from the EIA Cypriot cemetery Palaepaphos Skales analysed by Charalambous et al. (2014, 213) contained iron likely derived from the smelting of local chalcopyrite. Gale et al. (1990) substantiated the theory with high copper contents from an analysis of iron objects from the 11th century Egyptian New Kingdom mining Temple at Timna (Rothenberg 1988). Iron from copper production subsequently became widely accepted in the field (e.g. Åström et al. 1986, 28; Pleiner 1988, 35; Photos 1992, 800–801; Pickles and Peltenburg 1998, 79, 90–91; Waldbaum 1999, 30).

Scholars typically identify Cyprus in the 13th or 12th centuries as the earliest location where iron as a by-product was identified and exploited based on the technological sophistication of its smiths in the LBA. The copper extraction and export industry on Cyprus was arguably the most advanced and robust in the region, making it the main supplier of copper to the kingdoms that ringed the Mediterranean from the 16th century onwards (Kassianidou 2013, 51–52; Knapp 2013, 406ff). Cypriot smiths, therefore, had the opportunity and skill to recognise a serendipitous material and the wherewithal to exploit it. They also had the advantage of efficient smelting furnaces. Reducing iron oxides in copper slag to metallic iron required high temperatures in a reducing environment that was only achieved in the LBA due to better insulating materials and more efficient air delivery from the use of the tuyère and bellows system (Charles 1980, 167; van der Merwe and Avery 1982, 148; Craddock and Meeks 1987, 192; Kassianidou 1994, 74). Again, the robust industry on Cyprus provided the grounds for such improvements. For example, the introduction of tuyères at the LC copper

smelting site of Enkomi and Politico Phorades significantly improved copper matte production from the preceding MC period (Knapp and Kassianidou 2008, 144; Kassianidou 2008, 258–63; O'Brien 2015, 62). From Cyprus, the newly discovered skill of ironworking spread with the EIA mercantile travels of its smiths to the Levant, Aegean, and Italy.

By the late 1990s, criticism arose regarding the copper smelting by-product theory. The primary concern is the simple fact that, to this day, that there is no direct evidence that iron was produced in this manner on Cyprus or anywhere; nor do we have workshop evidence indicating that both iron and copper were produced in the same location (Kassianidou 1994, 76; Maddin 1982, 311). And, despite finding numerous ancient copper-smelting slag heaps throughout the Mediterranean, Erb-Satullo et al. (2014, 157) argue that to date no lumps of metallic iron 'bears' that develop on the furnace lining have been discovered, which one would expect if both metals were produced in the same furnace. This is remarkable considering that Constantinou (1992, 63) estimates there to be 4 million tonnes of copper slag in 40 different locations spread over the periphery of the Troodos Mountains from 3500 years of copper production on the island. How has evidence of the iron by-product technique remained absent? The reality is that, although small pieces of metallic iron are found in copper smelting slags, chemical properties make it nearly impossible to remove the copper while leaving the iron in its metallic state (Erb-Satullo et al. 2014, 157). It is worth bearing in mind that fluxing the sulphide ores with silica rather than iron oxides may have been the preferred method, as indicated by the analysed slag remnants from the LBA settlement Karamallos near the modern day Apliki mine (du Plat Taylor 1952, 152).

Part of the issue revolves around the difficulty distinguishing between copper smelting and bloomery iron slags. Pleiner (2000, 254) points out that copper and iron slags can be very similar in terms of chemical composition and micrographic phases, with wüstite, fayalite, magnetite, and glass being common (see Rehren and Pernicka 2008, 235). For example, some LBA copper slags contain up to 20% wüstite (Maddin 1982, 312, fn. 5). Efficient smelting processes remove most traces of copper or iron from their respective slags, so only the presence of isolated unreduced ore particles or sporadically occurring metallic copper prills and copper sulphides within a range of 0.5-3 wt.% can make the identification of copper slags definitive.[13] Schaeffer (1971, 376) noted that copper slags collected from Enkomi contained copper residues in the range of 3-6%. In iron slags, the presence of copper usually is below 0.02% wt.% (Veldhuijzen and Rehren 2007, 194). Misidentification is a problem with finished products as well. Upon reanalysis of the iron items with copper contents from Timna originally analysed by Gale et al. (1990), Merkel and Barrett (2000) found the copper remnants to be the result of post-depositional contamination from copper objects in the tomb rather than the production process.

Another issue with obtaining iron from copper smelting is the potential to produce unworkable iron due to the presence of sulphides. The presence of sulfur from copper ores in concentrations above 0.015% has the potential to make any iron produced brittle and prone to corrosion (Read 1934, 384; Schrama et al. 2017, 333). This poses problems for a Cypriot origin as that industry relied on copper sulphide ores composed of pyrite and chalcopyrite from the Troodos Massive (Constantinou 2012, 5). As an alternative option, Kassianidou (1994,

[13] Tylecote (1992, 20) says that copper content in copper slags can be up to 4%.

76, 79) suggested that gossans, rich in the iron oxides limonite and hematite, or umbers, rich in iron and manganese oxides, were directly smelted to produce iron. Not only does this option by-pass the technical problems with producing metallic iron from copper smelting, but it also leverages the fact that Cypriots were already familiar with both local materials. Miners used the colourful, brightly stained red and orange surface gossan formations as indicators of an underlying copper-rich deposit (O'Brien 2015, 6–8, 197), while metallurgists used gossans and umbers as fluxes in copper smelting throughout the BA (Constantinou 1982, 13, 19).

This option also addresses the issues of scalability that arise with the by-product method. As the EIA progressed into the Roman period, we see increasing numbers of iron objects on Cyprus. Since the island completely lacks typical iron ores such as hematite, magnetite, limonite, and siderite, it would have had to rely on copper smelting to supply the growing demand of the iron industry. Based on slag samples from excavations at Hala Sultan Tekke, Tholander (1982) calculated that almost half a kilo (0.45kg) of wrought iron could be produced from remelted copper slags after six days of processing two charges (30kg each), each of which had been smelted three times in a day (12 hours per day). This means that to meet increasing iron consumption, this required increased copper production regardless of market demand, which is a very inefficient way to scale a new industry. Additionally, such interdependence between both metal industries increases risk; should an issue like supply disruptions or decreased demand arise in one, then it will inevitably affect the other.

A more probable scenario is that Cyprus eventually imported iron billets and bars from regions that directly smelted their local iron ores using the bloomery method in bowl

furnaces.[14] Regions might have included the Aegean, Anatolia, and the Levant where local iron ore sources were exploited in the EIA. Iron was traded throughout Europe and the Near East in the EIA in the form of primary smelting blooms, or as wrought iron in various stages of work in the form of billets, bars, and rods (Pleiner 2006, 21–25).[15] This set composed the blacksmiths' starting stock from which he could forge to further purify the iron by expelling extra slag, and apply smithing methods to create steel through carburisation or increase hardness and ductility through various heat treatments. A large late 8th century BCE hoard consisting of 160 tonnes of iron blooms, billets, and bipyramidal bars was excavated from a storeroom in the palace of Sargon II at Khorsabad (Loud and Altman 1938, 40:99, 195, 213–17, 220, pl. 62). Similar bipyramidal bars were found at Susa and Nimrud, and an unprovenanced collection is held in the Louvre Museum in Paris. The records of several Neo-Assyrian kings indicate that these kinds of portable iron objects were often collected as spoils of war or as tribute (Pleiner and Bjorkman 1974, 291–96).

The final issue that I would like to raise is simply that the by-product method is not exportable. It might work in regions with an active copper industry with access to copper sulphide ores like the Levant and the Caucuses, but in regions with minimal access to, or that completely lack, minable copper ore sources, the method is simply irrelevant. This includes Anatolia, parts of Assyria and Mesopotamia, the Aegean, and Italy. Even if the Cypriots did

[14] To learn more about how the bloomery or direct method for smelting iron works, see thorough discussions by Tylecote (1992, 48–50), Pleiner (2000, 131–37), and Blakelock et al. (2009, 1745–46).

[15] A bloom is a semi-congealed porous or spongy mass of iron and slag. It is an initial product produced by smelting iron ore using a bloomery furnace. Iron bars are products of heating the bloom in a forge and hammering it to mechanically consolidate and shape the iron, and to expel excess slag. Billets are an intermediate forging stage between the bloom and bar iron (see the glossary of terms on the website of The Historical Metallurgy Society: http://hist-met.org/glossary.pdf).

invent iron smelting first and shared their technology, what was required for much of the rest of the Mediterranean to participate was a second technological innovation – the invention of the bloomery process and bowl furnace, along with the ability to prospect for and mine iron ore sources. The significant increase in iron production in the later IA and particularly the Roman era was facilitated by this technology. We have evidence from the few excavated EIA smithies that bloomery smelting existed by at least the first half of the 11th century at Phokaia in western Anatolia (Yalçın and Özyiğit 2013) (Chapter 4).

Despite the myriad of issues, there remains a kind of consensus that the by-product method is the best theory that we have according to the current state of the data (Pleiner 2000, 13; Erb-Satullo et al. 2014, 157). Indeed, it might well describe the situation in Cyprus, but it seems to me that it was likely that there was not one, but at least two, iron trajectories coexisting at the end of the LBA. There is not really any reason why two production methods for the same metal could not have been explored. For precedence, we simply only need to look to the wide variety of experiments with early copper smelting taking place across the Near East in the EBA, from Mesopotamian river valleys through to northern Iran and eastern Anatolia. There was no single strategy for metal production in this period, so we see multiple smelting techniques employed on a range of high and low-quality copper and cassiterite ores, as well as alloying copper with tin, arsenic, antimony, or a combination to create ternary bronzes (Tylecote 1992, 9ff.; Yener 2012, 266; Yener et al. 2015, 597). It seems that the discovery of a new metal would encourage experimentation rather than strict replication of a single technology.

1.2.3 Theories of necessity: bronze and fuel shortages

The other major contender for the development of ironworking belongs to an alternative set of theories that rely on the principle that 'necessity is the mother of invention'. The idea is that ironworking arose to fill a gap that opened around 1200 BCE. The earliest version of this type of theory is Snodgrass' (1971, 231, 237–39, 248–49) pivotal bronze-shortage theory.[16] He posited that the political upheavals in the eastern Mediterranean at the end of the BA caused major disruptions to the long-distance trade networks set up in the preceding centuries. The trade in all metals including copper decreased, but the tin routes were particularly vulnerable as tin derived from only a few sources in the ancient world.[17] As tin is the essential alloy added to copper to make bronze, this would have resulted in a Mediterranean-wide bronze shortage affecting the production of everything from cosmetics and farming tools to armour and weapons. Times of stress and discontinuity created in part by metal shortages led to an increase in foundry hoards and the recycling of bronzes towards the end of the LBA (Knapp 1988, 152; Snodgrass 1989, 24–25).

For the following two decades, the theory of a bronze shortage remained the primary motivator for the development of ironworking until analyses of EIA bronze objects showed that items contained tin well within normal LBA ranges (~10% tin, Tylecote 1992, 18), and at times unusually in high amounts (13%+ tin). Items analysed came from Knossos on Crete (Catling and Jones 1977), Nichoria in the southwestern Peloponnese (Rapp et al. 1978, 165–67), Lefkandi on Euboea (Jones 1980, 447–59), Kalaopdi in Phokis (Roderer 2007), Pherae in

[16] Snodgrass (2006: 126) later refers to this as the 'circulation model'.
[17] At the time of writing (Snodgrass 1971, 231), Afghanistan had not yet been identified as the primary source of tin for the Mediterranean market (Cleuziou and Berthoud 1982).

Thessaly (Orfanou 2015, 241–48), Kouklia and Palaepaphos Skales on Cyprus (Sydney Pickles 1988, 15–19; Charalambous et al. 2014), and several sites in the Levant (Waldbaum 1999, 30). The items tested were as large as tripods, spearheads, and hemispherical bowls, thereby dispelling Catling's (1983, 283ff.) explanation that additional tin was reserved solely to improve the appearance of decorative ornaments such as the dress pins analysed at Nichoria. We also do not see an increased use of arsenic, antimony, or zinc to act as a replacement alloying agent (Pickles and Peltenburg 1998, 68). Lead-isotope analysis by Stos-Gale (2016, 391) indicates that a shortage in copper was equally unlikely as a motivator for the switch to iron because the Aegean could be self-sufficient from their copper sources at the Laurion mine in Attica. From the MB II to LBA I, most Aegean copper came from local sources, particularly Laurion, while only in the LB II-III do we see a rise in imports from Cyprus and the southern Anatolia regions of the Elazig and Taurus Mountains.

An alternative necessity driver is the fuel-shortage theory. Based on ethnographic observations of charcoal production in the Iranian Plateau, Horne (1982) pointed out that, although iron smelts at a higher temperature than copper, fuel consumption rates for iron smelting were roughly half that of copper, requiring 10 kg of charcoal rather than 20 kg to produce 1 kg of metal, making iron production the more efficient of the two. Wertime (1983) looked at evidence that ancient peoples were aware of the deforestation that they were affecting from overgrazing and pyrotechnical activities such as cooking, lime burning, ceramic firing, and copper smelting, so they switched to the more energy-efficient iron production for conservation purposes. Managing this resource certainly would have been key – Constantinou (1992, 71) estimates that the 3500 years of charcoal production for copper activity on Cyprus

required the deforestation of 150,000 sq km of pinewood forests, which is 16 times the total land mass of the island. Nevertheless, direct evidence that this issue was a motivator remains enigmatic. Waldbaum (1989, 118–20) reviewed the minimal environmental data from the LBA to EIA and noted that, while there is evidence for deforestation in the Aegean and the Levant, the extent to which it impacted life is inconclusive.

1.2.4 A metal with benefits: theories of democracy, monopolies, economic entrepreneurship, and prestige

A third set of theories are based on the idea that iron was so beneficial, whether as a technically superior product that gave an edge against the competition, or by providing an economic benefit to a specific group in society, that its production was promoted for gain. The idea is that iron was sporadically produced in the BA, so some smiths had discovered the secret of production, but economic incentives in the beginning of the EIA promoted its regular production. An early theory with such a motivation was put forward by the famous anthropologist Childe (1942, 191), who believed that the ubiquitous nature of iron ores cheapened the metal to the point that commoners could equip themselves with tools for agriculture and weaponry more on a par with the BA warrior. Essentially, "Cheap iron democratized agriculture and industry and warfare too," resulting in a kind of urban revolution. Of course, subsequent studies that reveal the difficulties involved in smelting iron with ancient techniques, that question its superiority to bronze in the early centuries of production, and that indicate that iron was initially the prerogative of the elite, all render this theory problematic, something that even Childe (1950, 222) later acknowledged.

In other cases, iron production was deliberately controlled as a form of economic strategy, like we see in monopoly theories. In his history of the Philistines, Macalister (1914, 125–26) highlighted a Biblical passage (I Samuel 13:19-23) about the Israelites in the time of Saul and Jonathan, noting that "there was no smith found throughout all the land of Israel", forcing them to rely on the Philistines to sharpen their farming equipment and for a supply of weapons. Macalister interpreted this as an outright monopoly. Although iron is never directly mentioned, due to the conventional assignment of the time of Saul to the 11th century, Muhly (1982, 52) argued that it must mean iron, the production of which was a closely guarded secret held by the Philistines to maintain technological superiority in face of their neighbours. Waldbaum (1999, 38–39) was critical of this monopoly, pointing out that iron items have been found in 12th century levels throughout the Levant, not just at so-called Philistine sites. Gottlieb's (2010, 99) more recent review of ironworking in Israel not only presents additional iron items spread throughout the 12th century Israelite territories, but she also notes that copperworking remained the primary metal industry in Philistia, with the first iron tools only appearing as late as the Iron IIB (9th century).

The Hittite monopoly derives from the assumption that Hittite kings guarded the ironmaking secret to amass considerable wealth by cornering the lucrative iron market. Evidence for this scenario comes primarily from the famous 13th century 'iron letter' KBo I 14: 20-27 (Cavaignac 1934; Goetze 1940), where the Hittite king Ḫattušili III informs the Assyrian king Adad-nirari that, at this time, he is unable to send iron as his workers are unable to produce good iron (*parzillu damqu*) in a timely manner. All too often, this singular request has been extrapolated into a practice, interpreted as one example of many Near Eastern kings who

sought this valuable commodity from a singular Anatolian source (e.g. Hall 1923, 180; Forbes 1950, 418). Iron not only provided the Hittites with economic advantages, but also military superiority (Gurney 1954, 86–87). However, as with the case of most monopolies, the Philistine and Hittite were thought to have lost their stranglehold on the secret after the upheavals in the Levant caused by the 'Sea Peoples', and with the disintegration of the Hittite empire in the 12th century. Unemployed itinerant smiths then travelled throughout the Levant (Negbi 1991, 216–19) or to Cyprus (Cook 1953, 33; Desborough 1972, 315; Zaccagnini 1983, 258; 1990, 498) in search of new elites for whom they could produce the highly valuable metal, or they taught techniques to Aegean smiths via the new Asia Minor colonies such as Miletus, Ephesus, and Samos (Richardson 1934, 569; Niemeier 2000, 132). In the end, there is little to recommend this theory. As Chapter 2 will demonstrate, ironworking was practised in several locations throughout Anatolia prior to the Hittite empire period. And, as Pleiner and Bjorkman (1974, 307) point out, we do not see an expected explosion of iron around the Mediterranean after the fall of the Hittite empire, but a gradual development at differing speeds across disparate locations.

Iron restriction is also at the heart of Morris' (1989, 506–8, 514) Deposition Theory. He suggested that EIA elites attempted to tap into the prestigious value of early iron to promote their own elite identity. As iron was a rare and valuable material in the BA, the EIA elites aimed to control the smiths who knew how to produce iron. They used the metal to reinforce their membership within the elite class by making it the appropriate metal for grave goods in formal burial. Iron use solidified their power by excluding the rest of society from accessing it, and they gifted weapons and jewellery of iron as a means of admitting less powerful households

as lower order members of the elite. Such restriction could only be maintained for a short time, and eventually iron became pervasive enough to lose its value, forcing elites to look to the imports that characterise the 'Orientalizing period' in Greece. It is an interesting theory, but the main issue simply is that iron really was too widespread of a practice from early on to be controlled (Papadopoulos 2017, 976), indicated by its appearance in EIA burials from all social levels in the Aegean and Cyprus (see Chapters 3 and 5).

Sherratt's (1994: 60–62; 2003: 44) theory of economic entrepreneurship for Cyprus also proposes an economic strategy that taps into the high value of iron at the beginning of the EIA; but, rather than elites, the agents are craftsmen and traders who work together to exploit the demand for iron. Over the course of the LBA, European bronze industries expanded their scale and specialisation. Items moved greater distances, such as the circum-Apline 'Urnfield' types moving along maritime trade routes into the Mediterranean. By the end of the 13th century, oxhide ingots from the rich Apliki copper mines in Cyprus reached as far afield as Sardinia, the Black Sea and eastern Anatolia. Demand increased the circulation of recycled and scrap bronze transported in ships like the Cape Gelidonya wreck and deliberately amassed in hoards dating to the late 13th and 12th centuries across the Mediterranean. By the end of the BA, the quantity of bronze circulating in the Mediterranean economy had increased to such a level that it forced a gradual devaluation of bronze on an international scale, thereby cutting into Cypriot export profits.

In response, Sherratt suggested that Cypriot traders attempted to maintain their foothold in international trade through product diversification, exporting an increased range of high-value products to their traditional markets in the Aegean and Levant. Amongst these

items were the large group of iron knives found in Cypriot EIA tombs (see Chapters 5 and 6). In contrast to bronze, the value of iron remained very high and the preserve of the elites due to its scarcity and its traditional ideological association with power and rulership. Supplementing the trade in copper and finished bronze products with highly valued iron knives and daggers would help stem the economic loss resulting from the progressive devaluation of bronze. Prior to the EIA, iron blades were created adventitiously as a by-product of copper working on an ad-hoc basis, but the new export market prompted Cypriot smiths to develop more consistent and reliable methods of iron production, which would eventually lead to the creation of utilitarian production methods.

The theory has been criticised on several fronts, in part by Pickles and Peltenburg (1998, 67), who point out that Sherratt excluded material from 62 Cypro-Geometric tombs at Palaepaphos-Skales, but primarily by Muhly (2006, 20), who refers to the idea as "both ingenious and totally perverse", because it ignores the special technical problems involved in working with iron and the difficulties in making it into a utilitarian metal. To these criticisms, I would add two more points. The first is that it is worth reiterating that most iron knives found in the Mediterranean came from Cypriot settlement and funerary contexts. The high proportion from tombs suggests that they were designed primarily as personal objects for local consumption rather than export, and that it was internal demand that drove their development. The second point, and to my mind the most troubling, is the fact that it is difficult to prove that the iron knives found outside of Cyprus actually came from Cyprus. While the typology of the iron knives will be discussed in Chapter 5, Waldbaum (1982, 333) noted that versions found in the Aegean, Cyprus, and the Levant are variable enough that they

cannot be stylistically traced to a single point of origin, but can instead be linked to local blade forms.

What should be evident by now is that the key debate under the umbrella of the origins of iron really focuses on when, where, and why iron *smelting* was invented. Considerations of mining, smithing, technical spread, and iron use remain relatively understudied in the ancient world. We are sometimes left with the impression that, once iron smelting was achieved, these other segments fell into place. Admittedly, these processes tend to leave little in the way of archaeological data, but I will attempt to address them as much as possible.

1.3 Chapter organisation

The thesis is organised accordingly:

Chapter 1: the introduction which sets out the scope and aims of this thesis.

Chapter 2: a review of the iron industry in Anatolia from the EBA to the EIA, arguing that an ironworking industry did exist in the BA, and that models for the expansion of iron after the 12th century must take this into account.

Chapter 3: a presentation of evidence for ironworking in the Aegean BA, arguing that a low-level industry existed in this region and was likely linked to the industry in western Anatolia.

Chapter 4: a presentation of the evidence of ironworking in the Aegean EIA, and a discussion on how the Aegean iron industry developed.

Chapter 5: a presentation of the evidence for ironworking in the Cypriot EIA, and a typology for the iron knives.

Chapter 6: a discussion on how the Cypriot iron industry developed.

Chapter 7: the conclusion, which compares how the iron industries developed in each region.

Chapter 2. Ironworking in Anatolia

The concept of a low-level but active iron industry in the BA Aegean runs contrary to the established view of second millennium ironworking with regard to the production of small ceremonial and ornamental objects through adventitious means or propitious finds of meteoritic iron. The Aegean, like other regions in the eastern Mediterranean, has been plagued by a refusal to accept that iron could be extracted from the mineral/ore before the end of the BA (Limet 1984, 191; Yalçın 1999, 181). However, the idea may be more palatable if we turn to the Aegean's closest BA ironworking neighbour, Anatolia, where a growing body of evidence from excavations and metallographic analyses in the last 15 years indicates the existence of an iron industry with deliberate smelting practices that extend possibly as far back as the EBA. This section reviews the Anatolian, material including objects unearthed since Yalçın's 1999 review in an attempt to write a continuous history of iron in the region.

2.1 Iron in the Early Bronze Age

The earliest iron in Anatolia dates to the third millennium in the form of small jewellery and handheld weapons that range geographically from south-eastern Anatolia (Tilmenhöyük), across the northern central (Alaca Höyük and Dorak) and north-western (Troy) regions. Such finds from the earlier half of the BA are generally regarded as adventitious, that is, having been created through serendipitous or accidental production of iron, usually as a by-product or influenced by foreign smiths. In any case, they are not created through standardised or deliberate processes. This perception is in part encouraged by the lingering perception in academia and the public eye that meteorites were the only source of iron in the eastern

Mediterranean BA (e.g. Sanchez and Boult 2016; Yuhas 2016; Bridge 2017; Sci-News 2017; Traverso 2017). Jambon's (2017) recent p-XRF analysis utilising a new geochemical approach suggests that relying on a nickel (Ni) content of 5%+ is not a reliable method of determining a meteoritic origin of an iron object. Instead, he suggests that we consider both ratios of Fe:Ni and Ni:Co (iron, nickel, cobalt) when determining origin. Analyses of meteorites indicate that nickel may decrease through weathering or oxidation in specimens and is, therefore, not reliable, whereas cobalt content is less affected and therefore more reliable.

Jambon's methodology certainly warrants further research, but his sweeping conclusion is that if we cannot rely on a low nickel content to identify smelted iron, and we know that no nickel-rich iron is smelted, then we must consider that no object in the BA is of smelted iron! While on the surface this is indeed logical, it is not a sound conclusion. His "discovery" is based on a small sample size of seven BA objects from disparate parts of the NE, most of which were previously tested and accepted as meteoritic.[1] His narrow perspective ignores other forms of data that one must consider when working on the source of iron in the BA. This includes new (and older) evidence for smelting in the region, textual references for the trade of smelted iron, and items that are too large to be produced from a meteorite alone (e.g. sword). The increase in number of objects up to 1200 BCE (when Jambon places the introduction of smelting), as well as find contexts that indicate that they were not just items of the elite, indicate that the number of iron objects increased and were more widely available,

[1] *Consensus meteoritic:* Ugarit/Ras Shamra axe (Syria): (Schaeffer 1939, 1:107ff.; Witter 1942, 55; Richardson 1943, 72; Waldbaum 1980, 76, n.22); Gerzeh beads (Egypt): (Gowland 1912; Desch 1928; Johnson et al. 2013; Rehren et al. 2013); Tutankhamun dagger, bracelet, headrest (Egypt): (Bjorkman 1973, 124; Comelli et al. 2016) **|** *Under debate:* Alaca Höyük dagger (Anatolia): (not meteoritic: Wertime 1973, 885, n.90; Waldbaum 1980, 71; Yalçın 1999, 180; Yener 2000, 69; meteoritic: Nakai et al. 2008, 323) **|** *Unanalysed:* Umm el Marra pendant (Syria): (Schwartz et al. 2003, 331).

a scenario that only deliberate production could create – unless, of course, meteor showers were an increasingly common occurrence over the skies of the third and second millennia.

Undoubtedly, the so-called "metal from heaven" (*bi3-ni-pt*)[2] was a component of any LBA King's inventory, as the meteoritic iron dagger blade from Pharaoh Tutankhamun burial indicates (Carter 1927, 2:154ff.; Comelli et al. 2016), but here we will consider the wider comparanda from sites across Anatolia that indicated that smelted iron existed well before the middle of the second millennium. We start in the late Chalcolithic and EBA (ca. 3000 BCE). This period in Anatolia was one of active metallurgical exploration and trade of several metal types, driven particularly by the smelting of copper and creation of bronzes, but also by the cupellation of silver and lead. It is an unlikely coincidence that the earliest iron object in Anatolia comes from a site in the southeast, Tilmen Höyük, located near the polymetallic Taurus Mountains. Metals from these mountains were connected to a wider metal trade that linked to the Levant, northern Iran, and into the Balkans (Yener et al. 1991; Yener 2009; Stos-Gale and Gale 2003, 97; Stos-Gale 2016, 382–84).

The first items associated with the nascent iron industry in Anatolia are finds of hematite, which is a form of iron ore (Tbl. 1, Fig. 3). It is unlikely that these ores were used for smelting iron. The earliest piece dates to Chalcolithic levels at Tell Kurdu (ca. 5500-4000 BCE), where ground hematite was found inside one of the groundstone mortars in a pottery kiln workshop. It was likely used to paint geometric designs on Ubaid-related ceramics (Yener

[2] This Egyptian term for iron (*biA-n-pt*) occurs no earlier than the New Kingdom 19th Dynasty, ca. 1300 BCE. This association with heaven, sometimes translated as "sky", is frequently taken as evidence that iron derived from meteorites before 1200 BCE (e.g. Ball 1914, 204; Sayce 1928, 226–27; Wainwright 1932, 15, 1936, 5). This association is not without sceptics, however, with some dating back to the 19th century when the idea was in vogue (e.g. Beck 1884, 32–33; Bjorkman 1973, 114; Photos 1989, 403).

2000, 69; Yener and Edens 2000). By the EBA I, hematite was shaped into mace heads placed in tombs at Korucutepe, Tülintepe, and Kültepe (Brandt 1978, 60, pl. 110:2; Yakar 1984, 67, 73; Yener 2000, 69). The tomb at Korucetepe contained two bodies. The mace head belonged to the male, who was also accompanied by a tanged copper knife with a silver band ending in spirals that wrapped around his wrist, and a belt decorated with small limestone disc-shaped beads. Similar pieces appear at Chalcolithic and EBA sites throughout Palestine (Alamari and Hauptmann 2008, 434; Gernez 2008, 125). Although not smelted iron, the hematite artefacts indicate a familiarity with the location and mining of iron ore deposits, and an integration of the material into the symbolic system of early grave gifts.

Common to each of these sites is their location in eastern Anatolia on trade routes to the Levant/Syria (Korucutepe, Tülintepe) and Iran (Göltepe), as well as their proximity to the mining areas of the polymetallic Tarsus mountain range. Göltepe is of particular interest because it was the tin-processing site for the nearby Kestel mine, which was exploited since the late Chalcolithic (Yener et al. 1989; 1991). Over a ton of EBA crucibles, numerous slags, and over 5000 stone grinding tools were excavated from pit houses with hearth structures at Göltepe (Yener and Vandiver 1993, 216ff.; Yener 1994; 2008, 59, 60), as well as hematite lumps with elemental signatures similar to those from Kestel. The hematite was ground and processed for the tin ore casserite content and alloyed with copper to make some of the earliest tin-bronzes in the region. Experimental smelting of the hematite indicates that several methods were possible to liberate the casserite from the ore (Earl and Özbal 1996; Laughlin

and Todd 2000)[3] and, as iron oxide (ore) was present throughout the processes, methods may have been found to utilise a secondary product. Muhly (1993, 251–52) even suggested that iron ore was the desired product (although he doubted the EBA dating in that case).

Regardless of which metal was produced (tin seems likeliest), hematite ore was clearly an important resource for trade with the Levant and northern Iran. Tin was essential for the production of tin-bronzes, which appeared in the EB II-III in the Levant, northern Iran, Mesopotamia, and throughout Anatolia. Systematic mining and processing complexes like Kestel/Göltepe would have fuelled this expansion and possibly competed with mines in Afghanistan, Turkmenistan (Yener 2008, 61), Uzbekistan, and Tadjikistan (Alimov et al. 1998). Yener et al. (2015, 607–8) proposes a strategically three-tiered system for the production, exchange, and consumption system between the recently discovered Hisarcık mine with casserite deposits, its associated mining community Senir Sırtı in the Kayseri Plain, and the EBA urban centre Kanesh 26 km north. If tin extraction and trade was controlled by a local urban elite, as the Hisarcık- Senir Sırtı-Kanesh situation suggests, then hematite was a crucial resource, which might explain why it was found at several sites in eastern Anatolia shaped into mace heads, the preferred symbol of power for the emerging elite in the third millennium (Zimmermann 2007, 66, 2008, 345).

While it is true that the use of iron-oxide ores for tin production is not direct evidence for an iron industry, their use does present us with an idea of how and why iron appears as it does in the third millennium in Anatolia. Simply put, the variety of metallurgical experiments

[3] Some doubt the identification of Kestel as a tin mine based primarily on very low tin concentrations from the samples at Göltepe (see Ernst Pernicka et al. 2003, 170 for references).

taking place in this period exposed smiths in several locations to circumstances where they could have created bloom iron serendipitously in their production processes. The EBA was a period with no one single optimal strategy in early metal production (Yener et al. 2015, 597). For example, Kestel/Göltepe and Hisarcık/Senir Sırtı used very different types of casserite ores, hematite and yazganite,[4] that required alternative cupellation methods. Both methods required the exposure of iron ores to reducing environments when producing tin alloy. Along the Iranian Plateau, arsenic-rich speiss slags, a typically unwanted by-product of iron or lead smelting, from Shahr-I Sokhta, Tepe Hissar, Arslantepe, and Arisman may be the result of the accidental smelting of iron-arsenic ores, or, were they intentionally produced as direct alloying agents for arsenical copper (Thornton 2009, 318–19). Even within this tradition variety appears, as the methods used at Tepe Hissar produced higher metal yields from the slags. Again, iron oxide ores play a part in the early copper metallurgy of the region.

We are accustomed to framing the development of copper and bronze-working over the course of several millennia, so why not iron? Yalçın (2008), for instance, begins the history of copper-working in Anatolia from the Neolithic to the EBA II, a span of roughly six millennia. He even links the start the exploitation of copper to the collection and use of its ore, green malachite, to form into small objects or ground for cosmetics. Although iron does not occur natively like copper, for the copper industry to expand as it did in Neolithic Anatolia and the Chalcolithic Near East, it required the development of pyrotechnologies such as roasting, smelting, annealing, and casting. The EBA witnesses experimentation with ore types and its alloys, tin, arsenic, and antimony, and sometimes their combination to create ternary bronzes

[4] A recently discovered iron-tin-arsenic ore (Yener et al. 2015).

(Yener 2012, 266). From here bronze extends the history of copper into the MBA and LBA, and discussion focuses on improvements to furnace design, the composition of ingots, and the mobilization of long-distance trade networks for the distribution of such ingots and finished products. But when we discuss iron, we describe it as a transition to something, that is, the next step in bronzeworking that takes place around 1200 BCE (Haarer 2001, 268–69). Within this framework we deny iron its own history. Data from Anatolia, however, provides the opportunity to write a history of ironworking.

The earliest iron objects in Anatolia come from the eastern regions connected to the metals trade originating from the Tarsus Mountains. The first item is a twisted iron bracelet (AN.50) came from EB I Tomb M3 at Tilmen Höyük in Gaziantepe (Esin 1969, 142, 182, no. 17607, 1976, 225–26), a site along the passes through the Taurus mountains on a trade route connecting Mesopotamia and the Central Anatolian Plateau at sites including Kültepe and Alishar Höyük (Selover 2015, 341). The EB I in the region is a period of recovery from the collapse of Uruk and the trading system that extended into Mesopotamia at the end of the Late Chalcolithic (Algaze 2013), suggesting a local rather than imported origin for the bracelet. Tilmen Höyük was one of the centres that avoided destruction or abandonment, so it participated in the growing focus on regional trade and the development of shared cultural features (Yakar 1999, 506).

Iron objects increased in the following periods, again with an emphasis on jewellery, which aligns with preferences in arsenical copper. In the eastern Anatolian Keban region, a ring (AN.60) (72.8% Fe, 6.12% Cu) and fragment (AN.70) (73.32% Fe, 2.19% Cu) were found at the large fortified EB II settlement of Tepecik (Yener 2000, 70). This region comprised a

network of fortified centres throughout the Altinova Valley including Norşuntepe, Tülintepe, and Korucutepe, all dotted around the modern Keban Dam Reservoir, each of which had active EB II copper smelting industries processing sulphide (Zwicker 1980, 17), malachite, and azurite ores (Özbal 1983, 214–15). Tepecik is one of the few sites to contain an arsenic-copper ingot (Esin 1982, 72, 76). This region comprised a regional school for arsenical copper items along with Arslantepe further west (Yakar 1984, 71; Efe 2002, 52). Metal items in this period tend to be small ornamental items: primarily copper pins, a few projectile points, and axes at Norşuntepe (Hauptmann 1982), arsenical bronze jewellery, tools, shaft-hole axes and spearheads from Tepecik and Tulintepe (Esin 1979, 112, 2001, 102–7), and silver jewellery at Korucutepe (van Loon 1978, 2:60, pls. 109, 110). Arslantepe is an exception with a hoard of 22 arsenical bronzes including 9 swords and 12 spearheads (Palmieri 1981, 109, figs. 3–4).

Iron also appeared in north-western Anatolia in the earliest levels of Troy. A trench from Troy I (EB I-II) revealed a piece of worked iron (AN.80) (Easton 2002, 207, 327, fig. 166; Tagebuch 1871: 466), while Treasure L from Troy II contained two items, one lost, and the other interpreted as a mace head, pommel, or slag (AN.90-100, Fig. 4) (Schuchardt 1891, 20; Pernicka 1995, 61; Antonova et al. 1996, 174, no. 226). A lump of iron was also found in an EB III treasure deposit from Tarsus in Cilicia (AN.310), perhaps indicating a sense of the value of iron in this period (Goldman 1956, 33). Deposits from Troy II have also revealed a spherical piece, a bar, and two pieces of slag (AN.110-140). Götze's (1897) analysis suggested that the bar is of meteoritic iron, but as this study was conducted in the late 19th century it is worth reanalysing, particularly with the presence of iron slag in the same level. Götze (1902, 362, pl. 44.III) paralleled the bar to silver bars from level II Treasure deposits, which he investigated as

an early form of currency (Bobokhyan 2009, 28). These bars are likely standardised ingots for distribution, like the six highly pure nut-shaped silver ingots from the same level (Forbes 1950, 197; Oy 2017, 13). That Troy II relied on the import of ingots is implied by the exceptional numbers of bronzes with high tin ratios, the presence of ingot moulds, and the absence of smelting equipment implying the transition to smithing activities (Branigan 1974, 65, 74; De Jesus 1980, 101, 136, 368; Yakar 1985, 28; Fidan et al. 2015, 73). The move to importing metal ingots rather than ores dramatically increased across several other regions in the EB II, including south-eastern and western Anatolia, the Iranian Plateau, and southern Levant (Müller-Karpe 1994; Yalçın 2000; Golden et al. 2001, 961; Thornton 2009; Fidan et al. 2015).

The two iron slags from level II are particularly intriguing (AN.130, 140). While it is essential that the iron remains from the Trojan excavations are verified (Easton 2002, 327), if the slag is indeed from ironworking then they are the earliest evidence for iron production in Anatolia (and the world!). The appearance of iron is not necessarily a surprise at Troy – in the EB II, western Anatolian mining and metallurgy come into its own, characterised by definable breakthroughs in production from the arrival of Syro-Cilician toggle pins and tools, and the development of tin alloying techniques (Efe 2007, 49; Fidan et al. 2015, 73; Oy 2017, 13). In the EB III, the regions become increasingly interlinked in what Efe (2007) dubs the 'Great Caravan Route.' Relations along this route involved technological exchange, so that metallurgical developments accelerated with the emergence of urban centres at Troy and Limen Tepe (Efe 2007, 55). Against this backdrop is the rich polymetallic geology of the Troad with abundant silver and gold deposits along the Asia Minor coast, as well as deposits of lead, copper, and zinc (Kassianidou and Knapp 2005, 219; Oy 2017, 13–14). Oy (2017, 15) argues

that Troy is the most important mining centre in western Anatolia and the Aegean during the EBA, while Korfmann (1996, 94) argues that in the following millennium it is a key trader of iron imported from the Black Sea regions.

Iron continues to be used for jewellery in the EB III. Iron makes its first appearance in northern Syria at this time in the form of a small, round necklace pendant (AN.250) from the wealthy Tomb 1 from Umm el Marra (Schwartz et al. 2003, 331). In Anatolia, however, focus shifts to the central region, where iron appears in the wealthy 'Royal' tombs at Alaca Höyük (Arık 1937; Koşay 1938, 1951). Centralisation and urbanisation emerge later in this region than elsewhere (Selover 2015, 57). The clearest evidence for change comes from Alaca Höyük, with its 14 shaft graves containing ostentatious funerary offerings made of gold, silver, electrum, tin-bronze, arsenic-copper, lead, iron, and semi-precious stones. Iron jewellery includes two pins with gold mace-like heads (AN.170, 180) from tomb MA, a crescent-shaped plaque (AN.200) from tomb M.C., and an N-shaped necklace terminal (AN.190) from tomb M.A. Analysis of one of the pins (2.7% Ni) and the plaque (2.4% Ni) indicate a smelted origin (Yalçın 1999, tbl. 1).

The EB III was not only a period of great technological advancement in jewellery techniques (Kelly-Buccellati 1990), but also in weapons metallurgy (Yakar 1985, 25, 35; Efe 2007, 55). This is nowhere more evident than at Alaca Höyük with its daggers, swords, and ceremonial knobbed mace-heads of tin-bronze, arsenic-copper, gold, and, for the first time, iron for knives and daggers. The knife (AM.210) from Tomb TM is unfortunately fragmentary, but the two daggers (AM.220, 230, Fig. 5) from Tomb C are much better preserved. They have gently curved triangular handles with a circular pommel made of gold-sheet over a wood core,

and a blade with convex edges and a curved section. The microscopic distribution of carbon on the blades suggests that they were forged (Aslihan Yener 2000, 69). Stronach (1957, 102) attributes the daggers to a Western Asiatic type that descended from mid-third millennium Mesopotamian forms such as those from the ED IIIa (2600-2450 BCE) Royal Cemetery at Ur and tombs at Kish (Mackay 1925, pls. III, XVII.B16, 1929, pls. XXXIX.1839, LXII.16; Woolley 1934, pls. 157.U11513, U11512, 228.U14222; Maxwell-Hyslop 1946, 12–13, pl. I Type 9). An iron dagger of the Western Asiatic style was also found in Mesopotamia at Kish in a contemporary Early Dynastic IIIa (2600-2450 BCE) tomb from Mound A (Torres-Rouff et al. 2012, 213, fig. 7 FM236415). The dagger with an iron blade with an ivory handle and gold gilt strip has striking parallels with daggers from the Ur and Kish cemeteries (Mackay 1929, pl. XXXIX.2730; Woolley 1934, pls. 151.U9361, 155.U10021).

The premier iron implement from Alaca Höyük comes from Tomb K. The dagger (AN.160, Fig. 5) has a thin triangular iron blade, flat in section, and a gold handle with a crescentic-shaped pommel. It belongs to a class of dagger that again finds its origins in Mesopotamia from the Royal Cemetery at Ur and Kish, and continues in royal tombs, such as one from the Middle Kingdom pharaoh Amenemhat II (1938-904,) and elite tombs at Ugarit (1900-1750 BCE), Byblos (handle of ivory), and Tell Atchana (1500-1300 BCE) (Woolley 1934, pls. 152, 155.U10020; Schaeffer 1949, 59–60, figs. 18, 19, 27). The jury is out on the origin of the iron – see note 1 – but the majority believe it to be smelted. Nakai et al.'s (2008) nickel values derive from XRF surface analysis, which we must view with caution considering the limitations of XRF when measuring the true content of heterogeneous materials (like metal)

(Tykot 2016, 43). Three iron objects (AN.240) found next to a furnace from EB III levels excavated in the 2007 season suggest smelting capabilities (Çinaroglu and Çelik 2009, 93).

Further evidence for ironworking in central Anatolia comes from late EB III levels at Kaman-Kalehöyük. Excavations that have been taking place since 1986 by the Japanese Institute of Anatolian Archaeology have revealed ironworking continuously throughout strata from the late EB III to the EIA. Four items (AN.260-300) from stratum IVa (2200-2000 BCE) were analysed by Akanuma (2008), the most important of which was a bar-shaped fragment with enough carbon content (0.1-0.3 mass %) to be classified as steel. Analysis also revealed yet another fragment of the iron ore hematite, as well as two fragments of a partially or completely melted clay furnace wall of unknown use. These items were found in the same North IV sector in layers of burnt soil and, in some cases, charcoal. Although evidence of Mesopotamian influence is minimal in the IV levels, the author is cautious to suggest that ironworking was an independent local development until iron is found in the earlier stratum IVb (Hideo Akanuma 2008, 319–20). As the site is only 160 km southwest of Alaca Höyük, we must wonder if ironworking developed at Kaman-Kalehöyük in part to feed demand in a region that, although urbanised later than the eastern and western parts of Anatolia (Selover 2015, 57), seems to have developed an appetite for metals. Funerary gifts at the large EB III İkiztepe necropolis included 191 weapons of bronze, copper, gold and silver, for example (Yakar 1985, 31–33).

The largest item from the EB III, a sword (AN.310), comes from the Royal Tomb at Dorak in north-western Anatolia. The craftsmanship is remarkable, with a pommel of obsidian carved in the shape of two leopards inlaid with gold and amber spots (Buchwald 2005, 72). At 75 cm

in length, it is the earliest object of this size to date. With it was a cartouche of the 5th Dynasty Pharaoh Sahure, but unfortunately it was excavated in secret and has subsequently disappeared, making verification impossible (Waldbaum 1978, 20, 1980, 71). This sword is the crowning piece of the EBA Anatolian collection. Before the end of the third millennium, major changes take place that disrupted the great trade networks linking central and eastern Anatolia to Mesopotamia, and the western coastal regions to the Aegean. Across the board we see a series of site destructions and abandonments (Peltenburg et al. 2000; Massa 2014; Selover 2015, 108). Soon after, we enter a new period referred to as the Assyrian Trading Colony (2000-1750 BCE) owing to the dominance of the new trading relationship established with Mesopotamia. The Dorak sword marks the end, at least until further excavations, of the period of iron used for decorative and ostentatious items of prestige, power and display. In the following millennium, iron will be applied to a new range of objects that are not nearly as elaborate.

Iron in EBA Anatolia seems to have been the reserved preserve of the elite, first used for jewellery in a region known for its silverwork – perhaps as an imitation of silver. As the region increasingly enmeshed with the cultures of south and central Anatolia in the EB I-II, it is possible that iron technology spread from the east along the Cilician coast through the Taurus Mountains to the west via the 'Great Caravan Route' (Efe 2007) or the 'Anatolian Trade Network' (Şahoğlu 2005). The situation in Troy is confusing and needs further verification, but it does seem that some form of standardised iron production was underway. The levels at which iron appears, however, do correspond with the influx of Mesopotamian, Syrian, and Cilician metal objects heading westward (Efe 2007, 24), a route that may have included iron.

In central Anatolia ironworking was underway by the early third millennium; however, as excavations continue into the EBA level IV at Kaman-Kalehöyük, we should not rule out the possibility of evidence emerging for ironworking in the late fourth millennium (Omura 2013, 2012).

Material from the EB III, indicates that iron technology had advanced to a point where enough could be produced to smelt and forge larger items such as daggers and sword blades for use as ceremonial and decorative items. At Alaca Höyük the application of iron was part of a strategy to use metal items, particularly those with foreign associations, as symbolic objects to promote and legitimise the social power of the elite. This in part included a policy of extravagant display, particularly of gold, that is absent from the MBA and LBA deposits (Bachhuber 2011, 167–68). The strategy also included applying valuable iron to objects that reflected their intensified exchange with Syro-Mesopotamia (Mansfield 2001, 42–43). Considering the evidence for smelting at Alaca Höyük, we must consider that the Kish iron dagger was also an Anatolian product produced in the Mesopotamian style, and that EB III exports not only included raw metals but also finished products.

Towards the end of the EB III the extensive trade network that integrated the regional settlement hierarchies across Anatolia collapsed. The trade with Mesopotamia that revives at the start of the second millennium will be of a different nature than previously, administered in part through merchant outposts (*kārū/kārum*) and waystations (*mabartū*) set up by Assyrian cities in neighbourhoods at Kültepe-Kaneš (ca. 1974-1700 BCE), Ankuwa at Alişar Hüyük, Acemhöyük (Purušḫanda) and Hattušaš (ca. 1900-1700 BCE). Tens of thousands of cuneiform tablets from these sites indicate that they formed a geographic trading unit east of the

Kızılırmak River populated by private merchants who facilitated the export of Anatolian gold, silver, and copper to Elam and Aššur in exchange for tin, luxury wool and linen textiles, spices, and high status commodities such as lapis lazuli, carnelian, and iron (Veenhof 1995; Dercksen 2010, 110). This network, which connected the Black Sea to the Persian Gulf, undoubtedly contributed to the spread of ironworking in the MBA.

2.2 Iron in the Middle Bronze Age

This period has previously been noted for its dearth of iron finds (Buchwald 2005, 72), but the finds at Kaman-Kalehöyük and the *kārū* reveal an active industry alive and flourishing in central Anatolia. Improvements to iron production techniques are evident on items from Kaman-Kalehöyük stratum IIIc (AN.320-390) (2000-1700 BCE) and the Kültepe-Kaneš equivalent *kārum* level Ib (AN.410-430) (Fig. 6). First, a handful of iron fragments sampled contained carbon contents between 0.1-0.3%, indicating a composition of steel (Akanuma 2003, 2005, 152; 2006, 221, 2007, 135). The microstructure of a sample of iron slag indicated that it had solidified after coming into contact with metallic iron partially consisting of steel, thereby confirming such methods were underway at Kaman-Kalehöyük in this period. Second, items from stratum IIIb (1700-1500 BCE) have fewer impurities than those from stratum IIIc, suggesting that the purification process used in the production of steel improved with time (Akanuma 2005, 152).

Differences between trace element compositions for objects from Kaman-Kalehöyük and Kültepe-Kaneš indicate different sources for their iron objects, whether that be the raw material, smelted, refined, or finished products (Akanuma 2007, 136–37). It seems unlikely

that Kaman-Kalehöyük, 200 km west, supplied the merchants at Kültepe-Kaneš, with iron as analysis reveals they these sites relied on separate sources (Akanuma 2003, 146, 2005, 154). Besides, the *kārum* appears to have been more than capable of acquiring its own (see below). At Kaman-Kalehöyük, copper production existed alongside iron, but the preliminary reports do not indicate if it was practised in the same area of the site. Further iron slags reported by the director Omura (2008, 2010, 2012) from the 22nd season, and iron material from the 26th and 27th seasons' preliminary reports, indicate that metalworking was located in the North-central sector. Iron mining and the location of reliable sources were perhaps being developed in this period as, even within Kaman-Kalehöyük, trace elements indicate constantly changing, multiple sources for iron objects from the IIIc through to the IIa (4th century BCE) (Akanuma 2005, 155).

This kind of variability in terms of sources and quality is borne out in merchant records from Kültepe. Based on the translation of the Old Assyrian words *amūtu* and *aši'u* as bloom-iron and iron ore (Maxwell-Hyslop 1972),[5] in text ICK 1 55 : 21, 25, 27, 31, 34 the writer requests iron, but if it is not *damqu* (good quality) then he does not want it. Again, in CCT 4 34c : 15 a request is made for "pure" *amūtu*, that is without slag or impurities. A merchant can guarantee the quality of iron based on his seal (reputation?) (BIN 4 50 : 5). The material is

[5] Abbreviations:
AT - D.J. Wiseman, *The Alalakh Tablets*
ATHE - B. Kienast, *Die altassyrischen Texte des Orientalischen Seminars der Universitat Heidelberg und der Sammlung Erlenmever*
BIN - *Babylonian Inscriptions in the Collection of J. B. Nies*
CAD - *Chicago Assyrian Dictionary*
CCT - *Cuneiform Texts from Cappadocian Tablets*
ICK - *Inscription Cunéiformes du Kultépé*
KTS - J. Lewy, *Keilschrifttexte von Kiiltepe bei Kaisarije*
TCL - *Textes cunéiformes, Musées du Louvre*

variably described as pure, not pure, not refined, fine, and excellent (Bjorkman 1973, 112); CAD A/2 98). Such scrutiny of quality was applied so rigorously to the copper trade that specialised terminology developed to describe the quality spectrum, because metal value was determined by post-smelt purity (Dercksen 1996, 33–36; 2010, 110). *amūtu* was not produced in such quantities to warrant such an extensive vocabulary.

It was an expensive metal, fetching ratios of 40:1 (KTS 39a : 23) and 35:1 (BIN 6 28 : 22) with silver, while a ratio of 8:1 for gold was considered too little in CCT 4 4a : 44. Scarcity must have been a factor, as it was traded in small quantities that would serve for inlays for items like bronze pinheads, or as wire fastenings for tools and weapon handles from contemporary Alişar Hüyük (von der Osten 1937, 253, 264, 273, figs. 284, 290.d2948), for jewellery, and knife blades (Maxwell-Hyslop 1972, 159–60). In one instance, it took three months of small instalments to fulfil a 2 ¾ shekels order (CAD A/2 98). Iron was in such great demand that it was a guarantee against a large sum of silver (22 ½ minas 5 shekels) from a loan owed to the merchant Ennam-Aššur in REL 105 when the agreement was set up. The value of iron must have been stable enough to protect this sum as well as potentially grow in value, as provisions were added in case of surplus proceeds from a sale. Ennam-Aššur was eventually murdered and robbed in REL 107 for the silver he earned when he sold the iron to the king of Tawniya to make back his losses (Larsen 2014, 4–5, no. 527, 2015, 16; Stratford 2017, 133).

Like other metals, iron was regulated and levied by local administrations, seen in letters like one referring to Kaneš taxing 10% on an inspected quantity of iron (CCT 4 4a; V. Donbaz 2001, 84). Levies were high enough to warrant smuggling attempts, an offence punishable by imprisonment, as *Pūšu-Kěn* found out when his smuggled goods included *aši'um* (ATHE 62;

Larsen 1976, 198, n. 29). The illegal trade of iron might result in the seizure and confiscation by the palace, leading to merchants warning each other not to take risks, such as “let no packet be spotted on the road” (KTS 37a 18). Stakes were high enough to issues threats: “if the palace has confiscated my *aši’u* in your house…” (TCL 21 271 : 10). Merchants clearly were not always certain where they could find iron ore. Four traders sent with gold and silver were unable to obtain *aši’u* despite venturing *libbi mātim*, “into the heart of the country” because it was currently unavailable in the region (CCT 2 48 : 5, 9, 25, 27, 28). An exasperated writer in BIN 4 45 : 11 requests that “should there be any *aši’u* anywhere, write."

Kaneš is mentioned as a source for *aši’u* on several occasions (ATHE 62 : 38, 64 : 30, 25; TCL 14 23 : 32, TCL 21 135 r 11’, CAD A/2 442), and the palace of Kuššara was mentioned in connection with the transaction, which was perhaps involved with the administration after the conquest of Kültepe-Kaneš in level Ib (Bryce 1999, 36–37). The lower town site revealed extensive metal workshops in Assyrian levels containing scores of moulds, furnaces, and copper tools (Müller-Karpe 1994, 49–66). Two large so-called iron ingots were reported in level II from central room 7 of the house of the wealthy Anatolian merchant Peruwa (Özgüç 1959, 36). Testing indicated that they contained magnesium, but the analysis has never been published (Özgüç et al. 1952, 16). The large, 14-room house also contained several slag deposits in addition to possible crucibles, indicating involvement in the production and exchange of metals (Lehner 2014, 143) The *kārum* at this level revealed three workshops with activities related to the manufacture of finished metal products rather than smelting. At least six workshops are preserved from level Ib. Based on their location and arrangements, they show considerable continuity with the previous period, despite the destruction on the site

(Lehner 2014, 144). Compared to the previous period, they are much more clearly attached to residential buildings. Fragments of iron have been excavated from these workshops (Akanuma 2003, 145, 2005, 152).

Textual evidence suggests that even the process of forging (indicated by *ṣarāpum*, heating) could produce dubious results. In CCT 4 4a, a merchant warns against forging/heating the *amūtu* which, when complete, reduced the value, presumably in terms of quality and quantity, by 4 shekels. In the same letter, the refusal of the first buyer, Ennam-Aššur, an expert in the metal trade at Kaneš (Larsen 2015, 288–89), to pay for the *amūtum* in silver may indicate that merchants were well aware of the risks of purchasing poor-quality, non-forgeable iron. Iron was not the only metal to encounter quality issues, as we have reports of merchants similarly struggling at times to find good-quality copper (Dercksen 2010, 210). It appears the iron moved in trade circles in two forms, as raw metal or to be worked. As Maxwell-Hyslop (1972, 159) pointed out, *aši'u* is never assigned a price or weight in texts, perhaps because its value was difficult to determine until smelted. In ICK 1 55 : 34, the writer requesting iron does not want it if it is impure or if it has not yet been refined; that is, if the risk of a poor smelt or forge is not removed. On a rare treaty between Aššur and Kaneš, Anatolian rulers could buy the *a-ší-i-im* for silver after checking its quality (Donbaz 2005, Kt 00/k 6; Veenhof and Eidem 2008, 191). Such variability in quality is reflected archaeologically in contemporary fragments from Kaman-Kalehöyük IIIc and Kültepe-Kaneš Ib workshops where Akanuma (2003, 145, 2005, 152) identified a high level of residual impurities composed of sulfuric compounds originating from ore, but were not removed due to poor smelting.

In the Assyrian Trade Colony period it appears that, geographically, iron moved in a network that connected local Anatolian production centres to the *kārū*. The texts are clear in that the mining, production and processing of metals was handled primarily by the locals, although a few Assyrian smiths did exist (Dercksen 2010, 111), but the trade to both local Anatolian royalty and abroad was facilitated by the Assyrians (Dercksen 2010, 110; Tsumoto and Siegelová 2011, 276). Traders would frequently head into the hinterland or move between towns in search of iron. Aside from Kaman-Kalehöyük, other local Anatolian sites enmeshed in this network contained small fragments and items of iron and hematite ore dated throughout the period, including Alişar Hüyük and Alaca Höyük (AN.450-480). Like most metals traded in this period, texts suggest that iron moved as an unfinished product verified by weight according to minas and shekels. Towards the end of this chain of exchange, iron arriving to the *kārū* was worked into finished products. A prime example is an ivory box decorated with a horizontal row of three iron and two lapis lazuli studs on each side (AN.440), from level III Acemhöyük (Purušḫanda) (Fig. 7). Iron finds outside of this network are rare in this period. They include an item identified as a spike (AN.400) from Troy V (Easton 2002, 195, 237, fig. 159) and a fragment (AN.490) from 'Hittite' stratum C at Kusura in western Anatolia (Lamb 1937, 39, 1938, 217; Yalçın 1999, 178).

The three centuries of the Assyrian Trade Colony period are pivotal to writing a history of ironworking in Anatolia. While there is reason to believe that a low-level iron industry existed in EBA, central Anatolia focused on the production of elite prestige goods, in the MBA we witness a burgeoning and active iron industry. The archives of Assyrian merchant traders have been invaluable for tracing some of the mechanisms of this trade (Cordani 2016a), but

recent metallurgical analysis of finds from Kaman-Kalehöyük and Kültepe-Kaneš broadens the picture. Iron in this network clearly was not an adventitious item, but a proper commodity integrated in the wider metals exchange that connected the smaller Anatolian production sites to urban trading centres. It was sought after by merchants and smiths alike and, while production was precarious and could not always be relied upon, it was produced regularly enough to grab the attention of palace administrations of the towns it moved through. This implies a system of ore resource collection that currently eludes the archaeological records. Continued excavations at Kaman-Kalehöyük, including unpublished finds from the 26th and 27th seasons (Omura 2010, 2012 preliminary reports), will hopefully continue to illuminate the *chaîne opératoire* of iron production in MBA Anatolia.

Another segment of the industry missing from the archaeological record is product consumption. Unlike the preceding period, we rarely see finished products archaeologically or in the trade records. Cordani (2016a, 3) notes a few texts referring to iron rings (e.g. AKT 5 11; ATHE 39; KTK 68), perhaps as equivalents to the silver, gold, and copper 'ring money' known as *ḫar* in Old Babylonian and Old Assyrian texts from the MBA (Powell 1978). From the Mari archives in Syria we do have a text dated ca. 1700 BCE referring to an iron bracelet that the king of Carchemish sent to Mari (V9, Dossin 1952). One tantalising tablet from 18th century BCE Alalakh (Tell Atçana level VII) does mention that, among the war booty that King Ammitaku collected from his attackers, were 400 "spearheads(?)" of iron (AT 410, Wiseman 1953, 107), possibly an exaggeration, but one of the earliest references to iron used for fighting implements. This is also one of the earliest texts to use the Sumerogram AN.BAR, which is the Akkadian term *parzillu*- referring to iron. These terms appear in the literature around the same

time (Bjorkman 1973, 114). Valério and Yukabovich (2010) argue that the etymology of *parzillu*- comes from the Luwian term for iron, *parzassa*, which the Assyrian traders adapted, along with several other loan words, as they increasingly dealt with smelted iron. It quickly replaced the original Sumerogram KU.AN back in Mesopotamia. The Luwians were an Anatolian linguistic group present in south central and eastern Anatolia in this period, possibly with their seat of power located at Acemhöyük (Purušḫanda) (Valério and Yukabovich 2010, 239–48), integrating them with the *kārum* trade network.

This example implies a flow of influence from Anatolia to Mesopotamia, but the trade as presented through the activities of foreign traders in the text minimises the agency of the locals, who were the majority inhabitants of the trading cities, and runs the risk of perpetuating the view of Anatolia as a peripheral resource centre zone for Mesopotamia (Larsen 1987, 55; Yener 2000, 11–12). Traditional thinking points to Mesopotamian consumers as the stimulus for metal production, including iron, in Anatolia (Muhly 1980, 27), although references to iron being bought and sold for profit only take place within Anatolia (Cordani 2016a, 4). We get the impression from texts that refer to iron brought from Mesopotamia that an active consumer market existed within Anatolia. CCT 4 34c deals with the order to buy some textiles in Aššur or, alternatively, tin or *amūtum* in small pieces. In KTS 1 30, Ikunum, a ruler of Aššur, shipped 11 shekels of *amūtum*, as well as lapis lazuli, to Anatolia. Several other texts (TC 2 9; TC 2 23; AKT 6a 169; AKT 6a 46; duplicate AKT 6a 47) suggest that *aši'um* and *amūtum* were purchased from the City Hall in Aššur. In BIN 4, 50 KU.AN/*amūtum* must be traded for *pirikannu* textiles. Mesopotamia was indeed producing finished iron objects such as daggers, tool blades, and inlays since the early 3rd millennium (Waldbaum 1980, 70; Torres-Rouff et al.

2012, 213, fig. 7). Some of the consumers included Anatolian rulers (e.g. TCL 4 39 : 10f), who may have been interested in iron for royal insignia and symbols of power in thrones and sceptres (Cordani 2016b, 169; KBo 3.22 rev. 75 with duplicates). Such diverse sourcing strategies are paralleled in the analysed samples from Kaman-Kalehöyük and Kültepe-Kaneš (see above).

Unfortunately, the Anatolian archaeological record does little to clarify the question of consumers – iron objects as grave gifts or finished products, remain absent in this period. Iron is equally absent from graves in the Hittite period, but finished objects are much more common from their sites, indicating that iron was also used locally. Trade documents in this period were rarely applied to clay tablets, which were reserved for ritual, festival, mythic, and administrative affairs in the Old and Middle Hittite Kingdom, as well as a few tax and treasury inventory lists in the New Hittite Kingdom (Tsumoto and Siegelová 2011, 276; Cordani 2016b, 165–66). As a result, while iron appears almost entirely as finished products, these tend to feature as exotic, prestigious items used for power and ritual – we lose some of the pragmatic aspects of the iron business. Direct discussion of metallurgical practices remains enigmatic in both periods.

Nevertheless, ironworking continues to flourish in the following centuries in central Anatolia under the auspices of the Hittite Empire. The end of the Assyrian Colony Period is marked by the conquests of Hattušaš and Kaneš and in the early 17th century BCE. Although this marks the end of control by Assyrian merchants over the network, it did not end the network; instead, it transitioned to a new administration that continued to encourage and engage in the iron industry. Between 1700 BCE and the collapse of the Hittite Empire in ca.

1180 BCE, the nature of the iron data changes; we have a wider variety of small implements and finished objects than previously, a phenomenon mirrored in both local documents and archaeological evidence from neighbouring regions including Mesopotamia and the Levant. Iron appears for the first time in the Aegean on Crete.

2.3 Iron in the Late Bronze Age

Like the preceding period, iron finds in Anatolia are concentrated in the central region, in the heartland of the Hittite Empire – Hattušaš, Büyükkale, Alaca Höyük, and Kaman-Kalehöyük (Fig. 6). Alaca Höyük continues to produce iron artefacts, most of which cannot be dated more precisely than the Hittite Empire Period, therefore ca. 1700-1200 BCE. Aside from a continued production of ornaments and jewellery, we see an increase in weapons and tools. Although they may be valuable items, these items do not show an equivalent ornamentation to the knives and daggers from Alaca Höyük EB III tombs. Thus far, we have yet to excavate iron from tomb contexts, which indicate a preference for use in life rather than mortuary ritual; in the early part of the EIA, the amount of iron found in tombs greatly increases in Anatolia, which is in line with the rest of the eastern Mediterranean.

Traditionally, this period is viewed as the floruit of Anatolian ironworking. The large-scale production of this highly valuable material was so centralised within the Empire that its production constituted a veritable product monopoly, so that any eastern Mediterranean kingdom requiring iron sought it out directly from Hittite kings. Today, the idea of a 'Hittite Monopoly' is considered incredulous (Zaccagnini 1970; Waldbaum 1999, 32; Jean 2001, 163) and founded on a too literal reading of the famous early 13th century 'iron letter' KBo I 14: 20-

27 (Cavaignac 1934; Goetze 1940), wherein the Hittite king Ḫattušili III informs the Assyrian king Adad-nirari that, at this time, his workers are unable to produce good iron (*parzillu damqu*) in a timely manner (Saggs 1984, 184; Beckman 1999, 139; Muhly 2006, 24). I would add that the corpus of roughly 200 Hittite documents citing iron tends to over-represent Hittite activity when compared to other regions (see overview in Reiter 1997, 344–99). Additional problems with a monopoly idea include the fact that, since the Old Assyrian Colony period, textual and archaeological evidence indicates an active iron trade with Mesopotamia that included iron exports to Anatolia. It is also in this period that we see iron items increase in neighbouring regions like the Levant, as well as spread to new ones such as the Aegean and Georgia.

2.3.1 Iron objects in the Hittite world

Most discussions on Hittite period ironworking focus on references made in palatial texts. In Old and Middle Kingdom, Hittite texts with references to iron come from cult and mythic texts, while in the New Kingdom this shifts to appearances in tribute and tax lists. In her review of the corpus, Siegelová (1984, 74–75, 164–67; 2001; 2005, 38–39) concluded that, over the course of the Old to New Hittite Kingdom, the number and the diversity of objects increased. In the Old Hittite period, iron was a deeply symbolic material, its strength and durability emphasised in royal insignia such as thrones, sceptres, and spearheads to enhance the legitimacy of the ruling elite. It also related to items used for rituals and magic. In Middle Hittite texts, iron remained in use for royal insignia and cultic function, but not always tied to the king. It expanded, however, to objects belonging to cult officials as well as votive iron idols

in anthropomorphic and zoomorphic forms. By the Hittite Empire, iron implements may appear in large quantities in single lists, such as 18 swords, 56 daggers, 66 ingots in a chest, and 81 spearheads, suggesting a move away from the symbolic to the functional realm. Iron was no longer a luxury commodity, indicated by reduced references to iron jewellery and its application to less important cult objects that are additionally refined with gold and silver ornaments.

The issue that arises, however, with the attempt to write 500 years of metallurgical history that starts with cult and mythic texts, followed by tribute and tax lists, is that it produces an inconsistent narrative. Each source-type provides us with a specific use-case for iron, but they do not exclude the fact that they may have existed in the other realms. Cordani's (2016b, 173) investigation concluded the opposite of Siegelová's, in that the types of objects remained more or less the same throughout the periods and that the technical vocabulary did not grow significantly. Košak (1986, 134) warns that, due to the uneven representation of the textual evidence, of which roughly 20% dates to the Old and Middle Hittite periods (Cordani 2016b, 165), it is misleading to conclude that iron production steadily increased through the centuries. As a result, Cordani (2016b, 164) rejects the idea of the Hittite period as an intermediate phase of a long and linear process which started with iron used for royal insignia as a symbol of power and in luxury goods, and culminated in its predominance over all other metals in daily use and war equipment.

The archaeological remains support Cordani's conclusions. From the very start of the Hittite period there is a shift in the type of data. The small pieces and fragments from the Old Assyrian Colony and Old Kingdom periods give way, where identifiable, primarily to weapons

and tools. A sticking point is the set of objects from Alaca Höyük that are ambiguously dated in strata IV-II ranging during the period 1700-1200 BCE (Koşay 1966; Muhly et al. 1985). It would be interesting to know if items such as arrowheads, daggers, and spearheads indeed were produced in the Old Kingdom. Unfortunately, we do not have any objects definitively dated to the brief Middle Kingdom (ca. 1500-1430 BCE). In sounder strata, from 1500 BCE onwards, come a chisel, daggers, knives, arrowheads, axeheads, spearheads, and a few pieces of armour scale, which are rare in any material (Hulit 2002). Noticeably absent from the corpus are high status sceptres, ornamental statuettes and vessels, and fine jewellery noted in the Hittite texts. In fact, iron use in the EBA at sites like Alaca Höyük better reflect the world of royal symbolism and luxury that we see in the Old and Middle Hittite texts. The discrepancy might be explained by the fact that, unlike in the EBA, Anatolians of the BA did not deposit iron into their tombs, a practice that will be revived only in EIA. Overall, the picture painted is one of consistent iron object-type production over 500 years.

2.3.2 Mastery of iron production

Beyond object number and diversity, another key discussion point on ironworking during the Hittite Empire period is the question of mastery over the production processes. Košak (1986, 134) divided ironworking into three phases based on terminology: iron (AN.BAR) from the Old Kingdom, black iron (AN.BAR GE_6) from Šuppiluliuma I (ca. 1380 BCE), and good iron (AN.BAR SIG_5) and white iron (AN.BAR BABBAR) from Ḫattušili III (ca. 1275 BCE). Siegelová similarly attributed the rise in the number of iron objects to significant changes in production techniques. Basing such technological developments solely on these texts, however, poses

problems considering that, throughout this time, the sources are completely silent about production processes.

At one time, the controversial iron speiss from a late 15th or 14th century domestic context in the Hattušaš Lower City was the earliest piece of evidence to support ironworking in Anatolia. It was one of two items tested out of 12 identified by the excavator Boehmer (1972, 131, pl. VIII, nos. 1246–47) as ingots (or blooms). It is uncertain if this group belongs together. Analysis revealed an unworkable material containing iron sulphide matte (FeS) and iron arsenide (FeAs) with some matte and silicate slag (Muhly et al. 1985, 76–77, pls. VIII, IX) (Fig. 8). Shalev (2004, 2663) suggests that this slag was the result of smelting ore containing iron, arsenic, and sulfur. We do have a few reports in this period that refer to unworkable iron. Aside from the KBo I 14: 20-27 'iron letter', the late 13th century smith Šulmu notes in a Middle Assyrian letter found at Dur-Katlimmu that he was given a quantity of iron to make 20 arrowheads and a small amount to make the handle of a whip, but this material was not workable (Cancik-Kirschbaum 1996, 170–74, text 16). Clearly, as we saw in the Old Assyrian Colony period, obtaining quality iron ore remained problematic. This issue was not limited to the LBA Hittites; however, as two pieces of speiss were found at Lachish (Israel) and four from a workshop in the Kamid el-Loz palace (Lebanon) (Frisch et al. 1985, 146–48; Hachmann 1986, 27; Shalev 2004), this indicates that other regions producing iron also ran into production issues. Thornton et al. (2009, 309) note that ferrous speiss is similar in appearance to iron, but

because it is brittle it can only be used for casting, so it might have been repurposed for the iron figurines referred to in Hittite texts.[6]

Iron slags, without further analysis and comparisons, do little more than confirm the presence of ironworking at a site. The second item analysed from Boehmer's excavations at Hattušaš turned out to be iron smelting slag (Schaaber et al. 1977, 261). Today, a few more items may be added to the mix. The later excavator at Hattušaš, Seeher, reported further unpublished slags and iron finds (Yalçın 1999, n.19). At Kaman-Kalehöyük, several lumps of slag from level IIIa (Hittite Empire 1450-1200) indicate that iron production continued at this site after the Assyrian Colony period (Akanuma 1995a, 1995b, 2003). One of the more intriguing observations made by Akanuma (2005, 152) is that iron items from Kaman-Kalehöyük strata IIIb (Old Hittite Kingdom) have a higher purity than those from IIIc (Assyrian Colony), suggesting some improvements to smelting purification techniques.

Several items tested from this period have carbon contents high enough to indicate steel. A knife, bar, and fragment from Kaman-Kalehöyük level IIIa had carbon contents of 0.3-0.5%+. Akanuma (2005, 155–56) noted, however, that carbon content varied across the objects, suggestive either of an inability to fully control the process, or that two or more kinds of steel were deliberately manufactured. At least five objects from the Old Assyrian Period at this site were made of mild steel (carbon contents 0.1-0.3%); therefore, while there is continuity in terms of knowledge, it does suggest that techniques were improved from one

[6] Some scholars suggest that ferrous speiss may have been produced as an alloying component for the production of arsenical copper (Paulin et al. 2003; Thornton et al. 2009). Speiss ingots have been found in LBA hoard at Kanalski Vrh in Slovenia (A. Paulin et al. 1999), and considering Anatolia's reliance on tin imports this may have been a viable alternative for small items like the arsenical-bronze pendants found in the Kanalski Vrh hoard.

period to the next. An analysed late 14th century lugged axe from Hattušaš lower town level Ib had particularly high carbon concentrations of 0.6-0.7% (Boehmer 1972, 137; Muhly et al. 1985, 78, pl. IXb, no. 3; Yalçın 1999, 182). Again, heterogeneity is the name of the game when it comes to iron sources at Kaman-Kalehöyük, and, like the preceding period, objects demonstrate great variability in trace elements indicative of multiple sources.

Based on the metallurgical analyses, we may cautiously observe that production techniques incrementally improved over the Hittite period. This is evident in the ability to remove impurities and the increase in the number of steeled items. This use of carburisation will only continue to increase after the 13th century into stratum II (Masubuchi 2008, 281). Such improvements were likely driven by specialist blacksmiths referred to in texts from the Old and Middle Hittite periods (Souckova-Siegelová 2001, 190; Siegelová 2005, 38; Cordani 2016a, 17, LÚMEˇS AN.BAR; LÚ.MEˇS AN.BAR.DÍM.DÍM). Cordani (2016b, 172, KUB 42.21 obv 6) discusses a few technical terms in ritual texts that distinguish between 'good iron' and 'iron from the brazier', the latter perhaps meaning a bloom or ball/lump deriving from an initial or early smelt.[7] The implication from the text is that iron may have also circulated in a pre-forgeable form. Trade information is minimal in this period, as iron bar-shaped implements from Hattušaš and Korucutepe may be our first glimpse of transportable iron billets (Boehmer 1972, 137, pl. XLIII; van Loon 1980, 3:147, nos. 70–332; McConchie 2004, 230, tbl. 15) (Fig. 9).[8]

[7] For discussion on the use of PAD for ingot (e.g. 3 PAD AN.BAR in KUB 42.76 obv. 1 inventory) and *purpura/i-* for lump (e.g. 20 [pur-]pu-ru-uˇs AN.BAR, KBo 17.46+: 26 festival text) see Singer (2006, 254) and Weeden (2011, 314–15).

[8] In this period, the correct term for transportable, workable iron is billet, which is an intermediary stage in the bloomery process between the bloom (straight from the furnace) and bar iron. A billet is worked to some degree so has a lower slag content than the bloom. The term ingot cannot be applied because they are made from casting metals, and in this period ancient smiths were unable to achieve the heating techniques required for casting iron. See the glossary provided by The Historical Metallurgy Society, London: http://hist-met.org/glossary.pdf.

Analysis of the item would be useful to determine the iron production stage – for example, currency bars and billets in Iron Age Britain were of partly processed iron (Hingley 2006, 217).

It is possible that Hattušaš was the main producer of not only finished iron, but all metallurgical products in Anatolia, based on the high concentrations of tools and metallurgical work areas in the centre (Blackwell 2011, 325). This overwhelming concentration indeed creates an impression of a technical monopoly in all metals, not just iron; however, the likelier scenario is that it reflects the fact that rulers of the Hittite heartland supported the infrastructure, taken over from the Assyrian Colony Period, that facilitated the industry from mine to consumer. That the movement of commodities remained a primary concern of Hittite kings is indicated by the special state protection guaranteed by law granted to foreign and local merchants operating within the empire (Hoffner 2002, 4). We also know of a sophisticated mass-production and distribution system of pottery organised by the empire (Henrickson 1994, 109–10; Müller-Karpe 2002, 257). Note that with the vast majority of the iron from this period came from sites under the Hittite sphere of influence, suggesting that iron circulated throughout the empire network and beyond to the Amuq Valley site, Tell Açana, in northern Syria. Ḫattušili I's (ca. 1650-1620 BCE) empire-building campaigns in the southeast were likely aimed at gaining control of the trade routes from Syria and Mesopotamia, with a particular interest in maintaining a constant supply of tin from Elam (Bryce 2005, 82–83; Collins 2012, 37; Burns 2017, 11). Eventually, Tell Açana will be annexed to the Hittite empire after its conquest in the mid-14th century BCE by Šuppiluliuma I. The establishment of Hattušaš as the capital during Ḫattušili I's reign would have directed the flow of metallurgical resources to this centre for the production of weaponry for the army that maintained the empire.

2.4 Iron after 1300 BCE

The most notable event at the end of the BA in Anatolia is the gradual collapse of the Hittite empire over the course of the 13th century. Up to this point, most BA iron finds were confined to the Hittite heartland in central Anatolia, but it is in this period that we see the development of three regional trends for the use of iron.

2.4.1 Post-Hittite sites

The first group considers sites that were connected to the Hittite empire at the end of the BA. The regions include the central Anatolian Hittite heartland, the eastern frontier Keban region, and the southern coastal site of Tarsus. Despite the gradual collapse of the empire, it appears that the iron network remained intact within central Anatolia. Indeed, iron finds decreased at Hattušaš after its abandonment and minor destruction around 1180 BCE, but the excavator Seeher (1997, 328, fig. 11) reports finding an 11th century BCE workshop containing iron slags and worked fragments, indicating that production was still underway in the old capital at the village level, as occupation was reduced to a small hamlet on the hill of Büyükkale and a few burnt-out Hittite buildings in the Lower Town (Kealhofer et al. 2009, 280). Production also continued at Kaman-Kalehöyük where iron lumps, slag, and finished pieces of wrought iron and steel/carburised iron finds significantly increase over the course of stratum II. Again, sourcing strategies will remain diverse, and there appears to be no move to standardisation in the production techniques. Only by stratum IIa do we see evidence of quenching (Akanuma 2006, 220–21; Masubuchi 2008, 281, 291–291; Omura 2010, 2013). In

central Anatolia, if Kaman-Kalehöyük is any indication, the production of iron not only continued unabated, but increased with time.

In the east, iron slag found with production debris, including spout-shaped bellows and a smelting crucible from the industrial 'Farmstead' precinct of Norşuntepe, indicates that local production continued in this region, albeit at significantly reduced levels (McConchie 2004, 112–13, tbls. 11–12). A second iron billet from Korucutepe (Phase K) suggests a continued regional trade network connected to Hattušaš.[9] The site produced a similar iron billet in the preceding LB II level (Phase J), which McConchie (2004, 110) links to ones from Hattušaš (Boehmer 1972, pl. XLIII.1246, 1247). The sickle and tanged arrowhead from the same level are similar to central Anatolian types found at Hattušaš (Boehmer 1972, pls. XLVI.1300, 1302-1304; LI). The iron fibula is unique in this region in part because of its non-utilitarian nature, and it suggests that the iron trade network might have extended to Cyprus or the Levant. Despite this apparent continuity with the Hittite world, other material components suggest that, after a series of 12th century destructions, the sites of the Keban were increasingly drawn into the developing pre-Urartian Van-Urmia culture of the EIA I (1100-900 BCE) in terms of new ceramic forms and architectural styles (Sevin 1991, 95–97; Bartl 1995, 207–10). Nevertheless, the Keban sites retained their emphasis on tools and weapons for use within their settlement, which contrasts with the ornamental jewellery and weapons made from inhomogeneous low carbon iron that the Van-Urmian group produced for burial depositions

[9] The excavator reports this billet to be a mixture of hematite and chromite resulting from an improper smelt (van Loon 1980, 3:178).

(see below; McConchie 2004, 113; Sevin 2005, 368), which suggests that, at least initially, the post-Keban sites retained some of their iron production traditions.

Tarsus/Gözlükule presents a third post-Hittite trajectory, one that entails building stronger connections with its maritime neighbours after the site destructions of 1200 BCE. At Tarsus, locally produced Mycenaean wares noticeably increased in the LB IIB post-destruction settlement (Killebrew 2012, 30; Korkmaz 2016, 151). The particular LH IIIC 1:b assemblages are similar to those found in Cyprus, particularly the linear bowl forms connected to LC IIB and IIIA contexts at Kition and Kanzali (Goldman 1963, 93–95; Sherratt and Crouwel 1987, 339). Connections to the Levant are suggested by finds of Tarsian banded wares in north-western Syria, and the appearance of a Levantine-style fibulae in Cilicia (Goldman 1937, 277; Yakar 1993, 17–18). The post-destruction levels were very thin, which might be why we do not see iron until the 11th century. Metal objects are generally scarce in the Tarsus habitation levels, and both the bronze and iron objects are weapons and tools. Most of the items are generic, including six iron awls, two of which still have bone handles. However, two iron knives with straight blades and flicked-up tips suggest inspiration from the Levant rather than central Anatolia (Fig. 10). Parallels come from Beth Pelet (Tufnell 1930, pl. XXX.129 iron) and Gezer (Macalister 1912, pl. CXCVIII.1 bronze) in Palestine, and Tell es-Saʿidiyeh in Jordan (D'Amato and Salimbeti 2015, 39), and Tell Shiukh Fawqâni in northern Syria (Tenu 2009, fig. 5 iron). Arguably, Tarsus in this period was drawn into the metallurgical sphere of the eastern Mediterranean rather than that of central and eastern Anatolia.

2.4.2 Pre-Urartian eastern Anatolia

The second regional iron complex is embedded in a new pre-Urartian cultural horizon beginning in the mid-13th century and centred on the Lake Urmia basin in north-western Iran, but which extended northward through the Lake Van region of eastern Anatolia, into southern Armenia, Georgia, and south-western Azerbaijan to the Caspian Sea, and southward from Takab to Alborz and to the eastern Zagros mountains (Matney 2011, 447–50; Danti 2013, 327–29) (Fig. 11). Although iron use begins throughout the cultural horizon, in the southern Caucuses (Armenia and Georgia; Nieling 2009, 286–94) and western Iran (Tepe Sialk, Tepe Giyan; Muscarella 1974, 50, 51, 82), by far the greatest concentrations of iron objects are from the region stretching between Lake Van and Lake Urmia. EIA I chamber tombs K2, K4, K6/7 (1250-1000 BCE) from the Karagündüz cemetery alone produced at least 37 small items from multiple burials: pins, fibulae, bracelets, rings, daggers, and knives made of low-carbon iron (Sevin and Kavaklı 1995, 1996; McConchie 2004, 240, 341; Sevin 2005, 368). Contemporary chamber tombs at Hakkari and Hasanlu produced fewer but similar finds (Dyson 1964, 39, 1965, 196, 1967, 2957; Muscarella 1974, 49, 80; Belli and Konyar 2003a, 124, fig. 49).

Iron use in this region contrasts considerably with that of central Anatolia in terms of volume, which is surprising considering its absence from BA levels at these sites. Nevertheless, this region was so productive that, by the 11th century, the finds number in the hundreds at Karagündüz, Hakkari, Yoncatepe, Ernis-Evditepe, and Dinkhatepe (Belli 2001; Belli and Konyar 2003a, 2003b; Muscarella 1968, 1974). The objects from the 9th century onwards are so numerous that they deserve a study in their own right. By the rise of the Urartian kingdom in the mid-8th century, iron was produced on an industrial scale (Yener et al. 1996, 383), with at

least 92 smelting sites identified by survey throughout the Van region (Belli and Yalçin 1994). These kind of numbers align with the incredible iron productivity seen on the other side of the Zagros Mountains in Syria and northern Israel (Veldhuijzen and Rehren 2007; Yahalom-Mack and Eliyahu-Behar 2015).

Although the beginning of this rapid ironworking trajectory coincides with the collapse of the Hittite empire, there are alternative explanations to the dissolution of a Hittite technological monopoly. As Kaman-Kalehöyük indicates, Anatolian sites relied on multiple sources to fulfil their iron needs. Considering the number of iron deposits throughout Iran and the Caucuses (Pigott 1982, fig. 21) (Fig. 12), it is likely that iron flowed into the Hittite eastern regions from this area, so the Van-Urmia groups were in an ideal location to redirect these local resources to supply their needs. It is probably not a coincidence that only three chamber tombs from Karagündüz, a cemetery connected to a semi-nomadic group occupying the pasturelands along the Van-Iran highway, produced the earliest and most abundant EIA I iron collection in the region (Köroğlu and Konyar 2008, 125).

For the Van-Urmian groups, this need was, at least in part, for personal display in burial rituals. In contrast with central Anatolia, iron in this region was used for jewellery and personal ornaments, such as knives, in tomb depositions rather than settlement contexts. This brings the region in line with practices developing throughout the eastern Mediterranean in the Levant, Cyprus, and the Aegean. Unlike these regions, however, iron in the Van-Urmia was a second-choice metal. Compared to their south Caucasian neighbours, Ayaz (2016, 291) characterises the Van-Urmian group as a poorer sub-culture based in part on the lower level of workmanship seen in the burial goods. Whereas the Caucasian groups produced their most

impressive pieces in bronze, Özfirat (2001, 141) suggests that the Van-Urmian group had limited access to bronze because they reserved it for their most ornamental objects. Iron was available in the Caucuses during the EIA I, but they applied it almost exclusively to knives, daggers, arrowheads, and spearheads.

2.4.3 Asia Minor

Iron remains along the Asia Minor coast are scanty. Compared to the other two regions, iron appears here later, from the 11th century onwards, and numbers do not grow significantly until the 9th century. Like central Anatolia, this might in part be a factor of poor preservation due to most finds coming from settlements – only Assarlik contained iron in tombs. City destructions in the early 12th century do not seem to have been a factor in the appearance of iron – Sardis, and Iasos each have destruction levels, but their iron deposits coincide with ones from new settlements (Phokaia, Assarlik) and ones from sites left unscathed (Troy, Beşik Tepe). The minimal number of published photographs makes typological links to other regions challenging, as does limited publication. For example, the blade found in a pit with transitional LH IIIB-C wares at Beşik Tepe was only mentioned in passing (Mellink 1984, 446, 451). And the unpublished tools and knives from well-stratified citadel and lower town contexts at Troy would be an insightful dataset for this discussion (Becks 2003, 50). Nevertheless, this region was not under Hittite control and there is little evidence to suggest contact with central Anatolia (Kozal 2003, 71–72). Therefore, the region maintained distinct cultural features, one of which was clear contact with the Mycenaean world at dozens of sites, particularly Troy,

Beşik Tepe, Miletus, Iasos, Sardis, and Müsgebi (Kelder 2004, 54–63; McMillan 2016, 7). This seaward orientation continued into the EIA as a feature of the ironworking.

The material from the cemetery at Assarlik in Caria suggests strong contacts with the Aegean world. The location of manufacture of the pottery is a subject for debate, but whether imported or a local imitation it drew inspiration from the Dodecanese style (Desborough 1952, 220–22 vs. Snodgrass 1971, 67; Lemos 2002). The bronze finds were mostly Caner's (1983) type II arched fibulae of Aegean inspiration, and the gold disk from tomb C of Rhodian inspiration (Higgins 1980, 119). These objects are the reason why Assarlik features as a key site in the discussions of EIA migrations from the Aegean (Carstens 2011, 492). Although the spearhead (AN.1350) from Tumulus Tomb A finds closer parallels in the Mediterranean world than Anatolian (Fig. 13), the key objects are the set of iron knives (AN.1360, 1390, 1400, 1410) (Figs. 14-15) with links to blades with flicked-up tips from Levantine LBA bronze and EIA iron knives (Fig. 16) – the same type that we see in Tarsus (Fig. 10). Single-edge knives are infrequent in LBA Anatolia, and even at Hattušaš they do not appear in abundance until Phrygian levels (Büyükkale II 900-700 BCE) (Boehmer 1972, 147). Across the Balkans, Italy, the Aegean, Cyprus, and the Levant, the iron knife is the archetypal object to track the movement of ironworking (Pare 2017, 29–47). The iron knives frequently feature as the earliest and most consistently produced items of iron, so their appearance at Assarlik indicates that this site's ironworking tradition was drawn into the eastern Mediterranean production sphere, which differed from that of the post-Hittite central and pre-Urartian eastern Anatolian traditions.

Advanced forging techniques on an axe from Lydian Sardis support further connections to Mediterranean ironworking practices. Metallographic analysis of an iron axe from the

House of Bronzes deep sounding Lydian trench revealed it to have undergone strengthening by hammering layers of uncarburised and carburised iron together (Maddin et al. 1983, 178–81, figs. 1–6, pls. 59–60). This layering technique used a block of carburised bloomery iron to hot hammer to a block of uncarburised iron. Several rounds of reheating and hammering were required to shape the tool. Lang (1989, 1991) reports that a similar lamination technique was applied to an 11th century Cypriot dagger held in the British Museum. Various carburisation and hardening techniques were also employed to iron items on Cyprus and throughout the Levant in the EIA (Waldbaum 1999; Maddin 2010), indicating a sort of cross-regional sharing of such techniques. When compared to the consistently low-carbon iron used in pre-Urartian eastern Anatolia/north-western Iran, it appears that the Zagros Mountains acted as a sort of dividing line between two different ironworking traditions developing in the EIA.

That the communities of Asia Minor were capable of producing their iron locally is suggested by evidence of 11th century ironworking at Phokaia in Lydia. Excavations revealed two oval buildings dated to the PG, one of which contained the remains of a blacksmith's workshop (Özyiğit 2005, 8, 44, 2006, 310; Yalçın and Özyiğit 2013). Inside, excavators found ovens, a stone anvil, charcoal, slag, and metallic residues around the ovens, suggesting that smelting, or at least secondary smelting for purification, was one of the activities taking place. The workshop is dated to the early 11th century, based on a SMyc amphora found in situ on the floor (Özyiğit 2005, 10; Yalçın and Özyiğit 2013, 241, fig. 6). Directly under the floor in the foundation levels were sherds of Mycenaean LH IIIA1-C middle period pottery (Özyiğit 2005, 5–7, 9), suggesting that the workshop was established in the second half of the 12th century. The ovens remained in use until at least the end of the 11th century. This data makes the

workshop the oldest known blacksmith in the Aegean world, and certainly one of the earliest in the Mediterranean.

For decades, the development of ironworking in EIA Anatolia has been explained by the disintegration of the Hittite empire. In the wake of destructions at Hittite centres, smiths relocated to new regions and possibly abroad, taking their technological knowledge with them (Akanuma 2007, 125). Although a form of metallurgical decentralisation undoubtedly took place, this had less to do with technological know-how and more to do with organising and attracting raw resources. The Hittite empire was likely a strong market and infrastructural force that drew or directed in many of the iron ore resources. As we have seen, BA Hittite sites sourced from multiple locations. With the gradual end of the Hittite empire, transport routes would redirect iron ore and billets to new regions with purchasing power. This might include the small Syro-Anatolian city-states that grew out of local officials and administrators taking control in the absence of central authority (Yakar 2003, 16; Dodd 2007; Mora 2010). Such regionalism explains the development of at least three ironworking complexes in the Anatolian EIA. This redirection of resources sets the groundwork for the massive production of iron on an 'industrial scale' from the 9th century in the burgeoning Urartian and Phrygian kingdoms, and the Greek Asia Minor colonies (Yener et al. 1996, 383). These entities facilitated greater demand and infrastructural support than was seen in the first few centuries following 1200 BCE.

2.5 Conclusion

Taking this diachronic perspective on Anatolia ironworking allows us to develop a narrative for an industry that arguably extends back to 3000 BCE, where it took root in the hematite mining industry – it did not rely on the occasional working of meteoritic iron (Pleiner 2000, 12). Over the course of two and a half millennia, we witness a progressive development in ironworking techniques and an increase in uses from jewellery and ornaments to the application to tools and weapons. It is in the MBA that we have enough evidence in terms of documentation and material to claim the existence of a localised production industry that included an iron export/import relationship with Mesopotamia, where iron objects appear as early in the preceding millennium as they do in Anatolia. By the LBA, this trade likely expanded to the Levant, where the number of items recovered greatly increases from the 15th century onwards. This spread, of course, runs contrary to the concept of a Hittite iron monopoly, and the centralization witnessed in the find patterns likely reflects iron piggybacking off the pre-existing trade network for more desirable items, such as silver, gold, copper, textiles, and precious stones. The multiple sourcing strategies for iron ore from the MBA through the EIA implies a coordinated network. While we have indications that iron was not solely for use in the main centres, it was produced in these locations in greatest the abundance and so has the best chance for survival – most finds come from settlements where preservation conditions are worse than in tombs.

The transition of the perception of iron as high value to one lowly enough for application to utilitarian items is a key component of most theories on iron development. In Anatolia, this transition is unclear. The merchant texts of the Assyrian trade colonies imply a

rare but well-known material in circulation, but the Hittite texts suggest a material inflated to mythical and royal symbolism. The corresponding finds, however, do not bear the usual trademarks of high-status items. They are not deposited in the tombs of the elite like other precious status items, and they are applied to relatively mundane tools including chisels, sickles, nails, arrowheads, etc. Rarity certainly helped keep the value of iron high in a market sense – it traded for high amounts in the MBA, and production quality remained a concern of merchants throughout the literate BA. I would suggest, however, that the Hittite texts are misleading. In these cases, its value was inflated when applied to items that belonged to the gods or kings. In reality, the value of iron vis-à-vis other metals probably decreased before the beginning of the EIA as the sourcing strategies, transportation infrastructure, and manufacturing techniques improved over the millennium. Metallurgical testing indicates that by the LBA, some iron was used as a practical metal, probably a relatively expensive one, for bladed implements. And, if anything, the disruptions to the production network at the end of the BA increased the EIA market value of iron higher than it was in the 13th century!

The importance of these developments in Anatolia is to broaden the world of iron into which the industries of the Aegean and Cyprus appear. The goal is to set the metallurgical stage. Focusing on developments solely in these regions runs the risk of presenting the start of their industries as though in an iron vacuum. Any theory must account for the existence of BA iron industries that are more robust than 'sporadic' and 'adventitious' in neighbouring regions. I have focused on Anatolia in part because its continuous iron data from the EBA allows for a discussion of an 'industry', and because of the region's close interactions with the eastern Mediterranean throughout the BA. A direct connection between the iron industries is

difficult to ascertain prior to the EIA. With Cyprus, there is the possibility that Cilicia was one of the regions that tapped into the redirection of iron resources in the 12th century after the break-up of Hittite transportation routes. Iron appeared late in Cyprus, but where smiths obtained its iron resources, being ore-poor, is one of the most perplexing questions regarding its industry. Even if iron was produced as a by-product of copper smelting (Chapter 1), at some point the island had to have switched to iron imports to sustain the growing demand (Pleiner 2000, 13). Southern Anatolia and northern Syria are all possible contenders for EIA supply.

The Aegean world is a more complex case. Most of the early pieces of iron in the Aegean are found on Crete in the early and middle BA. Based on tool design and the presence of a Minoan saw at Hattušaš, Blackwell (2011, 332, 334) believes that Cretan smiths became aware of or were influenced by Anatolian practices at the beginning of the second millennium BC, if not earlier, and there are signs of substantial interaction between the regions in the Protopalatial period. Could the early iron on Crete have arrived from Anatolia? This is the primary iron-practising region that Crete interacted with. In the LBA, the iron story in the Aegean shifts to the mainland, where we have the consistent production of bezel rings made in part of iron focused primarily on the Argolid. Influence from the Hittites of central and south Anatolia is doubtful as we have virtually no evidence of contact between the regions (Kozal 2003; McMillan 2016, 6) save for a few irregular interactions in Thrace and the Balkans (Özdoğan 2002, 73–74; Vianello 2008, 9–10). The high level of interaction with the western Anatolian coast, however (noted above), opens up a few possibilities for an exchange of skills in iron. Nonetheless, these bezel rings are decidedly local, and their production should be sought in the Mycenaean world (Chapter 3).

Chapter 3. Ironworking in the Bronze Age Aegean

This chapter discusses the appearance of iron in the BA Aegean. Objects from this period are small and did not require much in the way of durability. Most items are decorative, such as beads, rings, and bracelets. Their distribution pattern covers a range of geographies, but do centre on Crete and the Argolid. Objects increase in number from the MH/MM to the LH/LM periods. Turning to Snodgrass' Three Stages model, iron finds in the BA, particularly the Aegean, are described as sporadic, being produced without any kind of regularity, usually the result of chance finds of meteoritic iron (Table 2, Fig. 17). Within the greater Mediterranean context, the Aegean occupies a very minor role within most models for ironworking. The region is viewed as incapable of producing iron, so any items found result from imports from the East or the presence of foreign smiths.

This chapter aims to challenge some of these characteristics of Aegean BA iron. First, although now established, a point worth reiterating is that BA ironworking, not just in the Aegean but throughout the eastern Mediterranean, did not rely on meteorites as the raw source. In fact, analysis of material from the Aegean led Pleiner (2000, 12) to conclude that meteoritic iron played no part in the invention of iron smelting. Second, evidence indicates that iron may have been smelted from iron-rich laterite sources on the Greek mainland, which suggests local production rather than importation of early iron objects to the Aegean. To this end, the third challenge is to the idea of sporadic production. One class of object containing iron arguably appears regularly and with some pattern: signet and finger rings found primarily on Crete and in the Peloponnese from the 18th to 13th centuries BCE. They conform to Minoan and Mycenaean traditions, suggesting local production and demand for iron. As the preceding chapter indicates, iron production with some control and regularity could be achieved in the BA, and the close nature of Aegean-

Anatolian relations throughout this period must be considered when explaining Aegean production. While the ring collection hardly constitutes an 'industry', the rings do indicate a degree of local knowledge and access to iron that has otherwise been denied to the Aegean. The chapter will close with a proposed model for the BA iron industry in the Mediterranean.

3.1 Meteoritic iron in the Aegean

The idea that the earliest metallic iron was obtained from meteorites first appears in late 19th century discussions that interpret the Babylonian and Egyptian use of the terms "heaven-stone" or "sky-stone" for iron to indicate a meteoritic origin (Cooper 1868, 403; Gsell 1910, 47). The theory was slow to gain traction as it did attract its share of sceptics (e.g. Beck 1884; Gowland 1912, 276; Petrie 1915, 12; Wainwright 1932, 3) until the 1920s, when metallurgists began chemically testing early iron objects for the elevated nickel levels characteristic of meteorites. Although metallurgists knew for some time that nickel differentiated meteoritic iron from iron ores (e.g. J. V. Day 1877, 22), and despite earlier calls to test nickel content in early Egyptian iron objects (Ball 1914, 204; Rickard 1927), it was not until Desch (1928, 440) reported nickel levels comparable to meteorites in a pre-dynastic El Gerzeh bead and an iron object from a royal tomb at Ur that the idea really took hold (Wainwright 1932, 3; Peake 1933, 640).

The theory seems to be enjoying a resurgence in recent mainstream news media. In 2016 the publication by Comelli's team in the journal *Meteoritics & Planetary Science* (2016) stating that the iron dagger blade from Pharaoh Tutankhamun's (14th century) tomb was made of meteoritic iron sparked a series of articles in the media, including the *BBC, The Telegraph, The Guardian*, and *The Times*. A year later, Jambon's (2017) conclusion, that

several analysed BA objects were likely made of meteoritic iron (Chapter 2), similarly sparked a series of news articles, some with misleading titles such as *Before the Iron Age, Most Iron Came From Space* (Traverso 2017) and *Bronze Age Iron Artifacts Likely Made from Meteoric Iron: Study* (2017). Each of these articles reference the same handful of analysed material and leave out the growing corpus of unanalysed and smelted iron objects. The idea is very misleading to the point that the public is 40 years behind academic research.

Much of the theory's appeal was that the scarcity of a meteor fall could account for both the late development of iron smelting as well as the sporadic appearance of second millennium iron objects over the wide geographic range of the eastern Mediterranean (Ball 1914, 204; Rickard 1927, 79). Snodgrass (1980, 1982) developed a three-stage model for procuring iron technology that outlines the important points of the theory of meteoritic origins.[1] He suggested that iron from smelting was unknown in the BA, stage 1, but instead came from meteorites, which were worked by cold or heated hammering. The assumption is that, if ancient smiths knew how to directly smelt iron ore in the BA, then they would have produced iron objects on the kind of scale that we see in the Iron Age because iron is a superior metal to bronze for many kinds of tools and weapons. As this did not occur, the sporadic appearance of iron objects could only be explained as a case of opportunistic ironworking from an inconsistent source, such as the rare opportunity of finding a meteorite. This explanation acts as a sort of default for BA Aegean iron. For example, Sakellarakēs (1997, 627, fig. 675) identified a bead (BA.20) placed in the central position of a shell necklace from the MM IIA-IIB floor level of Burial Building 9 at Arkhanes as

[1] Snodgrass updated his model in 1989 and republished it in 2006.

meteoritic iron not based on any kind of compositional analysis, but presumably its early date.

To test the theory of meteoritic origins, Varoufakis (1981; 1982) analysed the composition of 13 iron objects from Aegean contexts dated between the 17th to 12th centuries using atomic absorption spectroscopy. The average nickel content for objects with a meteoritic iron source ranges between 4 or 5–12% (Tylecote 1987, 101; Photos 1989, 404).[2] With a single exception, the nickel contents of the Aegean objects are below 5% (Varoufakis 1982, 316).[3] Although Varoufakis rules out a meteoritic origin, it is difficult conclude definitively without additional metallographic investigation. Nickel content alone is not enough to establish a meteoritic origin for iron (Tholander and Blomgren 1991, 103), as it has resulted in the misidentification of objects as meteoritic (Tylecote 1988, 158). It is worth noting that surface enrichment also influences nickel levels, as does smelting nickel-rich iron laterite ores (Tylecote 1988, 149, 159). Additional criteria for establishing meteoritic iron should include analysis of trace elements, inclusion composition, particularly of phosphides, the identification of characteristic Neumann bands or Widmanstätten structure, and the absence of smelting slag (Tylecote 1987, 103; Photos 1989, 405). For example, by using scanning electron microscopy on an iron bead from pre-dynastic Tomb 67 at El Gerzeh in Egypt, Johnson and her team (2013) identified not only a high nickel content, up to 30% in some places, but also the distinctive crystalline Widmanstätten structure found in meteorites. Rehren and colleagues (2013) confirmed their conclusions on three other beads from the tomb using several non-invasive neutron-

[2] The range varies between 4–5 % and 10–12% according to the Photos (1989), with exceptional pieces reaching 60% nickel content.

[3] Varoufakis calculated the nickel content of hoop of unpublished ring no. 2377 from the National Museum in Athens to be 10.77%. This figure is an estimate because the sample was contaminated by the lead contained within the internal convex of the hoop. The original analysis revealed 3.28% nickel.

based and X-ray based analytical methods to determine the composition and as well as structure. The combination of criteria means they can finally put to rest the debate about the origin of the iron in the El Gerzeh beads.[4]

Chapter 2 presented us with a scenario where meteoritic iron played little to no role in the development of an iron industry. We should not exclude the use of sideric meteorites in Anatolia, perhaps for items imbued with magical properties such as amulets, as there are indications of their use throughout the BA in the Near East and Transcaucasia (Pleiner 2006, 5). But the contribution of these items to the development of smelting and forging techniques was minimal. Meteoritic iron, due to its high nickel content, is brittle and resists shaping even when heated to forging temperatures, and, depending on the composition, can break along these structures when heated and hammered (Tholander and Blomgren 1991, 104).[5] Overall, its working would not have led down the same paths of experimentation like we see in EBA Anatolia with hematite ores, ferrous speiss, or the early smelting at Kaman-Kalehöyük.

3.2 Smelted iron in the Aegean

An alternative explanation for the appearance of nickel in some of the Aegean objects is that their iron was mined from the iron-rich nickel-laterite deposits found throughout the Balkans and Turkey, including Kastoria and Komnina Vermion in northern Greece, north central Euboea, Lokris in central Greece, and locations throughout the

[4] In the original analysis, Gowland (Wainwright 1911, 178) reported the composition to be hydrated ferric oxide resulting from the rusting of wrought iron. El-Gayer (1995) also doubted a meteoritic origin based on low nickel levels and traces of copper in his electron probe analysis of surface scrapings from the beads.

[5] To see an attempt to forge a meteorite using modern blacksmithing tools, visit the YouTube video recoded by the UK blacksmith Alec Steele (2017). The experiment demonstrates issues with heat, malleability, and friability due to composition encountered in meteoritic iron.

Messinian Gulf.[6] Although considered low grade ores by modern standards, these nickel-laterites continue to be exploited today for the production of iron-nickel alloys (Alevizos and Repouskou 2011). Smelting such ores could have produced iron with nickel contents in a similar range to meteorites (Varoufakis 1981, 31; Tylecote 1987, 98; Photos 1989, 404). Tylecote (1987, 99) attributes the high percentage and variable range of nickel contents (1.48-10.77% Ni) in the 15-13th century Mycenaean finger rings to these ores. Varoufakis (1982, 116–117) notes that the iron jewellery dating between the 15th and 13th centuries contain higher percentages of nickel (>1.0–4.94%) than the second group of iron objects dating to the 12th century consisting of the Volos plaque (LH IIB), and the Perati and Tiryns knives (LH IIIC), which contain trace amounts of nickel (<0.05%). One explanation for this grouping is that the earlier set comes from local laterite ores, whereas the later set were smelted from an alternative ore source (Blomgren 1980; Tylecote 1987, 98; Photos 1989, 404), or perhaps improved purification techniques. The rust-resistance qualities produced by the nickel in these ores certainly would make them ideal iron for jewellery (Tylecote 1988, 160).

This theory favours local production as an explanation for the appearance of BA iron objects in the Aegean, over traditional explanations of meteorites or importing raw iron from the Eastern Mediterranean. The Aegean frequently finds itself on the periphery of BA metal production models. In particular, it is perceived as a minimal contributor to the circulation of raw materials in the Mediterranean-wide metals market, when in fact silver (Stos-Gale and Gale 1982), lead (2008; Muhly 2008, 72), and possibly copper (Rehren and Pusch 2012, 219) were mined at Laurion in Attica at least since the MH, if not earlier. Lead

[6] For more information on the various ore sources, see Bakhuizen 1976; Cooke and Nielsen 1978, 116–17; Albadakis 1981; Marinos 1982, 242; Eliopoulos et al. 2012.

isotope analysis of EH I–MH I Aegean tin-bronzes by Stos-Gale (2016, 389) indicates the use of copper sources from Laurion as well as the Cyclades. Although it is feasible that iron was smelted in the BA Aegean, the question of ore sources requires further analysis that focuses on characteristics other than nickel content, such as the nickel/cobalt ratio as Jambon (2017) has suggested, and explores the possibility of sourcing objects using recent information on the geochemical and mineralogical characteristics of the ore sources in the Aegean (e.g. Eliopoulos and Economou-Eliopoulos 2000; Alevizos and Repouskou 2011).

The most compelling evidence for iron production in the Aegean is direct evidence for smelting and other production processes. Remains of metallurgical activity can take a variety of forms, including metal finds in the form ingots or semi-finished objects, associated waste and discarded products, or tools and installations for production (Rehren and Pernicka 2008, 235). Unfortunately, such evidence is sparse in the Aegean. One possibility comes from the metal workshop excavated in 1982 by Kilian (1982; 1983) in the lower town on the lower acropolis of Tiryns. Room 191 of building IV had a central fireplace and a pit (LXII 42/68) dating to the mid-13th century. From within and around the pit and fireplace were two mills, a grindstone, an obsidian scraper, scrap copper or bronze, a lead weight, and what Zwicker identified as ferrous speiss (BA.350), an iron-arsenic alloy waste product from iron working (Kilian 1983, 304, 306, fig. 31). Other finds of LBA ferrous speiss come from the iron-working area at Hattušaš (Muhly et al. 1985, 77), four pieces from a palace copper workshop area at Kāmid el-Lōz in Lebanon (Frisch, Mansfeld, and Thiele 1985, 158, 178-180; Hachmann 1986, 27), and two lumps from Lachish, one from a 14-13th century context and the other from the 12th century temple (Shalev 2004) (Chapter 2). Although Zimmerman (2001, 113) believes that the Tiryns piece is actually base-metal speiss produced from copper extraction or roasting, Thorton's team (2009, 309) note that

all of these LBA speiss examples do not contain significant levels of base metals as would be expected from copper or lead smelting, because speiss traps these particular metals during smelting. In all likelihood, they do reflect work with iron production.

It is not unrealistic to think that the Aegean had significantly less exposure to working with iron ores than its eastern neighbours. As at EBA sites in eastern Anatolia and the Iranian Plateau at Tepe Hissar and Shahr-i Sokhta (Thornton 2009, 218–19), some of earliest exposure to working iron oxide ores in the Aegean came from the production of ferrous speiss. The excavators at Poros Katsambas, a coastal site in north-central Crete near Knossos, found a partly corroded piece of iron arsenide (BA.10) in EM I-IIA levels, which they believe was produced as an alloying agent to increase the arsenic content in copper (Doonan, Day, and Dimpoulou-Rethemiotaki 2007, 109, 111–13; C.P. Thornton, Rehren, and Pigott 2009, 309–10). It is by working closely with iron oxides in the context of copper alloying that I suggest that Anatolian smiths first developed techniques in the EBA to obtain wrought iron (Chapter 2), perhaps through serendipitous means (Chirikure 2015, 29).

As enticing as the Tiryns speiss is, it at present remains enigmatic. Although tin replaced arsenic in the MBA (Tylecote 1976, 29; Cooke and Nielsen 1978, 190; Tylecote 1992, 35), arsenic-copper alloys and arsenic-tin-bronzes, along with zinc and antimony-copper alloys, continued to appear in the LBA Aegean (Craddock 1976; Charles 1980, 172; Tylecote 1992, 27), as well as further afield in Cyprus, the Levant, and the Near East (Swiny 1982; Tylecote 1987, 143; Zwicker 1992, 168). Unfortunately, contemporary bronzes from Tiryns have not been analysed so the prevalence of arsenic is unknown. We cannot yet rule out that this speiss might be the result of a continued arsenic-alloying process.

3.3 Aegean iron items

One indication that an iron object was manufactured locally, at least at the forging stage, is that it was constructed in the local craft tradition. Typological links do not identify the ore provenance, as mining, smelting, and forging processes may have taken place at considerable distances from one another. Techniques to scientifically source iron, including the use of iron slag inclusions (Blakelock et al. 2009), must develop further before any reliable provenancing can take place. Unfortunately, many iron items from the Aegean BA are rendered unidentifiable by corrosion, like the 'cube of iron' (BA.40) from Tomb 17 at Mavrospelio (Forsdyke 1926, pl. 23), or the unidentified 'piece' (BA.340) from Grave V(D) at Tiryns (Rudolph 1973, 40, no. 22, pl. 18.5). In other cases, the generic shape of an item prevents identification of a regional typology. Such is the case with items like the nails from Asine and Knossos (BA.30, 60), a bead (BA.20) from MM IIA-B Burial Building 9, two LM IIIA beads (BA.130) from Tholos A at Arkanes-Phouni (Sakellarakes 1991, 78, 1997, 158ff, 627, fig. 675), and two bracelets from Tombs 17 and 69 at Ialysos on Rhodes (Maiuri 1926, 45; Jacopi 1930, 284, fig. 26) and another from Nichoria Area III (Catling et al. 1983, 310, no. 85). In these cases, we cannot rule out the possibility that the iron was imported as bloom or billets, or as partially made or completed objects.

Of the 37 iron objects found in 18th to 13th century Aegean contexts, 15 have a typological connection. Eleven of these are signet rings, which will be discussed below. One of the other items is an LH IIIB iron pendent with gold mountings from Dendra Tomb 2 (BA.300, Fig. 18). The iron stud is slightly curved and measures 2.5 cm in length. The square gold mountings at each end are adorned with granulation along the upper edge, as well as three rows of granulation around the central threading hole (Persson 1931, 79, 102, no. 14, pl. 33:6). Based on the mounting shape, the pendant takes the form of Aegean 4-sided

prism seals, not amygdaloid as Persson suggested. The iron was possibly meant to imitate a lustrous hematite, diorite, or black steatite (Fig. 19). The mounting caps have more granulation than usual, but the similar style caps are common on pendant seals: Mycenae (Demakopoulou 1996; CMS I, 68), Aspis in Argos (CMS I, 205), Knossos (CMS II,2 029), and two examples from Cyprus (Fig. 20).[7] I am unaware of examples of 4-sided prism seals with gold caps. The shape may be the result of the fact that, presumably, a prism is easier to hammer out from iron than shaping or rolling the stud into an amygdaloid or cylindrical shape.

The second item is the well-preserved knife BA.270 from Thermi on Lesbos (Lamb 1936, 207, pls. 25, 47). Although normally included in Aegean iron lists due to modern geography, typologically it is more at home within the Anatolian and Near Eastern repertoire. The blade is leaf-shaped with slightly convex sides and a rounded tip. The edge curves up slightly in the upper blade to the tip. In section, it is a flat triangle thinning to a sharp cutting edge. Although dagger-like in shape, the blade lacks a midrib. The shoulders slope towards the flat, long rivetless tang. In total it is 18.5 cm long, the tang approximately 2.5 cm long (Fig. 21).

Riveting was typical for EBA Aegean (Sandars 1956, 174–75), whereas unriveted tangs were the norm on early bronze blades from the eastern Mediterranean and the Near East. Take, for example, one of the earliest forms in Anatolia, the Type 1 dagger identified in both Maxwell-Hyslop's (1946, 3–5, pl. 1.1) and Stronach's (1957, 90, fig. 2.2) typologies. Examples are found in the Anatolia and the Balkans during the third millennium BCE. Parallels include EBA copper and bronze daggers from Sveti-Kyrillovo in southern Bulgaria

[7] CMS = *Corpus der minoischen und mykenischen Siegel*.

(Kazarow 1914, 88, pl. 24.d), no. DA446N from Karataş in Lycia, southern Anatolia (Mellink 1967, 255, pl. 17.18), no. b. 921 from Alişar I in central Anatolia (Schmidt 1932, fig. 65), and no. 5849 from Troy II (Schmidt 1902, 228) (Fig. 5). Petrie (1917, 30, 167, pl. 31.139) presents an interesting parallel of an unriveted, "large knife-like" dagger from Tyre in the University College, London collection, but unfortunately additional information is unavailable. Each of these examples shares the thin oval or diamond profile and long, narrow tang particular to Anatolia (Stronach 1957, 90) (Fig. 22).

Knife parallels are rarer, but a useful one is no. 961 from the destruction level at Troy III, ca. 2100 BCE (Schliemann 1880, 506–507). No. 967 from the same level is a similar type, but with the tang missing. Another example is from Kusura in western Anatolia from period C ranging from 1900 to 1200 BCE (Lamb 1937, 41, pl. 19.6; Deshayes 1960, 127, pl. 41.13, no. 2408). Cyprus provides a few useful parallels, EC–MC examples. Stewart (1962, vol. IV:1A, fig. 100.11) records one dated from the EC IIIB-MC I, another comes from a MC Tomb 316 at Lapithos (Åström 1972, vol. IV:1B, fig. 10.6, no. 169), and one from MC III Tomb 5 at Linou (Flourentzos 1989, figs. 115, 207.9) (Fig. 23).

While the chronological range of this blade type is quite extensive, appearing in the EBA, its dagger-like shape continued into the MBA, although a single rivet on the tang, or rivets on the shoulders, become more common. I suggest dating this blade to the EBA levels at Thermi when the material culture indicates that the settlement in this period was closely enmeshed in the north-western Anatolia rather than Aegean sphere of influence (Blegen 1938, 593). Lamb (1936, 207) dated the knife to the LH IIIA-B hesitantly because the context was disturbed. Her excavations revealed five successive town levels from this period covered by significantly less extensive and scantier remains of MBA and LBA levels. The knife was found in Area Γ at 0.5 m below the surface. While Γ was heavily occupied in the

earlier phases, in the later phases it only contained a collapsed wall with some wheel-made Red and Grey wares mixed with EBA wares. Beyond the wall, Lamb (1936, 71) reports that the upper levels in the area were made of earth washed down from the mound above and contained a mix of EBA sherds with a few later wheel-made sherds among them. The knife possibly was amongst the mound material. While the material might be surprising for this early date, we should bear in mind that iron implements appeared in Anatolia as early as the EBA (Chapter 2, Table 1).

With the exclusion of the Lesbian knife, the number of items from the Aegean BA decreases, and would only seem to encourage the view that the appearance of iron at this time could be described as 'sporadic', meaning that their existence does not form any kind of regular pattern that would indicate a need for the consistent production of good-quality iron to supply a regular market. The exception to this rule is the collection of 11 signet rings that form a coherent class of object that consistently reappear over the course of the later first millennium in Crete and the Peloponnese. Each of these signet rings was constructed according to the conventions and techniques of contemporary Minoan and Mycenaean rings by smiths familiar with this regional tradition. Of particular interest are the eight that date to the 14th and 13th centuries from the Argolid and northern Crete. Their similar construction, use of multiple metals, as well as high degree of experimentation with the iron, give the impression that their appearance was neither random nor sporadic, but instead indicate a movement towards commissioning iron in jewellery as the material became more widely available. A closer look at the rings reveals a higher degree of sophistication and familiarity with working the material than would be expected from incidental and intermittent opportunities to work with iron.

3.4 Iron rings in the Aegean

Although the number of objects and their varieties steadily increased during the second millennium in the Aegean, rings of and with iron constitute the largest category, with at least 18 known specimens dating between the 17th and 13th centuries. As a group, the rings fall into two categories. The first category is finger rings formed from a simple hoop of iron. Seven such rings come from elite tombs at Vapheio and Asine in the 15th and 14th centuries, Thebes, Melathria in Laconia, and Phaistos in the 14th-13th centuries. The second category consists of 11 signet rings with bezels, sometimes with figurative designs thought to indicate ownership (e.g. Sakellarakes 1991, 151). Signet rings are very common in elite burials from the Minoan and Mycenaean world, particularly in gold (Table 3).[8]

3.4.1 Construction features

Signet ring typologies are based primarily on construction techniques.[9] Most of the signet rings fall under Younger's (1984) Type VII or Vassilikou's (2000) Type VI categories (Fig. 24).[10] What defines this category is the construction material. In contrast to the primarily gold rings in other categories, these rings are any bi- or polymetallic combination of silver or the base metals bronze, iron, or lead with gold. The bezel has a base metal core onto which two metal plates are riveted, one on top, the other on the bottom. The upper surface of the bezel is convex and has three facets. The hoop has a metal core and is covered with a thin sheet, usually of gold, on the exterior side. The interior hoop and finger-

[8] See the *Corpus der minoischen und mykenischen Siegel* volumes and Vassilikou's *Mycenaean Signet Rings* (2000) for numerous examples of signet rings in elite burial contexts.

[9] There is a good deal of literature dealing with the typologies and construction techniques of Minoan and Mycenaean rings. For topology see Younger (1984), Xénaki-Sakellariou (1989), and Vassilikou (2000). For construction techniques see Evely (2000, 2:424–430), Müller (2003), and Papasavvas (2008).

[10] I will use Younger's (1984) Types because they remain the primary typology cited for signet rings.

bed are one piece of hammered gold sheet. The ends of the hoop core are riveted into the bezel core. Small rivets secure the gold sheet to the interior of the hoop. This construction method makes it easier to differentiate between finger ring where both hoop ends join to create a full loop, and signet rings where the bezel is missing, as in the case with rings BA.200 and BA.250 from Mycenae and the National Museum.

Hoops in fragments, such as BA.110 from Asine, remain ambiguous. Müller (2003, 478, fn. 26) calls this construction the gold-iron ring type, but iron need not be present for this type of construction to be used (Fig. 25). See, for example, the gold and bronze rings from Asine Chamber Tomb 1 (CMS I, 200, 201). The earliest Type VII ring is the 17th century MM III from the Anesmoplia shrine on Crete (BA.50, Fig. 26). The ring has an iron ellipsoid bezel plate and a hoop of silver (Müller 2003, 478, fn. 22). Rivet holes visible in the radiograph indicate that the hoop was riveted to the bezel, as with later examples of Type VII rings (Müller 2003, 478, fn. 26). Based on later examples, it is entirely possible that the bezel was originally covered in gold foil. It is unlikely that the silver hoop was covered by foil because rivet holes are not present on the lower external side of the hoop as would be expected.

Younger (1984, 89) suggests that Type VII rings began in the LH II-IIIA on the mainland, primarily in the Argolid, but the Anesmopilia specimen suggests an earlier start on Crete. LH I ring no. 9 from Kakovatos-Pylos should push back the date of Type VII rings, but only its iron bezel is preserved, and, although other metals were likely part of its construction, the find is not technically bimetallic (Fig. 27).[11] Nevertheless, the bezel

[11] Iakōvidēs (1970, 295) refers to the find as “the gold-bound bezel of a ring,” Buchholtz and Karageorghis (1973, 27) describe it as an "Iron ring bezel set in gold," while Waldbaum (1978) says of the ring that “the front half and bezel were iron, and the whole overlaid with gold." These authors are misleading in their descriptions as a gold overlaid was not found on the bezel (See Müller 1909, 275; Varoufakis 1982, pl. XXX.1), but they presume that there was one originally.

indicates it was constructed in the typical manner of Type VII rings. Both early rings (BA.50 and 70), one from Crete and the other from Elis, suggest that the origins for the bimetallic rings should be sought outside the Argolid. In fact, the earliest Type VII ring from the Argolid is the recently discovered LH II silver-iron ring from the Aidonia Treasure (BA.120, Fig. 28). Younger (1984, 89) proposes that three sealings made by the same circular bimetallic ring from the LM IB Arsenal Deposit at Knossos (Evans 1903, 56–57, fig. 19; Gill 1974, 34–36, fig. 3) indicate that the origins of Type VII may be traced to Cretan circular prototypes. However, earlier evidence for bimetallic ellipsoid signet rings on Crete comes from the LM IA ring at Malia, which is made of lead (CMS V, S1A 58). Although the gold foil is missing, Kopaka (1984, 7) thinks it likely that gold foil originally covered the leaf bezel. She bases this on the fact that it explains why the casting defects were not eliminated and why the figured engraving on the lead bezel has so little detail. She also points to this frequent practice in later post-palatial rings (1984, 7, fn. 17). Although its lead casting construction makes it an atypical Type VII ring, as it also has some elements of Type I, rivets still would have been necessary to hold the gold foil in place. Such bimetallism and riveting are important features of Type VII rings. The Anesmopilia ring (BA.50), however, suggests that Type VII arrived on the mainland in fully developed form from Crete.

Also notable with the Anesmopilia ring is that its MM III date makes it one of the earliest examples of an ellipsoid bezel ring.[12] Metal signet rings began to be produced in Crete in the late MM II with large round bezels: a silver ring from Tomb III at Mochlos, two rings, one of bronze and one of silver, come from the funerary cave at Gerontomouri in Lasithi, a gold ring from Mavrospelio, and a lead ring from Sphoungaras. Sealings from

[12] Note that Evely (2000, 2:398) dates the ring to the MM II/III.

Phaistos and Ayia Triada demonstrate the use of such rings in administrative contexts. Early examples of ellipsoid bezels include the undecorated MM II rings from a tholos at Platanos and tombs at Mochlos, a copper signet ring from the upper burial level in Tholos E at Archanes, and a soft stone bezel from of a signet ring from an unknown context dating to the MM III (CMS V,8 353). Round and ellipsoid bezels coexisted between the MM IIB and LM I, but round or nearly round bezels were increasingly favoured until the LH I, when ellipsoid became the preferred fashion (Pini 2010, 15). The new bezel shape was facilitated by the introduction of the Type IV ring identified by Younger (1984) and Vassilikou (2000) on Crete in the MM III at Mochlos and Isopata. These rings are made of four gold pieces soldered together into a hollow ring.[13] From the LH I onwards, their popularity increased so much that Müller (2003, 476) suggests that they represent at least 50% of all published gold rings.

While Type VII and IV rings (Fig. 24) are separate construction classes, they do share several similar construction techniques: both are made of four pieces, two for each bezel and hoop, both have single metal piece concave finger-beds, and the hoop is inserted between the outer bezel plate and the finger-bed. Although Higgins (1980, 84), Younger (1984, 85), and Evely (2000, 2:430) report that the bezels of Type IV were filled with magnetite sand, green powder, or a dark powdery substance of refractory clay or earth, Papasavvas (2008, 177) argues that the sand is mistaken for an oxidised bronze core. Therefore, Type IV rings tend to be incorrectly referred to as hollow rings but, in fact, like most Type VII rings, they also contained a solid metal core that the gold foil bezel sheets were attached to. This core was necessary to provide a solid support for the gold sheets so

[13] Müller (2003, 476, fn. 13) comments that Younger's (1984) term 'four piece ring' is inaccurate.

that the bezel could function as a seal when pressed against a clay or wax surface (Papasavvas 2008, 176). This metal core strategy was adopted for the gold-plated bezel Type VI rings, which have a construction style between Types IV and VII. Type VI rings have a layer of gold leaf folded over the edges of the flat bronze bezel core. The bezel is set into a tub-like gold cup without rivets and the ends of the hoops are inserted into the tub slots. Like Types IV and VII, Type VI rings are made of four pieces. Although examples of this ring type are fewer, Younger (1984, 87) puts their origins in the LM III, making Type VI rings contemporary with the others. What is important to notice is that most of the construction differences between Types VI and VII reflect the needs of their materials: gold components can be soldered, whereas the riveting of gold to bronze or iron is necessary because soldering two different metals is technically impossible (Müller 2003, 478). The date of the Anesmoplia Type VII (BA.50) ring and the similarities in construction style with other Cretan types mean that Type VII rings are not, as was once thought, derivatives of Type IV rings, but that Types IV, VI and VII developed contemporaneously on Crete before being exported to the mainland.

The combination of iron and silver in ring BA.50 is also present in the LH IIB Aidonia treasure ring BA.120. As they are the only two from the iron ring corpus constructed like this, could there be a relationship between these two rings? Could the Aidonia ring have been made in Crete and exported to the Argolid? In the Aidonia ring (BA.120), the edges of the silver hoop are rolled over in order to hold a sheet of highly oxidised iron which covers the trapezoidal surface of the hoop. The oval bezel was secured to each end of the hoop by means of a small nail. The silver sheet on the back side of the bezel is attached to the interior side of the hoop (Kaza-Papageorgiou 1996, 51, no. 20). What is not apparent from the published description, but is from the accompanying photo, is that the hoop edges curl

over the upper surface of iron sheet. Clearly, the iron sheet is the lower one of the two bezel sheets. The bezel would have originally had a domed covering plate, whether of gold foil or another material, to hide the hoop ends. This construction differs from that of the Anesmopilia ring (BA.50). Whereas with the Aidonia ring the hoop edges are visible, the x-ray image clearly shows that the silver hoop edges of the Anesmopilia ring insert into the iron bezel. It is entirely possible that a gold foil sat on top of the iron bezel core, but we cannot be certain.

The Anesmopilia ring follows the general construction guidelines of Type VII rings, but the construction of the Aidonia ring, interestingly, bears a closer resemblance to that of Type IV. Like Type IV rings, the lower iron bezel plate had a separate piece of the silver sheet attached on its back side to make the finger bed. In Type VII rings, the finger bed is a single piece with the covering of the inner side of the hoop. And, like Type VI rings with a hoop of thick gold sheet, so the hoop of the Aidonia ring was of a thick silver sheet. Considering the thickness of the silver hoop, there would have been ample space between the missing upper and preserved lower bezel sheets to fill with a sandy substance. The material requirements of the ring, of course, meant that the hoop was riveted rather than soldered to the bezel. Since the first seal workshops were established on the mainland in the LH II (ca. 1450 BCE) (Vassilikou 2000, 10), and taking into consideration the popularity of Type IV rings after the LH I, it is possible that the Aidonia ring is an a experimental specimen from a local workshop testing the application of the construction techniques on alternative materials.

3.4.2 Bimetallism and Polymetallism in Aegean Bronze Age signet rings

Compared to the 300-plus known gold signet rings (Pini 2010, 64), the number of bimetallic rings is relatively small. Nevertheless, their numbers increase in the later BA, and by the LH IIIA it is more appropriate to refer to Type VIII rings as polymetallic rather than bimetallic because of the use of three and four metals on the same ring.[14] Within the group, the number of rings using iron as a component make up a distinctive proportion that may well rival the number using silver.[15] Considering the general rarity and presumed expense involved with ironworking in this period, the use of iron, particularly when paired with other metals, garners a great deal of scholarly attention. One of the key features of Stage 2 in Snodgrass' Three Stages iron adoption model was the appearance of bimetallic objects in the 12th century. The archetypal objects for this are the bimetallic single-edge knives that appear primarily in Cyprus but are found elsewhere in the eastern Mediterranean. In this case, bimetallism is interpreted as a sign of a great deal of experimentation and a new attitude towards the use of iron because it marks a transitional stage from full bronze working, a period when smiths were either reluctant or unable to work fully with iron, to full ironworking. From this perspective, the polymetallic rings in Table 3 represent an important step for the adoption of iron in the Aegean, which begins well before the end of the BA.

Waldbaum (1982, 326–329), however, criticises what she considers the overstated significance of bimetallism in the Cypriot knives, pointing out that the practice of iron bimetallism is a long-standing tradition in the BA Near East, in many cases because the contrast of colours and textures in multiple metals on an object achieved a desired

[14] For this reason, I prefer the term polymetallism.
[15] Silver was another rare material in LBA tombs despite mining activity at Laurion in Attica (Kelder 2016).

aesthetic appeal. This sentiment may well have been the case with the earliest silver-iron rings. The silver hoop-iron bezel combination begins on Crete at least in the MM III, and then moves to Aidonia in the Argolid in the LH IIB (BA.50, 120). Precedence for this kind of artistic transfer already exists in other minor arts, particularly in Laconia and Messenia where contact with Crete was the earliest (Vassilikou 2000, 40). With the hoop missing from the LH I Kakovatos-Pylos ring (BA.70) we cannot be certain that it was silver, but the fact that the bezel is fully of iron like rings BA.50 and BA.120, and that its 3.3 cm-long bezel is comparable to the 3 cm-long one on BA.120, suggests that these three rings exist within a similar construction tradition. The silver-iron practice passes briefly into the LH III at Mycenae, where LH IIIA-B ring BA.180 from Chamber Tomb 68 reverses the pattern, having an iron hoop and a silver bezel (Fig. 29). The combination of silver and iron is, in some ways, surprising, as they both have a similarly shiny and silvery metallic appearance and are prone to corrosion. Silver is not commonly combined with other metals in rings, including gold ones. With the iron, if the finger rings are any indicator, wearing worked iron had a certain aesthetic appeal. The extra weight that iron added to the ring may have also been desirable. Silver combined with iron falls out of favour in later rings for combinations with bronze, copper, and lead. The exception is the LH IIIA Dendra I ring (BA.150, Fig. 30), but here the construction diverges from an aesthetic function as the silver is a sheet on the lowest part of the bezel that likely acted as the finger-bed and thus would not be visible when worn. The silver finger-bed attached to a lead core is covered on top by an iron sheet. Like Mycenaean ring BA.180, the Dendra BA.150 hoop is of iron.

Waldbaum (1982, 328–329) argues that iron riveting on the Cypriot knives was not the result of the technical limitations of the smiths, but rather it demonstrates a high level of accomplishment, and the choice of bronze rivets might have more to do with the fact

that they run less risk of damaging the organic material handles. Bronze rivets might also have afforded a smith the opportunity to demonstrate his skill in combining metals. The latter option may also apply to the Aegean rings. As mentioned previously, riveting was a necessity when combining metals due to the technical problems of soldering different metals. In many cases, we cannot tell the original material of the rivets. Being so small, the original material of the rivets is the first to corrode, leaving only the rivet holes observable. Nevertheless, polymetallic rings were a rare opportunity for BA jewellers to demonstrate one of the sophisticated techniques that existed in their ring construction repertoire. Scholars have often remarked on the high technical level employed to solder joints so perfectly that the rings appear to be solid (e.g. Xénaki-Sakellariou 1989, 326; Evely 2000, 2:429–430; Vassilikou 2000, 16; Papasavvas 2008, 176). The craftsmen were equally skilled at minimising the visibility of riveted joins. An LH II-IIIA ring from Asine (BB.3, Table 4) demonstrates the great lengths taken to conceal the rivets by placing them in discreet locations on the gold top plate and on the reverse of the bronze bezel core to secure both pieces together (Fig. 31). Such technical practices demonstrate a prioritisation of the aesthetic principles of seamlessness and consistency, perhaps with the aim of making the rings look as though they were made of pure gold.

3.4.3 Bi-bezel plate rings

There is a small but distinctive subset of the polymetallic category using iron which I term bi-bezel rings. These sheet rings have a Type VII construction, but the upper side of the bezel core is plated in two sections by precious metal foil sheets so that the scene is divided horizontally (Higgins 1980, 84) (Fig. 32). Table 4 lists the few examples of such rings, most of which belong to the LH II-IIIA. Clay impressions made by bi-bezel rings from LM IB

Knossos (BB.1) and LH III B2-C1 Pylos (BB.5) extend the range on either side (Blegen 1958, 180, pl. 42, fig. 20; Gill 1965, 91, 1974) (Fig. 33). Bi-bezel ring sealings leave a distinctive horizontal line on the clay impressions, and a bezel rivet is visible on impression BB.5. Interestingly, on all bi-bezel examples, half of the bezel foil sheets are missing. Traditionally, it was thought that the missing half was also made of gold. For example, Savignoni (1904, 593, fig. 55) suggested that the iron mass on the Phaistos ring bezel (BA.140, Fig. 34) was an iron plate that sat between the bronze bezel core and the gold foil overlay, and that it was so corroded it caused the foil on one side to detach. Müller (1909, 275), however, draws attention to the fact that the break on this ring, as well as the others, is so even and clean that we should not assume that the other half of the bezel was gold. Although Boardman (2001, 56) flirts with the idea that the bezel overlay was designed to be detachable, perhaps to be kept by a relative upon interment of the deceased, he favours Müller's idea that the black metallic masses on the upper bezel plates of the Phaistos ring BA.140 and Mycenae ring BA.190 (Fig. 35) are the remains of a corroded silver overlay.

X-ray fluorescence analysis by Müller (2003, 477–78, pl. CIf), however, confirmed that the iron mass in ring BA.140 was not a layer between the bezel and overlay, and that it does not extend under the remaining gold foil. He also determined that iron, not silver, was the material of the foil overlay. Analysis also revealed that this was the same for ring BA.190. It seems, then, that the missing half of the row of figure-of-eight shields and floral motifs on BA.140, and that the upper half of the recumbent bulls on BA.190, were once chiselled or hammered into the iron sheet. In fact, a faint impression of the original upper portion of both bulls is visible on the seal impression of BA.190 (Fig. 35, upper right). Krzyszkowska (2005, 200) is sceptical that these flimsy bezel sheets were robust enough for sealing, but the clay impressions on BB.1 and BB.5 suggest that some were. Müller also

found that the hoop cores of both rings, as well as BB.3, were bronze, covered on the interior by a gold sheet that also formed the finger-bed, and on the exterior by sheets of gold and iron on each half of the hoop. The iron sheet is missing on all rings, but the gold sheets have a clean edge where the iron sheet would have attached. Rivet holes in the hoops of BA.140 and BB.3 are visible (Figs. 31, 34). Boardman (2001, 56) suspects that the Dendra rings (BA.156, 160) also had this type of construction, which is supported by Varoufakis' (1981, 29) analysis of the Dendra ring III (BB.6, Table 5) which had traces of a silver overlay on the lead bezel. No trace of iron, however, was detected.

Separate iron sheets were not the only way to achieve a bi-bezel. Several rings suggest a structural variation that uses the core rather than an attached overlay sheet to represent the other half of the figured decoration. For instance, Mycenae ring BB.4 is an unusual example of a ring with a silver bezel core (Fig. 32c). Overlaid on half the bezel is a gold foil depicting three women in procession with a clean, scalloped pattern horizontal edge in the middle of the bezel. To cover the other half with another sheet obscures the precious metal, and if the other overlay was silver, then its use is redundant. Instead, the other half of the intaglio scene was possibly directly cut or chiselled into the bezel surface, which would explain that the usual base metals like lead or bronze were rejected for this bezel core. For an example of this method see the LM I ring from Hogarth's House A debris at Knossos (BB.7, Fig. 36). This structure might also apply to the Asine rings (BB.2, 3) where the bezel core was bronze and the half bezel foil with decorated with bull leaping scenes. Although bronze is usually reserved for bezel cores, it does play a decorative role on some signet rings and has a malleable quality that makes it easy to cast, hammer, chisel, and punch like gold and silver.

The ability to etch the iron overlay sheets with figurative designs raises the possibility that the Anesmopilia, Kakovatos-Pylos, and Aidonia bezels (BA.50, 70, 120) did not necessarily have a gold foil overlay for decoration, which is usually assumed.[16] Instead, their iron bezels could have been chiselled or punched, as with ring BB.7.[17] In this case, their construction is closer to that of Type II rather than Type VII rings: two pieces of metal with the bezel secured to the hoop by rivets through the hoop's flattened ends (Younger 1984, 84) (Fig. 24). These construction features represent the first of two phases of iron use in Aegean rings. In the first phase, iron was used structurally as well as aesthetically for the iron bezel and combined with a silver hoop. Unfortunately, the hoop of BA.70 is missing, but we cannot help but wonder if it too was silver. The second phase begins in the LH/LM II with the Phaistos signet (BA.140) and Vapheio finger rings (BA.100). Iron assumes a purely aesthetic role as a decorative overlay on the bezel and some hoop. On the finger rings and some signet rings, the structural-aesthetic use of iron moves to the hoops. This transition indicates several technical changes in the forging operations that Aegean jewellers applied to iron. First, the drawing-down operations required for the thinness of the bezel overlay sheets would have been more difficult to achieve than the thicker bezel plates. An increase in riveting was necessary to attach the sheets. Second, the hoops of the rings required the first application of bending and rolling operations in the Aegean.

[16] The Kakovatos-Pylos ring BA.70. The first to publish the ring, Müller (1909, 275), does not report any gold overlay on the ring, neither does Montelius (1924, 199, fig. 687), nor the last person to analyse the ring, Varoufakis (1981, 25, 1982, 315). Nevertheless, between the publications several authors have described the bezel as being 'partly overlaid with gold' (Lorimer 1950, 111, no. 3), 'gold-bound' (Iakovidis 1970, 295), 'set in gold' (Buchholz and Karageorghis 1973, 27), and 'the whole overlaid with gold' (Waldbaum 1978, 28). Although photographs of the bezel are not of great quality (Fig. 27), no gold seems to be visible. Presumably it was assumed that bezel once had a gold overlay, and this made its way into descriptions.

[17] There is also the possibility that these rings were undecorated, like the MM II ellipsoid bezel rings from a tholos tomb at Platanos and tombs at Mochlos (Pini 2010, 15).

The introduction of iron rings corresponds with the height of signet ring popularity in Neo-Palatial Crete as they spread with palace life and the administration on Crete (Vassilikou 2000, 56). This expansion resulted in a wide range of quality, with numerous poor-quality seals with simple designs or crude pictorial motifs produced alongside carefully worked examples, reflecting a wide range of owners on the social spectrum (Krzyszkowska 2005, 154). Perhaps it is unsurprising, then, that in this atmosphere of technical experimentation a new metal should appear in signet rings. Around 1400 BCE, the transition from the LC II to LC III takes place in signet ring use in Minoan palace administration, but increases in the Mycenaean world (Vassilikou 2000, 56). The geographic distribution of the Phase 2 rings follows this transfer to the mainland, particularly in the LH II and III (Vassilikou 2000, 56–57), with the first appearing at Phaistos (BA.140) around the same times as Mycenae (BA.190). The construction of these two rings was so similar that Müller (2003, fn. 23) suggests that they came from the same workshop. Both have the same, almost exact 2.4 cm x 1.6/1.62 cm bezel size. The earliest iron finger rings appear in the Argolid in the LH II. From this point onwards, all iron rings in the Aegean are from Mycenaean contexts. With the establishment of mainland workshops around 1450 BCE, Mycenaean jewellers experimented with form and developed their own iron rings according to their repertoire and tastes. This second phase develops the bi-bezel type, which places greater emphasis on the aesthetic properties of iron in terms using it to create a colour contrast with the gold. As Snodgrass emphasises, the Aegean rings indicate that polymetallism is indeed an important step in the development of ironworking, but I would argue that it happens much earlier than the 12th century.

3.4.4 Iron rings and ironworking practices

Although the typology of the rings does not indicate if smelting took place in the Aegean, it does demonstrate that local workmanship took place in the forging operations. To create a finished product, an iron billet or bloom required a series of hot forming and shaping operations (Pleiner 2006, 53–64), several of which were applied to the Aegean items. For example, upsetting was applied to the nails, drawing down, pointing, and sharpening to the drill point, drawing-down to the bezel plates to thin and widen them, and bending and rolling to the ring hoops and bracelets. Planishing to smooth the surfaces would have been applied to all objects, particularly the jewellery in order to achieve a lustrous or polished look. To perform these operations, the smith had to pay careful attention to the heating and cooling processes.

The metallurgical sophistication required for these operations tends to be overshadowed by developments in the heat treatment of iron. Heat treatments apply heat to alter the crystalline structure of the metal to manipulate its properties. According to Snodgrass' model, the development of these techniques was a pivotal point in the development of ironworking because they suggest a more sophisticated level of knowledge and confidence in working iron. They are, therefore, a defining feature of Snodgrass' Stage 2. The relevant heat treatments include carburising, quenching, tempering, and annealing and which, together, increase material hardness, ductility, and malleability in addition to reducing brittleness. The earliest evidence for their consistent application is in 12th century Cyprus (Tholander 1971; Maddin 1982; Stech et. al. 1985; 1986; Lang 1989, 19). These techniques receive a great deal of attention, arguably at the expense of the range of hot forming and shaping operations that already existed in the BA.

The importance of BA forging operations, however, should not be overlooked; as they differ from techniques for bronzeworking, they had to be experimented with, learnt, and transferred to the next generation within the workshop context. The signet rings and the Dendra pendant demonstrate that such knowledge existed in some Aegean workshops, and the possibility that ring nos. 11 and 12 came from the same workshop suggests some control and reliability in the forging of iron. Interestingly, when Cyprus begins to produce iron in the 12th century, the repertoire is limited almost entirely to bladed implements, knives, daggers, and swords, whereas the Aegean continues to produce its diverse range of items, which require a wider range of forging techniques than the Cypriot items. This will be discussed further in the following chapters.

3.4.5 Magical rings

An alternative explanation for combining iron with other metals in rings that persistently appears in the literature relies on so-called magical properties attributed to iron. In BA contexts, archaeologists rarely attribute iron finger rings with magical powers, but instead find profound meaning in the polymetallic practice. Of the three rings from Dendra (nos. 15, 16, 24), Persson (1931, 56) thought that "the union of four metals in the same object is striking and one is forced to ask whether some magical power in them is not already intimated." He suggested that the magic came from the minor electrical currents created by the combination of copper, iron and lead. A similar suggestion has been made for the Phaistos ring, but in both cases it is dubious whether a galvanic effect would have been noticeable to the ring wearer (Evely 2000, 2:398; Boardman 2001, 56). Other authors are less specific with their reasons for attributing magical properties to the rings (e.g. Higgins 1980, 42; Sakellarakes 1997, 651).

One idea popular in the late 19th and early 20th centuries linked the magical properties of iron to its celestial origins from meteorites. Such a relationship is questionable not least because of the problems that arise when identifying iron made from meteorites in ancient texts. Previous scholars have presumed that any connection between iron being from heaven or the sky must be a reference to meteoritic iron. Sayce (1928, 226) and several others (e.g. Przeworski 1939, 140; Garelli 1963, 272, 284; Forbes 1964, XI:248; Landsberger 1965, 294, n. 25) argued that the Sumerogram KÙ.AN was one such term for "metal from heaven/god"; as Bjorkman (1973, 114) points out, however, AN and BAR each have a vast array of meanings, and when referring to metals it likely refers to tin. Although the Hittite term AN.BAR GE_6 translates literally as "black iron", it is thought to be the term for meteoritic iron because of a passage that says "they brought black iron of the sky from the sky" (Siegelová 1984, 159–60; Košak 1986, 125: KBo 4.1 I 39 w., duplicate KUB 9.33 obv. 15), even though similar epithets referring to iron and the sky are formed using the usual term for smelted iron, AN.BAR. This term, however, is a late development in Neo-Hittite texts, introduced after AN.BAR stood for smelted iron since Old Script, so Košak (1986, 126) unconvincingly suggests that AN.BAR originally meant meteoritic iron. Sayce (1928, 227) suggested that "black iron" instead might refer to hematite, which is not unreasonable considering our inability today to distinguish between hematite and iron without chemical analysis. Similarly in Egypt, the term *bỉ3-nỉ-pt*, "iron from the sky", replaced the common term for iron *bỉ3*, well after smelted iron was known in the 19th Dynasty (ca. 1320 BCE) (Wainwright 1932, 15; Harris 1961, 59).

One reason why the link between iron and magic persists comes from attempts to draw parallels between the methods and attitudes of modern African ironworking with the formative practices of the BA (e.g. Frazer 1927, 2:225–36; Forbes 1950, 378–79, 1967;

Rowlands 1971; Alexander 1983, 30; Herbert 1993; Gell 2008). Ethnographic research in the early 20th century indicated that, in many parts of Africa, ironworkers were attributed with occult powers, and were either shunned or were the centre of initiation rituals because their ability to transform ore to iron was the ideal metaphor for such rituals (Killick 2007, 595). This includes the African association of magic, taboos and secrecy with iron and the smith. As Blakely (2006) compellingly demonstrates in *Myth, Ritual, and Metallurgy in Ancient Greece and Recent Africa,* however, there are significant differences between the Greek and African data that render them poor analogies. Comparisons in recent years, however, are more productive when the focus is on understanding the production processes and the factors influencing the decision-making process in production rather than on cultural perceptions of iron (e.g. Friede and Steel 1986; Kiriama 1987; Chirikure and Rehren 2004; Chirikure 2006; Rehren et al. 2007).

Based on this discussion, one might be led to believe that iron never had any magical association. This simply would not be true. Iron is involved in a foundation ritual for building a new house or one being rebuilt after being destroyed (Goetze 1955, 356; KBo 4.1 obv., duplicates: KUB 2.2; KUB 9.33). Aside from an apotropaic, iron is part of a purification element in a ritual designed for the Removal of the Threat Implied in an Evil Omen (Goetze 1955, 355; KUB 9.13, KUB 24.5). Nevertheless, these texts need to be placed in perspective. Extensive work on Hittite cuneiform texts by Siegelová (e.g. 1984, 1993; 2001; 2005) indicates that the use of iron in these ritual contexts is rare and that, instead, it was more common to charge iron and other metals with ideological meaning relating to power, strength, and royal legitimacy. We must also bear in mind that, even in texts where iron does have a magical or ritual role, it is one of several metals and precious stones involved in the process along with gold, silver, copper bronze, jasper, lapis lazuli and several

others. Yet, we do not believe that, every time an item is made of gold or silver in the ancient world, it is magical. Other criteria are necessary to establish this connection, and such criteria should also be applied to iron. The element of context is important because the Hittite rituals indicate that iron, like gold and the other metals, whether precious or base, is made magical by the ritual, not by any kind of power that it inherently possesses. Rather, its properties, such as strength, will determine which role it plays within the ritual. This is not to deny that iron could have a magical component associated with it, but in the case of the polymetallic rings their potential magical quality must be based on the Aegean context, and not links to foreign rituals, nor later Greek analogies such as the magical iron rings from Hellenistic Samothrace (Blakely 2011).

3.4.6 Iron rings in the international context

This discussion on the bezel rings emphasised two points. First, that rings were made locally by craftsmen versed in Minoan-Mycenaean traditions, and second, that their smithing techniques required more sophistication and learning than is usually credited to Aegean LBA smiths. To close this discussion on the bezel rings, I want to shift focus to the wider eastern Mediterranean iron context when addressing why these rings, and other jewellery of local Mycenaean style such as the Dendra pendant, had iron in them. It is easy to appeal to iron's scarcity and exoticness as a prestige item, but the motivations were likely more complicated than that. Pare (2018) identifies a Near Eastern 'ring horizon', which starts in the 13th century with the rise of iron ring jewellery, such as bimetallic finger rings, bracelets, and anklets throughout Mesopotamia to the coasts of Syria and the southern Levant into the Negev. They become more widespread in the 12th and 11th centuries. The propensity for iron jewellery in the Levantine 'ring horizon', and its absence

in the Aegean world, means that the iron bracelets from the LH IIIB and IIIC chamber tombs on Rhodes signal that the island's entry into ironworking came under the sphere of the east rather than the Aegean (Maiuri 1923, 127; 1926, 45; Jacopi 1930, 284, fig. 26).

To the 'ring horizon' geography I would add the Mycenaean world. The iron jewellery found in the elite tombs of the Peloponnese contributes to what Feldman (2002; 2006a, 26; 2006b) identified as the 'international style'; that is, a shared visual language on easily exchanged items that helped to create an elite identity which transcended cultural boundaries and bound the group together. It acted as a key tool in the formation of relationships between elite members of different states and as a marker of one's membership in the international elite. Many Mycenaean bezel rings include key motifs drawn from this Near Eastern-based style, such as images of the Master of Animals and heraldic Griffins (Aruz 2008, 138–39, fig. 77; Papazoglu-Manioudaki 2008, 277–78, fig. 173). Possession of objects with motifs that formed this visual language facilitated membership into this international community, so the use of iron for rings, bracelets, and pendants by the Mycenaean elite signal another aspect of their membership into the club of 'brotherhood' with other Great Kings (Feldman 2006a, 39).

3.5 Functional and decorative iron

We do have a few items from this period that suggest that iron was not solely used for decorative or ornamental purposes, but at times served a functional use. We have the interesting case of the traces of iron found on the break of a lead plaque used to clamp the door jamb to the wall from an LH IIIA-B context in the palace at Gla (Ridder 1894, 293; Tsountas and Manatt 1897, 381). As the clamp was found *in situ* on the wall, it is unlikely that an iron piece contaminated the clamp. Was it applied as decoration to cover, or

functionally to mend the break? In the LB IIIB, we have the first tool in the Aegean, a drill point tip (BA.310) from a palatial jewellery workshop in the Kadmeia at Thebes (Symeonoglou 1973, 70, fig. 274.8) (Fig. 37). I suspect that iron by this period expanded beyond solely elite contexts and was likely used for non-ornamental items such as tools. Considering the ample amount of metalwork in tombs of this period, however, evidence for metalworking on the LBA Greek mainland is sparse, both in terms of tools finds in burial contexts (Brysbaert and Vetters 2010, 26) and the lack of production sites (Blackwell 2011, 321–22).

The final thought before closing the chapter focuses on the development of ironworking in the BA Aegean, I want to address two iron nails found in the BA Aegean. The earliest iron item from the Greek mainland is a heavily corroded nail found amongst the pebble fill of an undisturbed MH II cist grave at Asine (Dietz 1980, 2:30, 84, fig.59). The nail was likely hammered into some sort of furniture or architectural feature where it would not be visible, perhaps in a way reminiscent of the nails in the ivory box from Acemhöyük dated ca. 1900 BCE (AN.440, Fig. 7). The second iron nail has an ornamental head of a gold Mycenaean rosette found in a LM I-II context by Evans (1899, 66) at Knossos. The nail likely attached the rosette to a piece of wooden furniture such as a footstool, chest, chair, or coffin. We know from the elaborately decorated furniture listed in the Pylos tablets (Ventris and Chadwick 1973, 338 345), and from wooden furniture found at wealthy cemeteries in Knossos, in the Shaft Graves of Mycenae, and in chamber tombs at Archanes, Dendra, Midea, Mycenae, and Prosymna, that Mycenaean furniture included gold inlays and appliqués of embossed floral motifs (Krzyszkowska 1996; Sakellarakes 1996). For an example, see the rosettes attached to the well-preserved gold larnax from the 4th century

tomb of Philip II at Vergina (Fig. 38). Alternatively, the rosette may have been affixed to wooden structural beams as part of the architectural décor.

These nails raise questions about the validity of a decorative/utilitarian divide that is key to Snodgrass' transition from Stages 1 to 2. In both cases, although the iron nails serve a purely functional use, in other works they act as a tool, and it is difficult to determine if iron was chosen for its practicality or if the material was added to the value of the item to which it was attached. Certainly, they would no longer be visible once hammered into furniture. Is visibility a requirement for ornamental use? If the iron bezel rings discussed above were originally overlaid with gold, then is the iron core functional rather than decorative? Was iron chosen in these cases because of its intrinsic, functional, or aesthetic values? Items such as these blur the lines between ornamental/decorative and functional/utilitarian uses of iron in the LBA Aegean.

3.6 A model for Aegean Bronze Age ironworking

3.6.1 Phase 1

If ironworking took place in the BA Aegean, then how did it develop? In the first phase, the place to look is Crete. Apart from a nail from MH II Asine, the find locations of the earliest iron material are on Crete in the 18th to 16th centuries BCE, at sites not far from Knossos. This is unsurprising considering the close metallurgical connection between Crete and Anatolia, the only definitive place where iron smelting took place in the Near East until the LBA. Since the EBA II (2800-2500 BCE), the islands of the east Aegean, the Cyclades, and mainland Greece were culturally connected to western Anatolia via the Anatolian Trade Network (Şahoğlu 2005), which is demonstrated by the standardisation of tool and weapon forms throughout the regions (Yakar 1985, 38). Although the Aegean utilised local

copper sources at Laurion, western Crete, and the Cyclades, they also relied on sources from the Balkans and Anatolia throughout the EBA (Stos-Gale 2016). It was from Anatolia that the practice of tinning bronzes passed to the Aegean islands, where it replaced arsenic-bronzes. The tin and copper moved via the newly established northern tin route that passed through western and central Anatolia onto Iran (Oy 2017, 15, 17). The third millennium metallurgical experiments from Poros Katsambas and Chrysokamino on Crete (Betancourt 2006; Pryce et al. 2007), as well as copper slag finds from the islands of Seriphos and Keos (Stos and Gale 2006; Georgakopoulou et al. 2010), indicate that the Aegean was not simply a recipient of metallurgical knowledge, but that it also participated in techniques and practices taking place throughout the Near East in EBA-MBA periods.

In the MBA, that the connection to Anatolia strengthens with the Minoan quest for metals. Niemeier (2000, 132) identifies Miletus on the Asia Minor coast as a major junction in the metals trade between Anatolia and the eastern Aegean based on abundant evidence of trade with Minoans, starting in period III and growing significantly in period IV in the form MM IB-III/LM IA wares (Raymond et al. 2016). We have MM pottery in MBA I-II contexts at Hazor, Ugarit, Qatna, Hama, Byblos, Beirut, and Karmi, as well as references in Mari texts to Cretan goods that indicate an active trade connection to Crete. It is significant that this corresponds to the period when the Kültepe-Kaneš merchant records and iron finds from Kaman-Kalehöyük, Kültepe, Acemhöyük, Alişar Hüyük, and Troia indicate that smelted iron was circulating around central and western Anatolia (Chapter 2). Although we lack direct textual and material evidence of trade between central Anatolia and Crete (Raymond 2005, 173–74), I agree with Niemeier (2000, 133) in that the metals trade certainly included the transfer of new technologies and ideas from Anatolia into the Aegean. Certainly, we see a strong MBA metalworking influence from Anatolia in the tools

found on Crete (Blackwell 2011, 332). Whether the Minoans smelted their own local sources of iron remains uncertain. It is a matter of debate whether the high phosphorus content of north-western Cretan ore would have made iron too brittle, or produced products with a desirable hardness (Varoufakis 1982, 318, 1989, 281; Muhly 2008, 69; Kalpaxis et al. 2006, 168). Nevertheless, it is entirely possible that the earliest iron came to Crete as finished products, or as a bloom of *amūtu* like we see in the Kültepe-Kaneš texts.

3.6.2 Phase 2

In the second phase of ironworking in the BA Aegean, we turn to the Mycenaean world. From the 15th century onwards, the Mycenaeans of the Peloponnese adapted many Minoan craft and artistic skills, iron smithing being one of them. This is what the series of iron rings indicates. The earliest bezel ring of iron comes from a 16th century sanctuary context at Anesmopilia on Crete, followed by a series dated from the 15th to 13th centuries centred on the Peloponnese. The earliest jewellery on the mainland comes from sites in Elis, Messenia, and Laconia, regions which Vassilikou (2000, 40) notes were the earliest to demonstrate craft influence from Cretan culture. Other forms favoured for iron included pendants, bracelets, and simple finger rings. Undoubtedly, iron was a lucrative metal in this period, so while its application to jewellery was influenced by the visual language of the Great King elite, some of the specific media chosen, like bezel rings and the Dendra pendant, were based on local means of representing prestige through objects shared by Minoans and Mycenaeans (Kilian-Dirlmeier 1988, 165). Did such jewellery and rings take part in the international elite gift exchanges?

While the bezel rings confirm Minoan-Mycenaean smithing aptitude, they do not confirm the presence of smelting practices. There is the possibility that they imported iron

stock bars like the ones from 14th century Büyükkale levels IVb/III at Hattušaš (Boehmer 1972, 137, pl. XLIII). The Mycenaeans significantly increased trade relations over the Minoans with western Anatolia in the LBA, indicated by the spread of their pottery spread throughout the Asia Minor coast and the mention of Mycenaean territory of Ahhiyawa in Hittite texts (Cline 1991; Mountjoy 1998; Kelder 2004, 2013). At Miletus in period V-VI, they seemed to have taken over the relationship from the Minoans (Raymond et al. 2016, 67ff). Interestingly, there is little evidence for direct contact between the Hittite and Mycenaean world (Dickinson 2006, 29; McMillan 2016, 6, 10). Nevertheless, iron may have come from networks across western Anatolia. The close relationship with Troy is one possibility (Becks 2003; Pavuk 2005).

3.6.3 Phase 3

During the 13th century, two changes take place in Mycenaean iron production. The first change pertains to smelting practices. Based on Varoufakis' (1982, 316) metallographic analyses of BA iron objects, Evely (2000, 2:398) argued for two phases of production. The first phase used laterite ores that provided the high nickel (1.5-10.5%) and cobalt contents in small jewellery. From the 13th century into the 12th, new ores were smelted for larger objects, like knives, that produced lower nickel content (<0.046%). This change, however, might also reflect improved smelting techniques rather than new ore sources. Today, we know that to produce the desirable nickel-rich iron (ferronickel alloy), we must utilise fluxes, such as silica, carbon restriction, and/or mechanical techniques to retard the reduction of iron oxide to metallic iron in the smelter.[18] Nickel oxides reduces more readily

[18] Ferronickel today is a desirable alloy for stainless and heat resistant steels. The addition of nickel increases corrosion resistance and high temperature strength of modern steels. There is an international community of researchers aiming to improve the nickel content of low-quality laterite ores worldwide!

than iron oxide; therefore, slowing the iron reduction process so that it only partially reduces means that, rather than having nickel join the forming slag, the reduced nickel and some iron can bind, creating a nickel-rich iron alloy (Cao et al. 2016, 15).

I can see a situation where, in experiments with smelting furnaces, a similar scenario was inadvertently reproduced with Greek lateritic ores. Reducing conditions are hindered if not enough carbon in the form of charcoal is added to the charge. The carbon monoxide (CO) produced removes oxygen from the ore and the surrounding environment. Higher temperatures make the CO more effective and efficient at producing the reducing environment. A furnace with too little CO or is not hot enough, might lead to a partial smelt situation where the nickel and only some of the iron oxide reduce initially and form an alloy that puddles in the lowest, hottest part of the furnace where it expels further impurities. The result is a nickel-rich iron bloom removed from the furnace for refining. Greene (1956) filed a patent in 1951 outlining how to purposefully achieve this exact result. He used a silica flux to create only a partial reduction of iron oxide. Silica in the form of sand is a common flux in copper smelting when the gangue is high in iron content (Tylecote et al. 1977, 306; Craddock and Meeks 1987, 191; Tylecote 1992, 9). Stos-Gale (2016) has persuasively argued for the smelting of Aegean copper ore sources in the BA. Could early iron smelters, who were versed first in copper smelting, have initially developed a method using a silica flux, thereby achieving partial reduction of nickel-rich iron oxide?

The decrease of nickel in iron objects from the 13th century onwards may be a result of the use of alternative fluxes that achieved a better smelt. Alternatively, it might reflect the increased temperatures that LBA smelters could achieve, which would have improved reduction efficiency (van der Merwe and Avery 1982, 142; Craddock and Meeks 1987, 192; Knapp and Kassianidou 2008, 144; Veldhuijzen 2009). I suspect that the improved

insulating materials and addition of tuyères to raise temperatures in LBA copper furnaces throughout the eastern Mediterranean would have also been applied to iron smelters. Although nickel is desirable in modern steels, it would have made ancient wrought iron blooms resistant to deformation when refining and smithing (Tholander and Blomgren 1991, 104). So much, then, for changing nickel contents.

The second notable 13th century change in Aegean ironworking is the application of iron to objects other than jewellery. LH IIIB Thebes reveals the earliest tool, a drill point, and two knives from tombs on Thasos with strong ties to Aegean trade networks, indicated by glass and amber beads, pottery, and bronze knives of Mycenaean types in the cemeteries (Koukoulē-Chrysanthakē 1992, 822). This trend gains momentum in the 12th century. We have tools such as a sickle blade tip from the Tiryns Treasure hoard (Iakovidis 1970, fig. 4; Buchholz and Karageorghis 1973, cat. 28), a grater from the forge room of the industrial quarter at Malthi (Valmin 1938, 372, 373, pl. 30.18), an arrowhead from the Lion Gate at Mycenae (Wace et al. 1921, 34). Knives and daggers of iron become widespread in LH IIIC contexts throughout the Aegean mainland in Attica, Crete, Messenia, and Achaea, and on the islands of Crete, Euboia, and the Cyclades. Swords and spearheads of iron appear in the following century, and production gains momentum in the PG. Although tools increase in the SM, finds are generally rare in subsequent periods. Bear in mind that these finds tend to reflect the integration of iron objects into funerary identities rather than daily use; yet, if Muhly (1992, 697) is correct in supposing that only a fraction of what was in circulation has survived, then grave finds reflect segments of production trends. Items that were better suited as social markers are likely overrepresented in tombs, hence why we have many more swords than tools, for example. Nevertheless, the trends outlined here suggest that the shift to producing weapons and tools in iron did not take place suddenly

with the onset of the 'Iron Age', but was a continuous development extending back to at least the 13th century, if not earlier. We know from hoard contexts that the Aegean tool kits of bronze standardised in the LBA (Blackwell 2011, 323); and, by the 13th century, we see them shift to iron, followed by three to four centuries of ramping up before consistent production (Chapter 4).

3.7 Conclusion

Based on the material discussed here, I suggest that ironworking in the Aegean BA is different than suggested by Snodgrass' Three Stages model. Key points are as follows:

1. Stage 1 does not refer exclusively to hammering meteoritic or terrestrial iron. Both sources are rare, and terrestrial iron deposits do not exist in the Aegean. Instead, BA discussions should emphasise a low-level familiarity with iron smelting on a local scale in certain locations such as the Aegean. The chemical analysis of the BA iron objects and potential links to local nickel-laterite iron ore sources makes this a distinctive possibility.

2. That the idea that bimetallism was a special feature of Stage 2 (12th century) needs to be revised (or eliminated). As the Aegean rings demonstrate, bimetallism and polymetallism including iron is already a feature of the BA (Stage 1) in some regions.

3. That the idea of a "partial awareness" of the utilitarian uses of iron is not the preserve of a 12th century Stage 2. It may be pushed back to at least the 14th and

13th centuries. The functionality of iron seen in the rings, as well as utilitarian uses of tools like nails, the drill point, knives, and possibly the door clamp mend in the Aegean BA, suggest a greater functional use than previously thought.

4. That not all iron objects were imported from the Near East. The group of Aegean rings and the Dendra pendant were locally constructed according to contemporary Minoan and Mycenaean bezel ring conventions and techniques. At the very least, some Aegean smiths acquired a basic knowledge of the forging operations of forming and shaping.

5. That at least one coherent class of object was produced in the LBA. The iron rings from the Aegean were produced with some regularity, and their deposition in elite tombs in northern Crete and the Peloponnese was not 'sporadic' but a regional elite practice that was linked to the Near East.

During the LBA, some Aegean smiths were able to produce iron objects for their elite, indicated by a series of bezel rings and other jewellery produced in the local tradition. While it may not constitute a full 'industry', it was also far from what Haarer (2001, 267) refers to as 'inconsequential experimentation'. Instead, the working of iron in the LBA Aegean should be viewed as part of the smiths' participation in, and active cultivation of, the Near Eastern elite 'international style'. The Aegean's earliest exposure to ironworking in the EBA-MBA likely came from Crete's craft connections to Anatolia, while in the LBA the 'ring horizon' drew Mycenaean Greece into the Levantine and Near Eastern sphere of iron influence.

Chapter 4. Ironworking in the Early Iron Age Aegean

This chapter investigates the development of the iron industry in the Aegean from the 'Collapse' of the BA palatial system in the late 13th century, through the Postpalatial period and to the end of the MPG, around 850 BCE. Although many forms of arts and crafts diminished or disappeared, ironworking continue despite the 'Collapse' and subsequently flourish. During these centuries, hundreds of iron objects have been excavated across a wide geographic range. Although most models present Aegean ironworking as having been introduced from abroad, the goal of this chapter is to develop a model for the growth of the iron industry in the Aegean that integrates the BA ironworking tradition discussed in Chapter 3. The aim is it to describe the industry based on unique local features of ironworking in the Aegean, rather than appealing to pan-Mediterranean trends in iron metallurgy to explain early iron use in the region. To this end, this chapter is divided into three sections. The first section develops a model for the growth of the Aegean iron industry based on the find contexts of the items and their relationship to the social and economic developments taking place in this period. The dataset of iron objects used in developing this model can be found in Table 6, and the typological links to preceding bronze forms in Table 7. The second and third sections focus on concepts of technology transfer and the role of craftsmen in the growth of the industry.

4.1 A model for Aegean Early Iron Age ironworking

According to Snodgrass' Three Stages model, BA ironworking is superfluous in the establishment of EIA iron industries, including that of the Aegean. One could argue that the techniques and sources utilized by the discreet iron industry that serviced the LBA elite in Crete and the Peloponnese were simply forgotten along with a range of other BA crafts

that dwindled in the Postpalatial period (Dickinson 2006a, 77, 115). In the 12th century, there is a notable reduction of contact between the Aegean and western Anatolian. At Troy VIIa, LH IIIA2-B wares decrease until they are completely absent in Troy VIIb (Becks 2003, 51–52; Pavuk 2005, 273–74). Contacts with other Near Eastern regions also diminished, so that, whatever resources that the east supplied to Mycenaean Greece, which might have included iron, would have been lost to the Aegean world (Dickinson 2006a, 56). Chirikure (2015, 30) notes that throughout history, we have many examples of seemingly advanced technologies that appear only to subsequently disappear because the cultural-specific filters that they pass through deem them unacceptable. This is apparent, to some degree, with the technical abilities to produce more complex items such as of bronze armour and silver wares (Andreyev 2013, 425). One key filter was the late 13th century collapse of the palace economy system to which much elite patronage and metalworking was associated. Nevertheless, I do not think that this is the case with ironworking. Instead, the find locations and types of objects produced suggest that the 12th and first half of the 11th centuries continued the trends that took root in 13th century ironworking (Chapter 3).

4.1.1 Phase 3

The location of most of the Postpalatial finds also indicates continuity in production. Most iron finds from LH IIIC and SMyc/Min levels concentrate on the Peloponnese and Crete, the central areas of Aegean BA iron production (Fig. 39). Malthi finds include knives, a dagger, a grater, and rivets or nails. Paralimni-Teichos Dymaion has knives, Tiryns two swords and a sickle, a sword from Palaiokastro Gortyna, a ring from Asine, and an

arrowhead and pin from Mycenae.[1] In Crete, knives were found in the Psychro Cave and an Upper Gypsades tomb, and a piece of iron from Mouliana. Iron appears in a few new regions, two knives from Lefkandi, iron fragments and a knife from Kamini and Aplomata on Naxos, and knives, a pin, and an unidentifiable piece from tombs at Perati. The overlap of iron find locations from the BA to the 12th century is significant considering more recent thinking that views the Postpalatial world as one defined by much more than the collapse of the Mycenaean palatial system collapse, and no longer characterises it as a life of discontinuity, isolation, and mass migration (Dickinson 2006a, 60–62; Thomatos 2006; Middleton 2008; 2010, 90).

4.1.1.1 The Peloponnese

The 12th century Peloponnese witnessed continued investment in many of the key BA sites despite the series of destructions. The Argolid, Tiryns, Asine, and possibly Argos experienced population increases, perhaps as a result of outlying settlements moving to the centres (Thomatos 2006; Dickinson 2006a, 63). Many rebuilding efforts took place involving a high degree of organisation, as at Tiryns and Midea (Middleton 2010, 74). Tiryns

[1] Dickinson (2006a, 147) suggests that the sickle tip from the 'Tiryns treasure' was a highly prized item from the Near East (Karo 1930, no. 6228a). Its eastern origin, however, is indeterminate. Only the upper half of the blade remains, from the middle to tip, a segment that is typologically ambiguous. Bronze sickles from several late Mycenaean hoards (Spyropoulos 1972, pls. 11, 12) provide useful parallels, Iakovides (1970, 293, fig. 4) believed the sickle to be based on Mycenaean types. As to the value of the object, we ought not over-emphasise the 'treasure' element. The pit certainly contained a share of treasure items: jewellery of gold, semi-precious stones, faience, and amber. But it also contained many bronze objects that were whole (seven vessels, cauldron, ingot, Cypriot tripod, sickle) and broken (two swords, two pieces of firedogs), that remind us of other hoards found throughout the Aegean in this period. I would suggest that it is in this vein that we interpret the iron sickle – less as a treasure item, but more as a source of reusable metal in the form of an iron billet that smiths could rework, much like the other bronze objects in the hoard. Its value comes from its convertibility rather than intrinsic metal worth or prestigious elements like the gold and amber jewellery. Its addition to the hoard belonging to an elite family is not unlike the collections of iron weapons and tools recorded in the treasury inventory lists of the 13th to 14th century Hittite kings discussed in Chapter 2 (Siegelová 1984, 131ff.; 2005, 39). The sickle was a means of storing iron capital, which was a common feature of metal use and hoarding in this period (Dickinson 2006a, 120), and one that is paralleled by an equivalent sickle of bronze found with it inside the cauldron.

grew to 25 hectares, rivalling the LH IIIB city. The fortification was repaired and, in the Lower Town, new houses with paved areas and courtyards were constructed, as well as several buildings on new streets containing workshops, storage areas, and a shrine (Maran 2002, 223; Kilian 1988, 135). On the Upper Citadel, a narrow megaron Building T was built over the old Megaron, and the round altar in the great court was replaced by a squared platform version (Maran 2002, 114–15). Tiryns clearly maintained an important position in the Postpalatial world (Middleton 2010, 90).

Occupation continued as well at Mycenae, although it is less clear than the rebuilding at Tiryns (French 2002, 138). LH IIIC material was found in several areas of the citadel, notably the Lion Gate, the Granary, the Citadel House area, the House of Columns, the House of the Warrior Vase, and Houses C, D, M, N and H, which attest to the continued use of the site, as does the continued use of the chamber tomb cemetery (French 2002, 135–40; Thomatos 2006, 179). Throughout this period, Mycenae experienced repeated destructions right into the early 11th century. One cannot help but wonder if the iron arrowhead (A.2160) from the LH IIIC stratum at the Lion Gate, one of the earliest iron weapons in the Aegean, is the remnants of one such attack.

Other sites that continued to prosper in the Peloponnese include Asine, where habitation is attested in the Lower Town, and on the northern slopes of the acropolis where some new houses may have been constructed (Thomatos 2006, 196). Achaea was populated in the LH IIIC more heavily than once thought (Dickinson 2006a, 64; Mountjoy 1999, 1:365–402), including the fortified coastal site of Paralimni-Teichos Dymaion, which was destroyed at the end of LH IIIB, but reoccupied and used until the end of LH IIIC when it again suffered a destruction (Mountjoy 1999, 1:402). Although there is no evidence for palatial architecture in Arcadia (Middleton 2010, 9), over 100 tombs that span the LH IIB-

SMyc have been excavated from Palaiokastro Gortyna (Blackman 1996, 33). A cremation burial containing an iron sword (A.1660) from this necropolis is one of the earliest examples of weapons burials in cremation and inhumations tombs that are found in the Postpalatial period concentrated in Achaea, Naxos, eastern Crete, as well as scattered across other regions in the Aegean (Cavanagh and Mee 1998, 95, 135; Dickinson 2006a, 74).

Although Messenia and Laconia experienced some site abandonment and depopulation, several sites like Malthi remained active (Mountjoy 1999, 1:301; Middleton 2010, 87). It is significant that the site produced several finds of iron from its settlement, including a knife from a domestic context in the Megaron complex (A.50), as well as several items from a workshop in its Industrial Quarter. The complex consisted of three rooms, A41-43, within which a series of crafts and metallurgical activities took place in the upper LH III stratum (Valmin 1938, 102–4, 412–13). Iron dagger (A.1240) from room A42 is the earliest iron and is the only example of a non-Naue II form. It is a tangless knife reminiscent of Papadopoulos' (1998, 4ff, pls. 1–3) Type I, variant A daggers, with a rounded butt pierced by two rivet holes, possibly three rivet holes on the corroded side. The four pieces of its remaining blade have a broad midrib (Fig. 40).[2] This dagger indicates that Aegean smiths initially converted local forms to iron before transitioning to the new Naue II forms arriving in the 13th and 12th centuries in bronze. With the knife was found a group of tools including a spherical weight-stone, 2 spindle whorls, 4 knives of obsidian, 1 flint saw, and 2 worked bones. Room A41 included a saddle quern, 2 sandstone mace heads, 2 whetstones, 3 spindle whorls, 1 bronze chisel, and 6 damaged bronze knives found together, likely kept for reuse. Room A43, where the perforated iron piece (A.3270) and a fragment of an iron

[2] See also Maxwell-Hyslop's Type 16 (1946, 18, pl. 11.16).

knife blade (A.60) were found, contained the remains of a hearth, charred wood, ashes, and iron ore (A.5850) scattered around the hearth walls. Valmin (1938, 102) refers to the area as the 'forge room', noting that bronze and ironworking activities took place in the room. These finds suggest that iron circulated within communities of the living, not just the dead, possibly being produced at sites in the Peloponnese, and almost certainly being used for craftsmen's tools. Iron may have been much more prevalent in the 12th century than funerary remains lead us to believe.

Iron use in the Postpalatial period of the Peloponnese is a continuation of many of the same practices that began in the LBA, specifically the 13th century. For example, iron jewellery decreases in Peloponnesian tombs. The only potential example that we have is the finger ring (BA.110) from Asine Chamber Tomb I, which is variously dated from the LH II-IIIA and IIIC. The de-emphasis on jewellery is unsurprising as it was elite elements that desired such items of iron in the LBA, the wealthiest of which came from Peloponnesian centres. In the LH IIIC, with perhaps the exception of Tiryns, this wealthy upper echelon disappeared (Dickinson 2006a, 66). Tomb types and the same cemeteries continued to be used, as did the expression of wealth and social rank through the use of weapons and jewellery, but the social class represented was not on the same level of wealth as those of the preceding period (Thomatos 2006, 178, 241; Middleton 2010, 101). I suspect that the wealthy Peloponnese patrons who traditionally used iron as an elite expression not only disappeared, but that iron began to lose its purpose as a prestige metal. I would argue that the 12th century in the Peloponnese is an extension of the third phase of ironworking, as noted in Chapter 3.

4.1.1.2 The eastern Aegean *koiné*

While this shift in iron use was taking place in the Peloponnese, a change in the relationship with iron was also notable in the regional unit encompassing Rhodes to Perati, with Naxos at the centre. Together, these formed a sort of 'miniature Mycenaean *koiné*' (Desborough 1964, 228; Vlachopoulos 1998; Dickinson 2006a, 68), what I will refer to as the eastern Aegean *koiné* of iron use. Wealth in the 12th and early 11th centuries of the Aegean seems to have shifted eastward from the Peloponnese, as it is in the cemeteries of Perati, Aplomata and Kamini on Naxos, Ialysos on Rhodes, and Langada on Kos that the greatest levels of prosperity and foreign contacts are evident (Thomatos 2006, 178). Although iron was largely absent from these eastern Aegean areas in the LBA, it is in the cemeteries of Attica, Naxos, and Crete that we see the second component of continuity in iron use from the 13th to early 11th centuries in terms of the choice of objects produced.

As knives traditionally used in funerary display were converted into iron across the Aegean in the LH IIIC/SMyc, each region adapted the knives to different social identities. For example, their absence from tombs in the Peloponnese, the primary region for the initial use of knives in mortuary practice, and the settlements finds at Malthi and Paralimni-Teichos Dymaion, speaks of an increased use of iron knives among the living rather than the dead. At Perati, they seem to have been embraced as a form of exotica that individuals used to reconfigure the rules on mortuary display (Murray 2018). Tomb 38 was not wealthy, having 22 pots, 2 bronze, 1 gold item among 6 individuals along with the iron knife (A.20), and neither was Tomb 28, where an iron knife (A.10) was the only item along with 2 pots for one individual. Although they were not imported from Cyprus, in a community that sought new categories of imported objects rarely seen in BA contexts in the Aegean for funerary expression, the iron knives would still have achieved the desired 'foreignness',

being a novel material absent from the regions in preceding LH contexts. The knife (A.30) in Chamber Tomb A at Kamini on Naxos accompanied a wealthy female burial with a bronze belt buckle and pin, faience beads and pendant, a gold earring and diadem, bronze and silver rings, and a carnelian lentoid seal stone (Vlachopoulos 2006, 355, 369–71).

When investigating the transition from bronze to iron in the Aegean, we tend to focus on what Papadopoulos (2017, 977) refers to as the sphere where it mattered most, namely warfare. Although it will become common in this realm, in the LH IIIC swords and daggers are rare, with only a handful of examples in the following SMyc/SMin. They really are prevalent only in the PG. Even the earliest LH IIIC dagger that we have from Malthi links to Mycenaean dagger forms (A.1240). Only at Palaiokastro Gortyna, Tiryns, and Crete do the new types of Naue II blades appear in iron before the late 11th century (A.1250-1360, 1660-1780). Spearheads of iron appear in the later 11th century on Crete and the mainland. Before this interest in weaponry takes off, it is, instead, knives with links to LBA bronze predecessors that dominate the repertoire in the Postpalatial period. In fact, knives of iron appear at several LH IIIC and SMyc/Min cemeteries that have a tradition of using bronze knives from the LBA (Tbl. 12). For example, LBA bronze knives that were the prototypes for many of the EIA iron knife shapes were found in the LM IIIA Upper Gypsades Tomb I, several LH IIIC tombs on Serraglio on Kos, several LM III tombs at Knossos, throughout LM III levels in the Dictaean Cave on Crete, and an LH IIIC settlement level from Lefkandi (Table 10).[3] It appears that Aegean smiths were initially interested in converting local Mycenaean knife and dagger forms to iron as well as the Naue II forms that were introduced to the Aegean in the LH IIIB.

[3] For information on the iron knife Shapes, see below, Chapter 5, and Table 10.

Continuity is also prevalent in LH IIIC and some SMyc/Min jewellery, particularly the emphasis on rings and pendants. The production of iron finger-rings, so common in the LH IIIA-B Peloponnese, remained in use, with an example from the LH IIIC Kerameikos (A.3570), followed by a collection of SMyc/Min hoops from Corinth, Athens, Theotokou in Thessaly, and Vrokastro and Knossos on Crete. Several shield-bezel rings, derived from LH III signet rings, were found in the Athens Agora and Knossos North Cemetery tombs. LH IIIC and SMyc pendants (A.3580-90) from Kerameikos graves remind us of the LH IIIB pendant from Dendra Chamber Tomb II (BA.300). A unique LH IIIC pin with a glass paste bead (A.3560) came from Perati, and one SMyc pin with an ivory head from the Kerameikos (Fig. 41). As iron developed in the eastern Aegean *koiné* it was integrated into jewellery sets in a way reminiscent of LBA forms and practices.

As with the LBA, iron jewellery in this period belonged to the wealthier tombs in their respective cemeteries as part of the expression of an elite identity. This is particularly evident in the tombs containing shield-bezel rings. For example, SMyc cist Tomb 63 in the Athenian Agora of a young adult female is one of the wealthiest of the entire period in Athens, and certainly rivalling many of those of the contemporary Kerameikos (Papadopoulos and Smithson 2017, 421–22). The plentiful jewellery included not only the four or five iron shield-bezel rings (A.3610-30), but plentiful bronze items: 15-16 bronze, 3 fibulae, 1 long pin, 1 pendant, and other indeterminate corroded ornaments. Small finds accompanying the burial associated with the heavily corroded iron shield-bezel ring (A.3830), from SMin Tomb 40 at the Knossos North Cemetery, included a gold rosette and wire, and an iron pin. SMyc Kerameikos Grave 108 had a particularly high concentration of ornaments. Along with the iron ring (A.3640) on the left hand were 10 bronze rings, while on the right hand were 7 rings, and on the right-hand-side were 13 fibulae, a pin, and an

armband with pearl, and a rare example of glass. Kerameikos Grave 113 contained a rare iron pin with a spherical ivory head placed on the breast (A.3600), along with a bronze pin, 2 fibulae, 3 bronze rings, and a steatite spindle whorl.

A few of the tombs were simpler in terms of a display of wealth. In Kerameikos Grave 36, the LH IIIC iron pendant (A.3580) sat on the chest of the individual who was adorned with three bronze rings and an iron wire spiral. LH IIIC Grave 20, with the iron hoop (A.3570), also had another ring of bronze as well as a pin and fibula. Finally, LH IIIC multi-burial Perati Tomb 108, with the glass head iron pin (A.3560), contained the highest number of ivory items in this wealthy cemetery (Murray 2018, 46, tbl. 5). Nightingale (2009, 501) believes this pin to be a Cypriot import based on a link to ribbed or grooved faience pin heads from LC contexts.[4] If this is correct, then this pin is likely linked to what Murray (2018, 44) identified at Perati as the use of an eclectic and personal selection of exotica by the elite to self-fashion social distinction. Although the same levels of wealth could not always be achieved as those of the LBA, we see that, in the eastern Aegean *koiné*, iron was initially integrated into the vestiges of LBA forms of ornamental funerary display.

The 12th century and early part of the 11th century in the Aegean represent the culmination of a process that began in the 13th century in the Peloponnese. As iron moved east, its use in the Aegean partitioned into two regional spheres. As this period is notable for the regionalism of its material culture (Dickinson 2006a, 67), we need to envisage all areas of the Aegean behaving the same towards iron. In the Peloponnese, where ironworking had existed since the LBA, we see a move away from prestige to utilitarian

[4] Pins are generally rare in the Mycenaean world (Konstantinidi-Syvridi 2014, 153), but if this pin is Cypriot, then this type of pin in iron is unknown, as all iron examples from Cyprus have ivory or bone heads (Chapter 5). Murray (2017, 147–48) points out that there is evidence for an active Mycenaean glass industry in the LBA, with evidence for production at Mycenae and Thebes.

uses of iron in items like tools and daggers in settlement contexts. The initial use of iron in the eastern Aegean *koiné* emphasises prestige elements previously seen in the LBA Peloponnese by applying iron to jewellery and the conversion of Mycenaean bronze blade forms to iron with decorative elements added by bronze rivets. In this region, iron was added to the cultural system that used metals as the single most significant indicators of wealth and social status (Morgan 1990, 196–97; Dickinson 2006a, 121). Some of these differences between the two iron-using regions might be the result of the fact that the Peloponnese was able to smelt and work its own iron locally, and in the eastern regions the scarcity of iron made it useful for expressing wealth and status in a world that, as Dickinson (2006a, 72, 121) notes, was scrambling for new status symbols.

4.1.2 Phase 4

The 11th century is a time of significant changes in the Aegean, characterised by Rutter (1992) and Dickinson (2006a, 76–77) as a final decline, where processes that began with the collapse of the palaces culminated at the end of the Postpalatial Period. We see the disappearance of painted pottery, and likely accompanying elite patronage, further abandonment of living and cult sites, possible migrations to Asia Minor, Cyprus, and the Levant. We also observe significant changes in material culture that include the disappearance of several Mycenaean practices, such as burying the dead with figurines and making unburnt offerings, the decline of certain crafts, like that associated with the production of steatite whorls/buttons and weights, and changes to minor items like the form of the standard cooking-pot jug (Dickinson 2006a, 77; 2006b, 121). New forms of dress, mortuary practices, and expression of material culture in pottery, crafts, and metalwork emerge.

Rather than hinder the use of iron, populations chose to integrate iron into many of the material changes, thereby promoting ironworking to a degree that its use proliferates into a new pattern of iron use that extends over most of the PG period. Arguably, the Aegean enters the fourth phase of its ironworking history. At this point, we see the key signs of the cultural integration of iron in material use and self-sufficiency in its production. The key features of this phase include: the geographic expansion of iron use throughout the Aegean, its integration into a standardised PG funerary display and proliferation of use in such contexts, its application to a wider range of objects derived from Urnfield types already used in bronze for several centuries before conversion, and the first evidence for direct production in the 11th and 10th centuries at several excavated workshops throughout the Aegean world.

Starting in the 11th century and gaining momentum throughout the 10th century is the increased use of iron in funerary contexts across new Aegean regions. The initial region that flourishes with iron in the 11th century is Crete. In all item types but jewellery, the greatest concentration of iron finds came from Cretan contexts. Dickinson (2006a, 76, 2006b, 116) notes that, more than any other region, Crete maintained its BA heritage consisting of a mix of Minoan and Mycenaean elements, and it generally seems to have prospered, perhaps in part due to its position along the route to the central Mediterranean, which was still being travelled by Cypriot traders. One tomb, Vrokastro Chamber Tomb 1, had such an excessive amount of iron that it seems likely that, in this century, either the limited iron ore sources in north-western Crete or nearby Laconia mentioned in Chapter 3 were exploited (Varoufakis 1982, 318–19; Muhly 2008, 69, 71; Kalpaxis et al. 2006, 168), or they were acquiring blooms or billets for forging from eastern merchants on their way west. Markoe (1998, 236–37) dubbed this route along the north of Crete the ‘iron gateway’

for its role in attracting Phoenicians to the island in search of iron in the central Mediterranean during the 9th and 8th centuries. Other regions of note with evidence of initial iron use in the PG are in northern Greece, at sites in Epirus, Macedonia, Thessaly, and the Chalcidice at Torone.

4.1.2.1 The standardisation of iron use

This geographic spread was accompanied by a corresponding application of iron to a wider range of objects. Starting in the 11th century, but again picking up momentum in the 10th century, we see the application of iron most notably in the realm of weaponry, with the introduction of iron spearheads, pikes, and axeheads. Although a few Naue II swords appeared in iron in the early 11th century, their number grows across the Aegean for burial use from the 10th century onwards. Daggers, although never popular in tombs, are converted to Naue II forms in the 11th century and appear sporadically in several regions in the PG. Obeloi of iron also appear in the 10th century, and the range of various tool types increases in PG contexts. Changes occur in the realm of jewellery, with a de-emphasis on BA forms like bezel and finger-rings, bracelets and pendants, to an almost exclusive use of iron for dress pins and fibulae with a narrow range of types. Iron knives remained common from the 12th to mid-9th centuries. Each of these object types that were converted to iron are key components within the set of typical PG grave goods of the elite.

Both the spread of iron geographically and its application to new objects probably links to the increased standardisation of mortuary display and increased wealth in the 10th century. We see this growing uniformity on several fronts, starting with tomb type. By the EPG, most of the Aegean transitioned to the almost exclusive use of single burial in cists, pits, or shaft graves, with a few exceptions in parts like Messenia, Crete, and Thessaly.

Although single burial use in the SMyc is interpreted as a way of making burial more economic, as Lemos (2002, 184, 186) points out, PG tombs did not emphasise economy but instead indicated a great deal of skill and investment in terms of construction and grave goods. We also see the increased use of the expensive rite of cremation using several methods (Lemos 2002, 186). It was most popular in Euboea, Attica, and Crete, but least utilised in the Argolid.

A key feature of the PG period is a growing degree of standardisation in mortuary display practices. Of the Athenian burials, which provide the majority of mortuary evidence for the PG (Lemos 2002, 152), Whitley (1991, 105, 111–12) observes that PG burials are more rigid and less idiosyncratic than in the SM, and their grave goods much more uniform. The distribution of grave goods remained stable across the 10th and 11th centuries, although there were important variations at specific sites (Morris 1999, 238). Also notable is that the use of imports in grave credo decreases in the PG, the highest concentration being at Lefkandi, and on a smaller scale, at Skyros, Atalanti, coastal Thessaly, and the Dodecanese, and they are notably absent from tombs in the Argolid and Athens (Lemos 2002, 189–90). This placed a greater emphasis on using local sets of mortuary goods to furnish tombs, a process that drew iron into the fold as one of the local options. In Phase 4, which covers the 10th to the mid-9th century, iron increasingly became incorporated into specific burial identities and gender associations through the conversion to and use of specific objects. We will review a selection of these objects below.

One such identity included that of the so-called warrior or weapons burials. These begin in the LH/LM IIIC, and continued to be highly regarded in the PG and into the Geometric period. They are defined by grave gifts related to military characteristics, including the most important being Naue II swords or daggers, spears, and sometimes

additional related items like knives, obeloi, arrowheads, armour, phalera, axes, graters, and whetstones (Cavanagh and Mee 1998, 95; Dickinson 2006a, 73, 158). Most are inhumations, but there are some cremation burials. Although many are wealthy in terms of valuable and exotic items, many others are modest with only the weapons acting as the key identity markers of the deceased (Deger-Jalkotzy 2006, 151–52). Although found throughout the Aegean, Postpalatial weapons burials are concentrated in Achaea, especially the Patras region, on Naxos and in eastern Crete, and in the PG in Athens, Lefkandi, and Thessaly. They are noticeably absent from most of the Peloponnese, particularly the Argolid (Lemos 2002, 188; Dickinson 2006a, 73; D'Onofrio 2011, 650).

Although iron became a regular feature of these weapons kits, its application was not essential for the creation of the 'warrior identity'. Naue II blade forms were introduced in the 13th century from continental Europe, where locally produced bronze versions appeared in 13th and 12th century Aegean tombs. Iron versions arrived late on the scene. For example, Deger-Jalkotzy's (2006) review of LH/LM IIIC warrior burials show that swords from Perati, Achaea, Arcadia, Thessaly, Naxos, Kos, and Crete were all of bronze. Iron versions of the swords and spearheads were integrated in the 11th century, particularly on Crete, and continued well into the PG. Eventually, iron swords outnumber bronze swords by the PG, but this appears to reflect a form of personal preference because bronze versions continue well into the Geometric period (Lemos 2002, 188). The use of iron swords was not the result of an intrinsic value generated by being made of iron – these swords appear in the tombs with rich and modest furnishings, thereby cross-cutting wealth and status levels. Instead, they were latecomers to the creation of the warrior identity, and it was their integration into this highly regarded social identity that created value for the iron and the sword. Once iron swords were inducted as appropriate identity markers of a

warrior, it means that the inclusion of the specific item (sword) with its particular features (iron) was more important than the actual value of the materials and labour involved. An additional piece of the puzzle that we are missing is how the swords were used in life. The fact that Naue II swords were heavily standardised and mass-produced to a level never seen in the Aegean before (Papadopoulos 2017, 977) suggests that there was also an active consumer group that used the swords in life as well as in death. Most Naue II swords from the Peloponnese, for instance, came from non-funerary contexts (Dickinson 2006a, 74). Such pervasiveness in life and standard use in death in Phase 4, if not earlier, would have decreased the value of iron be removing its exclusiveness.

In the 11th century, Crete leads the way in iron knife finds, most of which are associated with male weapons burials across the island at Knossos North Cemetery (A.140-60) and Vrokastro (A.180-220), and at Panagia, as part of a hoard of bronze weapons buried next to the Tomb A dromos (A.230-50). The wealth and access to iron varied across the island. For example, Knossos North Cemetery Tomb 186 contained a bronze spearhead and phalera, honing and whetstones, an iron dagger (A.1320), and a stirrup jar, whereas in Tomb 201 we have the full range of warrior kit including five bronze arrowheads, a Naue II sword, spearhead, phalera, strips, iron pins (A.3880-90), gold rings, ivory mountings, bone inlays, and a boar's tusk helmet. The wealthiest of the warrior lot was included in Vrokastro's wealthy multi-burial Chamber Tomb I containing 33 vessels, six faience seals, a bronze tripod, fibulae, tweezers, fish-hook, a gold bezel ring, and iron axe head (A.2340), iron adze (A.2350), iron spearhead (A.2360), iron chisel (A.3330), and an estimated 25-plus iron-bladed weapons found in corroded masses (A.2370) (Hall 1914, 123–39). Whenever iron knives are associated with male burials in the 11th century, it is always part of a warrior's kit. This kit will come to include iron in the form of Naue II daggers, swords, and

spearheads from the EPG and well into the Geometric period across the rest of the Aegean, spreading to Attica, Euboea, Boeotia, Thessaly, Macedonia, Rhodes, and many other east Aegean islands.

Iron knives were not just the prevue of male burial practice, but also appear in a few female tombs. Early SMin Tomb VII from Upper Gypsades on Crete was the wealthiest in the cemetery in terms of vases and other grave goods. The iron knife (A.120) was the only item found in the larnax with the skeleton, which was accompanied by an assortment of pottery and bronze pins in the southwest corner of the tomb (Hood et al. 1958, 205–8). Karphi Tomb M11 was also wealthy, containing two female burials, along with the iron knife (A.170), a bronze bow fibula, an iron fibula, a steatite spindle whorl, a rock crystal top on a human-head rhyton, several stirrup jars and bowls (Pendlebury and Money-Coutts 1937, 106, 121, pl. 28.3). Chamber Tomb V from Vrokastro contained a female with earrings, a ring, and fibula of bronze, faience beads, obsidian flakes, and a large assortment of dining vessels (Hall 1914, 151, pl. 21A; Evans 1935, 4.1:377, fig. 315; Hoffman 1997, 103). Interestingly, pins were the main iron items in SMyc and PG female burials kits; however, in the Cretan burials containing iron knives, the few pins included were made only of bronze. Several Athenian PG female graves also contained iron knives (D'Onofrio 2011, 653), as was MPG-LPG Tomb B from Theotokou in Thessaly (Wace and Droop 1906, 326, fig. 12i; Wace and Thompson 1912, 213, fig. 147i).

Further alterations to the value of iron as it was incorporated into the PG funerary kit took place in the realm of ornamental display. Over the course of the 11th century, bezel rings disappeared, pin types changed, and iron was rarely applied to pendants. Iron was instead applied to an alternative ornamental piece, namely dress pins, which, by the PG, were used primarily for female burials, usually found in pairs (Lemos 2002, 189). Athenian

burials led the way in iron pin and fibulae use in terms of numbers, but their use was almost universal across the Aegean world. The exception, however, being the Argolid where female burials almost always had a pair of pins and some rings, but in bronze rather than iron, and no fibulae (Lemos 2002, 189). This pattern was not a factor of minimal tomb evidence, as we see an increase in tomb numbers in the northwest Peloponnese, particularly western Achaea, in the Postpalatial period (Vermeule 1960, 18; Dickinson 2006a, 64; Middleton 2010, 81). Instead, it reinforces the idea that, by the end of the LH IIIC, iron had already lost most of its value for personal ornamentation and prestige display in the Peloponnese, whereas in other parts of the PG Aegean it was embraced. The same goes for the weapons in the Peloponnese, where most come from non-funerary contexts, and the few weapons burials that do exist are in regions that never developed an LBA palatial system (Dickinson 2006a, 74; Middleton 2010, 101).

We should not overestimate the value of iron as a display metal in the 10th and 9th centuries, however. Although its use was prolific for female dress pins, many of these pins found their way into poorer tombs and those of middling wealth in the PG, particularly in the Athenian Kerameikos. The inclusion of iron pins had less to do with the metal providing a prestige-adding element to the owner and more with the fact that dress pins were increasingly incorporated into the realm of appropriate choice, a sort of funerary uniform, since the 12th century. The addition of iron was secondary to this process, as it was with swords, daggers, and spearheads and, as a result, the metal was normalised in society through the regularity of its use.

The altering value of iron as a metal, in and of itself, outside of the Peloponnese is evident in the wealthiest tomb from the PG period, the shaft grave containing a female inhumation and male urn-cremation from the MPG Toumba building at Lefkandi. Among

the elaborate jewellery of gold and bronze buried with the female, were two Type 2 pins with an iron shafts with gold sheet covering the head, globe, and part of the shaft (A.4320, Fig. 42) (Popham et al. 1993, pl. 18c; Lemos 2002, 128–29, fig. 6.3; Kosma 2012, 67, no. 6). Three additional pins are typical Type 2 bronze specimens. The application of gold sheet to iron pins is unique in the Aegean, but unlike other burials, I would argue that iron was not valuable enough on its own to be included in a grave of a person of this high stature. Instead, the addition of gold to the iron core elevated the iron pins to the appropriate level. This also applies to the iron dagger (A.1560) with four bronze rivets in an ivory handle placed beside the head and right shoulder of the female burial (Harrell 2014, 99).[5] It is the only dagger or knife with preserved ivory handle plates in the Aegean – most are of wood or bone. Again, an iron knife fits into the mortuary tradition, but it required the addition of craftsmanship and the exotic added by the ivory to make it an acceptable elite gift. I would suggest that prestige value was generated in this case not through specific objects, but through the combination of multiple metals and materials, ivory, gold, bronze, and iron within the entire burial display unit.

4.1.2.2 Evidence for iron production within the Aegean

By Phase 4, we can launch a strong argument for the direct production of iron in the Aegean. The primary indication comes from a series of waste products and smelting structures at several workshops from around the Aegean. The smithy from Phokaia in Lydia

[5] It is interesting that the iron knife in Upper Gypsades Tomb VII was similarly placed next to the head, but left shoulder of the female burial in the larnax (Hood et al. 1958, 208, fig. 8; Hoffman 1997, 102–3, pl. 127). An iron knife was also placed next to the right shoulder near the head of the Lower City cist Tomb 40 female skeleton from Asine (Frödin and Persson 1938, 138, 425). Most tombs are too disturbed to determine the position, but these examples might suggest an established mortuary position for iron-bladed implements in female burials.

was discussed in Chapter 2. There is little archaeological evidence for the presence of trade between the Aegean and Anatolia after the Mycenaean period until EPG pottery from central Greece appears in Troy VIIb3 levels, Mytilene, and the tombs at Assarlik and Dirlmil in Caria (Bayne 2000, 200–217, 314; Lemos 2002, 148, 240; Becks 2003, 49; Rose 2008, 412; Carstens 2011), so it is difficult to say whether or not ironworking along this coast influenced or provided smithing iron to central and northern Greece. Regardless, the ore sources and smelting infrastructure would have come from Anatolia rather than Greece. There is evidence for a trade network established between Troy and Thrace in the 12th century, which extended to include Thessaly and Lokris by the 10th century (Rose 2008, 420). It might be through this route that one of the earliest smelting sites in the Aegean was established at Vardaróftsa in the Vardar Valley, Macedonia. Publication is limited, but Davies (1926, 196–99) analysed a piece of iron slag (A.5875) found with LH IIIC pottery in Period C 12-11th century levels (settlement 10, 21st half metre) and determined the smelting extraction to have been efficient, removing most of the metallic iron, although analysis of a blade found in the same level suggested that the ore quality was quite poor. Gold smelting also took place at the site.

The most extensively excavated workshop with evidence for iron smelting comes from 12th to 11th century levels at Malthi in Messenia. Valmin (1938, 102–4) reported a three-room structure (A 41-43) with adjacent rooms (A 46-47) that were continuously used for industrial production from MH levels to the end of the LH period. Finds from both strata of the rooms consist of a variety of stone, bone, and obsidian tools. The LH upper stratum contained all the metal finds, iron and bronze, indicating that the production of both metals

took place alongside one another within the complex.[6] The sheer range of craft activities indicated by the implements led Valmin to characterise the craftsmen as "jacks-of-all-trades", proficient in the production of simpler items for weaving to more elaborate ones like the working of boars' tusks and the production of potentially elite identity markers like mace heads. Contrary to ideas of itinerancy in the LH IIIC, the workshop appears to have been a firmly established location for training apprentices over several generations, and one where the population would have ventured to the smith at the central settlement rather than wait for the travelling craftsman to visit the village.

The unique piece of evidence from this workshop is in Room A 43, the 'forge room'. The hearth was located along the east wall and formed of upright slabs roughly 1.10 m thick and covered with ash and pieces of charred wood. Aside from the iron blade pieces in the upper stratum, at the top level of the fireplace were scattered pieces of dark-brown heavy stones, identified on analysis as a local type of iron ore, that Valmin (1938, 103, 412–13) claimed was still used in the area for local iron smelting. How this furnace was used is unclear. Was this furnace used for both iron smelting, forging, and bronze melting? Was the same furnace also used as a forge for the operation of smithing processes on the resultant metallic iron bloom? Based on the numerous whetstones and polishers found in multiple rooms, it seems likely that the final forging operations took place in the same workshops as the smelting. The same went for bronze, where a hoard of good and broken bronze knives in Room A41 represents metal stock that could be recycled into new items. It appears that access to new sources of bronze and copper were harder to come by than iron at 12th century Malthi.

[6] Waldbaum (1978, 31) notes that Desborough (1964, 94) is uncertain about the dates of the iron objects, but she dates to them the LH IIIC or to the early EPG at the latest. Snodgrass (1980, 353–54) dates the finds to a purely Mycenaean level (LH IIIC).

Fast forward in time to another Messenian community, the village of Nichoria. Excavation of the settlement indicates that the population of Nichoria in Dark Age (DA) II levels (975–850 BCE) reached 200 people divided into roughly 40 families living in small, apsidal homes clustered around a larger 10.5 m long building (Thomas and Conant 2003, 38). Despite being in a relatively remote location of the Messenian Gulf, the village was able to procure its own metallurgical resources and was self-sufficient in producing iron and bronze products. Several pieces of iron slag (A.5950) dating to the DA II level came from Area IV (Cooke and Nielsen 1978, 311–12). Several finished products came from this level in various parts of the settlement, including iron knives, an axe, nails, and dress pins (Catling et al. 1983, 309–11). A few smaller items including a knife, nail, and scrap came from the earlier DA I levels (1075-975 BCE), suggesting that the smiths had access to iron since the SMyc. Other slags, scraps, and what looks like a billet from areas III and IV came from mixed DA levels, suggesting that, even when the settlement shrank to about half its size in the DA III (850-750 BCE), iron was ubiquitous enough to continue production. Unfortunately, we do not have evidence for smelting or smithing furnaces or remains of a workshop. We do note that, like Malthi, copper and bronze melting, and possibly smelting, were also taking place at Nichoria in the MH, LH, and DA levels (Rapp et al. 1978). Analysis of the bronzes reveals consistently high tin levels throughout all periods, indicating that metallurgical resource networks consistently operated throughout the Peloponnese (Kayafa 2006).

4.1.3 Model summary

The relationship between iron and the inhabitants of the Aegean underwent two key phases in the EIA. Phase 3 was an extension of a pattern that began in the 13th century

Peloponnese, where there is a movement towards using iron for utilitarian items like tools, knives, and daggers. Iron spread to other parts of the Aegean in the 12th century, dubbed the eastern Aegean *koiné*, where it was initially utilised in similar ways to the LBA; that is, it was incorporated in jewellery and ornamentation for wealthy and status-defining mortuary display. The transition to Phase 4 was not sudden, but it varied in terms of pace across several regions over the course of the 11th century. Crete, for example, was a major player, with Attica and northern Greece not far behind. We have direct evidence through waste material and a few furnace features that, by the PG, a self-sufficient iron industry was underway in the Aegean. We can also be confident that the iron in PG tombs was locally produced because the circumstances that caused the reduction of imports in this period would have also applied to iron imports.

I agree with Morris (1999, 218, 231) in that, towards the end of the 11th century, iron took on a major role in burial symbolism, but this is where we have a departure of opinion – it did not define the 10th century elite order. Only in specific areas outside of the Peloponnese was iron appropriated for elite burial display in the Phase 3 Postpalatial segment. The greatest change in burials from the 11th to 9th centuries, however, was not the application of iron to grave gifts, but the standardisation of mortuary display. Many mortuary features were shared across the entire Aegean, such as the move to single burial and the increasing use of metal types of Urnfield origins in iron and bronze. Others were more regional, like the bias to weapons burials in Attica, Euboea, Crete, and Thessaly. Iron was enveloped within this standardisation movement by being incorporated into specific mortuary identities, such as the warrior, or prestige display, as in the use of iron pins and fibulae for women in Attica. Other regions like the Argolid largely excluded iron from burial gifts.

As iron became a regular part of the mortuary kit, its use was increasingly normalised, causing a decrease in its intrinsic value as a metal; that is, one with display value simply because of its rarity and prestige connotations. Its incorporation into standard funerary kits further encouraged its production, making the metal increasingly prevalent in society. The result was not a sudden crash in its symbolic value. Instead, its continued use in PG and later Geometric mortuary practices indicates that value was created by its combination with appropriate funerary objects (e.g. obeloi), materials (e.g. gold), and membership in the standard funerary display kit repertoire. Again, we return to Pare's (forthcoming) idea of iron as a 'Special Purpose Metal'. Although he applied the term to the undefined meaning and value of iron in the LBA, I believe that we see similar flexibility and ambiguity in Aegean Phases 3-4. The definition of iron in this period was not prescriptive, but depended on burial practices of the region, the identity of the owner that it was interred with, and the object to which it was applied. This is one of the reasons why iron never fully replaced bronze (Papadopoulos 2017, 978); instead, iron became another one of the available options from which consumers could choose.

This discussion of use and value is, of course, one-sided – we are confined to forming a model based on iron use in the realm of the dead rather than the realm of the living. Undoubtedly, iron use was increasing in daily life, and I agree with Whitley (2001, 82) in that, by 900 BCE, most regions throughout Greece had fully embraced iron technology. An underlying assumption of the model presented here is that the iron in funerary contexts represents a smaller portion that that which circulated for daily use. Contrary to Morris' Deposition model, where the high value of iron was derived from the elite withholding it from the populace, I agree with Papadopoulos (2017, 976) in that iron was too widespread to be controlled. In fact, the Deposition model better describes the

situation in the earlier part of the LH than the Postpalatial, and the greatest loss of, or arguably transition, in the value took place in the between the later LH and the Postpalatial period. This is the value, however, of writing Aegean ironworking history to include features of ironworking in the BA – we can confront data that argues against singling out one period as a point of innovation (Haarer 2001, 269) and figure out how the industry developed on a scale that is not constrained by our archaeological conventions of cultural periods. To this end, I have argued that we need to look to the BA to write the history of ironworking in the Aegean, relying on local rather than foreign factors for its development, which remains a popular explanation for the development of ironworking in the Aegean. The next section addresses the problems with using technological transfer from Cyprus and the east to explain the origins of iron in the Aegean EIA.

4.2 The transfer of iron technology from Cyprus to the Aegean

A commonly held belief is that the earliest iron objects in the Aegean were imported from Cyprus and that, therefore, the practice of ironworking came to the Aegean from Cyprus (e.g. Brock 1957, 218; Desborough 1972, 316; Crielaard 1998, 191; Andreyev 2013, 426). Evidence for this argument includes early iron Naue II blades in the Aegean (Lorimer 1950, 115, 268; Müller-Karpe 1962, 63, 65; Snodgrass 1980, 347; Karageorghis 1982, 299), but the key objects are the early iron knives that are believed to originate from Cyprus (e.g. Dickinson 2006a, 147, 2006b, 119; Murray 2018, 41, 44, 48) or Syria and Anatolia (e.g. Buchholz and Karageorghis 1973, 54, no. 638). The knives are targeted for three reasons. First, the 12th century iron knives from Enkomi Tombs 58 and 108, and a dagger from Kourion Kaloriziki Tomb 40 on Cyprus are thought to predate any found in the Aegean, including those from Perati (Snodgrass 1980, 219). Second, the iron knives from

the Perati tombs were paralleled to ones from Cyprus (Salamis Tomb 1), Anatolia, Syria, and Egypt, from where the shapes were thought to originate (Iakovidis 1969a, 344, 459, 1980, 91–93; Waldbaum 1982, 322). Finally, there is an idea that Aegean smiths lagged behind their eastern counterparts in terms of skill (Lorimer 1950, 115; Zimmermann 2001, 116), so that ironworking must have taken place under foreign tutelage (Dickinson 2006a, 147).

4.2.1 Iron knives and technology transfer

I would like to address these three points. With regard to the first point, evidence that iron knives appeared on Cyprus before the Aegean is difficult to maintain. The excavation of blade fragments from LH IIIB and LH IIIB-C transition phases in the Kentria and Tsiganadika cemeteries on Thasos in the North Aegean predate anything on Cyprus (BA.360-370, Fig. 43). Their appearance coincides with the arrival of Mycenaean trade on the island at the end of the BA (Koukoulē-Chrysanthakē 1992, 822; Papadopoulos and Koukoulē-Chrysanthakē 2009, 11). These are contexts that range 50-100 years earlier than those at Enkomi and Kaloriziki.[7] The earliest iron object on Cyprus is thought to be a knife from Tomb 113 at Kouklia Eliomylia (C.10, Tbl. 8), dated to the transitional LC IIC-IIIA (Karageorghis 1990, 80, 84–87, fig. 11A-A, pls. 83, 88; Zimmermann 2001, 116). At best, this makes it contemporary with the Tsiganadika knife. That is, if we consider the Eliomylia specimen a knife, then its distinctive crescent shape and single rivet suggest that it is instead a sickle (see Chapter 5). Iron sickles of a similar shape and rivet count are known

[7] Steel (1996, 298) has re-dated Tomb 40 from Kourion Kaloriziki since Snodgrass' publication, pushing its date back to the LC IIIB (1100-1050 BCE).

from 13th century Hattušaš and 12th century Korucutepe in central Anatolia (Tbl. 1).[8] By extension of the Cypriot-Aegean argument, should we be looking to Anatolia for the origins of Cypriot iron?

The key question is whether relying on the object find date is a reliable indicator that the transference of technological practice has taken place. One issue is that, because correlations between Aegean-Cypriot-Levantine contexts remain fluid due to new evidence and reinterpretations of old pottery sequences, arguments of primacy rely on unreliable evidence.[9] With the find contexts so close in date, is it realistic to expect an object to single-handedly represent the transfer of an entire technology, nay, industry? Much of this reasoning relies on the second point that I want to address, the idea that the earliest iron knives and swords in the Aegean were imported directly from Cyprus due to the fact that they share typological traits with specimens from that island.

The first point to bear in mind is the fact that the production of knives has a lengthy history in the Aegean, as outlined by Sandars (1956) in her key article, *The antiquity of the one-edged bronze knife in the Aegean*.[10] In his dissertation on BA tools in the eastern Mediterranean, Blackwell (2011, 317, 323) notes that, in the MH period, knives constituted nearly half of the tool implements in the Aegean. In the LH, they are quintessential components of a standardised Aegean toolkit found in caches and hoards, along with double axes and chisels of variable sizes. Throughout the Mycenaean world, bronze knives were common funerary equipment in some of the wealthiest cemeteries: the shaft graves

[8] Boehmer (1972, 147, pl. XLVI) calls nos. 1300, 1302-1304 knives, but when compared to Deshasyes' (1960, pl. XLV-XLVII) sickle category it is clear that they belong to this object category. The difference is evident when compared to true iron knives found at Hattušaš (e.g. Boehmer 1972, pl. XLVII).

[9] See Coldstream (2003) and Mazar (2005) for correlations between chronologies in these regions, and Dickinson's (2006a, 13ff) discussion on relative and absolute chronologies in the Postpalatial period.

[10] I define a knife as having a blade with a single edge, the blade profile therefore usually triangular. For a more thorough discussion on my definition of a knife, see the typology section of Chapter 5.

of Grave Circles A and B at Mycenae, the chamber tombs of Dendra and Mycenae, tombs at Prosymna and Ialysos, and Cretan tombs at Isopata, Knossos, and deposits in the Psychro Cave.

It is important to note that the blade shape and riveting on iron knives are firmly rooted in local typological tradition. In Chapter 5, I develop a typology for iron knives based on the much larger and better-preserved corpus from Cyprus, which I will use to refer to the Aegean knives (Tbl. 10, Figs. 44, 50). Present in the Aegean group are Shapes 1, 2, 3, 6, 6A, 8, 9, and 11, each of which have parallels drawn directly from the Mycenaean culture of the Peloponnese, many of which are listed in Table 12. As on Cyprus, Shape 1 with a sloped heel and riveted handle plates is the most popular and derives from bronze examples throughout the Aegean, Italy, and continental Europe. These knives appear in the Peloponnese, Crete, and Euboea throughout the 14th century. Shapes 6 and 6A are the most common knives found in Mycenaean tombs, beginning in the 17th and 16th centuries in the Peloponnese. Although two examples come from Mavrospelio in Crete dating to the 17th century, the majority are from the 14th century onwards, which corresponds with Mycenaean influence on Crete during the Palatial period. Shape 11 derives from Mycenaean razor-knives found in tombs throughout the Peloponnese from the 14th century onwards. Shape 8 is rare in the Aegean and Cyprus, where they appear in bronze roughly a century before when being converted to iron.

Most of the early iron knives come from sites that demonstrate strong continuity with the Mycenaean world. The settlements for the Kamini cemetery on Naxos, Paralimni-Teichos Dymaion and Malthi in the Peloponnese, Lefkandi, and the Cretan sites of Vrokastro, Knossos, and the Psychro Cave all demonstrate continuity and vitality over the 13th to 12th centuries (Middleton 2010, 71ff). Although the blade shape of the two early

knives from Kastri are indiscernible, they appear alongside better preserved bronze knives of Mycenaean forms in graves containing LH IIIB imports and local imitations (Koukoulē-Chrysanthakē 1992, 822). The only exception to the Mycenaean connection is Perati, which was a new cemetery established at the LH IIIB/C transition, which used an eclectic mix of exotica to create new mortuary practices to define elite status (Murray 2018, 44, 49, 58). Nevertheless, its two knives from Tombs 28 and 38 hardly "lack comparanda from earlier LH III sites in Greece," as Murray (2018, 44) asserts. Both knives fit comfortably into the most common Mycenaean types, Shapes 1 and 6; and, despite the other imports in the cemetery, there is no reason to assume that just because they are made of iron that they must be imports, as their excavator Iakōvidēs (1969b, 459) suggested. Tombs 28 and 38 do not contain any other imported items. I agree with Bachvarova (2016, 283) in that the iron knives did not symbolise a connection to the East, particularly Cyprus, for the Greeks. They were instead a reconfiguration of an object type that was a regular part of the expression of identity in mortuary practice throughout the Mycenaean world.

Aside from an appeal to the Aegean tradition of the knives, the second point of note is that there are some stylistic differences between the Aegean and Cypriot iron knife corpuses that indicate different traditions of manufacture. For example, Cypriot knives frequently have flanged tangs, whereas in the Aegean all preserved examples have squared or rounded butts. This is an interesting variation from even the bronze antecedents in the Aegean, where flanging is very common. It suggests that Cypriot smiths were working from Aegean BA models rather than iron ones. Aegean knives with preserved tangs tend to have fewer rivets, with only one or two well-spaced apart, being the most common (A.20, 90, 120). Rivets are not packed side-by-side as tightly as some examples from Cyprus, and we do not see rivets in numbers of five, six, and eight like we do on Cypriot specimens (C.1170,

C.800, C.1130) (Fig. 51). The emphasis on the ornamental or aesthetic component is not as obvious in Aegean examples. Although fewer handles are preserved in the Aegean than in Cyprus, we do not have any in ivory like, which we do on Cyprus. Bone seems to have been the preferred expensive option. The practice of bimetallic riveting is less common, and we do not have any with gold or silver rivet caps like we see on the CG II-III specimen C.1130 from Amathus Tomb 310, even though capping rivets with precious metals was a practice found on MBA and LBA daggers and swords from Crete and the Peloponnese (Chapter 5). Overall, Aegean knives appear to have had less technical and aesthetic investment than the group in Cyprus.

Admittedly the number of knives found in iron is surprisingly low compared to the popularity of the knife in the BA. And, it is true that iron knives were much more popular on EIA Cyprus than in the Aegean, so much so that I characterise them as the archetypal item of the Cypriot iron industry (Chapters 5 and 6). Explanations for these discrepancies, however, should be sought in regional funerary practice preferences rather than differential access to, or ability to, produce iron. Iron in the Aegean was indeed applied abundantly, but in this case to object classes that were much more fundamental than knives during the changes taking place in funerary identity and display in the Postpalatial world. This selection includes several types of globe pins and arched fibulae, which were introduced to the Aegean in the 13th century, where they were much more common in iron and bronze in the 12th and 11th centuries than on Cyprus. It also applied to Naue II swords and daggers in the Aegean, which appear primarily in iron after the 13th century, when they were standardised and mass produced (Papadopoulos 2015, 183). Such blades remained rare on Cyprus compared to other regions of the Mediterranean and continental Europe (Suchowska-Ducke 2015). Compared to the BA, knives as an object class lose some of their

value as grave gifts, appearing only rarely in wealthy funerary contexts. Instead, they are often supplementary items in warrior kits, or personal items in poorer tombs. The object classes with preferential conversion to iron reflect shifts to material culture thought more appropriate for funerary use (Snodgrass 2000, 177ff; Dickinson 2006a, 72; Papadopoulos and Smithson 2017, 977–78). This means that focusing too heavily on iron knives creates a misleading picture of the early Aegean iron industry.

4.2.2 Itinerant craftsmen and technology transfer

The third point to address is the idea that Cypriot smiths produced better-quality iron objects than their Aegean counterparts because they began working the material at an earlier date. I am wary of such qualitative assertions without analytical data to support them. As far as I am aware, no metallographic studies of the kind conducted on Cypriot specimens that detect the various heat treatments were applied to the objects during the smelting and forging phases. Scientific analyses on Aegean objects instead focused on nickel content to clarify the debate on the meteoritic origins of early iron (Chapters 1 and 3). On the Cypriot specimens, we have detected advanced methods of carburisation for steeling, quenching, tempering, and laminating techniques; without the equivalent studies and datasets for the Aegean world, however, I am concerned that we have an unjustified view of Cypriot primacy and supremacy in terms of knowledge of ironworking vis-à-vis their peers around the EIA Mediterranean.

We must keep the application of heat treatments on Cypriot objects in perspective with the known variability in product quality that the bloomery process achieves. Bijker (1995, 7) warns against the assumption that links a successful artefact with assured technological development. Technological development is rarely linear, but instead is

replete with failures, dead-ends, and alternative solutions. We saw in Chapter 2 that iron from MBA Kaman-Kalehöyük IIIc and Kültepe-Kaneš Ib varied in quality based on diverse ore sourcing and level of purification techniques applied. Even when steel products could be achieved at Hittite Kaman-Kalehöyük level IIIa, the smiths continued to produce steel with variable carbon contents. Chirikure and Rehren (2004) similarly demonstrate that, although the same bloomery process was used by the Nyanga complex in south Africa from 1300-1900 CE, the quality of iron produced in each period varied from soft iron to steel. Finally, we must keep in mind that Cyprus was not the only region to utilise carburising, quenching and tempering techniques at an early date – the steeled Mt. Adir pick from Palestine indicates that some smiths in the Levant also experimented with heat treatments (Davis et al. 1985). Until the dataset enlarges to include samples from the rest of the Mediterranean, claims of Cypriot smithing superiority do not carry any weight in this thesis.

At times, the Aegean receives unfair treatment when it comes to its iron industry. Zimmermann (2001, 116), for example, makes the unfounded comment that, in terms of iron implements, Aegean metallurgists were visibly two to three generations behind those in 12th century Cyprus. He does not clarify how he arrived at that observation, but it hardly seems justified. The Aegean corpus is certainly smaller, and preservation generally poorer, but there are some fine early specimens with riveted tangs and blades with thin, rectangular sections. A.120 from Upper Gypsades and A.180 from Vrokastro are as impressive as C.380 from Salamis Tomb 1 (Shape 1), or A.190 and A.230 from Vrokastro and Panagia are as fine as C.970 from Amathus Tomb 311 (Shape 11). In fact, the level of standardisation and quality of hilt production on Naue II swords from the Aegean is impressive, whereas Cypriot smiths largely shied away from sophisticated sword production.

Of craft production in the Postpalatial period, Dickinson (2006a, 114) notes that the only significant innovation, namely ironworking, is represented by a limited range of rather simple forms. To be fair, most of the same forms appear in Cyprus where, if anything, their iron forms are *more* restrictive than in the Aegean (Chapter 5). For example, Cyprus boasts only a handful of simple iron pins and fibulae compared the Aegean. In contrast to metalworking from the Mycenaean world, the iron repertoire in the Aegean is rather unimpressive (Andreyev 2013, 425), but so are the Cypriot specimens when contrasted to their LBA bronze tripods, stands, incised vessels, and hemispherical bowls with lotus handles. Also, is it accurate for Dickinson (2006a, 147) to assert that the Aegean lacks the metallurgical background compared to Cyprus and the Near East to accomplish iron production? Mycenaean metallurgists produced elaborate swords, greaves, and helmets, and iron production does appear in the BA (Chapter 3). Pernicka and team (2003, 146) discuss recent research that suggests that the development of tin-bronze metallurgy was an indigenous Aegean development in the EBA rather than one directed by foreign influence. Furthermore, recent research by Gale and Stos-Gale (2010; 2016) indicate that objects derived from Aegean copper, silver, and lead ore sources circulated around the Mediterranean. Their LBA extractive production scale was probably not on the same level as that of Cyprus, but their metallurgical BA skill truly deserves more credit than we think. I wonder if our perception of the EIA Aegean as a 'dark age', a period of survival after the collapse, limits our ability to recognise their achievements before and after 1200 BCE?

Overall, I tend to agree with Zimmerman (2001, 116) in that there is no evidence to say that the iron tools found in the Aegean were imported. Even if we accept that the earliest items indeed came from Cyprus, however, this fact does not address the disparity between object and industry. Specifically, no one has outlined the mechanisms by which

the inhabitants went from a familiarity with imported iron goods to knowledge of iron technology. This really is a significant leap between practices. I have already pointed out in the introduction (Chapter 1) that Cyprus and the Aegean must have relied on different smelting techniques; that is, direct versus indirect smelting techniques (via copper production). If Cyprus is responsible for the technology transfer to the Aegean, then how do we account for the knowledge gap between these two smelting techniques? Or that iron production appeared at several centres simultaneously, in Attica, Crete, and Euboea?[11] There is no obvious point of entry to the region.

Most theories place the responsibility for introducing iron to the Aegean on itinerant metallurgists, either Aegean ones who went eastwards to train (Dickinson 2006a, 118), or Cypriot ones that arrived and integrated in EIA society, teaching local smiths to smelt and forge iron in the 12th century (Popham 1994, 22; Mazarakis Ainian 2006, 194–95).[12] Undoubtedly, skilled craftsmen were part of the equation, but if we depend on them as the driving agents for ironworking, then how do we account for the other numerous steps in the production chain? Who taught the locals how to prospect, mine, and beneficiate the local iron ores and fluxes, and set up the production and transportation network from mine to smelter to smithy? This is a large network to leverage regionally, considering the number of production stages that required implementing and linking (Fig. 1). Such a network needed investment beyond the smiths to turn it into an industry that scaled to the level of regular production that we see in the Athenian and Knossian burials from the SMyc/Min into the PG. Hjärthner-Holdar and Risberg (2009: 985) sum up the

[11] No one has argued that the iron items of the LH IIIC and SMyc/Min came from a single Aegean centre.
[12] The model typically refers to itinerant craftsmen more generally, not just metallurgists, but those working in other precious media like stone, faience, ivory, etc. For the thesis, the focus is on the 'itinerant metallurgist' contingent.

multiple sides of investment as follows: “Iron technology could not have been introduced and accepted without the effort of skilled craftsmen working in a consenting social environment, that allowed the allocation of resources—not least man-power—and who readily saw the advantages, both political and economic, brought by the new technology.”

To get a sense of the enormity of building such an iron production network, we can turn to ethnographic work on traditional bloomery methods of iron production used in parts of Africa. Chirikure’s (2006) work with the Njanja in Zimbabwe, and Pole’s (2010) work with the Mawu of Ghana, reveal just how labour-intensive the production cycle is, even on a small scale, when viewed from start to finish, from miner to consumer. To construct the furnace shaft alone (excluding the bowl, tuyère shafts, the shelter, etc.), Pole (2010, 53, 57) recorded 50 hours with the help of 4-5 people. The mining required several crews alone to get the ore from the mine to the smelting site. The emphasis here is that models relying on itinerant craftsmen to spark technological development alone are deficient insofar as they fail to outline the mechanisms by which an industry grew out of a few knowledgeable individuals. Put another way, the development of any new industry, including ironworking, required that actors other than the smith invest in the new system, thereby shouldering a series of risks. For example, the MBA Kültepe-Kaneš texts from Chapter 2 suggest that Assyrian merchants, in their dealings with issues of iron quality and availability, shouldered many of the risks of the nascent industry, and certainly were invested as key actors in transporting iron blooms, billets or bars to smiths located in major centres. In the 12th century Aegean, is it realistic to suppose that foreign metallurgists made the initial investment into the new system and assumed all the risks of promoting the new material?

If the initial investment in ironworking did indeed fall onto their shoulders in the 12th century Aegean, then such an investment does not easily align with the usual motivations attributed to them. Evidence for specialised BA ironworkers is scarce, the exception perhaps being a small contingent in the Hittite capital Hattušaš based on Old and Middle Hittite texts (Chapter 2), so most itinerant metallurgists who knew ironworking probably produced copper and bronze products as their mainstay. As the itinerant craftsmen models explain the travelling component as an attempt to escape the BA collapse at home in search of reliable markets and patrons, does taking a bet on promoting iron when bronze production was still viable, as it evidently was in the 12th and 11th centuries Aegean, make sense? Should we presume that, in this period, the networks for obtaining iron resources were more reliable than those to obtain tin and copper, and that the newcomers had preferential access to this resource?

Another issue with the itinerant metallurgists is that this model, at its core, relies on an outmoded diffusionist theory. For example, what we see in the LBA-EIA Aegean is a series of innovations and new cultural elements, many of which derive from continental Europe. This includes the globe-pins, violin-bow and arched fibulae, flame-shaped spearheads, 'Peschiera dagger' types, shield bosses, obeloi, and Naue II blades, as well as cremation burials and new pottery decorations. At one time, we explained their appearance in the Aegean using an invasion-diffusion model, usually prescribed to Dorian invaders from the Balkans (e.g. Desborough 1972, 22-23-111; Snodgrass 1971, 305–21), but sometimes characterised in a series of waves after Milojčić (1948; Bouzek 1985, 143–45). Even ironworking was once counted among the imports brought by northern invaders (e.g. Ridgeway 1896, 113, 1901, 1:628; Peake 1933, 648; Richardson 1934, 558, 577) until

Snodgrass (1965) dispelled the idea by demonstrating that Hallstatt ironworking lagged behind that of the Aegean by several hundred years.[13]

These days, we rely on more sophisticated models to explain the appearance of the object types listed above. Such concepts include metallurgical *koiné*, hybridisation, connectivity, world systems, etc. We do not presume that Balkan and continental European smiths came to the Greek mainland in the 13th century and taught the late Mycenaeans how to create fibulae and Naue II swords. We instead believe that local smiths determined how to make them based on metallurgical experience, experimentation, and visual replication.[14] Yet, with iron objects, we persist with the diffusionist idea that Aegean smiths required direct instruction from foreigners. But how could such instruction be successfully administered if the itinerant metallurgists were travelling around the Aegean, as is usually presumed?

This question pertains to a contradiction in the model related to the processes of learning metallurgical arts. Studies on the process of learning how to produce crafts indicate that training takes place over a lengthy period in which the apprentice learns from the master the habits related to the operational sequence of production (Rückl and Jacobs 2016, 316–17). The complicated processes of extractive metallurgy and smithing was no exception. Documentary evidence from the past is scanty, but training often lasted many years.[15] Knowledge-sharing is a lengthy, repetitive process, so we must wonder how a 12th

[13] Harland (1930, 59) also disputed linking iron with the Dorian invasion some 30 years before Snodgrass.
[14] For work on how Urnfield bronze types arrived and were replicated in the Aegean see Borgna and Cassola 2005; Jung and Eder 2005; Jung et al. 2008; Cazzella 2009; Jung 2009.
[15] For example, Read (1902, 47) observed that smithing apprenticeships in parts of the 19th century CE Bantu-speaking regions of Africa often demanded lengthy service. English law in the 16th century CE set a minimum of 7 years of service for craft apprenticeships (Wallis 2008, 5–6), and 17th century records from colonial Virginia suggest a range of 3-13 years of service (Gill 1965, 32). The length of service might to some degree be governed by social practice (e.g. compensatory labour, gift presentation) rather than the essential time it takes to impart technical wisdom.

century foreign smith could simultaneously travel around Greece delivering made-to-order iron items in Lefkandi, Athens, and Crete, yet spend enough time in a location to train apprentices to a level where they could meet the level of production that we see in the 11th century onwards. It is for exactly this reason that Kienlin (2016, 133–34) points out that, in ethnographic research, metalworkers in foreign cultural contexts are rare. Metalworkers are most successful when firmly integrated in local communities; therefore, mobility, if any, tends to be restricted to an area with some kind of previously established contact and affinity in terms of communication, exchange, and/or a broadly similar socio-economic background.

The social entrenchment of metalworkers argued by Kienlin accords with the fact that we have virtually no historical texts substantiating the existence of travelling craftsmen. In their reviews of available LBA and EIA texts from the around the Mediterranean pertaining to craftsmen, Zaccagnini (1983, 258) and Muhly (2005, 685) conclude that the documentary evidence does not support the idea of a mobile class of craftsmen. Common themes in the historic records are that highly skilled craftsmen were precious commodities, often (but not always) attached to palace or elite complexes, whose services could be invited, requested, or exchanged by rulers and patrons, or treated as precious booty by invaders. Zaccagnini's (1983, 258) summation of the evidence is that to link the "movements of 'free' artisans with the spread of fundamental technologies (e.g. iron metallurgy) seems a serious historical mistake." Wallace (2018) is particularly critical of the concept of itinerant craftsmen, referring to it as a kind of trope or simplified shorthand to explain technology transfer.

By now, it is hopefully apparent that the itinerant metallurgist model is an unsatisfactory explanation for the role of craftsmen in the spread of ironworking in the EIA

Aegean. What follows is an alternative proposal for the role of metallurgists that incorporates the BA ironworking tradition. We have evidence that a small group of smiths, likely located in the LBA Peloponnese, were capable of working iron into products, specifically bezel rings and pendants (Chapter 3). Why look abroad when we have evidence of some familiarity at home? If we agree that 1) smiths best work when entrenched within communities, and 2) that technical learning is a lengthy and sustained process, then it is not far-fetched to believe that some of the BA knowledge extended through to the EIA.

4.3 Early Iron Age iron technology and craftsmen in the Aegean

The continuous production of iron items in the LH IIIC Peloponnese indicates that this area remained a key knowledge node for ironworking through the LBA-EIA transition. This is unsurprising, as its legacy as the centre of the Mycenaean world once made it the region with the highest concentration of craftsmen in the Aegean. For example, Linear B tablets from Pylos record over 400 smiths at Messenia working in some capacity (Tournavitou 1997, 37; Blackwell 2011, 322). Traditional scholarship views Mycenaean craftsmen as closely bound to the palace structure, envisioning them as wholly dependent on elite patronage for resources, pay, and the infrastructure to continue their crafts (Parkinson et al. 2013, 414). This was reinforced by texts from the Near East suggesting that the activities of their craftsmen were carefully controlled (Muhly 2005, 685). In such a model, the collapse of the palaces and elimination of the elite meant that specialist skills like ironworking would be forgotten.

This view of Mycenaean palaces as economic control centres that monopolised nearly every aspect of the political economy, however, has been challenged in the last 10 years (e.g. Galaty and Parkinson 2007a, 2007b), thereby paving the way for alternative

models of economic production. Relevant here is the idea that only some specialised industries were closely controlled by the palaces, like textiles, whereas others like pottery and metallurgy operated outside of the palatial sphere (Parkinson et al. 2013, 419). This model opens the door for the perpetuation of the local ironworking tradition within metallurgical circles during Phase 3. Such continuity, however, required three key components: 1) a stable environment to facilitate the lengthy teaching process, 2) continued access to networks of raw material acquisition, and 3) a consumer base with interest in products made of iron.

4.3.1 Stable communities for metallurgical teaching

The Linear B tablets provide us with some indication that strong metallurgical circles operated independently of the palatial network. Bech Gregersen (1997, 46–47) and Gillis (1997, 509) argue that the series of contracts (*ta-ra-si-ja*) recorded in Linear B tablets were the means by which the palace distributed raw resources to, and ordered finished products from, work groups outside of the palace control. Such craftsmen were referred to as *wanakateros* or *lawageisios* (Tournavitou 1997, 37). The Pylos tablets indicate that such outsourcing included metallurgical products. This kind of system is reminiscent of that which we saw in central Anatolia in the Assyrian Colony Period (Chapter 2), where merchants and palace patrons alike acquired raw sources of bronze and iron which they gave to smiths to create a desired finished product. In this system, BA smiths would not have been restricted by palaces from teaching their skills to others in their communities, meaning that metallurgical knowledge must have been more pervasive outside of the palatial world than was previously thought. Indeed, Gillis (1997, 512) notes that the

amounts of metal dealt with in the *ta-ra-si-ja* tablets were so miniscule that the bulk of a smith's production did not go to the palace, but must have been distributed privately.

In a world where not all metallurgists were dependent on palace patronage, stability and continuity would have been offered by the many Peloponnesian communities that continued to thrive, and some even grow, in the 12th and early 11th centuries. Investment in Postpalatial centres like Tiryns, Pylos, Mycenae, and Asine would have continued to attract people and trade – in other words, consumers and material resources that would have encouraged the perpetuation of metallurgical skills across generations. This would explain why, for example, despite the fact that the range of crafts practised reduced in the early part of the EIA (Dickinson 2006a, 115), many LBA bronzeworking techniques continued into the 11th century, most evident in objects like knives, swords, spearheads, cauldrons, pins, and fibulae that maintained their level of Mycenaean standards (Andreyev 2013, 425). Undoubtedly, without palatial patronage some specialist skills were not perpetuated: Andreyev (2013, 425) notes that technically more complex items like greaves, helmets, bronze and silver vessels, pendants, and diadems largely disappear. Nevertheless, as Dickinson (2006a, 144–45) points out, metalworking continued largely without interruption, which could only be achieved within a consistent environment for teaching, learning, and experimenting with metallurgical practice.

4.3.2 Continued networks for resource acquisition

The second key component for continuous ironworking is reliable access to the raw sources, either ores for smelting or billets for smithing. Overall, metal networks appear to have remained intact during the 13th to 11th centuries, as all of the common metals continued to be available in this period in similar quantities to the LBA, including bronze,

lead, iron, and precious metals like gold and silver (Dickinson 2006a, 121, 145; Thomatos 2006, 241). It is likely that the leadership groups responsible for leveraging the labour and resources to rebuild and expand several Peloponnesian settlements also maintained the exchange infrastructure required for metal production. This network probably grew out of a pre-existing Mycenaean supervision system for the metals industry. Gillis (1997, 511–12) has identified several groups of local authorities, the head of smiths (*qa-si-re-u*) and king's men (*ko-re-te, po-ro-ko-re-te, da-mo*), who acted as points of contact between the palace and village. Villages were often responsible for providing the raw materials themselves, so there were clearly independent local systems in place for resource acquisition. Since the metal industry was so decentralised, local authorities could continue to operate without detrimental disruption due to the removal of the palace system.

4.3.3 Consumer base for iron

The final component required to pass along ironworking knowledge was an active consumer base interested in finished iron products. Although BA ironworking was aimed at the wealthy upper echelons of Mycenaean society, by the 13th century there are indications that iron was becoming available to a wider segment of Peloponnesian society, which would only increase over time into the 11th century. The need for a consumer base might explain why iron expands to Crete and to the central and eastern Aegean areas in Phase 3. The presence of iron in this period tends to be explained as an import from Cyprus, either in the form of an object or itinerant craftsmen fleeing the destructions in the eastern Mediterranean. Other than the dress pins, however, most of the objects are firmly rooted in local production and burial traditions: pendants, bezel and finger-rings, knife and dagger typologies.

Equally plausible is that technical knowledge might have come from the Peloponnese. There is evidence for population movement after the palatial collapse, which might account for some of the site expansion in the east at the unknown Perati settlement, Xeropolis at Lefkandi, Emporio on Chios, and Grotta on Naxos (Dickinson 2006a, 63–64; Middleton 2010, 71, 73, 79). Dickinson (2006a, 66, 120) believes that traders and craftsmen moved to sites where they would have better chances of plying their trade, perhaps motivated by what he has identified as a general skills shortage outside of Crete, indicated by the continued use of obsolete objects, notable deficiencies in metal items likes spearheads, fibulae, and daggers, and the production of sub-standard pottery production and decoration. Those who did not head to the growing sites in western Achaea or other parts of the northwest Peloponnese might have moved east or to Crete (Dickinson 2006b, 118), or to other stable communities with strong, wealthy, and continuous populations like Athens (Papadopoulos 2017, 978, 981).

I suspect that working iron in Phase 3 to these newer regions was ancillary to producing bronze finished products. As argued above, itinerancy is not conducive for leveraging resource acquisition networks to a high level. Work in copper and bronze remained strong in the Postpalatial period, and this was likely the priority of any Peloponnesian smiths entering new communities. Ironworking was likely done on an ad hoc basis as local ore sources were being discovered, such as at Malthi where the iron ore came from nearby sources. It was this scarcity that initially saw iron items treated as prestige objects in mortuary display in Crete, Attica, Euboea, and the eastern Aegean islands, perhaps brought on by a skills shortage or the fact that metallurgists initially worked part-time (Gillis 1997, 512; Dickinson 2006a, 120; Kienlin 2016, 132). Indeed, the varied craft and metallurgical activities in the 12th century levels of the Malthi workshop

suggest that metalworking was either a part-time pursuit among other crafts, or that multiple workers shared a space within which to practise their specialisations. By the PG, however, we have evidence of workshops specialising in specific metals. Small-scale smelting of iron took place at the MPG village of Nichoria, and a 10th century furnace at Argos (Desborough 1965, 214) and early 9th century structure at Thorikos in Attica (Bingen 1967, 29; Gale et al. 2009, 160, 161) provide evidence for silver cupellation. The appearance of specialised iron workshops in the PG and the accompanying increase in bronze and iron finds and, by Phase 4, smiths were working full-time as demand increased and ore acquisitions networks were improved. Once established in communities, smiths would have taken on apprentices and a lengthy training process began that would be perpetuated by future generations.

It is within this context of entrenchment that ironworking could expand so extensively in Phase 4. This period is notable for its uniformity in metalwork (Dickinson 2006a, 118, 157). To achieve such standardisation, because training is such a lengthy process, it is unlikely that smiths travelled around the Aegean producing the same objects and teaching apprentices as they went. Instead, apprentices went to train with smiths who established themselves first in larger, better-supported communities like Athens, Xeropolis, Knossos, and Serraglio on Kos. Ethnographic research indicates just how conservative products are from apprenticeship structures because the system aims to establish standardisation in technique and process, discouraging inventiveness and creativity (Coy 1989, 10; Deafenbaugh 1989, 173; Lancy 2012, 118). An apprentice is expected to copy a master's techniques and innovations exactly. Such a system would encourage the high level of standardisation and uniformity observed in metalwork across the Aegean in this period. As apprentices completed their lengthy training, they might

replace their master or venture to new communities where they would not compete with their master (Lancy 2012, 114, 118), likely on the edges of their current community network. This mechanism facilitated the movement of iron knowledge across the Aegean, spreading out from the centres over several generations such that, by the MPG, even small, 200-person communities like Nichoria in Messenia smelted their own iron.

Phase 4 is one of continuous growth in the use of iron, such that, based on sanctuary dedications and references by Hesiod and Homer, by the 8th century most regions in the Aegean were using iron as their main metal (Morgan 1990, 195). What is remarkable about the expansion of iron use in this period is that we do not have evidence that the spread of the technology relied on a centralised elite control to leverage its production. Its growth across the Aegean was pervasive, yet inconsistent in pace, and moved at incremental stages across regions, which one would expect from the apprenticeship model. Based on ethnographic research, Kinelin (2016, 132–33) points out that metal industries do not need a strong, centralised elite to grow and become efficient. Instead, metallurgical practice was frequently self-organising within particular segments of society, and metallurgical knowledge was passed along kinship lines. So long as Aegean smiths had access to stable communities, raw sources, and a reliable consumer group, ironworking knowledge could survive a collapse. Parallels for this kind of spread are found in the Levant at Taanach and Tell Hammeh, where political fragmentation in the Iron Age I and II periods stimulated local industries to exploit their locally available raw metals sources (Stech-Wheeler et al. 1981, 268; van der Steen 2004).

4.4 Conclusion

Some of the ideas in this chapter run contrary to several commonly held beliefs regarding the ironworking in the EIA Aegean. These challenges may be summarised as follows:

1. Contrary to Snodgrass' Stage 1, BA ironworking in the Aegean is important. I divide the development into four stages that extend back to the EBA that represent a continuous development, not always in a linear fashion, of a low-level industry. Key developments take place in Phase 3, but the changes in production and use find their origins in the 13th century, if not earlier, in the Peloponnese.

2. The development of iron was a sustained practice with a series of transitions through phases in different regions, not a sudden switch from ornamental to utilitarian objects like we see in Snodgrass' Stage 2. Ornamental iron objects remained important throughout EIA Aegean mortuary practice. The idea of phases is that they are not linear or comprehensive. Phases 3 and 4 took place in different regions at differing times. Iron was not "the most significant *technical innovation* of the period" (Dickinson 2006a, 121) because, although more extensively used in the EIA, iron was a pre-existing industry that was able to transverse the 'Collapse' and grow alongside the continued copper and bronzeworking practices.

3. Contrary to many, we have reason to believe that most, if not all, of the earliest LH IIIC-SMyc/Min iron objects were of local production, rather than imported from Cyprus, and that the proliferation of the industry was the result of local investment,

not foreign influence. Certainly, technological knowledge sharing contributed to the Aegean industry, but some phases were much more dependent on eastern influences than others. For example, Phase 2 LBA possibly relied on imports of iron blooms or billets, while Phase 4 used locally smelted iron sources. In each of these phases, most of the object forms on the Mainland and Crete were of a decidedly local character.

4. The promotion of the iron industry was the result of consumer choice rather than ideas of technological superiority of iron or major advancements in its production in the 12th century. Increased integration in funerary practices, if not daily use for which we sorely lack evidence, promoted production and investment in infrastructure for resource acquisition and an apprenticeship structure to teach the craft. By Phase 4, remote villages like Nichoria were self-sufficient in iron production. If anything, major advancements in iron technology were likelier to have taken place under these kind of prosperous circumstances in the PG rather than the earlier ramping up of the LH III-SMyc/Min.

5. Contrary to the idea that travelling craftsmen spread ironworking, the data and ethnographic examples indicate that a model where craftsmen minimised itinerancy better promoted production. They required stable communities with infrastructure for resources, as well as a location to train apprentices who could spread the knowledge when they established themselves in new locations. This model accounts for the increased output of iron items and the high level of uniformity of metal items across the regions in Phase 4.

This concludes the discussion on Aegean ironworking. The next chapter focuses on the iron industry in Cyprus, which followed a very different development trajectory than the Aegean, regardless of the fact that these two regions were closely connected from the 12th century onwards. The next two chapters will highlight just how much local factors rather than foreign stimuli determine the nature of an iron industry.

Chapter 5. Objects of iron from Early Iron Age Cyprus

This chapter begins the two-part investigation into the development of the iron industry in Cyprus from the close of the BA around 1200 until 900 BCE. Over the course of these 300 years, there are at least 304 published iron objects spanning the LC III to CG II (Tbl. 8). Most finds are bladed implements, in particular a set of 131 knives,[1] as well as several daggers and swords, from 14 coastal and inland sites in Cyprus (Fig. 45). To begin the investigations, this chapter develops a comprehensive typology for the knives, and links the other iron implements such as swords and daggers to pre-existing typologies. The goal is not to source the origin of the knife forms, or those of any of the other objects, but to contextualise their appearance within the wider Mediterranean metallurgical framework. By this method we will outline the iron profile of Cyprus by answering specific questions: do the object types link to a Bronze Age tradition, or do they develop solely to accommodate the new metal? Does their design originate in Cyprus, or do they model foreign types? And how do iron and bronze forms relate to one another? Once we understand the iron landscape of Cyprus, we will proceed to develop a model for the growth of the industry and initial use of iron in the following Chapter 6.

[1] 126 knife examples are represented by some portion of the blade and/or tang; 5 are represented by handles only.

5.1 Iron knife typologies

5.1.1 Previous typologies

Several iron knife typologies exist, the earliest of which was developed by Gjerstad using material from the Swedish Cyprus Expeditions from 1927 to 1931. His first typology solely relies on examples from Idalion, and three of the six types include LC III examples (Gjerstad 1935, II:575–76, pl. 173). His second typology covers knives dated between the GC I to CC from Amathus, Idalion, Lapithos, and Marion (Gjerstad 1948, IV:2:132–35, 213, fig. 21). Types 1 and 3 of his two typologies have double-cutting edges, making them daggers rather than knives. Åström (1967, 1; 1972, IV:1D:473, fig. 60) produced an alternative LC III typology which eliminated the double-edge type, added a few examples from Enkomi and Kourion Bamboula, and created an extra category. Table 9 summarises these typologies. Both Gjerstad and Åström describe their Types 2 and 3 similarly, but Åström's typology differs by placing Idalion knife no. 1068 (C.300) into a separate Type 1 category. Åström identifies the shorter tang, single rivet, and blunted end as features that warrant an alternative classification.

These three typologies, however, do not form a coherent series. Åström's Types only address LC III examples, and Gjerstad's two typologies do not knit together well: although the variety of types expands, none of the examples from the second series are earlier than the CG I, and only two of the CA examples from his first typology (Idalion nos. 490, 727b) reappear in his second. Additionally, the most common knife form Shape 1 (see below) is missing from all typologies. Also notable is the fact that bronze and iron knife typologies are usually treated separately, which limits our understanding of their relationship. Only Catling's (1964, 102–4) three-type typology integrates a single iron knife, no. 13 from Enkomi Tomb 6. More recently,

Macdonald (1992) used the profile of the cutting edge and spine to develop a typology for knives from Amathus tombs 110-385, which cover the GC II onwards.[2] Macdonald recognises that his typology is incomplete and recommends that the more recent discoveries of knives dating to the LC III necessitate a revision. The improvement of a comprehensive typology will enhance our understanding of the development of iron in Cyprus, so the remainder of this section attempts to construct such a typology using all Cypriot knives from the LC III to CG II with comparable components.

5.1.2 Building a new typology

Defining a knife is essential when constructing a typology for the Cypriot knives. In the literature, there is a habit of referring to the knives under discussion as 'single-edged', presumably to differentiate them from the 'double-edge' EC and MC blades that are commonly referred to as knives (Åström 1957, 139–41, fig. 10; Stewart 1962, IV:1A:245-246. figs. 97-98) (Fig. 46). Function was the key factor for defining these dual-sided blades as knives rather than daggers. Dagger implies a thrusting weapon, whereas a knife, while it can be used as a weapon, may also be a cutting tool. Åström (1972, IV:1B:136–38, fig. 9) and Stewart (1962, IV:1A:245, figs. 97, 98) assigned blades with hooked-tangs (rat-tail tangs) and high midribs into dagger categories because Schaeffer (1936, 42 ff) demonstrated that they could be used as spearheads, daggers, or swords, i.e. thrusting weapons (Fig. 47). Any other short-bladed

[2] Macdonald (1992, 48, fn. 46) mistakenly attributes Gjerstad's 1948 typology to Åström (1967).

implement was categorised as a knife. Catling (1964, 56), on the other hand, identified the same double-edged bladed implements as daggers.[3]

Referring to these double-edge blades as knives, however, remains common (e.g. Swiny 1982; 1986; Todd 1986; Dunn-Vaturi 2003). Balthazar (1990, 324) expressed puzzlement at the terminology, but nonetheless followed suit. Lassen (2007, 253) avoided weighing in on the debate by referring to them as "daggers/knives". I choose to use the terms dagger and knife to indicate features of shape and form rather than function. Knives have a single cutting edge on the blade, and their section is roughly triangular. Daggers have two cutting edges and a diamond section when a midrib is present, and an ovoid or flat section when it is not (Fig. 48).[4] With these definitions in mind, I drop the epithet "single-edged". As for the EC and MC blades, on account of their double-edges they should be classified as daggers, making true knives rare on Cyprus prior to the LC III.

From the collection, 79 are preserved and published well enough to compare. As a whole, the Cypriot iron knives share several features (Fig. 49). Most had wood, bone, or ivory handle plates fixed to a squared or flanged tang by a row of bronze or iron rivets.[5] Based on

[3] The length at which a dagger becomes a sword is a contentious debate. For example, at the lowest end Catling (1964, 110) made 25 cm the threshold, whereas Gordon (1953, 67) set the mark at 35.5cm (14 inches), Childe at 39 cm (Stewart 1962, IV:1A:245), and Shalev (2004, 1) generously at 50 cm. Length is less of an issue for iron knives as even the best preserved do not surpass 30 cm.

[4] To Shalev (2004, 1), "A dagger is defined as a metal tool with a hilt and double-edged blade, unlike a knife which has only a single blade." I generally agree, but hesitate to rely heavily on the blade having a hilt – examples of blades from the Cypriot EC to LC are often tangles (e.g. Stewart 1962, IV:1A:246, fig. 100.5, 6; Catling 1964, 61, 125–26, figs. 3.8-11; 15.1-4). It is not always clear how a hilt would have attached to a blade, whether hafted or riveted. We must be aware that razors can be double-edged blades with tangs and might be mistaken for daggers. Blegen (1937, 322 ff.), for example, mistook the "leaf-shaped" blades from the tombs at Prosymna (Catling 1964, 230) as daggers rather than razors.

[5] At least three examples in the Cypriot corpus are unriveted: C.20 (Enkomi Tomb 108), C.820 (Palaepaphos-Skales Tomb 83), C.970 (Amathus Tomb 311). Unriveted tangs are not typologically significant. Their number is small and unriveted tangs were the norm across the European continent and the Mediterranean prior to the LBA.

the few fully preserved examples, knife length from tip to tang ranges from 8 to 30 cm. The knives are thin, with maximum blade width between 1 and 3 cm. The LC III specimens come from several sites, and the CG I and II specimens primarily from two sites, namely Palaepaphos and Amathus. This typology, therefore, reflects certain regional preferences and excavation biases, so we must be cautious of applying any conclusions to the entire island.

Broadly speaking, most of the knives fall into Deshayes' (1960, 313-316) Type K, particularly K2b. This kind was common in the Aegean at the end of the BA, and features a rectilinear and elongated blade shape, and a narrow tang with rivets arranged in an axial line. Type K, however, is too broad for the closer inspection required here. Following Macdonald's (1992) attention to the profile of the cutting edge and spine, the blades divide into 11 primary shapes that do not follow any obvious regional distribution pattern, and most span multiple periods (Tbls. 10, 11, Fig. 50). Relying on profile descriptions paints a clearer image of the shape of the blades than some of the descriptive terms used in previous typologies such as "leaf-shaped", "lance-shaped," or "Aegean type".

Secondary typology elements include tang shape and size and method to affix the handle (i.e. rivets). This might come as a surprise because, in Sandars' (1956, 175) quintessential typology on single-edged knives in the Aegean, the absence or presence of flanging on the tang (fishtail tang) is the defining feature between Classes 1a and 1b;[6] blade length and rivet number vary considerably within each class, and flanged versions are less common than non-flanged (Karantzali 2001, 71). The drawback to relying on blade shape is that we cannot classify knives when only the tang preserves. With Cypriot knives, however,

[6] See Macdonald (1992, 48–49) for details on the flanged tang in knives from Amathus.

the small number of preserved examples and the variability in tang form and rivet number across the shapes means that tangs are not useful typological markers.[7] Bronze tangs simply preserve much better than iron ones. Also, Sandars (1956, 177) noted that tang flanging was a marked innovation in the Aegean at the beginning of the LBA, but in Cyprus no such chronological distinction exists; both flanged and squared tangs accompany the knife forms from the start, so are inconsequential to this study.

5.1.3 The iron knife typology

Shape 1 (Fig. 51a-i)

Shape 1 is so common that it should be considered the island's standard form of iron knife. It has a distinctively concave edge and convex spine that narrow to the tip. In some specimens, the tip turns slightly upwards making an S-shaped blade profile (C.550, 1130, 700). The concave profile varies from a strong curve (C.380, 540, 420, 490) to a slighter one (C.330, 600, 610, 630, 800, 700). The curvature range along the edge is remarkable, so with some examples it is difficult to distinguish from the straighter blades of Shapes 6 or 7 (C.810)**.** Most have a curved, sloped or angular stepped heel where the blade joins the tang and would have abutted the perishable handle. Heels are features adopted from Aegean bronze specimens (e.g. nos. 1.12 Mycenae, 1.14 Oxylithos, Fig. 53), where they appeared in the 16th century when bone and wooden handles were attached to knives throughout the eastern Mediterranean

[7] Knife tangs, with their thin, flat profile and straight edges, help differentiate a corroded blade from a dagger. Cypriot dagger tangs belong to three main types: the unriveted "rat-tail" or hooked tang, which extends back to the Chalcolithic, short triangular tangs with rounded or squared butts that may or may not be riveted, and the rarer riveted flat tangs that narrow to a point. See Catling's (1964, 56–62) section on EC and MC daggers for further details on tang types.

(Karantzali 2001, 71). Sandars (1956, 177) attributed the concave profile on some blades to whetting the edges. While this might contribute to curvature on some knives, the tell-tale sign of an intentional curve, even on corroded samples, is the parallel change in angle of both the cutting edge and spine towards the upper tip of the blade; on heavily whetted knives, the spine will remain straight. Had more of the blade of C.810 been preserved, its angles would probably have resembled the almost complete C.700.

Some of the best-preserved tangs of all iron knives in Cyprus belong to this shape. Based on the few fully preserved tangs, two types are evident, namely riveted and unriveted. Riveted tangs are the most common and, where fully preserved, the tangs terminate in either a flange (C.530, 1140, 1170), or a squared/rounded end (C.610, 620, 800) (Macdonald 1992, 50). The number of rivets does not necessarily correspond to tang length: some tangs have only a few rivets spaced apart (C.630, 1140, 1230, 490), while others pack as many in the row as possible (C.800, 1130, 1170). Rivets are single pieces that were inserted through the tang; ones in iron were not forged with the original tang but added later. Rivets are made in both bronze and iron, and on a few specimens both materials (C.1270, 710), but the application of one material or the other does not exhibit any definable pattern according to date, knife type, or rivet number. Waldbaum (1982) has addressed bimetallism and concluded that the combination of metals is not technologically or stylistically significant.

One observation of note is that iron rivets in the knives are never nearly as tightly packed on a tang as examples in bronze (C.1160 (4 rivets), 1170 (5 rivets), 800 (6 rivets), 1130 (8 rivets)). In these instances, the overabundance of rivets serves a decorative purpose, as this many would be unnecessary to affix the handle. For example, the most decorative knife of the

group, C.1130 from Amathus, has ivory hilt-plates secured by eight bronze rivets, which were capped alternately with silver and gold sheet. Traces of two bronze fragments adhering to one side of the blade may be the remains of a scabbard (Karageorghis 1981, 148, pl. XXIV: 1,3, 1982, 299, pl. XXV:3; Waldbaum 1982, 340, Cat. 27; Macdonald 1992, 49, 63). Capped rivets are rare in Cyprus. A comparable handle comes from the butt fragment of a bronze dagger or knife from a pit at Kouklia-Evreti KD 140. The bone grip plates are fastened by bronze rivets capped with thin gold sheets (Maier and Karageorghis 1984, 68, fig. 54). The practice occasionally appears for knives in the Aegean, and bronze knives with gold-capped rivets date to the LM I-II at Pseira (Sandars 1956, 175, 189, 1.4) and the LM IIIA Tomb 2 "Tomb of the Double Axes" at Isopata on Crete (Evans 1914, 42, 58, fig. 54). Better documented are the numerous examples of MBA and LBA daggers and swords from Crete and the Mycenaean world with gold or silver sheet-capped bronze rivets (Hood 1994, 173–86; Papadopoulos 1998). We find similar silver capping on later CA swords from Cyprus (Karageorghis et al. 2000, 164–65, nos. 268, 270).

Despite the abundance of Shape 1 examples today, the shape was largely absent from previous typologies. This was in part because each typology only addressed segments of the relevant periods in question, thereby only giving a partial view of the entire corpus. Gjerstad's (1948, IV:2:213) Iron Age typology includes three CG I-II examples from Amathus and Lapithos, and Snodgrass (1980, tbl. 10.1) includes one LC IIIB knife (C.380). The result is that their typologies relied on what was an eclectic mix of experimental forms in an ad hoc industry that obscures the level of standardisation and regularity that actually existed. Another factor is that the corpus has grown significantly with the publication of the Kouklia/Palaepaphos cemeteries

(Karageorghis 1983; Karageorghis and Raptou 2014), which provide the majority of Shape 1 examples from the CG and, to a lesser extent, the Amathus tombs (Karageorghis 1981, 1987; Macdonald 1992). While we still cannot claim that we have a holistic view of the range of knife types in Cyprus, compared to our predecessors we see a knife shape that was reproduced so regularly that it formed the crux of a fledgling iron industry.

Shape 1 connects the Cypriot specimens further afield than the Aegean. The curved and S-shaped blade originated from Montegiorgio and Baierdorf bronze types from northern Italy and central Europe (Bianco Peroni 1976, 14–15; Schaeffer 1971, 377; Macdonald 1986, 140). The tang of those examples, however, have raised edges and usually end in a ring (Fig. 52).[8] The blade shape is rare in riveted form in the LBA Anatolia (e.g. Boğazköy, Boehmer 1972, 145, pls. 47–48), but rivets appear in the EIA at coastal sites such as Tarsus and Assarlik (Goldman 1937, 277, fig. 34; 1963, 363; Carstens 2011, 487, fig. 5) (Chapter 2). The combined use of a flat tang with squared or flanged ends, a sinuous curved or S-shaped blade with a heel, and riveting to affix the handle was a late 15th and 14th century BCE Aegean adaptation. This combo appears on 12th century knives of the Matrei-type in central Italy, on examples in eastern Cyprus, and throughout the Levant (Figs. 52, 54, 55). In their Cypriot form, Shape 1 knives appeared first on the east coast. An LC IIIA iron knife comes from Enkomi, followed by other 12th century iron examples from Salamis and Kition, and bronze examples from Enkomi and Sinda. In the CG I, Shape 1 moved westwards to Lapithos, Amathus, Palaepaphos-Skales,

[8] The Matrei knife type is similar to the Apulian knives in terms of having a flanged tang, riveting, and sinuous S-blade (Bianco Peroni 1976, 16–19 pls. 2-3). They have a distinctive notch at the base of the blade edge, and decorative linear incisions on the blade link them to knife types north of the Alps. Their main distribution is north Italian sites in the Veneto and Emilia regions. Chronologically, they correspond to Hallstatt A1 and 2 phases of the 12th and 11th centuries.

Plakes, and Xylinos. Examples in either material have not yet appeared at Idalion, Katydhata, Kourion, or Palekythro. From the 16th to 12th centuries, the blade shape went on a journey from Urnfield Central Europe through to Italy, the Aegean, and on to Cyprus via the Dodecanese.[9] In Cyprus, the blade was adopted in conjunction with a new metal, iron, and it is this adaptation that accompanied the blade to the Levant.

Once on Cyprus, the tang options underwent a degree of experimentation. C.820 from Palaepaphos Skales, has a long, rectangular-sectioned unriveted tang with a swelling at the end. The tang likely acted as the handle. It is unique, even when compared to bronze examples. A parallel might be drawn with a bronze knife from the Upper Grot where the haft terminates in a human head (Hogarth 1899, 110, fig. 44) (Fig. 56). Hogarth notes that it is unprecedented in the Mycenaean world, but he draws distant parallels to Scandinavia. While C.820 does not terminate in a human head, both handles are round in section, narrow after the sloped heel, and widen towards the butt.

The Levantine tradition of using ring-pommel handles made of bone and ivory appears on several Cypriot knives (Tbl. 13, Fig. 57-59).[10] This includes a bronze LC IIIA knife with ivory

[9] Rare examples of Shape 1 knives in Italy are confined to the south at sites with strong Aegean connections. One comes from a late 14th to 13th century context at the *emporion* site of Scoglio del Tonno near Taranto, Apulia (Bianco Peroni 1976, 14–15, no. 16, pl. 2; Alram-Stern and Deger-Jalkotzy 2006, 105; Bietti Sestieri, Giardino, and Gorgolioni 2010, 462, 465, fig. 7.38). A bronze knife mould inspired by Aegean prototypes was found with 12th century Mycenaean IIIC pottery at Roca Vecchia in Apulia (Bietti Sestieri 2008, 29, fig. 18). A local variation of Shape 1 knives is found in the 12th century Matrei types that appear in central Italy. They utilise curved and S-shaped blades with linear designs on the spine, while the edge has a sort of stepped heel that appears more as a notch removed from the lower edge. The riveted tangs have raised edges and usually end in a flange (Bianco Peroni 1976, 16–17, pls. 2-4, nos. 24-39). See Bouzek (1985, 145) for a summary of the direction of influence between European, Italian, and Aegean knives.

[10] Maier (Dever and Gitin 2003, 540) suggests that the ivory ring handles from the Levant may have influenced the metal rings on knives in Italy and Urnfield contexts. Sherratt points out that, chronologically, this is impossible, as the Levantine knives are much later than any others and, importantly, that the ivory ring handles only make it as far in the Aegean.

ring found among a workshop assemblage of metal objects from Enkomi (Cyp.10, Fig. 60) (Schaeffer 1971, 377, fig. 82b; Courtois 1982, 160, fig. 4.3, 1984, III:26, no. 227, fig. 8. 13, pl. I.4, II.18; Lagarce and Lagarce 1986, 62, pl. XVII: 2), and another from Enkomi with only the handle preserved (Cyp.20, Fig. 60) (Caubet 1987, fig. 5.57, pl. XI). Similar handle plates appear on two CG I iron knives from the Palaepaphos Plakes cemetery, C.660 in bone and C.710 in ivory, both affixed by bronze rivets. C.710 likely had ivory discs with engraved rosettes that were affixed by three small iron rivets still embedded in the ring (Karageorghis and Raptou 2014, 50, pls. 27, 89), and it likely resembled the handle of an iron knife from destruction layer 4 at Megiddo (Lev.70) (Schumacher 1908, IA:87, IB:pl. XXVII.a) (Fig. 57). A unique reinterpretation of the ring-pommel is LC IIIA iron knife C.240 from the Cesnola Collection. The handle shape is exactly like the Levantine style with a small perforation hole and a groove on the outer edge of the pommel-ring, but it is made of bronze and incised with designs similar to those on Italian bronze-handles, as well as Levantine bone and ivory ones (Fig. 57).

One of the earliest knives, LC IIIA C.20 from Enkomi, has an unusual unriveted rectangular tang that ends with half a ring enlarged on the lower side. The ring-pommels on most Urnfield, Balkan, or south Italian bronze knives are too round and evenly formed to be models (Bouzek 1985, 147; Mazar 1985, 2:7) (Fig. 61). The best parallels are a unique set of large bronze knives, *Schlachtmessern* (battle knives),[11] from Mycenae Grave Circle A, Shaft Grave IV (Karo 1930, 103–4 pl. XCVII, nos. 443, 445, 447; Schliemann 1976, 279, nos. 442, 442a), Grave Circle pit 2 at Pylos (Blegen et al. 1973, 161, figs 229, 5), Vapheio (Petrie 1917, 27, pl. xxxii.E1), and the recently excavated Griffin Burial at Pylos (Davis and Stocker 2016a,

[11] Molloy (2010) calls these large knives "single-edged" and assigns them the range of MH III-LH IIIA1.

2016b) (Tbl. 13). Although an entirely different blade shape from Shape 1, their rounded bronze solid-cast handles coil into a ring termination on the lower side of the handle in a way reminiscent of the Enkomi knife C.20 (Fig. 62). The Enkomi knife, as a result, is a remarkable specimen because it combines two components, blade and handle, that were being experimented with in the Aegean at the end of the BA. LC IIIA knife C.60 from Kouklia Teratsoudhia is similarly experimental. Like C.20, it too has a semi-circle that protrudes on the lower side of the handle, but instead of being made of metal is it ivory and likely once had discs affixed. This knife combines handle material and decoration (ivory, discs) inspired from the Levant with an Aegean handle design (*Schlachtmessern*) on a blade material (iron) popularised in Cyprus.

5.2.2 Shape 2 (Fig. 6j)

Shape 2 only has a few examples. These specimens have a curved blade with a convex spine, but where the blade angle changes, the spine straightens as it narrows to the point. The edge is concave starting from the join, but where the angle changes the edge becomes convex to the pointed tip. The overall blade curve has a triangular angle to it that differs from the gentler slope of Shape 1. The concavity on the edge of the upper blade further differentiates the knives from Shape 1. C.290 from Idalion varies from the Enkomi examples in that it has a sloped heel and the blade angle is less triangular. The blade is reminiscent of some machete-like Mycenaean knives from Grave Circle A (no. 2.1) and Prosymna (no. 2.2) (Fig. 63). All three specimens date to the LC III. Knife C.40 from Enkomi Tomb 58 is of a larger size, having 29.2

cm of preserved length with traces of ivory hilt plates held by four bronze rivets.[12] Åström (1967, 1) thought that this shape was inspired by Aegean types, but I could not find convincing parallels. It may be little more than a variant of Shape 1.

Shape 3 (Fig. 6k)

The two examples of Shape 3, C.10 and C.640, come from the Palaepaphos cemeteries of Eliomylia (LC IIIA), and Skales (CG I). The knives have a concave edge, convex spine, a crescent-shaped blade that narrows to the tip, a small steeped heel, and short, squared tangs with a single rivet. Zimmerman (2001, 116) believes that the example from Eliomylia is the earliest iron knife in Cyprus. Although identified in the literature as knives, in reality they may be sickles. Their distinctive crescent shape with a slightly stepped heel is familiar from sickle and reaping blade inventories in Deshayes (1960 vol. 2, pls. 45-47) and Catling (1964, 83–84

[12] There is some confusion about the find location of this knife; for almost a century, it was misidentified as coming from the Enkomi Foundry Hoard. In his original publication, Murray (1900, 31) noted that Tomb 58 has two iron knives with ivory handles, no. 955 with a distinctive handle shaped as a bull's leg (pl. II:995), but the second knife he does not give an inventory number. On page 25, however, Murray refers to an iron knife with an ivory handle in figure 25 as no. 1482. A context for this knife was not provided. The inventory number is strange because inventory numbers for items from the Foundry Hoard in figure 16 have range from 1456 to 1535, into which no. 1482 would fit. Nevertheless, Murray does not mention that an iron knife was found in the Foundry Hoard. The problem arises when Schaeffer (1952, 31, pl. 64.6) published an image of an iron blade from Murray's excavations in the British Museum which he claims is from the Enkomi Foundry Hoard. This blade matches one from figure 16 identified strangely as no.*994. The star (*) would seem to be Murray's (or the editor's?) acknowledgement of some kind of mistake, because inventory numbers 994 and *994 are ribbed vases (p. 31). Murray did not provide any information on an additional iron knife no.*994. Schaeffer (1952, 31, fn. 3) explains this mysterious iron knife as one that Murray forgot to mention in his report. Presumably, Shaeffer realised that no. 1482 was a bronze knife misidentified by Murray, as Catling (1964, 103, fig. 10:12, pl. 11:g) published knife no. 1482 fig. 16 as flimsy bronze knife with a bone handle (confirmed by Snodgrass (1980, tbl. 10.1)); the images of knives in Murray's fig. 16. 1481 and 1482 match Catling's fig. 10.11 and 12). Considering that Murray never mentioned an iron knife in the Foundry Hoard, it is interesting that Schaeffer never made the link between no.*994 and Murray's second knife from Tomb 58. Perhaps this was because, in Schaeffer's photo, the blade is missing an ivory handle. Nevertheless, in the ensuing decades, no.*994 was placed in the Foundry Hoard (Åström and Åström 1972, IV:1D:476; Snodgrass 1980, tbl. 10.1, Cat. 8) until Waldbaum (1982, fig. 1, cat. 12) was able to locate and reunite the missing haft in the British Museum with the blade. This knife now matches Murray's drawing of the second Tomb 58 knife. The reunited pieces can be viewed on the British Museum website online collection, museum no. 897,0401.994.+.

fig. 8, pl. 5). Parallels are noted in Table 12, but the best examples include no. 3.4 from Aigera in Achaea (Alram-Stern and Deger-Jalkotzy 2006, 108, pls. IX, 23), no. 3.7 from the Athens Acropolis Hoard (Montelius 1924, 1:153, 156, fig. 491), and no. 3.16 from Enkomi (Courtois 1984, III:20, fig. 8) because they all have a single rivet as well as close blade shape. Blade parallels with rivetless tangs include nos. 3.17 and 3.18 from Enkomi (Courtois 1984, fig. 8; Dikaios 1969, pl. 171) (Fig. 64).

The single rivet on a short square tang is what sets these iron specimens apart from the rest of the knife corpus. In bronze blades, it is a key feature used to set sickles apart from knives which have two or more rivets (Stubbings 1954, 293). Based on shape, alone some sickles might otherwise be identified as Shape 1 knives (see Catling 1964, 84, n. 7). The arch of a sickle blade tends to be greater than on the knives, but this is not a reliable rule. Single-rivet "sickles" Aigera no. 3.1 and Drakotrypa no. 3.13 are cases in point, where their blade shapes resemble iron knives C.910, 1240 (Lapithos), and 490 (Palaepaphos Xylinos), while their enlarged sloping heels are similar to that of C.870 from Amathus (Fig. 65). One exception might be no. 3.2 from the Mycenae Poros wall hoard. The slightly upturned tip is reminiscent of Shape 1 blades C.550 and C.1130 (Amathus), and C.700 (Palaepaphos Plakes), but its single rivet on a short square tang is likely why the excavators identified it as a sickle (Wace 1953, 7, pl. 2b (4th from left); Stubbings 1954, 293; Deshayes 1960, 343, pl. XLVI,6, no. 2796) (Fig. 66). The single-rivet rule is, of course, not without exception, as evidenced by the two rivets on Knossos sickle no. 3.15 in Deshayes' (1960, 344, pl. XLVI, 21) sickle inventory, compared to the dual-riveted tangs on C.1140, 910, 1240, and 490 (Figs. 65, 67).

If C.10 and C.640 indeed are iron sickles, then they differ from two iron counterparts (nos. 448, 647) from the LC III settlement levels at Enkomi (Courtois 1984 fig. 7.21; Dikaios 1969, 1:725, pls. 135:77, 172:16). Although poorly preserved, these specimens have unriveted wide tangs reminiscent of Catling's sickle type b4 exemplified by no. 1276 from the Enkomi Weapons Hoard (Catling 1964, 83, pl. 5:e) or no. 2412 from Maa-Palaiokastro (Karageorghis and Demas 1988, pl. 106) (Fig. 68).

Shape 4 (Fig. 6l)

Shape 4 contains two LC IIIB specimens, C.250 from Enkomi and C.310 from Idalion. They have a concave edge, convex spine, hooked or rounded tip, a large, flat swollen heel and riveted tang. C.310 is the only iron knife in Gjerstad's (1935) typology, grouped in Type 2. Åström (1967, 1) adds C.210 from Kourion Bamboula to Gjerstad's Type 2, but these knives are different, the one from Kourion having a convex edge and concave spine. Both specimens here are small for knives: C.310 is 12cm, and C.250 is an unusually small 5cm in length. The knife is reported as fragmentary, but Dikaios (1969, pl. 172.17) draws it as a complete specimen (albeit with an awkward join), so it is difficult to confirm its true shape. If the blade were extended, then its wide base and steep curves would suggest that it is another iron sickle from Enkomi. Dikaios (1971, 2:526, 762) also refers to this knife as an "Aegean Type", but I have yet to find a parallel from that region.

Shape 5 (Fig. 6m)

This shape is rare. One example, C.350, is from an unknown find location in the LC IIIC Tomb 19 in the Kourion Kaloriziki cemetery. It has a slightly concave edge, a straight or slightly convex spine, and sloped heel. At the upper blade, the edge turns upwards to form a round, blunted tip. The arrangement for securing the haft is unclear. It possibly had a raised midrib, an unusual feature on knives in the Aegean and Cyprus. The preserved length is 15.7 cm, maximum width 1.5 cm across the heel. Wood fragments were found on the upper blade. This specimen is not well preserved, being composed of four fragments, but the excavator Benson (1973, 124) admits uncertainty with the joins. Benson (1973, 124) points out that shapes from Kourion Kaloriziki do not correspond to the more common knives found by the SCE at Enkomi. Indeed, knives from Kourion in this typology correspond with I.5, III.8, and III.9. Although rare, Shape 5 is not entirely without precedent. An Aegean parallel comes from LH II-III Trypha IX at Kallimani in Khalkis (Fig. 69). The blade has a concave edge, straight spine, sloped heel, and round, blunted tip. Like C.350, the hafting mechanism is unclear. It is 16.2 cm in length and 2 cm wide across the heel. Hankey (1952, 94) links it to an earlier LH I knife that Blegen (1937, fig. 270.4) found at Prosymna, but this knife belongs to Shape 6A (see below).

Shape 6 (Fig. 6m-n)

This shape has a straight edge and spine that narrow to the tip and widen slightly towards the lower blade. Variation Shape 6A has a sloped or stepped heel and, in some examples, a very straight back to the tip. On the upper blade, both edges curve slightly to the point. They resemble daggers in oblique view but have a single cutting edge. C.920 has an

unusual swelling in the blade, perhaps a sloped heel before the (missing) tang. Tangs of this form, where preserved (C.260, 1060, 1250), are short and flat with two rivets to attach the handle. The only fully preserved knife, C.1250, is 15 cm long. Seven iron examples come from six sites and all but two date to the CG II. This number is remarkably small considering that the shape was so popular in the LBA Aegean that Persson (1931, 98, pl. 32,6 top) and Evans (1906, 64, fig. 71, no. 51c) consider it the "ordinary" shape for the region. The shape and variants dominate most knife lists (e.g. Sandars 1956 Appendix 1; Papadopoulos 1979, 157). The shape exists on Crete since at least the MM II from Mavrospelio tombs at Knossos, and the MH III/LH I from Grave Circle B tombs at Mycenae. I have found over 100 examples of these knives in bronze from the Aegean and rest of the Mediterranean, but Table 12 summarises a selection of examples.

Aegean bronze parallels for Shape 6 show greater variation than their Cypriot iron counterparts. Many examples are almost twice as long as C.1250. Rivet number varies markedly, ranging from 1 to 6, and the edge of some blades flick upwards towards the tip (e.g. Dendra no. 6.25). Shape 6 parallels for C.1250 include Mycenae no. 6.15, Khalkis no. 6.22, Dendra no. 6.23, and Isopata no. 6.55 (Fig. 70). Shape 6A (sloped/stepped heel) sometimes has a flicked-up tip like Prosymna no. 6.30, Thebes no. 6.52, Dictaean Cave no. 6.79, and Beth Pelet no. 6.102 (Fig. 71). 6A examples with straight tips include Khalkis no. 6.37, Mycenae no. 6.34, Prosymna no. 6.39, Ialysos no. 6.87, and Serraglio, Kos no. 6.85 (Fig. 72). The sloped/stepped heel has no geographic or chronological significance. Both Shapes 6 and 6A have examples with very straight spines and edges that angle up to meet the spine at the tip: Dendra no. 6.25, Mycenae no. 6.18, Pylona, Rhodes no. 6.90, and Enkomi no. 6.97 (Fig. 73).

Shape 6 is uncommon outside of the Aegean world. Both variations turn up in 13th century contexts at Maa-Palaikastro (nos. 6.92, 6.95) (Fig. 74). Karageorghis and Demas (1988, 247) comment on the shape's rarity in a Cypriot context. A 13th century variation from Kalavasos-Ayios Dehmitrios (no. 6.93) has an unusually sharp angle on the stepped heel and pointed tip, which might also have a parallel in the upper blade fragment no. 6.94 from Maa-Palaikastro. Iakovides (1980, 94, fig. 113, no. M 26) notes the use for a similarly shaped knife from Perati is for cloth or leather cutting. A few examples of Shapes 6/6A appear in the Levant, including one of iron from Gezer (no. 6.101), and a bronze import found with an early Naue II sword in a hoard from Ugarit (no. 6.99).

The Palo Orsi museum in Catania, Sicily, houses another variation, 6B, from Thapsos (no. 6.105). It was found with other objects from the Aegean and is potentially an import. The blade is very slim, and the lengthy tang has three rivets. It closely resembles no. 6.104 from Katarraktis, Achaea, which has four rivets along the tang and two in a row lengthwise.[13] Both have a very slightly concave edge and widen at the lower blade before meeting the slightly fanged tang (Fig. 75). The blade sides are so straight that they resemble Shape 6 rather than Shape 1. Nevertheless, these examples demonstrate the subjective nature of classification, and remind us that the nature of handcrafted metalwork means that smiths will never produce the exact same shape twice, making it sometimes difficult to tell where one shape ends and the next begins.

[13] This variation is rare – Papadopoulos (1979, 157, figs. 310 (e), 345 (c)) recognised that this knife was unusual, noting that it looked like cross a between Sandars' Class 1 and 6. Although an unusually narrow and tapering blade, the blade shape based on the outline of the sides fits into Shape 6. He did not know of any parallels when writing. I only know of the unpublished knife from the Palo Orsi museum in Catania.

Considering the Cypriot propensity for converting Aegean forms into Cypriot iron knives, it is surprising that the most common Aegean shape does not appear more frequently. Sandars (Hood et al. 1958, 234) and Verdelis (1977, 50–51) note that Aegean bronze knives with very long, straight spines with parallel or nearly parallel edges and long handles did not survive past the LH IIIB, which is confirmed by the fact that only a few eastern Mediterranean examples date to the 14th century or later (Tbl. 12).

Shape 7 (Fig. 6o)

The four iron examples share a straight edge, and a straight or slightly convex spine that slopes to the pointed tip. Preserved tangs are flanged. So far, the shape is confined to CG II-III from the Amathus and Palaepaphos Skales cemeteries. C.1180 is one of the lengthier knives in the entire corpus at 26.75 cm, while C.880 and C.1200 are 16.7 cm and 17.8 cm, respectively. The shape was difficult to find parallels for. LH I knife no. 7.1 from Schliemann's Mycenae excavations is a possibility (Fig. 76). The blade of Gezer bronze knife Lev.10, with an ivory ring-end pommel, is a close parallel with its straight edge and convex spine that tapers to a pointed tip (Fig. 57).

Shape 8 (Fig. 6o-p)

Shape 8 includes the majority of knives with a convex edge and concave spine. Some examples are very well preserved, and the majority date to the CG with the exception of an LC III knife from Kourion Bamboula (C.210). Like Shape 1, the strength of the curve varies within the series, with (C.1030) from Kouklia Skales representing the strongest curve. The blade width

is relatively even or widens slightly towards the lower blade, and two specimens have sloped (C.410) and stepped heel (C.950). The majority have flat, rectangular tangs with two rivets for the handle. Traces of handles are remarkably well preserved in this group, as well as bits of cloth wrapped around the blade of C.460. Handle traces are wood except for the LC III C.210 example, which is bone. The shape is represented in the Aegean, Cyprus, and the Levant in iron. The thin, tapering blade of C.1030 is paralleled on Dictaean Cave no. 8.3, while the blade curve and short tang on C.210 and Koumasa no. 8.2 are very similar (Fig. 77).

C.950 from Lapithos is unique because its wooden handle is in the shape of a bird's head (Fig. 78). Thought to have originated in Egypt, bronze bird-head handles are also found in the Aegean. An example comes from LH IIIB-C Perati (Anim.60) (Tbl. 14). An ivory version was found at Kourion Bamboula (Anim.65). C.950 differs from these examples in that its head makes up the entire handle and it turns away from the palm if gripped, whereas on the examples the heads curve around to face the blade. These types of duck-head handles are commonly found on Levantine ivory cosmetic boxes (Saidah 2004, 26, figs. 16, 64, no. 33). Müller-Karpe (1963, 10-11, fig. 1.2-3) alternatively points to 14th century continental knives from Riegsee in upper Bavaria (Anim.40), and Şpălnaca, Albania (Anim.85).

The best parallels are Italian and continental examples. The handle terminal on Anim.30 from Fucino near L'Aquila is of bronze, while that on Amin.75 from Pentalica in Sicily, and a sword from the same cemetery, are made of ivory (Fig. 79). Like C.950, their bird heads face the edge side of the blade, away from the palm. The blade on Fucino Anim.30 is reminiscent of Shape 1, drawing from Baierdorf types. With the Pentalica examples, however, Tanasi (2004, 342) believes that they are Mycenaean imports or inspired by Aegean

prototypes. Certainly, the ivory handles are from the East, but overall the knife blade shape with recurved tip is uncommon in the Aegean. There is nothing particularly Mycenaean about Amin.75, and the bird-head handles from the Aegean noted above draw on Levantine examples. Eastern influence is evident in the form of an ivory bull-leg handle on knife C.50 from the wealthy LC III Enkomi Tomb 58. Similar examples are attested to in LBA Levant and Egypt (Fig. 80).

Shape 9 (Fig. 6q)

Similar to Shape 8, but here the spine is straight or slightly convex, while the edge is convex and only at the upper blade curves to a rounded or pointed tip. The blade is short (max. 13 cm) and relatively wide to the tip. Tangs of this shape are short and contain one or two rivets. Bronze parallels, particularly for Kouklia Skales C.650, exist on the Aegean mainland, Crete, Cyprus, and the Levant (Fig. 81).

Shape 10 (Fig. 6r)

Only one example exists, C.930. It is a 7 cm blade fragment with a straight edge and spine that is slightly narrow toward the upper blade. Despite the straight edge, this blade is Type III because the blade overall curves upward: before the broken end, the edge and spine curve sharply upwards. Identification of the shape is difficult, and any links made will be met with some scepticism. Nonetheless, enough remains to suggest parallels from Katarraktis (no. 10.1), Scoglio del Tonno, Italy (no. 10.2), and Enkomi (no. 10.3) (Fig. 82). All three knives have a convex edge with stepped heel and concave spine. They differ from Shape 9 in that the

overall blade curve is not smooth but formed of straight edges at angles, particularly at the heel and again at the mid or upper blade. The tang is narrower than the heel of the lower blade. This particular shape is tied to the Aegean. Bianco Peroni (1976, 25) and Bietti Sestieri (2010, 459, 462) refer to no. 10.2 as an "Aegean type" imported to the Mycenaean *emporion* of Scoglio del Tonno.

Shape 11 (Fig. 6r)

This shape has two late examples from CG II Amathus and CG II-III Kition in the Cesnola Collection. Both share a curved rectangular 2.7 cm-wide blade, convex edge, concave spine, defined heel that draws up to an unriveted tang, which, in section, is four-sided and rectangular with rounded edges. The tang on C.970 is short, being 4 cm long, and 0.7 cm wide, and ends with a slightly curved-down butt. The short, unriveted tang meant that great force could not have been applied on its use. This, combined with its short 10.9 cm length and blade shape, suggest that it was a razor. Although C.1190 is almost twice as long at 20.6 cm, over-sized razors are known in Italian and Aegean graves.

Exact precedents are unknown, but they likely drew from the varied repertoire of Cyprus where razors were much less standardised than the popular LH tomb types of the Aegean types with their sharp corners on curved, rectangular blades (Fig. 83). Cypriot razors were less restricted in shape, as indicated by the generic blade form that Catling (1964, 230) refers to as "sickle"-type razors. Two bronze razors from Enkomi (nos. 11.8, 11.10), and two knives with pierced tangs for hanging from Enkomi LC II Tomb 22 and the LC III Enkomi Hoard (nos. 11.7, 11.9) share some traits with C.970, particularly the blunted tips and rectangular-

sectioned unriveted tangs (Fig. 84). LBA Aegean connections should not be entirely excluded: no. 11.7 is thought to be an Aegean import (British Museum no. 1897,0401.1481 n.d.), no. 11.8 has a parallel in Perati no. 11.6, while the tang butt on no. 11.65 turns down like C.970, but finishes with a full coil (Fig. 85) . Perhaps something similar was at one time present on C.970. A slightly later parallel from the Aegean is the iron knife from LPG/EG Grave XXVII in the Athenian Agora (Fig. 86).

5.1.4 Typology final remarks

The goal of this brief typological discussion is not to source the origin of the knife forms, but to contextualise their appearance within the wider Mediterranean metallurgical framework. The case has previously been made that LH Aegean bronze knife models provided the inspiration for Cypriot iron knives.[14] Linking each shape to specific bronze prototypes from the Mediterranean, however, reveals the full extent to which Cypriot smiths drew on a previously existing repertoire. Nine out of 11 shapes derive from close Aegean examples. Of the two shapes without Aegean parallels, Shape 4 knives are unique and, given their LC III date, might be early experimentations with form. The Shape 11 examples date to the CG II and might derive from local BA bronze razors, but there is a long gap between the LBA and CG II. Ultimately, none of the knife shapes derive from the local BA series. Daggers were common funerary equipment in EBA-LBA Cyprus, and the blades were standardised in elongated

[14] See Sandars 1956, 183–87; Catling 1964, 104; Åström 1967, 87; Åström and Åström 1972, IV:ID:478, 483–84; Waldbaum 1982, 331–32; Lagarce and Lagarce 1986, 62–63; Zimmermann 2001, 117.

triangular forms which are absent on the iron knives (Fig. 46, 48).[15] As noted, although early scholars refer to EC and MC blades as knives, on account of their double edges they should be classified as daggers, making true knives rare on Cyprus prior to the LC III.

We can trace the movement of shapes from the Aegean mainland and Crete through the Dodecanese, Rhodes, and to Cyprus through the dispersal of bronze forms (Tbl. 12). We cannot identify a single point of entry for the knives because those dated to the 12th century appear at coastal sites on both sides of the island: Enkomi, Kourion, and Kouklia/Palaepaphos. The corpus is unfortunately too small to infer any important regional differences in the adoption of iron, but an island-wide typology is possible because of the publication of the Kouklia/Palaepaphos cemeteries (Karageorghis 1983; Karageorghis and Raptou 2014), which provide the majority of Shape 1 examples from the CG and, to a lesser extent, the Amathus tombs (Karageorghis 1981, 1987; Macdonald 1992). This enlarged corpus demonstrates enough repetition of shapes to suggest a degree of standardisation from which we can discern the range of models that ancient smiths drew on when introducing iron knives to Cyprus.

5.2 Daggers and Swords

In a different vein from the knives, iron dagger production began with the conversion of local LC dagger forms from bronze to iron. In bronze, these daggers are characterised by rounded butts of varying lengths, leaf-shaped blades, a midrib and one to three rivets (Catling 1964, 125–29, fig. 15, pl. 15). Six LH III iron daggers in this local style are preserved from three

[15] Detailed studies are provided by the Swedish Cyprus Expedition series (Stewart 1962; Åström 1957; 1972), Catling (1964), and Balthazar (1990).

sites on Cyprus (Tbl. 8), which represent the final iteration of a series that extended back into the EC period. At the same time, iron production coincided with the adoption of a new object type, the Naue II or *Griffzungenschwert* (grip-tongue) sword, which marked a departure from the bronze rat-tailed tang swords and round-butt daggers of BA Cyprus (Catling 1964, 110–12, pl. 12) (Figs. 47, 48). The Naue II style was simultaneously used for daggers (C.1380) and subsequently replaced the local series.

The appearance of this form on the island is part of the general spread of Naue II swords at the end of the BA. They developed as 13th century bronze types in the Alpine and Balkan regions, and were adopted for swords and daggers in the Aegean by the LH IIIB2 at Mycenae (Mehofer and Jung 2008, 122; Molloy 2010, 409) and to iron by the late SMyc/EPG, where its form remained stable relative to European developments (Snodgrass 1964, 105). Bronze swords appear in northern Syria by the late 13th century (Mehofer and Jung 2008, 133). Cyprus promptly followed suit in the late LC II, but here both materials appeared together in the 12th century. It is difficult to claim that the Naue II replaced the local rat-tail tanged series swords, which were the standard for the EC and MC, because they were scarce after the LC I (Catling 1964, 110–13), leaving a gap of roughly 250 to 300 years between sword types. Like the knives, they are a new object class from the West; they appear, however, first in bronze before being converted, only slightly later, to iron. And, like the Aegean, the majority of swords were of iron, and the bronze ones were confined primarily to the 13th and 12th centuries. Cyprus boasts only 13 iron sword and 13 dagger specimens from the LC IIIA to the end of the CG II (Figs. 87, 88), a significantly smaller number than the contemporary Aegean. It is not until

the CG III/CA I that there is an uptick in preserved sword specimens, whereas dagger numbers continued to diminish.

Several typologies exist for Naue II swords and daggers in Cyprus, the Aegean, and continental Europe designed according to hilt shape, number of rivets to secure hilt plates, and the presence of "blood channels" or ridges on the blade. The correspondence of these typologies allows us to track the development of styles across Europe and the eastern Mediterranean. The most relevant typologies relating to Cypriot specimens are Catling's (1964, 1961, 114–15, Groups I-IV) Cypriot bronze groups and Kilian-Dirlmeier's (1993, Gruppen A-C, Typen 1-4) Aegean bronze and iron types (Fig. 89). Two schools of thought developed regarding spheres of influence for Cypriot sword design. The first is that Cypriot smiths drew on models from Italy and the Aegean for their bronze and iron swords (Catling 1964, 116; Bouzek 1985, 209). The second is that iron swords demonstrate closer affinities with early bronze specimens from Cyprus and the Levant (Snodgrass 2000, 230; Georganas 2005, 69). Both statements are true, as the Cypriots converted Naue II models from both east and west into iron, but in so doing their swords and daggers developed a distinctively Cypriot style (Tbl. 15).

The earliest Naue II swords in Cyprus drew on flanged-tanged swords from Europe and the Aegean (Group I; Gruppe A), starting with the LCII/IIIA sword C.1750 from Enkomi Tomb 18, followed shortly by four LC IIIA swords from Enkomi Well 212 (C.1760-90) (Fig. 90). Notable features are the overlapping triangular-shaped shoulders and high number of rivets, eight on some examples, which have precedence on Naue II swords in Europe (Bouzek 1985, 124), Italy, and the Aegean (Kilian-Dirlmeier 1993, pls. 34, 37) (Fig. 91). In iron, however, rivet number

differentiates Cypriot swords from western Naue II models. Aegean specimens typically have three or four rivets (see Kilian-Dirlmeier 1993, pl. 44-46), whereas Cypriot ones typically have higher numbers of rivets: C.1500 and C.1520 have eight, C.1490 has six, while C.1480, and C.1550 have five. Interestingly, unlike iron knives and daggers, the early swords are not bimetallic, which does occur occasionally in the Aegean and later on the decorative CA polymetallic swords (C.1670, C.1700, C.1720, C.1730).

Another defining feature of Cypriot iron swords is a tendency towards rounded shoulders. Sometimes they are exaggerated, as on C.1490. While some of the roundedness might arguably be a feature of corrosion on this specimen, several other Cypriot blades share this feature to varying degrees: compare C.1380, C.1500, C.1510, C. 1520, C.1550, C.1600, C.1670. The feature continues as late as the CC I (C.1740). Overlapping shoulders, frequently on western models, are rare in iron, the exception for a CG I sword from Kouklia (C.1480). This sword also highlights the bowed or ovoid tang-grip found on several specimens with varying tang terminations, e.g. C.1400, C.1510, C.1520, C.1560, and C.1590.

Macdonald (1992, 46) links rounded shoulders to eastern Naue II models, specifically a Period II (1075-925 BCE) bronze sword from Hama (Fig. 92), on which Catling based his Group IV. Influence from the Hama sword is apparent on contemporary swords C.1500 and C.1550, and potentially the reconstructed dagger C.1450. The swords are short, being 41 cm, 32.7 cm, and 37.7 cm respectively, have a straight and narrowing grip, squared ears, and a thin spur. A late 13th century precedent for this form is found in three bronze swords from the Ugarit hoard (Fig. 92) (Schaeffer 1956, 223, 224.12, 14, 15). These are longer, between 63-73 cm, have larger pommel ears, and triangular shoulders similar to those on Kilian-Dirlmeier's (1993, pls.

42, 43) Type 3 swords (Fig. 93). The Hama sword, however, is too late to significantly influence the Cypriot repertoire – rounded shoulders appear already on an LC III bronze sword from Enkomi Tomb 47 (C.1800) and an LC IIIB iron dagger from Kourion Kaloriziki Tomb 40 (C.1380) (Fig. 94). Although rounded shoulders are apparent on a 12th century sword from Zagazig Bubastis in Egypt (Burchardt 1912, 61, pl. V.2; Peet 1911, 282, fig. 1), they are not a common feature of eastern swords. The Ugarit swords have rhomboid shoulders, and a survey of Near Eastern swords indicates a preference for triangular-shaped blades flush with the hilt (Petrie 1917, 19; Maxwell-Hyslop 1946; Shalev 2004). In the Aegean, only a few iron swords have rounded shoulders; subsequent swords developed thinner, triangular-sloping shoulders closer to the local bronze forms.

From eastern Naue II models comes one of the earliest securely datable iron swords, LC IIIB C.1470, with narrow shoulders, three rivets along the tang, scalloped tang edges, and a distinctive fan-butt (Fig. 87). It is in good condition, with the midrib still visible and its length fully preserved at 79.7 cm, making it one of the longest swords in the repertoire. The best parallel is a later CA I sword from Kouklia Eliomylia (C.1660), also with narrow shoulders, three axis rivets, and 76.5 cm in length. Its tang varies a little, having three scallops on the edges and a wider fan-top butt (Fig. 95). This type of tang is rare outside of Cyprus, but derives from a series of Cast Hilt Daggers from the Levant, Shalev's (2004, 49–54, pl. 17.157-160) Types 7 G and H (Fig. 96). Examples range in date from the late 15th to 11th centuries from Akko, Gezer, Bahan, Ugarit (Schaeffer 1956, fig. 223), Hasanlu IV (Muscarella 1988, 54, fig. 64) and possibly earlier in Egypt. C.1560 is a later CG II variation, combining the eastern fan-butt with the bowed tang grip and rounded shoulders common on Cypriot types (Fig. 87). From Cyprus, the

tang type transfers to the Aegean, evidenced by a contemporary LPG specimen from Agora Tomb 27 (A.2150, Fig. 97) (Blegen 1952, fig. 3.1, pl. 75c). Kilian-Dirlmeier (1993, pls. 41, 42) labels these swords Type 2, and further examples appear in EG-MG graves at Athens, Lefkandi, and Marmariani (Figs. 93, 98). Note that both C.1470 and C.1560 have only two or three rivets like their eastern counterparts.

Some of the key features of Cypriot iron swords (high number of rivets, bowed grip, and rounded shoulders) appear on the earliest iron swords in the Aegean, leading some to suggest that they are imports from Cyprus (Lorimer 1950, 268; Müller-Karpe 1962, 63, 65). For example, the late SMyc Tiryns Tomb 28 and EPG Kerameikos Tomb 6 swords and Grave A and B daggers both have rounded shoulders and bowed grips (Kraiker and Kübler 1939, 101–4, 183, pls. 31, 32, 76; Snodgrass 2000, fig. 76) (Fig. 99). The Agora Tomb XXVII warrior burial dated to 900 BCE contains several items that suggest eastern – or, more specifically, Cypriot – influence. It contains a bulb-fan sword with rounded shoulders similar to that of the late 10th century CG II Palaepaphos Plakes Tomb 145, two Shape 11 knives similar to those in CG II Amathus Tomb 311, and the unusual combination of a trunnion axe with a chisel or awl also seen in Kouklia Skales warrior Tomb 76 (Blegen 1952).

Flanged-tanging is uncommon in Cyprus, but then no tang type really could be called common. The best way to characterise the Cypriot style is as unstandardised. Cypriots show a great willingness to experiment with forms. Take, for example, the unique combination of features found on C.1490, which has the small perpendicular pommel ears of Group III from Aegean swords, the narrow spur of Group IV from Levantine swords, and the rounded

shoulders of Cypriot swords. Such experimentation with forms is paralleled in Cypriot knife production.

In the same vein, daggers C.1390 and C.1420 have unique ivory T-shaped handles that defy a sphere of influence. Both daggers have rhomboid grips, which is a regular feature of Aegean swords but unusual in Cyprus, yet the handles appear to be a method of recreating the hilt on Canaanite cast-hilt daggers. The bronze hilts were inlaid with ivory, bone or wood plates for decoration (Shalev 2004, 41). The shape of the bronze cast-hilt on an iron-blade example from 12th century El-Far'a South is a possible parallel (Shalev 2004, 53–54, pl. 18.164, Type 7K). Cast-hilt daggers have been found in a LC IIA well context at Enkomi (Lagarce and Lagarce 1986, 63, 64, pl. 17.1; compare Shalev 2004, 46–47, pl. 15, Type 7E), and tombs at Katydhata (Catling 1964, 128, pl. 15:i, j, k, l).The presence of dagger moulds from a 12th century deposit at Enkomi indicates that some were locally produced (Catling 1964, 274–75, pl. 51:a, b, c). The T-shaped handles on our iron daggers belong to a class of daggers from the LBA, and the addition of Naue II shoulders, rivets, and handle plates is purely a Cypriot innovation. Compared to the variety found in Cyprus, Kilian-Dirlmeier's four sword types, into which most iron examples fit, make Aegean sword design appear very conservative.

5.3 The other objects

5.3.1 Spearheads

Iron was applied to socketed spearheads at the relatively late period of the CG I, considering that they were produced in bronze since the LC II (Catling 1964, 110, 117–25; Karageorghis et al. 2000, 55). This is also the case in the Aegean (Snodgrass 1964, 103; Lemos

2002, 120), although on Cyprus a large portion of the corpus continued to be produced in bronze. The initial introduction of socketed spearheads to Cyprus, according to Catling (1964, 124), was under the influence of Aegean forms, particularly from Crete, that slowly integrated and altered local forms until there was an influx in the 12th century. In this case, the socketed spearheads could be considered local items, having replaced the EC and MC series of rat-tail tang spears (Catling 1964, 56–59, 110, 117) when they were converted to iron. The Cypriot iron corpus is fairly unremarkable and, like bronze versions, are difficult to develop into coherent typology (Catling and Catling 1980, 256). Overall, they fit into the range of spearheads introduced in the LC and lasted to the CA (Matthäus 1985, 73–89; Macdonald 1992, 47–48). Additionally, we have a few examples of iron ring collars with bronze spearheads. These are rings placed at the bottom of the socket to secure the wooden shaft in the socket.

5.3.2 Axe heads

The corpus consists of four items identified as axeheads (Fig. 100). The two CG I axeheads are trunnion or lugged types. These forms originated in the Anatolia MBA, and are introduced to Cyprus in the LC I where they persist until the LC III in roughly equal numbers to those found in Syria-Palestine and shipwrecks (R. Maxwell-Hyslop 1953, 74–75; Catling 1964, 87; Blackwell 2011, 149–50, 340–41). Like the BA examples, the iron types belong to Maxwell-Hyslop's (1953, 72, fig. 5) Type II classification; that is, they have a flat blade with slight lug protrusions and a minimally splayed edge. C.2430 is unprovenanced, but C.2490 is one of the few trunnion axeheads from a datable tomb context; the majority of LBA specimens are

unprovenanced (Catling 1964, 87, C2, C3, pl. 6:h,i; Åström and Åström 1972, IV:1D:480, fig. 61.5) or come from LBA hoards (Catling 1964, 87, C4, pl. 6:j). The appearance of iron versions is a continuation of the locally produced LBA form.[16] Like the spearheads, although the form existed on the island for several hundred years, they were not converted to iron until 150 years after iron production begins.

The GC II, iron axeheads are less clear in terms of typology. C.2840 from Kouklia Skales Tomb 69 is interesting. Karageorghis (1983, 181, 182, pl. CXVIII, fig. CXXXVI) identifies it as a trunnion axe head corroded to the point of missing lugs, but its flat, rectangular shape, slightly convex edge, slightly narrowed butt, and 12.2 cm length resembles Catling's (1964, 88, fig. 8:9, pl. 6:k) unique LC II-IIIB axe-like tool. The primary difference is that the iron specimen does not have a narrow cutting edge on one of its long sides. If this connection is unconvincing, at the very least the specimen fits into the flat axe tradition that extends back to the EC.

5.3.3 Tools

Tools are among the earliest items produced in iron in the LC III. The majority are concentrated within the Enkomi settlement, which should not come as a surprise considering that Enkomi accounts for over half of the entire LC bronze tool assemblage (Blackwell 2011, 206). Many iron specimens are too corroded to positively identify object type, making some identifications in site reports speculative. Nevertheless, the LC III does not introduce any iron objects that do not have a local precedence in bronze. Three burins (C.2240, 2300, 2310) with

[16] Finds of 20 plus trunnion axeheads from the Cape Gelidonia shipwreck led Catling (1964, 88) to suggest that they were produced in Cyprus in the 12th century and therefore are evidence of their spread westward from the Near East.

bone handles from the Enkomi settlement, including an industrial context, have several parallels in bronze (Courtois 1984, III:24, 50, figs. 7:2-6, pl. XVI:16; Lagarce and Lagarce 1986, 62–63, pl. 17:8, 9) or with just the bone handle remaining (Courtois 1984, III:56, figs. 17.23-28) from similar industrial contexts at Enkomi. These types date back to the EC and MC series of chisels and awls with bone or antler handles (Catling 1964, 64–65, fig. 4; Åström 1972, vol. IV:1B, fig. 11). LC IIIA tanged-chisel C.2220 from Kourion Bamboula Tomb 25 is comparable to its LC IIB predecessors from the cemetery (Benson 1972, pl. 34.B1260-1261). Sickles were used in Cyprus throughout the BA, but the three Enkomi examples (C.2210, 2280, 2340) have a wider butt than most bronze examples, and a blade that tapers to a narrow point. They bear some resemblance to an unriveted specimen in the Enkomi Weapon Hoard (Catling 1964, 83, pl. 5:e). Since iron evidence shifts to graves in the CG I, we see a reduction in craft and agricultural tools that coincides with the introduction of a new cooking tool, the obelos. The appearance of bronze and iron obeloi on Cyprus in the CG I coincides with its appearance in the Aegean, and continued to be used into the CG III (Vonhoff 2012, 135, 139; Matthäus 2014, 114).

5.3.4 Ornaments, Jewellery, Pins, and Fibulae

Ornamental objects do not show much in the way of creativity or conversion of local forms. The majority of items relate to dress: pins, fibulae, and plaques with piercings to sew onto material (Hala Sultan Tekke plaques). A few items are decorative attachments, such as the plaques with bronze rivets found on the Idalion West Acropolis, or the iron hoops from Kouklia Skales Tomb 89 that Karageorghis (1983, 320, pl. CLXXXIX, fig. CXCIII) suggests were

attachments for the two iron knives found in the tomb. These items drew exclusively on 12th and 11th century BCE Aegean traditions, but certainly no earlier. For example, the iron bezel rings popular in the BA Aegean are absent on Cyprus, as is jewellery more generally. Bronze finger-rings were less popular on Cyprus that in the Aegean, with only a handful dating to the LC IA-IIIB (Catling 1964, 235; Paule 2015, 30). Similarly, in iron, only two simple LC III hoop finger-rings are preserved. The CG IA spiral ring, however, links to a widespread EC and MC series that declined in the LBA (Catling 1964, 233).

The pins are similar to Lemos' Aegean Type 3 iron shaft with a globe of bone or ivory, which appeared in burials from late LH IIIC Argolis and late SM/PG Kerameikos in Athens (Lemos 2002, 107). These derive from Snodgrass' (2000, 226) LH IIIC bronze Type 1. It is the most common pin form in the Aegean, first in bronze, and then in iron from the PG onwards, whereas in Cyprus iron versions existed since the pin's introduction in the 12th century. The Cypriot pins vary from the Aegean ones, however, in that all have globe heads of ivory or bone rather than a flat disc-head with a globe on the upper shaft. As the pins appear in iron earlier on Cyprus than the Aegean, there is some question as to whether they were made locally or imported from Cyprus (Snodgrass 2000, 228; Lemos 2002, 108; Ruppenstein and Lagia 2007, 228).

Two pin types emerge from the small Cypriot group. Three dating between the LC IIIB and CG IA (1100-1000 BCE) from Kourion Bamboula and Kouklia Skales tombs (C.2970, C.3040, C.3110) have ivory and bone conical heads reminiscent of Catling's (1964: 73, fig. 6:4,5) toggle pins, with conical heads dated to the MC III which were thought to be foreign. Two CG pins (C.3080, C.3130) have ivory and bone pomegranate heads very similar to those seen on spindle

whorls from LC IIIA contexts at Kition (Sauvage 2014, 192–93), which were common in the Levant at sites such as Ugarit and Lachish, but rare in the Aegean. These pins have a bronze parallel from LC IIIB Kourion Kaloriziki Tomb 26 and three from CG IA Kouklia Skales Tomb 1 (Catling 1964, 239, pl. 41:j). Interestingly, none of the pin types from the Cypriot BA series were converted to iron (e.g. button and roll-top pins).

Several types of bronze fibulae of Aegean and Levantine types appear on Cyprus from the 13th century and soon became standard dress items (Birmingham 1963; Steel 2004, 196; 2013, 47). The three CG I iron examples pertain to one specific type only, the unbeaded asymmetrical arch-bow (Birmingham 1963, 85), which originated in bronze in the LH IIIC to SM Aegean, but appear in iron in the 11th century in the Aegean, Cyprus, and the Levant (Snodgrass 2000, 226; Lemos 2002, 109). Although fibulae establish themselves on 12th century Cyprus first in the violin-bow form (Birmingham 1963, 82; Matthäus and Schumacher-Matthäus 2015, 46), which underwent a series of local developments (Catling 1964, 246), only the secondary arched fibulae forms were converted to iron in the later 11th century. Compared to the Aegean, Cypriot fibulae remain more popular in bronze than iron, so we wonder if these few iron examples were imports from the Aegean, where the practice of producing ornamental iron objects extended back to the BA (Chapter 3).

5.4 Conclusion

This chapter took stock of the iron industry by reviewing the entire corpus of material, object type by object type, to paint a broad picture of how iron was adapted. Reviewed as a whole, the iron objects can be connected to the rest of the Mediterranean through typology

where possible. See the chart below for a summary. Based on this review, two notable features emerge:

Object type	Object adoption	Adaptation to iron	Conversion details	Origins of Cypriot iron type
Trunnion axeheads	16th	Late 11th	Old LBA Near Eastern type converted to new material	Anatolia
Spatulae	Late 15th	12th	Old LBA Near Eastern type converted to new material	Levant/Syria
Spearheads (socketed)	Late 15th	Late 11th	Old LBA Aegean type converted to new material	Aegean
Fibulae	13th	Late 11th	Old LBA Urnfield object type converted to new material	Aegean
Knives	Starts 13th, majority 12th	12th	New LBA/early EIA Urnfield type object type with new material	Aegean blades, Levantine ivory handles
Swords	12th	Early 11th	New EIA Urnfield object type (Naue II) with new material	Aegean and Levantine blades, local style developed
Globe-head pins	12th	12th	New EIA object type with new material	Levant/Syria?
Daggers	LBA, early 11th (Naue II)	Early 11th	Old Cypriot BA object type converted to new material & new object type with new material	Aegean and Levantine blades, local style developed
Obeloi	Late 11th	Late 11th	New EIA object type with new material	Aegean

1. Iron did not gradually replace existing bronze models in Cyprus.

- The corpus is unquestionably dominated by iron knives from the early 12th century, from which a handful of bronze knives also belong. There are arguably at least four Aegean-type bronze knives that appear in the 13th century from Kalavasos-Ayios Dehmitrios and Maa-Palaikastro which belong to the shape that is most common in the

Aegean, Shape 6, which never gains much popularity in iron on Cyprus. Clearly, the arrival of knives on the island corresponds to the expansion in the use of iron.

- Swords appear in bronze on the island, the earliest dating to the end of the 13th century at Enkomi, while the earliest datable iron one belongs to the early 11th century. The situation is complicated, however, by the fact that the iron swords bear little resemblance to the handful of bronze Naue II ones of the 12th century, and they appear to follow their own trajectory. Bronze swords are uncommon after the LC III.

- The small collection of daggers paints a clearer picture replacement, albeit a quick one concentrated to the first half of the 11th century. Here, local bronze dagger types were converted to iron and then replaced by various Naue II forms.

- Socketed spearheads appear in bronze earlier on Cyprus, by roughly 400 years, than they do in iron. They exist alongside the local rat-tail tang types until the socketed ones begin to be made of iron in the last half of the 11th century, when they disappear. Iron spearheads never fully replace bronze versions. If anything, iron ushers in the end of rat-tail tang spearheads rather than replacing bronze. Bronze and iron obeloi both appear in the CG I, but iron is immediately preferred.

- In the case of ornamental objects, jewellery, pins, and fibulae, iron never really replaced bronze, and those objects are even rarer in iron after the mid-9th century.

2. **The advent of iron coincided with the adoption of several new object types primarily from the Aegean.**

- Over half of the items in iron represent new object types derived from Aegean models: knives and obeloi. With Naue II swords and daggers, it is more ambiguous because the flanged Aegean types arrive first in bronze, but the iron versions look to the east. With daggers, the local forms were completely abandoned by the end of the middle of the 11th century.

- Socketed spearheads and trunnion axeheads were already established on the island prior to iron production, but were not converted to iron until the late 11th century. Spearhead forms came from the Aegean, although the trunnion axeheads come from a wider eastern range, possibly the Levant or Anatolia.

- The situation with fibulae is unclear, as bronze violin-bow fibulae are an Urnfield type (Alexander and Hopkin 1982, 405, 409) and date to the 13th century on Cyprus, but only a handful of the later arched fibulae, which developed in the Aegean, appear in iron and bronze contemporary with Aegean specimens. Globe-head pins are equally enigmatic, and potentially derive from eastern models.

With the exception of a few tool types (sickles, burins, chisels), and early daggers, there is a clear bias towards converting foreign objects to iron. The early forms of knives, Naue II

blades, fibulae, and pins were developed in the Urnfield cultural complex in the 13th century, which covered a wide geographic area from western Hungary to eastern France, and the North Sea to the Alps. These object types moved south through Italy to the Aegean, where they were carried eastward to Cyprus and the Levant. Whether they were carried by Aegean colonists or Cypriot traders is a matter of much debate (Knapp 2013, 453 for references). Regardless of method of transfer, with the exception of the obeloi and trunnion axeheads, these object types were among the package of goods that arrived on Cyprus during the height of its trade with the Adriatic and Mycenaean world in the late 14th to early 12th centuries (Catling 1964, 86; Steel 2004, 196; Voskos and Knapp 2008, 663; Knapp 2013, 453). Sherratt (2016, 295, 296) suggests that, within the context of increasing trade, the central European bronze types were viewed by Cypriots as newly fashionable novelty items, and so were subsequently incorporated into burials as exotic status items. Suchowska-Ducke's (2015) mapping of Naue II swords across the entirety of Europe indicates just how peripheral the Mediterranean was to the Urnfield complex. Cyprus and the Levant sat on the fringes of this culture, their exposure mediated through trade partners, thereby emphasising the rarity of these objects and their potential to be harnessed as prestige items in the status-laden world of the 13th century Cypriot elites (Keswani 2005, 393; Sherratt 2000, 44).

This novelty feature of the Urnfield-type did not last long, however, and in the following centuries their conversion to iron facilitated their incorporation into the Cypriot material corpus. This takes place against the backdrop of two contemporary trends. Cyprus in the late 13th and 12th centuries witnessed a decrease in trade with the west (Maier and Karageorghis 1984, 71; Sherratt 1994, 67–68; Knapp 2013, 453), notably a decrease in imports

from the Mycenaean world (Steel 2013, 46), yet it intensified copper production island-wide at the key metalworking sites of Enkomi, Paphos, Kition, and Hala Sultan Tekke (Webb 1999, 287; Sherratt 2016, 293). It is in this expanding metallurgical context that iron makes its appearance and is promptly applied primarily to Urnfield types – knives, swords, daggers, and fibulae. From the 12th century onwards, the high number of knives indicates a form of mass production that corresponds with the increasing rise in material homogeneity and standardisation that begins in the LC IIIB, particularly notable in Proto-White Painted ware and other types of pottery such as zoomorphic vessels (Janes 2013, 151, 152; Knapp 2013, 464, 468; Steel 2013, 46). Metallurgically, this standardisation is mirrored with the knife shapes, and arguably also with swords and daggers. The knives in particular, as well as items such as bronze fibulae and hemispherical bowls, became standard features of CG graves across social strata, wealth, and gender (Chapter 6). So, with what started as novelty items, iron facilitated the integration of Urnfield forms into the cultural milieu of the Cypriot EIA.

This chapter covered the object type choices that Cypriot smiths and consumers made when it comes to adapting iron. Iron appears to have integrated quite seamlessly into Cypriot society and burials, at times paving the way for new object types. Perhaps iron facilitated the uptake of several new objects – iron use had no precedence on Cyprus prior to 1200 BCE, so Cypriots had a certain leeway with what to produce and how to use it. This might explain why iron adoption on Cyprus reflects an eclectic choice of foreign and local models for adaption to iron. It might also explain why several of the item types, particularly the knives and Naue II blades, seemed to defy standardisation in an era marked by increasing material homogeneity – the flagship item of Cypriot ironworking, namely the knives, sort into eleven shapes! The

next chapter dives further into the significant role that the iron knives of Cyprus played in expanding the industry.

Chapter 6. Ironworking in Early Iron Age Cyprus

This chapter continues the examination of the early iron industry in Cyprus by focusing on a model that characterises the growth of the industry and initial use of iron in Cyprus. Across the eastern Mediterranean, these centuries were pivotal to the development of iron-production technologies because they mark the rise of iron to a central place in the metal's economy alongside copper production and distribution. Snodgrass encapsulated this transition in three broad stages (Chapter 1). According to his model, a region enters the full Iron Age when it satisfies three conditions: (1) it uses iron for utilitarian objects (Stage 2), (2) it develops controlled and reliable smelting techniques for producing workable wrought iron (Stage 2-3), and (3) iron objects predominate in terms of numbers over bronze for utilitarian objects (Stage 3). For many, the Aegean was exemplary in this respect, and the gradual replacement of bronze by iron from the 12th to 10th centuries in grave deposits is well documented (Snodgrass 1980, 348, 250, tbls. 10.2, 10.3; 1996; Catling and Catling 1980; Catling 1996; Morris 1999, 211, fig. 6.2). Yahalom-Mack and Eliyahu-Behar's (2015) project *Reconstructing Ancient (Biblical) Israel* demonstrates that iron in the Levant was used for utilitarian purposes by the late 12th century, and was systematically produced to replace bronze items in the 10th to 9th centuries.

Cyprus, although geographically positioned between these key regions, is an outlier in this model. First, ornamental iron items are absent from the island in the BA; therefore, when iron does appear for the first time in the 12th century, the iron industry appears to spring up out of nowhere, and would have relied not on the early iron ore extraction and smelting techniques being developed in the Caucuses, Anatolia and the rest of the Mediterranean, but

on the acquisition of a by-product of copper smelting. Second, Stages 1 and 2 appear to have been compressed, as they were ushered in by the simultaneous arrival of locally produced utilitarian bladed items and tools as well as a small contingent of ornamental items. Third, it is difficult to define Stage 3 on Cyprus because with the arrival of iron came a wave of new types of objects based on bronze prototypes that either disrupted the local bronze series, thereby obscuring a gradual replacement (e.g. daggers, spearheads), or introduced wholly new objects to Cyprus (e.g. knives, swords, obeloi, fibulae) so that by default, iron immediately dominated over bronze. In some respects, Stage 3 began alongside Stages 1 and 2.

This chapter explores these deviations in terms of a series of choices on the part of the Cypriot smiths and consumers when iron was introduced to the island. We tend to think of such choices in terms of the *chaîne opératoire*; that is, a series of decisions that pervade the entire metallurgical process from ore prospection to artefact production (Rehren and Pernicka 2008, 234). This chapter focuses on two aspects of this decision-making process. The first are the choices that smiths made regarding which objects to adopt and how to adapt them to iron. In Cyprus, the local production of iron entailed the wholesale development of new classes of objects adapted primarily from Aegean and Levantine bronze models. This requires a review of the typological relationship of Cypriot iron items to those further afield in the Eastern Mediterranean. The second aspect is how the consumers chose to use and deposit the items, which entails an investigation of their find contexts, particularly funerary depositions.

6.1 Ironworking in Bronze Age Cyprus

A salient feature of the Cypriot iron industry, compared to other areas of the Mediterranean, is the lack of BA iron finds. Cyprus is, of course, famous for its extensive BA copper industry, attested to by the numerous workshops, furnaces, smelting waste products (i.e. slag), and scrap metal hoards found at Enkomi (Dikaios 1969; 1971; Crewe 2007), Kition (Stech et al. 1985; Karageorghis and Kassianidou 1999), Hala Sultan Tekke (Tholander 1982), Apliki (du Plat Taylor 1952; Muhly 1989), and Politco Phorades (Knapp and Kassianidou 2008). Further evidence includes the widely traded oxhide ingots that have been sourced to Cypriot copper ores (Gale and Stos-Gale 2005, 119–24). They have been found throughout the eastern Mediterranean and as far west as Sicily, Sardinia, Corsica, Marseille, and Oberwilflingen in Germany. The largest cache is the late 14th century BCE Uluburun shipwreck carrying 350 oxhide ingots excavated off the coast of southwest Turkey (Pulak 2000, 350). Tripod stands are another important class of object that testifies to the highly skilled level of bronzeworking that Cypriot artisans achieved. They were widely distributed across Cyprus, Crete, and the Cyclades, as well as mainland Greece, Sardinia, and Italy (Papasavvas 2001; 2004; Charalambous et al. 2014). Within this world of copper, iron objects were absent and there is no evidence for ironworking, so it is with some surprise that the island adopts iron production technologies as quickly and fervently as it does after 1200 BCE.

Several excavations recorded LBA instances of iron, but either the identification is doubtful, or the items come from unsecure contexts. This applies to the 'lumps of iron,' usually identified as iron ore or slag, found in MC I Tombs 313 C-D and 322 from Lapithos (Gjerstad

1934, I:97, no. 44; Åström 1972, IV:1B:474),[1] on the LC IIA floor of the Ayios Iakovos sanctuary (Gjerstad 1934, I:357, no. 17), in a LC IIB tomb at Ayia Irini (Palaiokastro) (Quilici 1990, 94, 141, fig. 243, no. 255), and in LC IIC-IIIA levels at Enkomi. Zimmermann (2001, 113) is sceptical, however, that these are the waste products of iron smelting, but instead identifies them as ferruginous slags from copper extraction of local chalcopyrites. Chemical analyses of slags from prominent smelting regions in Cyprus as well as Palestine, northern Iran, and Oman reveal a consistently high iron content (Pleiner 2000, 12–13). This might be for one of two reasons. In the first option, copper sulphide ores such as chalcopyrite $CuFeS_2$, commonly found in Cyprus, contain iron which remains in the slag after smelting (Pleiner 2000, 254).

The second possibility is that metallic iron diffused into the copper when it was added as a flux during the smelt (Tylecote and Boydell 1978, 45). On Cyprus, iron oxide fluxes came in the form of haematite or limonite found on the exposed tops of chalcopyrite deposits (gossans), or as oxide and manganese-rich umbers abundant throughout the island (Kassianidou 1994, 76). By the LBA, smiths found that adding around 30% of iron oxides as a flux to the copper ore charge increased the efficiency of slag formation when smelting lower-quality sulphide ores (Pleiner 2000, 12). This process increased the required smelting time, thereby exposing the copper to the iron-rich slag for longer. Since iron has a high solubility in molten copper, metallic iron could dissolve into the copper where it would be expelled into the slag once the copper solidified (Craddock and Meeks 1987, 192; 1988, 120). Maddin (1982,

[1] Waldbaum (1978, 18) states that the lump from the floor of Tomb 313 C-D was analysed and found to be terrestrial iron. I can find no reference to the analysis in the monographs. Furthermore, it is unlikely to be terrestrial (telluric) iron because the closest source for this type of iron is in western Greenland, particularly on Disko Island, found in dykes in pieces as small as 1 cm or less (Tylecote 1987, 98).

312, fn. 5) estimates that LBA slags contain 7-20% iron oxide. The resulting copper slags are very similar to iron bloomery slags in terms of appearance and chemical composition (Maddin 1982, 311; Rehren and Pernicka 2008, 235), and the best way to distinguish between them is by observing traces of copper in the form of remnant sulphides, unreduced ore particles or sporadic metallic copper prills (Pleiner 2000, 12, 254).[2] It is likely, then, that the 'iron lumps' are a case of slag misidentification.

In her seminal investigation of iron finds in the Mediterranean, Waldbaum (1978, 18) lists several BA objects from Cypriot contexts of questionable date. The mid-13th century BCE iron 'hairpin' found in a sherd from Hala Sultan Tekke actually dates to the 12th century BCE and is a 'wire' used in pottery production or repair (Tholander 1979, 106–9; P. Åström et al. 1986, 37). The agate sceptre with traces of iron in the socket is part of the infamous 'Kourion Treasure' (Myres 1914, 374, no. 3001), found with, according to the excavator Cesnola (1877, 302–5), a hoard of gold, silver, and precious stone jewellery and statues from one of the rock-cut treasure vaults under the mosaic floor of what he identified as a temple. Unfortunately, the item provenience is unreliable, as Masson (1984a, 1984b) revealed through testimonial witnesses and Cesnola's letters to Samuel Birch at the British Museum. Cesnola fabricated much of his excavation and, realistically, the 'treasure' is a collection of items found in burial grounds around the city, particularly the cemetery at Ayios Ermoyenis below the eastern city gate. Although published as a temple treasury, in his letters Cesnola acknowledges finding human remains in the vaults (Masson 1984b, 3–5). The date of the sceptre remains

[2] The copper content of LBA slags is very low, with Craddock and Meeks (1987, 191) estimating between 0.3-1%, while Pleiner (2000, 254) suggests between 0.5-3%. These values are the result of the high level of efficiency attained by the smelting techniques used on low-quality sulphide ores in the LBA.

uncertain, although excavations of rich Cypro-Archaic, Cypro-Classical, and Hellenistic burials in the vicinity of the 'Kourion Treasure' have revealed similar materials, suggesting that the sceptre might belong to the later first millennium rather than the BA (e.g. Christou 1994; 2000).

Only two iron objects in Cyprus potentially predate 1200 BCE. The first is a set of heavily oxidised iron beads, or, as the excavator Ohnefalsch-Richter (1893, 465, pl. 172.16c) refers to them, iron links from a chain ornament. Unfortunately, he does not provide a detailed description, and the quality of the plate drawing is too poor to determine any kind of typology for the beads. He is also vague on his date of the tomb, placing it in the 'iron period', which we can presume to mean after 1200 BCE. Gjerstad (1926, 55) likewise places the tomb in the post-1200 LC III period. Based on the presence of a White Slip II bowl in the tomb, Sjöqvist (1940, 24, n. 4) and Åström (1989, 7) agree that the tomb must be dated earlier to the LC II. The second item is one of the nine gold finger rings from the Upper burial of Tomb 9 at Kition. The ring is a Cypriot type, has a gold band with an incised rope motif and an iron wire wrapped around the middle (Karageorghis 1974, 89, pl. 92). Karageorghis (1974, 93) uses the high percentage of Mycenaean IIIB vessels, the lack of later forms, and the fact that there was a period of abandonment prior to the reoccupation of the site around 1200 BCE to place the terminus of the grave at 1225 BCE. In this case, the ring belongs to an LC IIC (13th C BCE) context rather than the LC IIB one that Waldbaum (1999, 47, no. 35) suggests.

The dearth of material, in contrast to subsequent periods, raises the question of whether the absence is the result of improper recording or a tendency to ignore iron in early excavations. Both scenarios seem unlikely, as 20th century excavations in Cyprus have a long

history of high standards of practice, particularly earlier in the century when many of the key methods in place today were only developing. For instance, Åström (1989, 5, 7) acknowledges that Markides' methods of excavation in 1915 at Katydata were remarkable for the time: his notebooks were meticulous, he drew many sections of the tombs, and recorded different stratigraphic burial layers. At Idalion, Gjerstad (1935) made an effort to record small amorphous fragments of iron, tuyères, and slag at a time when such material tended to find their way into spoil heaps. Dikaios (1969) began excavations at Enkomi in 1948, where he identified and collected the remains of metallurgical installations including waste material such as slag. He recorded the finds and stratigraphy so meticulously that generations of scholars have repeatedly returned to the material for fresh studies (Kassianidou 2012, 94). Finally, iron is recorded so consistently across Cyprus in the LC III, even at sites where earlier BA levels were also excavated, that it is hard to believe that its appearance in the 12th century is anything other than a well-documented phenomenon.

And it is this lack of iron that makes the transition to the EIA so dramatic on Cyprus. To date, there are at least 304 published iron objects dated from the 12th to 10th centuries (Tbl. 16). This number pales in comparison to those of the Aegean and the Levant, but in these regions iron production has BA precedent. One way to get a sense of the increase in iron use over time is to view and compare the total numbers by density of items per year (Tbl. 17). We must be wary of relying too much on numbers to characterise the early Cypriot iron industry. Factors related to looting, uneven publication, and preservation can skew the perspective. For example, the fact that settlement finds are so few in the CG compared to the LC III obscures the scale of growth over each period. Bearing this in mind, we can cautiously observe that 1)

There is a definite and sharp increase in iron items after 1200 BCE; and 2) Over the course of 300 years there was a consistent increase in the availability of iron items for Cypriot consumption.

The rapid growth of this new industry was facilitated by the recently developed technique of obtaining forgeable iron as a by-product from smelting copper sulphide ore using iron-rich fluxes, iron-rich gossan ores, or from copper matte production.[3] Whichever source was used to obtain iron, the process immediately separated out Cyprus from the rest of the iron-producing regions. Most regions in Snodgrass' model relied on a bloomery furnace to extract workable iron from mined iron ores, a much more efficient and scalable method, but one that required the development of new sourcing, transportation, and smelting strategies. Evidence that iron ore smelting was underway in the EIA was identified at workshops at Colchis in the Caucuses (Khakhutaĭshvili 2005; 2009), Vardaroftsa in Macedonia (Davies et al. 1925; Waldbaum 1980, 89; Pleiner 2000, 23), Phokaia in western Anatolia (Yalçın and Özyiğit 2013), and several sites throughout the Levant including Beth-Shemesh, Tell Hammeh, and Tel Hazor (Veldhuijzen and Rehren 2006; 2007; Veldhuijzen 2009; Yahalom-Mack and Eliyahu-Behar 2015, 290–93). If Cypriot iron sources were obtained as by-products, then, unlike the regions mentioned, it only required alterations to resources that were already exploited on the island, and metallurgical installations and techniques already in use.

The next segment of the chapter is dedicated to exploring how the Cypriot iron industry rapidly grew from nothing viewed through the lens of two object types. The object types were selected for the unique perspective that each gives on the iron industry. Introduced in the

[3] See Chapter 1 for references.

previous chapter was the idea that iron was applied in two phases that, perhaps unsurprisingly, correspond to two major cultural phases on the island. Knives are the only iron object type present in abundance over these two phases and represent both the introduction and maturing of the industry. By comparison, the second object types are Naue II blades, which appear in the LC IIIB when major changes in material culture take place. They are features of the warrior burial kits adopted from the Aegean.

6.2 Knives and the Cypriot iron industry

As the previous chapter demonstrated, a key feature of the early iron industry in Cyprus is the clear bias towards a single type of object, the iron knife. Knives are the majority iron object on Cyprus, 131, representing for each period (LC III, CG I, CG II) anywhere from 34 to 55% of the entire iron corpus. Their numerical dominance has not gone unnoticed, as they form the primary piece of evidence that places Cyprus at the centre of several models for the development and dissemination of ironworking in the eastern Mediterranean. For Snodgrass (1980, 1982, 1989), they indicate the earliest application of iron for utilitarian purposes and mark Cyprus' transition to a full Iron Age ahead of surrounding regions. Metallurgical analyses of knives from the Idalion, Hala-Sultan Tekke, Lapithos, Amathus, Kition, and Palaepaphos-Skales cemeteries demonstrate the technological sophistication of the Cypriot smiths vis-à-vis neighbouring regions.[4] Sherratt (1994; 2003) has explored the potential economic benefits that exporting iron knives, and possibly the technology, could have had for Cyprus and the rest

[4] See Åström et al. (1986), Blomgren and Tholander (1976), Lang (1989, 1991), Maddin (1982), Stech et al. (1985), (1971, 1979).

of the Mediterranean. As the archetypal object of the Cypriot Iron Age, iron knives present a unique glimpse into the earliest adoption of ironworking in Cyprus.

The preceding chapter outlined the adaptation of Aegean bronze knives to iron in Cyprus. The final products of this journey represent a series of stylistic and typological decisions made by Cypriot smiths and consumers of the iron knives. For example, the popularity of the Shape 1 blade was entirely a local choice. In the Aegean, the preferred bronze knife was Shape 6, which has a straight edge and spine that narrow to the tip and widen slightly towards the lower blade; some have a sloped heel. Arguably, this shape is the most common in the LBA Aegean. Considering the Cypriot propensity for converting Aegean forms into Cypriot iron knives, it is noteworthy that Shape 1, which was uncommon in the Aegean, was preferred to Shape 6. The reason, may in part, be due to timing, as Aegean bronze knives with very long, straight spines and parallel edges with long handles did not survive past the LH IIIB (13th century) (Hood et al. 1958, 234; Verdelis 1977, 50–51). Shape 6 did not travel well, and its disuse corresponds to the rising popularity of Shape 1 iron knives in 12th and 11th century Cyprus.

The selection of Shape 1 out of the entire Aegean repertoire, however, indicates that the arrival of the knife on Cyprus cannot be explained by 12th century BCE Aegean invasion, colonisation, or hybridisation of the island, as is commonly suggested (e.g. Catling 1964, 104; Schaeffer 1971, 377; Lagarce and Lagarce 1986, 62; Dothan 2002, 21; Karageorghis and Raptou 2014, 117).[5] An alternative avenue to consider is that, with the adoption of Aegean knife-styles, Cyprus tapped into the Mediterranean metallurgical *koiné* (Ridgway 1988, 627;

[5] See Leriou 2002 for a detailed study on the subject.

Carancini and Peroni 1997; Jung 2009; Fulminante 2014, 28–29 for summary) which was prompted in part by the influx of Urnfield and circum-Alpine bronzes into the Mediterranean (Sherratt 2000, 84–86; 2003, 41). Cyprus was hardly excluded from this network as some scholars suggest (Matthäus 1980, 136–37; Bouzek 1985, 209–11; Borgna 2009, 295), but instead contributed to the *koiné* by being one of the first regions to convert almost an entire object class from bronze to iron.

As iron knives are among the earliest and most numerous LC IIIA objects on the island, they indicate that iron was not initially used on Cyprus to gradually replace existing local bronze forms as we expect to see in Stage 2. The only exception was daggers, in that the conversion of local dagger forms to iron before being fully replaced by iron Naue II versions in the CG I introduced a brief Stage 2 in the LC III. With knives, bronze knife versions had existed alongside their iron contemporaries for several shapes since the LC III, but they never competed with iron numerically. There may be a degree of selection bias obscuring the full picture – most bronze knives up to the end of the CG II come from Enkomi, and iron may simply have been the preferred material for burial. Nevertheless, after the 11th century BCE, bronze knives fell out of favour while iron versions continued to appear in tombs into the CA and CC at Amathus, Palaepaphos, Katydata, Ktima, Salamis, Marion, and Limassol.[6] The popularity of iron knives suggests that, for this particular object class, iron essentially by-passed bronze and Stage 3 began immediately.

[6] Later bbronze knives: CG II-III Tomb 310 and CA Tomb 163 at Amathus (Macdonald 1992, 49, 63, no. 4.1, fig. 9:11, pl. XVI:8; 1992, 55, no. 40, fig. 6:8, pl. XIII:3), and CA I T.7 or 8 from Kouklia Eliomylia (Karageorghis 1967, 212, fig. 21.47).

The fact that knives existed in both materials indicates that the preference for iron was a choice and not any kind of technological limitation on the part of the smiths; knives were not necessarily easier to forge than other iron items. The drawing down and sharpening techniques that were required to create the blade and cutting edge was the same as those used for the body of arrowheads, axeheads, spearheads, and chisels. In fact, knives required more investment than some other items. The tangs had to be punched for the rivets, and rivets made of iron would have required a combination of drawing down and upsetting. Like other Mediterranean regions similarly experimenting with iron, Cypriot smiths could apply a range of new forging techniques in their repertoire. The fact that so many knives could be produced by the 12th century suggests that smiths had the control over the ironworking process required of Snodgrass' transition from Stages 2 to 3.

6.2.1 Iron knife production

This ability to produce knives quickly, and in such abundance, was facilitated by the availability of handle materials. Out of the 131 knives, 51 have traces of a perishable handle material, most of which (38 in total) are wood plates riveted to the hilt rather than ones of ivory or bone, as with most Aegean and Levantine examples. Wood was a much more abundant and less expensive material to obtain than bone and imported ivory, as it came from pine forests on the Troodos hills that were much more abundantly wooded in antiquity (Kassianidou 2013, 40). This made knives more readily available to a wider market. It is no coincidence that there are more knives found in Cyprus than in the rest of the Mediterranean; these were high-demand items and local smiths constructed knives to meet consumption

rates. The number of wood handles in funerary contexts increases over the LC IIIB-CG II. In fact, the LC III has the greatest variety of organic and metal handle materials, but by the CG II the more standard wood was preferred.

Since most iron knives found in the eastern Mediterranean came from Cypriot settlement and funerary contexts, it is likely that their demand was fuelled by the local Cypriot elite market rather than one abroad. Also, the high proportion from tombs suggests that they were designed primarily as personal objects for local consumption rather than export. Elaborate ivory and bone handles did exist; we have nine of ivory and five of bone from Cypriot contexts. The wood-handle knives, however, are so distinctively Cypriot that, if they did export iron knives, then the ivory and bone-handle versions were reserved primarily for this purpose rather than internal market consumption. For example, ivory and bone-handle bimetallic knives are rare in the local Levantine repertoire (Artzy 2006: 60-62), but they start appearing in the late 12th and 11th centuries at Tel Miqne-Ekron (Dothan 1989, 2002), Tel Qasile (Mazar 1975, 78, pl. 7B), and Sikil Dor (Dothan 2003, 209), whereas wood handles are virtually unknown. These are usually considered imports from Cyprus (Sherratt 2003, 47; Stern 2013, 55–56). While sourcing the knives to a single origin is problematic (Waldbaum 1982, 333), the few fully preserved iron examples follow Cypriot blade types: Shape 1 from the Tel Miqne-Ekron Philistine Temple Building 350 (Dothan 2002: 3, 5, 14-15, figs. 2:3, 12-13; 2003: 209) and Shape 8 from the Megiddo destruction level IV (Schumacher 1908 IA: 87, IB: pl. XXVII.a; Dothan 2002: 19, fig. 19b).[7] Although this Levantine group might be the result of ceremonial gift

[7] A bronze knife with an ivory ring-pommel was found at Gezer, but it cannot be dated more specifically than Level IV (1400-1000 BCE) (Deshayes 1960, 321, no. 2592; Dothan 2002, 19, fig. 19e; Macalister 1912, vol. II: 268; III: pl. CXCVIII:16). Its blade is reminiscent of Shape 7, which is rare and was difficult to place the origin.

exchange, as Dickinson (2006, 146–47) has suggested for the appearance of iron knives at the Aegean cemeteries Perati, Lefkandi, and Knossos, foreign exchange was not the primary impetus of their production. Knives with ivory and bone handles are in the minority compared to wood handles. Only in the Levant do ivory and bone dominate the repertoire.

Knives with ivory and bone handles are the most ornamental on the island. With a single exception, they all have bronze rivets, which Waldbaum (1982) suggests were for decorative purposes, whereas knives with wood handles might be of bronze or iron. The handles often have a ring-pommel. Of note is that fully preserved iron-riveted knives never have more than three rivets, whereas bronze ones might have anything from three up to eight. In some of these instances, the overabundance of rivets serves solely a decorative purpose as it would be unnecessary for so many to be affixed to the handle. The most decorative knife of the group, C.1130 from Amathus Tomb 310, has ivory hilt-plates secured by eight bronze rivets which were capped alternately with silver and gold sheets. Traces of two bronze fragments adhering to one side of the blade were the remains of a scabbard (Vassos Karageorghis 1981, 148, pl. XXIV: 1,3, 1982, 299, pl. XXV:3; Waldbaum 1982, 340, Cat. 27; Macdonald 1992, 49, 63). Knives of bone and ivory handles come from some of the wealthiest graves containing iron knives, and they frequently appear as pairs, perhaps as a form of ostentatious display: Enkomi Tomb 58, Palaepaphos-Plakes Tomb 144, and Amathus Tomb 310 each contained two ivory-handle knives, while Palaepaphos-Plakes Tomb 142 had two of bone. Bone handles offered a cheaper imitation to ivory, the material being widely available yet similar in appearance.

Wood-handle knives show greater variety in terms of their association with wealth. As already noted, many are bimetallic and could have had capped rivets. Several accompany ivory knives, as in Amathus Tombs 21 (stratum 1) and 310. Some came from wealthy graves, such as Kouklia Skales Tomb 49 (CG I), Amathus Tomb 25 (CG I), and Lapithos Kastros 420 (CG IA). On the other end of the spectrum, they come from simpler graves with only a few small bronze items like rings or needles and pottery (Lapithos Plakes Tomb 602 stratum 1, Amathus Tomb 311, Ktima Tomb IV, Kouklia Skales Tomb 84), or are the only metal items in the tombs (Amathus Tombs 6, 19). Occasionally, they are the only item found with a burial (Lapithos Tomb 601), or they are one of two or three items placed in the amphorae with the bones when the tomb was being cleared for subsequent burials (Kourion Kaloriziki Tomb 19). They also appear in a rare example of cremation burial (Kourion Kaloriziki Tomb 39). Most, however, belong to burials in between containing items of bronze, and perhaps a few ornaments in gold, faience, ivory, and bone (e.g. Amathus Tomb 23, Kouklia Skales Tomb 80, and Lapithos Kastros Tomb 411), or at least a great deal of pottery (Ktima Tomb VIII). Iron knives appear to have been in demand throughout and accessible to several levels of society. Perhaps Sherratt's (1994, 65, 69, 1998) burgeoning 12th century Cypriot sub-elite, and presumably iron, could be procured at a faster rate than ivory in Cyprus, so wood handles were one strategy to satisfy local demand:

Ivory (costly + exclusive) <----> Bone (cheaper + imitative) <----> Wood (cheap + mass prod)

6.2.3 Iron knives as prestige objects

This high demand and complimentary accessibility to iron knives does raise the question as to what motivated demand. Do the knives represent the initial use of utilitarian iron on Cyprus? Or were they sought after as prestige items to compliment the status of the owner? These are the two most common interpretations for knife use, but the division between these functions is not always clear, and some specimens present us with an ornamental element (bimetallic ivory and bone-carved handles) on a typically utilitarian object (knife). Cypriot LBA ivory work is well known (Voskos and Knapp 2008, 672) and, based on the concentration of ivory knife handles from Palaepaphos tombs and the high-quality carving on spatulae handles from Evreti Tomb 8 and Teratshoudhia Tomb 104, Karageorghis and Raptou (2014, 62) suggest that the region was the EIA production centre for carved ivory objects. Indeed, most of the iron pins, which would have been capped by ivory or bone heads, are concentrated in tombs on the west side of the island. Nevertheless, ornamental iron production is not a major feature of the iron profile of Cyprus. In fact, the production of iron jewellery, pins, and fibulae is conspicuously absent compared to the Levant (Gottlieb 2010; Yahalom-Mack and Eliyahu-Behar 2015) and the Aegean (see graves at Perati, Lefkandi, Asine, Kerameikos Athens, etc.), where it is a distinctive component of the early stages of iron-working in these regions.[8] Side-stepping this Stage 1-2 transition again sets Cyprus apart from other early iron-producing regions of the Mediterranean.

[8] In the Aegean, ornamental iron production is likely a hangover from the tradition of bezel and finger-ring production practised throughout the Middle and Late Helladic periods. At least 18 have been published from the mainland and Crete. The jewellery collection also includes two LH IIIB bracelets and a ring from Ialysos Rhodes and a pendant from Dendra Argolid, and several MM IIA and LM IIIA beads from Crete.

Returning to the question of function, if the iron knives were initially viewed as prestige items, then such status must not have lasted long. McConchie (2004, 34–35, 136) suggests that the utilitarian properties of hardness and sharpness were secondary to symbolic value, but the application of smithing procedures including carburisation, quenching, and tempering from the 12th century BCE indicates a pursuit of utilitarian concerns. A key component of the status-enhancing element is exclusion, so that only a select group controls access to the material (Morris 1989, 507; Sherratt 2003, 41). This required that iron circulation be tightly controlled by an elite in these early periods (Pigott 1982, 23). Increasing control over the manufacture process, however, facilitated by the use of wood for handles, entailed a kind of mass-production over the 300 years that would have undercut its symbolic value, particularly in the transition to the Cypro-Geometric when iron was applied to an increasing number of object types that appear in tombs across the island. It is in this context of standardisation that iron knives became a commonplace burial affair that cross-cut several strata of society (see below).

Despite wide spread iron knife finds across the island, it is notable that the iron is absent from some key cemeteries. Salamis is a case in point. Because of the intense level of competition seen in the display in elite tombs, manifesting in elaborate mortuary display around feasting, sacrifice, and wealthy gifts of an exotic and luxury nature, it is notable that only iron in the form of two ivory-handle knives is only present in a single LC IIIB late tomb, and none during the CG I-II, when competition was at its height (Janes 2013, 160–64). Salamis was built from the population of abandoned LBA Enkomi and so continued the same control over the metallurgical resources from the preceding period. Despite transferring the same

political and social system from Enkomi to the new settlement (Iacovou 2008, 635; Janes 2013, 160), iron virtually disappears from elite tombs, suggesting that, if iron held prestige value in the LC IIIA at Enkomi, by the start of the Iron Age it had lost such status in this mortuary system. Iron is also conspicuously absent from wealthy tombs at Maa-Palaekastro (Karageorghis and Demas 1988) and around the Limassol area (Karageorghis 2012), both of which had access to copper resourcing regions.

Furthermore, the appearance of knives in several domestic, craft, and workshop contexts suggests that they were not made solely for prestigious funerary display. In terms of LC IIIB domestic contexts, Enkomi knife C.250 was found with a stone quern; and fragmentary Plain Wheel-made II and Bucchero jugs and juglets were found in the Area I Ashlar Building (Porphyrios Dikaios 1969, 1:217, 296, 526, 762); at Kourion Bamboula, knife C.340 from Area A, House VIII, Room 3 was associated with several storage vessels, a Plain Ware amphoid krater, bronze tweezers, and a fragment of an iron tool fragment (C.3180) (Benson 1969, 14; 1972, 19, 130); and, in the Idalion West Acropolis, knife C.290 was found with a basalt pestle (Gjerstad 1935, II:534, 576). Two knives from Idalion were associated with craft activities. Knife C.300 was found with a cluster of objects used for weaving and jewellery production, including a terracotta and four steatite spindle whorls, several types of faience, cornelian and glass paste beads, half of a steatite mould for casting various types of beads, a basalt pestle, bronze needles and a pin, a bronze bar with a rounded end, and a large piece of raw rock crystal (Gjerstad 1935, II:558, 559). Room XXXV A was used for craft production, as found with knife C.310 as was iron slag (C.3240), a lump of red ochre, an inscribed steatite spindle whorl, a pear-shaped cornelian pendant, a bronze leech-shaped earring, a limestone pyxis, and several

types of beads: a light-blue tubular paste bead, a light-blue faience tubular bead, a glass paste bead, and a biconical oblong cornelian bead (Gjerstad 1935, II:560, 575 576, pl. 173.1132). At Kition, knife C.330 found at Northern Workshop rooms had direct evidence for copperworking in the form of fragments of a crucible, bellows, and copper slag (Karageorghis and Demas 1988, I: 136-137). Associated objects from Floor II include three large pithoi, a pile of sling bullets, a scarab, a fragmentary glass bottle, and several Proto-White Painted vessels. The absence of knives from excavated Cypro-Geometric settlements probably has more to do with the disruption from successive occupations (Iacovou 2008, 639) than a move to restrict iron knives solely to funerary use.

Iron use in similar LC III contexts extended to objects other than knives. At Enkomi 11, iron tools of various types (e.g. chisels, sickles, burins) came from several domestic, craft, and industrial contexts, including an iron pickaxe (C.2260) associated with workshop refuse such as pieces of slag and copper (Courtois 1984, III:50). LC IIIB Idalion levels had several iron plaques and slag from craft production and storage areas, while four daggers were found throughout the settlement. Hala Sultan Tekke had an iron handle from an LC IIIA workshop refuse pit (Åström 1976, 117, 123ff.). LC IIIB Kition, which took over metallurgical production from Hala Sultan Tekke (Iacovou 2008, 637), had an iron dagger (C.1370) from a room in the Western Workshops, and a chisel (C.2350) from Room 5A designated for weaving and grinding activities based on finds such as loom weights, a quern, two pounders and a pestle, a long thin bronze tool, a perforated gypsum disc, a weight, and a glass bead (Karageorghis and Demas 1988, I: 134; II: 189). The appearance of iron knives and tools took place at centres that had their metallurgical facilities intensified in the LC IIIA (Sherratt 1998, 300), suggesting a degree

of availability high enough that iron could be applied to a range of domestic and industrial objects from the very beginning of the LC III, thereby compressing Snodgrass' Stages 1 and 2 to a single period.

Overall, these patterns of production and deposition emphasise abundance rather than restriction: mass production with an emphasis on a local market, use of wood handles, deposition in graves as personal objects for occupants of a range of access to wealth, and coincident presence in domestic, craft, and industrial contexts. Based on these varied contexts, there is little reason to believe that Cypriots viewed iron or knives primarily as having ornamental status or as prestige objects as they did in contemporary regions throughout the eastern Mediterranean (i.e. the Aegean and the Levant). In fact, there is reason to believe that the knives were presented as personal tools in graves, as they were frequently associated with whetstones that were used to sharpen blade edges. The knives have been found in at least 18 different burials with the knives. Of the knives found with whetstones and have handles preserved, most are made of wood, the exception being Palaepaphos-Plakes Tomb 144, which had two ivory-handle knives. Even if these knives were not functional as tools,[9] their association with whetstones suggests that they were presented as such. And, the fact that, in at least three cases (Kourion Kaloriziki Tomb 19, Kouklia Skales Tomb 63, Palaepaphos-Plakes 147), knives were one of the few grave goods placed in the amphora with the bones of

[9] Debate surrounds the question of iron's superiority to bronze in terms of hardness and ability to produce a better cutting edge for tools and weapons in this early period of iron production, and whether this is the reason for the expansion of ironworking across the Mediterranean. Metallographic studies focus on determining the qualities of hardness (carburisation, quenching) and brittleness (tempering) in relation to this debate. Several concluded that early iron was preferable to bronze (e.g. Tylecote 1980), and that the techniques applied to the Cypriot knives support this claim (Maddin 1982; Muhly 1980, 51; Pickles and Peltenburg 1998, 84; Tholander 1971). This claim is rejected by those who argue that early iron was inferior to bronze for practical uses (McConchie 2004, 34; Pigott 1982, 25, 1982, 25; Williams 2003).

secondary burials during tomb clearings emphasises the personal nature of the objects. Similarly, one of the undisturbed skeletons in Lapithos Kastros Tomb 429 had only an iron knife and whetstone directly associated with the same.

6.2.4 Iron objects and Warrior kits

Another object that iron knives consistently appear with are socketed spearheads, of bronze or iron. Together, they appear in at least 19 funerary contexts. Bronze-socketed spearheads were introduced to Cyprus from the Aegean in the 13th and 12th centuries (Catling 1964, 122–25; Steel 2013, 47) as part of the warrior kit that included Naue II swords and bronze greaves (Voskos and Knapp 2008, 670; Steel 2013, 47), and associated drinking sets (Karageorghis 2006, 670). Borgna (2009, 294) argues that the appearance of warrior burials on EIA Cyprus means that they tapped in to the Aegean warrior culture; as such, they participated in the construction of a wider Mediterranean Homeric world that Karageorghis (2006) suggests is represented by the display of weapons and dining sets in the 12th century Salamis 'Royal Tombs' and the 11th century Palaepaphos graves. Iron began to participate in this realm at the beginning of the 11th century, when it expanded to weapons in the CG period.

It is tempting to interpret the Cypriot iron knives as warrior equipment. In the Aegean LBA, bronze knives are viewed as part of the warrior's tool kit (Whittaker 2008, 71), an impression reinforced in Homer's *Iliad* where knives serve the purposes of sacrifice and tool.[10] At Patroclus' funeral, Achilles uses his iron knife (σιδήρῳ) to sacrifice bulls, sheep, goats, and

[10] Knives are difficult to identify in Homer's epics because the word for the metal that they are made out of, χαλκός (bronze) or σίδηρος (iron), is frequently substituted for the object itself (μάχαιρα) (Autenrieth 1891). The words for sword differ from knife: ξίφος or φάσγανον.

boar, enough to host the funeral banquet for the entire Achaean army (Hom. Il. 23.24-34). Knives, however, may also be sacrificial tools of a more sinister nature. Achilles was grieving so desperately over the body of his beloved comrade Patroclus that Antilokhos saw fit to hold both of Achilles' hands for fear that he would take his own life with his knife (Hom. Il. 18.29-34). The parallel with a sacrifice is clear – Antilokhos expects that Achilles will slit his own throat with the knife: δείδιε γὰρ μὴ λαιμὸν ἀπαμήσειε σιδήρῳ. This is the same knife that Achilles will later use to make sacrifices at Patroclus' funeral feast discussed above (Hom. Il. 23.30). But the warrior's knife also had pragmatic applications. For example, Patroclus' squire uses a knife (μάχαιραν) to remove an arrowhead from the thigh of the battle-wounded Eurypylus (Hom. Il. 11.842-848).

Linking knives to warrior equipment on Cyprus, however, is complicated by the fact that scholars do not agree that spearheads count as weapons exclusive to single-handed combat that make up an Aegean warrior's essential kit (Deger-Jalkotzy 2006, 169). For example, spearheads may be associated with low level soldiery (Driessen and Macdonald 1984, 56) or hunting activities (Whittaker 2008, 81).[11] In four of the Cypriot warrior tombs with iron knives, spearheads were absent, but the tombs were identified as warrior burials due to the presence of a shield boss and iron sword (Kouklia Skales Tomb 64), or iron swords with obeloi (Lapithos Kastros Tomb 409), or bronze strainers (Palaepaphos Plakes Tombs 145, 146).[12] In eight of the 19 tombs with knives and spearheads, the warrior association is clearer

[11] Hunting activities might be implied in Amathus Tomb 7, burial stratum 1 which contains rare examples of iron arrowheads and an iron axe with its two knives.

[12] For the tombs considered here, a warrior burial is defined by containing two or more items typically associated with warrior burials in the Aegean: swords, daggers, bronze armour, obeloi, tripods. Although Palaepaphos Plakes Tomb 142 did not contain a sword or dagger, it did contain several obleoi, a spear socket and spike/ferrule, a bronze bowl and tripod. Knives were excluded from the definition.

(e.g. Amathus Tomb 21 burial 1: bronze spearhead, bowl, shield boss), but the remaining 11 simply contain knives and spearheads, so cannot be positively identified as warrior burials. Six other tombs contain iron spearheads, but knives are absent.

Karageorghis and Raptou (2014, 42, 117) suggest that knives belonged to a warrior's equipment for the preparation of meat roasting. This connection works in the Palaepaphos-Plakes cemetery. Three tombs combine obeloi and knives as well as other potential warrior objects, defined in the Aegean as having weapons exclusively used in single combat such as swords, daggers, and possibly spears (Deger-Jalkotzy 2006, 169). These tombs include spearheads, arrowheads, an iron dagger (Tomb 144), a bronze tripod (Tomb 142), helmet and phalera (Tomb 144), strainers and a sword (Tomb 146). We should be cautious of linking obeloi, knives, and warrior identity. Like the spearheads, obeloi were absent from what might otherwise be identified as a warrior burial, such as Tomb 145 contained an iron sword and two knives (one with a wood handle). Attribution of warrior identity is further complicated by the fact that the three tombs under consideration were very wealthy intramural tombs with items from multiple burials and periods mixed together. Arguably, the combination of knives and obeloi had more to do with ostentatious display than warrior identity. For example, Tomb 142 excessively has 10 iron obeloi with its 2 bone knives, and each of the tombs include unusually high numbers and types of iron items as well as bronze items (e.g. tripods, bowls, helmet, phalera, thymiaterion, shovel, scale pans, tweezers), and gold, silver, bone, and ivory ornaments.

Outside of the Palaepaphos-Plakes cemetery the combination of obeloi and iron knives is inconsistent. Palaepaphos-Xylinos Tomb 132 with two obeloi is a wealthy intramural burial

containing over 130 goods, many of which suggest domestic activities: pestle and mortar, two terracotta tripods, and several coarse ware tankards and amphorae. The rest of the goods are gold jewellery, a bronze thymiaterion, several faience figures, and pottery. Lapithos Kastros Tomb 411 is a single undisturbed burial with three obeloi with a single knife, but no indication of a warriorhood. Instead, it included pottery, a bronze fibula, bowl, and pins of bronze, iron, and ivory. Lapithos Kastro Tomb 409 is interesting. Along with an obelos and three iron knives was an iron sword and items associated with shepherding, a bronze crook and goat statuette. Do the knives and the obelos belong to the kit of a warrior, shepherd, or leader? A ceremonial or utilitarian function of the small corpus of six crooks, sometimes referred to as sceptres, is undetermined (Schaeffer 1952, 59–60; Catling 1964, 259–60). Unfortunately, the tomb was robbed so it is impossible to determine how many burials and to which burial these items may be associated. An LC IIIA tomb from Sinda in some ways is an earlier and less wealthy version of the Lapithos tomb. It similarly contained a shepherd's crook, statuettes of a goat and ram, and bronze bowl. In place of the iron knives was a bronze Shape 1 knife; and, instead of an obelos and sword were spearheads with a spike, one socketed and the other hook-tanged. Domestic and personal items were present in the form of a ceramic tripod, several pestle and mortars, terracotta beads, and a cylinder seal (Schaeffer 1952, 59, fig. 14). Despite the presence of spearheads, the emphasis is on shepherding and domestic activities.[13]

Although iron knives were frequently associated with masculine activities, it is notable that they also appear in burials linked to the female identities. Some were found with goods

[13] Indications of occupation are rarer in the CG than the later CA period (Janes 2013, 164), with perhaps the exception of warrior identities.

related to domestic activities or food preparation. Kouklia Skales Tomb 84, a simple single grave, had a Shape 8 wood-handle knife, a stone pestle and two jugs of courseware. Other items included two bronze fibulae and ring, a stone bead, and several WP I bowls, jugs, and amphorae of several sizes. Ktima Tomb VII contained three wood-handle knives, two of Shape 8, along with three spindle whorls, two bronze pins, and over 130 ceramic items. In other tombs, the knives appear as personal display items alongside female ornaments and jewellery. Aside from fine ceramics, Amathus Tomb 25, Kouklia Skales Tomb 79 lower burial, Lapithos Kastros 420 contained items of gold, silver, and bronze jewellery, gold rosettes, plaques and a mouthpiece, bronze bowls, a bone button, stone vases, and faience seal. Each of these tombs have at least one knife with a wood handle. Knives have also been found in graves that the excavators explicitly identify as female burials, such as Kourion Kaloriziki Tomb 40, Amathus Tomb 25, and Salamis Tomb 1 – which Gjerstad (1979) even suggested that this was the tomb of a Greek princess sent to marry into the royal family of Salamis! Far from exclusive, iron and knives not only crosscut wealth and status, but also sex and gendered activities. Only children appear to be excluded.

As the archetypal object of Cyprus, the iron knives reveal the extent to which early smiths tapped into the Mediterranean metallurgical *koiné* to be the first region to convert a new class of object into iron for consumption by the local market. The appearance of knives in domestic, craft and industrial contexts, as well as in poorer graves, indicates that iron did not automatically make knives valuable. If anything, handle material in wood, bone or ivory was a more important factor in assigning value. It certainly was appropriate, or at least preferable, to produce knives in iron, but as a new object class and new material, their use was not

directed by BA precedence. The result was accessibility across society rather than restriction. And, instead of gradually replacing bronze items, they appeared on the scene immediately, indicating that Cypriot smiths had control over the iron production process from the 12th century onwards. The knives only provide a single perspective on the iron industry, one that is dependent on a western sphere of influence combined with local ingenuity. If we turn to other early produced iron objects on Cyprus, then we gain a broader picture of the burgeoning industry.

6.3 Daggers, swords and the Cypriot iron industry

Compared to knives, iron swords do display a stronger link to a warrior burial ethos – each of the seven burials with swords across the CG I and II also contain one or more secondary objects related to warrior equipment such as spearheads, greaves, helmet cheek piece, phalera, shield boss, thymiateria, strainers, bowls, obeloi, or drinking sets. Overall, these graves fit comfortably into the Aegean warrior burial tradition, but they make up only a small portion of grave identities and iron use in EIA Cyprus. There is not much in the way of overlap between iron swords and daggers – the only tomb containing both is Palaepaphos Plakes Tomb 144, but with several burial periods mixed together by the bulldozer an association between them should not be assumed.

Iron daggers show a similar connection to warrior burials. Prior to the introduction of the Naue II iron dagger, bronze daggers appeared in wealthier LC tombs. For example, the LC IIIB Kouklia Evreti Tomb 8 contained iron knives as well as two bronze daggers in a local style (Catling 1964, 126–27). Here, the bladed combination is purely ornamental as it is one of the

richest LBA tombs in Cyprus, filled with an abundance of gold, silver and ivory items (Catling 1968). The earliest iron Naue II blade in a Cypriot funerary context (C.1380) appears again in what is one of the wealthiest tombs from the period, Kourion Kaloriziki Tomb 40, but in this case it is thought to accompany a cremation male burial that was disturbed when the tomb was looted (McFadden and Sjöqvist 1954, 133–34). Unlike later examples, its handle is of bone rather than ivory, emphasising the transitional nature of this blade. Other finds associated with it were a bronze spearhead, strainer, shield boss, bowl, and a gold and enamelled sceptre. An ornamental element, however, is emphasised by the ivory handle plates that preserve on all of the Cypro-Geometric specimens – wood is used for the sheath. What is interesting to note about the transition to the Naue II dagger form is that it has the effect of elevating daggers from their status from common to prestige items. By the LC, daggers were much less common in tombs than in preceding periods (Catling 1964, 129), and belonged to modest graves. Even most of our iron daggers of local forms occur in settlements, including domestic and workshop contexts. In the CG, however, the addition of ivory and association with warrior ethos indicates a rejuvenated interest in dagger forms.

As with the knives, the conversion to iron for dual-bladed implements was also accompanied by the adoption of a new object type, but in this case, the source of inspiration came from eastern rather than western models. Based on the typology, the bronze Naue II swords on Cyprus had flanged tangs characteristic of Aegean swords. Most were from unprovenanced contexts, but the earliest datable bronze Naue II with warrior kit came from Enkomi Tomb 18, which might be from an Aegean soldier who participated in the city's level IIB (late LC IIC) destruction (Catling 1955; Dikaios 1969, 1:406–8; Karageorghis 1990, 19). The

only exception to the Aegean influence in bronze may be the Gruppe C, a spur with ears sword from Tomb 47 based on its rounded shoulders, a characteristic of local Cypriot Naue II. The iron typology came from the Levant towards the end of the first half of the 11th century BCE based on the iron sword with the scalloped tang from the Idalion West Acropolis. The appearance of iron swords on Cyprus, as with the knives, reflects the Cypriot propensity for drawing on and adapting new object forms that were sweeping across Europe and the Mediterranean at the end of the BA. This wave included Naue II blades from continental Europe (Suchowska-Ducke 2015), which reached the Levant by the late 13th century BCE at Ugarit and Megiddo on swords with spur tangs.

The mixing of spheres of influence is most apparent in the warrior burials Palaepaphos Skales Tomb 64 and Plakes Tombs 144 and 145. They contained Naue II swords derived from eastern types, along with Aegean warrior equipment such as a helmet cheek-piece, phalera, shield boss, and a drinking set. Cypriot smiths, in their experimentation with iron Naue II forms, did not feel pressure to conform to Aegean precedent, just as the consumers did not feel constrained to represent the warrior identity according to the same standards as those in Aegean burials. For example, not all tombs with swords and daggers include the extraneous Aegean warrior equipment (e.g. Kouklia Skales Tomb 43, Lapithos Kastros Tomb 409, Amathus Tomb 521), other than a spearhead, that is found in the Palaepaphos Plakes Tombs 142, 144, and 146, which overtly emphasise the warrior identity.

These factors suggest that Cypriots were much more interested in adopting the object, perhaps as a means of demonstrating military prowess rather than specifically the Aegean warrior burial culture. Although Aegean Naue II swords developed within the context of a

wider distribution and standardisation of all sword types in the LH IIIB-C (Molloy 2010, 423), Cyprus was not restricted by such standardisation: the LC sword-making tradition ended by 1400 BCE (Catling 1964, 116), so their smiths were free to develop a distinctive local style having a high number of rivets, a bowed grip, and rounded shoulders.[14] Cyprus did not witness the rise of warrior burials and an increased emphasis on a militaristic ethos at the end of the BA nearly to the same degree that the Aegean did (Deger-Jalkotzy 2006, 152; Whittaker 2008, 82). In fact, the primary referencing to military display already took place in the LC I when elites looked to a Near Eastern warrior package (Steel 2004, 196). Cyprus' following LC decline in sword burials thus corresponds to the decline of warrior burials in the LBA Levant until the very end of the period (Philip 1995, 145). For this reason, Cyprus has significantly fewer sword and dagger burials goods than in the Aegean, and why Cypriot warrior burials needed not conform to those features of Aegean ones.

Overall, iron swords and daggers paint a picture of Cyprus that conforms closer to Snodgrass' Three Stages Model than do the knives. This applies to daggers in particular, because of the brief period (LC III) where local Cypriot forms were converted to iron before being replaced by Naue II versions in the CG I. This introduces a brief Stage 2 in the LC III. The ability to control the iron production process, a key component of the transition from Stages 2 to 3, is emphasised by the fact that the iron Naue II appears almost contemporaneously in bronze and iron, and that the Cypriot smiths chose to convert eastern and western regional bronze forms as well as develop a few types unique to Cyprus (t-shaped, spur with ears).

[14] A few SMyc and EPG specimens in the Aegean with these features are thought to be Cypriot imports, so it is through this medium that some speculate that ironworking was introduced to the Aegean from Cyprus (e.g. Georganas 2005, 69; Lorimer 1950).

6.4 A model for Cypriot Early Iron Age ironworking

One key theme of this chapter was to demonstrate just how much of an outlier Cyprus is in the development of ironworking compared to the rest of the eastern Mediterranean based on Snodgrass' Three Stages Model. These outlier components may be summarised as follows:

1. Stage 1, by-passed: BA ornamental objects were absent and became only a small component of the EIA corpus, so that the industry subsequently develops in an absence of an ironworking tradition.

2. Stages 1 & 2, compressed: the simultaneous appearance of iron 'utilitarian' objects (tools, bladed items) along with a small contingent of ornaments compressed the development of these two stages.

3. Stage 2: ironworking relied on the development of a parochial copper smelting by-product method rather than the bloomery process spreading throughout the rest of Europe (see below).

4. Stage 3, ambiguous: the transition to this stage is difficult to discern, and in some respects began the moment iron appeared on the island. Iron use coincided with the arrival of new Urnfield objects (knives, Naue II swords and daggers, obeloi, fibulae) in the 12th and 11th centuries, thereby by-passing bronze so that iron immediately

dominated those object classes. Only in a few cases was there a more gradual replacement of bronze (daggers, spearheads). In other cases, iron never dominated over bronze (fibulae, axeheads, arrowheads, spearheads, ornaments, and jewellery). In some respects, Stage 3 began alongside Stages 1 and 2.

As an alternative model, I suggest that the adoption of iron on Cyprus occurred in two phases that align with major cultural changes taking place on the island. The first phase covered the 12th and early 11th centuries (LC III), while the second started in the later 11th century (CG I-II) with some overlap between them.

6.4.1 Phase 1

In the first phase of the 12th to early 11th centuries (LC III), iron was applied in two ways. First, it was adapted to the local series of LBA tools including daggers, burins, and sickles that we find in settlement contexts. Second, it was adapted to foreign items that were integrated into the status-defining burial practices of the wealthy Cypriot elite towards the end of the BA, in the 14th and 13th centuries (LC II) (Keswani 2004, 85, 2005, 393; Knapp 2008, 156; Webb 2005, 180). As the LC II-IIIA was a time of cultural continuity on the island (Steel 2004, 208; Iacovou 2008, 631; Knapp 2013, 447), the selective nature of burial gifts, particularly towards foreign and imported items, continued, and explains why some items were rejected and some were selected for conversion to iron when they were first adopted on the island. Rejected items include spearheads, arrowheads, and Urnfield fibulae and flanged Naue II swords. The converted items, knives (Aegean), pins (eastern), and ivory-handled spatulae (Levantine),

found their way into some of the wealthiest graves of the LC IIIA: Kouklia Evreti Tomb 8, Enkomi Tomb 58, Kourion Bamboula Tomb 16, and of the LC IIIB: Kourion Kaloriziki Tomb 40, Salamis Tomb 1 ('The Royal Tomb'). Kaloriziki Tomb 40 contained the earliest Naue II iron blade and arguably represents the transitional integration of Naue II blades into graves of the CG.

The best objects for defining attitudes towards iron in this phase are the series of knives found in domestic, industrial, and primarily funerary contexts. They highlight features of the industry such as experimentation, mass production, accessibility, and standardisation. In the initial phase, objects moved among the realm of the living as everyday objects and tools. In the realm of the dead, iron reached several social strata in the upper levels, but, unlike other regions, this was not in the form of ornaments or jewellery. Instead, when combined with other features such as material, exotic qualities, or identity in the context of the grave, they could assume the role of prestige objects for the 12th century elite that still looked to BA models to reinforce their authority and status. The key driving force in this phase for iron development was fuelled by demand from the local market, not a foreign one. The expanding urban and industrial world of the Cypriot LC IIIA facilitated iron exploration and left enough space for it to thrive alongside bronze when bronze alone could not keep up with demand.

6.4.2 Phase 2

The second phase begins with changes in material culture during in the LC IIIB but comes to fruition in the CG. At the beginning of the 11th century (LC IIIB), changes begin in terms of settlement relocations, burial practices, architecture, and pottery that will eventually crystallise into a pan-Cypriot-Geometric culture (Hemary and Iacovou 1999, 154; Iacovou

2008, 634, 639; Knapp 2013, 464, 468). It is in this second phase that the application of iron expands to a significantly wider range of items, many of which had been on the island for several centuries before conversion – and some object types were never fully converted. Iron was applied to the recently arrived obeloi from the Aegean and Naue II blades. Long-standing items such as spearheads, arrowheads, fibulae, and trunnion axeheads were converted to iron. Many changes on the island in this period are thought to have originated from the west, as Aegean material culture and burial practices began appearing on the island (Janes 2010, 128). This includes the appearance of Aegean-type warrior burials across the island, which likely prompted the conversion of bronze weaponry in the CG I to iron. The new items reflect either Aegean dress preferences (fibulae) or refer to warrior kits found in the contemporary Aegean (spearheads, arrowheads, axeheads, obeloi). These items were not always applied in a consistent combination for typical Aegean warrior burials, so strict adherence was not essential for expression. It is in this realm where prestige uses of iron continued, seen in Naue II blades that combined ivory handles, foreignness, and warrior identity. By having Naue II forms replace local dagger forms, daggers were elevated from their status as tools when we first encounter them in iron in the LC III, to prestige items of the CG.

In this phase, iron was no longer restricted to wealthy elites, but extended to include the lower strata of society. It became less exclusive, expanding to an even wider set of people with some relatively poor or modest graves containing knives, which proliferated due to quickly made, cheaper wood-handles. This expansion paralleled the standardisation and mass production seen in CG I pottery. The focus is much less on prestige items like we saw in the LC III with elaborately carved ivory-handled spatulae, which go out of use after the LC IIIA. The

Aegean Type 2 iron pins with ivory or bone globes introduced in the CG I never became common. Also notable in this phase is the absence of iron excavated in settlement contexts due to site reuse and preservation challenges that would have allowed us to trace the parallel development of iron tools. Undoubtedly, their use as daily objects continued if the few instances of chisels, awls, a spindle, and abundant obeloi[15] in CG tombs are any indication.

Addressing the question of the value that Cypriots placed on iron in the EIA, Sherratt (2016, 295–96) argues that Cyprus produced so much iron over time that it changed their cultural perceptions of iron from a precious metal to a base metal. I would argue, contrary to most models for Mediterranean iron adoption, that iron was not valued for its intrinsic worth as a new, rare, or precious material. Iron on Cyprus was abundant from the start, and it was applied to 'utilitarian' tools from LC III industrial and domestic contexts. Value was instead created by embedding iron items in wider cultural practices, so that its value derived from combining iron with some other element such as ivory (spatula), exotica or foreignness (knife), or status marker (warrior burial Naue II blade). Pare (this volume) encapsulates this ambiguity between use and value of iron in the BA Levant with the term 'Special Purpose Metal' – iron was not circumscribed, either with a particular or a singular meaning, making it flexible for new or changing applications. So, the two phases noted here have less to do with technological developments than they do with the major cultural changes witnessed on Cyprus during the transition from the LBA-EIA, whether one attributes them to hybridisation, migration, or economic entrepreneurship (Iacovou 2008; 2013; Knapp 2013, 451–65 for discussion; Sherratt

[15] Spindle C.2380 from Kouklia Skales Tomb 78 has an iron shaft and wood whorl, in contrast to the usual LC III and CG I forms of an ivory shaft with ivory, bone or stone whorls (Sauvage 2014, 192–93, 201–4, 214). Contemporary Kouklia Skales Tomb 76 had three such bone rods with stone whorls.

1994; 1998; 2016; Voskos and Knapp 2008). Iron application followed the changing values of burial practices and accompanying tomb gifts during the transition from the LBA-EIA.

6.5 The development of the Early Iron Age Cypriot iron industry

The factors that led to this deviation from the Mediterranean norm derive, in part, from the metallurgical situation that developed in the copper industry over the LC period. Over the course of the LC, elites increasingly controlled the copper industry across Cyprus (Keswani 2004, 128, 137, 2005, 393) so that, by the 13th century, they consolidated power and controlled trade across the island (Sherratt 2016, 293). Archaeologically, this manifests in several ways. From the 17th to late 14th centuries BCE we see a major decrease in bronze objects in tombs, yet detect a thriving industry on Crete that was dependent on Cypriot copper, and coincides with an increase of prestige and luxury items in Cypriot elites' tombs as a result of this export (Knapp 2008, 158; Papasavvas 2012, 117, 118; J.M. Webb and Frankel 2015, 19–20). LC bronze foundry hoards throughout Cyprus (Catling 1964, 278–94; Knapp 1988, 198; Knapp et al. 1988), including harder to obtain foreign and foreign-inspired metal tools (Blackwell 2011, 206), and the practice of bronze recycling in the Northern Workshops at Kition (Karageorghis and Kassianidou 1999, 183–85), indicate that the alloy was circulating in increasingly small quantities that lagged behind demand (Sherratt 2000, 41). Urban settlement shifted over the MC-LC I, with new towns established on the coasts by the LC II to facilitate the trade of copper (Keswani 2004, 85; Papasavvas 2012, 118–19) or expanded to accommodate increased copper production, as at Enkomi (Crewe 2007, 159). Peltenburg

(1996, 35) argued that several of the LC fortresses established on the route linking mining sites to Enkomi were established by that city to protect its interests in getting copper to the coast.

This centralised system continued into the 13th century, when we begin to see Cypriot traders operate in a more open economy that undermined the elite-dominated system of the LBA (Knapp 2013, 447). Turmoil in the Mediterranean reduced the demand for copper, so much so that large quantities of bronze entered into circulation, leading to the first signs of economic decline from the devaluation of bronze as it began to spread to more diverse levels of society (Webb 1999, 288; Sherratt 2000, 43; 2003, 40–44; Papasavvas 2012, 119). This scenario is implied by the influx of new bronze types to Cyprus (Catling 1964, 86; Steel 2004, 196). Despite the economic stress and the social upheaval on the island, resulting in abandoned settlements, the LC IIIA was a time of great economic and cultural prosperity characterised by a high degree of cultural continuity and increasing urbanisation (Steel 2004, 208; Iacovou 2008, 631; Knapp 2013, 447).

The 12th century witnessed major growth at metallurgical centres such as Enkomi, Kition, Hala Sultan Tekke, and Palaepaphos with an accompanying intensification of activities in the workshop areas (Iacovou 2012, 66, 2008, 637; Sherratt 2016, 239), and the establishment of urban sanctuaries and cult associated with industrial practices (Sherratt 1998, 300, 304; Webb 1999, 287). At Enkomi in particular, we see the greatest number and diversity of carpentry and masonry tools from the LC, presumably to accompany the increased building programme. For this reason, Blackwell (2011, 206) suggests that Enkomi controlled access to craft tools and even certain craft industries in this period. The fact that the majority

of iron knives (50%) and tools (85%) from settlement contexts also come from Enkomi might suggest a kind of preferential access to iron production, at least in the 12th century.

At this point it is worth considering what Bell (2012, 181) refers to as Ugarit's special relationship with Enkomi. LBA Ugarit was an important, if not the primary, trade port in the eastern Mediterranean, acting as a gateway for the movement of tin westward. In return, Cyprus was one of its main suppliers of copper: a letter from the Ugarit trader Rapanu's house (RS 94.2475) refers to the Alashiyan (Cypriot) King Kushmeshusha's intention to send 33 copper ingots of just under one talent each (almost a tonne) to King Niqmaddu of Ugarit (ca.1220 BCE) (Galliano and Calvet 2004, 188, no. 177). Cypro-Minoan tablets from the Ugarit Palace archives refer to the merchant Yabninu, who appears to be an active trader of private and palatial metals and other commodities. Along with tin, two letters indicate that Yabninu's trade activities included the movement of iron through Ugarit: in one (RS 11.795) he received a consignment of oil, tin, and iron from the palace to sell on behalf of the king, and in the other (CTA 141; RS 11.799) he deals with an imported 20 talents of tin and 2 talents of iron (Courtois 1990, 120–21, 123, 125; Bell 2012, 183). Five similar tablets found at Enkomi, two of which came from the metalworking section of Quartier 1 West (Dikaios 1963), which was only a day's sail away from Ugarit (160km), suggest that Enkomi's early access and swift increase in iron came from the same supply that they relied on for tin.

The southern Levant is another supply possibility from the last half of the 11th century when Cyprus increased relations with the region after a significant reduction in the late 13th century (Sherratt 1994, 67–68; Voskos and Knapp 2008, 673). Evidence for smelting iron through bloomery methods comes from several EIA sites throughout the region including

Beth-Shemesh and Tell Hammeh in Jordan, and Tel Hazor in Israel (Veldhuijzen and Rehren 2006; 2007; Veldhuijzen 2009a; 2009b; 2009c; Yahalom-Mack and Eliyahu-Behar 2015, 290–93). However, imports in any large quantities from this region were unlikely to have taken place until 10th century BCE (Iron IIA) when production significantly increased, and iron became the dominant metal (Yahalom-Mack and Eliyahu-Behar 2015, 290, 300–301).

Whether or not one accepts the theory that Cypriot smiths acquired iron as a by-product of smelting copper sulphide ore, or through the use of gossans or matte, these methods were limited in terms of scalability; and, at some point, they would have turned to smelting iron ores, or at least working imported iron billets directly, in order to keep up with consumption rates (Pleiner 2000, 13). This might explain why a scenario with an Aegean merchant trading iron for copper ore from Temese exists in the *Odyssey* (Hom. Od. 1.178-184). But, in the initial period of ironworking, each of the possible methods suggested for Cypriot self-sufficient ore extraction would benefit from the same infrastructure investments that went into the copper industry. Gossans, for example, are surface indicators of copper deposits (Constantinou 1983, 17) and, therefore, could be ordered, mined, transported, and processed through the same system. So, any positive adjustments made to the copper industry would have contributed to the development of ironworking on Cyprus.

An expansion of the craft and industrial industries would also have facilitated the production of products requiring craft-collaboration – for example, objects of ivory and metal such as the bronze and ivory hand mirrors from Kouklia Evreti Tomb 8 and Enkomi Tombs 19, 24 and 73 (Maier and Karageorghis 1984, 68, 75, figs. 55, 58; Krzyszkowska 1996; Papadopoulos 2010, 132, fig. 6.5), bronze and ivory pins found in numerous LC tombs, as well

as our iron and ivory knives, spatulae, and pins. Cyprus was involved in the ivory trade since at least the early 14th century, attested to by a request from the Pharaoh for an ivory and copper consignment from Cyprus in one of the Amarna letters (Karageorghis 2002, 34). Excavated ivory workshops from LC IIIA contexts at Enkomi (Dikaios 1969, 1:99–100), Kition (Karageorghis 1985, 2:336–37), Kouklia Evreti (Maier 1969, 40–41; Maier and von Wartburg 1985, 148; Maier and Karageorghis 1984, 68–70), and Hala Sultan Tekke (Åström 1992) indicate that the practice continued as part of the industrial expansion of these centres.

What both the bronze and iron industries required in order to grow and coexist was a market large enough. As was introduced in the preceding chapter, iron in the LC III moved in two spheres, the first one of these being the urban sphere occupied by numerous tools, daggers, and knives in several domestic, craft, and workshop contexts. Historically, urbanisation fuelled a demand for metals and increased production, both of which would require great variety and quantity of tools (K. Aslihan Yener 2000, 4). For example, the reorganisation of Enkomi's Quartier 1W industrial 'Fortress' complex in the LC IIC into smaller units is indicative of the shift away from large, centralised industrial operations to one based on cottage industries run by enterprising artisans and family-run businesses (Pickles and Peltenburg 1998, 87–90).[16] This scenario would require a proliferation of tools, and one borne out by the need to recycle bronzes (Karageorghis and Kassianidou 1999) and the increase in number of tools, the majority of which come from LC IIC-IIIA foundry hoards (Catling 1964, 78;

[16] A burin of iron and bone also came from the LC IIIA levels of this Quartier (Lagarce and Lagarce 1986: 63, pl. 17:8: Point top. 355).

Karageorghis 1984, 63), or abandoned floor levels within LC III settlements like Enkomi (Lagarce and Lagarce 1986, 63).

In this demanding environment, bronze and iron production could coexist because, in this period, they would have belonged to the same resourcing system. Surface gossan formations were common features used by the prehistoric miners of Cyprus to identify underlying copper deposits. They would be easily identifiable by colour, and could be an abundant resource, being anywhere from a few to 40m in thickness (O'Brien 2015, 197). For example, the LC I primary-copper smelting workshop Politico-Phorades was located 500m from a small deposit of copper ore accompanied by a large gossan formation at Kokkinorotsos (Knapp and Kassianidou 2008, 137–38). So, in the competitive environment of the 12th century, where the small-scale enterprises needed to get a hold of raw materials by whatever means they could (Sherratt 2016, 295), and if Pickles and Peltenburg (1998, 90) are indeed correct that miners at the primary sources were heavily pressured to deliver as much copper ore and related products as possible, then as surface features gossans offered a less labour-intensive alternative for collection that could be added to diversify bulk deliveries. In this way, gossan could potentially be a cheaper yet additional source of metal for tools (including daggers) to meet demand in larger cities heavily involved in production across several industries like Enkomi, Kition, Kourion Bamboula, and Idalion. That iron processing practices took place at these same sites is indicated by various pieces of slag and unworked iron from LC III domestic and craft contexts. It is difficult to ascertain what portion of a craftsman's tool kit would be of iron rather than bronze – only a fraction of what was in circulation has survived and iron numbers through excavation are increasing (Muhly 1992, 697). Nevertheless, iron and its tools

were a feature of the changing copper production landscape at the very end of the BA on Cyprus.

According to this model, there was neither a bronze shortage in the 12th century, a favoured theory for the development of ironworking (see Snodgrass 1971, 231, 248), nor a need to fill a shortage of tools on Cyprus. Instead, iron objects appear as part of the expansion of several industries aimed a meeting market demand for all sorts of products. Traditionally, this market has been sought abroad; but, over the course of the 13th and 12th centuries, people on Cyprus had more access to wealth, thereby fuelling an internal market for status and luxury goods not only in the upper echelons of society, but at a burgeoning sub-elite level as well (Sherratt 1994, 65, 69, 71). Previously, Cypriot elites relied on foreign goods to indicate status, but in the 12th century those interested in luxury objects for tombs turned to previously ignored finished bronze products, making the local market one of the main centres of consumption for Cypriot copper (Papasavvas 2012, 120, 122). For example, from the LC IIC-IIIA we see a marked increase of bronze hemispherical bowls made specifically for tombs (Lagarce and Lagarce 1986, 64; Papasavvas 2012, 120).

Part of the expansion of new luxury and status items for local markets entailed the reproduction of Aegean exotica. For example, by the 12th century, the 13th century imported Mycenaean wheel-made pottery was replaced by an increasing range of shapes and motifs of Aegean type produced on local pottery (Wijngaarden 2002, 159; Iacovou 2008, 631; Sherratt 2016, 294). The range of Urnfield bronzes discussed in the previous Chapter 5 belong to this category, as do our large corpus of iron knives. It is into this context that iron knife production accords closest to the data, rather than one where Cypriot smiths and traders, recently

liberated from centralised elite control, cashed in on the high valuation of iron due to its rarity in the BA by offering iron as an additional prestige product offering alongside pottery exports to the Levant (Sherratt 1994, 67–68, 2003, 44, 2016, 291). Iron knives circulated first and foremost as personal items throughout several Cypriot social strata, and only secondarily were exported (or travelled with Cypriots) abroad to the few finds that we have in the Levant and the Aegean. The industrial intensification just described would have facilitated the mass production and smithing experiments that we see with the knives, and the repetition of shapes at several sites across the island already in the LC III (specifically Shapes 1, 2, and 9) makes us wonder if these are the work of only a handful of workshops.

One feature of this model is that it does not rely on the arrival of itinerant craftsmen from regions already engaged with the technology to initiate the industry on Cyprus. Such models rely on the movement of craftsmen searching for work in the wake of the breakdown of the Hittite empire, where iron in the BA, based on royal inventories, was thought to be a controlled palace industry (Cook 1953, 33; Zaccagnini 1990, 495; Negbi 1991, 216–19; Waldbaum 1999, 32). Direct connection to Anatolian ironworking in the 12th century is difficult to establish as finds along the Asia Minor and southern coasts date from the 11th century.[17] Therefore, the appearance of iron at coastal sites probably has more to do with the location of LBA industrial practices than external stimuli: the final copper processing and production processes of most industries (e.g. ivory, gold) took place in the major coastal

[17] See finds from Beşik Tepe (Mellink 1984, 446, 451; Alishan Yener, Geçkinli, and Ozbal 1996, 383), Troy (Becks 2003, 50), Assarlik (Carstens 2011, 487, fig. 5; Paton 1887, 68–72), Sardis (Hanfmann 1964, 7), Tarsus (Goldman 1937, 277, 1963, 363), and an 11th century workshop at Phokaia (Yalçın and Özyiğit 2013).

centres like Paphos and Enkomi, before being shipped abroad or redistributed throughout the island (Iacovou 2012; Kassianidou 2012).

This model nestles Cypriot ironworking within the context of a changing copper industry, which runs contrary to Gottlieb's (2010, 104) findings, that EIA sites with a strong Canaanite bronzeworking tradition adopted iron later than others. There are circumstances, however, that make the Cypriot situation different. In Canaan, iron adoption was uneven across the region, whereas adoption in Cyprus was much more widespread across coastal sites – in the LC IIIA alone iron is present at ten different sites. Nevertheless, we must acknowledge that there still remain LC III cemeteries without iron – Limassol (V Karageorghis 2012) and Maa-Palaekastro (Karageorghis and Demas 1988), for example, but such sites are in the minority; most of the major sites and cemeteries across LC III Cyprus contain some iron. Gottlieb (2010, 102) attributes the differential adoption of iron in Canaan to uneven prosperity. The northern sites prospered from trade with Phoenicia, Greece, and continuous access to the Cypriot copper supply. In Cyprus, so many of the sites of the LBA were geared towards the extraction and export of raw copper (e.g. oxhide ingots) or finished bronze products (e.g. tripods), in a network that extended from the Troodos Mountains to the coasts, that any changes to the industry would send ripples throughout other segments.[18] This includes the addition of ironworking to the industrial network, which, as discussed above, grew complementary to a continued copper industry in Cyprus.

[18] See Bryce and Birkett-Rees (2016, 148) to get a sense of the breadth of this network.

6.6 Conclusion

This chapter concludes the two-part investigation into the early adoption of ironworking in Cyprus from 1200 to 900 BCE. The previous chapter reviewed the iron profile of Cyprus, the object types that were produced in iron, and how those object types related to the wider Mediterranean world at the start of the EIA. This chapter focused on the contexts of use for the early objects and what they reveal about an industry that rapidly grew from nothing in the BA into an integral segment of Cyprus' metallurgical repertoire. As noted in the previous chapter, iron development on Cyprus shows two distinct phases that align with major cultural changes that take place in the EIA, the first covering the 12 and early 11th centuries (LC III) and the second starting in the later 11th century (CG I-II), with some overlap between them. These phases have less to do with technological development than they do with the application of iron in response to changes in material culture.

Compared to other regions in the Mediterranean, the speed with which the early iron industry developed was unparalleled. In terms of numerical dominance, other regions certainly out-pace Cyprus; However, the speed with which Cypriots took a non-existent industry and built it in to one accessible to large segments of society, and adapted specialised implements previously unknown before iron, is what sets it apart. How this scenario played out boils down to the industrial and cultural circumstances of the island. This is where pan-Mediterranean iron development models have their limitations – it does not leave much room to appreciate the nuances of each region's burgeoning industry. Yener (2000, 14) noted that technology is a complex cultural behaviour that frequently defies historical narrative of origins and evolutionary stages. The oddities of the Cypriot case should make that clear. Indeed, this

case indicates that we should couch discussions on the development of ironworking in regional circumstances rather than relying on external stimuli to determine the course of the industry.

Chapter 7. Conclusion

The foremost aim of the thesis was to create specific models for the development of ironworking industries in the Aegean and Cyprus from the BA to EIA. This was borne out of the belief that pan-Mediterranean models are unable to explain the integration of the metal into cultural and economic practices across multiple regions. The concern with an overarching model is that it whitewashes the particulars of each group's interaction with the new metal, and that it excludes details that do not fit the model. Each of the three regions examined in the thesis present us with differing trajectories of iron use. For example, how do we fit the extensive, multi-millennial ironworking tradition of Anatolia into models that focus on the 12th to 9th centuries, the 'Transition' (Haarer 2001, 269), as the pivotal period of innovation (Chapter 2)? The fact that Cypriots of the EIA initially used iron for utilitarian and prestigious purposes is an unusual case, and certainly not accounted for in Snodgrass' Three-Stages model (Chapters 5-6). In a similar vein, the transition to utilitarian uses of iron in the Peloponnese in the 13th to early 11th centuries, and the prestigious display uses in the eastern Aegean *koiné* in the 12th to 11th centuries, make it difficult to generalise about iron use across the entire Aegean; we cannot speak of a unified 'Aegean model' (Chapter 4). To reiterate this point, it is worth briefly reviewing the models for the Aegean and Cyprus, and to address the research questions that directed the thesis.

7.1 Model summaries for the Aegean and Cyprus

The first research question of the thesis was, *how are the early ironworking industries in the Aegean and Cyprus similar, and how do they differ?* By the early 9th century, the Aegean

and Cyprus reached the point that Huysecom (2001, 4) refers to as the "generalization of iron", that is, the widespread production and use of iron, where the prestigious nature of the metal diminished such that its use in everyday life made it no more or less important than other metals. The lead up to this point, however, was the focus the thesis, one that chronologically covered several millennia, from the EBA to the beginning of the MG in the Aegean, and the CG II in Cyprus. The result of the investigation is two models delineating the separate trajectories for the development of ironworking in the Aegean and Cyprus.

The Aegean

Four key stages can be delineated for the Aegean, which cover the EBA to the early MG, a span of approximately 2,650 years (Chapters 3 and 4). *Phase 1*, covering the EBA-MBA, centred on the Minoan world, where the few examples of iron ornaments may have been imported as finished products or were locally worked from billets that came from Anatolia via the Cyclades. *Phase 2* shifts the focus to the LBA Mycenaean world of the Peloponnese, where, among the skills learnt from Minoan craftworking, was smithing (if not smelting). Mycenaean craftsmen produced iron jewellery for the elite, the most important being a group of signet rings that incorporated iron into their construction. The typology of the signet rings indicates local production, and their use in wealthy mortuary display was part of the set of visual arts that the elite used to integrate themselves into the 'brotherhood' of kings in the Near East. *Phase 3* began in the 13th century Myceanean world, where iron began to be applied to tools (drill point) and practical implements (knives, clamp). Smelting might be evident in the ferrous

speiss from a workshop in Tiryns, and in the reduction of nickel content in finished products. Similar phases are evident in Anatolia, but they took place at a much earlier date (Chapter 2)

Chapter 4 addressed ironworking in the EIA, where *Phase 3* extended into the Postpalatial world but along two trajectories. Iron use for utilitarian objects increased in areas where iron was produced in the BA, the Peloponnese and Crete, at centres with continued urban building and infrastructure investment. Evidence for iron production came from a workshop in Malthi, Messenia. Increased iron finds in the settlements suggests that iron circulated for daily use rather than mortuary display in the Peloponnese. This reflects the continuation of practices that began in the 13th century: a decreased use of iron in jewellery and ornamental display in favour of utilitarian uses. Iron also spread eastward, to what I termed the eastern Aegean *koiné*, where it was adapted to metal forms and elite prestige uses that originated in the LBA. Smiths adapted iron to knives of an LBA types for male and female burials, and they applied it to jewellery for elite mortuary display, with a continued emphasis on rings, bracelets, and pendants.

The transition to *Phase 4* overlaps with *Phase 3* in the 11th century, with full coverage over the PG. Iron use spreads to new regions such as northern Greece, but it is Crete that initially leads the way in terms of production. This spread was not the result of itinerant craftsmen, but metallurgists who set up shop at stable Postpalatial centres with a consumer population. Apprentices trained in these centres, and their imitation model led to the uniformity of metal types of the PG. On the completion of training, they sought opportunities on the peripheral parts of the network belonging to their urban centre, thereby gradually spreading ironworking to the new communities in which they established themselves. Iron use

also standardised in this period. Iron was applied to a wider range of utilitarian and ornamental objects, which were integrated into standardised burial practices and funerary kits, such as swords for warrior burials and Type 2 pins for female graves, thereby normalising the use of iron. Any residual prestige value intrinsic in the metal diminished with increased production and regularity of use. We have direct evidence for iron smelting, which had spread to the point that small communities like Nichoria were self-sufficient in terms of output.

Cyprus

Cyprus underwent only two phases of ironworking between the 12th and 10th centuries, which were of a different nature to that of the Aegean. Iron was completely absent in the BA, but it was adopted enthusiastically in the 12th and first half of the 11th centuries (LH IIIC). In *Phase 1*, it was applied in two ways (Chapter 5). First, it was adapted to the local series of LBA tools that we find in settlement contexts. Second, it was adapted to new Urnfield item types from the Aegean that were integrated into the status-defining burial practices of the wealthy elite towards the end of the BA (LC II). The flagship item was a series of at least 11 knife shapes that were adopted along with iron, and their mass-production was fuelled by local demand rather than an export market. Iron facilitated the integration of these item types (knives, swords, daggers, and fibulae) into the cultural milieu of the Cypriot EIA. The urban and industrial expansion of Enkomi, Kition, and Paphos in the LC IIIA facilitated iron exploration, and by the EIA, the iron industry thrived alongside the copper industry, supplementing copper production which could not keep up with the demand for metal implements. Iron was either

imported as blooms or billets, or the result of a by-product retrieval method from copper smelting.

Phase 2 corresponds with changes in material culture and mortuary practice that began in the LC IIIB, but came to fruition in the CG (Chapter 6). Iron was applied to a much wider range of items, most of which related to Aegean-style weapons burials, including, obeloi, spearheads, arrowheads, fibulae, and trunnion axe heads. The application of iron in this phase reflects the changing values of burial practices and accompanying tomb gifts during the transition from the LBA-EIA. Iron was no longer restricted to wealthy elites, but extended to include the lower strata of society, which was made possible by the proliferation of iron knives with cheaper wood handles. As the phase progressed, iron was no longer valued for its intrinsic worth as a new or rare material, contrary to most models for Mediterranean iron adoption. Value was created by combining iron with some other element such as ivory, exotica or foreignness (knife shape), or status marker (warrior burial Naue II blade).

7.2 Research questions addressed

Four remaining research may be addressed:

1. *What is the relationship between Cyprus and the Aegean in the development of iron?*

The Aegean: Although the Aegean is commonly thought to be dependent on Cyprus when it comes to learning ironworking technology, very little evidence exists for such a dependency. The Aegean had a low-level ironworking tradition in the LBA, very few, if any, of the EIA items of iron were based on Cypriot-type goods, and both regions used different iron production

methods – the Aegean relied on the bloomery process, Cyprus the by-product method (or imported billets). It is possible that a few of the earliest objects were imported from Cyprus, as has been suggest for the glass paste pin (A.3560) from Perati Tomb 108, and the Tiryns sword with rounded shoulders (A.1670), but these are debatable (Chapter 3), and even if they are imports, they do not represent the wholesale transference of technological knowledge. The Aegean has evidence that iron was produced contemporaneously with Cyprus, in the 12th century, and that the iron was also applied to locally-rooted object types, such as the knives on Thasos (BA.360, 370) and Perati (A.10, 20), the shield-shaped bezel rings in the Agora from Athens (A.3610-30), and Type 2 pins across the Aegean.

Cyprus: At first glance, Cypriot ironworking is closely linked with the Aegean. Cyprus might have had to import iron billets, and, based on the close trade relationship that Cyprus had with the Aegean in the EIA, the Aegean is a likely source for such billets, although Anatolia and the Levant ought not be ruled out. In addition, Cypriot smiths applied iron primarily to new object-types that came from the Aegean: knives, Type 2 pins, fibulae, Naue II blades, and obeloi. Iron was integrated as part of a package of goods that were incorporated into Cypriot mortuary practices. Nevertheless, the way the objects were integrated was based on local practices that differed those of the Aegean, thereby putting a Cypriot stamp onto the use of iron. For example, iron knives were a much more important component of mortuary practices than in the Aegean, whereas ornamental uses of iron, and well as iron for Naue II blades, along with the warrior burial identity, was not as common in Cyprus as it was in the Aegean. Iron was also

applied to several local-style implements in the 12th century, such as daggers, awls, and trunnion axe heads.

2. *What is the relationship between the early copper and ironworking industries?*

The Aegean: The link between the copper and ironworking industries appears to overlap at the smithing stage, once iron has been produced into blooms or billets, and is ready for working into finished products. Workshops containing hoards composed of several metals, and finds of terracotta, stone, bone, antler, and ivory indicate that craft labour in the LBA and EIA might not have been specialised within single locations. The smith who produced finished copper objects might also have produced finished iron products. Depending on the region, iron and bronze were applied to the same object types. At the smelting stage, however, the industries diverge. How much the Aegean relied on the smelting of local copper from the Cyclades and Laurion is a matter of debate, but evidence that challenges the idea that a bronze or tin shortage took place in the Aegean EIA continues to grow. The Aegean would have had to continue to import smelted copper from abroad, likely Cyprus, and it likely relied on recycling hoarded and broken implements. As the smelting of any metal tends to take place close to the mine (unless the source is near the settlement like it is at Malthi), and the Aegean had iron ore sources throughout the region, mining and smelting required greater local investment to set up production sites. Although each industry relied on different acquisition sources, getting iron blooms/billets and copper ingots to the smiths required similar transport and trade infrastructure.

Cyprus: The copper industry witnessed significant investment in the periods preceding and corresponding to the appearance of iron on the island, in the LC IIC-IIIC, at key sites where some of the earliest iron objects came from: Enkomi, Paphos, Kition, and Hala Sultan Tekke. Iron may have been obtained as a by-product of local copper smelting, or, imported as iron billets from regions that they exported copper to, such as Anatolia, the Levant, or the Aegean. Regardless of which method was used to obtain iron for smithing, both methods were closely linked to the well-established copper industry that continued to thrive in the EIA, so that any investment in the infrastructure of this industry would only serve to promote ironworking. Rather than disrupt the industry, in Cyprus, ironworking found its niche by becoming the appropriate metal for the package of new Urnfield-based metal types coming from the Aegean.

3. *Under which types of social and political circumstances does an ironworking industry develop?*

The Aegean: Despite the collapse of the palatial social and economic structure at the end of the BA, ironworking continued to be practiced in the Peloponnese, and subsequently spread to other regions under the decentralised leadership structure that characterises the Aegean EIA. Whereas traditionally the mechanism for spread was attributed to itinerant craftsmen, it was likely the result of local leaders investing in the infrastructure for mining, smelting, and transport, and local craftsmen with their apprentices remaining fixed to communities that could provide stable access to sources and a consumer base. As wealth increased within

communities in the 10th century, the spread of ironworking grew alongside expanding infrastructure networks and apprentices moving to the fringes of the network. One clear manifestation of the increase in wealth across the EIA manifests in the investment in sanctuary sites throughout the Aegean world from the 8th century onwards.

Cyprus: This region provides us with an alternative political environment to that of the Aegean for the rise of ironworking. Cyprus did not experience the same level of disruption and population movements and declines as the Aegean. The centres that continued the copper production network in the EIA were the same ones that emerged in the Late Cypriot age, their political geography remained fluid across the LC to CG chronological horizons, only affected by what Iacovou (2007, 19; 2013, 17–19) identified as the "ebb and flow" of island-specific factors rather than external pressures (e.g. invaders, marauding Sea Peoples, significant decline in exports). Community investment in sanctuary and metallurgical sites increased, and populations continued to grow in EIA Cyprus, possibly due in part to migrations to the island in the late 12th to 10th centuries. These migrations might have brought the Aegean-type metal and pottery forms that were integrated in the local material culture through a process that Knapp (2008, 281; 2013, 453–64) calls 'hybridisation.' It was within a pre-existing centrally administered metallurgical environment that ironworking was fostered.

4. *Can we develop a model that accounts for a BA ironworking industry?*

Haarer (2001, 269) warns against singling out the period of Transition as the only period of consequence in the history of ironworking. In reality, it is a period of more rapid development punctuating a long continuity stretching over millennia, which means that any period preceding the Transition must be brought to bear on the development of ironworking. The Aegean and Cyprus, for example, present us with two alternative BA situations, one where ironworking skill, at least at the level of smithing, existed, and another where ironworking was wholly absent until the 12th century. Both scenarios affected how iron was used in the subsequent EIA.

The case of the Aegean, as with that of Anatolia, indicates that ironworking should be considered a process made up phases of interactions with the material that do not follow a linear relationship. The increased use of iron in the Aegean and Anatolia from the BA to the EIA was not inevitable. Nor was it the result of an evolutionary process dependent on a singular motivation, such as the idea that iron proved to be a superior metal to bronze, or that it could fill the gap left by a bronze shortage, or that it was an expensive prestige metal that could be leveraged by the elite for status display. Instead, it was dependent on a combination of local factors that were applied at different times depending on the location. These factors include a receptive consumer environment, a willingness to invest in the infrastructure to acquire the new metal, and the increase in the availability of iron as a result of the first two factors. Although the Cypriot situation indicates that a BA tradition is unnecessary for the adoption and adaptation of iron, it does suggest that BA factors still come into play when developing a

new industry. In Cyprus, the lengthy tradition of copperworking, centralised administrative centres, and continuity in mortuary practice facilitated the rapidity with which the iron industry grew in EIA Cyprus.

7.3 Final comments

The emphasis throughout the thesis has been on how to develop a model for the origin of ironworking that incorporates the lengthy history of and local factors for a region. Unfortunately, how the Aegean and Cyprus expanded their iron industries in the Geometric and Archaic periods is beyond the scope of the thesis. The history of ironworking does not end in both regions with its 'generalisation'. In the Aegean, for example, the application of iron for ornamental items reduced in favour of bronze, but its use for tools and weapons like swords, daggers, axes, and obeloi continued. Huysecom (2001, 4) suggests that "the generalization coincided with the realization that this metal, especially in the form of carburized steel, offers many advantages over other metals". Without further metallographic testing this cannot be confirmed, however, the continued emphasis on weaponry and tools in the Geometric and Archaic periods, Homer's vivid quenching simile in the *Odyssey* (9.391-393), and Hesiod's use of a smelting simile in the *Theogony* (859-866) suggest that heat treatments indeed continued to improve.

Geographically iron use extended to further Greek territories, including the colonies, such as Pithekoussai on the island of Ischia off of the Tyrrhenian coast of Italy, where some evidence for ironworking in the form of slag, bellow mouth-pieces, and crucibles has led to the suggestion the foundation of the site in mid-8th century was motivated by the exploitation of

iron ore sources from the nearby island of Elba (e.g. Dunbabin 1948, 3, 7–8, 254; Graham 1971, 43–44; Klein 1972, 35; Gosden 2004, 65). The evidence for Aegean iron smelting increases with time, with slag and furnace feature finds coming from Geometric and Archaic workshops, many of which were located in sanctuary sites such as the Temple of Itonia at Philia, Tegea in Arcadia, Kommos on Crete, the sanctuary of Apollo at Eretria, the sanctuary of Nymphe Alia at Oropos in Attica, the sanctuary of Apollo and Artemis at Kalapodi, the Heraion on Samos, and the Temple of Athena on Kalabaktepe at Miletus (Altherr-Charon and Amstad 1982; Kilian 1983; Shaw 1984; Yalçın 1993; Treister 1996; Nordquist 1997; Risberg 1992, 1997, 1998; Rehder 2000; Doonan and Mazarakis Ainian 2007).

Interest in ironworking on Cyprus diminishes for periods after the Cypro-Geometric. Excellent work continues to be produced on the copper industry in the Geometric to Hellenistic periods (e.g. Stos-Gale et al. 1998; Kassianidou 2013; Socratous et al. 2015), but other than its central role in several models on the origins of ironworking, the subject of later ironworking on Cyprus remains largely ignored. Later iron objects are mentioned in site reports, and they are part of a few knife typologies (Chapter 5), but a study of the industry and iron production on the island is lacking. This might be in part because direct evidence for local production via the by-product method remains enigmatic, as well as the fact that the number of iron items does not increase significantly in tombs the way it does in the Aegean Geometric and Archaic periods. Is this the result of the by-product being limited to the amount of copper produced? At what point would Cyprus have had to rely on imported billets to keep up with growing demand? Further experimental work to settle the feasibility of the by-product method would be excellent, because if it turns out to be impossible, and that Cyprus did in fact import billets

from the 12th century onwards, then it opens up a really interesting scenario for iron production and exchange in the eastern Mediterranean. Where would the billets come from? Is the level of iron trade and production much higher in this period than the grave goods imply?

One area of the eastern Mediterranean that is noticeably absent from the thesis is the Levant, another region where ironworking developed very quickly in the EIA. Thorough studies of the material and models of development have been worked on in recent years (e.g. McNutt 1990; Mirau 1997; Veldhuijzen 2005a; Gottlieb 2010; Yahalom-Mack and Eliyahu-Behar 2015; Pare forthcoming), as well as studies of several smelting sites at Tell Hammeh in Jordan and Tel Beth-Shemesh in Israel (Rothenberg and Tylecote 1999; Veldhuijzen and Rehren 2007; Blakelock et al. 2009; Veldhuijzen 2005b; 2009; 2012), and Timna in the Transjordan Valley (Gale et al. 1990; Merkel and Barrett 2000). The Levant offers an interesting additional local model as it shares several key elements that we see in the Aegean and Cyprus. As with Cyprus, the region has a long and strong tradition of copper production, and it has close ties to various trade networks throughout the Near East. As with the Aegean, the region experienced several site destructions and economic disruptions at the end of the BA, it had local sources of iron ore available within the region, and it too had a few objects dating to the BA.

Future work on the development of ironworking should also include contemporary developments taking place in central and southern continental Europe. These regions are often overlooked in eastern Mediterranean-based models, but recent work by Pare (2016, 2017) covering iron material from the western and central Balkans, Italy, the Iberian Peninsula, and Transylvania, Nieling (2009) on material from the southern Caucuses and eastern Anatolia, Rezesidze et al. (2018) on Colchis in Georgia, and Vilaça (2006, 2013) on Portugal, indicate that

these regions were equally active in developing their own ironworking practices during the transition from the LBA to EIA. Huysecom (2001, 3) notes that the “emergence of objects made of iron must be viewed as the result of complex situations where independent centres of innovation could be very close or even interrelate with centres which adopted the technique from somewhere else". What is evident from this set of work is that ironworking in the eastern Mediterranean was part of a wider tapestry of individual regions that shared local developments across this wider metallurgical complex. For example, notable across the regions, from the Iberian Peninsula through Italy, the Balkans, the Caucuses, to the Aegean, Cyprus and the Levant, is early emphasis on adapting iron to knife blades, many of which share close typological traits throughout this geography (see Pare 2017, 30–31, fig. 5; also Vilaça 2013, 93–94; Chapter 5). Chernykh (2002, 30), in a review of the history of metals, observed that new metals spread quickest through new material provinces. If so, then what role could the knives have played in ironworking? Their ubiquity seems to suggest that they represent a common typological iron-language across Europe and the eastern Mediterranean, and therefore further investigation might provide insights into how local developments in ironworking were shared across this metal network. Naue II blades and spearheads also provide interesting typological links throughout the iron object horizon.

In terms of a final note on the broader history of ironworking, the data presented in the thesis for Anatolia, the Aegean, and Cyprus does not support a model that attributes the origins of iron metallurgy to an innovation by a single metallurgical master, whose technology, during the Transition, diffused to the rest of Europe via itinerant craftsmen. Instead, the defining feature of this period is that ironworking took place simultaneously in multiple

centres across a vast metallurgical landscape, each one developing its own teaching and resource acquisition methods, making some very practical discoveries and incremental developments in mining, smelting, heat treatments on the local level, which they share with neighbouring regions through the movement of goods that experienced smiths might try to imitate, or the movement of people who share particular insights (not the entire production method from mining to smithing!). Developments that take place in such a disparate way are difficult to encapsulate in a single, pan-European model, so, the best method to approach ironworking is by breaking down the scenario across all regions involved, identifying the particulars of their iron industries, and defining how these regions interacted to form a wide picture of ironworking across Europe and the Near East.

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The impact of iron technology on the economy of the Aegean and Cyprus from 1200-850 BCE

Volume II: Tables and Figures

Thesis submitted for the degree of Doctor of Philosophy in Archaeology

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No.	Period	Start	End	Site	Context	Item	Handle / Head	Reference
AN.10	Chalcolithic	5500	4000	Tell Kurdu	Ubaid levels, inside a groundstone mortars in the Tr 11 pottery kiln workshop	Hematite ore		Yener 2000: 69; Edens and Yener 2000
AN.20	Late Chalcolithic/EB I	4000	2800	Korucutepe	Tomb, Stratum XXXVII	Hematite mace head		Brandt 1978: 61, pl. 110:2; Yakar 1984: 67, 73; Yener 2000: 69
AN.30	EB I	3000	2800	Tülintepe		Hematite mace head		Yener 2000: 69
AN.40	EB I	3000	2800	Göltepe		Hematite mace head		Yener 2000: 69
AN.50	EB I	3000	2800	Tilmen Höyük	Tomb M3	Bracelet		Esin 1969: 142, 188, no. 17607; 1976: 225-226
AN.60	EB II	2800	2500	Tepecik		Ring		Esin 1982; Yener 2000: 70
AN.70	EB II	2800	2500	Tepecik		Fragment		Esin 1982; Yener 2000: 70
AN.80	EB I-II late	3000	2800	Troy/Ilios	Troia I, North-South trench, central sector, area I, deposit 14	Piece of iron		Tagebuch 1871: 466, no. NS/c.i.14; Easton 2002: 207, 327, fig. 166
AN.90	EB II late-III early	2650	2400	Troy/Ilios	Troia II late, Treasure L	Mace head, pommel, or slag		Schliemann 1891: 20; Götze in Dörpfeld 1902: 339, 385, fig. 356; Schmidt 1902: 244, no. 6116; Bjorkman 1973: 125; Waldbaum 1980: 70; Pernicka 1995: 61; Antonova et. al. 1996: 174, no. 226
AN.100	EB II late-III early	2650	2400	Troy/Ilios	Troia II late, Treasure L	Item lost		Waldbaum 1978: 20
AN.110	EB II late-III early	2650	2300	Troy/Ilios	Troia II	Iron bar		Götze 1897; Götze 1902: 362, pl. 44.III; Bobokhyan 2009: 28

Table 1. Iron objects of Anatolia

AN.120	EB II late-III early	2650	2300	Troy/Ilios	Troia II, North-South trench, northern sector, area II, deposit 6, mixed in mudbrick house debris with stone foundations	Spherical piece		Tagebuch 1871: 256, 258f, 260; Easton 2002: 147, 327
AN.130	EB II late-III early	2650	2300	Troy/Ilios	Troia II, North Platform, area II, deposit 7	Slag		
AN.140	EB II late-III early	2650	2300	Troy/Ilios	Troia II, North-South trench, nothern sector, area III, deposit 11	Slag		
AN.150	EBA III	2500	2300	Dorak	Royal Tomb	Sword	Obsidian, gold & amber inlay	Waldbaum 1980: 71; Buchwald 2005: 72
AN.160	EB III	2500	2100	Alaca Höyük	Tomb K	Dagger	Gold	Arik 1937: 167, pl. 182; Koşay 1944; 1945: 78f; Koşay 1951: 70, 167, pl. 182; Stronach 1957: 103, fig. 2.27; Wertime 1973: 885, n. 90; Nakai et. al. 2008
AN.170	EB III	2500	2100	Alaca Höyük	Tomb M.A	Pin	Gold	Koşay 1938: 107, pl 82; 1951: 70, 167; Waldbaum 1980: 70; Yalçın 2005: 496
AN.180	EB III	2500	2100	Alaca Höyük	Tomb M.A	Pin	Gold	Koşay 1938: 107, pl 82; Waldbaum 1980: 70; Yalçın 2005: 496
AN.190	EB III	2500	2100	Alaca Höyük	Tomb M.A.	Necklace terminal		Kosay 1938: 114, 115, 122
AN.200	EB III	2500	2100	Alaca Höyük	Tomb M.C.	Semi-lunate disc		Koşay 1938: 123, 129; 1944: 107, 119, 129, 187, pls 87, 95, 100
AN.210	EB III	2500	2100	Alaca Höyük	Tomb T.M	Knife		Arik 1937: 95, fig 129D
AN.220	EB III	2500	2100	Alaca Höyük	Tomb C	Dagger	Gold	Arik 1937; Koşay 1944, pl. CII; 1945; Koşay 1951: 70, 167; Stronach 1957: 102, fig. 3.5; Wertime 1973: 885; Yener 2000: 69

Table 1. Iron objects of Anatolia

AN.230	EB III	2500	2100	Alaca Höyük	Tomb C	Dagger	Gold	Yener 2000: 69
AN.240	EB III	2500	2100	Alaca Höyük	LX-LXII/ 50–52 Grid	Objects (3)		Çinaroglu and Çelik 2009: 93
AN.250	EB III	2300	2300	Umm el Marra		Pendant		Schwartz et al. 2003; Jambon 2017
AN.260	EB III late	2200	2000	Kaman-Kalehöyük	Stratum IVa, sector North IV	Fragment		Akanuma 2008
AN.270	EB III late	2200	2000	Kaman-Kalehöyük	Stratum IVa, sector North IV	Hematite ore		Akanuma 2008
AN.280	EB III late	2200	2000	Kaman-Kalehöyük	Stratum IVa, sector North IV	Furnace wall/hearth fragment		Akanuma 2008
AN.290	EB III late	2200	2000	Kaman-Kalehöyük	Stratum IVa, sector North IV	Furnace wall/hearth fragment		Akanuma 2008
AN.300	EB III late	2200	2000	Kaman-Kalehöyük	Stratum IVa	Other objects, unknown quantity		Akanuma 2008
AN.310	EB III late	2100	2000	Tarsus/Gözlü Kule	Treasure, Room 74	Iron lump		Goldman 1956: 33; Waldbaum 1980: 71
AN.320	Old Assyrian Colony	2000	1700	Kaman-Kalehöyük	Stratum IIIc, sector North XXIV, Grid XLVIII-56	Fragment		Akanuma 2005: 147, 152; 2007: 135
AN.330	Old Assyrian Colony	2000	1700	Kaman-Kalehöyük	Stratum IIIc, sector XII, Room 150, Grid XLIX-54	Fragment		Akanuma 2007: 135
AN.340	Old Assyrian Colony	2000	1700	Kaman-Kalehöyük	Stratum IIIc, sector XII, Room 150, Grid XLIX-55	Fragment		Akanuma 2003; 2005: 152; 2007: 135
AN.350	Old Assyrian Colony	2000	1700	Kaman-Kalehöyük	Stratum IIIc, sector XII, Room 150, Grid XLIX-55	Fragment		Akanuma 2003; 2005: 152; 2007: 135
AN.360	Old Assyrian Colony	2000	1700	Kaman-Kalehöyük	Stratum IIIc, Sector North IV, Grid XXXVIII-55	Slag, iron		Akanuma 2007: 135
AN.370	Old Assyrian Colony	2000	1700	Kaman-Kalehöyük	Stratum IIIc	Slag pieces		Akanuma 2007: 135
AN.380	Old Assyrian Colony	2000	1700	Kaman-Kalehöyük	Stratum IIIc, sector North V	Iron products		Omura 2010; 26th Excavation and Survey in Kaman-Kalehöyük (2010)

Table 1. Iron objects of Anatolia

AN.390	Old Assyrian Colony	2000	1700	Kaman-Kalehöyük	Stratum IIIc, sector North V-VIII	Iron products		Omura 2012; 27th Excavation and Survey in Kaman-Kalehöyük (2012)
AN.400	MBA	2000	1700	Troy/Ilios	Troia V, North-South trench, central sector, area I, deposit 5; unspecified findspot	Spike?		Easton 2002: 195, 237, fig. 159
AN.410	Old Assyrian Colony	1950	1836	Kültepe-Kaneš	Karum lower city, Level II, House of Peruwa, Room 7	Iron pieces (2) w/manganese ore		Özgüç 1952-53: 151; 1953: 200; 1959: 36; Özgüç et. al. 1952: 16; Dercksen 2005: 28
AN.420	Old Assyrian Colony	1836	1700	Kültepe-Kaneš	Karum lower city, Level Ib workshop	Fragment		Akanuma 2003: 146; 2005: 152; 2006: 221; 2007: 125
AN.430	Old Assyrian Colony	1836	1700	Kültepe-Kaneš	Karum lower city, Level Ib workshop	Fragment		Akanuma 2003: 146; 2005: 152; 2006: 221; 2007: 125
AN.440	Old Assyrian Colony	1900	1875	Acemhöyük (Purušḫanda)	Layer III	Nails (12) in ivory box		Özgüç 1976; MIlard 1990
AN.450	Old Assyrian Colony	1900	1700	Alişar Hüyük	Stratum II	Pinhead inlay pieces		von der Osten 1939: 253, 264, 273, figs. 284, 290
AN.460	Old Assyrian Colony	1900	1700	Alişar Hüyük	Stratum II	Wire		von der Osten 1939: 253, 264, 273, figs. 284, 290
AN.470	Old Assyrian Colony	1900	1700	Alişar Hüyük	Stratum II	Fragments		von der Osten 1939: 253, 264, 273, figs. 284, 290
AN.480	Old Assyrian Colony	1700	1700	Alaca Höyük	Level IV, area H(4) 5	Hematite ore		
AN.490	Old Hittite Kingdom	1700	1500	Kusura (Afyon Karahisar)	Stratum C	Fragment		Lamb 1936: 39; 1937: 217
AN.500	Old Hittite Kingdom	1700	1500	Kaman-Kalehöyük	Stratum IIIb, sector North I, Grid XLIV-55	Fragment		Akanuma 2005: 147
AN.510	Old Hittite Kingdom	1700	1500	Kaman-Kalehöyük	Stratum IIIb, sector North III, Grid XXXIX-55	Fragment		Akanuma 2005: 147
AN.520	Old Hittite Kingdom	1700	1500	Kaman-Kalehöyük	Stratum IIIb, sector North VIII, Grid XXXI-55, Pit 2697	Hematite ore (pigment?)		Akanuma 2006: 209, 217, 219

Table 1. Iron objects of Anatolia

AN.530	Old Kingdom-Hittite Empire	1700	1200	Alaca Höyük	Strata IV-II, under pavement of the Hittite temple	Semi-circular object		Koşay 1951: 14, 140 tbl 8*5.3; 1966: 184, 191, 195, 197, 198, 227-8, tbl 41-3, 46
AN.540	Old Kingdom-Hittite Empire	1700	1200	Alaca Höyük	Strata IV-II	Nail		Koşay-Akok 1966: 184, 191, 195, 197-8, 227-8, figs 41-3, 46; Muhly et. Al. 1985
AN.550	Old Kingdom-Hittite Empire	1700	1200	Alaca Höyük	Strata IV-II	Nail		Koşay-Akok 1966: 184, 191, 195, 197-8, 227-8, figs 41-3, 46; Muhly et. Al. 1985
AN.560	Old Kingdom-Hittite Empire	1700	1200	Alaca Höyük	Strata IV-II	Nail		Koşay 1951: 36, 140
AN.570	Old Kingdom-Hittite Empire	1700	1200	Alaca Höyük	Strata IV-II	Needle/pin		Koşay 1966: 184, 191, 195, 197-8, 227-8, figs 41-3, 46; Muhly et. Al. 1985
AN.580	Old Kingdom-Hittite Empire	1700	1200	Alaca Höyük	Strata IV-II	Arrowhead		Koşay 1966: 184, 191, 195, 197-8, 227-8, figs 41-3, 46; Muhly et al. 1985
AN.590	Old Kingdom-Hittite Empire	1700	1200	Alaca Höyük	Strata IV-II	Dagger/spearhead		Koşay 1951: 14, tbl 8*5.3; 1966: 184, 191, 195, 197, 198, 227-8, tbl 41-3, 46
AN.600	Old Kingdom-Hittite Empire	1700	1200	Alaca Höyük	Strata IV-II	Bracelet/ring		Koşay 1951: 14, tbl 8*5.3; 1966: 184, 191, 195, 197, 198, 227-8, tbl 41-3, 46
AN.610	Old Kingdom-Hittite Empire	1700	1200	Alaca Höyük	Strata IV-II	Plaque/knife blade		Koşay 1951: 14, tbl 8*5.3; 1966: 184, 191, 195, 197, 198, 227-8, tbl 41-3, 46
AN.620	Old Kingdom-Hittite Empire	1700	1200	Alaca Höyük	Strata IV-II	Fragment		Koşay 1951: 14, tbl 8*5.3; 1966: 184, 191, 195, 197, 198, 227-8, tbl 41-3, 46
AN.630	Old Kingdom-Hittite Empire	1700	1200	Alaca Höyük	Strata IV-II	Handle, conical socket (spearbutt?)		Koşay 1951: 14, tbl 8*5.3; 1966: 184, 191, 195, 197, 198, 227-8, tbl 41-3, 46
AN.640	Old Kingdom-Hittite Empire	1700	1200	Alaca Höyük	Strata IV-II	Axe-like object		Koşay 1951: 14, tbl 8*5.3; 1966: 184, 191, 195, 197, 198, 227-8, tbl 41-3, 46
AN.650	Old Kingdom-Hittite Empire	1700	1200	Alaca Höyük	Strata IV-II	Seal stamp		Koşay 1941: 12; Koşay 1966: 27, 51, 141, 142, 168, pl. 32

Table 1. Iron objects of Anatolia

AN.660	Old Kingdom-Hittite Empire	1700	1200	Alaca Höyük	Strata IV-II, reduced to stone walls and located one meter below temple foundations	Deposit of iron		Koşay 1941: 11-12, photos; Koşay-Akok 1966: 27, 142
AN.670	Old Kingdom-Hittite Empire	1700	1200	Alaca Höyük	Strata IV-II, sondage in the heart of the temple, 30cm under the pavement Middle Hittite stratum	Fragment		Koşay 1941: 12; Koşay-Akok 1966: 27, 142
AN.680	Old Kingdom-Hittite Empire	1700	1200	Alaca Höyük	Strata IV-II, sondage in the heart of the temple, 30cm under the pavement Middle Hittite stratum	Blocks		Koşay 1941: 12; Koşay-Akok 1966: 27, 142
AN.690	Middle Hittite-Hittite Empire	1500	1300	Alaca Höyük	Stratum IIIa	Armour scale		Koşay 1951: 14, tbl 8*5.3; 1966: 184, 191, 195, 197, 198, 227-8, tbl 41-3, 46
AN.700	Middle Hittite-Hittite Empire	1500	1300	Alaca Höyük	Stratum IIIa	Circular plaque		Koşay 1951: 14, tbl 8*5.3; 1966: 184, 191, 195, 197, 198, 227-8, tbl 41-3, 46
AN.710	Luwian	1700	1250	Troia	Troy VI	Knife		Schliemann 1881: 674, fig. no. 1421; Muhly et al. 1985: 70
AN.720	Hittite Empire Period	1450	1200	Kaman-Kalehöyük	Stratum IIIa	Slag lumps		Akanuma 1995a; 1995b; 2003: 137
AN.730	Hittite Empire Period	1450	1200	Kaman-Kalehöyük	Stratum IIIa	Fragments		Akanuma 2003
AN.740	Hittite Empire Period	1450	1200	Kaman-Kalehöyük	Stratum IIIa-IId, sector North XII,	Knife		Akanuma 2003; 2005: 155
AN.750	Hittite Empire Period	1450	1200	Kaman-Kalehöyük	Stratum IIIa-IId, sector North XXX, Grid XLVIII-51	Bar-shaped implement		Akanuma 2003; 2005: 155
AN.760	Hittite Empire Period	1450	1200	Kaman-Kalehöyük	Stratum IIIa-IId	Fragment		Akanuma 2003; 2005: 155
AN.770	Hittite Empire Period	1450	1200	Kaman-Kalehöyük	Stratum IIIa-IId	Pigment-use ore		Akanuma 2004; 2006: 219
AN.780	Hittite Empire Period	1450	1370	Tell Açana/Alalakh	Niqmepa Palace, Level IV, room 8	Lumps		Woolley 1955: 120, 279, 282; Muller-Karpe 1994; Yener 2007: fig. 105
AN.790	Hittite Empire Period	1450	1350	Hattušaš/Boğazköy	Büyükkale IVb, Lower City level 2, stratum 3	Chisel		Boehmer 1972: 145, pl. XLVI; Yalçın 1999: 181
AN.800	Hittite Empire Period	1450	1350	Hattušaš/Boğazköy	Lower Town level 2, domestic context J/20 House 19, Room I	Ring		Boehmer 1979: 35, pl. XXI; Muhly et al. 1985: 71

Table 1. Iron objects of Anatolia

AN.810	Hittite Empire Period	1450	1350	Hattušaš/Boğazköy	Level 2-1b	Finds of iron and slag		Yalçın 1999: 181, n. 19; Seeher 1999 pers. comm.
AN.820	Hittite Empire Period	1450	1300	Hattušaš/Boğazköy	Lower Town level 2 or 1b, domestic context	Speiss or iron arsenide (12)		Boehmer 1972: 131; Muhly et al. 1985: 76-77, pls. VIIIa-b, IXa
AN.830	Hittite Empire Period	1450	1300	Hattušaš/Boğazköy	Lower Town level 2 or 1b, domestic context	Slag		Schaaber et. al. 1977: 261; Muhly et al. 1985: 77
AN.840	Hittite Empire Period	1450	1300	Hattušaš/Boğazköy	Büyükkale IVb/III, J/20 debris of a level 2 mudbrick building, domestic context	Bar-shaped object/ billet, elongated		Boehmer 1972: 137, pl. XLIII.1246
AN.850	Hittite Empire Period	1450	1300	Hattušaš/Boğazköy	Büyükkale IVb/III, J/20 debris of a level 2 mudbrick building, domestic context	Bar-shaped object/ billet, triangular		Boehmer 1972: 137, pl. XLIII.1247
AN.860	LBA II	1400	1200	Korucutepe	Phase J: CXXVIII	Iron bar/billet		van Loon 1980: 147-148, pls. 45G, 49G, 45H; McConchie 2004: 230, tbl. 15
AN.870	LBA II	1400	1200	Korucutepe	Phase J: CXXX	Mini axe		van Loon and Buccellati 1970; van Loon 1980: 147-148, pls. 45F, 49F; McConchie 2004: 230, tbl. 15
AN.880	LBA II	1400	1200	Korucutepe	Phase J: CXXX	Part of scale armour		van Loon 1980: 147-148, pls. 45G, 49G, 45H; McConchie 2004: 230, tbl. 15
AN.890	LBA II	1400	1200	Korucutepe	Phase J: CXXX	Part of scale armour		van Loon 1980: 147-148, pls. 45G, 49G, 45H; McConchie 2004: 230, tbl. 15
AN.900	Hittite Empire Period	1350	1300	Hattušaš/Boğazköy	Lower City level 1b, found in level with houses on high stone socles	Axe, lugged		Bittel 1957: 17, fig. 12; Boehmer 1972: 138, pl. XLIV; Muhly et. al. 1985: 78, pl. IXb.3; Yalçın 1999: 182
AN.910	Hittite Empire Period	1350	1270	Tell Açana/Alalakh	Level II	Arrowhead		Woolley 1955: 120, 279, 282; Muller-Karpe 1994
AN.920	Hittite Empire Period	1350	1185	Tell Açana/Alalakh	Level II-I	Arrowhead		Woolley 1955: 120, 279, 282; Muller-Karpe 1994

Table 1. Iron objects of Anatolia

AN.930	Hittite Empire Period	1300	1200	Hattušaš/Boğazköy	Büyükkale III, Lower City level 1, K/20	Nails (4)		Boehmer 1972: 149, pl. XLIX; Muhly et al. 1985: 78, pl. IX.b2; Yalçın 1999: 182
AN.940	Hittite Empire Period	1300	1200	Hattušaš/Boğazköy	Büyükkale III, Lower City level 1, K/20	Rings (3)		Boehmer 1972: 156, pl. LV; 1979: 35
AN.950	Hittite Empire Period	1300	1200	Hattušaš/Boğazköy	Lower City level 1, Temple 1, Hittite debris	Spearbutt, conical		Boehmer 1972: 144, pl. XLV
AN.960	Hittite Empire Period	1300	1200	Hattušaš/Boğazköy	Büyükkale III, Lower City level 1, K/20	Sickle		Boehmer 1972: 147, pl. XLVI
AN.970	Hittite Empire Period	1300	1200	Hattušaš/Boğazköy	Büyükkale III, Lower City level 1, K/20	Arrowhead		Boehmer 1972: 151, pl. XLIX
AN.980	Hittite Empire Period	1300	1200	Hattušaš/Boğazköy	Büyükkale III, Lower City level 1, K/20	Spindle		Boehmer 1972: 158, pl. LVI
AN.990	Hittite Empire Period	1300	1200	Hattušaš/Boğazköy	Büyükkale IIIa (Great Fortress), Lower City level 3? (check the German)	Axe, lugged		Boehmer 1972: 138, pl. XLIV
AN.1000	Hittite Empire Period	1300	1200	Hattušaš/Boğazköy	Büyükkale IIIa (Great Fortress) translate the context	Spearbutt or conical spearhead		Boehmer 1972: 144, pl. XLV
AN.1010	Hittite Empire Period	1270	1185	Tell Açana/Alalakh	Level I	Spatula		Woolley 1955: 120, 279, 283; Muller-Karpe 1994
AN.1020	Hittite Empire Period	1270	1185	Tell Açana/Alalakh	Topsoil, unprovenanced	Ironworking indications		Yener et al. 2004: 27
AN.1030	Hittite Empire Period	1270	1185	Tell Açana/Alalakh	Dig house drawers, small finds	Iron artifacts		Yener 2002
AN.1040	Hittite Empire Period	1300	1200	Tepecik		Tool		Çukur and Kunç 1989: 117, 119, tableau 5, no. 31
AN.1050	Hittite Empire Period	1300	1200	Tepecik		Fragments (3)		Çukur and Kunç 1989: 117, 119, tableau 5, nos. 29, 30, 32
	Post-Hittite Iron Age							
AN.1060	EIA I-II early	1200	900	Kaman-Kalehöyük	Stratum IId-III, sector North XII	Fragment		Akanuma 2005: 148

Table 1. Iron objects of Anatolia

AN.1070	EIA I-II early	1200	900	Kaman-Kalehöyük	Stratum IId-IIIa, sector North XXX	Fragment		Akanuma 2005: 148
AN.1080	EIA I-II early	1200	900	Kaman-Kalehöyük	Stratum IId, sector North VI	Fragment		Akanuma 2005: 148
AN.1090	EIA I-II early	1200	900	Kaman-Kalehöyük	Stratum IId, sector South	Large no. iron objects, including knives		28th Excavation and Survey in Kaman-Kalehöyük (Omura 2013)
AN.1100	EIA I-II early	1200	900	Kaman-Kalehöyük	Stratum IId, sector South	Iron items		25th Excavation and Survey in Kaman-Kalehöyük (Omura 2010)
AN.1110	EIA I-II early	1200	800	Korucutepe	Phase K, KRC 69/385	Knife/sickle		Ertem 1968; van Loon 1970: 11; 1978; 1979; 1980; McConchie 2004: 110, 229, tbl. 13
AN.1120	EIA I-II early	1200	800	Korucutepe	Phase K, KRC 69/449	Fibula		van Loon and Buccellati 1970; van Loon and Güterbock 1972; McConchie 2004: 110, 229, tbl. 13
AN.1130	EIA I-II early	1200	800	Korucutepe	Phase K, KRC 69/209	Ingot/billet		van Loon 1980: 178; McConchie 2004: 110, 229, tbl. 13
AN.1140	EIA I-II early	1200	800	Korucutepe	Phase K, KRC 70/87	Arrowhead, tanged		van Loon 1978; 1980; McConchie 2004: 110, 229, tbl. 13
AN.1150	EIA I late-EIA II early	1100	900	Norşuntepe	North section of south terrace building	Knife handle		McConchie 2004: 229, tbl. 11
AN.1160	EIA I late-EIA II early	1100	900	Norşuntepe	South section of south terrace building	Fragments		McConchie 2004: 229, tbl. 11
AN.1170	EIA I late-EIA II early	1100	900	Norşuntepe	South section of south terrace building	Knife blade		McConchie 2004: 229, tbl. 11
AN.1180	EIA I late-EIA II early	1100	900	Norşuntepe	Farmstead building N28, industrial precinct	Slag		McConchie 2004: 229, tbl. 12
AN.1190	EIA I late-EIA II early	1100	900	Hattušaš/Boğazköy	Workshop	Fragments/ slags		Yalçın 1999: 181, fn. 19; Seeher 1997: 328, fig. 11; Zimmermann 2001: 118, fn.
AN.1200	EIA I late	1100	1000	Tarsus/Gözlükule	Settlement	Knife		Goldman 1963: 363
AN.1210	EIA I late	1100	1000	Tarsus/Gözlükule	Settlement	Cleaver		Goldman 1963: 363, fig. 168.3
AN.1220	EIA I late	1100	1000	Tarsus/Gözlükule	Settlement	Spearhead		Goldman 1963: 367, fig. 172.111

Table 1. Iron objects of Anatolia

AN.1230	EIA I late-EIA II early	1100	1000	Tarsus/Gözlükule	Settlement	Knife	Wood	Goldman 1937: 277, fig. 34; 1963: 363, fig. 168.9, 20; 170
AN.1240	EIA I late-EIA II early	1100	1000	Tarsus/Gözlükule	Settlement	Knife	Wood	Goldman 1937: 277, fig. 34; 1963: 363, fig. 168.20
AN.1250	EIA I late-EIA II early	1100	1000	Tarsus/Gözlükule	Settlement	Awls (6)	Bone	Goldman 1937: 277, fig. 35; 1963: 364, fig. 170
AN.1260	EIA I late-EIA II early	1100	1000	Tarsus/Gözlükule	Settlement	Chisels		Goldman 1937: 277
AN.1270	EIA I late-EIA II early	1100	1000	Tarsus/Gözlükule	Settlement	Axe		Goldman 1937: 277
AN.1280	EIA II	1000	900	Tarsus/Gözlükule	Settlement	Knife		Goldman 1963: 363
AN.1290	EIA II	1000	900	Tarsus/Gözlükule	Settlement	Spearbutt or		Goldman 1937: 277; 1963: 365
AN.1300	EIA II	1000	900	Sirkeli Höyük		Axe		
	Asia Minor EIA							
AN.1310	EIA I	1225	1175	Beşik Tepe	Pit with transitional Myc IIIB-IIIC wares, late Troy VI - early Troy VII habitation levels	Blade		Mellink 1984: 446, 451; Muhly et al. 1985: 71; Yener et al. 1996: 383
AN.1320	EIA I	1100	1050	Troy	Troia VIIb2 citadel and lower town	Small tools and knives from well-stratified contexts		Becks 2003: 50
AN.1330	EIA I	1100	1050	Phokaia	Workshop	Ovens, anvils, slag, chargcoal, residues on rocks and clay		Yalçın and Özyiğit 2013
AN.1340	EIA I	1100	1050	Sardis	House of Bronzes, deep sounding Level 93.60	Knife		Hanfmann 1963: 7
AN.1350	EIA I	1050	950	Assarlik	Tumulus Tomb A	Spearhead		Patron 1887: 68; Carstens 2011: 487, fig. 5
AN.1360	EIA I	1050	950	Assarlik	Tumulus Tomb A	Knife		Patron 1887: 68; Carstens 2011: 487, fig. 5
AN.1370	EIA I	1050	950	Assarlik	Tumulus Tomb B	Fragments of weapons		Patron 1887: 68; Carstens 2011: 487, fig. 5

Table 1. Iron objects of Anatolia

AN.1380	EIA I	1050	950	Assarlik	Tomb C	Spearhead		Patron 1887: 70; Carstens 2011: 487, fig. 5
AN.1390	EIA I	1050	950	Assarlik	Tomb C	Knife		Patron 1887: 70; Carstens 2011: 487, fig. 5
AN.1400	EIA I	1050	950	Assarlik	Tomb C	Knife		Patron 1887: 70; Carstens 2011: 487, fig. 5
AN.1410	EIA I	1050	950	Assarlik	Tomb D	Knife		Patron 1887: 72; Carstens 2011: 487, fig. 5
AN.1420	EIA I	1050	950	Assarlik	Tomb D	Fragments of weapons		Patron 1887: 72; Carstens 2011: 487, fig. 5
AN.1430	EIA I	1050	950	Assarlik	Tomb unidentified	Sword?		
AN.1440	EIA II	1000	900	Sardis	House of Bronzes, deep sounding	Sickle		Swift 1967: 36; Maddin et al. 1983: 181
AN.1450	EIA II	1000	900	Sardis	House of Bronzes, deep sounding,	Axe		Maddin et al. 1983: 178-180, figs. 1-6, pls.
AN.1460	EIA II	1050	900	Iasos	Tomb XXIX	Knife		Levi 1969-70: 466, 469
AN.1470	EIA II	1050	900	Iasos	Tomb unknown (but I can get)	Nail		Levi 1969-70: 469
	VAN-URMIA AREA IA							
	EIA I	1300	1000	Hakkari	Collective grave M2	Armrings (14)		Belli and Konyar 2003: 124
	EIA I	1300	1000	Hakkari	Collective grave M2	Dagger		Belli and Konyar 2003: 124, fig. 49
	EIA I	1250	1000	Karagündüz	Collective grave K2	Knife		Sevin and Kavakli 1996: 31
	EIA I	1250	1000	Karagündüz	Collective grave K2	Bracelet		Sevin and Kavakli 1996: 31
	EIA I	1250	1000	Karagündüz	Collective grave K2	Dagger		McConchie 2004: 240
	EIA I	1250	1000	Karagündüz	Collective grave K2	Bracelet		Sevin and Kavakli 1996: 31
	EIA I	1250	1000	Karagündüz	Collective grave K2	Pin		Sevin and Kavakli 1996: 31
	EIA I	1250	1000	Karagündüz	Collective grave K2	Dagger		Sevin and Kavakli 1996: 35
	EIA I	1250	1000	Karagündüz	Collective grave K2	Ring		Sevin and Kavakli 1996: 32
	EIA I	1250	1000	Karagündüz	Collective grave K2	Pin		Sevin and Kavakli 1996: 31
	EIA I	1250	1000	Karagündüz	Collective grave K2	Knife		Sevin and Kavakli 1996: 31
	EIA I	1250	1000	Karagündüz	Collective grave K2	Ring		Sevin and Kavakli 1996: 32
	EIA I	1250	1000	Karagündüz	Collective grave K2	Ring		Sevin and Kavakli 1996: 32
	EIA I	1250	1000	Karagündüz	Collective grave K2	Dagger fragments (2)		McConchie 2004: 240, 341
	EIA I	1250	1000	Karagündüz	Collective grave K2	Bracelet fargment		Sevin and Kavakli 1996: 31
	EIA I	1250	1000	Karagündüz	Collective grave K2	Bracelet		Sevin and Kavakli 1996: 31
	EIA I	1250	1000	Karagündüz	Collective grave K2	Bracelet		Sevin and Kavakli 1996: 31
	EIA I	1250	1000	Karagündüz	Collective grave K2	Knife		Sevin and Kavakli 1996: 34

Table 1. Iron objects of Anatolia

	EIA I	1250	1000	Karagündüz	Collective grave K2	Pin		Sevin and Kavakli 1996: 33
	EIA I	1250	1000	Karagündüz	Collective grave K2	Dagger		Sevin and Kavakli 1996: 34
	EIA I	1250	1000	Karagündüz	Collective grave K4	Fragments		Sevin and Kavakli 1996: 31
	EIA I	1250	1000	Karagündüz	Collective grave K6	Bracelet		Sevin and Kavakli 1996: 31
	EIA I	1250	1000	Karagündüz	Collective grave K6	Bracelet		Sevin and Kavakli 1996: 31
	EIA I	1250	1000	Karagündüz	Collective grave K6	Bracelet		Sevin and Kavakli 1996: 31
	EIA I	1250	1000	Karagündüz	Collective grave K6	Bracelet		Sevin and Kavakli 1996: 31
	EIA I	1250	1000	Karagündüz	Collective grave K6	Bracelet		Sevin and Kavakli 1996: 31
	EIA I	1250	1000	Karagündüz	Collective grave K6	Bracelet		Sevin and Kavakli 1996: 31
	EIA I	1250	1000	Karagündüz	Collective grave K6	Bracelet		Sevin and Kavakli 1996: 31
	EIA I	1250	1000	Karagündüz	Collective grave K6	Pin		Sevin and Kavakli 1996: 33
	EIA I	1250	1000	Karagündüz	Collective grave K6	Bracelet		Sevin and Kavakli 1996: 31
	EIA I	1250	1000	Karagündüz	Collective grave K6	Bracelet		Sevin and Kavakli 1996: 31
	EIA I	1250	1000	Karagündüz	Collective grave K6	Knife?		Sevin and Kavakli 1996: 35
	EIA I	1250	1000	Karagündüz	Collective grave K6	Bracelet		Sevin and Kavakli 1996: 31
	EIA I	1250	1000	Karagündüz	Collective grave K6	Knife		Sevin and Kavakli 1996: 35
	EIA I	1250	1000	Karagündüz	Collective grave K6	Ring		Sevin and Kavakli 1996: 31
	EIA I	1250	1000	Karagündüz	Collective grave K7	Fibula		Sevin and Kavakli 1996: 33
	EIA I	1250	1000	Karagündüz	Collective grave K7	Bracelet		Sevin and Kavakli 1996: 33
	EIA I	1250	1000	Karagündüz	Collective grave K7	Bracelet		Sevin and Kavakli 1996: 33
	EIA I	1250	1000	Karagündüz	Collective grave K7	Fibula		Sevin and Kavakli 1996: 33
	EIA I	1250	1000	Karagündüz	Collective grave K7	Bracelet fargments (3)		McConchie 2004: 240
	EIA I	1250	1000	Hasanlu	Period V, grave	Ring		Dyson 1964: 39; 1965: 196; 1967: 2957; Muscarella 1974: 49
	EIA I	1250	1000	Hasanlu	Period V, occupation deposit on the High Mound	Ring		Danti 2013: 348
	EIA I	1250	1000	Hasanlu		Dagger		Muscarella 1974: 80
	EIA I	1200	1200	Ruhr Museum, Essen	Art market purchase	Sword		Yalçın 2005: 498-499, figs 7, 8; Tsumoto and Siegelová 2011: 297, n. 89

Table 1. Iron objects of Anatolia

	EIA I/II	1100	900	Karagündüz	Recent published finds from Van area have hundreds of iron objects from the 11-10th century	Objects		Sevin and Kavakli 1995: 337-350; 1996; Yalçın 1999: 182; Belli and Konyar 2003: 194
	EIA I/II	1100	900	Hakkari	Recent published finds from Van area have hundreds of iron objects from the 11-10th century	Objects		Belli and Konyar 2003: 194
	EIA I/II	1100	900	Yoncatepe	Recent published finds from Van area have hundreds of iron objects from the 11-10th century	Objects		Belli and Konyar 2003: 194
	EIA II	1025	975	Ernis-Evditepe	Cemetery	Axe		Belli 1996: 164; Belli 2001: 148, fig. 10; Belli and Konyar 2003a: 181, fig. 17
	EIA II	1025	975	Ernis-Evditepe	Cemetery	Dagger		Belli 2001: 148, fig. 6; Belli and Konyar 2003a: 184, figs. 22:1, 23
	EIA II	1025	975	Ernis-Evditepe	Cemetery	Dagger		Belli 2001: 148, fig. 6; Belli and Konyar 2003a: 187, figs. 22:2, 23
	EIA II	1025	975	Ernis-Evditepe	Cemetery	Dagger		Belli 2001: 148, fig. 6; Belli and Konyar 2003a: 187, figs. 22:3, 23
	EIA II	1025	975	Ernis-Evditepe	Cemetery	Toggle pins (7)		Belli 2001: 148, fig. 7; Belli and Konyar 2003a: 184, fig. 18, 19
	EIA II	1025	975	Ernis-Evditepe	Cemetery	Bracelet (6)		Belli 2001: 148, fig. 8; Belli and Konyar 2003a: 189, figs. 24, 25
	EIA II	1025	975	Ernis-Evditepe	Cemetery	Mace heads (numerous)		Belli 2001: 148, fig. 9; Belli and Konyar 2003a: 184, fig. 20, 21
	EIA II	1025	975	Ernis-Evditepe	Cemetery	Ring		Belli and Konyar 2003a: 193, fig. 26
	EIA II	1025	975	Ernis-Evditepe	Cemetery	Ring		Belli and Konyar 2003a: 193, figs. 24, 26
	EIA II	1025	975	Ernis-Evditepe	Cemetery	Cylindrical pieces		Belli and Konyar 2003a: 193, fig. 27
	EIA II	1025	975	Ernis-Evditepe	Cemetery	Dagger		Belli 2001: 148
	EIA II	1025	975	Ernis-Evditepe	Cemetery	Dagger		Belli 2001: 148
	EIA II	1025	975	Ernis-Evditepe	Cemetery	Dagger		Belli 2001: 148

Table 1. Iron objects of Anatolia

	EIA II	1025	975	Ernis-Evditepe	Cemetery	Hatchet (axe?)		Belli and Konyar 2003
	EIA II	1000	800	Hasanlu	Burned Building I, Period IV	Dagger	Iron & gold handle, wood sheath	Dyson 1959: 12-14; 1964: 42, fig. 2:2, pl. XI,2
	EIA II	1000	800	Hasanlu	Burned Building I, Period IV	Dagger		Dyson 1959: 12-14; 1964: 42, fig. 2:7
	EIA II	1000	800	Hasanlu	Burned Building I, Period IV	Sword		Dyson 1959: 13; 1964: 42
	EIA II	1000	800	Hasanlu		Dagger		Dyson 1964: 42, fig. 2:8
	EIA II	1000	800	Dinkhatepe	Period II	Objects: jewelry and weapons		Muscarella 1974: 59
	EIA II	1000	800	Dinkhatepe	Period II	Jewellery (81)		Muscarella 1974: 59
	EIA II	1000	800	Dinkhatepe	Period II	Weapons (16)		Muscarella 1974: 59
	EIA II	1000	800	Dinkhatepe	Tomb B9, Square B9a, Period II	Bracelet		Muscarella 1974: 60, fig. 26.415
	EIA II	1000	800	Dinkhatepe	Tomb B9, Square B9a, Period II	Ring		Muscarella 1974: 60, fig. 26.413
	EIA II	1000	800	Dinkhatepe	Tomb B9, Square B9a, Period II	Ring (2)		Muscarella 1974: 60, fig. 26.419
	EIA II	1000	800	Dinkhatepe	Tomb B9, Square B9a, Period II	Stud		Muscarella 1974: 60-61, fig. 26.1042
	EIA II	1000	800	Dinkhatepe	Tomb B11, Square B10b, Period II	Pins (6)		Muscarella 1974: 61
	EIA II	1000	800	Dinkhatepe	Tomb B11, Square B10b, Period II	Ring		Muscarella 1974: 61
	EIA II	1000	800	Dinkhatepe	Tomb B11, Square B10b, Period II	Archer's ring		Muscarella 1974: 61
	EIA II	1000	800	Dinkhatepe	Tomb B6, Square B10b, Period II	Dagger	Bone	Muscarella 1968: 190, fig. 3; 1974

Table 1. Iron objects of Anatolia

	EIA II	1000	800	Dinkhatepe	Tomb B6, Square B10a, Period II, NW corner outside of tomb	Spearhead		Muscarella 1968: 121, fig. 14; 1974: 67
	EIA II	1000	800	Dinkhatepe	Tomb B6, Square B10a, Period II, with pottery at the entrance of the tomb	Point		Muscarella 1974: 67
	EIA II	1000	800	Dinkhatepe	Tomb B6, Square B10a, Period II, with pottery at the entrance of the tomb	Macehead		Muscarella 1974: 67
	EIA II	1000	800	Dinkhatepe	Tomb B6, Square B10a, Period II, with pottery at the entrance of the tomb	Knife		Muscarella 1974: 67
	EIA II	1000	800	Dinkhatepe	Tomb B6, Square B10a, Period II, with pottery at the entrance of the tomb	Pin		Muscarella 1974: 67
	EIA II	1000	800	Dinkhatepe	Tomb B6, Square B10a, Period II, with pottery at the entrance of the tomb	Pin, thick-knobbed		Muscarella 1974: 67
	EIA II	1000	800	Dinkhatepe	Tomb B6, Square B10a, Period II, with pottery at the entrance of the tomb	Chain		Muscarella 1974: 67
	EIA II	1000	800	Dinkhatepe	Tomb B6, Square B10a, Period II, along tomb western wall	Bracelets (2)		Muscarella 1974: 67
	EIA II	1000	800	Dinkhatepe	Tomb B6, Square B10a, Period II, along tomb western wall	Bracelet		Muscarella 1974: 67
	EIA II	1000	800	Dinkhatepe	Tomb B6, Square B10a, Period II, along tomb western wall	Bracelet		Muscarella 1974: 67
	EIA II	1000	800	Dinkhatepe	Tomb B6, Square B10a, Period II, along tomb western wall	Rings		Muscarella 1974: 67
	EIA II	1000	800	Dinkhatepe	Tomb B6, Square B10a, Period II, along tomb western wall	Horsebit		Muscarella 1974: 67
	EIA II	1000	800	Dinkhatepe	Tomb B6, Square B10a, Period II, along tomb western wall	Axe		Muscarella 1974: 67

Table 1. Iron objects of Anatolia

	EIA II	1000	800	Dinkhatepe	Tomb B6, Square B10a, Period II, along tomb western wall	Archer's ring		Muscarella 1974: 67
	EIA II	1000	800	Dinkhatepe	Tomb B6, Square B10a, Period II, along tomb western wall	Pin		Muscarella 1974: 67
	EIA II	1000	800	Dinkhatepe	Tomb B12, Square B10a, Period II	Pin		Muscarella 1974: 67
	EIA II	1000	800	Dinkhatepe	Tomb B15, Square B10a, Period II	Pin (3)		Muscarella 1974: 67
	EIA II	1000	800	Dinkhatepe	Tomb B15, Square B10a, Period II	Rings (5)		Muscarella 1974: 67
	EIA II	1000	800	Dinkhatepe	Tomb B15, Square B10a, Period II	Pin		Muscarella 1974: 67
	EIA II	1000	800	Dinkhatepe	Tomb B15, Square B10a, Period II	Archer's ring (3)		Muscarella 1974: 67
	EIA II	1000	800	Dinkhatepe	Tomb B8, Square B10b, Period II	Ring		Muscarella 1974: 68
	EIA II	1000	800	Dinkhatepe	Tomb B8, Square B10b, Period II	Ring		Muscarella 1974: 68
	EIA II	1000	800	Dinkhatepe	Tomb B1, Square B8a, Period II	Pin (3)		Muscarella 1974: 68
	EIA II	1000	800	Dinkhatepe	Tomb B1, Square B8a, Period II	Bracelet		Muscarella 1974: 68
	EIA II	1000	800	Dinkhatepe	Tomb B1, Square B8a, Period II	Loops		Muscarella 1974: 70
	EIA II	1000	800	Dinkhatepe	Tomb B1, Square B8a, Period II	Chain		Muscarella 1974: 70
	EIA II	1000	800	Dinkhatepe	Tomb B1, Square B8a, Period II	Knives (3)	Wood	Muscarella 1974: 70, fig. 45
	EIA II	1000	800	Dinkhatepe	Tomb B1, Square B8a, Period II	Dagger	Wood	Muscarella 1974: 70, fig. 45
	EIA II	1000	800	Dinkhatepe	Tomb B1, Square B8a, Period II	Staff or baton		Muscarella 1974: 70, fig. 45

Table 1. Iron objects of Anatolia

	EIA II	1000	800	Dinkhatepe	Tomb B1, Square B8a, Period II	Point		Muscarella 1974: 70, fig. 45
	EIA II	1000	800	Dinkhatepe	Tomb B5, Square B8e, Period II	Ring (2)		Muscarella 1974: 72
	EIA II	1000	800	Dinkhatepe	Tomb B5, Square B8e, Period II	Ring		Muscarella 1974: 72
	EIA II	1000	800	Dinkhatepe	Tomb B5, Square B8e, Period II	Bracelets/ anklets (2)		Muscarella 1974: 72
	EIA II	1000	800	Dinkhatepe	Tomb B5, Square B8e, Period II	Needle		Muscarella 1974: 72
	EIA II	1000	800	Dinkhatepe	Tomb B5, Square B8e, Period II	Pins (3)		Muscarella 1974: 72
	EIA II	1000	800	Dinkhatepe	Tomb B5, Square B8e, Period II	Pin		Muscarella 1974: 72
	EIA II	1000	800	Dinkhatepe	Tomb B5, Square B8e, Period II	Pin (2)		Muscarella 1974: 72
	EIA II	1000	800	Dinkhatepe	Tomb B5, Square B8e, Period II	Pin (3)		Muscarella 1974: 72
	EIA II	1000	800	Dinkhatepe	Tomb B5, Square B8e, Period II	Pin (2)		Muscarella 1974: 72
	EIA II	1000	800	Dinkhatepe	Tomb B5, Square B8e, Period II	Archer's ring (2)		Muscarella 1974: 72
	EIA II	1000	800	Dinkhatepe	Tomb B5, Square B8e, Period II	Spearhead (2)		Muscarella 1974: 72
	EIA II	1000	800	Dinkhatepe	Tomb B5, Square B8e, Period II	Knife		Muscarella 1974: 72
	EIA II	1000	800	Dinkhatepe	Tomb B5, Square B8e, Period II	Bracelet (3)		Muscarella 1974: 72
	EIA II	1000	800	Dinkhatepe	Tomb B3, Square 9a, Period II	Ring		Muscarella 1974: 75

Table 1. Iron objects of Anatolia

No.	Period	Start	End	Site	Region	Context	Item	Other Material	Measurements (cm)	References
BA.10	EM I-IIA	3500	2700	Poros Katsambas	Crete	Sanoudakis house plot	Ferrous speiss			Doonan et al. 2007: 109, 111-113; Thorton et. al. 2009: 309
BA.20	MM IIA-B	1800	1700	Arkanes	Crete	Burial Building 9	Bead			Sakellarakes 1997: 627, fig. 675
BA.30	MH II	1800	1650	Asine	Argolid	Cist grave 1970-12 (4D), east of the acropolis Kastraki	Nail		L. 7.2, max Th. 0.4 x 0.5	Dietz 1980: 30, 84, fig 59, no. 21; 1982: 86; Waldbaum: 1999 no. 18
BA.40	MM IIB	1750	1700	Mavrospelio	Crete	Tomb 17, Chamber B pit fill	Cube			Forsdyke 1926, pl. XXIII
BA.50	MM III/ IIIB	1650	1600	Anesmopilia/ Archanes-Phourni	Crete	West antechamber of sanctuary shrine building: collapsed roof, on first joint of small finger on left hand	Bezel ring	Silver	Hoop inner dia. 1.3	Varoufakis 1981; Sakellarakēs 1991, 1997; Zimmerann 2001: 112; Muller 2003: 478
BA.60	LM I-II	1600	1400	Knossos	Crete	Palace, west, between Magazines 5 & 6	Nail	Gold		Evans 1899: 66; Waldbaum 1978: 19
BA.70	LH I	1500	1500	Kakovatos-Pylos	Elis, Peloponnese	Tholos A	Bezel ring		Bezel L. 3.3	Zimmermann 2001: 112
BA.80	LH I-II	1500	1400	Nichoria	Messenia	Area III, K25 Rd, level 2, lot 710	Bracelet			Catling et al. 1983: 310, no. 85 (N236)
BA.90	LH I-II	1500	1400	Nichoria	Messenia	Area III N, K25 Ref, level 3, lot 823	Scrap			Catling et al. 1983: 311, no. 105 (N292)
BA.100	LH IIA	1450	1425	Vapheio	Laconia	Tholos tomb cist grave	Finger ring			Pini 2010 dates to LH IIA; Tsountas 147
BA.110	LH II-IIIA	1450	1300	Asine	Argolid	Chamber Tomb I:1, Barbouna	Finger ring			Frödin and Persson 1938: 373
BA.120	LH IIB	1425	1425	Aidonia	Argolid	Chamber Tomb 7, Pit 1, Gournospilia cemetery	Bezel ring	Silver	Bezel dia. 1.7 x 3, Hoop dia. 1.85	Zimmermann 2001: 112

Table 2. Iron objects of the Aegean Bronze Age

BA.130	LM IIIA	1400	1350	Arkanes-Phouni	Crete	Tholos A side chamber, in larnax	Beads (2)			Sakellarakes 1991: 78; 1997, 158ff, 634, fig. 671; Hughes-Brock 1996: 74
BA.140	LM IIIA	1400	1350	Phaistos	Crete	Chamber Tomb 10, Kalyvia cemetery	Bezel ring	Bronze, gold	Bezel 2.4 x 1.6, Hoop dia. 1.8	Savignoni 1904; Müller 1909; CMS II.3 113
BA.150	LH IIIA	1400	1350	Dendra	Argolid	Royal tholos tomb, Pit I, in gold cup w/ octopus designs	Bezel ring	Silver, lead		Zimmermann 2001: 112; Persson 1931: 56, pl. 35
BA.160	LH IIIA	1400	1350	Dendra	Argolid	Royal tholos tomb, Pit I, in gold cup w/ octopus designs	Bezel ring	Copper	Bezel L. 0.047 to 0.042, breadth 0.030. Hoop inner dia. 0.021-0.019; L. 4.7-4.2 x 3. Hoop inner D. 2.1-1.9	Zimmermann 2001: 112; Persson 1931: 56, pl. 35
BA.170	LH IIIA-B	1400	1200	Gla	Boeotia	Palace room D	Door plaque on clamp	Lead		Ridder 1894: 293; Tsountas and Manatt 1897: 381
BA.180	LH IIIA-B	1400	1200	Mycenae	Argolid	Chamber Tomb 68	Bezel ring	Silver		Varoufakis
BA.190	LH IIIA-B	1400	1200	Mycenae	Argolid	Chamber Tomb 58, Lower Town	Bezel ring	Bronze, gold	Bezel 1.62 x 2.4, Hoop inner dia 1.6-1.9/1.70 (Müller 2003); bezel 1.55 x 2.8 (CMS I, 91)	Varoufakis 1982: 315; Müller 2003: 477, fn. 23; CMS I 91
BA.200	LH IIIA-B	1400	1200	Mycenae	Argolid	Chamber Tomb 58, Lower Town	Bezel ring			Varoufakis 1982: 315
BA.210	LH IIIA-B	1400	1200	Mycenae	Argolid	Chamber Tomb 10	Finger ring			

Table 2. Iron objects of the Aegean Bronze Age

BA.220	LH IIIA-B	1400	1200	Mycenae	Argolid	Chamber Tomb 28	Finger ring			
BA.230	LH IIIA-B	1400	1200	Thebes	Boeotia	Theban Arch. Mus. (found on finger bone)	Finger ring			Unpublished: Buchholz and Karageorghis 1973: 111, no. 1357; Varoufakis 1981
BA.240	LH IIIA-B	1400	1200	Melathria	Laconia	Chamber tomb A1	Finger ring		Hoop ext. dia 2	Zimmermann 2001: 112
BA.250	LH IIIA-B	1400	1200	National Museum	Unkown	Unknown context	Bezel ring	Lead		Unpublished: Varoufakis
BA.260	LH IIIA-B	1400	1200	National Museum	Unkown	Unknown context	Bezel ring	Lead		Unpublished: Varoufakis
BA.270	LH IIIA-B	1400	1200	Thermi	Lesbos, North Aegean	Area Γ, north-west settlement, disturbed soil	Knife		L. 18.5	Lamb 1936: 207, pls. XXV, XLVII; Waldbaum 1980: 78
BA.280	LH IIIB/C	1300	1100	Ialysos	Rhodes	Chamber Tomb 17	Bracelet			Maiuri 1923-1924: 127; Maiuri 1926: 45; Buchholz and Karageorghis 1973; Waldbaum 1978: 34
BA.290	LH IIIB/C	1300	1100	Ialysos	Rhodes	Chamber Tomb 69	Bracelet			Jacopi 1930-31: 284, fig. 26
BA.300	LH IIIB	1300	1200	Dendra	Argolid	Chamber Tomb II	Pendant	Gold	L. 2.5	Persson 1931: 79, 102, no. 14, pl. 33:6
BA.310	LH IIIB	1300	1200	Thebes	Boeotia	Jewllery workshop, Kadmeia, Building B	Drill point		L. 3.4, W. 0.8 top, W. 0.1 narrow end	Symeonoglou 1973: 70, pl. 93, fig. 274.8
BA.320	LH IIIB	1300	1200	National Museum	Unknown	Unknown context	Finger ring			Unpublished: Varoufakis
BA.330	LH IIIB	1500	1400	Volos-Kapakli	Thessaly	Tholos tomb	Plaque		L. 2-2.5, L. max 2.69, H. max. 2.84, Th. Max. 0.2-0.4	Kourouniotis 1906: 236-237; Avila 1983: 36, fig. 6.7

Table 2. Iron objects of the Aegean Bronze Age

BA.340	LH IIIB-C	1300	1100	Tiryns	Argolid	Grave V(D)	Piece		L. 3.1	Waldbaum 1980, cat. 27; Rudolph 1973: 40, no. 22, pl. 18.5
BA.350	LH IIIB2	1250	1250	Tiryns	Argolid	Metal workshop, lower town on the lower acropolis: room 191, building IV, central fireplace and a pit (LXII 42/68)	Ferrous speiss			Kilian 1982; 1983: 304
BA.360	LH IIIB	1330/ 1300	1200	Kastri	Thasos, North Aegean	Kentria cemetery, Tomb K3A, phase IA	Knife			Koukoulē-Chrysanthakē 1992: 71, no. 3, pl. 23B.3, type E VIII
BA.370	LH IIIB-C	1300	1100	Kastri	Thasos, North Aegean	Tsiganadika cemetery, Tomb 19A, phase I	Knife			Koukoulē-Chrysanthakē 1992: 229, no. 10, pl. 124, type E VII

Table 2. Iron objects of the Aegean Bronze Age

No.	Site	Period	Description	Size (cm)	Context
BA.50	Anesmopilia	MM III	Iron bezel, silver hoop; rivet holes for attaching hoop to bezel visible	Inner D. 1.3 hoop	West shrine room on first knuckle of smaller (left) finger
BA.70	Kakoyatos-Pylos (Elis), no. 5682	LH I	Iron bezel (gold foil overlay?)	L. 3.3 bezel	Tholos A
BA.120	Aidonia, Gournospilia cemetery	LH IIB	Iron bezel core (highly oxidized); silver hoop with edges rolled over to hold the bezel and two small nails attach each end of the hoop to the bezel; silver finger-bed attached to the back of the bezel and interior of the hoop	3 x 1.7 bezel; D. 1.85 hoop	Chamber Tomb 7, Pit 1
BA.140	Phaistos, Kalyvia cemetery, HMm 48, F. 5 (CMS II.3, 113)	LM IIIA	Bronze bezel core, sheets of iron and gold fixed to each half; gold foil depicts row of figure-of-8 shields and floral motifs; hoop core bronze, external side gold and iron sheets fixed to each half, internal side and finger-bed single gold sheet; gold sheets fixed to bronze core by bronze rivets	2.4 x 1.6 bezel; D. 1.8 hoop	Chamber Tomb 10
BA.180	Mycenae, no. 2986	LH IIIA-B	Iron hoop, silver bezel		Chamber Tomb 68, Lower Town
BA.190	Mycenae, no. 2856 (CMS I, 91)	LH IIIA-B	Bronze bezel core, sheets of iron and gold fixed to each half on bezel surface; gold foil depicts the lower half of two recumbent bulls; hoop core bronze, external side gold and iron sheets fixed to each half, internal side and finger-bed single gold sheet (most missing); identical construction to BA.140 Phaistos ring	2.4 x 1.62 bezel; inner D. 1.6-1.9 hoop	Chamber Tomb 58, Lower Town
BA.200	Mycenae, no. 2866	LH IIIA-B	Iron hoop, bezel missing		Chamber Tomb 58, Lower Town
BA.150	Dendra, Ring I	LH IIIA	Iron hoop, bezel lower layer silver, middle lead, top iron; green spots on outer surface of hoop indicate traces of copper		Royal Tholos Tomb, Pit 1
BA.160	Dendra, Ring II	LH IIIA	External hoop iron, internal hoop lead with copper; bezel in 2 layers, lower lead, upper iron	4.7 x 3 bezel; inner D. 2.1-1.9 hoop	Royal Tholos Tomb, Pit 1

Table 3. Signet rings with iron in the Bronze Age Aegean

BA.250	National Museum Athens, no. 2337	LH IIIA/B	External convex hoop of iron, lead filling the interior concave of the hoop; bezel missing		Original context unknown
BA.260	National Museum Athens, no. 2347	LH IIIA/B	Iron bezel with indications of a lead layer that has disappeared; hoop missing		Original context unknown

Table 3. Signet rings with iron in the Bronze Age Aegean

No.	Site	Period	Description	Size (cm)	Context	CMS Reference
BB.1	Knossos	LM IB	Three clay impressions of the same lentoid seal showing water fowl and flowering plants	D. 3 bezel	Arsenal deposit	CMS II.8 172
BB.2	Asine, no. 10275	LH II-IIIA	Bronze bezel core, half plating of gold, other half missing. Bull leaping. Hoop missing. Hammer-chiseled. Rivets for the gold top plate are visible on the reverse of the bezel core and on the gold plate itself	2.8 x 1.8 bezel	Chamber Tomb 1	CMS I 200
BB.3	Asine, no. 10276	LH II-IIIA	Bronze bezel core, half plating of gold, other half missing. Bull(leaping?) left. Rivets for the gold top plate are visible on the reverse of the bezel core and on the gold plate itself	1.5 x 2.6 bezel; D. 1.3 hoop	Chamber Tomb 1	CMS I 201
BA.140	Phaistos, Kalyvia Cemetery, HMm 48, F. 5	LM IIIA	See Table 3	2.4 x 1.6 bezel; D. 1.8 hoop	Chamber Tomb 10	CMS II.3 113
BB.4	Mycenae, no. 2972	LH III A1	Silver bezel core. Gold plate on half of bezel. Scalloped division between bezel plates. Hoop missing. Hammer-chiseled	2.8 x 1.55 bezel	Chamber Tomb 71	CMS I 108
BA.190	Mycenae, no. 2856	LH III A-B	See Table 3	2.4 x 1.62 bezel; inner D. 1.6-1.9	Chamber Tomb 58	CMS I 91
BB.5	Pylos	LH III B2-C1	Clay impression from a metal ring with an oval bezel. Rivet imprint visible. Either polymetallic or bi-bezel	2 x 1.3 clay impression	Palace Room 98	CMS I 313

Table 4. Bi-bezel signet rings in the Bronze Age Aegean

No.	Site	Period	Description	Size (cm)	Context	CMS Reference
BB.6	Dendra, Ring III	LH IIIA	Lead bezel, copper hoop; traces of silver plating over lead bezel		Royal Tholos Tomb, Pit 1	
BB.7	Knossos, no. HMBr 2490	LM I	Bronze bezel and hoop with the figures cut into the bronze bezel. Two rivets are visible in the centre of the bezel face where the hoops join the bezel	1.7 x 0.8 bezel	Hogarths' House A debris, Temenos	CMS II.3 015

Table 5. Other rings from the Aegean Bronze Age

Knives

No.	Period	Start	End	Site	Region	Context	Rivets	Features	Shape	Size (CM)	References
A.10	LH IIIC	1200	1100	Perati	Attica	Tomb 28	1 bronze		6	L. 10.7	Iakovidis 1954: 98, fig. 10; 1964: 85-95; 1969: I: 18; II: 459, no.M75, fig.147; III: pl. 3a; 1980: 90, fig. 109, no. M75; Varoufakis 1981: 30, fig 2.9 or 10
A.20	LH IIIC	1200	1100	Perati	Attica	Tomb 38	2 bronze		1	L. 17.3	Iakovides 1964: 85-95; 1969 I: 283-284; II: 343-346, 459, no. M85, fig. 149; Perati III: pl. 82γ; Iakovides 1980: 91-93, fig. 111; Varoufakis 1981: 30, fig 2.9 or 10
A.30	LH IIIC	1200	1100	Kamini	Naxos, Cyclades	Chamber Tomb A	1 bronze		6	L. 10.6, L. tang 1.45, max blade W. 0.1-0.7	Zapheiropoulos 1960: 332; Orlandos 1960: 191; Snodgrass 1971: 221, 295; Mee 1982: 45; Vlachopoulos 2006 vol. A: 269, 355, 370, pl. 25, no. MN 3574
A.40	LH IIIC	1200	1100	Lefkandi	Euboia	North House, Phase 2A, Room 10, Floor fill. Domestic fill	4 bronze		1	L. 11.9; rivets L 1.6, D. 0.3	Popham and Sackett 1968: 14, no. 16.10.2a, fig. 22; Evely et al. 2006: 62, no. 16, fig. 5.10: 5, pl. 89.3
A.50	LH IIIC	1200	1050	Malthi	Messenia	Area B 62, domestic court, part of megaron complex			1	L. 8.2	Valmin 1938: 372, pl. 30.14, no. 126
A.60	LH IIIC	1200	1050	Malthi	Messenia	Area A 43, Industrial Quarter, forge room				L. 2.8, W. 2.5, Th. 0.4	Valmin 1938: 371, 412, pl. 30.17, no. 182
A.70	LH IIIC	1200	1100	Paralimni-Teichos Dymaion	Achaea			Fanged tang	6	L. 11.6	Μαστροκωστας 1964: 67; Papadopoulos 1979: 157, 227
A.80	LH IIIC	1200	1100	Paralimni-Teichos Dymaion	Achaea					N/A	Μαστροκωστας 1964: 67; Papadopoulos 1979: 157, 227
A.90	LM IIIC	1200	1100	Psychro Cave	Crete	Oxford Ashmolean Collection	3 iron	Bone handle only		L. 58	Boardman 1961: 21, fig. 5.78, pl. X
A.100	LM IIIC	1200	1100	Psychro Cave	Crete	Oxford Ashmolean Collection	2 iron	Bone handle only		L. 5.7	Boardman 1961: 21, fig. 5.79, pl. X
A.110	LH IIIC late	1100	1100	Pogoni	Epirus	Tumulus B, grave fill				N/A	Andreou 1987: 48; Papadopoulos 1987: 141

Table 6. Iron objects of the Aegean Early Iron Age

Knives

A.120	SMin early	1100	1050	Upper Gypsades, Knossos	Crete	Tomb VII, larnax	2 bronze	Wood handle, squared tang	1	L. 16	Hood et al. 1958: 208, 234, 248-249, fig. 32.12, pl. 60a; Hoffman 1997: 102-103, pl. 127
A.130	SMin	1100	1000	Praisos	Crete		1 iron		1		Possibly in the Sitias Archaeological Museum, Crete
A.140	SMin	1100	1000	Knossos North Cemetery	Crete	Tomb 2, Medical Faculty Site				L. 3.3, 2; W. 105	Catling 1996 I: 59; Snodgrass 1996: 586, no. 13+14
A.150	SMin	1100	1000	Knossos North Cemetery	Crete	Tomb 186, Medical Faculty Site	bronze		1	tang PL. 3, W. 1.5	Catling 1979: 46; Catling 1996: 191, fig. 163, pl. 274; Snodgrass 1996: 586, no. f2
A.160	SMin	1100	1000	Knossos North Cemetery	Crete	Tomb 201, Medical Faculty Site				L. 2.7, W. 1.7-1.3	Catling 1978: 46; Kilian-Dirlmeier 1993: 98, no. 255 (iron knife found w/ bz Naue II); Catling 1996: 195, fig. 164; Snodgrass 1996: 587, no. f9
A.170	SMin	1100	1000	Karphi	Crete	Tomb M11				L. 4.5; W. 1.7	Pendlebury and Money-Coutts 1937: 106, 121, pl. 28.3, no. 383
A.180	SMin	1100	1000	Vrokastro, Karakovilia	Crete	Chamber Tomb V	2 bronze		1	L. 19	Hall 1914: 151, pl. 21A; Evans 1935 IV.1: 377, fig. 315; Desborough 1964: 26, 61, 186; Desborough 1974: 262-263; Hoffman 1997: 103
A.190	SMin-EPG	1100	900	Vrokastro, Karakovilia	Crete	Chamber Tomb I	unriveted		11		Hall 1914: 138, pl. 21.j, no. 13
A.200	SMin-EPG	1100	900	Vrokastro, Karakovilia	Crete	Chamber Tomb I				L. 13.1	Hall 1914: 138, no. 14
A.210	SMin-EPG	1100	900	Vrokastro, Karakovilia	Crete	Chamber Tomb I, mass of blades	Blades only (11)				Hall 1914: 139; Hoffman 1997: 104
A.220	SMin-EPG	1100	900	Vrokastro, Karakovilia	Crete	Chamber Tomb I, mass of blades	bronze				Hall 1914: 139; Hoffman 1997: 104
A.230	SMin-EPG	1100	900	Panagia	Crete	Hoard to the right of the Tomb A dromos	unriveted		11	L. 12	Levi 1927-1929: 398-400, fig. 517
A.240	SMin-EPG	1100	900	Panagia	Crete	Hoard to the right of the Tomb A dromos			6		Levi 1927-1929: 398-400, fig. 517
A.250	SMin-EPG	1100	900	Panagia	Crete	Hoard to the right of the Tomb A dromos	Handle only			L. 8.5	Levi 1927-1929: 398-400, fig. 517
A.260	SMin-EPG	1100	900	Knossos North Cemetery	Crete	Tomb 208, Medical Faculty Site					Catling 1996: 200; Snodgrass 1996: 586, no. f4+9(iii)

Table 6. Iron objects of the Aegean Early Iron Age

Knives

A.270	SMyc late-EPG	1050	950	Kerameikos, Athens	Attica	Grave A	iron			L. 11, W. 1.2	Kraiker and Kübler 1939: 102
A.280	SMyc late-PG	1075	850	Nichoria	Messinia	Area IV NE, L23 Xklm, level 4, lot 4312/E			6	L. 10.2	Catling et al. 1983: 284, 310, fig. 5-53
A.290	SMyc late-PG	1075	850	Nichoria	Messinia	Area III N, K25 Ucd, level 4, lot 1172			1	PL. 8.5	Catling et al. 1983: 284, 310, fig. 5-56
A.300	EPG	1050	1000	Serraglio	Kos, Dodecanese	Tomb 7	4 bronze	Bone handle, squared tang	1	L. 19	Morricone 1978: 35-36, 75, fig. 60
A.310	EPG	1050	1000	Pylos	Messinia	Tholos tomb, Palace of Nestor				PL. 12.7	Blegen et al. 1973 III: 240, fig. 298:1, 3
A.320	EPG	1050	1000	Pylos	Messinia	Tholos tomb, Palace of Nestor	1 iron			PL. 8.2	Blegen et al. 1973 III: 240, fig. 298:1, 3
A.330	EPG	1050	950	Knossos North Cemetery	Crete	Tomb 48, Medical Faculty Site	2 iron			L. 8.9	Catling 1996: 93, fig. 174; Snodgrass 1996: 587, no. 22
A.340	EPG	1050	950	Pogoni	Epirus	Tumulus A cist graves	Blades only (multiple)				Andreou 1982: 57, 60; 1987: 48; Papadopoulos 1987: 141
A.350	EPG	1050	950	Tylissos	Crete	Tomb, cremation burial					Marinatos 1931: 114, figs. 2, 3, no. 6
A.360	EPG	1050	950	Lefkandi	Euboia	Skoubris Tomb 46					Popham et al. 1980
A.370	EPG-MPG	1050	900	Torone	Chalkdiki	Tomb 52, Terrace V	unriveted	Bone handle, leather sheath	3	PL. 10.4	Papadopoulos 2005: 126-127, 561, pl. 468
A.380	PG	1050	850	Knossos North Cemetery	Crete	Tomb 175, Medical Faculty Site				L. 5.9, hilt W. 2.2 flat, blade W. 2.7, max Th. 0.4	Catling 1996: 189; Snodgrass 1996: 587, no. f13
A.390	PG	1050	850	Knossos North Cemetery	Crete	Tomb 175, Medical Faculty Site				L. 4.4, W. 1.4	Catling 1996: 189; Snodgrass 1996: 586, no. f33
A.400	PG	1050	850	Knossos North Cemetery	Crete	Tomb 219, Medical Faculty Site				L. 10.2, W. 1.2	Catling 1996: 218; Snodgrass 1996: 586, no. f25
A.410	PG	1050	850	Kos	Kos, Dodecanese	Tombs					Morricone 1950: 320; Desborough 1972: 223, 309, 311

Table 6. Iron objects of the Aegean Early Iron Age

Knives

A.420	PG	1050	850	Lefkandi	Euboia	Skoubris Pyre 13	1 iron		8	L. 12	Popham et al. 1980: 138, pl. 114
A.430	PG	1050	850	Lefkandi	Euboia	Skoubris Pyre 13				PL. 2	Popham et al. 1980: 138, pl. 114
A.440	PG	1050	850	Torone	Chalkdiki	Tomb 38, Terrace V	Handle only	Bone handle		PL. 5.5, W. 1.4-1.1	Papadopoulos 2005: 112, 561, pl. 470
A.450	PG	1050	850	Kastri	Thasos	Kentria cemetery, Tomb K5B, phase II	Handle only	Bronze ring-end handle		L. 8	Koukoulē-Chrysanthakē 1992: 90, 407, fig. 91.2, pls. 39B, 353, type E VI.2
A.460	PG	1050	850	Kastri	Thasos	Tsiganadika cemetery, Tomb 7B, phase II	Handle only	Bronze handle		L. 4.5	Koukoulē-Chrysanthakē 1992: 407, fig. 91.4, pls. 78B.9, 353, type E VI.4
A.470	PG	1050	850	Kastri	Thasos	Tsiganadika cemetery, Tomb 14A				L. 4, W. 1.9	Koukoulē-Chrysanthakē 1992: 172-173, pl. 87, type E VIII
A.480	PG	1050	850	Kastri	Thasos	Tsiganadika cemetery, Tomb 14A				L. 3, W. 1	Koukoulē-Chrysanthakē 1992: 173, pl. 87, type E VIII
A.490	PG	1050	850	Kastri	Thasos	Tsiganadika cemetery, Tomb 14B, phase II				L. 4.5	Koukoulē-Chrysanthakē 1992: 177, pl. 90A, type E VIII
A.500	PG	1050	850	Kastri	Thasos	Tsiganadika cemetery, Tomb 16, phase II				L. 3	Koukoulē-Chrysanthakē 1992: 182, pl. 93, type E VIII
A.510	PG	1050	850	Kastri	Thasos	Tsiganadika cemetery, Tomb 18, phase II		Bronze ring-end handle		L. 15.6	Koukoulē-Chrysanthakē 1992: 202, 407, fig. 91.3, pl. 109, type E VI.3; Photos 1992: 798
A.520	PG	1050	850	Kastri	Thasos	Tsiganadika cemetery, Tomb 20Γ, phase II	1 iron			L. 7.8	Koukoulē-Chrysanthakē 1992: 242, pl. 133, type E VII
A.530	PG	1050	850	Kastri	Thasos	Tsiganadika cemetery, Tomb 20Γ, phase II				L. 8.2	Koukoulē-Chrysanthakē 1992: 242, pl. 134, type E X1
A.540	PG	1050	850	Kastri	Thasos	Tsiganadika cemetery, Tomb 23B				L. 2	Koukoulē-Chrysanthakē 1992: 267, pl. 153, type E VIII
A.550	PG	1050	850	Kastri	Thasos	Tsiganadika cemetery, Tomb 24, phase II				L. 12	Koukoulē-Chrysanthakē 1992: 272, pl. 154, type E VIII
A.560	PG	1050	850	Kastri	Thasos	Tsiganadika cemetery, Tomb 24, phase II				L. 9	Koukoulē-Chrysanthakē 1992: 272, pl. 154, type E VIII
A.570	PG	1050	850	Kastri	Thasos	Tsiganadika cemetery, Tomb 24, phase II				L. 9	Koukoulē-Chrysanthakē 1992: 272, pl. 154, type E VIII
A.580	PG	1050	850	Kastri	Thasos	Tsiganadika cemetery, Tomb 27A, phase II				L. 4.5	Koukoulē-Chrysanthakē 1992: 277, pl. 158B, type E VI.3
A.590	PG	1050	850	Kastri	Thasos	Tsiganadika cemetery, Tomb 34B, phase II				L. 12.6	Koukoulē-Chrysanthakē 1992: 316, pl. 180, type E VIII

Table 6. Iron objects of the Aegean Early Iron Age

Knives

A.600	PG	1050	850	Kastri	Thasos	Tsiganadika cemetery, Tomb 34B, phase II				L. 6	Koukoulē-Chrysanthakē 1992: 316, pl. 180, type E X.2
A.610	PG	1050	850	Kastri	Thasos	Tsiganadika cemetery, Tomb 34B, phase II				L. 3	Koukoulē-Chrysanthakē 1992: 316, pl. 180, type E X.2
A.620	PG	1050	850	Kastri	Thasos	Tsiganadika cemetery, Tomb 35B				L. 6.9	Koukoulē-Chrysanthakē 1992: 321, pl. 183, type E XI
A.630	PG	1050	850	Larnaki	Thasos	Larnaki cemetery, Tomb A, burial α, phase II				L. 5, W. 2	Koukoulē-Chrysanthakē 1992: 331, pl. 187, type E VII-VIII, Phase II
A.640	PG	1050	850	Larnaki	Thasos	Larnaki cemetery, Tomb B, burial β, phase II			8		Koukoulē-Chrysanthakē 1992: 334, pl. 188, type E VIII, Phase II
A.650	PG	1050	850	Larnaki	Thasos	Larnaki cemetery, Tomb 2Γ, burial α, phase II				L. 7.5	Koukoulē-Chrysanthakē 1992: 342, pl. 193A, type E VII, Phase II
A.660	PG	1050	850	Liatovouni	Epirus	Tombs	Knife blades		European		Douzougli and Papadopoulos 2010: 45-46, fig. 16
A.670	PG	1050	850	Kakavi	Epirus	Tumulus grave 1	1 bronze		European	L. 10	Hammond 1967: 349, 353, 358, fig. 27.1; Snodgrass 1971: 217, 260; Hammond 1971: 237; Harding 1972: 217-218; Kilian 1975: 42-43
A.680	PG	1050	850	Vajzë	Epirus	Tumulus A grave 2	1 iron		European	L. 9	Prendi 1957: 79, fig. 3a; Hammond 1967: 358; 1982: 634
A.690	PG	1050	850	Dodona	Epirus		1 iron		European	L. 13	Carapanos 1877: 108, pl. 53.7; Hammond 1967: 352, 359, fig. 27.2
A.700	MPG	950	900	Kerameikos, Athens	Attica	Grave 17	2 iron		6A	L. 14.5	Kraiker and Kübler 1939: 192, 198, pl. 76
A.710	MPG	950	900	Lefkandi	Euboia	Palia Perivolia Tomb 16			1	PL. 12.9	Popham et al. 1980: 148, pl. 246h
A.720	MPG-LPG	950	850	Agora, Athens	Attica	Tomb N 16:4					
A.730	MPG-LPG	950	850	Agora, Athens	Attica	Tomb N 16:4					
A.740	MPG-LPG	950	850	Asine	Argolid	Tomb 40, Lower City, right shoulder					Frödin and Persson 1938: 138, 425
A.750	MPG-LPG	950	850	Ialysos Marmaro Cemetery	Rhodes	Tomb 44	1 iron		1	L. 36	Laurenzi 1936: 163-164, fig. 152; Desborough 1952: 226, 311, 312
A.760	MPG-LPG	950	850	Ialysos Marmaro Cemetery	Rhodes	Tomb 44	Sickle-shape			L. 20	Laurenzi 1936: 163-164, fig. 152; Desborough 1952: 226, 311, 312

Table 6. Iron objects of the Aegean Early Iron Age

Knives

A.770	MPG-LPG	950	850	Theotokou	Thessaly	Tomb B		Leather sheath	1	L. 7.3	Wace and Droop 1906: 326, fig. 12i; Wace and Thompson 1912: 213, fig. 147i
A.780	MPG-LPG	950	850	Pogoni	Epirus	Building Delta					Andreou 2004: 61-62
A.790	LPG	900	900	Agora, Athens	Attica	Tomb XXVI/D 16:2			1	PL. 18.7	Young 1949: 297, pl. 72.31
A.800	LPG	900	900	Agora, Athens	Attica	Tomb XXVII/D 16:4/Grave 3			11	L. 14	Blegen 1952: 282, 287, 289, fig. 3.4, pl. 75c.4
A.810	LPG	900	900	Agora, Athens	Attica	Tomb XXVII/D 16:4/Grave 3					Blegen 1952: 282, 287, 289, fig. 3.5, pl. 75c.5
A.820	LPG	900	850	Marmariani	Thessaly	Tholos VI			9	L. 14	Tsountas 1899: 101; Heurtley and Skeat 1930-31: 36, fig. 15.23; Georganas 2005: 66
A.830	LPG	900	850	Marmariani	Thessaly	Tholos VI					Tsountas 1899: 101; Heurtley and Skeat 1930-31: 36; Georganas 2005: 66
A.840	LPG	900	850	Marmariani	Thessaly	Tholos VI					Tsountas 1899: 101; Heurtley and Skeat 1930-31: 36; Georganas 2005: 66
A.850	LPG	900	850	Marmariani	Thessaly	Tholos I		Wood handle			Tsountas 1899: 101; Heurtley and Skeat 1930-31: 37; Georganas 2005: 66
A.860	LPG	900	850	Knossos North Cemetery	Crete	Tomb 100, Medical Faculty Site	2 bronze, 1 iron			L. 15+	Catling 1996 I: 137; Snodgrass 1996: 586, no. 10+20+12+18
A.870	LPG	900	850	Skyros	Sporades	Stavropoullos Tomb					Desborough 1952: 311; Snodgrass 2000: 241
A.880	LPG	900	850	Karadiani Cemetery	Tenos, Cyclades	Tomb II			2	PL. 12	Levi 1925-1926: 215, fig. 15, left; Desborough 1952: 311, 160
A.890	LPG	900	850	Karadiani Cemetery	Tenos, Cyclades	Tomb II			1	PL. 9	Levi 1925-1926: 215, fig. 15, right; Desborough 1952: 311, 160
A.900	SPG	900	850	Lefkandi	Euboia	Toumba Tomb 3	3 bronze	Ivory handle	1	PL. 27.6	Popham et al. 1979: pls. 170, 217, 245; 1980: 170, 257, 452
A.910	LPG	900	850	Kerameikos, Athens	Attica	Grave 28					Kübler 1943: 35, pl. 38
A.920	LPG	900	850	Kerameikos, Athens	Attica	Grave 40				L. 13.4	Kübler 1943: 42, pl. 38
A.930	LPG	900	850	Torone	Chalkdiki	Tomb 56, Terrace V		Bone handle, leather sheath		PL. 4.2	Papadopoulos 2005: 130, 561, pl. 469
A.940	LPG	900	850	Atalanti	Boeotia	Karagiorghou Tomb II					Dakoronia 1985: 167

Table 6. Iron objects of the Aegean Early Iron Age

Knives

A.950	LPG	900	850	Atalanti	Boeotia	Gouras Tomb XIV					Dakoronia 1987: 227
A.960	LPG	900	850	Atalanti	Boeotia	Gouras Tomb XXIII					Dakoronia 1987: 228
A.970	LPG	900	850	Atalanti	Boeotia	Gouras Tomb XXIII					Dakoronia 1987: 228
A.980	LPG	900	850	Atalanti	Boeotia	Gouras Tomb XXXII					Dakoronia 1987: 228
A.990	LPG	900	850	Atalanti	Boeotia	Gouras Tomb XXXIII					Dakoronia 1987: 228
A.1000	LPG	900	850	Krannon	Thessaly	Tomb 1					Tziafalias 1983: 204
A.1010	LPG	900	850	Krannon	Thessaly	Tomb 1					Tziafalias 1983: 204
A.1020	LPG	900	850	Krannon	Thessaly	Tomb 28					Tziafalias 1983: 206
A.1030	LPG	900	850	Krannon	Thessaly	Tomb 37					Tziafalias 1983: 206
A.1040	LPG	900	850	Krannon	Thessaly	Tomb 37					Tziafalias 1983: 206
A.1050	LPG	900	850	Krannon	Thessaly	Tomb 61					Tziafalias 1983: 208
A.1060	LPG	900	850	Chloe-Velestino	Thessaly	Tholos tomb		Wood handle		L. 24.2, W. 3.1-1.3	Arachoviti 1994: 133
A.1070	LPG	900	850	Chloe-Velestino	Thessaly	Tholos tomb		Wood handle, fabric sheath		L. 10.3, W. 2.1-0.6	Arachoviti 1994: 133
A.1080	LPG	900	850	Halos	Thessaly	Tumulus B	Knife blades (multiple)				Μαλακσδιοτη 1992: 233
A.1090	LPG	900	850	Halos	Thessaly	Tumulus A - start tomb 4	Knife blades (multiple)				Μαλακσδιοτη 1992: 232
A.1100	LPG	900	850	Halos	Thessaly	Tumulus A, grave III				L. 15	Wace and Thompson 1911-12: 11, fig. 14d; Μαλακσδιοτη 1992: 232
A.1110	LPG	900	850	Halos	Thessaly	Tumulus A, grave V					Wace and Thompson 1911-12: 13; Μαλακσδιοτη 1992: 232; Kilian-Dirlmeier 1993: 113
A.1120	LPG	900	850	Vitsa	Epirus		Knife blades (multiple)		European		Vokotopoulou 1986: 297, 299, figs. 90-92
A.1130	LPG-Geo	900	600	Fortetsa	Crete	Tomb P	2 iron		6	L. 19.5	Brock 1957: 137, 202, pl. 172.1616
A.1140	LPG-Geo	900	600	Fortetsa	Crete	Tomb P			11	L. 21.5	Brock 1957: 137, 202, pl. 172.1611
A.1150	LPG-Geo	900	600	Fortetsa	Crete	Tomb P		Wood sheath	11	L.21.5	Brock 1957: 137, 202

Table 6. Iron objects of the Aegean Early Iron Age

Knives

A.1160	LPG-Geo	900	600	Fortetsa	Crete	Tomb P	1 bronze			PL. 17.5	Brock 1957: 137, 202
A.1170	EG	850	800	Nichoria	Messinia						McDonald et al. 1983: 284, 310, fig. 5-54
A.1180	EG	850	800	Nichoria	Messinia						McDonald et al. 1983: 284, 310, fig. 5-55
A.1190	EG	850	800	Nichoria	Messinia						McDonald et al. 1983: 284, 310, fig. 5-56
A.1200	EG	850	800	Nichoria	Messinia						McDonald et al. 1983: 284, 310
A.1210	EG	850	800	Nichoria	Messinia						McDonald et al. 1983: 284, 310
A.1220	EG	850	800	Asine	Argolid	Barbouna Area, Levendis Sector, Central Trench, Geometric House, Str. 3, floor deposit			3	L. 12.5; max W. 1.9; max Th 0.9	Hägg 1978: 104, 119, figs. 95-96
A.1230	PGB-MG	850	750	Fortetsa	Crete	Tomb P	1 bronze, 2 iron	Wood handle, bronze bands to hold scabbord	6	PL. 36.5, W. blade 3	Brock 1957: 137, 201, pl. 170

Table 6. Iron objects of the Aegean Early Iron Age

Daggers

No.	Period	Start	End	Site	Region	Context	Rivets	Features	Size (CM)	References
A.1240	LH IIIC	1200	1100	Malthi	Messenia	Room A 42, Industrial Quarter, workshop room, upper stratum			L. 14.3, W. 4, Th. 1	Valmin 1938: 102-104, 372, pl. 30.13, no. 474
A.1250	SMyc	1100	1050	Tiryns	Argolid	Grave XXVIII, with sword in warrior grave				Daux 1958: 707; Verdelis 1956: 4; 1963: 14, 16, fig. 8, pl. 5.4
A.1260	SMyc	1100	1050	Elateia-Alonaki	Phokis	Necropolis				Vonhoff 2013: 198
A.1270	SMyc	1100	1050	Kerameikos, Athens	Attica	Grave A	iron	Bone handle	PL. 13.5, L. handle 8.7, h. pommel 8	Kraiker and Kübler 1939: 101-102, pl. 31
A.1280	SMyc	1100	1050	Kerameikos, Athens	Attica	Grave B	3 bronze	Bone handle, scabboard fibres	L. 22, W. blade 2.3-4, Th. 0.02	Kraiker and Kübler 1939: 103-104, pl. 32
A.1290	SMin	1100	1000	Pantanassa	Crete	Tholos tomb				Vonhoff 2013: 198
A.1300	SMin	1100	1000	Praisos	Crete		2 iron			
A.1310	SMin	1100	1000	Knossos North Cemetery	Crete	Tomb 2, Medical Faculty Site			(i) L. 8, Max. W. 2.95+, (ii) L. 5, W. 1.85 tapering to 1.4	Catling 1996 I: 59; Snodgrass 1996: 579, no. 3
A.1320	SMin	1100	1000	Knossos North Cemetery	Crete	Tomb 186, Medical Faculty Site	8 iron		L. 25.9, Max. W. 4	Catling 1979: 46; Coldstream and Catling 1996: 191, fig. 163, pl. 274; Snodgrass 1996: 579, no. 186.f5
A.1330	SMin-EPG early	1100	925	Knossos North Cemetery	Crete	Tomb 208, Medical Faculty Site	1 iron		Max. W. 4.5	Coldstream and Catling 1996: 200; Snodgrass 1996: 579, no. f7 + 9(i) (ii)
A.1340	SMin-EPG early	1100	925	Knossos North Cemetery	Crete	Tomb 24, Medical Faculty Site	2 iron		L. 7.1; Max W. 2.1	Coldstream and Catling 1996 1: 74, fig. 173, pl. 287; Snodgrass 1996: 580, no. 7
A.1350	SMin-EPG early	1100	925	Knossos North Cemetery	Crete	Tomb 24, Medical Faculty Site			L. 26.4, Max W. 4.9	Coldstream and Catling 1996 1: 74; Snodgrass 1996: 579, no. 8
A.1360	SMin-EPG early	1100	925	Knossos North Cemetery	Crete	Tomb 24, Medical Faculty Site	2 iron		L. 8, broken, over 12.5, Max. W. 3.7	Coldstream and Catling 1996 1: 74, fig. 173, pl. 287; Snodgrass 1996: 580, no. 9
A.1370	EPG	1100	900	Vrokastro	Crete	Tomb VI	4 bronze		PL. 21	Hall: 153, pl. 21F

Table 6. Iron objects of the Aegean Early Iron Age

Daggers

A.1380	SMin-EPG	1100	900	Panagia	Crete	Hoard to the right of the Tomb a dromos			L. 22.5	Levi 1927-1929: 398-400, fig. 517
A.1390	SMin-EPG	1100	900	Panagia	Crete	Hoard to the right of the Tomb a dromos			L. 15.6	Levi 1927-1929: 398-400, fig. 517
A.1400	SMin-EPG	1100	900	Panagia	Crete	Hoard to the right of the Tomb a dromos			L. 11.8	Levi 1927-1929: 398-400, fig. 517
A.1410	SMin-EPG	1100	900	Panagia	Crete	Hoard to the right of the Tomb a dromos			L. 11	Levi 1927-1929: 398-400, fig. 517
A.1420	SMin-EPG	1100	900	Panagia	Crete					
A.1430	SMin-EPG	1100	900	Panagia	Crete					
A.1440	SMin-EPG	1100	900	Vrokastro	Crete	Chamber Tomb VI	4 bronze			Hall 1914: 153, pl. 21F, no. 3
A.1450	EPG	1050	950	Skoubris Cemetery	Euboia	Tomb 46				Desborough 1972: 190, pl. 41
A.1460	EPG	1050	950	Lefkandi	Euboia	Skoubris Tomb 46			L. 22.7, hilt W. 3.3, hilt L. 8, max Th. 0.8	Popham et al. 1980: 126; Catling and Catling 1980: 252, pl. 245e
A.1470	PG	1050	850	Eltyna	Crete	Tomb 14				Vonhoff 2013: 198
A.1480	PG	1050	850	Argos	Argolid	Tomb 184				Daux 1959: 755
A.1490	PG	1050	850	Marmaro	Rhodes	Tomb 44	bronze		PL. 4.6	Laurenzi 1936: 164
A.1500	PG	1050	850	Argos	Argolid	Tomb 184			L. 22	
A.1510	EPG	1000	900	Ayios Ioannis	Crete	Tomb VII or VIII	bronze	Wood handle & scabbord	L. 31	Boardman 1961: 141, fig. 9, 142, 146, pl. 39
A.1520	EPG	1000	900	Ayios Ioannis	Crete	Tomb VIII	1 bronze			Boardman 1961: 142, pl. 39
A.1530	EPG	1000	900	Fortetsa	Crete	Tomb XI				Brock 1957: 201, 22
A.1540	EPG	1000	900	Phaistos, Mulino Cemetery	Crete					Levi 1957-1958: 359, fig. 215
A.1550	EPG	1000	900	Knossos North Cemetery	Crete	Tomb 285, Medical Faculty Site	3 iron		1.3, shoulders 3.4, Max Th. 0.6	Coldstream and Catling 1996 I: 252; Snodgrass 1996: 579, no. f74
A.1560	MPG	950	900	Lefkandi	Euboia	Toumba Building/Heroön	4 bronze	Ivory handle	L. 34.5, W. 2.9-3.8,	Popham et al. 1993; Popham 1994: 15, fig. 2.3a; Lemos 2002: 120; Kosma 2012:

Table 6. Iron objects of the Aegean Early Iron Age

Daggers

A.1570	MPG	950	900	Kerameikos, Athens	Attica	Grave 17			L. 14.5, tang 1.8	Kraiker and Kübler 1939: 192, pl. 76
A.1580	MPG-LPG	950	850	Ialysos Marmaro Cemetery	Rhodes	Tomb 44	bronze			Laurenzi 1934-1935: 163, 164, figs. 150, 152; Desborough PGP: 226, 311, 312
A.1590	MPG-LPG	950	850	Ialysos, Marmaro cemetery	Rhodes	Tomb 44 (A.1934)			L. 20	Laurenzi 1936: 164, fig. 152
A.1600	MPG-LPG	950	850	Ialysos Marmaro Cemetery	Rhodes	Tomb 44	1 bronze	Bone handle	L. 46	Laurenzi 1934-1935: 163, 164, figs. 150, 152; Desborough PGP: 226, 311, 312
A.1610	MPG-LPG	950	850	Ialysos Marmaro Cemetery	Rhodes	Tomb 44			L. 20	Laurenzi 1934-1935: 163, 164, figs. 150, 152; Desborough PGP: 226, 311, 312
A.1620	LPG-PGB	900	800	Knossos North Cemetery	Crete	Tomb 28, Medical Faculty Site			L. 8.6 together, W. 1.6	Coldstream and Catling 1996 I: 79, fig. 173, no. 4
A.1630	LPG-PGB	900	800	Knossos North Cemetery	Crete	Tomb 28, Medical Faculty Site	4 bronze	Wood handle & scabbord	L. 26.1, Max. W. 5.4	Coldstream and Catling 1996 I: 79, fig. 173, pl. 287; Snodgrass 1996: 579, no. 6
A.1640	LPG-PGB	900	800	Knossos North Cemetery	Crete	Tomb 28, Medical Faculty Site				Coldstream and Catling 1996 I: 79
A.1650	LPG-PGB	900	800	Knossos North Cemetery	Crete	Tomb 285, Medical Faculty Site	5 bronze		L. 26.4, hilt L. 9.1; Max. W. 4.9	Coldstream and Catling 1996 I: 251, fig. 178; Snodgrass 1996: 579, no. f35

Table 6. Iron objects of the Aegean Early Iron Age

Swords

No.	Period	Start	End	Site	Region	Context	Rivets	Features	Size (CM)	References
A.1660	LH IIIC	1200	1100	Palaiokastro Gortyna	Arcadia	Tomb, cremation grave				Blackman 1996-1997: 33
A.1670	SMyc	1100	1050	Tiryns	Argolid	Grave XXVIII	iron			Daux 1958: 707; Verdelis 1956: 4; 1963: 14, 16, fig. 8, pl. 5.4; Wells 1983: 80; Kilian-Dirlmeier 1993: 106; Snodgrass 2003: 221, fig. 76 (calls dagger)
A.1680	SMyc	1100	1050	Athens	Attica					AD 22, 2 (1967): 92-93
A.1690	SMin	1100	1000	Kavousi, Thunder Hill	Crete	Tholos Tomb 2				Boyd 1901: 133
A.1700	SMin	1100	1000	Kavousi, Thunder Hill	Crete	Tholos Tomb 2				Boyd 1901: 133
A.1710	SMin	1100	1000	Kavousi, Thunder Hill	Crete	Tholos Tomb 3				Boyd 1901: 133
A.1720	SMin	1100	1000	Kavousi, Thunder Hill	Crete	Tholos Tomb 3			L. 14	Boyd 1901: 133
A.1730	SMin	1100	1000	Kavousi, Thunder Hill	Crete	Building A, Vronda Thunder Hill summit				Boyd 1901: 132, 137, fig. 4; Day et al. 1986: 355, 360
A.1740	SMin	1100	1000	Kavousi, Thunder Hill	Crete	Tomb 2				Boyd 1901: 133
A.1750	SMin	1100	1000	Kavousi, Thunder Hill	Crete	Tomb 3				Boyd 1901: 133
A.1760	SMin	1100	1000	Kanari	Crete					*Ergon* 1978: 60-62; Catling 1979: 50
A.1770	SMin	1100	1000	Kanari	Crete					*Ergon* 1978: 60-62; Catling 1979: 50
A.1780	SMin-EPG	1100	900	Panagia	Crete	Hoard to the right of the Tomb a dromos				Levi 1927-1929: 398-400, fig. 517
A.1790	EPG early	1050	1050	Elateia-Alonaki	Phokis	Tomb XLIV				Dakorōnia 2003: 186; Deger-Jalkotzy 1999: 197-198, fig. 7.12d; 2013: 226
A.1800	PG	1050	850	Volos	Thessaly	Tholos Kaplaki				Arvanitopoulos 1914: 141; Snodgrass 1964: 98; Kilian-Dirlmeier 1993: 113
A.1810	PG	1050	850	Vajzë	Epirus	Tumulus 1/A grave 8	4 iron	Bone handle	L. 84/85	Prendi 1957: 83-84, fig. 8; Hammond 1967: 358-359, fig. 27.3
A.1820	PG	1050	850	Dodona	Epirus				L. 58	Carapanos 1877: 109, pl. 57.2; Hammond 1967: 358-359, fig. 27.4

Table 6. Iron objects of the Aegean Early Iron Age

Swords

A.1830	PG	1050	850	Homlion	Thessaly	Chamber tomb 1			L. 67.2	Theocharis 1961-62: 175; Kilian-Dirlmeier 1993: 113; Georganas 2005: 65
A.1840	PG	1050	850	Ialysos	Rhodes	Tomb 44 (A.1934)	bronze (multiple)	Bone handle	L. 46	Laurenzi 1936: 164, fig. 152
A.1850	EPG	1050	950	Kerameikos, Athens	Attica	Grave 2 north	11+ iron at least	Wood sheath	L. 48	Kübler 1943: 47, pl. 38; Kilian-Dirmeier 1993: 106, pl. 40.273; Snodgrass 2000: 222, fig. 79a
A.1860	EPG	1050	950	Kerameikos, Athens	Attica	Grave 6	3 bronze		PL. 43.8	Kraiker and Kübler 1939: 99, pl. 76; Snodgrass 1964: 94, no. 3, fig. 5c
A.1870	EPG	1050	1000	Fortetsa	Crete	Tomb XI			L. 35, W. blade 1.8	Brock 1937: 22, 201, pl. 171.192
A.1880	EPG	1050	950	Ayios Ioannis	Crete	Tomb IV				
A.1890	MPG	950	900	Kerameikos, Athens	Attica	Grave 6				Kraiker and Kübler 1939: 183, pl. 76
A.1900	MPG-LPG	950	850	Agora, Athens	Attica	Tomb D 16:4				Blegan 1952: 289, pl. 75c.1
A.1910	MPG-LPG	950	850	Agora, Athens	Attica	Tomb N 16:4				
A.1920	MPG-LPG	950	850	Metropolis Cathedral	Attica	Warrior grave under				Arch emph 1953-1954: part 3, 93, 94, fig. 6; Desborough LMS 264
A.1930	MPG-LPG	950	850	Amyklae	Laconia					Fiechter 1918: 128
A.1940	LPG	950	900	Kerameikos, Athens	Attica	Kerameikos Grave E				Kraiker and Kübler 1939: 106, fig. 8; Snodgrass 1964: 98, 108, fig. 6a
A.1950	LPG	950	900	Kerameikos, Athens	Attica	Kerameikos Grave 28				Kübler 1943: 35, pl. 38; Kilian-Dirlmeier 1993: 106, pl. 40.274
A.1960	LPG	900	850	Lefkandi	Euboia	Tomb 14				Desborough 1972: 196, pl. 44
A.1970	SPG I/II	900	850	Lefkandi	Euboia	East Cemetery Tomb 47	4 bronze	Ivory handle	PL. 71.5, W. blade 3.8	Popham et al. 1979: pl. 149, 245; 1980: 161, 253
A.1980	LPG	900	850	Atalanti	Boeotia	Tomb II				Dakoronia 1985: 167
A.1990	LPG	900	850	Krannon	Thessaly	Tomb 37				Tziafalias 1983: 206
A.2000	LPG	900	850	Krannon	Thessaly	Tomb 40				Tziafalias 1983: 207
A.2010	LPG	900	850	Halos	Thessaly	Tumulus A, grave V				Wace and Thompson 1911-12: 26, fig. 15.1; Kilian-Dirlmeier 1993: 113, pl. 47.348; Georganas 2005: 65

Table 6. Iron objects of the Aegean Early Iron Age

Swords

A.2020	LPG	900	850	Halos	Thessaly	Tumulus A, grave XIV				Wace and Thompson 1911-12: 26, fig. 15.1; Kilian-Dirlmeier 1993: 113, pl. 47.349; Georganas 2005: 65
A.2030	LPG	900	850	Halos	Thessaly	Tumulus A, grave XIV				Wace and Thompson 1911-12: 26; Kilian-Dirlmeier 1993: 113
A.2040	LPG	900	850	Halos	Thessaly	Tumulus A, grave XI				Wace and Thompson 1911-12: 26, fig. 15.1; Kilian-Dirlmeier 1993: 113, pl. 47.350; Georganas 2005: 65
A.2050	LPG	900	850	Halos	Thessaly	Tumulus A, grave VII				Wace and Thompson 1911-12: 26, fig. 15.1; Kilian-Dirlmeier 1993: 113, pl. 47.351; Georganas 2005: 65
A.2060	LPG	900	850	Halos	Thessaly	Tumulus A, grave II			L. 82, tang L. 10	Wace and Thompson 1911-12: 11, 26, fig. 15.1; Kilian-Dirlmeier 1993: 113, pl. 48.352; Georganas 2005: 65
A.2070	LPG	900	850	Halos	Thessaly	Tumulus A, grave XVI?				Wace and Thompson 1911-12: 26, fig. 15.1; Kilian-Dirlmeier 1993: 113, pl. 48.353; Georganas 2005: 65
A.2080	LPG	900	850	Halos	Thessaly	Tumulus B				Μαλακσδιοτη 1992: 233
A.2090	LPG	900	850	Marmariani	Thessaly	Tholos tomb VI	bronze	Wood handle	L. 27, W. 3.6	Tsountas 1899: 101; Heurtley and Skeat 1930-31: 36, fig. 15.22; Georganas 2005: 64-65
A.2100	LPG	900	850	Knossos North Cemetery	Crete	Tomb 175, Medical Faculty Site			L. 2.5, W. 3.7 but broken at one edge	
A.2110	LPG	900	850	Knossos North Cemetery	Crete	Tomb 175, Medical Faculty Site	4 bronze		L. 20.5, hilt L. 9.5, W. shoulders 4.4, Th. at flanges 0.5, 0.3 elsewhere	
A.2120	LPG	900	850	Agioi Theodoroi	Thessaly	Tholos tomb				Georganas 2005: 64; A.Delt 42: 255; A.Delt 45: 204-205
A.2130	LPG	900	850	Nea Anchialos	Thessaly	Tholos tomb				Georganas 2005: 64; A.Delt 42: 255; A.Delt 45: 204-205
A.2140	LPG	900	850	Atalanti	Boeotia	Karagiorghou Tomb II				
A.2150	LPG/EG trans	850	850	Agora, Athens	Attica	Agora grave XXVII	4 iron		L. 88.3, L. blade 77.5	Blegen 1952: 286, 289, fig. 3.1, pl. 75c; Kilian-Dirlmeier 1993: 107, pl. 41.278

Table 6. Iron objects of the Aegean Early Iron Age

Weapons

No.	Period	Start	End	Site	Region	Context	Items	Size (CM)	References
A.2160	LH IIIC:1b	1200	1100	Mycenae	Argolid	Stratum X, Lion Gate	Arrowhead	L. 8, tang L. 3.5, head L. 4.5, W. 2.5	Wace 1921-1922: 34
A.2170	SMyc	1100	1050	Skyros		Papadimitriou's Tomb	Spearhead		Papadimitriu 1936: 231; Desborough 1952: 312
A.2180	SubMin	1100	1000	Kavousi, Thunder Hill	Crete	Building A, Vronda Thunder Hill summit	Axehead		Boyd 1901: 132; Day et al. 1986: 355, 360
A.2190	SMin	1100	1000	Kavousi, Thunder Hill	Crete	Tholos Tomb 3	Spearhead		Boyd 1901: 133
A.2200	SMin	1100	1000	Knossos North Cemetery	Crete	Tomb 2, Medical Faculty Site	Spearhead	PL. 16+	Coldstream and Catling 1996 I: 59; Snodgrass 1996: 582, no. 6-9
A.2210	SMin	1100	1000	Knossos North Cemetery	Crete	Tomb 2, Medical Faculty Site	Spearhead		Coldstream and Catling 1996 I: 59, no. 10
A.2220	SMin	1100	1000	Panagia	Crete	Tomb	Spearhead		Levi 1927-1929: 398, fig. 517
A.2230	SMin	1100	1000	Panagia	Crete	Tomb	Spearhead		Levi 1927-1929: 398, fig. 517
A.2240	SMin	1100	1000	Panagia	Crete	Tomb	Weapon (2)		Levi 1927-1929: 398, fig. 517
A.2250	SMin	1100	1000	Ayios Ioannis	Crete	Tomb IV	Spearhead		
A.2260	SMin	1100	1000	Ayios Ioannis	Crete		Unspecified		Catling 1981: 42
A.2270	SMin	1100	1000	Kavousi	Crete	Tomb 3	Spearhead		
A.2280	SMin	1100	1000	Kavousi	Crete	Tomb 3	Spearhead		
A.2290	SMin	1100	1000	Kalyviani Phaistou	Crete	Tomb	Unspecified		Catling 1986: 67
A.2300	SMin	1100	1000	Panagia	Crete		Spearhead		
A.2310	SMin	1100	1000	Panagia	Crete		Spearhead		
A.2320	SMin	1100	1000	Panagia	Crete		Unspecified		
A.2330	SMin	1100	1000	Panagia	Crete		Unspecified		
A.2340	SMin-EPG early	1100	975	Vrokastro	Crete	Chamber Tomb I	Axehead	L. 22	Hall 1914: 138, no. 10
A.2350	SMin-EPG early	1100	975	Vrokastro	Crete	Chamber Tomb I	Adze		Hall 1914: 138, no. 11
A.2360	SMin-EPG early	1100	975	Vrokastro	Crete	Chamber Tomb I	Spearhead		Hall 1914: 138, pl. 21B, no. 12
A.2370	SMin-EPG early	1100	975	Vrokastro	Crete	Chamber Tomb I	25+ weapons		Hall 1914: 139

Table 6. Iron objects of the Aegean Early Iron Age

Weapons

A.2380	SMin-EPG early	1100	975	Vrokastro	Crete	Chamber Tomb VII	Spearhead	L. 21.5	Hall 1938: 154, no. 2
A.2390	SMin-EPG early	1100	975	Knossos North Cemetery, Medical Faculty Site	Crete	Tomb 24, Medical Faculty Site			
A.2400	SMin-EPG	1100	900	Panagia	Crete	Hoard to the right of the Tomb a dromos	Spearhead	L. 41	Levi 1927-1929: 398-400, fig. 517
A.2410	SMin-EPG	1100	900	Panagia	Crete	Hoard to the right of the Tomb a dromos	Spearhead	L. 31	Levi 1927-1929: 398-400, fig. 517
A.2420	SMin-EPG	1100	900	Panagia	Crete	Hoard to the right of the Tomb a dromos	Obeloi+arrow head	L. 8.7	Levi 1927-1929: 398-400, fig. 517
A.2430	SMin-EPG	1100	900	Kanari	Crete		Spearhead		*Ergon* 1978: 60-62; Catling 1979: 50
A.2440	PG	1100	850	Vajzë	Epirus	Tumulus 3 grave 3	Spearhead	L. 37.5	Prendi 1957: 97, fig. 24; Hammond 1967: 359, fig. 27.6
A.2450	EPG	1050	1000	Ayios Ioseph	Epirus		Spearhead	L. 21	Hammond 1967: 359, fig. 27.5
A.2460	EPG	1050	1000	Ayios Ioannis	Crete	Tomb IV	Spearhead		Boardman 1960: 133, pl. 39
A.2470	EPG	1050	1000	Ayios Ioannis	Crete	Tomb V	Spearshaft		Boardman 1960: 134
A.2480	EPG	1050	1000	Fortetsa	Crete	Tomb VI	Obelos		Brock 1957: 202
A.2490	EPG	1050	1000	Fortetsa	Crete	Tomb XI	Spearhead		Brock 1957: 201, 22
A.2500	EPG	1050	1000	Fortetsa	Crete	Tomb XI	Spearhead		Brock 1957: 201, 22
A.2510	EPG	1050	1000	Fortetsa	Crete	Tomb XI	Spearhead		Brock 1957: 201, 22
A.2520	EPG	1050	1000	Fortetsa	Crete	Tomb XI	Spearhead		Brock 1957: 201, 22
A.2530	EPG	1050	1000	Fortetsa	Crete	Tomb XI	Obelos/Pike		Brock 1957: 202
A.2540	EPG	1050	1000	Fortetsa	Crete	Tomb XI	Obelos/Pike		Brock 1957: 202
A.2550	EPG	1025	975	Fortetsa	Crete	Tomb VI	Obelos		Brock 1957: 15, 202, no. 114
A.2560	EPG	1025	975	Pogoni	Epirus	Tumulus A cist graves	Spearhead		Andreou 1982: 57, 60; 1987: 48
A.2570	EPG	1000	900	Pogoni	Epirus	Tumulus C	Spearhead		Andreou 1987: 48
A.2580	EPG-MPG	1000	900	Athens	Attica	Kerameikos Grave 17	Spearhead		
A.2590	EPG-MPG	1000	900	Athens	Attica	Kerameikos Grave 34	Spearhead		
A.2600	EPG-MPG	1000	900	Athens	Attica	Kerameikos Grave 32	Spearhead		
A.2610	EPG-MPG	1000	900	Athens	Attica	Kerameikos Grave 28	Arrowhead		
A.2620	EPG	1050	1000	Knossos	Crete	Tomb II	Spearhead		Coldstream 1963: 38, fig. 9
A.2630	EPG	1050	1000	Knossos	Crete	Tomb II	Spearhead		Coldstream 1963: 38, fig. 9

Table 6. Iron objects of the Aegean Early Iron Age

Weapons

A.2640	EPG	1050	1000	Phaistos, Mulino Cemetery	Crete		Spearhead		Levi 1957-1958: 359, fig. 215
A.2650	EPG	1050	1000	Phaistos, Mulino Cemetery	Crete		Weapons, fragments		Levi 1957-1958: 359, fig. 215
A.2660	EPG	1050	1000	Petrokephali Cemetery	Crete		Weapons, fragments		Levi 1957-1958: 361
A.2670	SMin late	1050	1000	Fortetsa	Crete	Tomb XI	Obelos/Pike		Brock 1957: 202
A.2680	SMin late	1050	1000	Fortetsa	Crete	Tomb XI	Obelos/Pike		Brock 1957: 202
A.2690	SMin late	1050	1000	Fortetsa	Crete	Tomb XI	Spearhead		Brock 1957: 22, 201, no. 192
A.2700	SMin late	1050	1000	Fortetsa	Crete	Tomb XI	Spearhead		Brock 1957: 22, 201, no. 203
A.2710	SMin late-EPG early	1025	975	Knossos North Cemetery	Crete	Tomb 45, Medical Facutly Site	Spearhead		Coldstream and Catling 1996: 91, fig. 173, pl. 287; Snodgrass 1996: 582, no. f8
A.2720	SMin late-EPG early	1025	975	Knossos North Cemetery	Crete	Tomb 45, Medical Facutly Site	Javelin	L. 24.8	Coldstream and Catling 1996: 91, fig. 173, pl. 287; Snodgrass 1996: 583, no. f5+6+7
A.2730	SMin late-EPG early	1025	975	Knossos North Cemetery	Crete	Tomb 48, Medical Faculty Site	Spearhead	L. 30+, L. 21.6, socket Dia. 1.9, blade max W. 3.4 tapering to 1.9	Coldstream and Catling 1996 I: 93, fig. 174; Snodgrass 1996: 581, no. 12
A.2740	SMin late-EPG early	1025	975	Knossos North Cemetery	Crete	Tomb 285, Medical Faculty Site	Spearhead	L. 38, socket L. 10, blade W. 4.9, Th. 0.8	Coldstream and Catling 1996 I: 252; Snodgrass 1996: 581, no. f41(i)+53(d)+82
A.2750	SMin late-EPG early	1025	975	Knossos North Cemetery	Crete	Tomb 285, Medical Faculty Site	Spearhead	L. 41, socket L. 9, max. W. 4.2	Coldstream and Catling 1996 I: 252; Snodgrass 1996: 581, no. f41(ii)+53(e)+56
A.2760	SMin late-EPG	1025	900	Knossos North Cemetery	Crete	Tomb 175, Medical Faculty Site	Javelin		Coldstream and Catling 1996: 189; Snodgrass 1996: 583
A.2770	SMin late-EPG	1025	900	Knossos North Cemetery	Crete	Tomb 175, Medical Faculty Site	Spearhead		Catling and Colstream 1996: 188; Snodgrass 1996: 581, no. f7
A.2780	SMin late-EPG	1025	900	Knossos North Cemetery	Crete	Tomb 175, Medical Faculty Site	Javelin		Coldstream and Catling 1996: 189; Snodgrass 1996: 583
A.2790	SMin late-EPG	1025	900	Knossos North Cemetery	Crete	Tomb 175, Medical Faculty Site	Spearhead		Catling and Coldstream 1996: 189; Snodgrass 1996: 581, no. f14
A.2800	SMin late-EPG	1025	900	Knossos North Cemetery	Crete	Tomb 175, Medical Faculty Site	Spearhead		Catling and Coldstream 1996: 189; Snodgrass 1996: 581, no. f28

Table 6. Iron objects of the Aegean Early Iron Age

Weapons

A.2810	SMin late-EPG	1025	900	Knossos North Cemetery	Crete	Tomb 175, Medical Faculty Site	Spearhead		Catling and Coldstream 1996: 189; Snodgrass 1996: 581, no. f32
A.2820	SMin late-EPG	1025	975	Fortetsa	Crete	Tomb VI	Pike		Brock 1957: 15, 202, no. 108
A.2830	EPG	1000	900	Knossos North Cemetery	Crete	Tomb 285, Medical Faculty Site	Javelin	L. +30/PL. 20.4, socket L. 11, Dia 1.2, blade W. 3-2	Catling 1996 I: 253; Snodgrass 1996: 583
A.2840	EPG	975	900	Knossos North Cemetery	Crete	Tomb 285, Medical Faculty Site	Spearhead	L. 29+, socket L. 7.5, Dia. 1.5 (internally 1.1), blade W. 4.4-4.8, midrib Th. 0.8	Coldstream and Catling 1996 I: 252; Snodgrass 1996: 581, no. f56(ii)+62+91
A.2850	EPG	975	900	Fortetsa	Crete	Tomb VII	Spearhead		Brock 1957: 76, 201, no. 849
A.2860	MPG	950	900	Kerameikos, Athens	Attica	Grave 17	Spearhead	L. 23.5	Kraiker and Kübler 1939: 192, pl. 76
A.2870	MPG	950	900	Kerameikos, Athens	Attica	Grave 32	Spearhead		Waldbaum 1978: 32
A.2880	MPG	950	900	Kerameikos, Athens	Attica	Grave 34	Spearhead		Waldbaum 1978: 32
A.2890	MPG-LPG	950	850	Pogoni	Epirus	Building Delta	Spearheads		Andreou 2004: 61-62
A.2900	MPG-LPG	950	850	Pogoni	Epirus	Building Delta	Arrowheads		Andreou 2004: 61-62
A.2910	MPG-LPG	950	850	Ialysos Marmaro Cemetery	Rhodes	Tomb 44	Spearhead	L. 42	Laurenzi 1934-1935: 163, 164, figs. 150, 152
A.2920	MPG-LPG	950	850	Ialysos, Marmaro cemetery	Rhodes	Tomb 44	Obelos	L. 41	Laurenzi 1936: 164, fig. 152
A.2930	MPG-LPG	950	850	Agora, Athens	Attica	Tomb D 16:4	Spearhead		Blegen 1952: 289, pl. 72c.2, 3
A.2940	MPG-LPG	950	850	Agora, Athens	Attica	Tomb D 16:4	Spearhead		Blegen 1952: 289, pl. 72c.2, 3
A.2950	MPG-LPG	950	850	Agora, Athens	Attica	Tomb D 16:4	Axehead, trunnion		Blegen 1952: 289, pl. 72c.6
A.2960	MPG-LPG	950	850	Agora, Athens	Attica	Tomb D 16:4	Spear point/chisel		Blegen 1952: 289, pl. 72c.7
A.2970	MPG-LPG	950	850	Metropolis Cathedral	Attica	Warrior grave under	Spearhead		Arch emph 1953-1954: part 3, 93, 94, fig. 6; Desborough 1964: 264
A.2980	EPG late	950	900	Knossos North Cemetery	Crete	Tomb 28, Medical Faculty Site	Spearhead	L. 42.9, L. 8 socket, Dia. 1.9-1.4, W. 3.6 blade at shoulder	Coldstream and Catling 1996 I: 79, fig. 173, pl. 287; Snodgrass 1996: 581, no. 7

Table 6. Iron objects of the Aegean Early Iron Age

Weapons

A.2990	EPG late	950	900	Knossos North Cemetery	Crete	Tomb 28, Medical Faculty Site	Spearhead	L. 45.1, L. 8.2 socket, Dia. 1.8-1.4 blade, W. 4.3-5.2, Th. Midrib 1.2	Coldstream and Catling 1996 I: 79, fig. 173, pl. 287; Snodgrass 1996: 581, no. 8
A.3000	EPG late	950	900	Knossos North Cemetery	Crete	Tomb 100, Medical Faculty Site	Javelin	L. 30.8	Coldstream and Catling 1996 I: 137; Snodgrass 1996: 583
A.3010	EPG late	950	900	Knossos North Cemetery	Crete	Tomb 100, Medical Faculty Site	Javelin	L. 29.7	Coldstream and Catling 1996 I: 137; Snodgrass 1996: 583
A.3020	EPG late	950	900	Knossos North Cemetery	Crete	Tomb 100, Medical Faculty Site	Javelin	L. 31.2	Coldstream and Catling 1996 I: 137; Snodgrass 1996: 583
A.3030	EPG late	950	900	Knossos North Cemetery	Crete	Tomb 100, Medical Faculty Site	Javelin		Coldstream and Catling 1996 I: 137; Snodgrass 1996: 583
A.3040	EPG late	950	900	Knossos North Cemetery	Crete	Tomb 100, Medical Faculty Site	Javelin		Coldstream and Catling 1996 I: 137; Snodgrass 1996: 583
A.3050	EPG late	950	900	Knossos North Cemetery	Crete	Tomb 285, Medical Faculty Site	Javelin	L. 31.2 (blade only), W. 2.6; midrib max. Th. 1	Catling 1996 I: 252; Snodgrass 1996: 583
A.3060	EPG late-MPG	950	900	Fortetsa	Crete	Tomb L	Spearhead		Brock 1957: 34, 201, no. 335
A.3070	EPG late-MPG	950	900	Fortetsa	Crete	Tomb L	Blades		Brock 1957: 34, no. 337
A.3080	LPG	900	850	Kerameikos, Athens	Attica	Grave 28	Arrowhead		Kübler 1943: 35, pl. 38
A.3090	LPG	900	850	Kerameikos, Athens	Attica	Grave 40	Axehead		Kübler 1943: 42, pl. 38
A.3100	LPG	900	850	Skyros	Sporades	Papadimitriou grave	Spearhead		AA 1936: 228-234
A.3110	LPG	900	850	Lefkandi	Eubioa	Toumba Tomb 14	Spearhead	L. 22.8, D. socket 2.8, W. blade 3.4	Popham et al. 1979: pls. 174, 244; 1980: 176, 255, 452
A.3120	LPG	900	850	Toroni	Chalkdiki	Tomb 56, Terrace V	Arrowhead	PL. 5, Wt. 2.15 g	Papadopoulos 2005: 130, 562, fig. 112c
A.3130	LPG	900	850	Atalanti	Boeotia	Karagiorghou Tomb I	Spearhead		Dakoronia 1985: 167
A.3140	LPG	900	850	Atalanti	Boeotia	Gouras Tomb XIV	Spearhead		Dakoronia 1987: 227
A.3150	LPG	900	850	Chloe-Velestino	Thessaly	Tholos tomb	Arrowhead (4)	0.2	Arachoviti 1994: 134
A.3160	LPG	900	850	Halos	Thessaly	Tumulus B	Spearhead (multiple)		Μαλακσδιοτη 1992: 233
A.3170	LPG	900	850	Halos	Thessaly	Tumulus A	Spearhead (multiple)		Μαλακσδιοτη 1992: 232
A.3180	MPG/LPG	900	850	Fortetsa	Crete	Tomb P	Arrowhead (2)		Brock 1957: 137, 202

Table 6. Iron objects of the Aegean Early Iron Age

Weapons

A.3190	MPG/LPG	900	850	Fortetsa	Crete	Tomb P	Spearhead	L. 23, socket L. 9.5, blade W. 2.6, socket dia. 1.6-1	Brock 1957: 137, 201, pl. 161
A.3200	MPG/LPG	900	850	Fortetsa	Crete	Tomb P	Spearhead		Brock 1957: 137, 201
A.3210	MPG/LPG	900	850	Fortetsa	Crete	Tomb P	Spearhead	L. 18.5, socket L. 11	Brock 1957: 137, 201
A.3220	MPG/LPG	900	850	Fortetsa	Crete	Tomb P	Spearhead		Brock 1957: 137, 201
A.3230	MPG/LPG	900	850	Knossos North Cemetery	Crete	Tomb 100, Medical Faculty Site	Obelos		Coldstream and Catling 1996 I: 136-137; Snodgrass 1996: 590, no. 100.f2a, 3, 9+13+15+19
A.3240	MPG/LPG-EG	900	800	Fortetsa	Crete	Tomb P	Obelos	PL. 21.9, Dia. 0.8-1	Brock 1957: 137, 202
A.3250	MPG/LPG-EG	900	800	Knossos North Cemetery	Crete		Spearhead		Snodgrass 1996: 581, no. D.f3

Table 6. Iron objects of the Aegean Early Iron Age

Tools

No.	Period	Start	End	Site	Region	Context	Items	Size (CM)	References
A.3260	LH IIIC	1200	1100	Tiryns	Argolid	Hoard, Tyrins Treasure	Sickle		Arvanitopoulos 1915; Karo 1930: 6228a; Maran 2006: 130 fn. 12, fig. 8.4b
A.3270	LH IIIC-SMyc	1200	1050	Malthi	Messenia	Room A 43, Industrial Quarter, forge room, upper stratum	Grater	16x11	Valmin 1938: 102-104, 372, 373, pl. 30.18
A.3280	LH IIIC-SMyc	1200	1050	Malthi	Messenia	Room D 34, Northern Quarter	Nails/rivets		Valmin 1938: 372, pl. 30.19
A.3290	Smin	1100	1000	Karphi	Crete	Tomb M4	Nail		BSA 1937: 102, 121, pl. 28,1, no. 178
A.3300	SMin	1100	1000	Karphi	Crete	Tomb M11	Blade		BSA 1937: 106, 121, pl. 28,3, no. 383
A.3310	SMin	1100	1000	Kavousi, Thunder Hill	Crete	Building A, Vronda Thunder Hill summit	Pick		Boyd 1901: 132; Day et al. 1986: 355, 360
A.3320	SMyc-EPG	1100	1000	Mesopotamos	Albania	Tumulus G	Sickle?		Papdopoulos 1984: 124
A.3330	SMin-EPG	1100	975	Vrokastro	Crete	Chamber Tomb I	Chisel		Hall 1914: 138, no. 13
A.3340	SMyc late-EPG	1075	975	Nichoria	Messenia		Nail		McDonald et al. 1983: 319
A.3350	EPG late-MPG	1000	900	Athens	Attica	Kerameikos grave 40	Chisel		
A.3360	EPG late-MPG	1000	900	Athens	Attica	Kerameikos grave 40	Axe		
A.3370	PG	1000	850	Serraglio	Kos	Tomb 64	Spatula (2)	L. 4.5, W. head 3.5, W. base 2.5	Morricone 1978: 270
A.3380	PG	1000	850	Ialysos, Marmaro cemetery	Rhodes	Tomb 44 (A.1934)	Sickle	L. 20	Laurenzi 1936: 164, fig. 152
A.3390	MPG-LPG	975	850	Nichoria	Messenia		Axe		McDonald et al. 1983: 274-276, 283-285, 310.87
A.3400	MPG-LPG	975	850	Nichoria	Messenia		Socketed tool		McDonald et al. 1983: 274-276, 283-285
A.3410	MPG-LPG	975	850	Nichoria	Messenia		Nail		McDonald et al. 1983: 274-276, 283-285

Table 6. Iron objects of the Aegean Early Iron Age

Tools

A.3420	MPG	950	900	Lefkandi	Euboia	Toumba horse burial	Horse bit	L. 17.5, H. 7.7, Th. Rod 0.7 eyes, max 1-1.2 stem	Sackett 1993: 71, 76, pls. 32, 34
A.3430	MPG	950	900	Lefkandi	Euboia	Toumba building	Hook	L. 9.3, H. 6.4, Th. 1.3-1.7	Sackett 1993: 72, 76, pls. 32, 34
A.3440	MPG-LPG	950	850	Agora, Athens	Attica	Tomb D 16:4	Snaffle bit		Blegen 1952: 289, pl. 72c.8, 9
A.3450	MPG-LPG	950	850	Agora, Athens	Attica	Tomb D 16:4	Snaffle bit		Blegen 1952: 289, pl. 72c.8, 9
A.3460	LPG	900	850	Iolkos	Thessaly	Tomb I	Nail		
A.3470	LPG	900	850	Theotokou	Thessaly	Tomb B	Blade		
A.3480	LPG	900	850	Kakavi	Epirus	Tumulus grave 4	Tweezers	L. 5	Hammond 1967: 349
A.3490	LPG	900	850	Atalanti	Boeotia	Karagiorghou Tomb III	Sickle		Dakoronia 1985: 167
A.3500	LPG	900	850	Atalanti	Boeotia	Gouras Tomb XXXII	Nail		Dakoronia 1987: 228
A.3510	LPG	900	850	Krannon	Thessaly	Tomb 28	Nail		Tziafalias 1983: 206
A.3520	LPG	900	850	Krannon	Thessaly	Tomb 28	Link		Tziafalias 1983: 206
A.3530	LPG	900	850	Krannon	Thessaly	Tomb 45	Nails		Tziafalias 1983: 207
A.3540	LPG	900	850	Halos	Thessaly	Tumulus B	Tweezers		Μαλακσδιοτη 1992: 233
A.3550	LPG	900	850	Halos	Thessaly	Tumulus A, grave I	Drill?		Wace and Thompson 1911-12: 11; Μαλακσδιοτη 1992: 232; Kilian-Dirlmeier 1993: 113

Table 6. Iron objects of the Aegean Early Iron Age

Ornaments

No.	Period	Start	End	Site	Region	Context	Items	Head/ Bead	Size (CM)	References
A.3560	LH IIIC	1200	1100	Perati	Attica	Tomb 108	Pin			Iakovides 1969 II: 394, 453; III: pl. 116a.Δ142
A.3570	LH IIIC	1200	1100	Kerameikos, Athens	Attica	Grave 20	Ring		Dia. 1.7	Kraiker and Kübler 1939: 16
A.3580	LH IIIC	1200	1100	Kerameikos, Athens	Attica	Grave 36	Pendant		L. 3	Kraiker and Kübler 1939: 20
A.3590	SMyc	1100	1050	Kerameikos, Athens	Attica	Grave 87	Pendant		L. 8	Kraiker and Kübler 1939: 40
A.3600	SMyc	1100	1050	Kerameikos, Athens	Attica	Grave 113	Pin	Ivory head		Smithson 1961: 175-176
A.3610	SMyc	1100	1050	Agora, Athens	Attica	Tomb 63	Bezel ring			Papadopoulos and Smithson 2017: 924
A.3620	SMyc	1100	1050	Agora, Athens	Attica	Tomb 63	Bezel ring			Papadopoulos and Smithson 2017: 924
A.3630	SMyc	1100	1050	Agora, Athens	Attica	Tomb 63	Bezel ring			Papadopoulos and Smithson 2017: 924
A.3640	SMyc	1100	1050	Kerameikos, Athens	Attica	Grave 108	Ring			Kraiker and Kübler 1939: 47
A.3650	SMyc	1100	1050	Olympeion, Athens	Attica	Grave 6	Ring			Styrenius 1967: 84
A.3660	SMyc	1100	1050	Corinth	Corinthia		Ring			Williams II 1970: 14, pl. 6
A.3670	SMyc	1100	1050	Theotokou	Thessaly	Tomb C	Ring			Wace and Thompson 1912: 214
A.3680	SMyc	1100	1050	Kerameikos, Athens	Attica	Grave 83	Ring		Dia. 1.7	Kraiker and Kübler 1939: 39
A.3690	SMyc	1100	1050	Kerameikos, Athens	Attica	Grave 83	Ring			Kraiker and Kübler 1939: 39
A.3700	SMyc	1100	1050	Kerameikos, Athens	Attica	Grave 83	Ring			Kraiker and Kübler 1939: 39
A.3710	SMyc	1100	1050	Kerameikos, Athens	Attica	Grave 84	Ring		Dia. 1.8, Th. 1.5	Kraiker and Kübler 1939: 39

Table 6. Iron objects of the Aegean Early Iron Age

Ornaments

A.3720	SMyc	1100	1050	Agora, Athens	Attica	Grave J 9:2	Pin			Styrenius 1967: 83
A.3730	SMyc	1100	1050	Agora, Athens	Attica	Grave 0 7:1	Pin			Thompson 1952: 108
A.3740	SMyc	1100	1050	Agora, Athens	Attica	M 16-17:1	Pin			
A.3750	SMyc	1100	1050	Mycenae	Argolid	Tomb Γ 21	Pin			Desborough 1973: 92
A.3760	SMyc	1100	1050	Fortetsa	Crete	Tomb Pi	Pin			
A.3770	SMyc	1100	1050	Kerameikos, Athens	Attica	Grave 113	Pin	Ivory head		Lord Smithson 1961: 175
A.3780	SMyc	1100	1050	Kerameikos, Athens	Attica	Grave 113	Pin			Lord Smithson 1961: 175
A.3790	SMyc	1100	1050	Kerameikos, Athens	Attica	Grave 22	Pin			Kübler 1943: 32
A.3800	SMyc	1100	1050	Kerameikos, Athens	Attica	Grave 25	Pin			Kübler 1943: 33
A.3810	SMyc	1100	1050	Lefkandi	Euboia	Skoubris Tomb 38	Pin		PL. 14.8, greatest W. 1.5, Dia. shaft 0.5	Popham et al. 1980: 123
A.3820	SMyc	1100	1050	Lefkandi	Euboia	Skoubris Tomb 38	Pin		PL. 19.7, greatest W. 1.7, Dia. Shaft 0.6.	Popham et al. 1980: 123, pl. 237b
A.3830	SMin	1100	1000	Knossos North Cemetery	Crete	Tomb 40, Medical Faculty Site	Bezel ring		Dia. External 2.2, Th. Bezel 1.3, at thinnest point 0.7	Coldstream and Catling 1996 I: 89, fig. 173; Snodgrass 1996: 596, no. 5
A.3840	SMin	1100	1000	Vrokastro	Crete	Tomb VI	Ring			Hall Vrokastro: 153
A.3850	SMin	1100	1000	Knossos North Cemetery	Crete	Tomb 40, Medical Faculty Site	Fibula		L. 12.3 bow and spring	Coldstream and Catling 1996 I: 89; Snodgrass 1996: 596, no. 12+13
A.3860	SMin	1100	1000	Knossos North Cemetery	Crete	Tomb 40, Medical Faculty Site	Fibula			Coldstream and Catling 1996 I: 89; Snodgrass 1996: 596, no. 17
A.3870	SMin	1100	1000	Karphi	Crete	Tomb M11	Fibula			BSA 1937: 106, 121, pl. 28.3, no. 384

Table 6. Iron objects of the Aegean Early Iron Age

Ornaments

A.3880	SMin	1100	1000	Knossos North Cemetery	Crete	Tomb 201, Medical Faculty Site	Pin		L. 15.1, Dia. 0.5	Coldstream and Catling 1996: 195, fig. 163, pl. 277; Snodgrass 1996: 594, no. f10 (i)
A.3890	SMin	1100	1000	Knossos North Cemetery	Crete	Tomb 201, Medical Faculty Site	Pin		L. 15.6, Dia. 0.65	Coldstream and Catling 1996: 195, fig. 163, pl. 277; Snodgrass 1996: 594, no. f10 (ii)
A.3900	SMin	1100	1000	Knossos North Cemetery	Crete	Tomb 2, Medical Faculty Site	Pin			Coldstream and Catling 1996 I: 59; Snodgrass 1996: 594, no. 4+5+8a
A.3910	SMin	1100	1000	Knossos North Cemetery	Crete	Tomb 208, Medical Faculty Site	Pin		L. 2.8, Dia. 0.2	Coldstream and Catling 1996: 200; Snodgrass 1996: 594, no. 40.f3, 6, 7, 10
A.3920	SMin	1100	1000	Knossos North Cemetery	Crete	Tomb 40, Medical Faculty Site	Pin			Coldstream and Catling 1996 I: 89; Snodgrass 1996: 594, nos. 3, 6, 7, 10
A.3930	SMin-EPG	1100	950	Vrokastro	Crete	Chamber Tomb II	Fibula			Hall 1914: 140, pl. 19D, no. 4
A.3940	SMyc-PG	1100	850	Vajzë	Epirus	Tumulus 1 grave 2	Pin		L. >10	Hammond 1967: 346; 1982: 634
A.3950	PG	1100	850	Knossos North Cemetery	Crete	Tomb 175, Medical Facutly Site	Pin		Dia. 1.1 head, shaft 0.3	Coldstream and Catling 1996: 189, fig. 176; Snodgrass 1996: 594, no. f12
A.3960	PG	1100	850	Knossos North Cemetery	Crete	Tomb 175, Medical Facutly Site	Fibula		L. 5.9	Coldstream and Catling 1996: 188, fig. 176; Snodgrass 1996: 596, no. 175.f3
A.3970	PG	1100	850	Knossos North Cemetery	Crete	Tomb 175, Medical Facutly Site	Fibula			Coldstream and Catling 1996: 189; Snodgrass 1996: 596, no. 175.f18a
A.3980	PG	1050	900	Asine	Argolid	Tomb 1970-15, phase 3, Lower City, Karmaniola area	Ring		H. 0.8-1.1; outer D. 2, Th. 0.3	Wells 1976: 18-19, figs. 24, 25, no. 1970-15:4; 1983: 101; Dietz 1982: 87
A.3990	PG	1050	900	Asine	Argolid	Tomb 1970-15, phase 3, Lower City, Karmaniola area	Fibula		L. 5.8; W. arch 0.5-1; Th. 0.3	Wells 1976: 19, figs. 24, 25, no. 1970-15:5; 1983: 101; Dietz 1982: 87
A.4000	PG	1050	900	Argos	Argolid	Peroukka Street Grave s	Ring			Kokkou-Viridi 1977: 176-178, fig. 4; 184-185, 188, 192-199, pl. 55; Wells 1983: 80, 101
A.4010	PG	1050	850	Iolkos	Thessaly	Tomb 1 (I)	Pin			Sipsie-Eschbach 1991: 161
A.4020	PG	1050	850	Iolkos	Thessaly	Tomb 12 (XII)	Ring			Sipsie-Eschbach 1991: 162

Table 6. Iron objects of the Aegean Early Iron Age

Ornaments

A.4030	PG	1050	850	Iolkos	Thessaly	Tomb 30 (XXVII, 30)	Items (2)			Sipsie-Eschbach 1991: 163
A.4040	PG	1050	850	Iolkos	Thessaly	Tomb 38 (XXXIII)	Bracelet			Theocharis 1961: 50; Sipsie-Eschbach 1991: 164
A.4050	EPG	1050	950	Kerameikos, Athens	Attica	Grave 11	Pin			Kraiker and Kübler 1939: 186
A.4060	EPG	1050	950	Kerameikos, Athens	Attica	Grave 13	Pin		Th. shaft near head 1	Kraiker and Kübler 1939: 188
A.4070	EPG	1050	950	Kerameikos, Athens	Attica	Grave 13	Pin		Th. shaft near head 1	Kraiker and Kübler 1939: 188
A.4080	EPG	1050	950	Ayios Ioannis	Crete	Tomb IV	Pin			Boardman 1960: 133, pl. 39
A.4090	EPG	1050	950	Ayios Ioannis	Crete	Tomb V	Pin (2)			Boardman 1960: 134
A.4100	EPG	1050	950	Serraglio	Kos, Dodecanese	Tomb 6	Pin		L. 4.1, disc dia. 1.1, globe dia. 1.2	Morricone 1978: 33, 73, fig. 54
A.4110	EPG	1050	950	Serraglio	Kos, Dodecanese	Tomb 6	Pin		Disc dia. 1.1, globe dia. 1.2	Morricone 1978: 33, 73, fig. 54
A.4120	EPG	1050	950	Serraglio	Kos, Dodecanese	Tomb 6	Pin		Disc dia. 1.1, globe dia. 1.2	Morricone 1978: 33, 73, fig. 54
A.4130	EPG	1050	950	Serraglio	Kos, Dodecanese	Tomb 38	Pin			Morricone 1978: 33, 226, fig. 453
A.4140	EPG	1050	950	Serraglio	Kos, Dodecanese	Tomb 38	Pin		globe dia. 1.2	Morricone 1978: 33, 226, fig. 453
A.4150	EPG	1050	950	Serraglio	Kos, Dodecanese	Tomb 38	Pin		globe dia. 1.2	Morricone 1978: 33, 226, fig. 453
A.4160	EPG	1050	950	Serraglio	Kos, Dodecanese	Tomb 47	Pin		L. 12	Morricone 1978: 33, 242, fig. 499
A.4170	EPG	1050	950	Serraglio	Kos, Dodecanese	Tomb 47	Pin		L. 10.3	Morricone 1978: 33, 242, fig. 499
A.4180	EPG	1050	950	Pylos	Messinia	Tholos tomb, Palace of Nestor	Pin		PL. 32.5, head dia. 1.3, shaft dia. 0.5	Blegen et al. 1973 III: 240, fig. 298:2
A.4190	EPG	1050	950	Pylos	Messinia	Tholos tomb, Palace of Nestor	Pin		PL. 29, dia. 0.85	Blegen et al. 1973 III: 240, fig. 298:7

Table 6. Iron objects of the Aegean Early Iron Age

Ornaments

A.4200	EPG	1050	950	Pylos	Messinia	Tholos tomb, Palace of Nestor	Pin		PL. 24	Blegen et al. 1973 III: 240, fig. 298:9
A.4210	EPG	1050	950	Lefkandi	Euboia	Skoubris Tomb 10	Pin		PL. 10, Dia. Head 1.4, Dia. Swelling 1.9	Popham et al. 1980: 112
A.4220	EPG	1050	950	Lefkandi	Euboia	Skoubris Tomb 10	Pin		PL. 10	Popham et al. 1980: 113
A.4230	EPG	1050	950	Lefkandi	Euboia	Skoubris Tomb 10	Pin		PL. 10.5	Popham et al. 1980: 113
A.4240	EPG	1050	950	Lefkandi	Euboia	Skoubris Tomb 16	Pin	Iron bead	PL. 9.5, Th. 0.4	Popham et al. 1980: 115
A.4250	EPG	1050	950	Lefkandi	Euboia	Skoubris Tomb 16	Pin		PL. 11.3, Dia. <3	Popham et al. 1980: 115
A.4260	EPG	1050	950	Lefkandi	Euboia	Skoubris Tomb 20	Fibula, arched		Est. L. 5.7, est. H. 3.5, Th. <0.5	Popham et al. 1980: 117
A.4270	EPG	1050	950	Lefkandi	Euboia	Skoubris Tomb 32	Fibula, arched		Est. L. 0.5, est. H. 2.2, Th. <0.4	Popham et al. 1980: 120
A.4280	EPG	1050	950	Lefkandi	Euboia	Skoubris Tomb 46	Fibula		PL. 2.3, Dia. <0.3	Popham et al. 1980: 126
A.4290	EPG-MPG	1050	900	Asine	Argolid	Tomb 17, Lower City, left shoulder	Pin			Frödin and Persson 1938: 132, 425
A.4300	EPG-MPG	1050	900	Asine	Argolid	Tomb 40, Lower City, right shoulder	Pin			Frödin and Persson 1938: 138, 425
A.4310	EPG-MPG	1050	900	Asine	Argolid	Tomb 44, Lower City, left shoulder	Pin			Frödin and Persson 1938: 139, 425
A.4320	MPG	950	900	Lefkandi	Euboia	Toumba Building/Heroön	Pins (2)	Gold foil	L. 11, 8.6	Popham, Touloupa, Sackett 1982: 169-174, fig. 6. Popham, Kalligas, Sackett 1993: pl. 18c. Lemos 2002: 128-129, fig. 6,3; Kosma 2012: 67, nos. ME 20238a, ME 20238b
A.4330	MPG	950	900	Lefkandi	Euboia	Skoubris Tomb 51	Fibula		L. 4, L. 3.7, Th. 0.6	Popham et al. 1980: 128
A.4340	MPG	950	900	Kerameikos, Athens	Attica	Grave 5	Pin			Kraiker and Kübler 1939: 183
A.4350	MPG	950	900	Kerameikos, Athens	Attica	Grave 15	Pin			Kraiker and Kübler 1939: 190, pl. 76

Table 6. Iron objects of the Aegean Early Iron Age

Ornaments

A.4360	MPG	950	900	Kerameikos, Athens	Attica	Grave 15	Pin			Kraiker and Kübler 1939: 190, pl. 76
A.4370	MPG-LPG	950	850	Ialysos Marmaro Cemetery	Rhodes	Tomb 43	Ring			Laurenzi 1934-1935: 163, 164, figs. 150, 152; Desborough PGP: 226, 311, 312
A.4380	MPG-LPG	950	850	Patelle Cemetery, Kamiros	Rhodes	Tomb XL	Pin			Jacopi 1932-1933: 127; Desborough PGP: 228
A.4390	MPG-LPG	950	850	Patelle Cemetery, Kamiros	Rhodes	Tomb XL	Pin			Jacopi 1932-1933: 127; Desborough PGP: 228
A.4400	MPG-LPG	950	850	Lindos	Rhodes		Pin			Blinkenberg 1931: 126; Desborough PGP: 232, 309
A.4410	MPG-LPG	950	850	Lindos	Rhodes		Pin			Blinkenberg 1931: 126; Desborough PGP: 232, 309
A.4420	MPG-LPG	950	850	Ialysos, Marmaro cemetery	Rhodes	Tomb 43 (A.1934)	Ring		Dia. 1.5	Laurenzi 1936: 163, fig. 150
A.4430	MPG-LPG	950	850	Ialysos, Marmaro cemetery	Rhodes	Tomb 43 (A.1934)	Pins (4)			Laurenzi 1936: 164, fig. 150
A.4440	MPG-LPG	950	850	Kos	Dodecanese	Tombs	Pin (10)			Morricone 1950: 320; Desborough PGP: 223, 309, 311
A.4450	MPG-LPG	950	850	Kos	Dodecanese	Tombs	Ring			Morricone 1950: 320; Desborough PGP: 223, 309, 311
A.4460	MPG-LPG	950	850	Agora, Athens	Attica	Tomb F 16:3	Fibula			Shear 1933: 470; Styrenius 1967: 90
A.4470	MPG-LPG	950	850	Agora, Athens	Attica	Tomb F 16:3	Fibula			Shear 1933: 470; Styrenius 1967: 90
A.4480	MPG-LPG	950	850	Agora, Athens	Attica	Tomb F 16:3	Pin			Shear 1933: 470; Styrenius 1967: 90
A.4490	MPG-LPG	950	850	Agora, Athens	Attica	Tomb C 9:13	Fibula			Shear 1937: 368: Styrenius 1967: 109
A.4500	MPG-LPG	950	850	Agora, Athens	Attica	Tomb C 9:13	Fibula			Shear 1937: 368: Styrenius 1967: 109
A.4510	MPG-LPG	950	850	Agora, Athens	Attica	Tomb C 9:13	Pin			Shear 1937: 368: Styrenius 1967: 109
A.4520	MPG-LPG	950	850	Agora, Athens	Attica	Tomb C 9:13	Pin			Shear 1937: 368: Styrenius 1967: 109

Table 6. Iron objects of the Aegean Early Iron Age

Ornaments

A.4530	MPG-LPG	950	850	Agora, Athens	Attica	Tomb Q 8:6, under Stoa of Attalus	Pin			Thompson 1954: 58
A.4540	MPG-LPG	950	850	Agora, Athens	Attica	Tomb M 17:3	Pin			
A.4550	MPG-LPG	950	850	Agora, Athens	Attica	Tomb C 9:9	Fibula			
A.4560	MPG-LPG	950	850	Agora, Athens	Attica	Tomb C 9:9	Pin			
A.4570	MPG-LPG	950	850	Agora, Athens	Attica	Tomb C 9:9	Pin			
A.4580	MPG-LPG	950	850	Agora, Athens	Attica	Tomb C 9:11	Fibula			Shear 1937: 368, fig. 31
A.4590	MPG-LPG	950	850	Agora, Athens	Attica	Tomb C 9:10	Fibula			Styrenius 1967: 109
A.4600	MPG-LPG	950	850	Agora, Athens	Attica	Tomb C 9:10	Fibula			Styrenius 1967: 109
A.4610	MPG-LPG	950	850	Agora, Athens	Attica	Tomb C 9:10	Pin			Styrenius 1967: 109
A.4620	MPG-LPG	950	850	Agora, Athens	Attica	Tomb C 9:10	Pin			Styrenius 1967: 109
A.4630	MPG-LPG	950	850	Agora, Athens	Attica	Tomb J 9:1	Fibula			Styrenius 1967: 109
A.4640	MPG-LPG	950	850	Agora, Athens	Attica	Tomb J 9:1	Pin			Styrenius 1967: 109
A.4650	G	950	850	Theotokou	Thessaly	Tomb B	Pin			Wace and Thompson 1912: 213, fig. 147h
A.4660	MPG/LP	950	850	Theotokou	Thessaly	Tomb B	Pin			Wace and Thompson 1912: 213, fig. 147l
A.4670	MPG/LP G	950	850	Theotokou	Thessaly	Tomb B	Pin			Wace and Thompson 1912: 213
A.4680	MPG/LP G	950	850	Theotokou	Thessaly	Tomb B	Pin			Wace and Thompson 1912: 213
A.4690	MPG/LP G	950	850	Theotokou	Thessaly	Tomb B	Pin			Wace and Thompson 1912: 213
A.4700	MPG/LP G	950	850	Theotokou	Thessaly	Tomb B	Ring			Wace and Thompson 1912: 213
A.4710	MPG/LP	950	850	Theotokou	Thessaly	Tomb B	Fibula			Wace and Thompson 1912: 213, fig. 147g

Table 6. Iron objects of the Aegean Early Iron Age

Ornaments

A.4720	G	950	850	Theotokou	Thessaly	Tomb C	Pin			Wace and Thompson 1912: 214, fig. 147c
A.4730	MPG-LPG	950	850	Eridanos	Attica	Tomb 5	Pin	Ivory		Schlorb-Vierneisel 1966: 7, pl. 11.1
A.4740	MPG-LPG	950	850	Eridanos	Attica	Tomb 5	Pin	Ivory		Schlorb-Vierneisel 1966: 7, pl. 11.1
A.4750	MPG-LPG	950	850	Aegina		Unknown	Pin			Furtwangler 1906: 400, pl. 114.49
A.4760	MPG-LPG	950	850	Asine	Argolid	Tomb PG 10	Pin	Bronze bead		Frodin and Persson 1938: 131, 425
A.4770	MPG-LPG	950	850	Asine	Argolid	Tomb PG 17	Pin			Frodin and Persson 1938: 132, 425
A.4780	MPG-LPG	950	850	Asine	Argolid	Tomb PG 40	Pin			Frodin and Persson 1938: 138, 425
A.4790	MPG-LPG	950	850	Asine	Argolid	Tomb PG 43	Pin			Frodin and Persson 1938: 139, 425
A.4800	MPG-LPG	950	850	Asine	Argolid	Tomb PG 44	Pin (2)			Frodin and Persson 1938: 139, 425
A.4810	MPG-LPG	950	850	Mycenae	Argolid	Tomb PG 601	Pin			Desborough 1954: 259
A.4820	MPG-LPG	950	850	Mycenae	Argolid	Tomb Γ 23	Pin	Bronze bead		Desborough 1973: 92, pl. 34c
A.4830	LPG	900	850	Atalanti	Boeotia	Karagiorghou Tomb III	Pin			Dakoronia 1985: 167
A.4840	LPG	900	850	Atalanti	Boeotia	Karagiorghou Tomb III	Pin			Dakoronia 1985: 167
A.4850	LPG	900	850	Atalanti	Boeotia	Karagiorghou Tomb VIII	Pin			Dakoronia 1985: 167
A.4860	LPG	900	850	Atalanti	Boeotia	Gouras Tomb VII	Pin			Dakoronia 1987: 227
A.4870	LPG	900	850	Atalanti	Boeotia	Gouras Tomb XII	Pin			Dakoronia 1987: 227
A.4880	LPG	900	850	Atalanti	Boeotia	Gouras Tomb XXIII	Pin			Dakoronia 1987: 228
A.4890	LPG	900	850	Atalanti	Boeotia	Gouras Tomb XXIII	Pin			Dakoronia 1987: 228

Table 6. Iron objects of the Aegean Early Iron Age

Ornaments

A.4900	LPG	900	850	Atalanti	Boeotia	Gouras Tomb XXIII	Pin			Dakoronia 1987: 228
A.4910	LPG	900	850	Atalanti	Boeotia	Gouras Tomb XXIV	Pin			Dakoronia 1987: 228
A.4920	LPG	900	850	Atalanti	Boeotia	Gouras Tomb XXIV	Pin			Dakoronia 1987: 228
A.4930	LPG	900	850	Serraglio	Kos	Tomb 38	Pin		Dia bead 1.2	Morricone 1978: 226, fig. 453 centre
A.4940	LPG	900	850	Serraglio	Kos	Tomb 38	Pin		Dia bead 1.5	Morricone 1978: 226, fig. 453 centre
A.4950	LPG	900	850	Serraglio	Kos	Tomb 38	Pin		Dia flat head 1.2	Morricone 1978: 226, fig. 453 left
A.4960	LPG	900	850	Serraglio	Kos	Tomb 47	Pin		L. 12, dia bead 1.2	Morricone 1978: 242, fig. 499 centre
A.4970	LPG	900	850	Serraglio	Kos	Tomb 47	Pin		L. 10.3	Morricone 1978: 242, fig. 499 bottom
A.4980	LPG	900	850	Serraglio	Kos	Tomb 44	Pin + globe		L. 11.2, head dia. 1.2, bead dia. 2; iron bead 2 dia. 1.1	
A.4990	LPG	900	850	Serraglio	Kos	Tomb 50	Pin		L. 13.5, head dia. 1.3, bead dia. 1.5	Morricone 1978: 247, fig. 508 bottom
A.5000	LPG	900	850	Serraglio	Kos	Tomb 50	Pin		L. 10.6, head dia. 1.2, bead dia. 1.6	Morricone 1978: 247, fig. 508 top
A.5010	LPG	900	850	Serraglio	Kos	Tomb 57	Pin		L. 16.5, head dia. 1, bead dia. 1.8-2	Morricone 1978: 259, fig. 541
A.5020	LPG	900	850	Vajzë	Epirus	Tumulus 1 grave 9	Pin		L. 11.2	Prendi 1957: 85, fig. 3b; Hammond 1967: 359
A.5030	LPG	900	850	Vajzë	Epirus	Tumulus 3 grave 2	Pins		L. 11	Prendi 1957: 96, fig. 22a; Hammond 1967: 359
A.5040	LPG	900	850	Vajzë	Epirus	Tumulus 3 grave 5	Pin			Prendi 1957: 97; Hammond 1967: 348
A.5050	LPG	900	850	Vajzë	Epirus	Tumulus 3 grave 5	Belt buckle		L. 4.3	Prendi 1957: 97, fig. 22c
A.5060	LPG	900	850	Chloe-Velestino	Thessaly	Tholos tomb	Pin		L. 5.1, W. 1.1	Arachoviti 1994: 133, fig. 12

Table 6. Iron objects of the Aegean Early Iron Age

Ornaments

A.5070	LPG	900	850	Chloe-Velestino	Thessaly	Tholos tomb	Pin		L. 6.2, W. 0.9	Arachoviti 1994: 133, fig. 12; Kilian-Dirlmeier 1984: pl. 13.338
A.5080	LPG	900	850	Chloe-Velestino	Thessaly	Tholos tomb	Pin		L. 19, W. 0.5, bead W. 2.5	Arachoviti 1994: 133, fig. 12
A.5090	LPG	900	850	Chloe-Velestino	Thessaly	Tholos tomb	Pin		L. 3.4, W. 0.4, bead W. 0.5	Arachoviti 1994: 133
A.5100	LPG	900	850	Chloe-Velestino	Thessaly	Tholos tomb	Pin		L. 12.5, W. 1	Arachoviti 1994: 133, fig. 12
A.5110	LPG	900	850	Halos	Thessaly	Tumulus B	Fibulae			Μαλακσδιοτη 1992: 233
A.5120	LPG	900	850	Halos	Thessaly	Tumulus B	Rings			Μαλακσδιοτη 1992: 233
A.5130	LPG	900	850	Halos	Thessaly	Tumulus B	Pins			Μαλακσδιοτη 1992: 233
A.5140	LPG	900	850	Kerameikos, Athens	Attica	Grave 26	Pin			Kübler 1943: 33
A.5150	LPG	900	850	Kerameikos, Athens	Attica	Grave 26	Pin			Kübler 1943: 33
A.5160	LPG	950	900	Xeropolis	Euboia	Tomb 16	Pin			Themelis 1969: 99
A.5170	LPG	950	900	Xeropolis	Euboia	Tomb 16	Pin			Themelis 1969: 99
A.5180	LPG	950	900	Asine	Argolid	Tomb 10, Lower City, right shoulder	Pin			Frödin and Persson 1938: 131, 425; Kilian-Dirlmeier 1984: 73, no. 268; Lemos 2002: 107
A.5190	LPG	950	900	Asine	Argolid	Tomb 43, Lower City, left shoulder	Pin			Frödin and Persson 1938: 139, 425; Kilian-Dirlmeier 1984: 73, no. 269; Lemos 2002: 107
A.5200	LPG	900	850	Marmariani	Thessaly	Tholos tomb II	Ring		Dia. 1.3	Tsountas 1899: 101; Heurtley and Skeat 1930-31: 36
A.5210	LPG	900	850	Marmariani	Thessaly	Tholos tomb VI	Ring (2)		Dia. 2	Tsountas 1899: 101; Heurtley and Skeat 1930-31: 36
A.5220	LPG	900	850	Marmariani	Thessaly	Tholos tomb I	Ring (2)			Tsountas 1899: 101; Heurtley and Skeat 1930-31: 36

Table 6. Iron objects of the Aegean Early Iron Age

Ornaments

A.5230	LPG	900	850	Marmariani	Thessaly	Tholos tomb III	Ring			Tsountas 1899: 101; Heurtley and Skeat 1930-31: 36
A.5240	LPG	900	850	Marmariani	Thessaly	Tholos tomb VI	Pin (2)		PL. 12	Tsountas 1899: 101; Heurtley and Skeat 1930-31: 36
A.5250	LPG	900	850	Marmariani	Thessaly	Tholos tomb I	Pin			Tsountas 1899: 101; Heurtley and Skeat 1930-31: 36
A.5260	LPG	900	850	Marmariani	Thessaly	Tholos tomb III	Pin		PL. 20.9	Tsountas 1899: 101; Heurtley and Skeat 1930-31: 36
A.5270	LPG	900	850	Marmariani	Thessaly	Tholos tomb V	Pin			Tsountas 1899: 101; Heurtley and Skeat 1930-31: 36
A.5280	LPG	900	850	Marmariani	Thessaly	Tholos tomb V	Fibula		W. 6.3	Tsountas 1899: 101; Heurtley and Skeat 1930-31: 36
A.5290	LPG	900	850	Marmariani	Thessaly	Tholos tomb III	Fibula		W. 5.7	Tsountas 1899: 101; Heurtley and Skeat 1930-31: 36
A.5300	LPG	900	850	Marmariani	Thessaly	Tholos tomb I	Fibula		W. 13.3	Tsountas 1899: 101; Heurtley and Skeat 1930-31: 35-36
A.5310	LPG	900	850	Kerameikos, Athens	Attica	Grave 9	Pin			Kraiker and Kübler 1939: 184
A.5320	LPG	900	850	Kerameikos, Athens	Attica	Grave 16	Pin			Kraiker and Kübler 1939: 191
A.5330	LPG	900	850	Kerameikos, Athens	Attica	Grave 16	Pin			Kraiker and Kübler 1939: 191
A.5340	LPG	900	850	Kerameikos, Athens	Attica	Grave 26	Pin			Kübler 1943: 34, pl. 39
A.5350	LPG	900	850	Kerameikos, Athens	Attica	Grave 26	Pin			Kübler 1943: 34, pl. 39
A.5360	LPG	900	850	Kerameikos, Athens	Attica	Grave 29	Pin			Kübler 1943: 35
A.5370	LPG	900	850	Kerameikos, Athens	Attica	Grave 29	Pin			Kübler 1943: 35
A.5380	LPG	900	850	Kerameikos, Athens	Attica	Grave 29	Pin			Kübler 1943: 35
A.5390	LPG	900	850	Kerameikos, Athens	Attica	Grave 30	Pin			Kübler 1943: 36

Table 6. Iron objects of the Aegean Early Iron Age

Ornaments

A.5400	LPG	900	850	Kerameikos, Athens	Attica	Grave 30	Pin			Kübler 1943: 36
A.5410	LPG	900	850	Kerameikos, Athens	Attica	Grave 37	Pin			Kübler 1943: 39
A.5420	LPG	900	850	Kerameikos, Athens	Attica	Grave 37	Pin			Kübler 1943: 39
A.5430	LPG	900	850	Kerameikos, Athens	Attica	Grave 38	Pin			Kübler 1943: 39, pl. 39
A.5440	LPG	900	850	Kerameikos, Athens	Attica	Grave 38	Pin			Kübler 1943: 39, pl. 39
A.5450	LPG	900	850	Kerameikos, Athens	Attica	Grave 45	Pin			Kübler 1943: 43
A.5460	LPG	900	850	Kerameikos, Athens	Attica	Grave 45	Pin			Kübler 1943: 43
A.5470	LPG	900	850	Kerameikos, Athens	Attica	Grave 47	Pin			Kübler 1943: 44
A.5480	LPG	900	850	Kerameikos, Athens	Attica	Grave 31	Pin			Kübler 1943: 36
A.5490	LPG	900	850	Kerameikos, Athens	Attica	Grave 33	Pin			Kübler 1943: 37
A.5500	LPG	900	850	Kerameikos, Athens	Attica	Grave 20	Pin			Kraiker and Kübler 1939: 194
A.5510	LPG	900	850	Kerameikos, Athens	Attica	Grave 29	Pin			Kübler 1943: 35
A.5520	LPG	900	850	Kerameikos, Athens	Attica	Grave 29	Pin			Kübler 1943: 35
A.5530	LPG	900	850	Kerameikos, Athens	Attica	Grave 39	Pin			Kübler 1943: 39, 40, pl. 39
A.5540	LPG	900	850	Kerameikos, Athens	Attica	Grave 39	Pin			Kübler 1943: 39, 40, pl. 39
A.5550	LPG	900	850	Kerameikos, Athens	Attica	Grave 39	Fibulae (2)			Kübler 1943: 45, pl. 39
A.5560	LPG	900	850	Kerameikos, Athens	Attica	Grave 48	Fibula			Kübler 1943: 37

Table 6. Iron objects of the Aegean Early Iron Age

Ornaments

A.5570	LPG	900	850	Kerameikos, Athens	Attica	Grave 33	Fibula			
A.5580	LPG	900	850	Nea Ionia	Attica	Urn 4	Pin		Pl. 36, D. bz globe 2.2, D. head 2.7, D. finial 1-1.5, L shaft btw globe & head 2.8, lowest D. shaft 0.5	Lord Smithson 1961: 173, pl. 27
A.5590	LPG	900	850	Nea Ionia	Attica	Urn 4	Pin		Pl. 39, D. bz globe 2.3, D. head 2.6, D. finial 1.2, L. shaft btw globe & head 4, lowest D. shaft 0.4	Lord Smithson 1961: 173, pl. 27
A.5600	LPG	900	850	Nea Ionia	Attica	Urn 4	Fibula		L. 11, H. 6.2	
A.5610	LPG	900	850	Nea Ionia	Attica	Urn 1	Pin		Pl. 21, D. bz globe 1.95-2.2, D. head 2.4, L shaft btw globe & head 2.8, Lowest D shaft 0.5	Lord Smithson 1961: 173, pl. 27
A.5620	LPG	900	850	Tiryns	Argolid	Grave 1	Pin			Müller and Oelmann 1912: 128, 129; Desborough 1952: 207, 309
A.5630	LPG	900	850	Tiryns	Argolid	Grave 2	Pin	Ivory head		Müller and Oelmann 1912: 128, 129; Desborough 1952: 207, 309
A.5640	LPG	900	850	Tiryns	Argolid	Grave 7	Pin			Müller and Oelmann 1912: 128, 129; Desborough 1952: 207, 309
A.5650	LPG	900	850	Tiryns	Argolid	Grave 10	Pin			Müller and Oelmann 1912: 128, 129; Desborough 1952: 207, 309
A.5660	LPG	900	850	Tiryns	Argolid	Grave 4	Pin			Müller and Oelmann 1912: 128, 129; Desborough 1952: 207, 309
A.5670	LPG	900	850	Tiryns	Argolid	Grave VI	Pin			Verdelis 1963: 28, pl. 10.4
A.5680	LPG	900	850	Tiryns	Argolid	Grave VI	Pin			Verdelis 1963: 28, pl. 10.4
A.5690	LPG	900	850	Tiryns	Argolid	Grave V	Pin			Verdelis 1963: 26, pl. 10.4

Table 6. Iron objects of the Aegean Early Iron Age

Ornaments

A.5700	LPG	900	850	Iolkos	Thessaly	Tomb XII	Ring			
A.5710	LPG	900	850	Theotokou	Thessaly	Tomb B	Fibula			
A.5720	LPG	900	850	Theotokou	Thessaly	Tomb B	Ring			
A.5730	LPG	900	850	Theotokou	Thessaly	Tomb B	Pins (6)			
A.5740	LPG	900	850	Fortetsa	Crete	Tomb P	Pins (2)		L. 19, Dia. 0.5	Brock 1957: 138, no. 1633
A.5750	LPG	900	850	Nea Ionia	Attica		Pin			
A.5760	LPG	900	850	Nea Ionia	Attica		Fibula			
A.5770	LPG	900	850	Lefkandi	Euboia	Palia Perivolia Tomb 3	Fibula leaf-bow	Bronze bead	L. 7.4, est. H. 3.2, max. w. of bow 1.5	Popham et al. 1980: 142, pls. 239h, 249,6
A.5780	LPG	900	850	Lefkandi	Euboia	Palia Perivolia Tomb 3	Pin		L. 3.3, 3.8	Popham et al. 1980: 143
A.5790	LPG	900	850	Lefkandi	Euboia	Palia Perivolia Tomb 3	Pin		L. 3.5, 3.4, 2	Popham et al. 1980: 143
A.5800	LPG	900	850	Lefkandi	Euboia	Palia Perivolia Tomb 3	Pin		L. 2	Popham et al. 1980: 143

Table 6. Iron objects of the Aegean Early Iron Age

Other items

No.	Period	Start	End	Site	Region	Context	Items	Size (CM)	References
A.5810	LH IIIC	1200	1100	Perati	Attica	Tomb Σ2	Unidentified (2)		Iakovidis 1969 II: 57, 463; Iakovidis 1980: 99
A.5820	LH IIIC	1200	1100	Kamini	Naxos, Cyclades	Unknown find spot	Unidentified (7)	L. 7.4, W. 1.7	Vlachopoulos 2006 vol A: 450, pl. 97
A.5830	LH IIIC	1200	1100	Aplomata	Naxos, Cyclades	Tomb Γ	Piece (2)		Vlachopoulos 2006 vol A: 454, 456; Mee 1982: 45
A.5840	LM IIIC	1200	1100	Mouliana	Crete	Tomb B	Piece		Hammond 1967: 356
A.5850	LH IIIC	1200	1100	Malthi	Messenia	Room A 43, Industrial Quarter, forge room, upper stratum	Ore		Valmin 1938: 412-413
A.5860	LH IIIC	1200	1100	Malthi	Messenia	Area D 34	Fragments		Valmin 1938: 372, 373, pl. 30.19
A.5870	LH IIIC	1200	1100	Malthi	Messenia	Tholos Tomb 2	Fragment		Valmin 1938: 373
A.5875	LH IIIC	1200	1100	Vardaróftsa	Macedonia	Period C, settlement 10, 21st half metre	Slag		Davies 1926: 196–199
A.5880	SMyc	1100	1050	Lefkandi	Euboia	Skoubris Tomb 15	Fragment	2x1.4	Popham et al. 1980: 114
A.5890	SMyc	1100	1050	Lefkandi	Euboia	Skoubris Tomb 38	Fragment	3.5x2.2, Th. +0.2	Popham et al. 1980: 123
A.5900	SMin	1100	1000	Olympeion, Athens	Attica	Grave 2	Fragments		Styrenius 1967: 48
A.5910	SMin	1100	1000	Karphi	Crete	Rm. K 69	Fragment		BSA 1937: 122, no. 449
A.5920	SMin	1100	1000	Karphi	Crete	Rm. K 88	Fragment		BSA 1937: 122, no. 449
A.5930	SMin	1100	1000	Kavousi, Thunder Hill	Crete	Tholos Tomb 4	Fragments		Boyd 1901: 135
A.5940	SMin	1100	1000	Kavousi, Thunder Hill	Crete	Building A, Vronda Thunder Hill summit	Fragments		Boyd 1901: 132; Day et al. 1986: 355, 360
A.5950	PG	1075	750	Nichoria	Messenia	Area III	Slag		McDonald et al. 1983: 311

Table 6. Iron objects of the Aegean Early Iron Age

Other items

A.5960	PG	1050	850	Asine	Argolid	East of the acropolis settlement 22/20.3/5, phase 1	slag		Wells 1983: 4.2: 80; 4.3: 227
A.5970	EPG	1050	1000	Ayios Ioannis	Crete	Tomb III	Fragment		Boardman 1960: 132
A.5980	EPG	1050	1000	Fortetsa	Crete	Tomb Theta	Fragment		Brock 1957: 17
A.5990	MPG-LPG	1000	900	Agora, Athens	Attica	Tomb D 16:4	Fragment		Blegen 1952: 290, pl. 72c.11
A.6000	MPG-LPG	1000	900	Agora, Athens	Attica	Tomb D 16:4	Wire		Blegen 1952: 290, pl. 72c.10
A.6010	MPG-LPG	975	850	Nichoria	Messenia	Area IV	Slag (3)		Cooke and Nielsen 1978: 211
A.6020	MPG-LPG	975	850	Nichoria	Messenia		Scrap		McDonald et al. 1983: 274-276, 283-285
A.6030	MPG-LPG	975	850	Nichoria	Messenia		Scrap		McDonald et al. 1983: 274-276, 283-285
A.6040	LPG	900	850	Atalanti	Boeotia	Gouras Tomb XXV	Pieces		Dakoronia 1987: 228
A.6050	LPG-MG	900	700	Larnaki	Thasos		Slag		Photos 1992: 798-801, Table 1
A.6060	LPG-MG	900	700	Larnaki	Thasos		Slag		Photos 1992: 798-801, Table 1
A.6070	LPG-MG	900	700	Tsiganadadika	Thasos		Slag		Photos 1992: 798-801, Table 1

Table 6. Iron objects of the Aegean Early Iron Age

Object type	Object adoption	Adaptation to iron	Conversion details	Origins of Aegean iron type
Trunnion axeheads	11th	11th	Old LBA Near Eastern type converted to new material; iron only	Anatolia or Cyprus
Spearheads (socketed)	Late 15th	11th	LBA Aegean type converted to new material; iron and bronze	Aegean
Asymmetrical Bow Fibulae	11th	11th	New fibula form converted to new material; iron and bronze	Local development from earlier forms
Knives	17/16th	13-12th	Old Aegean BA object type converted to new material; iron, bronze rare	Local blade and tang types
Swords	13th	12th	Old LBA Urnfield object type (Naue II) converted to new material; iron, bronze rare	Alpine and Balkan continental regions
Type 2 pins	12th	11th	New EIA object type with new material; iron and bronze	Local development, possible link to long-bronze pins w/crystal globe from Mycenae shaft-grave Circle B
Daggers	LH, 11th (Naue II)	11th	Old Mycenaean LH object type converted to new material & new object type with new material; iron, bronze rare	Local form and Alpine and Balkan continental regions
Obeloi	11th	11th	New EIA object type with new material; iron only	Cyprus

Table 7. Bronze object types converted to iron in the Aegean EIA

Knives

No.	Period	Start	End	Site	Location	Context	Rivets	Handle or Sheath	Shape	Size (CM)	References
C.10	LC IIIA	1200	1100	Kouklia	Eliomylia	Tomb 119	1 bronze		3	PL. 20.5	Karageorghis 1990: 80, 84, pl. 83, 88; Zimmerman 2001: 116
C.20	LC IIIA	1200	1100	Enkomi		Quartier 5W, Tomb 108	unriveted	Iron ring	1	tang, L. 10.5, tang W. 2.2	Courtois 1981: 260, 268-269, fig. 165/1 & 166/1; Fr. T. 108
C.30	LC IIIA	1200	1100	Enkomi		Quartier 5W, Tomb 108				R.L. 9	Courtois 1981: p. 260, fig. 165/2, 166/2?; Fr. T. 108
C.40	LC IIIA	1200	1100	Enkomi		Tomb 58	4 bronze	Ivory	2	PL. 29.2, W. 3.1, Th. 2.2	Murray et al. 1900: 15, fig. 25 *994, 31; Schaeffer 1952: pl. 64.6; Crewe 2007: fig. 58.11
C.50	LC IIIA	1200	1100	Enkomi		Tomb 58		Ivory bull's leg, handle only			Murray et al. 1900: 14, 25, 31, pl. II:995; Gjerstad 1926: 285, n. 3; Crewe 2007: fig. 58.2
C.60	LC IIIA	1200	1100	Kouklia	Teratsoudhia	Tomb 104, Chamber K		Ivory half ring, handle only			Karageorghis 1990: 60, pls. XX, LVII
C.70	LC IIIA	1200	1100	Kouklia	Teratsoudhia	Tomb 104, Chamber N, topmost cist soil				PL. 3.3	Karageorghis 1990: 34, pl. 25
C.80	LC IIIA	1200	1100	Kouklia	Evreti	Tomb 3a					Catling 1968; Maier and Karageorghis 1984: 68; Iliffe and Mitford 1953: 710-711
C.90	LC IIIA	1200	1100	Kouklia	Asproyi	Tomb 4	bronze - multiple				Waldbaum 1978: 29; Catling 1979: 274-275
C.100	LC IIIA	1200	1100	Kouklia	Asproyi	Tomb 4					Waldbaum 1978: 29; Catling 1979: 274-275
C.110	LC IIIA	1200	1100	Kouklia	Asproyi	Tomb 4					Waldbaum 1978: 29; Catling 1979: 274-275
C.120	LC IIIA	1200	1100	Kouklia	Evreti	Tomb 8	1 bronze			PL. 9	Catling 1968: 168
C.130	LC IIIA	1200	1100	Kouklia	Evreti	Tomb 8	2 bronze			PL. 4.5	Catling 1968: 168
C.140	LC IIIA	1200	1100	Kouklia	Evreti	Tomb 8					Catling 1968: 168 (spatula); RDAC 1985: 102, n.13 (spatula); Waldbaum 1978: 29 (knife fragment); Sherratt 1994: 86 (knife frag - based on

Table 8. Iron objects of the Cypriot Early Iron Age

Knives

C.150	LC IIIA	1200	1100	Kourion	Bamboula	Area A, Stratum D:2, House VII(2), Room 12 floor				L. 3.3 (largest piece)	Benson 1972: 130; Benson 1969: 11
C.160	LC IIIA	1200	1100	Kourion	Bamboula	Tomb 16	2 bronze			PL. 7.8, W. 2.75	Benson 1972: 19, 130
C.170	LC III	1200	1050	Enkomi		Quartier 4E, Sector 346 at 0.90cm depth				L. 5	Courtois 1984: 50, fig. 7:17
C.180	LC III	1200	1050	Enkomi		Quartier 6W	2 bronze		1		Lagarce and Lagarce 1986: 62, pl. 17.3
C.190	LC III	1200	1050	Enkomi		Settlement, Under sector 122 at 1m depth				L. 13.4, W. 3.2	Courtois 1984: 50, fig. 7:20
C.200	LC III	1200	1050	Enkomi		Tomb 6 (French Tomb 6)	bronze - multiple			L. 24.5	Schaeffer 1936: 96, fig. 40, 137 no.13/T.6:13
C.210	LC III	1200	1050	Kourion	Bamboula	Area A, Trench 2, Room 20	2 bronze	Bone	8	PL. 14.1, W. 2.4/2.5, Th. 0.3	Daniel 1938: 268, fig. 9, 269; Benson 1972: 130
C.220	LC III	1200	1050	Lapithos	Ajia Anastasia	Tomb 501 (1)	2 bronze	Bone		PL. 13	Markides 1916: 8-9; Gjerstad 1934: 163 Tomb 501
C.230	LC III	1200	1050	Palekythro	Kastrohro	Tomb 2					Åström 1972: 473
C.240	LC IIIA late	1150	1100	Cesnola Collection		Unpovenanced		Bronze ring, handle only		L. 9.5	Myres 1914: 487, no. 4753; Richter 1915: 440, no. 1644
C.250	LC IIIB	1100	1050	Enkomi		Area I, Ashlar Building, Floor IA of Room 19 Level IIIC (vol I); Area I, court, B-gamma 6-8 south, floor I (vol II)			4	L. 5	Dikaios 1969: 217, 296, 526, 762, pl. 172.17
C.260	LC IIIB	1100	1050	Enkomi		Area I, Ashlar Building, Room 13, in upper debris overlying floor II which is Level IIIC	2 bronze		6	PL. 11.4	Dikaios 1969: 201, 302, 714, 761, pls. 135:76, 172:5
C.270	LC IIIB	1100	1050	Enkomi		Area I, Ashlar Building, Room 24, in layer overlaying floor I, end of Level IIIC				L. 5.5	Dikaios 1969: 772, pl. 147:38, 176:53
C.280	LC IIIB	1100	1050	Enkomi		Area III, Room 89, Sector C, I-K 0-2 west, floor I, Level IIIC			2	L. 16	Dikaios 1969: 302, 767, pl. 176: 37, plan 257

Table 8. Iron objects of the Cypriot Early Iron Age

Knives

C.290	LC IIIB	1100	1050	Idalion	West Acropolis	Isolated find from area to north of Room XLVIII			2	L. 17.8	Gjerstad 1935: 534, pl. 173: 106, D4 115.8; Tholander 1971: 18, 22; Åström et al. 1986: 30
C.300	LC IIIB	1100	1050	Idalion	West Acropolis	Northeast section of the open area XL, next to the cult-house: south of Room XXXIV and east of Room XXXVII	1 unknown		9	L. 11.8	Gjerstad 1935: 558, 559 I7 95.7; Tholander 1971: 18, 22; Åström et al. 1986: 31
C.310	LC IIIB	1100	1050	Idalion	West Acropolis	Room XXXV A		Wood sheath	4	L. 12.9	Gjerstad 1935: 560, 576, pl. 173: 1132; I 10. 92.4
C.320	LC IIIB	1100	1050	Katydhata		Tomb 89	1 bronze		9	P.L. 8	Markides 1917: 11, 15; Åström 1989: 54, figs. 70, 169 (plan)
C.330	LC IIIB	1100	1050	Kition		Area II, Floor II Northern Workshops, Room 15	2 bronze		1	PL. 32	Karageorghis 1985 V.II: 189; Karageorghis and Demas 1985 V.I: 136, pls. CLIII, CCXVI; plan
C.340	LC IIIB	1100	1050	Kourion	Bamboula	Area A, Stratum E:2, House VIII, Room 3				L. 5.6 W. 2.7	Benson 1969: 14 (context); 1972: 130
C.350	LC IIIB	1100	1050	Kourion	Kaloriziki	Tomb 19		Wood	5	PL. 15.7 W. 1.5 (max)	Benson 1973: 27, 124, pl. 40
C.360	LC IIIB	1100	1050	Kourion	Kaloriziki	Tomb 19	2 bronze		9	PL. 9.0 W. 2.1 (max)	Benson 1973: 27, 124, pl. 40
C.370	LC IIIB	1100	1050	Kourion	Bamboula	Tomb 32				PL. 4, PW. 1.8	Benson 1972: 28, 130, pl. 35
C.380	LC IIIB	1100	1050	Salamis	Plakes	Tomb 1	3 unknown		1	L. 26; handle 7	Yon 1971: 18, pl. 15:36, 18:36, T.I; Chavane 1975: 36-37, pl.
C.390	LC IIIB	1100	1050	Salamis	Plakes	Tomb 1	1 unknown			PL. 8.5	Yon 1971: 18, pl. 15:37, 18:37, T. I
C.400	LC IIIB-CG I	1100	950	Kourion		Tomb 19	2 iron	Wood	5		Ohnefalsch-Richter 1893, pl. 173.19; Dussaud 1914: 278-280, fig. 201.h
C.410	CG IA	1050	1000	Kouklia	Skales	Tomb 84	2 iron	Wood	8	L. 12.1	Karageorghis 1983: 292, pl. CLXXIV, fig. CLXX
C.420	CG IA	1050	1000	Kouklia	Skales	Tomb 89	3 iron	Wood	1	PL. 13	Karageorghis 1983: 320, pl. CLXXXIX, fig. CXCIII
C.430	CG IA	1050	1000	Kouklia	Skales	Tomb 89	2 iron	Wood	8	L. 13.1	Karageorghis 1983: 320, pl. CLXXXIX, fig. CXCIII

Table 8. Iron objects of the Cypriot Early Iron Age

Knives

C.440	CG IA	1050	1000	Kourion	Kaloriziki	Tomb 39	1 iron			L. 12.6, W. 3.9, Th. 1:3	Benson 1973: 49, 124, pl. 40 (amph no. 3)
C.450	CG IA	1050	1000	Kourion	Kaloriziki	Tomb 35	2 bronze		X	PL. 6.4, W. 1.7	Benson 1973: 45, 124
C.460	CG IA	1050	1000	Kourion	Kaloriziki	Tomb 39	2 bronze	Wood, cloth sheath	8	PL. 13.7, W. 2.0, Th. 0.1	Benson 1973: 49, 124, pl. 40
C.470	CG IA	1050	1000	Lapithos	Kastros	Tomb 420	3 iron	Wood	1	L. 26	Gjerstad 1934: 237, 238, fig. 87 (plan), pl. 53.1; Åström et al. 1986: 33
C.480	CG IA	1050	1000	Lapithos	Kastros	Tomb 420	1 iron			L. 1.9	53.1
C.490	CG IA	1050	1000	Palaepaphos	Xylinos	Tomb 132	2 iron		1	L. 14.5	Flourentzos 1997: 212, fig. 7, pl. XLIII(43): 99
C.500	CG I	1050	950	Amathus		Tomb 15				L. 13.4	Gjerstad 1935: 93
C.510	CG I	1050	950	Amathus		Tomb 21, burial stratum 1	iron	Ivory ring, handle only		L. 13.7	Gjerstad 1935: 118, pl. 25.3
C.520	CG I	1050	950	Amathus		Tomb 21, burial stratum 1		Wood		L. 6.4	Gjerstad 1935: 118, pl. 25.2
C.530	CG I	1050	950	Amathus		Tomb 25		Wood	1	L. 22	Gjerstad 1935: 135, pl. 29.4; Åström et al. 1986: 34
C.540	CG I	1050	950	Amathus		Tomb 523	3 bronze	Ivory ring hypothesized	1	L. 28	Karageorghis 1987: 719, fig. 189; Macdonald 1992: 48 fn.
C.550	CG I	1050	950	Amathus		Tomb 523	3 iron		1	L. 24.6	Karageorghis 1987: 719, fig. 190; Macdonald 1992: 48 fn.
C.560	CG I	1050	950	Kition	Area II	Floor I, Northern Workshops, Room 16, Bothros 2					Karageorghis and Demas 1985 V.I: 159 (context only); plan 31
C.570	CG I	1050	950	Kouklia	Skales	Tomb 49	1 bronze	Wood	1	PL. 12	Karageorghis 1983: 60, pl. LXII, fig. LXXXIX.12; Stech et al.
C.580	CG I	1050	950	Kouklia	Skales	Tomb 49				L. 5.9, W. 1.6	Stech et al. 1985: 193, pl. 28.2 (microliths only)
C.590	CG I	1050	950	Kouklia	Skales	Tomb 76	1 iron	Wood	1	PL. 15.5	Karageorghis 1983: 216, pl. CXLIII, fig. CXLII
C.600	CG I	1050	950	Kouklia	Skales	Tomb 76	1 unknown	Wood	1	L. 20	Karageorghis 1983: 223, pl. CXLIII, fig. CXLII; Stech et al
C.610	CG I	1050	950	Kouklia	Skales	Tomb 76	1 iron		1	L. 10.5	Karageorghis 1983: 223, pl. CXLIII, fig. CXLII; Stech et al

Table 8. Iron objects of the Cypriot Early Iron Age

Knives

C.620	CG I	1050	950	Kouklia	Skales	Tomb 76	2 bronze		1	PL. 17	Karageorghis 1983: 219, pl. CXLIII, fig. CXLII; Stech et al
C.630	CG I	1050	950	Kouklia	Skales	Tomb 76	2 bronze		1	PL. 18	Karageorghis 1983: 223-224, pl. CXLIII, fig. CXLII; Stech et al 1985: 195
C.640	CG I	1050	950	Kouklia	Skales	Tomb 76	2 iron	Wood	3	L. 19	Karageorghis 1983: 217, Pl. CX:III. Fig. CXLII
C.650	CG I	1050	950	Kouklia	Skales	Tomb 76	2 iron		9	L. 13	Karageorghis 1983: 221, pl. CXLIII, fig. CXLII
C.660	CG I	1050	950	Palaepaphos	Plakes	Tomb 142	1 bronze	Bone ring	1	PL. 28	Karageorghis and Raptou 2014: 33, pls. XII, LXXXII
C.670	CG I	1050	950	Palaepaphos	Plakes	Tomb 142		Bone			32
C.680	CG I	1050	950	Palaepaphos	Plakes	Tomb 144	1 bronze	Ivory	1	PL. 13.7	Karageorghis and Raptou 2014: 50, pls. XXVII, LXXXIX
C.690	CG I	1050	950	Palaepaphos	Plakes	Tomb 144	1 iron	Wood	1	PL. 16.4	Karageorghis and Raptou 2014: 50, pls. XXVII, LXXXIX
C.700	CG I	1050	950	Palaepaphos	Plakes	Tomb 144	3 iron	Wood	1	PL. 19.5	Karageorghis and Raptou 2014: 51, pls. XXVII, LXXXIX
C.710	CG I	1050	950	Palaepaphos	Plakes	Tomb 144	2 bronze, 3 iron	Ivory ring, handle only		PL. 8.1	Karageorghis and Raptou 2014: 50, pls. XXVII, LXXXIX
C.720	CG I	1050	950	Palaepaphos	Plakes	Tomb 144	1 iron			PL. 7.1	Karageorghis and Raptou 2014: 50, pls. XXVII, LXXXIX
C.730	CG I	1050	950	Palaepaphos	Plakes	Tomb 146	1 bronze			PL. 9.8, 3.7	Karageorghis and Raptou 2014: 80, pl. LII(52)
C.740	CG I	1050	950	Palaepaphos	Plakes	Tomb 147	3 bronze			L. 17.2	Karageorghis and Raptou 2014: 94, pls. LVI, XCVII
C.750	CG I-III	1050	750	Katydhata		Tomb 1					Markides 1917: 11
C.760	CG I-III	1050	750	Katydhata		Tomb 1					Markides 1917: 11
C.770	CG I-III	1050	750	Katydhata		Tomb 64					Markides 1917: 12
C.780	CG I-III	1050	750	Palaepaphos	Plakes	Tomb 146	2 iron	Wood	1	PL. 24	Karageorghis & Raptou 2014: 80, pl. XCV
C.790	CG IB	1000	950	Amathus	Kafkalla	Tomb 521	3 bronze			PL. 5.6, PW. 1.6	Karageorghis and Iacovou 1990: 87, fig. 5, pl. X
C.800	CG IB	1000	950	Kouklia	Skales	Tomb 48	6 bronze		1	L. 21	Karageorghis 1983: 54, 57, pl. XLVIII.2, fig. LXXI

Table 8. Iron objects of the Cypriot Early Iron Age

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C.810	CG IB	1000	950	Lapithos	Plakes	Tomb 602	3 iron	Wood	1	L. 17	Gjerstad 1934: 272, pl. 59.2
C.820	GC IB-II	1000	900	Kouklia	Skales	Tomb 83	unriveted	Iron	1	L. 18	Karageorghis 1983: 285, pl. CLXXIV, fig. CLXVII
C.830	GC IB-II	1000	900	Kouklia	Skales	Tomb 83	3 bronze	Wood	1	PL. 14.2	Karageorghis 1983: 285, pl. CLXXIV, fig. CLXVII
C.840	GC IB-II	1000	900	Kouklia	Skales	Tomb 83			6	PL. 14	Karageorghis 1983: 285, pl. CLXXIV, fig. CLXVII
C.850	GC IB-II	1000	900	Kouklia	Skales	Tomb 83	2 iron	Wood	8	L. 11.1	Karageorghis 1983: 285, pl. CLXXIV, fig. CLXVII
C.860	GC IB-II	1000	900	Kouklia	Skales	Tomb 83	2 iron		9	L. 8.8	Karageorghis 1983: 279, pl. CLXXIV, fig. CLXVII
C.870	CG IIA	950	925	Amathus		Tomb 19	iron - multiple		1	L. 15.3	Gjerstad 1935: 113, pl. 24.6; Astrom et al. 1986: 34-36
C.880	CG IIA	950	925	Amathus		Tomb 6	1 bronze		7	L. 16.7	Gjerstad 1935: 28, 29, pl. 8.3
C.890	GC IIA	950	925	Kouklia	Skales	Tomb 53, Lower Burial	1 iron			PL. 7.7	Karageorghis 1983: 97, pl. LXXIV, fig. XCIX
C.900	GC IIA	950	925	Kouklia	Skales	Tomb 53, Lower Burial				PL. 6.9	Karageorghis 1983: 97, pl. LXXIV, fig. XCIX
C.910	CG IIA	950	925	Lapithos	Kastros	Tomb 409	2 iron	Wood	1	L. 17.3	Gjerstad 1934: 210, pl. 47.4; Schaeffer 1952: 60, fig. 14.6
C.920	CG IIA	950	925	Lapithos	Kastros	Tomb 409		Wood sheath	6	L. 8.5	Gjerstad 1934: 210, pl. 47.4; Schaeffer 1952: 60, fig. 14.8; Åström et al. 1986: 33
C.930	CG IIA	950	925	Lapithos	Kastros	Tomb 409			10	L. 7	Gjerstad 1934: 210, pl. 47.4; Schaeffer 1952: 60, fig. 14.5; Åström et al. 1986: 33
C.940	CG IIA	950	925	Lapithos	Kastros	Tomb 425	4 bronze	Wood		PL. 5.7	Gjerstad 1934: 250 pl. 55.3
C.950	CG IIA	950	925	Lapithos	Plakes	Tomb 601		Wood	8	L. 13.5	Gjerstad 1934: 268, pl. 58.3
C.960	CG II	950	900	Amathus		Tomb 311	2 bronze	Wood	1	Ext. L. 15.5; hilt W. 1.8; blade W. 1.5; blade L. 12.6; P.L. 16.0	Karageorghis 1981; Waldbaum 1982; Macdonald 1992: 63, pl. XVI:13, fig. 9.9
C.970	CG II	950	900	Amathus		Tomb 311	unriveted		11	L. 10.9; hilt W. 0.7; blade W. 2.7; hilt L. 4.0	Macdonald 1992: 63, pl. XVI:14, fig. 9.13

Table 8. Iron objects of the Cypriot Early Iron Age

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C.980	CG II	950	900	Amathus		Tomb 311	1 bronze	Wood		Ext. L. 1.5; hilt W. 2.3	Macdonald 1992: 63, pl. XVI:12, fig. 9.14
C.990	CG II	950	900	Amathus		Tomb 329	1 bronze	Wood		Ext. L. 7.1; hilt W. 1.4; blade W. 1.3	Macdonald 1992: 66, pl. XVII:17, fig. 10.19
C.1000	CG II	950	900	Kouklia	Skales	Tomb 63	3 bronze		1	PL. 10.2	Karageorghis 1983: 151, pl. CIII, fig. CXIX
C.1010	CG II	950	900	Kouklia	Skales	Tomb 77	4 bronze		1	PL. 6.5 & 5	Karageorghis 1983: 234, pl. CXLVII, fig. CXLIV; Stech et al 1985: 195
C.1020	CG II	950	900	Kouklia	Skales	Tomb 77	2 iron		8	P.L. 8.3	Karageorghis 1983: 234, pl. CXLVII, fig. CXLIV
C.1030	CG II	950	900	Kouklia	Skales	Tomb 80	1 iron	Wood	8	PL. 17.7	Karageorghis 1983, 253, pl. CLVIII, fig. CLVI
C.1040	CG II	950	900	Myrtou-Pighades	Kastro Pighades	Deposit			6	L. 19.7	Catling 1957: 88
C.1050	CG II	950	900	Palaepaphos	Plakes	Tomb 145		Wood	1	PL. 9.7	Karageorghis and Raptou 2014: 64, pls. XXXIX, XCII
C.1060	CG II	950	900	Palaepaphos	Plakes	Tomb 145	2 bronze		6	PL. 14.2	Karageorghis and Raptou 2014: 65, pls. XXXIX, XCII
C.1070	CG II-IIIA	950	850	Amathus		Tomb 379			7		Macdonald 1992: 49, pl. 18.9
C.1080	CG II-IIIA	950	850	Ktima		Tomb VIII	2 bronze	Wood	8	PL. 11	Deshayes 1963: 129, 233, pls. 70.3(F6), 21.15 (F6)
C.1090	CG II-IIIA	950	850	Ktima		Tomb VIII	2 bronze	Wood	8	PL. 9, tang L. 3.8, W. 1.6	Deshayes 1963: 129, 233, pl. 21.14 (F7)
C.1100	CG II-IIIA	950	850	Ktima		Tomb VIII	2 bronze	Wood		PL. 3.2, W. 1.4	Deshayes 1963: 129, 233
C.1110	CG II-III	950	750	Amathus		Tomb 23	1 bronze	Wood	1	PL. 10.5	Gjerstad 1935: 129, 130 pl. 29.2
C.1120	CG II-III	950	750	Amathus		Tomb 310	4 bronze	Ivory	1	L. 25.85; hilt W. 2.1; hilt L. 5.4; hilt-plate L. 9.7; blade W. 2.1	Karageorghis 1981: 148-149; 1982: Pl. XXV, 4; Kassianidou 2012: fig. 8; Macdonald 1992: 48, 63, pl. XVI:11, fig. 9.8

Table 8. Iron objects of the Cypriot Early Iron Age

Knives

C.1130	CG II-III	950	750	Amathus		Tomb 310	8 bronze, gold & silver-capped	Ivory	1	L. 30.2; hilt W. 2.1; hilt L. 5.2; hilt place L. 11.1; blade W. 2.1	Karageorghis 1981: 148-149, pl. XXIV: 1,3; 1982: 299, Pl. XXV, 3; Waldbaum 1982: 340, Cat. 27; Kassianidou 2012: fig. 8; Macdonald 1992: 48, 63, pl. XVI:10, fig. 9.7
C.1140	CG II-III	950	750	Amathus		Tomb 310	2 iron	Wood	1	Ext. L. 20.3; hilt W. 1.9; blade W. 1.9	Macdonald 1992: 63, pl. XVI:9, fig. 9.6
C.1150	CG II-III	950	750	Amathus		Tomb 310				Ext. L. 5.3; blade W. 1.4	Macdonald 1992: 63, pl. XVI:7, fig. 9.12
C.1160	CG II-III	950	750	Amathus		Tomb 313	4 bronze	Wood	1	Ext. L. 15.2; hilt W. 1.7; blade W. 1.7; blade L. 10.7	Macdonald 1992: 63, pl. XVI:16, fig. 9.16
C.1170	CG II-III	950	750	Amathus		Tomb 313	5 bronze	Wood	1	L. 14.4; hilt W. 1.7; hilt L. 4.5; blade W. 1.7	Macdonald 1992: 63, pl. XVI:15, fig. 9.15
C.1180	CG II-III	950	750	Amathus		Tomb 313	1 bronze	Wood	7	L. 26.75; hilt W. 2.5; hilt L. 5.3; blade W. 3.0	Macdonald 1992: 63, pl. XVI:17, fig. 9.1
C.1190	CG II-III	950	750	Kition	Cesnola Collection	Unpovenanced	unriveted		11	L. 20.6, W. 2.7	Cesnola 1903 III: pl. LVI, 5; Myers 1914: 483, no. 4728; Richter 1915: 349-350, no.
C.1200	CG II-III	950	750	Kouklia	Skales	Tomb 79, lower burial	2 bronze	Wood	7	L. 17.8	Karageorghis 1983: 247, pl. CLIV, fig. CLVI
C.1210	CG IIB	925	900	Amathus	Kambos	Tomb 2, burial IIb	2 brone	Bone	1	L. 21.6	Aupert and Tytgat 1984: 644, pl. 8.31
C.1220	CG IIB	925	900	Amathus		Tomb 21			6	L. 19.2	Gjerstad 1935: 117, pl. 25.2
C.1230	CG IIB	925	900	Kouklia	Skales	Tomb 64	4 iron		1	PL. 23	Karageorghis 1983: 153, pl. LXXXI, fig. CXX
C.1240	CG IIB	925	900	Lapithos	Kastros	Tomb 411	2 iron	Wood	1	L. 12.1	Gjerstad 1934: 215, pl. 48.2
C.1250	CG IIB	925	900	Lapithos	Kastros	Tomb 429	2 iron		6	L. 15	Gjerstad 1934: 263, pl. 57.4

Table 8. Iron objects of the Cypriot Early Iron Age

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C.1260	CG IIB	925	900	Lapithos	Kastros	Tomb 429				L. 7.5	Gjerstad 1934: 263, pl. 57.4
C.1270	CG IIB-IIIA	925	850	Amathus		Tomb 7	1 iron, 1 bronze		8	PL. 18.5	Gjerstad 1935: 39, 42, 43, pl. 8.5
C.1280	CG IIB-IIIA	925	850	Amathus		Tomb 7				L. 6.5	Gjerstad 1935: 39, 43, pl. 8.5
C.1290	CG IIB-CG III	925	750	Ktima		Tomb IIIb	1 iron			L. 14, tang W. 1.6	Deshayes 1963: 78, 233, pl. 70.5 bottom
C.1300	CG IIB-CG III	925	750	Ktima		Tomb IIIb				L. 10.2	Deshayes 1963: 78, 233, pl. 70.5 top
C.1310	CG IIB-CG III	925	750	Ktima		Tomb IV	3 iron	Wood		L. 16, tang L. 5, W. 1.7	Deshayes 1963: 83, 90, pl. 70.1 bottom

Table 8. Iron objects of the Cypriot Early Iron Age

Daggers

No.	Period	Start	End	Site	Location	Context	Rivets	Handles	Type	Size (CM)	References
C.1320	LC IIIA	1200	1100	Kouklia	Evreti	Tomb 4	3 bronze		Local	PL. 9	Maier and Wartburg 1985: 102 n.13 KTE IV (knife); Catling 1979: 274 for tomb
C.1330	LC IIIB	1100	1050	Idalion	West Acropolis	Unprovenanced, in sieves			Local	PL. 9.1	Gjerstad 1935: 541, 575-576, pl. CLXXIII
C.1340	LC IIIB	1100	1050	Idalion	West Acropolis	Corridor XLV			Local	L. 9.7	Gjerstad 1935: 546, 575-576, pl. CLXXIII
C.1350	LC IIIB	1100	1050	Idalion	West Acropolis	Debris, Layer 6			Local	L. 15.2	Gjerstad 1935: 556, 575-576, pl. CLXXIII
C.1360	LC IIIB	1100	1050	Idalion	West Acropolis	Filling layer			Local	PL. 12.9	Gjerstad 1935: 558, 575-576, pl. CLXXIII.4
C.1370	LC IIIB	1100	1050	Kition	Area II	Western Workshops, Room 115, Floor II	3 bronze		Local	L. 25.2	Karageorghis 1978: 916-917, fig. 84; Karageorghis and Demas 1985 V.I: 133, pls. CLIII, CCXVI; Karageorghis 1985 V.II: 188
C.1380	LC IIIB	1100	1050	Kourion	Kaloriziki	Tomb 40	1 iron	Bone	Naue II	L. 19.5	McFadden and Sjoqvist 1954: 140, pl. 26.36a, b; L. Astrom 1967: 89; Benson 1973: 50, 124; Vonhoff 2012: 197, fig. 3
C.1390	CG IA	1050	1000	Kouklia	Skales	Tomb 89	2 iron	Ivory, wood sheath	Naue II	L. 31.5	Karageorghis 1983: 320, 325, pl. CLXXXIX, fig. CXCIII
C.1400	CG I	1050	950	Amathus	Old West Cemetery	Tomb 523	5 iron	Ivory	Naue II	PL. 13.2	Karageorghis 1987: 719, fig. 188
C.1410	CG I	1050	950	British Museum		Unprovenanced	2 iron of 4 rivets			L. 35.5, Blade L. 29	Tatton-Brown 1989: 132, 136 figs 1a & b; Lang 1989; Lang 1991
C.1420	CG I	1050	950	Palaepaphos	Plakes	Tomb 144	3 iron	Ivory, wood sheath	Naue II	PL. 19	Karageorghis and Raptou 2014: 49, pls. XXVII, LXXXVIII
C.1430	CG IB	1000	950	Amathus		Tomb 521	2 bronze	Ivory	Naue II	PL. 7.7, PW. 2.4	Karageorghis and Iacovou 1990: 87, fig. 5, pl. X

Table 8. Iron objects of the Cypriot Early Iron Age

Daggers

C.1440	CG II	950	900	Amathus		Tomb 329	4 bronze	Ivory; wood sheath	Naue II	Orig. L 34, PL. 24, shoulder W. 3.1, max W. blade 2.7	Macdonald 1992: 44, 66, pl. X:9, fig. 1.6
C.1450	CA IB-CC	750	300	Amathus		Tomb 319	2 bronze		Naue II	PL. 5.6, 10.5, hilt W. 2.2-1.4, blade W. 2.4	Macdonald 1992: 44, 46, 64, pl. X:5, fig. 1.5

Table 8. Iron objects of the Cypriot Early Iron Age

Swords

No.	Period	Start	End	Site	Location	Context	Rivets	Handles	Tang	Size (CM)	References
C.1460	LC IIIA	1200	1100	Enkomi	Unpublished	Old French Excavations					Catling 1964: 116, no. 1; Snodgrass 1980: 344; Snodgrass 1981: 129; Sherratt 1994: 86
C.1470	LC IIIB	1100	1050	Idalion	West Acropolis	Open area XL	3 iron		scalloped	L. 79.7	Gjerstad 1935: 537, 574, pl. 171.1, F9 104; Åström 1967: 1, 89; Åström 1972: 473, 558, fig. 60.1
C.1480	CG I	1050	950	Kouklia	Skales	Tomb 43	5 iron		ovoid	PL. 30.7	Karageorghis 1983: 16, 24, pl. XXV, fig. LI
C.1490	CG I	1050	950	Kouklia	Skales	Tomb 76	6 iron		spur w/ears	PL. 64; W handguard 5.7; L. hilt 7.5	Karageorghis 1983: 216, 217, 230, pl. CXLIII, fig. CXLII
C.1500	CG I	1050	950	Kouklia	Skales	Tomb 76	8 iron	Ivory, wood sheath	spur	L. 41, W shoulder 4; L. hilt 5.3	Karageorghis 1983: 216, 217, pl. CXLIII, fig. CXLII
C.1510	CG I	1050	950	Kourion	Cesnola Collection	Unprovenenced			ovoid	L. 69.6, W. tang 4.45	Cesnola 1903 III: pl. LXXIV, 2; Myers 1914: no. 4725; Richter 1915: 400-401, no. 1462; Gjerstad 1948: 130, fig. 19.1; Schaeffer 1952: fig. 105.10; Catling 1964: 116; Snodgrass 1964: 97, no. 30, fig. 5h; Karageorghis et al. 2000: 164-165, no. 267
C.1520	CG I	1050	950	Kouklia	British Museum	Unprovenanced	8 iron	Ivory	flanged	PL. 24.7, blade L. 14.5	Snodgrass 1964: 99, no. 11; Tatton-Brown 1989: 133, 137, figs 2a & b
C.1530	CG I	1050	950	Palaepaphos	Plakes	Tomb 144	1 iron	Wood			Karageorghis and Raptou 2014
C.1540	CG IIA	950	925	Lapithos	Kastros	Tomb 409			flanged	PL. 6.5	Gjerstad 1934: 210, pl. 47.4; Åström et al. 1986: 33
C.1550	CG IIB	925	900	Kouklia	Skales	Tomb 64	5 iron		spur	L. 32.7	Karageorghis 1983: 153, pl. LXXXI, fig. CXX
C.1560	CG II	950	900	Palaepaphos	Plakes	Tomb 145	2 iron		bulb-fan	L. 54	Karageorghis and Raptou 2014: 67, pls. XXXIX, XCII
C.1570	CG II	950	900	Palaepaphos	Plakes	Tomb 145	3 iron	Wood			Karageorghis and Raptou 2014: 67, pls. XXXIX, XCII

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Swords

C.1580	CG I-III	1050	750	Palaepaphos	Plakes	Tomb 146					Karageorghis and Raptou 2014: 80, pl. LII
C.1590	CG III	900	750	Nicosia	Old Municipality	Tomb 1	3 iron	Wood	ovoid	L. 81, blade W. 3-4.5	Fasti Archaeologici 1951: 162, no. 1955; Megaw 1952: 114; Flourentzos 1989: 117, pl. 16:27, no. 14; Snodgrass 1981: 130, fig. 1
C.1600	CG III-CA I	900	600	Amathus		Tomb 366			flanged	L. 63.5	Macdonald 1992: 68, no. 2, fig. 3:4, pl. 11:1; Vonhoff 2012: 202, n. 44, fig. 11
C.1610	CA I	750	600	Amathus		Tomb 225					Macdonald 1992: fig. 3.1
C.1620	CA I	750	600	Amathus		Tomb 233					Macdonald 1992: fig. 1.9, pl. X:1
C.1630	CA I	750	600	Amathus		Tomb 243	11 iron, 1 bronze	Wood scabbord w/bronze covering & nails	flanged	PL. 55.1, L. 57	Macdonald 1992: 45, fig. 3:2
C.1640	CA I	750	600	Amathus	Site D	Tomb 286				L. 51.5	Snodgrass 1964: 99, fig. 6d (see Snodgrass for more refs)
C.1650	CA I	750	600	Amathus		Tomb 481			squared		Karageorghis 1987: 709, fig. 118
C.1660	CA I	750	600	Kouklia	Eleomylia	Tomb 7 or 8			scalloped	L. 76.5	Karageorghis 1966: 322, fig. 59; 1967: 212, 242, no. 46, figs. 21, 24, 25; Vonhoff 2012: 202, fig. 10 (incorrectly identifies this as the Nicosia T.1 sword)
C.1670	CA I	750	600	Mari		Tomb 1	4 bronze w/ silver caps	Ivory hilt, wood & leather scabbord		L. 82	Hadjicosti 1997: 256, 259, fig. 4.25; Karageorghis et al. 2000: 164
C.1680	CA I	750	600	Kourion		Graeco-Phoenician Tomb			flanged	PL. 51.3	Undset 1890: figs. 1-2; Naue 1903: 13, pl. 6.4-4b; Schaeffer 1952: 350, 357, 418, fig. 105.10; Snodgrass 1964: 97,
C.1690	CA I	750	600	Kourion		Graeco-Phoenician Tomb	5 rivets			PL. 37.2	Berlin Museum
C.1700	CA II	600	600	Salamis		Tomb 3	bronze rivets, silver caps			L. 92	Karageorghis 1965: 286, fig. 83; Karageorghis 1967: 38, 43, no. 95, pls. xlv, cxxix; Snodgrass 1981: 133

Table 8. Iron objects of the Cypriot Early Iron Age

Swords

C.1710	CA II	600	575	Tamassos		Royal Tomb 12				L. 71	Masson 1964: 227-230, figs. 16-17; Matthäus 2007: fig. 5
C.1720	CA II	600	480	Kourion, Cesnola Collection		Kourion Treasure				L. 59.4	Cesnola 1903 III: pl. LXXIV, 1; Richter 1915: 401, no. 1463; Gjerstad 1948: 131, fig. 19.2; Snodgrass 1964: 102, no. III.1, fig. 6j; Snodgrass 1981: 133; Karageorghis et al. 2000: 164-165, no. 268
C.1730	CA II	600	480	Cesnola Collection		Unprovenanced		Ivory		PL. 12.1	Richter 1915: 402, no. 1464; Snodgrass 1964: 102, no. III.2; 1981: 133; Karageorghis et al. 2000: 164-165, no. 270
C.1740	CA - CC I	750		Amathus		Tomb 272			flanged		Macdonald 1992: fig. 3.3
Bronze Naue II Swords											
C.1750	LC IIC-IIIA	1225	1175	Enkomi		Tomb 18, upper level	8 bronze		flanged	PL. 51.2, L. 75 reconstructed	Schaeffer 1952: 341, fig. 107.1; Catling 1964: 114, no. 27, pl. 12:h
C.1760	LC IIIA early	1200	1150	Enkomi	Quarter 5 East	Well 212	8 bronze		flanged		Lagarce 1971: 406, 407, 410, 412, figs. 16.c, 18:4, 19, 20; Mehofer and Jung 2008: 114, 124, fig. 5:1
C.1770	LC IIIA early	1200	1150	Enkomi	Quarter 5 East	Well 212	5 bronze		flanged		Lagarce 1971: 406, 407, 410, 412, figs. 16.c, 18:1, 19, 20; Mehofer and Jung 2008: 114, 124, fig. 5:2
C.1780	LC IIIA early	1200	1150	Enkomi	Quarter 5 East	Well 212	7 bronze		flanged		Lagarce 1971: 406, 407, 410, 412, figs. 16.c, 18:3, 19, 20
C.1790	LC IIIA early	1200	1150	Enkomi	Quarter 5 East	Well 212	6 bronze		unknown		Lagarce 1971: 406, 407, 410, 412, figs. 16.c, 18:2, 19, 20
C.1800	LC III	1200	1050	Enkomi		Tomb 47	2 bronze		spur w/ears	L. 42.7, W. 4.7, Th. 1.2	Schaeffer 1952: 341, fig. 107.2; Catling 1964: 114, 115, no. 28, pl.12:k; Matthäus 1985: 364 ff, no. 2, pl. 140:2
C.1810	LC III	1200	1050	Loizou Collection	Famugasta	Loizou sword, unprovencanced	8 bronze		flanged	L. 47, shoulder W. 5, L. hilt 10, blade W. max 3.5	Catling 1961: pl. XVIa-b, Catling 1964: no. 30, pl. 12j

Table 8. Iron objects of the Cypriot Early Iron Age

Swords

C.1820	LC III	1200	1050			Unprovenanced	5 bronze		flanged		Catling 1957: 115, no. 18, fig. 2, pl. IX A, B; 1964: 114, no. 31, fig. 12:i

Table 8. Iron objects of the Cypriot Early Iron Age

Weapons

No.	Period	Start	End	Site	Location	Context	Items	Handle	Size (CM)	References
C.1830	CG IA	1050	1000	Cesnola Collection		Unprovenanced	Spearhead		L. 28.1	Myres 1914: no. 4708; Richter 1915: 394, no. 1425
C.1840	CG IA	1050	1000	Cesnola Collection		Unprovenanced	Spearhead		L. 24.3	Myres 1914: no. 4709; Richter 1915: 394-395, no. 1426
C.1850	GC IB	1000	950	Cesnola Collection		Unprovenanced	Spearhead		L. 21.3	Myres 1914: no. 4710; Richter 1915: 394, no. 1427
C.1860	CG IA	1050	1000	Cesnola Collection		Unprovenanced	Spearhead		L. 18.8	Myres 1914: no. 4711; Richter 1915: 396, no. 1428
C.1870	CG IA	1050	1000	Cesnola Collection		Unprovenanced	Spearhead		L. 14.1	Myres 1914: no. 4712; Richter 1915: 396, no. 1429
C.1880	CG IA	1050	1000	Kourion	Kaloriziki	Tomb 39	Spearhead	Wood	PL. 23.6, W. 3.2, D. 2 (socket)	Benson 1973: 49, 124, pl. 40
C.1890	CG IA	1050	1000	Marion	Evrethades	Tomb 68	Spearhead	Wood	L. 33	Gjerstad 1935: 385, pl. 73.1
C.1900	CG I	1050	950	Alaas		Tomb 3	Spearhead		L. 16.8	Karageorghis 1977: 143, pls. XXXVII, XLII
C.1910	CG I	1050	950	Kourion	Bamboula	Tomb 17A	Arrowhead		PL. 6.2, D. 0.7	Benson 1972: 21, 131
C.1920	CG I	1050	950	Kythraia		Tomb 4	Spearhead		L. 16.7, max W. 3, D. base 2.7	Nicolaou 1965: 62, fig. 17
C.1930	CG I	1050	950	Kythraia		Tomb 4	Spearhead		L. 26, W. max 3, D. base 2.7	Nicolaou 1965: 63, fig. 18
C.1940	CG I	1050	950	Palaepaphos	Plakes	Tomb 144	Spearhead		Ht. 8.2, 13	Karageorghis and Raptou 2014: 50, pl. XXVII
C.1950	CG I	1050	950	Palaepaphos	Plakes	Tomb 144	Arrowhead		PL. 12.7	Karageorghis and Raptou 2014: 49, pls. XXVII, LXXXVIII
C.1960	CG I	1050	950	Palaepaphos	Plakes	Tomb 144	Arrowhead		L. 9.7	Karageorghis and Raptou 2014: 50, pls. XXVII, LXXXVIII
C.1970	CG I	1050	950	Palaepaphos	Plakes	Tomb 144	Arrowhead		PL. 6.6	Karageorghis and Raptou 2014: 50, pls. XXVII, LXXXVIII
C.1980	CG I	1050	950	Palaepaphos	Plakes	Tomb 144	Spearhead		L. 10.1, 4.5	Karageorghis and Raptou 2014: 50, pls. XXVII, LXXXIX

Table 8. Iron objects of the Cypriot Early Iron Age

Weapons

C.1990	CG I	1050	950	Palaepaphos	Plakes	Tomb 144	Spearhead		L. 30.5 w/wood shaft	Karageorghis and Raptou 2014: 50, pls. XXVII, LXXXIX
C.2000	CG IB	1000	950	Kouklia	Skales	Tomb 48	Ring, spearhead			Karageorghis 1983: 54, 56, pl. XLVIII, fig. LXXXI
C.2010	CG I	1050	950	Kouklia	Skales	Tomb 76	Ring, spearhead			Karageorghis 1982: 299; Karageorghis 1983: 219, pl. CXLIII, fig. CXLII
C.2020	CG IIA	950	925	Amathus		Tomb 6	Spearhead		L. 33	Gjerstad 1935: 27 -29
C.2030	CG II	950	900	Amathus		Tomb 311	Spearhead		Ext. L. 16.3; socket D. 2.3; socket L. 8; blade W. 2.9	Macdonald 1992: 63, pl. XII:2, fig. 5.6
C.2040	CG II	950	900	Amathus		Tomb 329	Spearhead	Wood	L. 28.75; socket W. 2.5; blade W. 3.7; blade L. 17.1	Macdonald 1992: 66, pl. XII:6, fig. 5.7
C.2050	CG II	950	900	Amathus		Tomb 331	Spearhead	Wood	L. 27.7; socket W. 2.7; ring D. 3; blade W. 4	Macdonald 1992: 66, pl. XII:4, 10, fig. 5.3
C.2060	CG II	950	900	Kouklia	Skales	Tomb 80	Spearhead		L. 29.5	Karageorghis 1983: 253, pl. CLVIII, fig. CLVI
C.2070	CG II	950	900	Myrtou-Pighades		Votive Deposit	Spearhead		PL. 18, W. 3	Catling 1957: 86, fig 34.85
C.2080	CG II	950	900	Kouklia	Skales	Tomb 77	Spearhead		L. 26.3	Karageorghis 1983: 232, pl. CXLVII, fig. CXLIV
C.2090	CG II	950	900	Kouklia	Skales	Tomb 77	Spearhead		L. 19.7	Karageorghis 1983: 232, pl. CXLVII, fig. CXLIV
C.2100	CG II-IIIA	950	850	Amathus		Tomb 7	Arrowhead		L. 7.7	Gjerstad 1935: 41, 43, pl. 8.5
C.2110	CG II-IIIA	950	850	Amathus		Tomb 7	Arrowhead		L. 10.6	Gjerstad 1935: 35, 43, pl. 8.5
C.2120	CG II-IIIA	950	850	Ktima		Tomb IV	Spearhead		L. 17.7	Deshayes 1963: 82-84, 90, 233, 234, pls. 29.3, 70.1 top
C.2130	CG II-III	950	750	Palaepaphos	Plakes	Tomb 143	Spearhead		PL. 22	Karageorghis and Raptou 2014: 43, 47, pl. XVI, LXXXIV
C.2140	CG II-III	950	750	Amathus		Tomb 23	Ring, spearhead	Wood	PL. 17	Gjerstad 1935: 129, 130, pl. 29.2

Table 8. Iron objects of the Cypriot Early Iron Age

Weapons

C.2150	CG IIB	925	900	Amathus		Tomb 21	Spearhead		PL. 18	Gjerstad 1935: 116, 118, pl. 25.2
C.2160	CG IIB-IIIA	925	850	Kouklia	Skales	Tomb 55	Spearhead	Wood	PL. 16.4	Karageorghis 1983: 110, pl. LXXX, fig. C
C.2170	CG IIB-IIIA	925	850	Kouklia	Skales	Tomb 69	Spearhead		L. 25.8	Karageorghis 1983: 181, 182 pl. CXVIII, fig. CXXXVI
C.2180	CG IIB-IIIA	925	850	Kouklia	Skales	Tomb 69	Spearhead	Wood, cloth	PL. 20.1	Karageorghis 1983: 181, 182 pl. CXVIII, fig. CXXXVI
C.2190	CG IIB-III	925	750	Ktima		Tomb IIIb	Spearhead		PL. 23, W. 3.2	Deshayes 1963: 78, 233, pl. 70.4
C.2200	CG IIB-III	925	750	Ktima		Tomb IIIb	Spearhead		PL. 18, W. ca. 3	Deshayes 1963: 78, 233, pl. 70.4

Table 8. Iron objects of the Cypriot Early Iron Age

Tools

No.	Period	Start	End	Site	Location	Context	Items	Handle	Size (CM)	References
C.2210	LC IIIA	1200	1100	Enkomi		Area III, Room 72 D, Sector C, Level IIIA	Sickle		L. 11	Dikaios 1969: 279, 701 end of IIIa, pl. 163.9, plan 254
C.2220	LC IIIA	1200	1100	Kourion	Bamboula	Tomb 25	Chisel		L. 8, W. 1.7, Th. 0.5	Benson 1972: 25, 130, pl. 35
C.2230	LC IIIA	1200	1100	Idalion	West Acropolis	Room XXXII	Blade		L. 8.0	Gjerstad 1935: 556, I 10 78.3
C.2240	LC III	1200	1050	Enkomi		Quartier 1W	Burin	Bone		Lagarce and Lagarce 1986: 63, pl. 17:8: Point top. 355
C.2250	LC III	1200	1050	Enkomi		Sondage XLVI (46), sector 27 b at 0.80 m depth	Chisel		L. 16 actual	Courtois 1984: 50
C.2260	LC III	1200	1050	Enkomi		Trench NS 495	Pickaxe		L. 13.1, 1.3 x 1.4 square section on opposite side of the tip	Courtois 1984: 50, fig. 7:16
C.2270	LC III	1200	1050	Enkomi		Sondage XLVI (46), sector 27 a at 0.80cm depth	Sickel		L. 26	Courtois 1984: 50
C.2280	LC III	1200	1050	Enkomi		West precinct area, north 5e street, sector 1445 at 0.75m depth	Sickel		L. 16.1, W. 4.2, Th. 0.5-0.6	Courtois 1984: 50, fig. 7:21
C.2290	LC III	1200	1050	Enkomi		Sondage XLI (41), sector 42 at 1.80m depth	Tool, blade fragment		L. 3, W. 2	Courtois 1984: 50
C.2300	LC III	1200	1050	Enkomi		Quartier 3W Sector 355 at 2.5m depth	Burin	Bone	L. 6, L. handle 2.5, D. handle 2.3	Courtois 1984: 50, fig. 7:6, pl. XVI:16
C.2310	LC III	1200	1050	Enkomi		Unprovenanced	Burin	Bone	L. 7.8, Dia. 3.8	
C.2320	LC IIIB-C	1100	1050	Enkomi		West City Wall House lining wall (unspecified)	Sickle			Karageorghis 1967: 315b

Table 8. Iron objects of the Cypriot Early Iron Age

Tools

C.2330	LC IIIB-C	1100	1050	Enkomi		West City Wall House lining wall (unspecified)	Tool			Karageorghis 1967: 315b
C.2340	LC IIIB	1100	1050	Enkomi		Area I, Ashlar Building, Room 8, floor II, level IIIB	Sickle		L. 28	Dikaios 1969: 296, 725, IIIa, pls. 135.77, 172.16
C.2350	LC IIIB	1100	1050	Kition		Area II Western Workshops, Room 5A Floor II	Chisel		L. 5.1	Karageorghis and Demas 1985 V.II: 189; Karageorghis and Demas 1985 V.I: 134, pls. CLIII, CCXVI, plan. 34; Waldbaum 1999: Cat. 8 calls no. 569, Maddin 1982 no. 1569; Sherratt 1994: 87 calls no 569
C.2360	LC IIIB	1100	1050	Kouklia	Xylinos	Tomb 186	Nail		L. 5.3	Karageorghis and Raptou 2014: 3, 6, 23, pl. V
C.2370	LC IIIB	1100	1050	Kourion	Kaloriziki	Tomb 40	Nail		P.L. (larger frag) 4; D. 0.6 (max)	Benson 1973: 50, 124; McFadden 1954: 139, pl. 25.31; Åström 1967: 2
C.2380	CG IA	1050	1000	Kouklia	Skales	Tomb 78	Spindle	Wood	P.L. 26	Karageorghis 1983: 236, 241, pl. CLI, fig. CXLVII
C.2390	CG IA	1050	1000	Kourion	Kaloriziki	Tomb 34	Nail		L. 9.5 Th (avg) 0.4	Benson 1973: 44
C.2400	CG IA	1050	1000	Lapithos	Kastros	Tomb 417	Obelos/pike		L. 29.5	Gjerstad 1934: 228, pl. 51.1; Åström 1986: 33; Pickles and Peltenburg 1998
C.2410	CG IA	1050	1000	Palaepaphos	Xylinos	Tomb 132	Obelos		Ex. L. 75.2	Flourentzos 211, 214, 218, pl. XLIII(43): 73+115
C.2420	CG IA	1050	1000	Palaepaphos	Xylinos	Tomb 132	Obelos		L. 76	Flourentzos 207, 214, 218, pl. XLIII(43): 13+72+82
C.2430	CG I	1050	950	Cesnola Collection		Unprovenanced	Axehead, trunnion			Myres 1914: 482, no. 4723; Richter 1915: 434, no. 1635
C.2440	CG I	1050	950	Kition	Area II	Floor I, Bothros 2, Room 16, Temenos A	Awl			
C.2450	CG I	1050	950	Kition	Area II	Temple 5, Floor I, Temenos B	Skewer		L. 15.8	Karageorghis and Demas 1985 V.I: 246; Karageorghis 1985 V.II: 217; Pls. CLXX, CCXXVIII
C.2460	CG I	1050	950	Kouklia	Skales	Tomb 67	Obelos		P.L. 75	Karageorghis 1983: 162, 172, pl. CXIV, fig. CXXXI
C.2470	CG I	1050	950	Kouklia	Skales	Tomb 76	Awl		PL. 11	Karageorghis 1983: 217, pl. CXLIII, fig. CXLIII; Maddin 1982: 309; Stech et al.

Table 8. Iron objects of the Cypriot Early Iron Age

Tools

C.2480	CG I	1050	950	Kouklia	Skales	Tomb 76	Awl		PL. 5	Karageorghis 1983: 217, pl. CXLIII, fig. CXLIII; Maddin 1982: 309; Stech et al.
C.2490	CG I	1050	950	Kouklia	Skales	Tomb 76	Axehead, trunnion		L. 18, Max W. 4.2	Karageorghis 1982; Karageorghis 1983: 223 Pl. CXLIII, Fig. CXLII
C.2500	CG I	1050	950	Palaepaphos	Plakes	Tomb 142	Trident		W. 32.8; P.Weight 1096.8g	Karageorghis and Raptou 2014: 35, 41-42, pls. XIII, LXXXIII
C.2510	CG I	1050	950	Palaepaphos	Plakes	Tomb 142	Obelos		P.L. 14.4	Karageorghis and Raptou 2014: 31, pl. XII
C.2520	CG I	1050	950	Palaepaphos	Plakes	Tomb 142	Obelos		PL. 19.9, 16.7, 15	Karageorghis and Raptou 2014: 33, pls. XII, XIII
C.2530	CG I	1050	950	Palaepaphos	Plakes	Tomb 142	Obelos		PL. 13.7	Karageorghis and Raptou 2014: 33, pl. XIII
C.2540	CG I	1050	950	Palaepaphos	Plakes	Tomb 142	Obelos		PL. 16.7	Karageorghis and Raptou 2014: 33, pl. XIII
C.2550	CG I	1050	950	Palaepaphos	Plakes	Tomb 142	Obelos		PL. 8.9	Karageorghis and Raptou 2014: 33, pl. XIII
C.2560	CG I	1050	950	Palaepaphos	Plakes	Tomb 142	Obelos		PL. 12.3	Karageorghis and Raptou 2014: 33, pl. XIII
C.2570	CG I	1050	950	Palaepaphos	Plakes	Tomb 142	Obelos		PL. 19.2	Karageorghis and Raptou 2014: 33, pl. XIII
C.2580	CG I	1050	950	Palaepaphos	Plakes	Tomb 142	Obelos		PL. 16.8	Karageorghis and Raptou 2014: 33, pl. XIII
C.2590	CG I	1050	950	Palaepaphos	Plakes	Tomb 142	Obelos		PL. 8, 6.5, 7.3, 7.1, 7.8	Karageorghis and Raptou 2014: 33
C.2600	CG I	1050	950	Palaepaphos	Plakes	Tomb 142	Obelos		PL. 28.3	Karageorghis and Raptou 2014: 33, pl. XIII
C.2610	CG I	1050	950	Palaepaphos	Plakes	Tomb 142	Rivet	Bone	PL. 4.7	Karageorghis and Raptou 2014: 32, pl. XII, LXXXII
C.2620	CG I	1050	950	Palaepaphos	Plakes	Tomb 144	Obelos		L. 14 and 15	Karageorghis and Raptou 2014: 49
C.2630	CG I	1050	950	Palaepaphos	Plakes	Tomb 144	Obelos		PL. 14.2	Karageorghis and Raptou 2014: 49, pl. XXVII
C.2640	CG I	1050	950	Palaepaphos	Plakes	Tomb 144	Obelos		PL. 10.4	Karageorghis and Raptou 2014: 49, pls. XXVII, LXXXVIII

Table 8. Iron objects of the Cypriot Early Iron Age

Tools

C.2650	CG I	1050	950	Palaepaphos	Plakes	Tomb 144	Obelos		PL. 12.1	Karageorghis and Raptou 2014: 49, pl. LXXXVIII
C.2660	CG I	1050	950	Palaepaphos	Plakes	Tomb 144	Obelos		PL. 12	Karageorghis and Raptou 2014: 49, pls. XXVII, LXXXVIII
C.2670	CG I	1050	950	Palaepaphos	Plakes	Tomb 144	Obelos		L. 91.1	Karageorghis and Raptou 2014: 49, pls. XXVIII, LXXXIX
C.2680	CG I	1050	950	Palaepaphos	Plakes	Tomb 144	Obelos		PL. 98	Karageorghis and Raptou 2014: 49, pl. XXVIII
C.2690	CG I	1050	950	Palaepaphos	Plakes	Tomb 144	Obelos		PL. 25	Karageorghis and Raptou 2014: 49, pl. XXVIII
C.2700	CG I	1050	950	Palaepaphos	Plakes	Tomb 144	Horse bit		L. of cheek pieces 14.8	Karageorghis and Raptou 2014: 49, pls. XXVI; LXXXVIII
C.2710	CG I	1050	950	Palaepaphos	Plakes	Tomb 144	Horse bit		L. of completecheek-piece 14.3	Karageorghis and Raptou 2014: 49, pls. XXVI; LXXXVIII
C.2720	CG I	1050	950	Palaepaphos	Plakes	Tomb 144	Obelos		L. 35.5; 15.7, 10.7, 1.8	Karageorghis and Raptou 2014: 51, pl. XXVIII
C.2730	GC IB-II	1000	900	Kouklia	Skales	Tomb 83	Spatula?		P.L. 8	Karageorghis 1983: 287, pl. CLXXIV, fig. CLXVII
C.2740	CG I-III	1050	750	Katydhata		Tomb 64	Awl			Markides 1917: 12
C.2750	CG I-III	1050	750	Palaepaphos	Plakes	Tomb 146 bathtub	Obelos		L. 58.5	Karageorghis and Raptou 2014: 75
C.2760	CG I-III	1050	750	Palaepaphos	Plakes	Tomb 146 bathtub	Obelos		L. 12	Karageorghis and Raptou 2014: 75
C.2770	CG IIA	950	925	Lapithos	Kastros	Tomb 409	Obelos		L. upper section 13, lower section 15.9	Gjerstad 1934: 210, pl. 47.4
C.2780	CG II	950	900	Myrtou-Pighades		Deposit	Nail		L. 5	Catling 1957: 88
C.2790	CG II	950	900	Palaepaphos	Plakes	Tomb 145	Rivets (3 in handle)	Wood		Lentini 2014: 142
C.2800	CG IIB	925	900	Lapithos	Kastros	Tomb 411	Obelos		L. 23.7	Gjerstad 1934: 215, pl. 48.2

Table 8. Iron objects of the Cypriot Early Iron Age

Tools

C.2810	CG IIB	925	900	Lapithos	Kastros	Tomb 411	Obelos		L. 24.8	Gjerstad 1934: 215, pl. 48.2
C.2820	CG IIB	925	900	Lapithos	Kastros	Tomb 411	Obelos		L. 15	Gjerstad 1934: 215, pl. 48.2
C.2830	CG IIB-IIIA	925	850	Amathus		Tomb 7	Axehead		L. 18	Gjerstad 1935: 38, 39, pl. 8.5
C.2840	CG IIB-IIIA	925	850	Kouklia	Skales	Tomb 69	Axehead		L. 12.2	Karageorghis 1983: 181, 182 pl. CXVIII, fig. CXXXVI
C.2850	CG IIB-IIIA	925	850	Kouklia	Skales	Tomb 69	Chisel?		P.L. 14.5	Karageorghis 1983: 181, 182 pl. CXVIII, fig. CXXXVI

Table 8. Iron objects of the Cypriot Early Iron Age

Ornaments

No.	Period	Start	End	Site	Location	Context	Items	Rivets	Head	Bead Shape	References
C.2860	LC IIIA	1200	1100	Kouklia	Asproyi	Tomb 7	Disc				Waldbaum 1978: 29; Sherratt 1994: 86
C.2870	LC IIIA	1200	1100	Hala Sultan Tekke	Area A	Pit B	Plaques (369)				Fischer and Bürge 2014: 55, 71-72
C.2880	LC IIIA	1200	1100	Kouklia	Teratsoudhia	Tomb 105, Chamber B	Spatula		Bone		Karageorghis 1990: 43, 70, pls. 37, 71
C.2890	LC IIIA	1200	1100	Kouklia	Teratsoudhia	Tomb 104, Chamber K	Spatula handle		Ivory		Karageorghis 1990: 60, pls. XX, LVII; Maier and Karageorghis 1984: 74
C.2900	LC IIIA	1200	1100	Kouklia	Evreti	Tomb 8	Spatula		Ivory		Iliffe & Mitford 1953: 710-711, fig. 5 (calls it a knife); Catling 1968: 168; Maier & Karageorghis 1984: 68, fig. 57
C.2910	LC IIIA	1200	1100	Kouklia	Evreti	Tomb 8	Spatula				Catling 1968: 168
C.2920	LC IIIA	1200	1100	Kouklia	Asproyi	Tomb 5	Spatula		Ivory		Waldbaum 1978: 29; Sherratt 1994: 86
C.2930	LC III	1200	1050	Enkomi		Tomb 6	Pin				Gjerstad 1935: 556, I. 929; Schaeffer 1936; Åström 1967: 2
C.2940	LC III	1200	1050	Enkomi		Tomb 74	Pin		Ivory		BM 1897/4-1/1511; Murray 1900: 53; Catling 1964: 240
C.2950	LC III	1200	1050	Enkomi		Unprov tomb	Pin head		Bone, antler	spherical	
C.2960	LC III	1200	1050	Enkomi	Quartier 5E	Sector 367	Ring			hoop	Courtois 1984: 50, fig. 7:18
C.2970	LC IIIB	1100	1050	Kourion	Bamboula	Tomb 19	Pin		Ivory	conical	Benson 1972: 131, pl. 35
C.2980	LC IIIB	1100	1050	Idalion	West Acropolis	Room XLVII	Plaque	2 bronze		bread loaf	Gjerstad 1935: 548 C 7 102.5
C.2990	LC IIIB	1100	1050	Idalion	West Acropolis	Northern House Room XX	Plaque	2 bronze			Gjerstad 1935: 555 U12 91.2
C.3000	CG I	1050	950	Amathus		Tomb 15	Fibula, arched				Gjerstad 1935: 93
C.3010	CG I	1050	950	Amathus		Tomb 15	Pin				Gjerstad 1935: 93

Table 8. Iron objects of the Cypriot Early Iron Age

Ornaments

C.3020	CG I	1050	950	Palaepaphos	Plakes	Tomb 144	Pin		Bone	rectangular	Karageorghis and Raptou 2014: 50, pls. XXVI, LXXXIX
C.3030	CG IA	1050	1000	Kouklia	Skales	Tomb 61	Fibula, arched				Karageorghis 1983: 133, pl. XCV. fig. CXVII
C.3040	CG IA	1050	1000	Kouklia	Skales	Tomb 78	Pin		Bone	conical	Karageorghis 1983: 239, pl. CLI, fig. CXLVII
C.3050	CG IA	1050	1000	Kouklia	Skales	Tomb 85	Pin				Karageorghis 1983: 301, pl. CLXXIX, fig. CLXXIX
C.3060	CG IA	1050	1000	Kouklia	Skales	Tomb 89	Attachement				Karageorghis 1983: 320, pl. CLXXXIX, fig. CXCIII
C.3070	CG IA	1050	1000	Kouklia	Skales	Tomb 89	Attachement				Karageorghis 1983: 320, pl. CLXXXIX, fig. CXCIII
C.3080	CG IA	1050	1000	Kouklia	Skales	Tomb 89	Pin		Bone	pomegranate	Karageorghis 1983: 315, pl. CLXXXIX, fig. CXCIII; Stech et al 1985: 195
C.3090	CG IA	1050	1000	Kouklia	Skales	Tomb 91	Ring			spiral	Karageorghis 1983: 334, pl. CXCV, fig. CXCIX
C.3100	CG IA	1050	1000	Kouklia	Skales	Tomb 91	Fibula, arched				Karageorghis 1983: 337, pl. CXCV, fig. CXCIX
C.3110	CG IA	1050	1000	Kouklia	Skales	Tomb 91, amphora 4+74	Pin		Bone	conical	Karageorghis 1983: 337, pl. CXCV, fig. CXCIX
C.3120	CG IA	1050	1000	Palaepaphos	Xylinos	Tomb 132	Pendant		Glass		Flourentzos 1997: 212, 214, 218, pl. XLIV(44): 101
C.3130	CG IIB	925	900	Lapithos	Kastros	Tomb 411	Pin		Ivory	pomegranate	Gjerstad 1934: 215, pl. 48.2
C.3140	CG IIB	925	900	Lapithos	Kastros	Tomb 429	Pin				Gjerstad 1934: 263, pl. 57.4

Table 8. Iron objects of the Cypriot Early Iron Age

Other Items

No.	Period	Start	End	Site	Location	Context	Items	References
C.3150	LC IIC	1300	1200	Katydhata		Tomb 16	Chain	Ohnefalsch-Richter 1893: 465; Gjerstad 1926: 55; Sjoqvist 1940: 24 n. 4; Åström 1989: 7
C.3160	LC IIC late	1250	1200	Kition	Area I	Tomb 9, Upper Burial	Wire	Karageorghis 1974: 89, pl. 92.292
C.3170	LC IIIA	1200	1100	Idalion	West Acropolis	Room XXVI	Slag (3)	Gjerstad 1935: 558 R9 91.7
C.3180	LC IIIA	1200	1100	Kourion	Bamboula	Area A, Stratum D:3, House IV; A-D:3	Fragment	Benson 1972: 19, 130
C.3190	LC IIC / LC IIIA	1200	1050	Hala Sultan Tekke		Trench 3	Handle	Åström 1976: 117, 123 ff., figs. 106, 107, 110ff; Blomgren and Tholander 1976: 123-126
C.3200	LC IIIA	1200	1050	Hala Sultan Tekke		Layer 1, Trench 2	Wire	Öbrink 1979: 23, 47, fig. 193 (pot sherd); Tholander 1979: 106-107, figs. 288-293; Åström et al. 1986: 37
C.3210	LC IIIA2	1150	1100	Sinda		North-west Area, Tomb 1, East Chamber	Unworked lumps	Furumark 2003: 128, tbl. 14
C.3220	LC IIIB	1100	1050	Idalion	West Acropolis	Room XLII, east of West Gate	Fragment	Gjerstad 1935: 555 G11 102.7
C.3230	LC IIIB	1100	1050	Kourion	Bamboula	Area A, Stratum E:2, House VIII, Room 3	Fragment	Benson 1972: 131
C.3240	LC IIIB	1100	1050	Idalion	West Acropolis	Room XXXV A	Slag	Gjerstad 1935: 560 I10 91.9
C.3250	CG IA	1050	1000	Kourion	Kaloriziki	Tomb 33	Fragment	Benson 1973: 43, 124, pl. 40
C.3260	CG I	1050	950	Palaepaphos	Plakes	Tomb 142	Rivet in bone handle	Karageorghis and Raptou 2014: 32, pls. XII, LXXXII
C.3270	CG I	1050	950	Palaepaphos	Plakes	Tomb 144	Rivet	Karageorghis and Raptou 2014: 51, pl. XXVII
C.3280	CG IIA	950	925	Lapithos	Kastros	Tomb 409	Fragment	Gjerstad 1934: 210, pl. 47.4
C.3290	CG II	950	900	Palaepaphos	Plakes	Tomb 145	Rivets (5)	Karageorghis and Raptou 2014: 71, pl. XXXIX

Table 8. Iron objects of the Cypriot Early Iron Age

Gjerstad 1935	**All LC III iron knives from Idalion**	**Description**
Type 1 (dagger)	Idalion nos. 333, 517, 727 b (point only), 897, 990	Leaf-shaped knife; pointed end; two cutting edges; midrib; narrow, flat, short tang fixed to handle by rivets
Type 2	Idalion no. 1132	Leaf-shaped, short, wide knife; rounded end; one cutting edge; no midrib; narrow, curved, flat tang fixed to the handle by rivets
Type 3	Idalion nos. 106, 158, 174a, 209, 297, 308, 442, 443, 490, 669, 994, 1006, 1020, 1068, 1129, 1236, 1417, 1427, 1438, 1442, 1448, 1456, 1489	Long, lance-shaped, straight or nearly straight knife; one cutting edge; pointed end, thickening back; flat, straight (or nearly straight) tang fixed to handle by rivets
Gjerstad 1948	**All CG-CC iron knives; types exluded if only of CA or later date**	**Description**
Type 1a	Amathus nos. 15.60, 25.4	Leaf-shaped; single cutting edge; straight or almost straight blade, narrow; back of blade sometimes curved; flat tang w/ rivets
Type 2a	Lapithos nos. 420.46, 602.27	Leaf-shaped; single cutting edge; curved blade; flat tang w/ rivets. The blade may be rather narrow or broad; both the back and edge are curved, concave or convex
Type 3 (dagger)	Amathus nos. 13.16, 18.19; Idalion no. 727 b	Leaf-shaped knife; double cutting edge; midrib; narrow, short tang
L. Åström 1967	**All LC III iron knives**	**Description**
Type 1	Idalion no. 1068	With short tang, one rivet, broad, slightly curved blade, blunt end
Type 2	Idalion no. 1132; Kourion Bamboula Room 20 no. B 1382	With short tang, one rivet, broad blade but with edge on the concave side, blunt end
Type 3	Idalion no. 106; Enkomi nos. 6.13, 58.994 (Foundry Hoard)	Flat tang with rivets, curved blade, pointed end
Snodgrass 1980	**All LC III iron knives (based on Åström 1967)**	**Description**
Type 1	Idalion no. 1068; Enkomi no. 203; Kourion Kaloriziki no. 1106	
Type 2	Idalion no. 1132; Kourion Bamboula no. B 1382	
Type 3	Idalion no. 106; Enkomi nos. 1455; 7, 5509/07 (frag.), 58.994 (Foundry Hoard), 6.13; Kourion Kaloriziki no. 1104; Salamis nos. 36; 37	
Macdonald 1992	**All CG-CA iron knives**	**Description**
Type 1 (Gjerstad Type 1b, 2a)	Amathus Tombs 311.15 (CG II); 310.11; 310.19; 310.4.1 (bronze hilt) (CG II-III)	Convex-backed, concave cutting edge; fishtail or rounded end

Table 9. Preceding Cypriot Knife Typologies

Type 2	Amathus Tombs 233.43.1 (CG III-CA I), 240.82 (CG III-CA I), 243/47.1-3 (CG III-CA I), 243.29 (CG III-CA I), 379.5.2 (CG II late - III early); Amathus Swedish tombs 7.50 (GC II-IIIA) (bronze?), 443 (CA I, II CC I), 450 (CA I, CC I)	Straight cutting edge, back runs parallel to cutting edge for about half the length until slopes to point; fishtail or rounded end; variation of type 1
Type 3 (Gjerstad Type 2d)	Palaepaphos Skales tombs 76.96 (CG I), 80.44 (CG II); Amathus tombs 302.67 (CA I, CC), 340.47.5 (CG III 47.5); Amathus Swedish tomb 2 (CG III-CA I), 7 (CA IB)	Concave back, convex cutting edge
Type 6	Amathus Tombs 311.13+14 (CG II), 278.20 (CA I), 114.41.3 (CA I)	Narrow tang instead of normal hilt

Table 9. Preceding Cypriot Knife Typologies

Concave edge, convex spine
1. Concave edge, convex spine, the lower blade sides run parallel until the arch angle beginning near the mid or upper end of the blade, and narrows to a pointed tip; slope of the blade curve varies considerably; most common shape
2. Concave edge, convex spine, curved blade with triangular angle roughly mid-blade; at the upper blade, the spine slopes to the tip, the edge is concave to the tip
3. Concave edge, convex spine, crescent-shaped blade, narrows to the tip, short, squared tang with single rivet; sickle-like shape
4. Concave edge, convex spine, hooked or rounded tip, a swollen, flat blade base, riveted tang
5. Concave edge, straight or slightly convex spine, widening at the heel, rounded tip
Straight edge, straight or slightly convex spine
6. Straight edge, straight spine, sides run parallel, even narrowing to the pointed tip; dagger-like shape
7. Straight edge, straight or slightly convex spine that slopes to the pointed tip
Convex edge, concave spine
8. Convex edge, concave spine, blade curves smoothly upwards and narrows towards a pointed tip
9. Convex edge, straight or slightly concave spine, short blade, thick at the lower end, upward-turned rounded tip
10. Convex edge, concave spine; blade curve forms a V-shape; both sides narrow to mid or upper blade and angle upwards parallel to the tip; stepped heel, narrow tang
11. Convex edge, concave spine, thick rectangular blade, thin narrow tang with a rectangular section and downturned end; razor-like

Table 10. Iron knife shapes descriptions

Concave edge, convex spine	Total	LC III	CG I	GC II	CG I-III
1	40	4	20	15	1
2	3	3	0	0	0
3	2	1	1	0	0
4	2	2	0	0	0
5	2	2	0	0	0
	49				
Straight edge, parallel spine	**Total**	**LC III**	**CG I**	**GC II**	**CG I-III**
6	7	1	1	5	0
7	4	0	0	4	0
	11				
Convex edge, concave spine	**Total**	**LC III**	**CG I**	**GC II**	**CG I-III**
8	11	1	4	6	0
9	5	3	2	0	0
10	1	0	0	1	0
11	2	0	0	2	0
	19				

Table 11. Iron knife shapes by period

Shape 1					
No.	Central Europe	Period	Site	Context	Reference
1.1	1200-1100	Ha A1-A2	Bavaria		Karageorghis 1971, fig. 82a.D
1.2	1200-1100	Ha A1-A2	East Alps (Baierdorf)		Karageorghis 1971, fig. 82a.F
	Italy	**Period**	**Site**	**Context**	**Reference**
1.3	1350-1200	RBA	Provinz Verona (North Italy)		Bianco Peroni 1976, 13, pl. 1, no. 7
1.4	1350-1200	RBA	Gegend von Vincenza (North Italy)		Bianco Peroni 1976, 12, pl. 1, no. 6
1.5	1350-1200	RBA	Scoglio del Tonno, Taranto, Apulia		Müller-Karpe 1959, pl. 13.9; Bianco Peroni 1976: 14, pl. 2, no. 16; Bietti Sestieri et al. 2010, 462, fig. 7.38, no. 203934
1.6	1200-1100	Ha A1	Monte Tesoro		Bianco Peroni 1976, 16, pl. 2, no. 23
1.7	1200-1100	Ha A1	Celano		Bianco Peroni 1976, 17, pl. 3, no. 28
1.8	1200-1100	Ha A1	Celano		Bianco Peroni 1976, 17, pl. 3, no. 29
1.9	1200-1100	Ha A1	Ortucchio		Bianco Peroni 1976, 17, pl. 3, no. 31
1.10	1200-1100	Ha A1	Torbole		Bianco Peroni 1976, 17, pl. 3, no. 32
1.11	1200-	FBA	Rocca Vecchia, Apulia	Knife mould, found with Myc IIIC pottery	Bietti Sestieri 2008, 29-30, fig. 18; Bietti Sestieri 2010, 465
	Mainland	**Period**	**Site**	**Context**	**Reference**
1.12	1400-1300	LH IIIA	Mycenae	Tomb 49 dromos	A. Eph. 1888, 173, pl. 9,20, Nat. Mus. no. 2485; Petrie 1917, pl. XXVI.K144; Montelius 1924, II, 232, fig. 796; Sandars 1956, 177, pl. 2.4; Xénaki-Sakellariou 1985, 127, pl. 35, no. 2485
1.13	1400-1200	LH IIIA1-B	Prosymna	Tomb XLII	Blegen 1937, 90, fig. 377.6
1.14	1400-1050	LH III	Oxylithos, Euboea	Tholos tomb	Papavasileiou 1910, 23-26, fig. 17
1.15	1400-1050	LH III	Aigera, Achaea		Alram-Stern 2006, 106, pls. IX, 23, no. 6
1.16	1400-1050	LH III	Mycenae	Tomb 76oς	Xénaki-Sakellariou 1985, 212, pl. 97, no. 3041(3)
1.17	1300-1050	LH IIIB-C	Mitopolis, Achaea		Papadopoulos 1979, 157, 284, fig. 308 (e.), 343 (b), no. PMX 76
1.18	1200-1150	LH IIIC early	Lefkandi, Euboia	Sectors IV-V, Phase 1b	Daux 1966, 902, fig. 12; Popham and Sackett 1968, 13, fig. 19; Bouzek 1985, 147, fig. 72:1; Evely et al. 2006, 283, fig. 5.10:1, pl. 88.10
	Crete	**Period**	**Site**	**Context**	**Reference**
1.19	1400-1300	LM IIIA	Upper Gypsades	Tomb I	Hood 1958, 233-234, fig. 32, pl. 59b, I 7
1.20	1400-1100	LM III	Dictaean Cave	Possibly from niches in Lower Grot	Hogarth 1899, 110, fig. 43.2, no. 441; Sandars 1956, 177, fig. 2.3; Deshayes 1960, I, 323, pl. XLIV, 12, no. 2608; Boardman 1961, 22, fig. 6B

Table 12. Bronze knives from Europe and the Mediterranean

1.21	1400-1100	LM III	Dictaean Cave	Possibly from niches in Lower Grot	Hogarth 1899, 110, fig. 43.1, no. 442; Sandars 1956, 190; Boardman 1961, 23, fig. 6G
1.22	1400-1100	LM III	Dictaean Cave	Sir John Evan's Collection; Oxford	Sandars 1956, 192; Boardman 1961, 19, fig. 4.70, pl. X
1.23	1400-1100	LM III	Dictaean Cave	Upper Grot south of the Altar	Hogarth 1899, 110, fig. 44
	Cyclades	**Period**	**Site**	**Context**	**Reference**
1.24	1350-1050	LH IIIA2-IIIC	Syros		Montelius 1924 I, pl. 16.2; Deshayes 1960 I, 322, II, 136, pl. XLIV, 11, no. 2598
	Kos	**Period**	**Site**	**Context**	**Reference**
1.25	1200-1050	LH IIIC	Serraglio		Morricone 1972, 278-279, fig. 239 (left)
1.251	1050-850	PG	Serraglio	Tomb 35	Morricone 1978, 35, 218, fig. 433
	Rhodes	**Period**	**Site**	**Context**	**Reference**
1.26	1400-1300	LH IIIA	Ta Tzingani, Kattavia	Grave a	Dietz 1984, 85, fig. 108; Dietz et. al. 2015, 35, pl. 8.38
1.27	1400-1200	LH IIIA-B	Apsaktiras	Grave 1	Dietz 1984, 58, fig. 62, no. 11; Dietz et. al. 2015, 34, pl. 8.36
1.28	1400-1200	LH IIIA-B	Apsaktiras	Unknown	Dietz 1984, 58, fig. 62, no. 9; Dietz et. al. 2015, 34, pl. 8.37
1.29	1350-1300	LH IIIA2	Ialysos	Tomb 26, Moschu Vunara Cemetery	Maiuri 1923-1924, 149, fig. 70
1.30	1300-1200	LH IIIB	Ialysos	Tomb 59, Mycenaean Acropolis	Maiuri 1923-1924, 231, fig. 147 centre; Deshayes 1960, 319, pl. XLIV, 2, no. 2599
1.31	1225-1175	LH IIIB2-C1a	Ialysos	Tomb 15, Moschu Vunara Cemetery	Maiuri 1926, 174, fig. 101, no. 26; Deshayes 1960, 321-322, pl. XLIV, 3, no. 2599; Harding 1975, 199; Macdonald 1986, 140, fig. 7
	Cyprus	**Period**	**Site**	**Context**	**Reference**
1.32	1200-1050	LC III	Sinda	Tomb 409	Dussaud 1914, 259/256, fig. 188.3; Petrie 1917, 24, pl. XXV.K101; BR. D.C.265; Shaeffer 1952, 59, fig. 14, top: 3; Deshayes 1960, 321, no. 2588; Catling 1964, 103 b3; Borgna 2009, 295, fn. 14
1.33	1200-1050	LC III	Enkomi		Karageorghis 1971, 377, fig. 82b; Courtois 1982, 160, fig. 4:3; 1984, 26, no. 227, fig. 8:13, pl. I.14, II.18; Lagarce 1986, 22-23, pl. 17.2
1.34	1100-1050	LC IIIB	Sinda	Super Str 1	Furumark 2003, 105-106, pls. 19, 20 Br.1
	Iberian Peninsula	**Period**	**Site**	**Context**	**Reference**
1.35	1300-900	FBA	Redondela, Pontevedra, Spain	Castro de La Lanzada	Coffyn 1985, 178, pl. XVIII: 1

Table 12. Bronze knives from Europe and the Mediterranean

	Levant	Period	Site	Context	Reference
1.36	1300-1200	LB IIB	Tell el-Far'ah (Beth Pelet)	Cemetery 800	Tufnell 1930, 9, pl. XXVI.99
1.37	1250-1150	LB IIB-IA I early	Megiddo	Stratum VIIB	Loud 1948 II, pl. 180.41, no. b731
1.38	1250-1150	LB IIB-IA I early	Tell es-Saʿidiyeh		D'Amato and Salimbeti 2016, 39; British Museum
1.39	1150-1100	IA I or IB	Megiddo	Stratum VI	Loud 1948 II, pl. 181.55, no. M5695; Deshayes 1960, 319, pl. XLIII.23, no. 2580
1.40	1150-1100	IA I or IB	Megiddo	Stratum VI	Loud 1948 II, pl. 181.57, no. M5656
1.41	1100-1000	IA IB	Megiddo	Tomb 39A, EI I intrusion	Guy and Engberg 1938, 165, fig. 172.4, pl. 167.2, no. x729; Deshayes 1960, 322, pl. XLIV.7, no. 2602
1.42	1050-1000	IA IB	Tell el-Far'ah (Beth Pelet)		Tufnell 1930, 8, pl. XXI.96
1.43	1000-900	IA IIA	Megiddo	Stratum V, locus 592	Lamon and Shipton 1939, 151, pl. 83.3, no. M196; Waldbaum 1982, pl. XXXIV.12, no. 72
	Anatolia	**Period**	**Site**	**Context**	**Reference**
1.44	1400-1300	LH IIIA	Beşik-Yassitepe, Asia Minor coast	Surface material of sixth or seventh city, mixed with Mycenaean pottery	Korfmann 1986a, 328, fig. 17.3; 1986b, 23, 27
				Shape 2	
No.	**Aegean**	**Period**	**Site**	**Context**	**Reference**
2.1	1600-1450	LH I-IIA	Mycenae	Shaft Grave II, Grave Circle A	Karo 1930, 70, pl. LXXII.218
2.2	1400-1200	LH IIIA1-B	Prosymna	Tomb XXXVII	Blegen 1937, 70, fig. 299
				Shape 3	
No.	**Aegean**	**Period**	**Site**	**Context**	**Reference**
3.1	1400-1000	LH III	Aigera, Achaea	Look A-S 2006 for description	Alram-Stern 2006, 108, pls. IX, 23, no. 9
3.2	1400-1000	LH III	Mycenae	Bronze Hoard in Poros Wall	Wace 1953, 7, pl. 2b (4th from left); Stubbings 1954, 293, no. 405 (sickle); Deshayes 1960, 343, pl. XLVI,6, no. 2796 (sickle)
3.3	1400-1000	LH III	Paralimini-Teichos Dymaion		Papadopoulos 1979, 157, 285, fig. 310 (c), 345 (a), no. PMX 119
3.4	1400-1000	LH III	Aigera, Achaea	Look A-S 2006 for description	Alram-Stern 2006, 108, pls. IX, 23, no. 10
3.5	1400-1000	LH III	Amorgos	Ashmolean Museum 1927/1362	Deshayes 1960, 343, pls. XLVI, 19, LXII, 8, no. 2801
3.6	1400-1000	LH III	Anthedon	Anthedon Hoard	Rolf 1890, 106, pl. XV, 12; Deshayes 1960, no. 2798
3.7	1400-1000	LH III	Athens	Acropolis, bronze hoard found 1888	Montelius 1924 I, 153, 156, no. 491; Deshayes 1960, no. 2797
3.8	1400-1000	LH III	Corinth		Montelius 1924 I, pl. 17.4
3.9	1400-1000	LH III	"Greece"		Montelius 1924 I, pl. 16.11
3.10	1400-1000	LH III	Mycenae	Acropolis. Athens National Museum nos. 2743, 2532	Deshayes 1960, 343, pl. XLVII, 6, no. 2790

Table 12. Bronze knives from Europe and the Mediterranean

3.11	1400-1000	LH III	Paralimini-Teichos Dymaion		Papadopoulos 1979, 158, 285, fig. 310 (d), 345 (b), no. PMX. 157
3.12	1400-1000	LH III	Pylos	Tomb K-2	Blegen et al. 1973, fig. 291.13
3.13	1400-1000	LH III	Drakotrypa, Achaea		Papadopoulos 1979, 155-156, figs. 307 (d), 341 (a) no. PMX. 388
3.14	1250-1150	LH IIIB2-IIIC1	Corinth		Dietz et al. 2015, 44, pl. 12.73
3.15	1200-1100	LM IIIC	Knossos		Deshayes 1960, 344, pl. XLVI, 12, no. 2805
No.	**Cyprus**	**Period**	**Site**	**Context**	**Reference**
3.16	1200-1050	LC III	Enkomi		Courtois 1984, fig. 8.18
3.17	1200-1050	LC III	Enkomi		Courtois 1984, fig. 8.21
3.18	1100-1050	LC IIIB	Enkomi	Level IIIB, Area I, room 9, on threshold of west doorway by south doorjamb	Dikaios 1969, 294, 726, pl. 171.41, no. 695
				Shape 5	
No.	**Aegean**	**Period**	**Site**	**Context**	**Reference**
5.1	1500-1000	LH II-LH III	Kallimani, Khalkis, Euboia	Trypha IX	Hankey 1952, 93-94, fig. 9, no. 516B
				Shape 6, 6A, 6B	
6	**Aegean**	**Period**	**Site**	**Context**	**Reference**
6.1	1700-1550	MH III	Mycenae	Grave Circle B, Λ-300	Mylonas 1972-1973, 140, pl. 123γ
6.2	1600-1500	LH I	Mycenae	Grave Circle B, Δ-281	Mylonas 1972-1973, 87, pl. 69β,3; Dietz 1991, 262, 265, fig. 80.37
6.3	1600-1500	LH I	Mycenae	Grave Circle B, N-307	Mylonas 1972-1973, 171-172, pl. 149α; Dietz 1991, 262, 265, fig. 80.32
6.4	1600-1500	LH I	Mycenae	Grave Circle B, A-256	Mylonas 1972-1973, 29, pl. 19β,2
6.5	1600-1450	LH I-IIA	Mycenae	Shaft Grave I, Grave Circle A	Karo 1930, 66, pl. XXXV.186; Petrie 1917, 27, pl. XXX.U33
6.6	1600-1450	LH I-IIA	Mycenae	Shaft Grave II, Grave Circle A	Karo 1930, 70, pl. LXXII.216b (top)
6.7	1600-1450	LH I-IIA	Mycenae	Shaft Grave IV, Grave Circle A	Karo 1930, 105, pl. XCIX, CII, no. 461
6.8	1600-1450	LH I-IIA	Mycenae	Shaft Grave IV, Grave Circle A	Karo 1930, 104, pl. CII.457
6.9	1600-1450	LH I-IIA	Mycenae	Shaft Grave VI, Grave Circle A	Karo 1930, 907, pl. XCVI, no. 907
6.10	1500-1400	LH II	Dendra	Tomb 8; found on rock bench	Persson et al. 1942, 44, fig. 48.3, no. 11
6.11	1450-1400	LH IIB	Dendra	Tomb 12 "Cuirass Tomb"	Verdelis 1977, 50-51, pl. XXIII
6.12	1500-1200	LH II-IIIA/B	Mycenae	Chamber Tomb 81	Xénaki-Sakellariou 1985, 224, 229, fig. 107 (α, β, γ, ε), 109 (δ), no. 3109
6.13	1500-1200	LH II-IIIA/B	Mycenae	Chamber Tomb 82	Xénaki-Sakellariou 1985, 231, 234, fig. 111, X, no. 3129
6.14	1500-1200	LH II-IIIA/B	Mycenae	Chamber Tomb 82	Xénaki-Sakellariou 1985, 231, 234, fig. 111, X, no. 3130
6.15	1500-1200	LH II-IIIA/B	Mycenae	Unmarked Myc grave	Xénaki-Sakellariou 1985, 135, 145, fig. 45, X, no. 2390
6.16	1500-1400	LH II	Mycenae	Tomb 515, Kalkani Cemetery, South Bank	Wace 1932, 58, pl. 29, no. 17

Table 12. Bronze knives from Europe and the Mediterranean

6.17	1500-1400	LH II	Mycenae	Tomb 515, Kalkani Cemetery, South Bank	Wace 1932, 58, pl. 29, no. 18
6.18	1500-1400	LH II	Mycenae	Tomb 518, Chamber, southwest corner, Kalkani Cemetery, South Bank	Wace 1932, 84, pl. 7, no. 50
6.19	1500-1400	LH II	Mycenae	Tomb 518, Chamber, SW corner, Kalkani Cemetery, South Bank	Wace 1932, 84, pl. 7, no. 51
6.20	1500-1400	LH II	Mycenae	Tomb 529, Kalkani Cemetery, South Bank	Wace 1932, 104, pl. 7, no. 25
6.21	1500-1050	LH II-III	Pylos	Grave Circle, Pit 2, pithos burial	Blegen 1973, 160, fig. 230: 10, CM. 2056
6.22	1450-1050	LH II late-III	Khalkis	Found w/ dagger	Hankey 1952, 93-94, fig. 9, no. 536
6.23	1350-1200	LH IIIA2/B	Dendra	Chamber Tomb 2; pit on west long side of chamber	Persson 1931, 100, pl. XXXII.5 bottom, no. 4
6.24	1350-1200	LH IIIA2/B	Dendra	Chamber Tomb 2	Persson 1931, 98, pl. XXXII.6 top, no. 27
6.25	1350-1200	LH IIIA2/B	Dendra	Chamber Tomb 2	Persson 1931, 98, pl. XXXII.6 centre, no. 28
6.26	1300-1200	LH IIIB	Prosymna	Tomb X	Blegen 1937, 128, fig. 512.3
6.27	1400-1050	LH III	Achaea		Papadopoulos 1979, 157, 285, fig. 309 (e.), 344 (b), no. K. 49
6.28	1400-1050	LH III	Thebes	Purchased in 1876 from Rhousopoulos in Athens	Worsaae 1879, 346, 343, fig. 6; 1881, 2330, 230, fig. 6; Montelius 1924 I, pl. 16.1; Dietz et al. 2015, 36, pl. 8.42, no. 3151
6A	**Aegean**	**Period**	**Site**	**Context**	**Reference**
6.29	1600-1500	LH I	Mycenae	Grave Circle B, A-255	Mylonas 1972-1973, 29, pl. 19α, 2
6.30	1600-1500	LH I	Prosymna	Tomb LII	Blegen 1937, 117-118, fig. 270.4
6.31	1600-1500	LH I	Miloi Manti	Tomb VII	Dietz 1991, 262, 265, fig. 80.36
6.32	1600-1450	LH I-IIA	Mycenae	Shaft Grave VI, Grave Circle A	Karo 1930, 932, pl. XCVI, no. 932
6.33	1500-1200	LH II-IIIA/B	Mycenae	Chamber Tomb 78	Xénaki-Sakellariou 1985, 216, 219, figs. 102, X, no. 3086
6.34	1500-1200	LH II-IIIA/B	Mycenae	Unmarked Mycenaean grave	Xénaki-Sakellariou 1985, 134, 145, figs. 45, X, no. 2328
6.35	1500-1200	LH II-IIIA/B	Mycenae	Tomb 65	Xénaki-Sakellariou 1985, 190, fig. 81, no. 3022
6.36	1500-1200	LH II-IIIB	Prosymna	Tomb XIII	Blegen 1937, 70, fig. 503
6.37	1500-1050	LH II-III	Khalkis	Found w/fragments of second knife	Hankey 1952, 93-94, fig. 9, no. 516A
6.38	1450-1350	LH IIB-IIIA2	Prosymna	Tomb XXXIV; inner left corner of chamber	Blegen 1937, fig. 262.1
6.39	1350-1200	LH IIIA2-B	Prosymna	Tomb XXXVIII	Blegen 1937, fig. 309
6.40	1400-1050	LH III	Aigera, Achaea		Alram-Stern 2006, pl. IX, 23, no. 2
6.41	1400-1050	LH III	Aigera, Achaea		Alram-Stern 2006, pl. IX, 23, no. 3
6.42	1400-1050	LH III	Aigera, Achaea		Alram-Stern 2006, pl. IX, 23, no. 5
6.43	1400-1050	LH III	Asine	Square H 8, Myc stratum	Frodin and Persson 1938, 311, fig. 214.2
6.44	1400-1050	LH III	Athens	Acropolis, bronze hoard found 1888	Montelius 1924 II, 153, 155-156 fig. 490
6.45	1400-1050	LH III	Vapheio		Petrie 1917, 26, pl. XXX.U4

Table 12. Bronze knives from Europe and the Mediterranean

6.46	1400-1050	LH III	Achaea		Papadopoulos 1979, 157, 284, fig. 308 (c), 342 (a), PMX. 312
6.47	1400-1050	LH III	Achaea		Papadopoulos 1979, 157, 284, fig. 308 (d), 342 (b), no. K. 36
6.48	1400-1050	LH III	Paralimni-Teichos, Achaea		Papadopoulos 1979, 157, 284, fig. 308 (f), 342 (e.), PMX. 117
6.49	1400-1050	LH III	Paralimni-Teichos, Achaea		Papadopoulos 1979, 157, 285, fig. 309 (a), 343 (c.), PMX. 156
6.50	1400-1050	LH III	Achaea		Papadopoulos 1979, 157, 285, fig. 309 (b), 343 (a), PMX. 322
6.51	1400-1050	LH III	Achaea		Papadopoulos 1979, 157, 285, fig. 309 (b), 342 (d), PMX. 327
6.52	1400-1050	LH III	Thebes	Purchased in 1873 from Rhousopoulos in Athens	Dietz et al. 2015, 35, pl. 8.41, no. 3152
6.53	1200-1150	LH IIIC 1	Perati	Tomb 137	Iakovides 1969 III, pl. 69γ, no. M 188
6	**Crete**	**Period**	**Site**	**Context**	**Reference**
6.54	1750-1600	MM IIB-LM IIIB	Mavrospelio, Knossos	Tomb V; Tomb IX; Tomb XVII; Tomb XIX.2 (2 knives); Tomb XX.1	Forsdyke 1926 (6 knives)
6.55	1400-1300	LM IIIA	Isopata	Tomb 2 Tomb of the Double Axes	Evans 1914, 58, fig. 54.2e
6.56	1400-1300	LM IIIA	Zapher Papoura, Knossos	Tomb 64; found w/knife 64d & razor 64e	Evans 1906, 69, pl. 91, fig. 113 no. 64c
6.57	1400-1300	LM IIIA	Zapher Papoura, Knossos	Tomb 4 shaft grave; two razors found in grave	Evans 1906, 23, fig. 113 no. 4b
6.58	1400-1300	LM IIIA	Zapher Papoura, Knossos	Shaft grave T3; found at feet w/bronze razor 3b	Evans 1906, 23, fig. 113 no. 3a
6.59	1400-1300	LM IIIA	Zapher Papoura, Knossos	Tomb 64; found w/knife 64d & razor 64e	Evans 1906, 69, pl. 91, fig. 113, no. 64c; Sandars 1956, 176, fig. 1.3
6.60	1350-1300	LM IIIA2	Upper Gypsades	Tomb VI; found w/thin bronze likely a leaf razor VI 6	Hood 1958, fig. 32, pl. 60, no. VI 5
6.61	1400-1200	LM III	Palaikastro Gournia	Beehive tomb	Bosanqet and Dawkins 1923, 119, pl. 25.K
6.62	1400-1200	LM III	Psychro Cave	Oxford AE 68	Boardman 1961, 19, fig. 4.62, pl. IX, no. 59
6.63	1400-1200	LM III	Psychro Cave	Oxford AE 46	Boardman 1961, 19, fig. 4.65, pl. X, no. 65
6.631	1400-1200	LM III	The MET, Gallery 171	Unprovenanced, Richard B. Seager Bequest	The MET, no. 26.31.469: https://metmuseum.org/art/collection/search/252391
6A	**Crete**	**Period**	**Site**	**Context**	**Reference**
6.64	2100-1800	EM III/MM I	Porti, Messara	Tholos	Xanthoudides 1924, 67, fig. 12, pl. 39b, no. 1436
6.65	1750-1600	MM IIB-LM IIIB	Mavrospelio, Knossos	Tomb III.4	Forsdyke 1926, 253, fig. 6.4
6.66	1400-1300	LM IIIA	Isopata	Tomb 2 Tomb of the Double Axes; gold-plated studs on sword also found	Evans 1914, 58, fig. 54.2d (6A); Sandars 1956, 179, fig. 2.1 (6); images differ
6.67	1400-1300	LM IIIA	Isopata	Tomb 3	Evans 1914, 15, no. 3b
6.68	1400-1300	LM IIIA	Isopata	Tomb 3	Evans 1914, 15, no. 3c

Table 12. Bronze knives from Europe and the Mediterranean

6.69	1400-1300	LM IIIA	Zapher Papoura, Knossos	Tomb 75 shaft grave	Evans 1906, 75, fig. 113, no. 72d
6.70	1400-1300	LM IIIA	Zapher Papoura, Knossos	Tomb 1; 2 bronze knives in tomb	Evans 1906, 22, fig. 15, no. 1d
6.71	1400-1300	LM IIIA	Zapher Papoura, Knossos	Tomb 51 pit cave; on top of body w/razor	Evans 1906, 64, fig. 71, no. 51c
6.72	1400-1300	LM IIIA	Zapher Papoura, Knossos	Tomb 62 knife found w/dagger at feet	Evans 1906, 68, fig. 74, no. 62d
6.73	1400-1300	LM IIIA	Zapher Papoura, Knossos	Tomb 64; found w/knife 64c & razor 64e	Evans 1906, 69, fig. 77, no. 64d
6.74	1400-1300	LM IIIA	Zapher Papoura, Knossos	Tomb 10 The Hunters' Grave	Evans 1906, 31, fig 113, 51c, no. 10b
6.75	1400-1300	LM IIIA	Zapher Papoura, Knossos	Tomb 13 chamber tomb	Evans 1906, 33, fig. 31, no. 13a; Montelius 1924: pl. 16.6 a, b
6.76	1400-1100	LM III	Dictaean Cave	Heraklion Museum	Boardman 1961, 19, fig. 4.58, pl. IX, no. 58
6.77	1400-1100	LM III	Dictaean Cave	Oxford AE 69	Boardman 1961, 19, fig. 4.62, pl. IX, no. 62
6.78	1400-1100	LM III	Dictaean Cave	Oxford AE 688	Boardman 1961, 19, fig. 4.64, pl. X, no. 64
6.79	1400-1100	LM III	Dictaean Cave	Oxford AE 45	Boardman 1961, 19, fig. 4.63, pl. X, no. 63
6.80	1400-1100	LM III	Dictaean Cave	Oxford AE 46	Boardman 1961, 19, fig. 4.65, pl. X, no. 65
6.81	1400-1100	LM III	Dictaean Cave	Sir John Evans's Collection	Boardman 1961, 19, fig. 4.68, pl. IX, no. 68
6.82	1400-1100	LM III	Dictaean Cave	Possibly from niches in Lower Grot	Hogarth 1899, 110, fig. 43.4
6.83	1300-1200	LM IIIB	Sanatorium		
6.84	1300-1200	LM IIIB	Sanatorium		
6A	**Lesbos**	**Period**	**Site**	**Context**	**Reference**
6.84i	1400-1200	LH IIIA-B	Thermi	Area T, room 4	Lamb 1936, 206, pls. 25, 47, no. 32.62
6A	**Kos**	**Period**	**Site**	**Context**	**Reference**
6.85	1200-1050	LH IIIC	Serraglio	Found in Asclepio region, not in tombs	Morricone 1972, 278-279, fig. 239 (right)
6.86	1200-1050	LH IIIC	Serraglio	Found in Asclepio region, not in tombs	Morricone 1972, 278-279, figs. 205 (right), 209
6/6A	**Rhodes**	**Period**	**Site**	**Context**	**Reference**
6.87	1400-1050	LH III	Ialysos	Tomb 4	Petrie 1917, 23, pl. XXIV.K33; BM no. 1870,1008.27: Greek & Roman Antiquities display: G12/dc8; Furtwaengler & Loeschcke 1886, 8, pl. D.6
6.88	1400-1050	LH III	Ialysos	House 1, Room 2, Strato Superiore	Monaco 1941, 130, figs. 89.1, 90
6.89	1350-1050	LH IIIA2-C	Apsaktiras	Unknown	Dietz 1984, 58, fig. 62, no. 10; Dietz et al. 2015, 35, pl. 8.39
6.90	1250-1150	LH IIIB2-IIIC early	Pylona	Tomb 5B, NW side of tomb w/last burial	Karantzali 2001, 71, fig. 42, pl. 47c, no. 1348
6.91	1200-1050	LH IIIC	Pylona	Tomb 4	Karantzali 2001, 71, fig. 42, pl. 47b, no. 1353

Table 12. Bronze knives from Europe and the Mediterranean

6A	Cyprus	Period	Site	Context	Reference
6.92	1300-1200	LC II	Maa-Palaikastro	Area II Rm 127b btw fls. IIIA & IV; found w/Myc IIIB pottery (1300-1190)	Karageorghis and Demas 1988, 94, pl. CVIII, CLXXXVIII, no. 5353
6.93	1300-1200	LC IIC	Kalavasos-Ayios Dehmitrios		Todd et al. 1989 II, fig. 22, no. K-AD 355
6.94	1300-1100	LC IIC-LC IIIA	Maa-Palaikastro	Floor I, North and East of Building IV, Pit 13 (Area 95)	Karageorghis and Demas 1988, 257, pls. CLIV, CCXXXVII, no. 711
6.95	1300-1100	LC IIC-LC IIIA	Maa-Palaikastro	Floor I, Area III West of Building II, Rm. 58	Karageorghis and Demas 1988, 78-79, 183, 247, pls. CXXXV, CCXXXII, no. 643
6.96	1200-1100	LC IIIA	Maa-Palaikastro	Area II, fl. III, RM 121	Karageorghis and Demas 1988, 149, 154 , pls. CXXXI, CCIV, no. 5274
6.97	1200-1100	LC IIIA	Enkomi	Batiment 18	Catling 1964, 103, b1, fig. 10.13, pl. 11:d; Schaeffer 1952, no. 5137
6.98	1100-750	IA	Kourion	Grave 19	Ohnefalsch-Richter 1893, 465-466, pl. 173.19.f; Dussaud 1912, 278-280, fig. 201.f
6/6A	**Levant**	**Period**	**Site**	**Context**	**Reference**
6.98.1	1250-1150	LBA III	Tell es-Saʿidiyeh, Jordan	Grave 406	British Museum 1992,0725.66
6.99	1200-1150	LH IIIC early	Ugarit, Syria	Quarter	Mehofer and Jung 2008, 112, 116, fig. 1.2
6.100		LBA	Megiddo		Schumacher 1908 IB, pl. 22e
6.101		LBA	Gezer		Macalister 1912 III, pl. CXCIX.13
6.102		LBA	Beth Pelet		Tufnell 1930, pl. XXX, no. 129
6.103		LBA	Beth Pelet		Tufnell 1930, pl. XXX, no. 110
6B	**All locations**	**Period**	**Site**	**Context**	**Reference**
6.104	1500-1400	LH II	Katarraktis, Achaea	Slim knife	Papadopoulos 1979, 158, fig. 310 (e), 345 (c), no. PMX. 56
6.105	1300-1190	LH IIIB2	Thapsos, Sicily	Aegean context, found with Myc IIIB pottery (1300-1190)	Paolo Orsi Museum
				Shape 7	
No.	**Aegean**	**Period**	**Site**	**Context**	**Reference**
7.1	1600-1500	LH I	Mycenae		Schliemann 1976, 75, no. 121
	Levant	**Period**	**Site**	**Context**	**Reference**
Lev.10	1400-1000	LBA	Gezer	Level IV. Specific context unknown	Macalister 1912 II, 268, III, pl. CXCVIII.16; Dothan 2002, 18, fig. 9e

Table 12. Bronze knives from Europe and the Mediterranean

Shape 8					
No.	**Aegean**	**Period**	**Site**	**Context**	**Reference**
8.1	1300-1050	LH IIIB-C	Polis, Ithaca	Not found in excavation	Benton 1934, 71-73, fig. 20.14
	Crete	**Period**	**Site**	**Context**	**Reference**
8.2	2600-2300	EM IIA	Koumasa, Mesara	Tomb Γ, rectangular tomb	Xanthoudides 1924, 47, pl. 29b, no. 1173
8.3	1400-1100	LM III	Dictaean Cave	Oxford AE 686	Boardman 1961, 19, fig. 4.71, pl. X, no. 71
	Cyprus	**Period**	**Site**	**Context**	**Reference**
8.4	1300-1190	LC IIC	Kition	Fl. IV, Temple 2, Area 2, Rm 24; found amongst scrap metal	Karageorghis 1985 II, 89, pls. 106, 186, no. 2412
8.5	1200-1150	LC IIIA1	Sinda	Sinda II	Furumark 2003, pls. 19, 20, tbl. 39, no. 18
8.6	1200-1050	LC III	Enkomi	Quartier 3W	Courtois 1984, 26, fig. 10.8, pl. 1.13 no. 224
	Levant	**Period**	**Site**	**Context**	**Reference**
8.7	1125-1100	EIA I	Tell Sabi Abyab, Syria	Level 2b, Room 1	Nieling 2009, fig. 137
Lev.70	1050-950	Iron IB late-IIA early	Megiddo, Palestine		Schumacher 1908 I, pl. XXVII.a; Dothan 2002, 19, fig. 19b
Shape 9					
No.	**Aegean**	**Period**	**Site**	**Context**	**Reference**
9.1	1700-1600	MH III	Mycenae	Grave circle B, Λ-298	Mylonas 1972-1973, 140, pl. 123α
9.2	1450-1200	LH IIB-IIIB	Prosymna	Tomb 36	Blegen 1937, fig. 283.1
9.3	1400-1050	LH III	Mycenae		Montelius 1942, pl. 16.7
	Crete	**Period**	**Site**	**Context**	**Reference**
9.4	1400-1100	LM III	Dictaean Cave		Boardman 1961, 19, fig. 4.61, pl. IX.61, no. AE. 684
	Cyprus	**Period**	**Site**	**Context**	**Reference**
9.5	1200-1100	LC IIIA	Enkomi	Level IIIB middle, Area I, Room 44	Dikaios 1969, 208, 269, 284, pls.138.39, 171.19, no. 893
	Levant	**Period**	**Site**	**Context**	**Reference**
9.6	1000-800	Iron IIA	Beth Shan	Upper Level V, NE locus 1549	James 1966, fig. 114.3
Shape 10					
No.	**Aegean**	**Period**	**Site**	**Context**	**Reference**
10.1	1400-1050	LH III	Katarraktis, Achaea		Papadopoulos 1979, 157, 285, fig. 309 (c), 343 (d), no. PMX 505

Table 12. Bronze knives from Europe and the Mediterranean

	Italy	Period	Site	Context	Reference
10.2	1350-1200	RBA	Scoglio del Tonno, Taranto, Apulia	Mycenaean emporion	Bianco Peroni 1976, 24-25, pl. 8.71; Bietti Sestieri et al. 2010, 462, fig. 7.39, no. 203933
	Cyprus	**Period**	**Site**	**Context**	**Reference**
10.3	1200-950	LC III-CG I	Enkomi	Quartier 3 W	Courtois 1984, 26, fig. 8.10, pl. I.13, no. 224
			Shape 11		
No.	**Aegean**	**Period**	**Site**	**Context**	**Reference**
11.1	1400-1300	LH IIIA	Pylos	Chamber Tomb E-6, Tsakalis Cemetery	Blegen et al. 1973, fig. 243, no. 12
11.2	1400-1300	LH IIIA	Prosymna	Tomb X	Blegen 1937, 128, 348, fig. 512.4
11.3	1400-1200	LH IIIA-B	Mycenae		Xénaki-Sakellariou 1985, no. 2486
11.4	1400-1200	LH IIIA-B	Mycenae	Grave 56-58	Xénaki-Sakellariou 1985, 74, no. 2876
11.5	1400-1100	LH III	Achaea		Papadopoulos 1979, 148, 272, fig. 296 (b), no. PMX 306
11.6	1200-1150	LH IIIC 1	Perati	Tomb 123	Iakovides 1969 III, pl. 128γ, no. M 157
11.65	1200-1150	LH IIIC 1	Perati	Tomb 122	Iakovides 1969 III, pl. 123δ, no. M 151
No.	**Cyprus**	**Period**	**Site**	**Context**	**Reference**
11.7	1450-1200	LC II	Enkomi	Tomb 22	British Museum no.1897,0401.1481, London
11.8	1200-1050	LC III	Enkomi		Catling 1964, 230, pl. 40:h, no. 1578
11.9	1200-1050	LC III	Enkomi	Foundry Hoard	Catling 1964, 102, fig. 10.11, pl. 11.f
11.10	1200-950	LC III-CG I	Enkomi		Courtois 1984, 26, fig. 3.60, pl. I.9, no. 226

Table 12. Bronze knives from Europe and the Mediterranean

No.	Period	Aegean	Site	Context	Blade	Handle	Shape	Reference
Aeg.10	LH I	1600-1450	Mycenae	Shaft Grave IV, Grave Circle A	Bronze	Bronze		Karo 1930, 103-104, pl. XCVII, no. 443
Aeg.20	LH I	1600-1450	Mycenae	Shaft Grave IV, Grave Circle A	Bronze	Bronze		Karo 1930, 103-104, pl. XCVII, no. 445
Aeg.30	LH I	1600-1450	Mycenae	Shaft Grave IV, Grave Circle A	Bronze	Bronze		Karo 1930, 103-104, pl. XCVII, no. 447
Aeg.40	LH I	1600-1450	Mycenae	Shaft Grave IV, Grave Circle A	Bronze	Bronze		Schliemann 1976, 279, no. 442
Aeg.50	LH I	1600-1450	Mycenae	Shaft Grave IV, Grave Circle A	Bronze	Bronze		Schliemann 1976, 279, no. 442a
Aeg.60	LH I	1600-1450	Mycenae		Bronze	Bronze		Montelius 1924, no. 11
Aeg.70	LH I	1500	Vapheio		Bronze	Bronze		Petrie 1917, 27, pl. xxxii.E1
Aeg.80	LH IIA	1450-1400	Pylos	Griffin Burial	Bronze	Bronze		Stocker and Davis 2016
Aeg.90	LH II-III	1450-1200	Pylos	Grave Circle, Pit 2	Bronze	Bronze		Blegen et al. 1973, 161, fig. 229: 5, no. CM. 2197; Harding 1975: 199
No.	**Period**	**Rhodes**	**Site**	**Context**	**Blade**	**Handle**	**Shape**	**Reference**
Rhod.10	LH IIIB2-C1	1225-1175	Ialysos	Tomb 15	Bronze	unknown	1	Maiuri 1926, 174-175, fig. 101, no. 26/3579
No.	**Period**	**Cyprus**	**Site**	**Context**	**Blade**	**Handle**	**Shape**	**Reference**
C.20	LC IIIA	1200-1100	Enkomi	Tomb 108, Quartier 5W	Iron	ivory	1	Courtois 1981, 260, 268-269, no. 25, fig. 165/1 & 166/1
Cyp.10	LC IIIA	1200-1100	Enkomi	Beneath beaten earth in room in "House of Knives" in large assemblage of metal artefacts	Bronze	ivory	1	Schaeffer 1971, 377, fig. 82b; Courtois 1986, 22-23, pl. 17.2
C.60	LC IIIA	1200-1100	Kouklia Teratsoudhia	Tomb 104	Iron	ivory		Karageorghis 1990, 60, no. K1, pls. XX, LVII
Cyp.20	LC III	1200-1050	Enkomi	Trench N 1 point top. 36	Unknown	ivory		Caubet 1987, 25, 32, fig. 5.57, pl. XI
C.240	LC IIIA late	1150-1100	Cesnola Collection		Iron	bronze		Myres 1914, 487, no. 4753; Richter 1915: 440, no. 1644
C.510	CG I	1050-950	Amathus	Tomb 21	Iron	ivory		Gjerstad 1935, 118, no. 48, pl. 25.3
C.660	CG I	1050-950	Palaepaphos Plakes	Tomb 142	Iron	bone	1	Karageorghis & Raptou 2014, 33, no. 81, pls. XII, LXXXII
C.710	CG I	1050-950	Palaepaphos Plakes	Tomb 144	Iron	ivory		Karageorghis & Raptou 2014: 50, no. 63, pls. XXVII, LXXXIX
C.540	CG I	1050-950	Amathus	Tomb 523	Iron	ivory	1	Karageorghis 1987, 719, fig. 189

Table 13. Ring-handled knives

No.	Period	Levant	Site	Context	Blade	Handle	Shape	Reference
Lev.10	LBA	1400-1000	Gezer	Level IV. Specific context unknown	Bronze	ivory	7	Macalister 1912 II, 268; II,: pl. CXCVIII:16; Deshayes 1960, 321, no. 2592; Dothan 2002, 19, fig. 19e
Lev.20	Iron IA-IB	1200-1000	Tel Miqne-Ekron	Field I sondage, Floor 36046, near industrial area; ass. w/ cultic installations and remains of a puppy	Iron	ivory		Dothan 2002, 16, fig. 16
Lev.30	Iron IB	1150-1100	Tell Qasile	Philistine Temple Building 319, locus 275, Stratum XII (12th or 11th c)	Iron	ivory		Mazar 1975, 78, pl. 7:B; Mazar 1985, 6-8, fig. 2; Waldbaum 1982, 332, pl. XXXIV, 10
Lev.40	Iron IB	1100-1050	Tel Miqne-Ekron	Philistine Temple Building 350, Room B, Stratum V, floor adjacent to *bamah*	Iron	ivory		Dothan 2002, 3, 5, 16, figs. 2:2, 14-15
Lev.50	Iron IB	1100-1050	Tel Miqne-Ekron	Philistine Temple Building 350, Room C, Stratum V	Iron	ivory	1	Dothan 2002, 3, 5, 14-15, figs. 2:3, 12-13
Lev.60	Iron IB	1100-1050	Sikil Dor	Area G, destruction layer Phase 9 associated w/Phoenician conquest of Sikil City, 1050 BCE	Unknown	ivory		Dothan 2002, 20, fig. 20
Lev.70	Iron IB late-IIA early	1050-950	Megiddo	Fourth layer, destruction level, south gate of castle	Iron	ivory, incised rosettes	8	Schumacher 1908 IA, 87, IB: pl. XXVII.a; Dothan 2002, 19, fig. 19b
Lev.80	Iron IB late-IIA early	1050-950	Megiddo	Fourth layer, destruction level, south gate of the castle	Iron	ivory(?)		Watzinger 1929, 31, pl. 22 (right); Dothan 2002, 19, fig. 19c
Lev.90	Iron IB late-IIA early	1050-950	Tel Miqne-Ekron	Stratum IC fill in L.27024 near fortifications system in Field III	Iron	ivory		Dothan 2002, 17, figs. 17-18
Lev.100	Iron IB late-IIA early	1050-950	Tell el-Far'ah	Cemetery 200, Tomb 220. Found with another iron blade w/bronze rivets	Iron	ivory(?)		Tufnell 1930, 12, pl. XXXIV: 190
Lev.110	Iron IIA	1000-900	Tell el-Far'ah	Cemetery 200, Tomb 227	Iron	ivory(?)		Tufnell 1930, 12, pl. XXX: 138; Dothan 2002: 19
Lev.120	Iron IIB	900-800	Beth Shan	Upper Stratum V	Unknown	bone		James 1966, fig. 114:10; Dothan 2002, 20, fig.19d

Table 13. Ring-handled knives

Bird Head Handles								
No.	**Date**	**Period**	**Site**	**Context**	**Blade**	**Handle**	**Shape**	**Reference**
Anim.10	1550-1295	18th Dynasty	Thebes, Egypt	British Museum, EA 65634-5	Bronze			Taylor 2010: 276, no. 140
Anim.20	1550-1295	18th Dynasty	Abydos, Egypt	Tomb D 77	Bronze			Museum of Fine Arts, Boston accession no. 01.7325
Anim.30	1300-1200	RBA	Fucino, L'Aquila, Italy	Inhumation tomb	Bronze		1	Bianco Peroni 1976: 15, pl. 2, no. 22
Anim.40	1300-1200	Bz D	Riegsee, Upper Bavaria		Bronze		Baierdorf	Müller-Karpe 1963: 10, fig. 1.2
Anim.50	1300-1200	Bz D	Hungary		Bronze			Müller-Karpe 1963: 10, fig. 1.6
Anim.60	1300-1050	LH IIIB-C	Perati, Aegean	Tomb 12	Bronze		1	Iakovides II 1969: 344, fig. 149, no. M53; Iakovides 1980: 91-93, fig. 111; Warren 1969: 104; Harding 1975: 199
Anim.65	1200-1100	LC IIIA	Kourion Bamboula	Tomb 16	Bronze	Ivory		Benson 1972: 131, pl. 36
Anim.70	1200-1100	Velatice I/ Ha A1	Wackonig, south Austria		Bronze		7	Říhovský 1972: 26-27, pl. 7.79
Anim.75	1200-1000	FBA/LH IIIC	Pentalica, Italy	Tomb 8 North; University College, London collection	Bronze	Ivory	Recurved tip	Orsi 1899; Petrie 1917: 25, pl. XXVI.K134; Tanasi 2004: 343, fig. 5.B
Anim.80	ca. 1200	19th Dynasty	Egypt	University College, London collection	Bronze		Hollow edge	Petrie 1917: 24, pl. XXIX.K233, K234
Anim.85	1000-800	HA B1	Şpălnaca, Albania		Bronze			Müller-Karpe 1963: 10, fig. 1.3
Animal Leg Handles								
No.	**Date**	**Period**	**Site**	**Context**	**Blade**	**Handle**	**Shape**	**Reference**
Anim.90	1400-1300	LB IIA	Meggido, Levant	Stratum VIII	Bronze			Loud 1948: pl. 180:38
Anim.100	1400-1300	LB IIA	Lachish, Levant	Tomb 216	Bronze			Tufnell 1958: 78, pls. 23:6, 54:45
Anim.110	1300-1200	LB IIB	Deir el-Balah, Levant	Tomb 114	Bronze		6	Dothan 1979: 19, figs. 32, 33
Anim.120	1300-1200	LB IIB	Deir el-Balah, Levant	BM Rm 4	Bronze			Dothan 1979: 106, fn. 41

Table 14. Animal-themed knives from the eastern Mediterranean

Anim.130	1300-1180	LB IIB	Tell Abu Hawam, Levant	Stratum IV, E4 in E corner of 62	Bronze			Hamilton 1935: 60-61, no. 374a
Anim.140	ca. 1200	19th Dynasty	Egypt	University College, London collection	Bronze		Recurved flamboyant (Petrie)	Petrie 1917: 25, pl. XXVI.K145
Anim.150	ca. 1200	19th Dynasty	Egypt	University College, London collection	Bronze		Hollow edge (Petrie)	Petrie 1917: 25, pl. XXIX.K231
Anim.160	ca. 1200	19th Dynasty	Egypt	University College, London collection	Bronze		Hollow edge (Petrie)	Petrie 1917: 25, pl. XXIX.K232
Anim.170	1200-1150	Iron IA	Tell Jemmeh, Levant	Building Level J	Bronze			Petrie 1928: 13, no. 9, pls. I.19, XXIII. J 181
C.50	1200-1050	LC III	Enkomi, Cyprus	Tomb 58	Iron	Ivory		Murray et al. 1900: 14, 25, 31 pl. II:995; Gjerstad 1926: 285, n. 3; Crewe 2009: fig. 58.2

Table 14. Animal-themed knives from the eastern Mediterranean

Table 15. Cypriot swords tang-based typology

Flanged | western origins

- Enkomi Tomb 18 upper level, LC IIC-IIIA; C.1750 (bronze)
- Enkomi Quarter 5 East Well 212, LC IIIA early; C.1760-90 (4) (bronze)
- Loizou Collection, unprovenanced, LC III; C.1810
- Kouklia unprovenanced British Museum, CG I; C.1520
- Lapithos Kastros Tomb 409, CG II; C.1540
- Amathus Tomb 366, CG III-CA I; C.1600
- Amathus Tomb 243, CA I; C.1630
- Amathus Tomb 329, CG II; C.1440

Ovoid | contemporary in the Aegean

- Kouklia Skales Tomb 43, CG I; C.1480
- Kourion unprovenanced Cesnola Collection, CG I; C.1510
- Nicosia Tomb 1, CG III; C.1590
- Amathus Tomb 523, CG I; C.1400

Bulb-fan | eastern origins, contemporary in the Aegean

- Palaepaphos Plakes Tomb 145, CG II; C.1560
- Amathus Tomb 521, CG I; C.1430

Spur | eastern origins

- Kouklia Skales Tomb 76, CG I; C.1500
- Kouklia Skales Tomb 64, CG IIB; C.1550
- Amathus Tomb 319, CA IB; C.1450

Scalloped | eastern origins

- Idalion West Acropolis Open area XL, LC IIIB late; C.1470
- Kouklia Eleomylia Tomb 7, CA I; C.1660

T-shaped | eastern origins, unique to Cyprus

- Kouklia Skales Tomb 89, CG I; C.1390
- Palaepaphos Plakes Tomb 144, CG I; C.1420

Spur with ears | unique to Cyprus

- Enkomi Tomb 47, LC III; C.1800 (bronze)
- Kourion Kaloriziki Tomb 40, LC IIIB; C.1380
- Kouklia Skales Tomb 76, CG I; C.1490

	Knives*	Daggers	Swords	Weapons	Tools	Ornaments**	Other	Total/period
LC II (1450-1200)	0	0	0	0	0	0	2	**2**
LC III (1200-1050)	40	7	2	0	17	14	8	**88**
CG I (1050-950)	42	5	6	19	36	13	3	**124**
CG II (950-900)	45	1	4	19	9	2	2	**82**
CG I-III (1050-750)	4	0	1	0	3	0	0	**8**
Total objects	**131**	**13**	**13**	**38**	**65**	**29**	**15**	**304**

*5 knives represented by handles only

**1 spatula represented by handle only

Table 16. Iron objects in Cyprus by categories

Period	Item number	Period years	Avg/year
LC I	0	150	0
LC II	2	100	0.02
LC III	88	150	0.59
CG I	124	100	1.24
GC II	82	50	1.64
Total*	**296**		

*Items dated CG I-III excluded

Table 17. Iron object densities in Cyprus by period

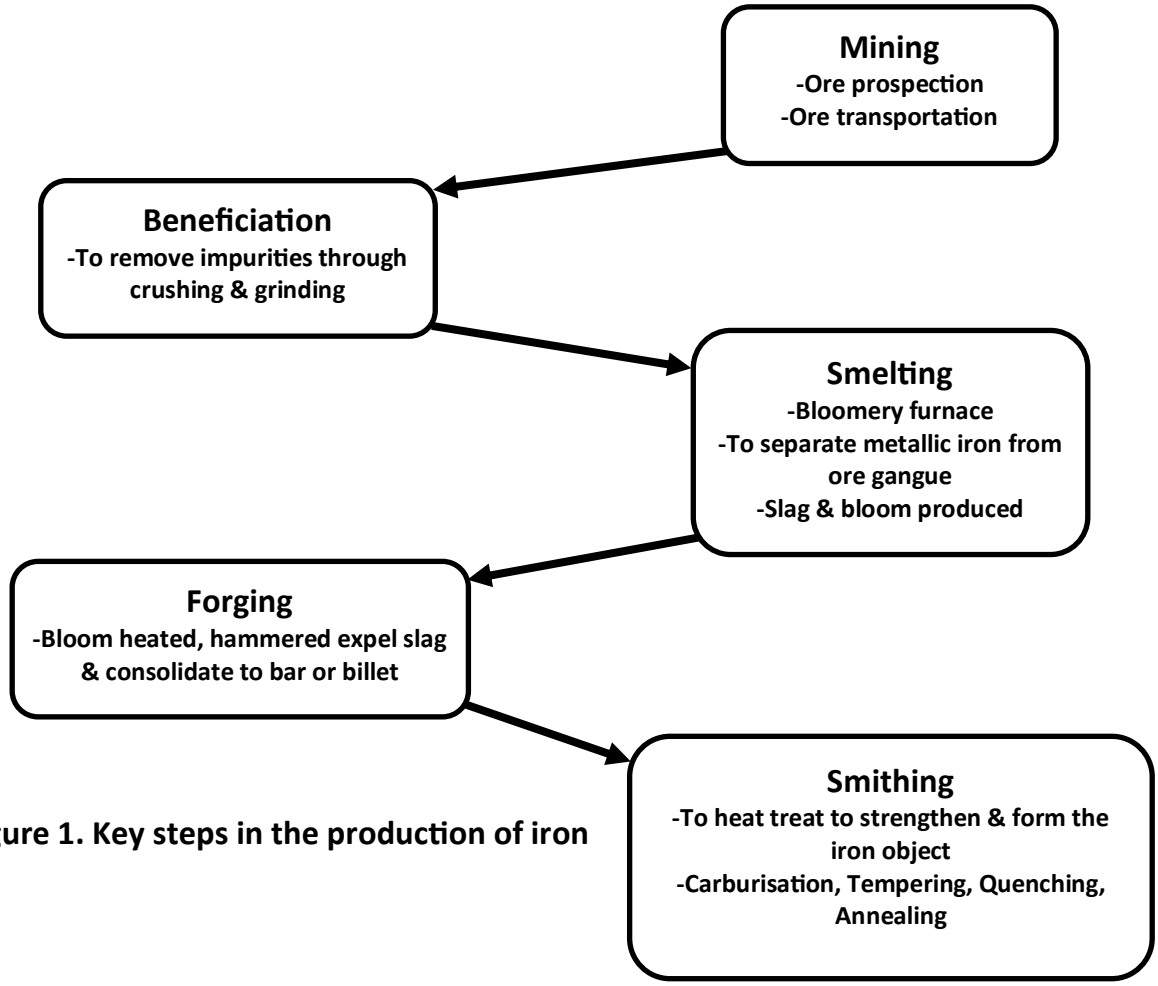


Figure 1. Key steps in the production of iron

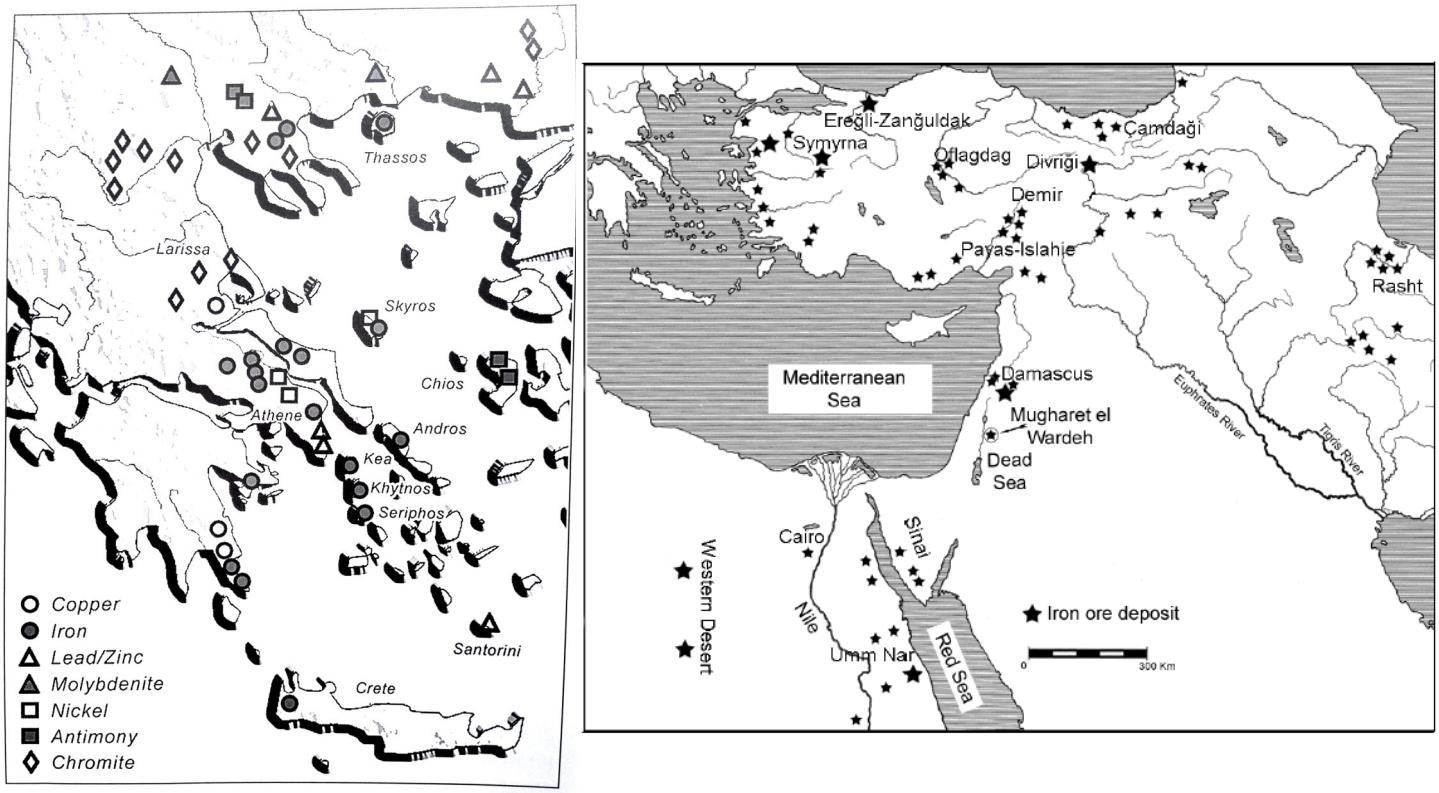
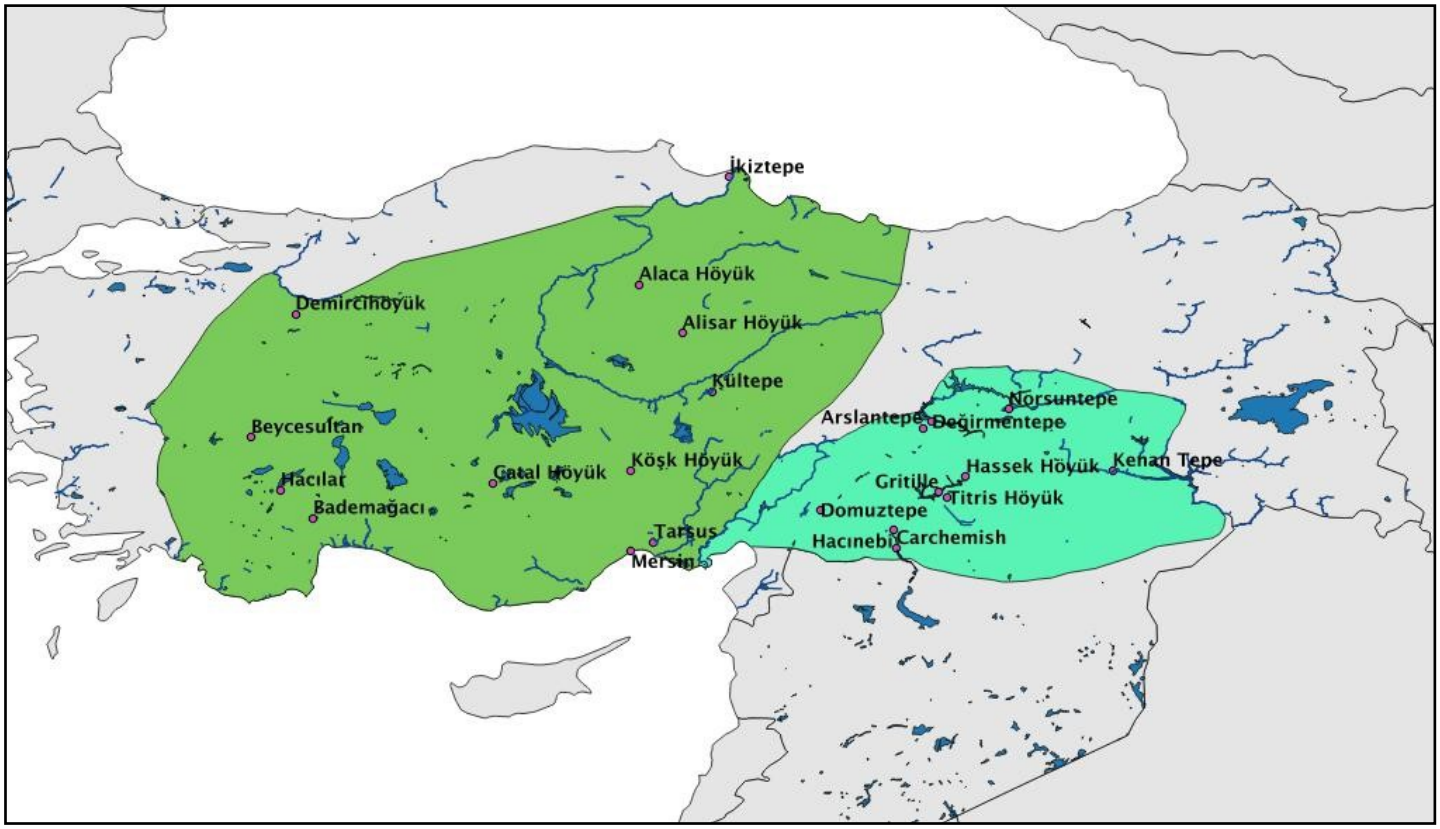


Figure 2. Iron ore deposits in the Aegean and eastern Mediterranean
(Muhly 2008, fig. 1; Pigott 1981)



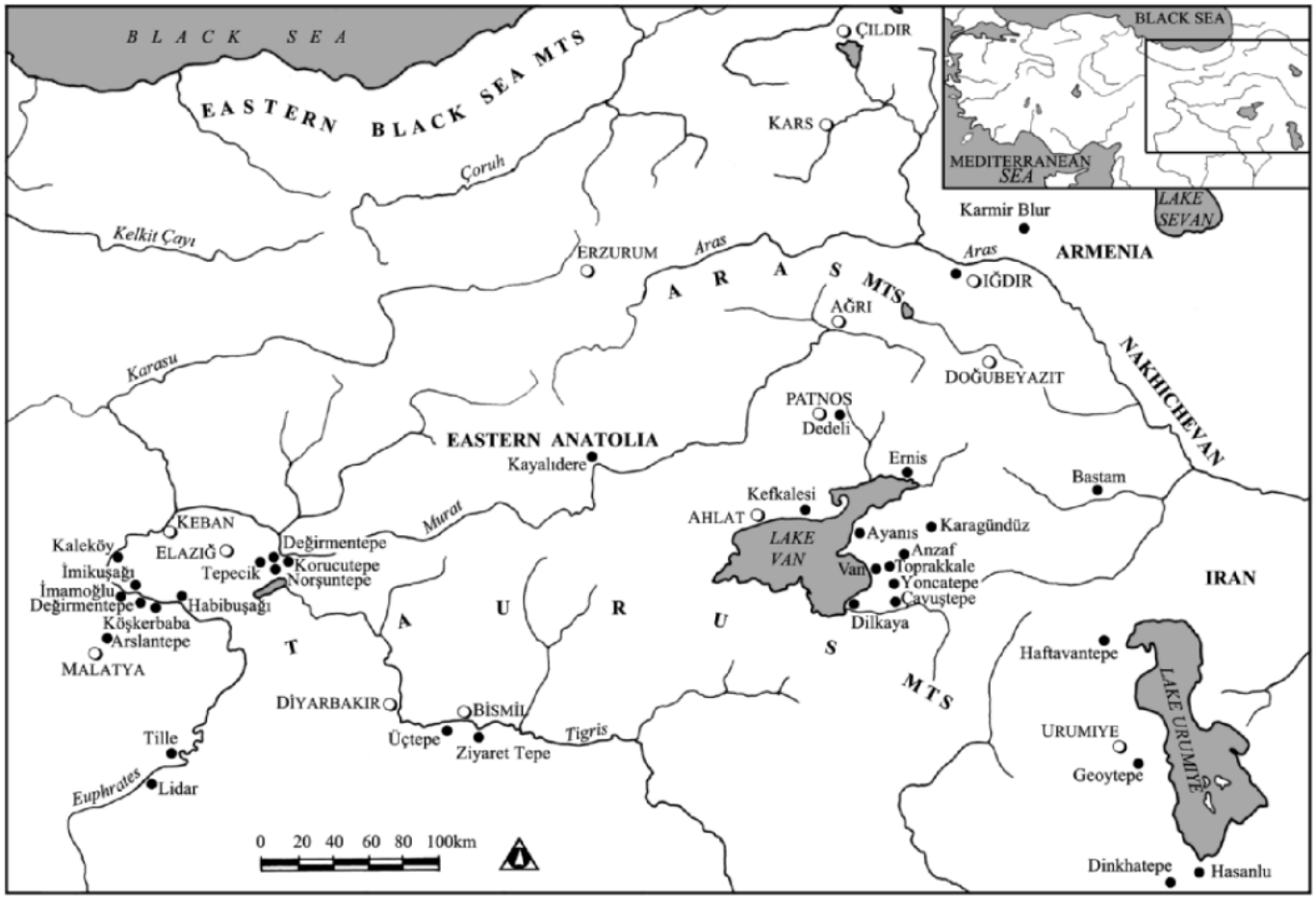


Figure 3. Chalcolithic and Early Bronze Age sites of Anatolia
(Selover 2015, fig. 3.1; Yalçın 1999, fig. 1)

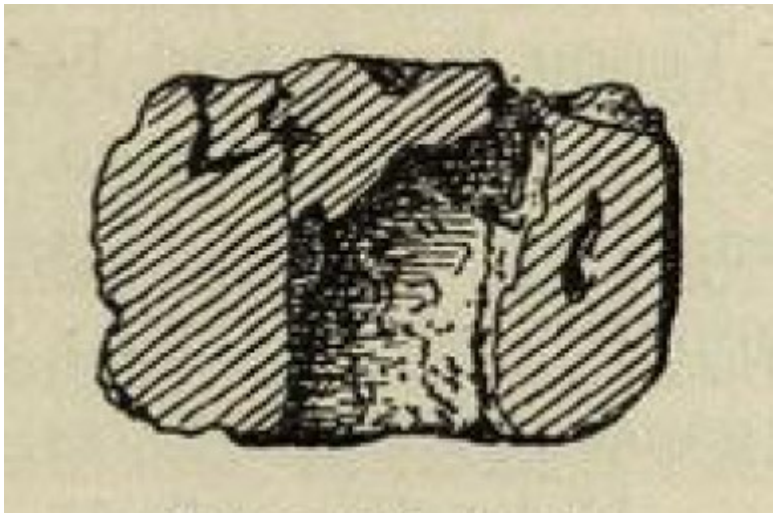


Figure 4. Iron mace head from Troy II late, Treasure L (Götze in Dörpfeld 1902, 356)

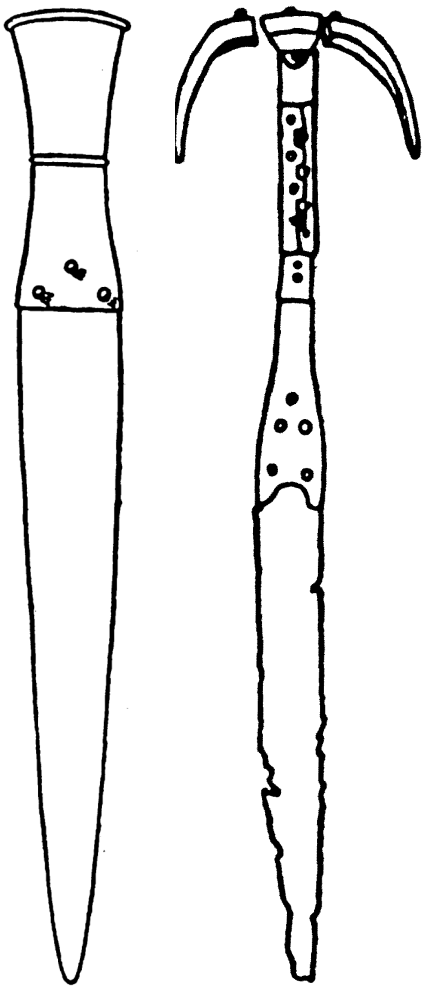


Figure 5. Iron daggers from Alaca Höyük Tombs C and K (Stronach 1957, figs. 2.27, 3.5)



Figure 6. Middle and Late Bronze Age sites of Anatolia (Houwink ten Cate 2018)



Figure 7. Ivory box AN.440 with iron nails from Acemhöyük (Purušḫanda) (Noumenon 2008)

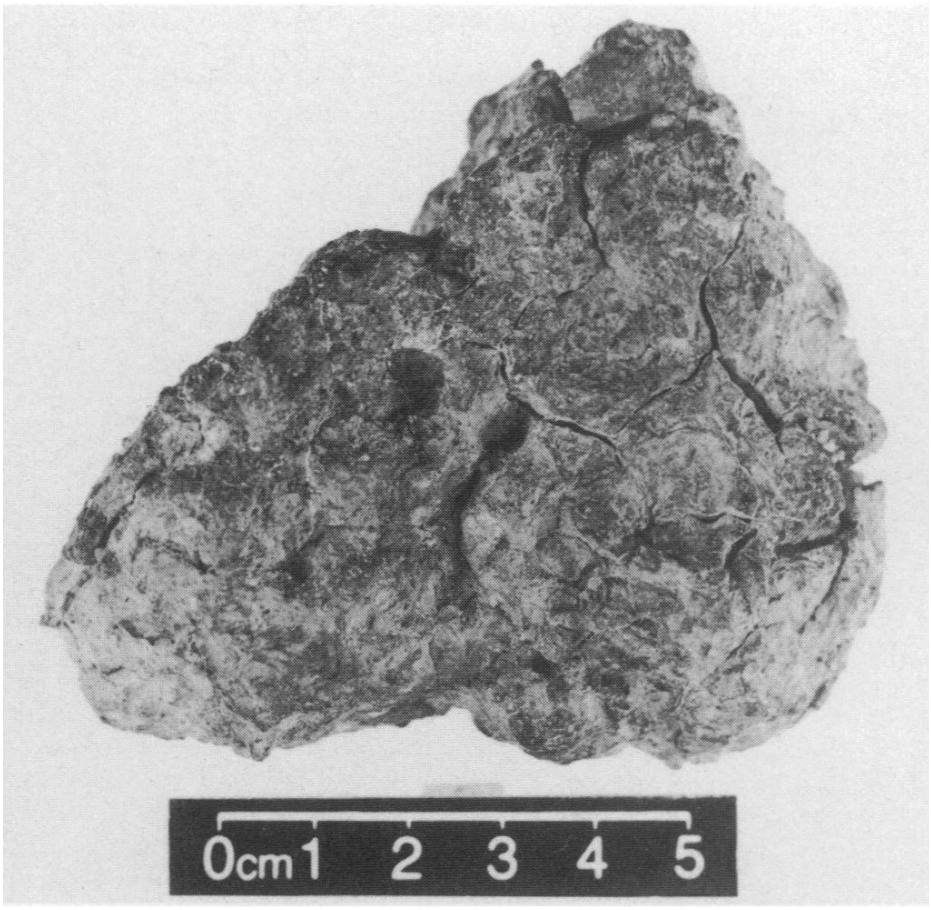


Figure 8. Iron speiss or iron arsenide from Hattušaš/Boğazköy (Muhly et al. 1985, pls. VIII, IX)

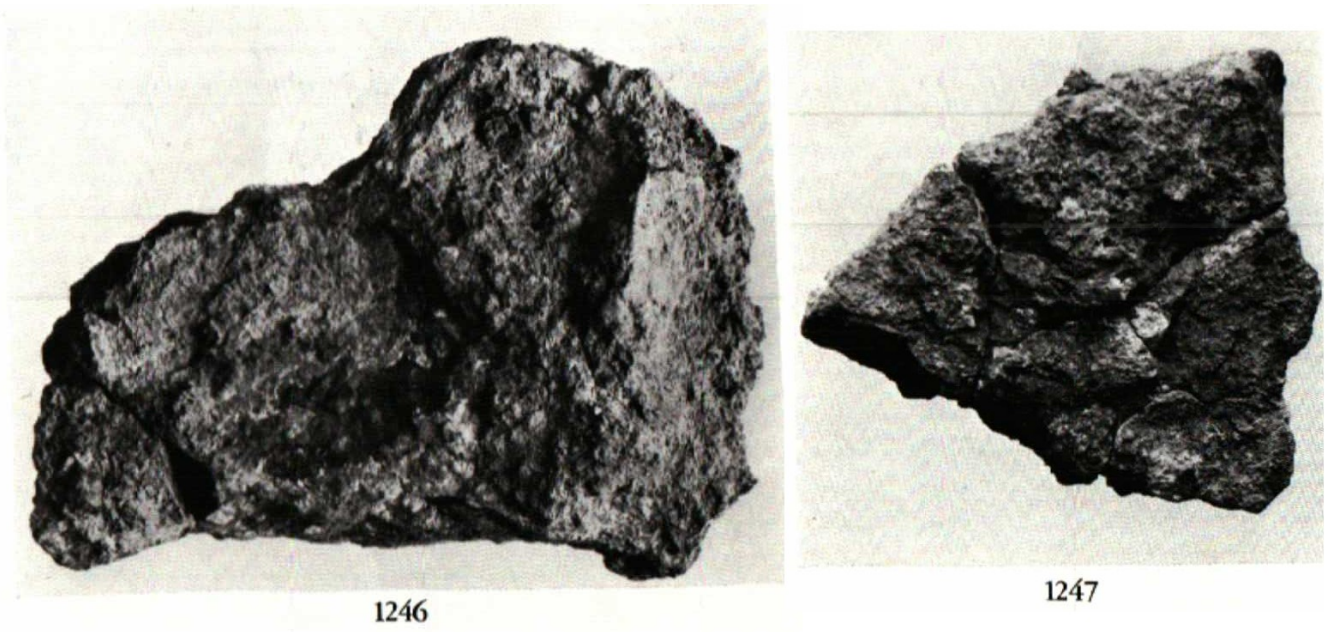


Figure 9. Iron bar-shaped implements from Hattušaš (Boehmer 1972, pl. XLIII)

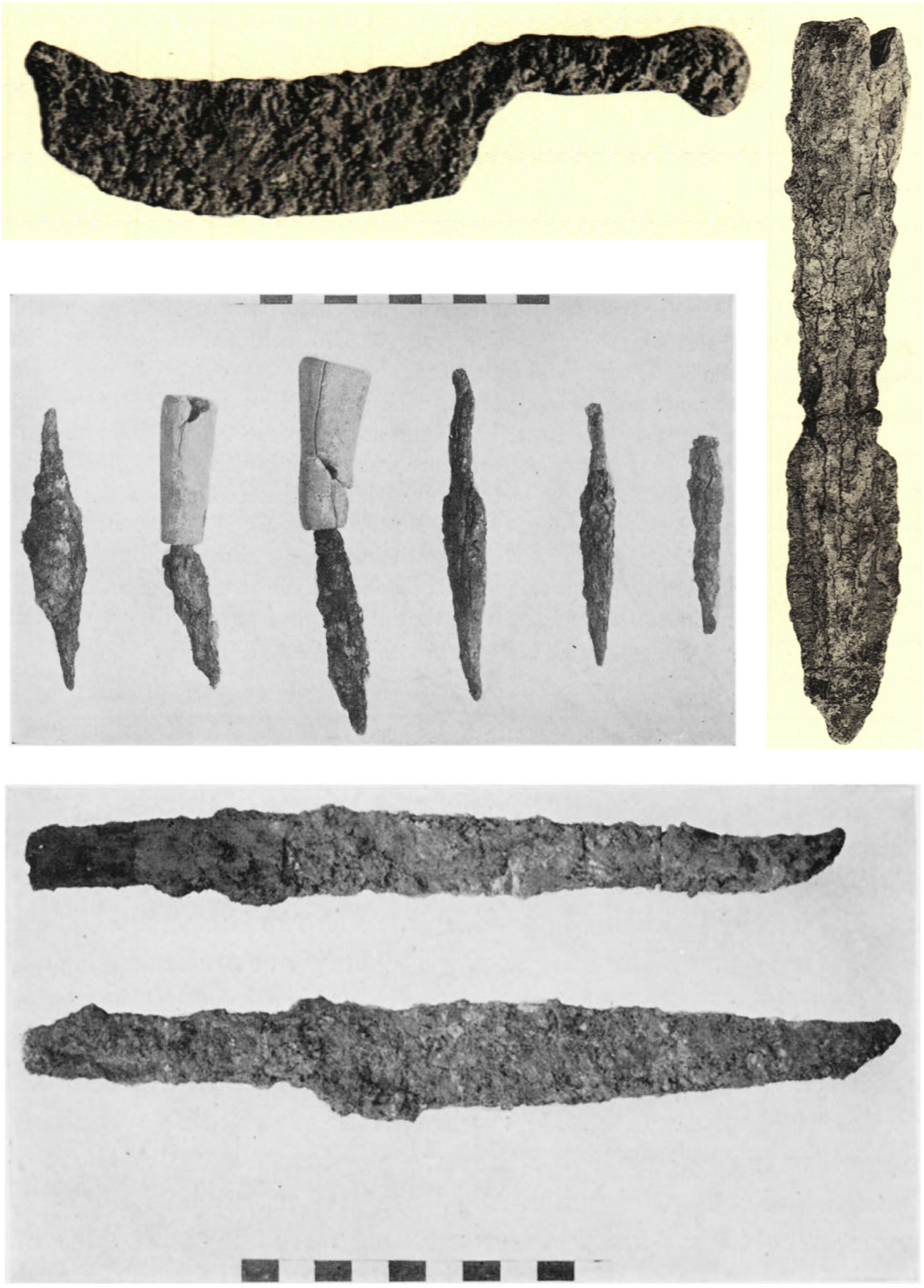


Figure 10. Iron cleaver, knives, spearhead, awls from Tarsus/Gözlükule (Goldman 1937, figs. 34, 35; 1963, figs. 168.3, 172.111)

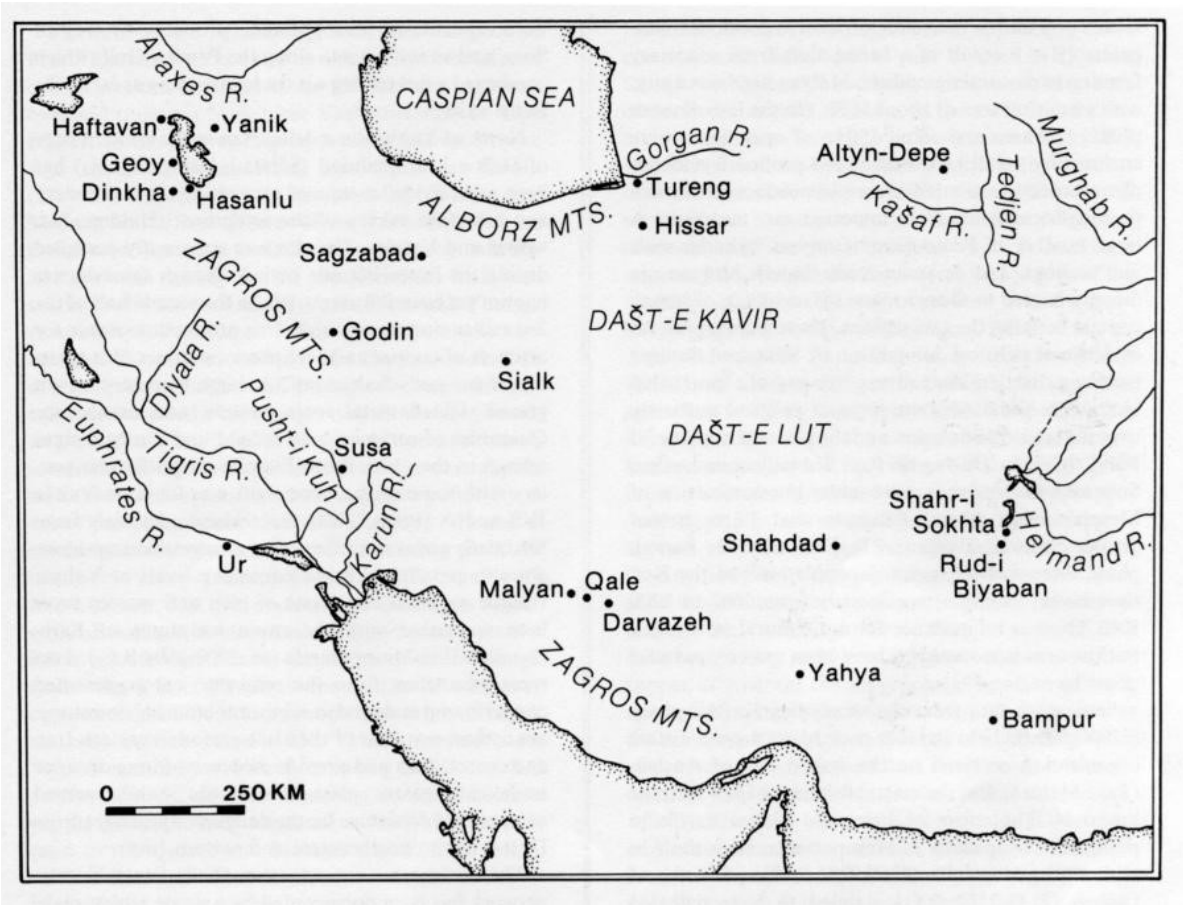


Figure 11. Pre-Urartian culture, map of Bronze Age sites in Iran and Afghanistan (Dyson and Voigt 1989, fig. 29)

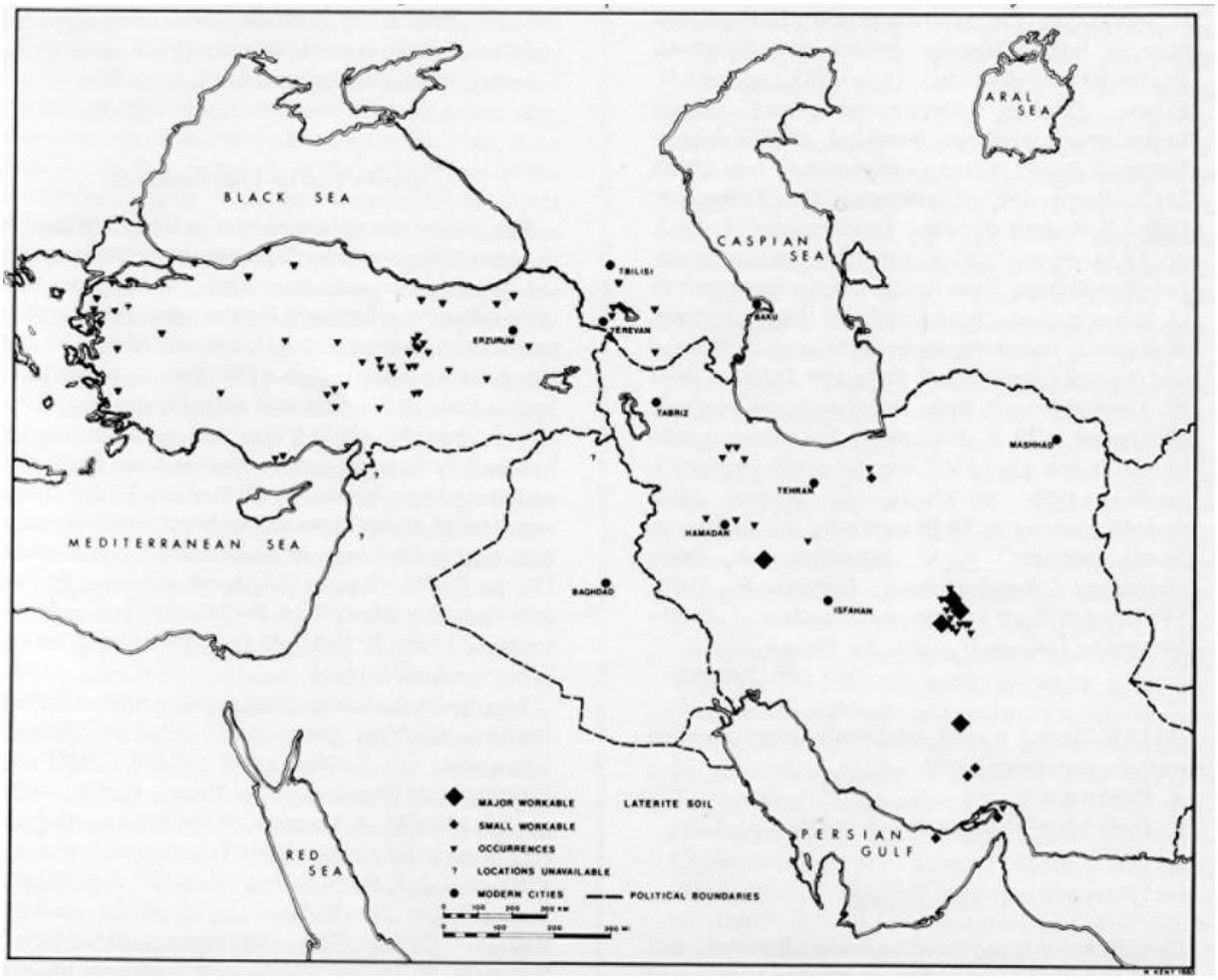


Figure 12. Iron ore deposits in Anatolia, Caucuses, and on the Iranian Plateau (Pigott 1982, fig. 21)

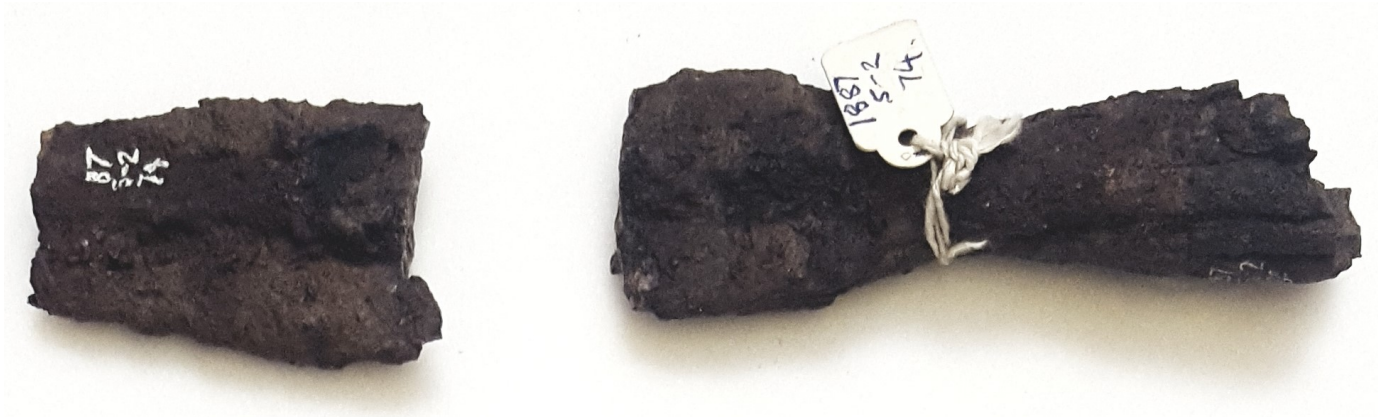


Figure 13. Iron spearhead from Tumulus A, Assarlik
(British Museum 1887,0502.74)



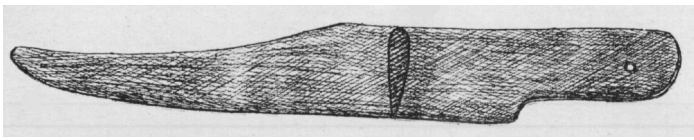
Figure 14. Iron knives from Tumulus A, Tomb D, Assarlik
(British Museum 1887,0502.69, 70)



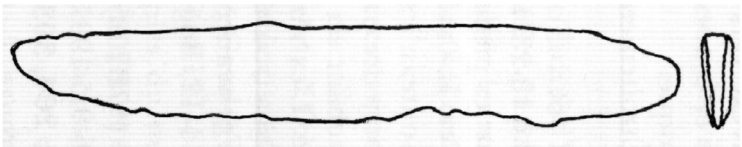
Figure 15. Iron knives from Tomb C, Assarlik (British Museum 1887,0502.71, 72)



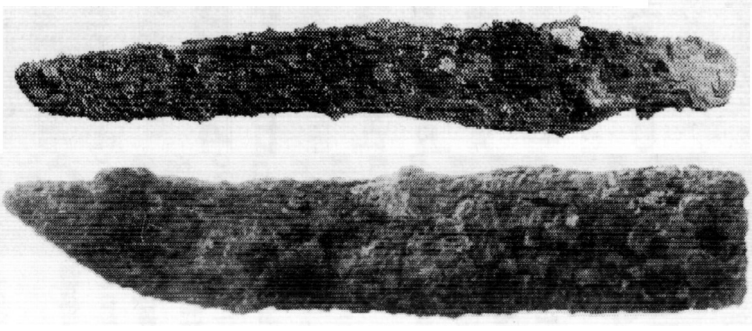
Tell Shiukh Fawqâni, Syria



Gezer, Israel



Hama, Syria



Hama, Syria

Figure 16. Levantine knives with flicked-up tips (Macalister 1912, pl. CXCVIII.12; Riis 1987, fig. 51.263, 265-67; Tenu 2009)

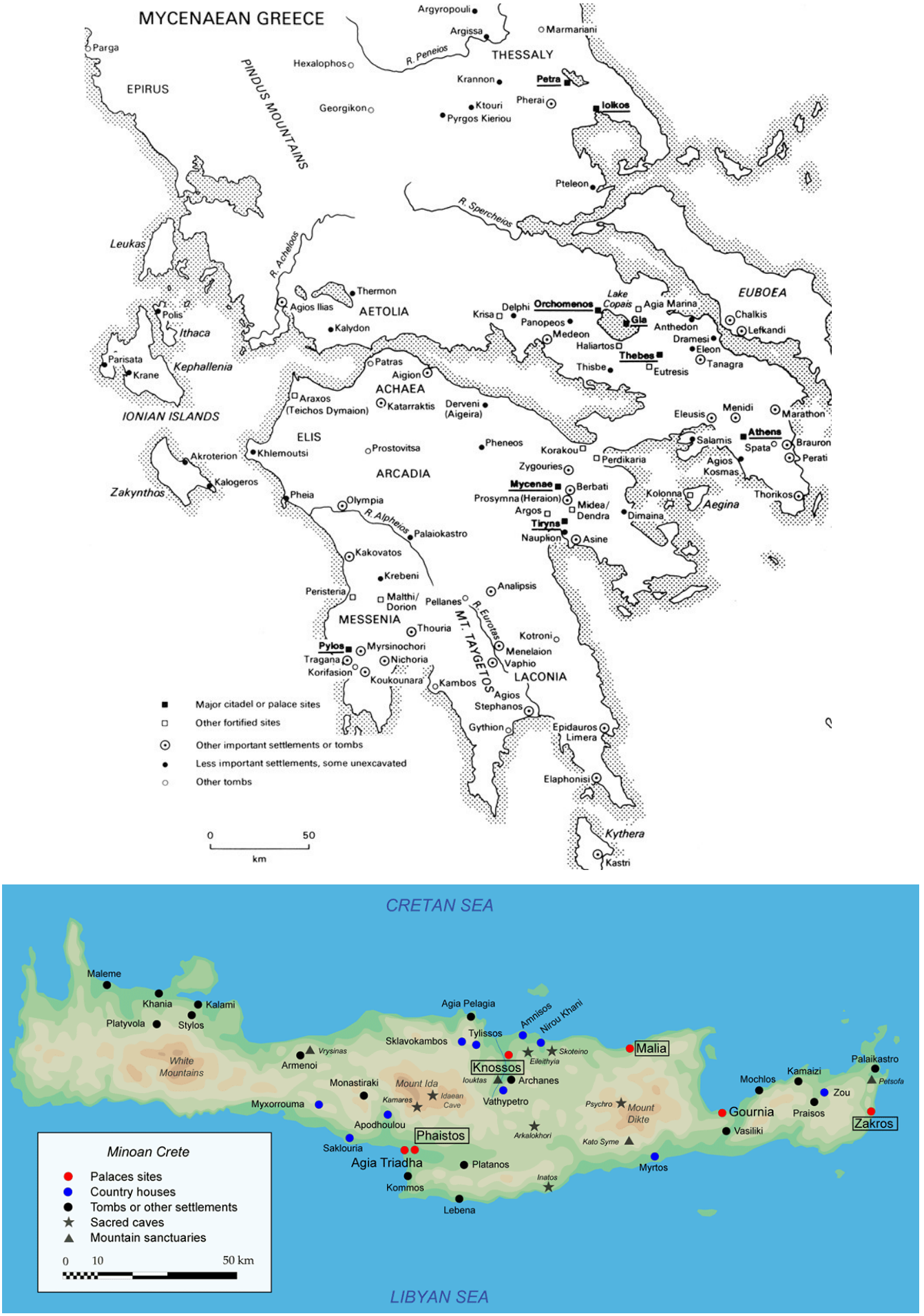


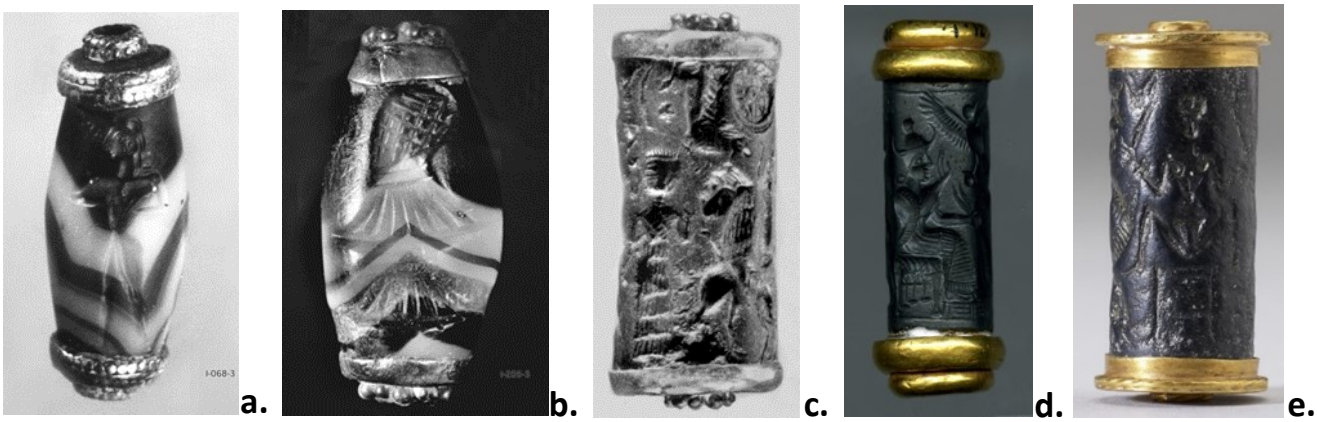
Figure 17. Late Bronze Age sites of Greece and Crete (Talbert 1985, 6; Saint-Pol 2006)



Figure 18. Iron pendant from Dendra, Chamber Tomb II, BA.300, LH IIIB (Persson 1931, pl. 33:6)



Figure 19.
Mycenaean steatite lentoid seal, LH IIIC, Metropolitan Museum of Art no. 26.31.339 (left); Minoan hematite amygdaloid seal, LM I-II, Metropolitan Museum of Art no. 26.31.273 (right)



a. b. c. d. e.

Figure 20. a. Mycenae agate cylinder seal (CMS I, 68);
b. Aspis, Argos agate cylinder seal, (CMS I, 205);
c. Knossos lapis lazuli cylinder seal (CMS II,2 029);
d. Cyprus hematite cylinder seal (British Museum 1900,0521.1);
e. Cyprus black stone cylinder seal (Walters Art Museum 42.415)

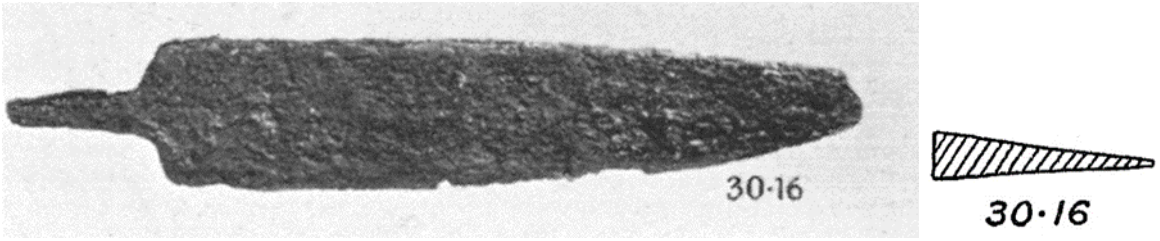


Figure 21. Iron knife and section from Area Γ, north-west settlement disturbed soil from Thermi, Lesbos, BA.270, LH IIIA-B (dating uncertain) (Lamb 1936, pls. XXV, XLVII)

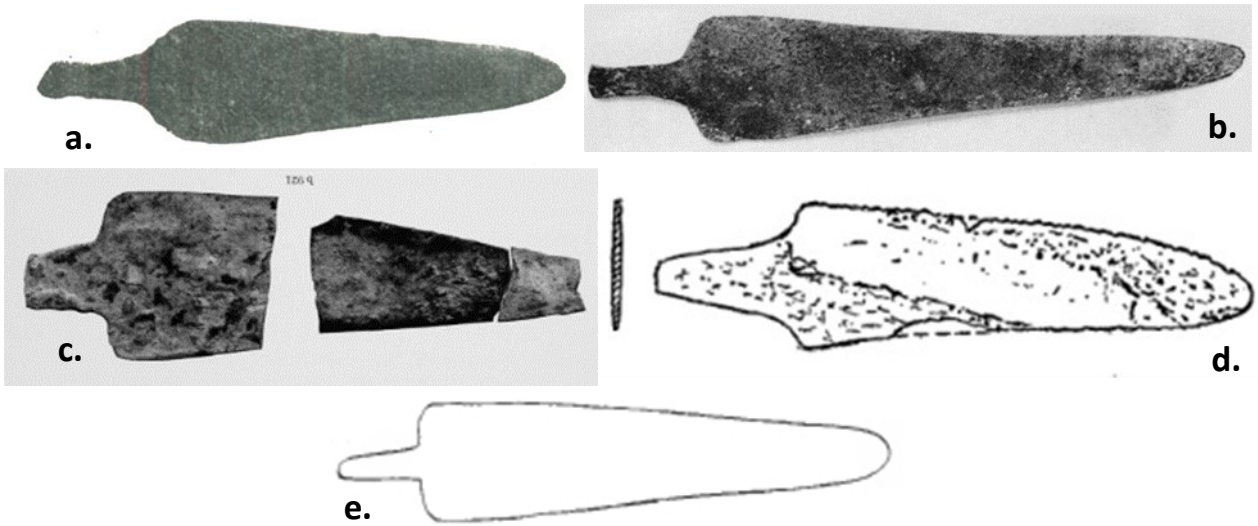


Figure 22. Daggers: a. Sveti-Kyrillovo, copper, L. 10.3cm, Troy II (2600-2250 BCE); b. Karataş, copper or bronze, L. 12.7cm, EB II-III (2700-2100 BCE); c. Alişar, copper, L. 13cm, Stratum I (2800-2500 BCE); d. Troy, bronze, L. 21.1cm, Troy II (2600-2250 BCE); e. Tyre, bronze, date and context unknown (Kazarow 1914, fig. 24.d; Mellink 1967, pl. 77.18; Schmidt 1932, fig. 65, b.921; 1902, 228, no. 5849; Petrie 1917, pl. 36.139

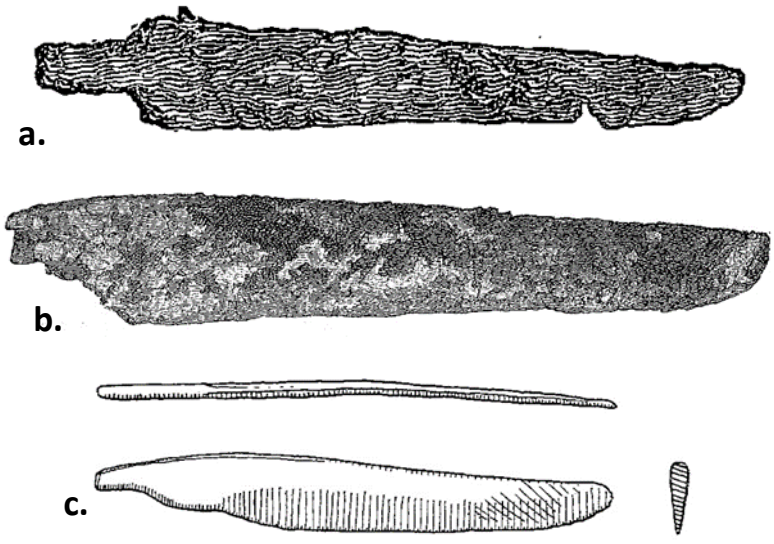


Figure 23. Knives: a. Troy, bronze, L. 21.6cm, Troy III destruction (ca. 2100 BCE); b. Troy, bronze, L. 15cm, Troy III destruction (ca. 2100 BCE); c. Kusura, copper, L. 9.5cm, 1900-1200 BCE) (Schliemann 1880, nos. 961, 964; Lamb 1937, pl. 19.6)

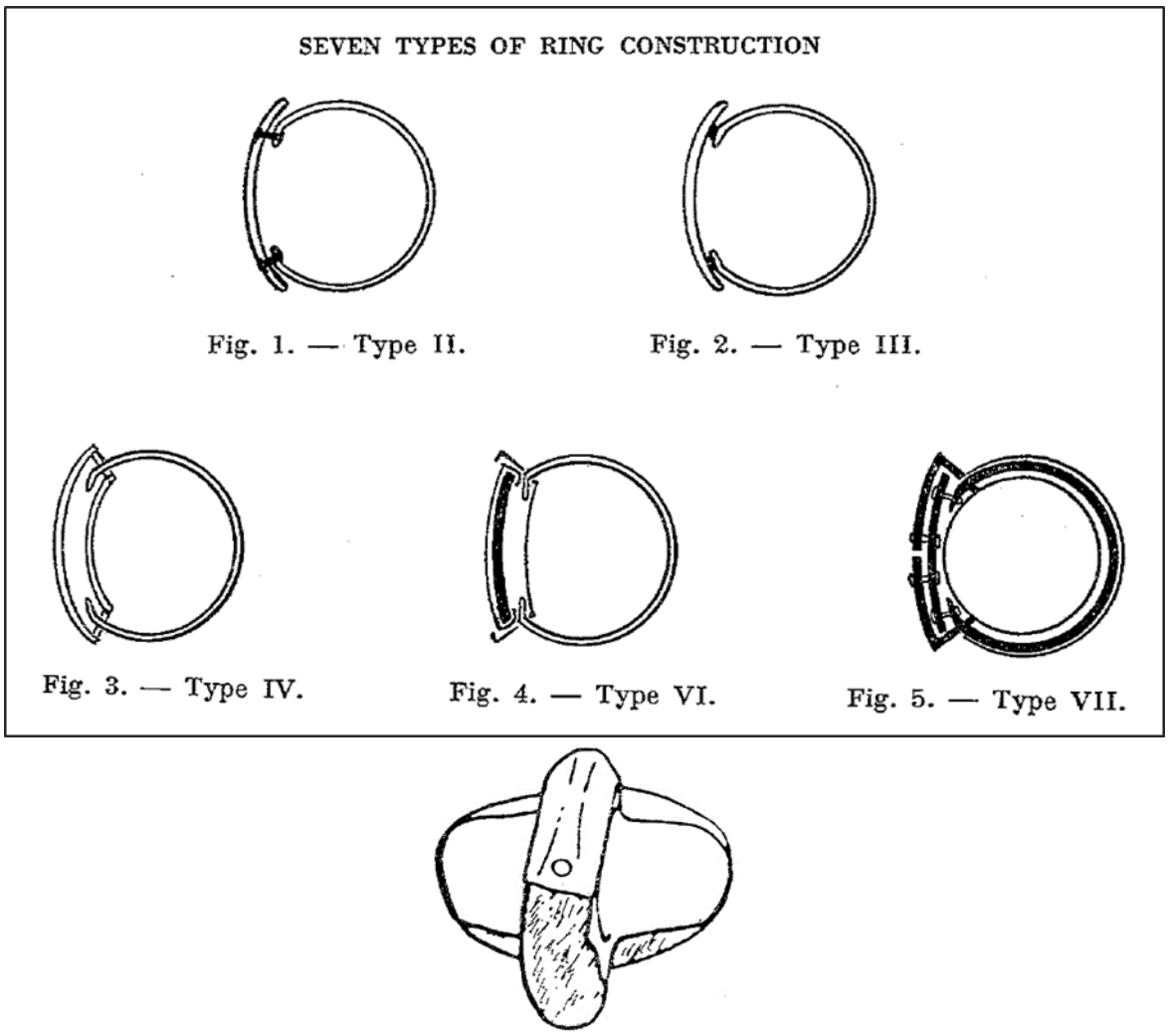


Figure 24. Younger's (1984) signet ring types (top); Vassilicou's (2000) Type VI hoop construction (bottom)

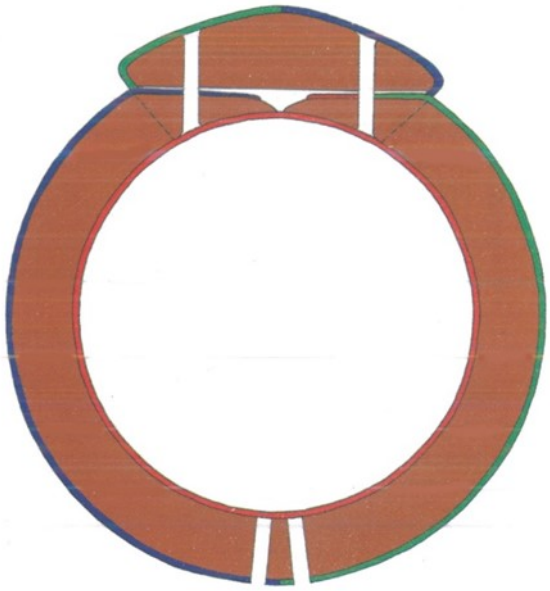


Figure 25. Müller's (2003, pl. CI) Gold-iron ring type; brown = bronze, green = iron, red = gold



Figure 26. Ring BA.50, West shrine room from Anesmopilia, Crete, MM III (Sakellarakas 1997, fig. 717)



Figure 27. Ring BA.70, Tholos A, Kakovatos-Pylos, Elis, LH I (Varoufakis 1981, fig. 1.4)



Figure 28. Ring BA.120, Chamber Tomb 7, Pit 1, Gournospilia cemetery, Aidonia, Argolid LH IIB (Kaza-Papageorgiou 1996, no. 20)



Figure 29. Ring BA.180, Chamber Tomb 68, Lower Town, Mycenae, LH IIIA-B (Varoufakis 1981, fig. 1.5)

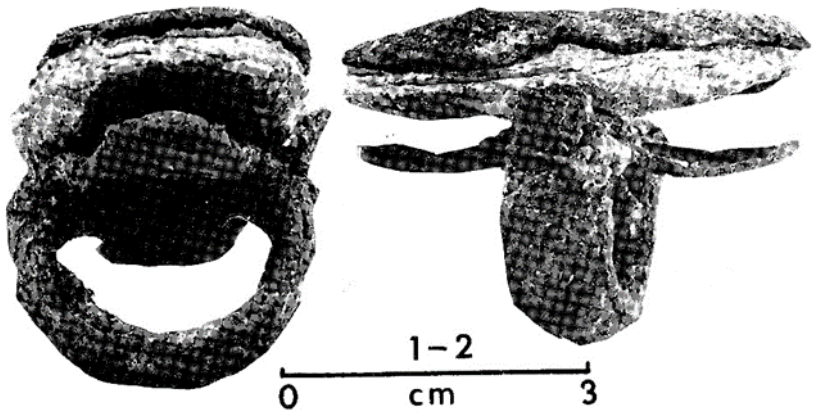
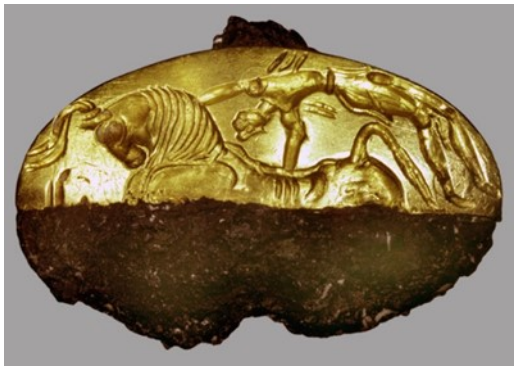


Figure 30. Ring BA.150, Royal Tholos Tomb Pit 1, Dendra, LH IIIA (Persson 1931, fig. 35)



Figure 31. Concealed rivets: Ring BB.3, Chamber Tomb 1, Asine, LH II-IIIA (CMS I, 201)

a.



b.



c.

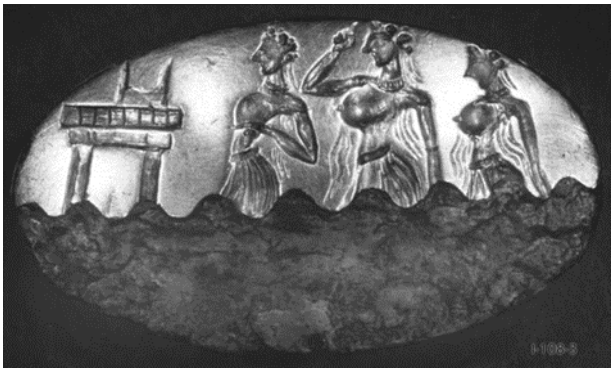


Figure 32. Bi-bezel rings: a-b. Ring BB.2-3, Chamber Tomb 1, Asine, LH II-IIIA (CMS I, 200, 201); c. Ring BB.4, Chamber Tomb 71, Mycenae, LH III A1 (CMS I, 108)

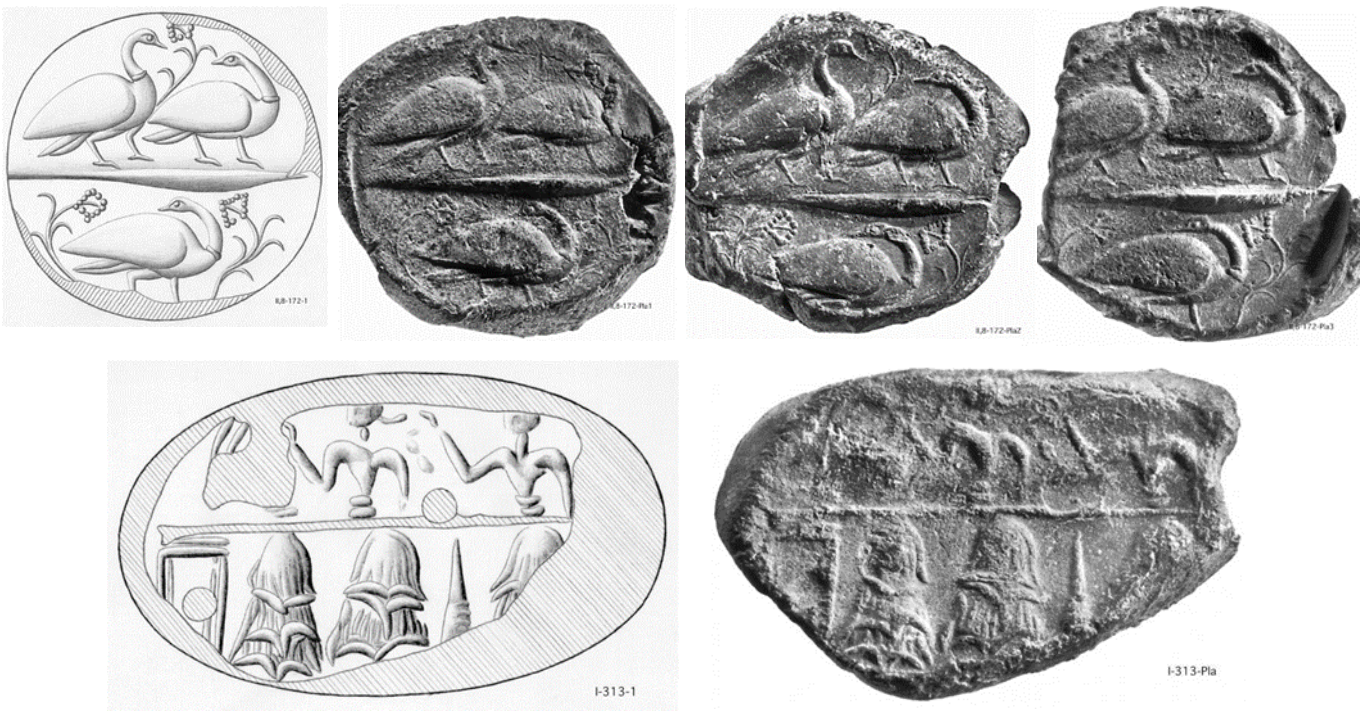


Figure 33. Bi-bezel clay impressions:
BB.1, three sealings, Arsenal Deposit, Knossos, LM IB (CMS II.8 172) (top);
BB.5, Palace room 98, Pylos, LH III B2-C1 (CMS I, 313) (bottom)

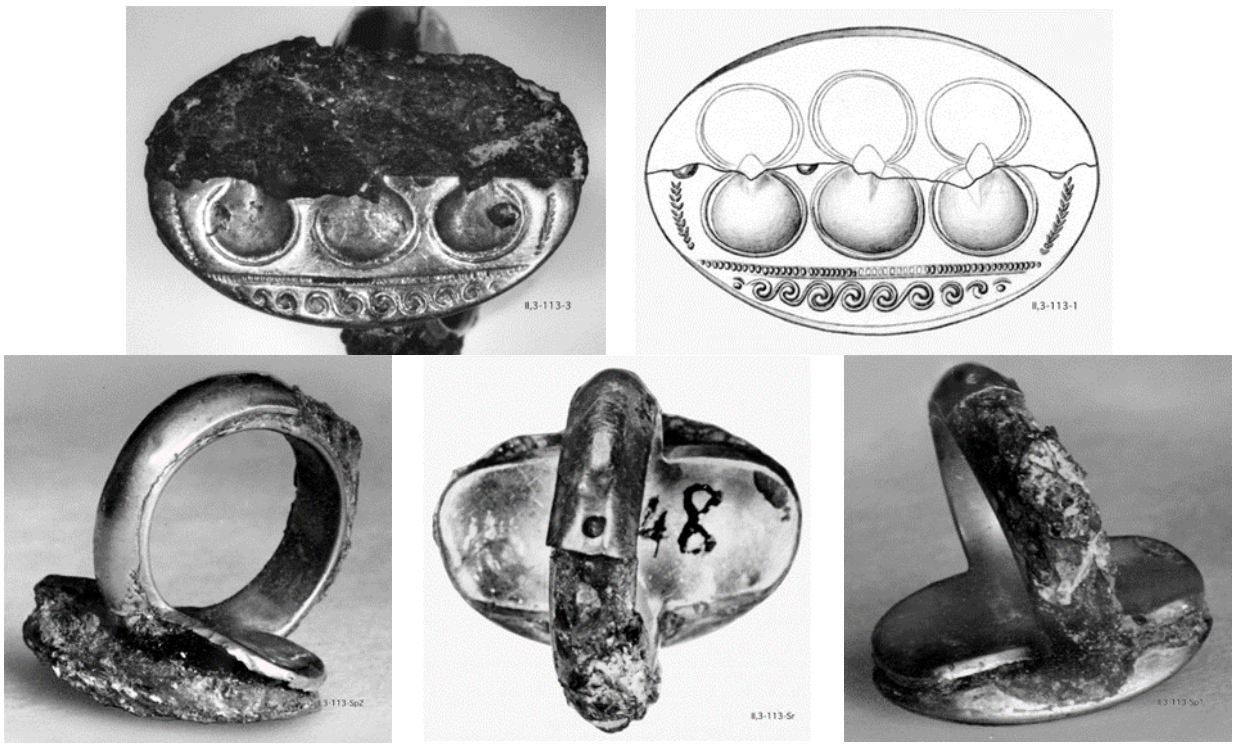


Figure 34. Ring BA.140, Chamber Tomb 10, Kalyvia Cemetery, Phaistos, Crete, LM IIIA (CMS II,3 113)



Figure 35. Ring BA.190, Chamber Tomb 58, Mycenae, LH IIIA-B (CMS I, 91)



Figure 36. Ring BB.7, bronze ring with figurative directly on the bezel plate, Hogarth's House A debris, Temenos, Knossos, LM I (CMS II.3, 015)

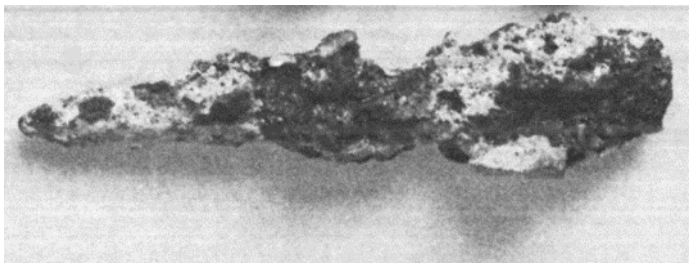


Figure 37. Square-end drill point or chisel BA.310, Jewellery workshop in the Kadmeia, Thebes, LH IIB (Symeonoglou 1973, pl. 93, fig. 274.8)



Figure 38. Gold larnax with attached rosettes, Tomb of Philip II, Vergina, 4th century BCE (Getty Images)

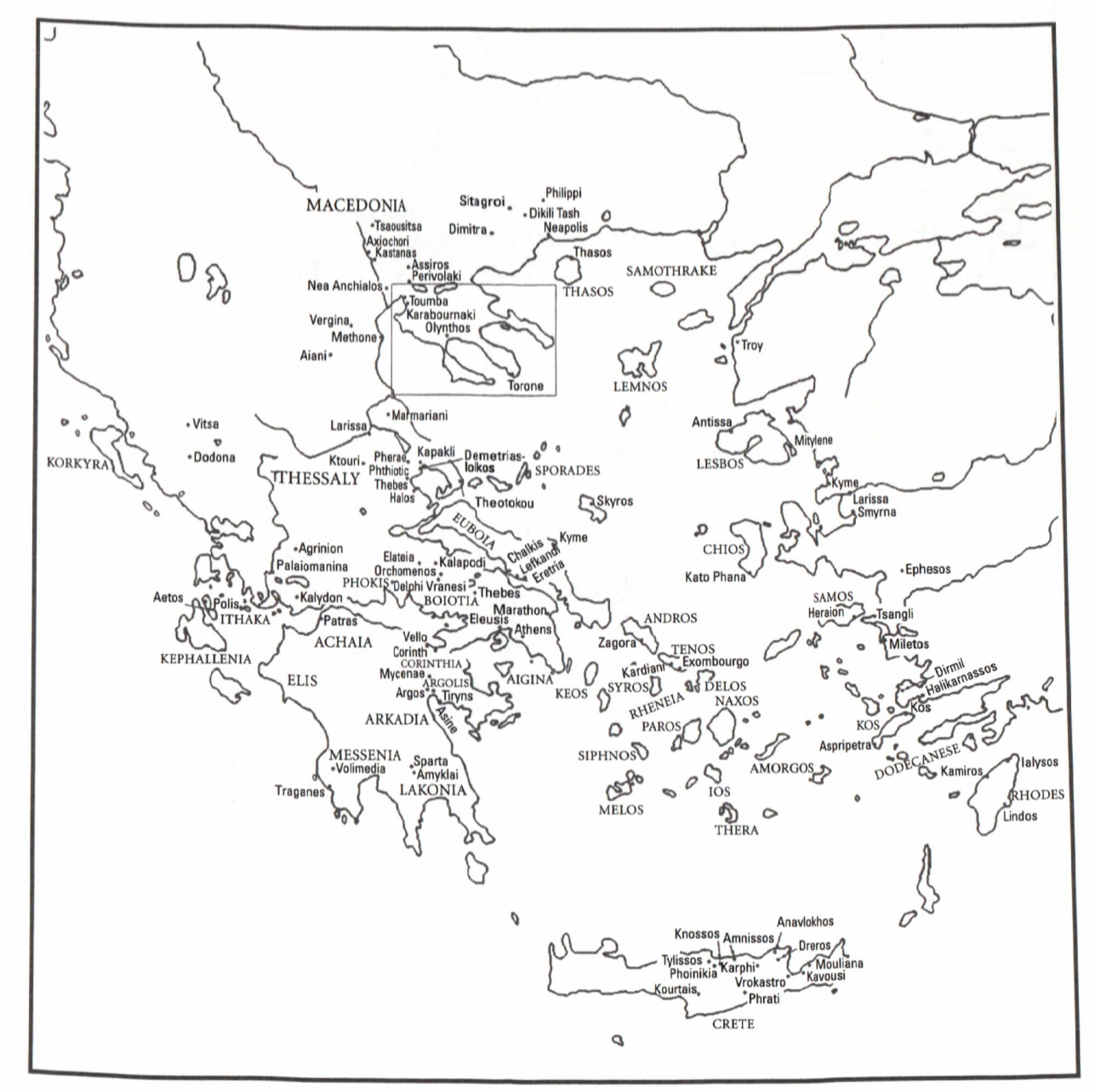


Figure 39. Early Iron Age sites of the Aegean (Papadopoulos 2005)

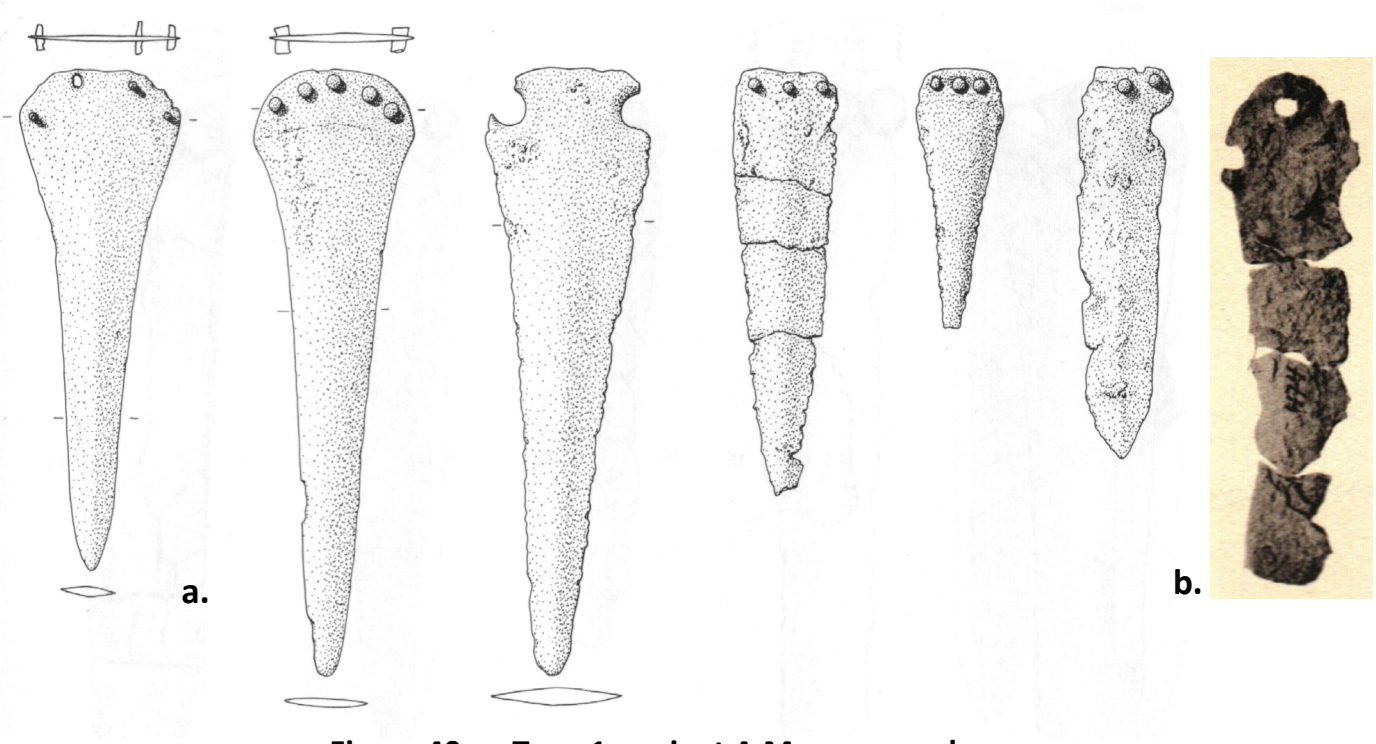


Figure 40. a. Type 1, variant A Mycenaean daggers;
b. Dagger A.1240 from Malthi Room A 42, Industrial Quarter, workshop, upper stratum
(Papadopoulos 1998, pl. 1.1-6)

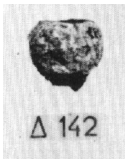


Figure 41. Iron pin A.3560 with glass paste bead in Perati Tomb 108
(Iakovides 1969, pl. 116a, Δ142)

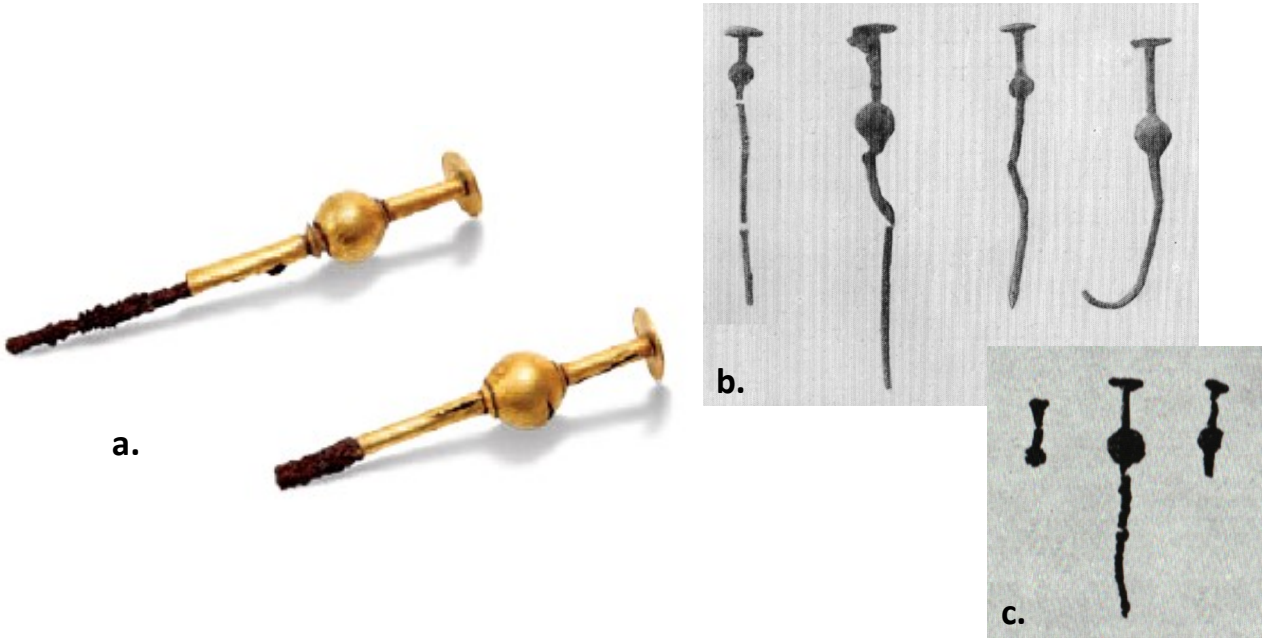


Figure 42. Type 2 iron pins
a. Iron pins A.4320 with gold foil, Lefkandi Toumba building, female burial, MPG;
b. Iron pins A.4420-30, Ialysos, Rhodes, MPG-LPG
c. Iron pins A.4100-70, Serraglio, Kos, EPG
(Kosma 2012, no. 6; Laurenzi 1936, fig. 150; Morricone 1978, fig. 54)

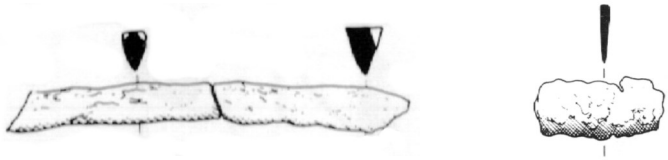
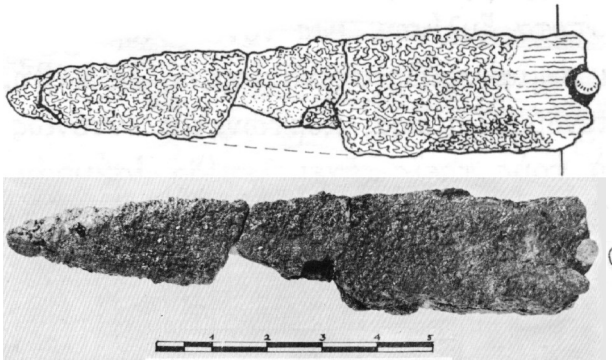
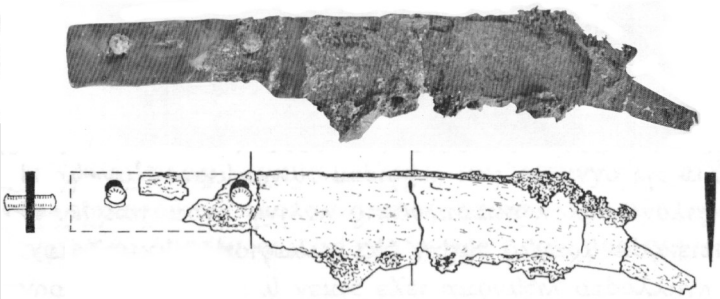


Figure 43. Iron knives from Thasos, LH IIIB
a. Tsiganadika cemetery, Tomb 19A, phase IA, BA.370
b. Kentria cemetery, Tomb K3A, phase I, BA.360
(Koukoulē-Chrysanthakē 1992: pls. 23B.3, 124, type E VIII)



A.10, LH IIIB-C Perati knife T.28,
Shape 6
(Iakovidis 1969, fig.147.M75, pl. 3a)



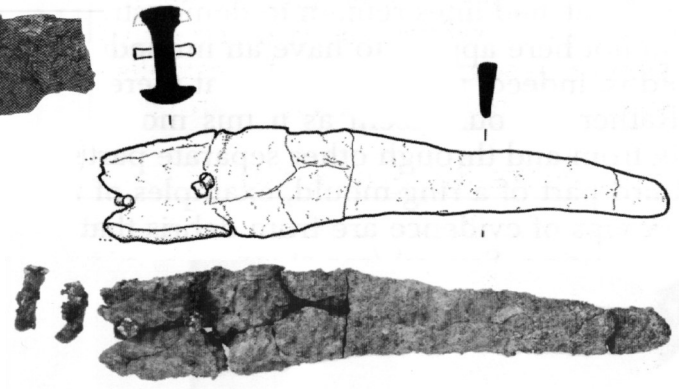
A.20, LH IIIB-C Perati knife T.38,
Shape 1
(Iakovidis 1969 M85, fig. 149, pl. 82γ)



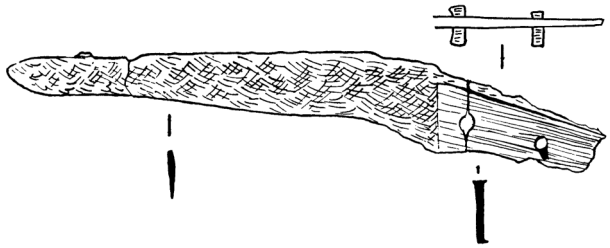
A.30, LH IIIC1 Kamini Naxos T.A knife,
Shape 6
(Vlachopoulos 2006, pl. 25.3574)



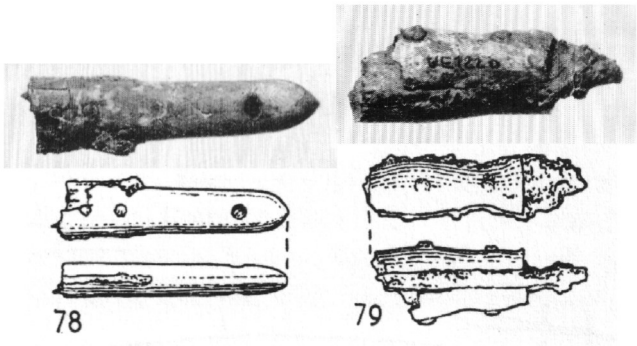
A.50, LH IIIC Malthi iron knife,
Shape 1
(Valmin 1938, pl. 30.14 no. 1267)



A.40, LH IIIC Lefkandi knife,
Shape 1
(Evely 2006, fig. 5.10.5, pl. 89.3.16)

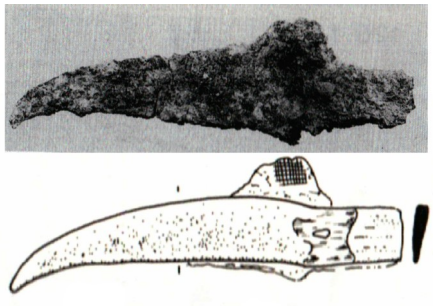


A.120, LM IIIC late Upper Gypsades,
Shape 1
(Hood et. al. 1958, fig. 32.12)

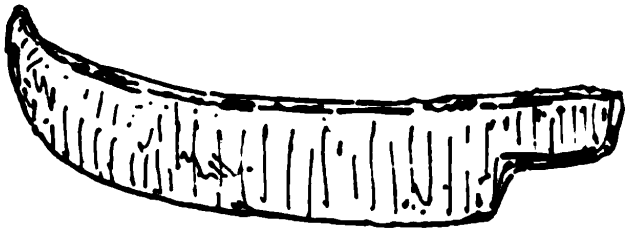


A.90, 100, LM IIIC Psychro Cave,
iron knife handles bone,
(Boardman 1961, fig. 5.78,79, pl. X)

Figure 44. Iron knives of the Aegean Early Iron Age



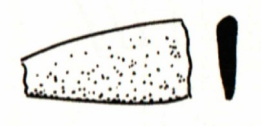
A.150, SMin Knossos North Cemetery, Tomb 186, Shape 1
(Catling 1996, fig. 163, pl. 274)



A.190, SMin-EPG Vrokastro Crete Tomb I, Shape 11
(Hall 1914, pl. 21.j, no. 13)



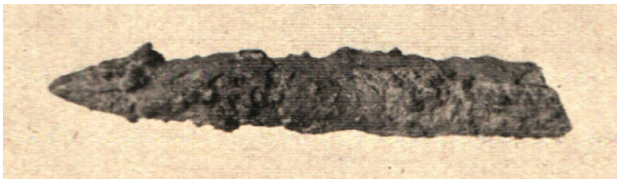
A.180, SMin Vrokastro Crete Tomb V, Shape 1
(Hall 1914, pl. 21A)



A.160, SMin Knossos North Cemetery, Tomb 201, (Catling 1996, fig. 164)



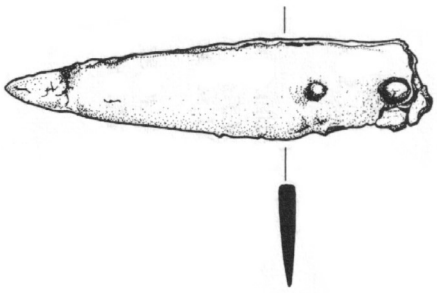
A.230, SMin Panagia, Crete, hoard, Shape 11
(Levi 1927-29, fig. 517)



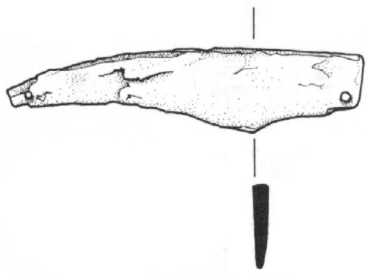
A.240, SMin Panagia, Crete, hoard, Shape 6
(Levi 1927-29, fig. 517)



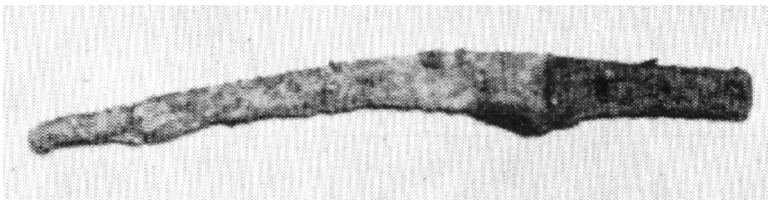
A.250,
SMin Panagia, Crete, hoard,
(Levi 1927-29, fig. 517)



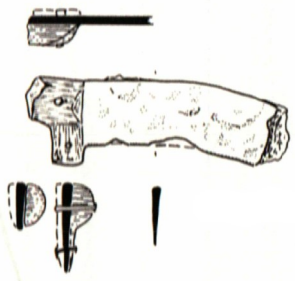
A.280,
SMyc late-PG Nichoria, Shape 6
(McDonald et al. 1983, fig. 5-53.90)



A.290,
SMyc late-PG Nichoria, Shape 1
(McDonald et al. 1983, fig. 5-56.93)



A.300, EPG Serraglio Kos, Tomb 7, Shape 1
(Morricone 1978, fig. 60)

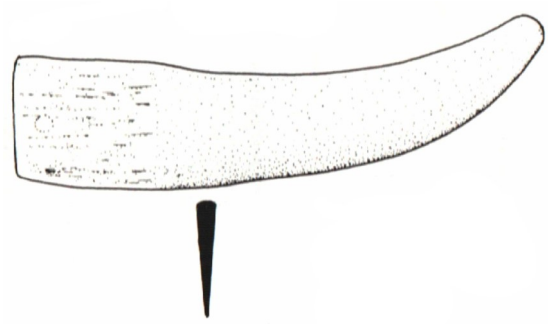


A.330, EPG Knossos North Cemetery, Tomb 48,
(Catling 1996, fig. 174.22)

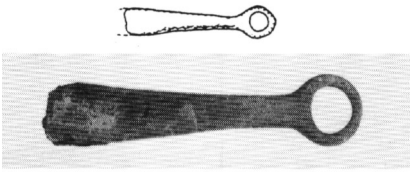
Figure 44. Iron knives of the Aegean Early Iron Age



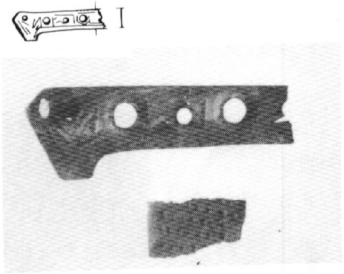
A.370, EPG-MPG Torone Tomb 52, Shape 3
(Papadopoulos 2005, pl. 468.4)



A.420, PG Lefkandi Skoubris Pyre 13, Shape 8
(Popham et al. 1980, pl. 114.1)



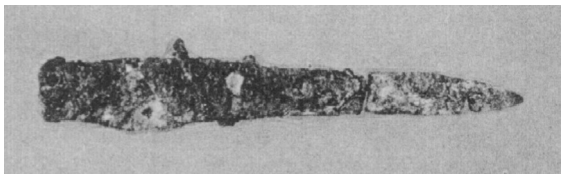
A.450, PG Kastri Thasos, Tomb K5B, (Koukoulē-Chrysanthakē 1992, pls. 91.2, 353.33)



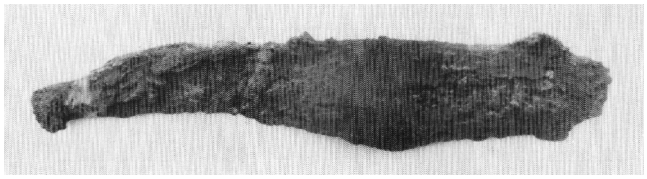
A.460, PG Kastri Thasos, Tomb 7B, (Koukoulē-Chrysanthakē 1992, pls. 91.4, 353.9)



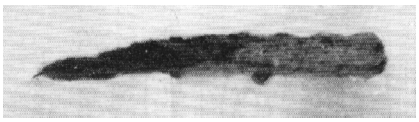
A.510, PG Kastri Thasos, Tomb 18, (Koukoulē-Chrysanthakē 1992, fig. 91.3, pl. 109.55)



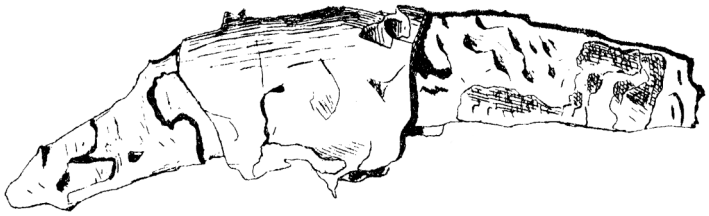
A.700, MPG Kerameikos Tomb 17, Shape 6A
(Kraiker and Kübler 1939, pl. 76)



A.710, MPG Lefkandi Palia Perivolia Tomb 16, Shape 1
(Popham et al. 1980, pl. 246h)



A.750, MPG-LPG Ialysos Rhodes, Marmaro Cemetery Tomb 44, Shape 1
(Laurenzi 1936, fig. 152)



A.770, MPG-LPG Theotokou Tomb B,
(Wace and Droop 1906, fig. 12i)

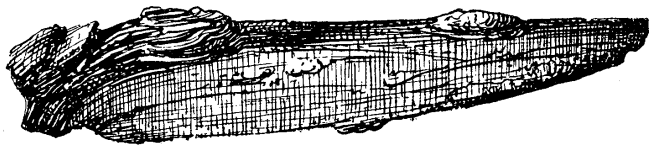


A.790. LPG Agora Tomb XXVI/D 16:2, Shape 1
(Young 1949, pl. 72.31)



A.800. LPG Agora Tomb XXVII, Shape 11
(Blegen 1952, fig. 3.4)

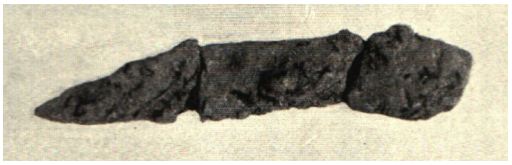
Figure 44. Iron knives of the Aegean Early Iron Age



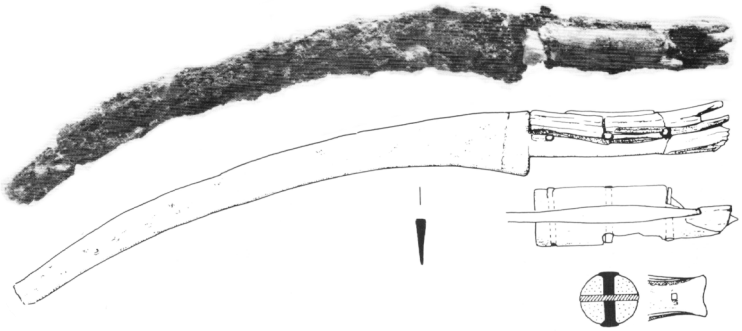
**A.820, LPG Marmariani Tholos VI,
Shape 9
(Heurtley and Skeat 1930-31, fig. 15.23)**



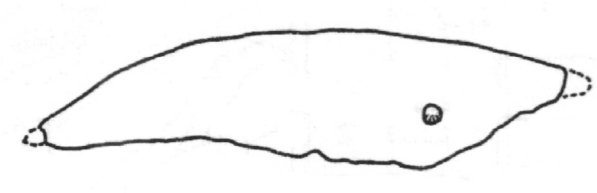
**A.880, LPG Karadiani, Tenos,
Shape 2
(Levi 1925-26, fig. 15 left)**



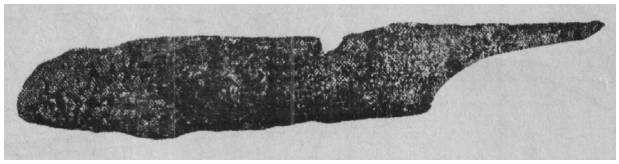
**A.890, LPG Karadiani, Tenos,
Shape 1
(Levi 1925-26, fig. 15 right)**



**A.900, LPG Lefkandi Toumba 3,
Shape 1
(Popham et al. 1980, pls. 170, 245)**



**A.670, PG Kakavi Epirus, Tomb 2,
European type
(Hammond 1967, fig. 27.1)**



**A.680, PG Vajzë Epirus, Tomb 1.2,
European type
(Prendi 1957, fig. 3a)**



**A.690, PG Dodona Epirus, European type
(Hammond 1967, fig. 27.2)**



**A.660, PG Liatovouni Epirus, European type
(Douzougli and Papadopoulos 2010, fig. 16)**

Figure 44. Iron knives of the Aegean Early Iron Age



Figure 45. Early Iron Age sites of Cyprus

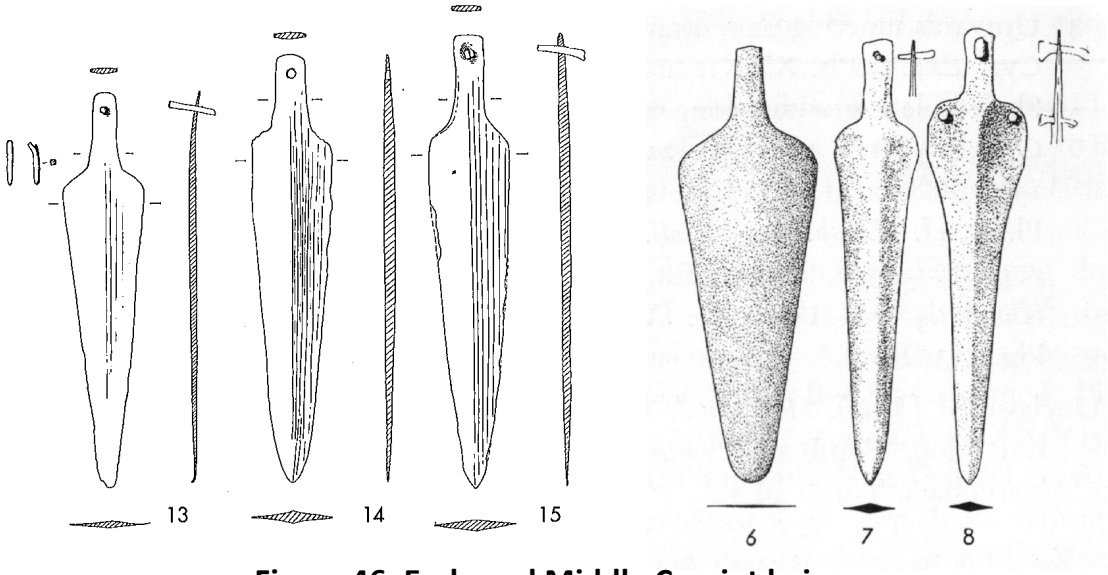


Figure 46. Early and Middle Cypriot knives (Stewart 1962, fig. 98; Åström 1972, fig. 10)

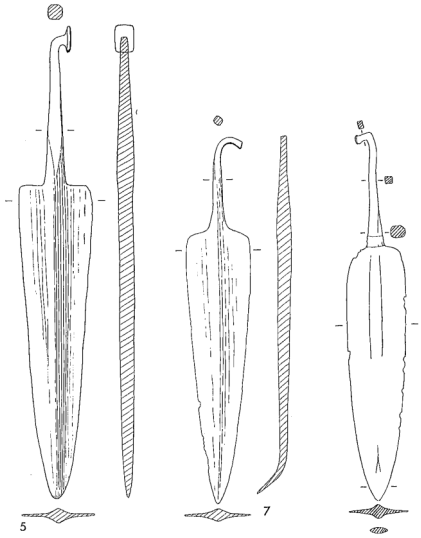


Figure 47. Early Cypriot hook-tang daggers (Stewart 1962, fig. 97)

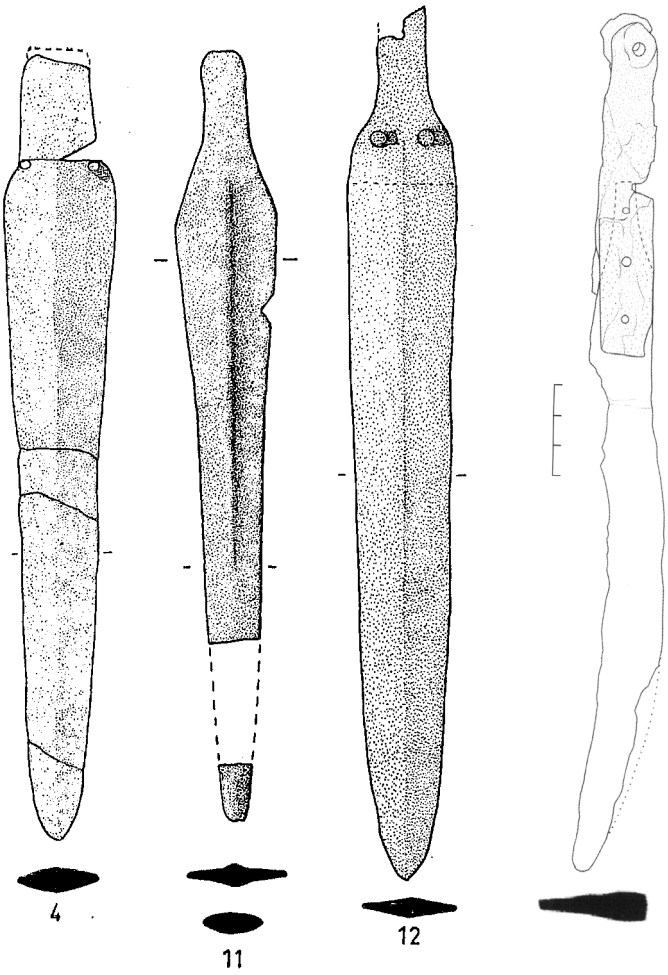


Figure 48. Late Cypriot daggers (left 1-3), Cypro-Geometric I knife (right) sections (Catling 1964, fig. 15; Karageorghis and Raptou 2014, pl. 82)

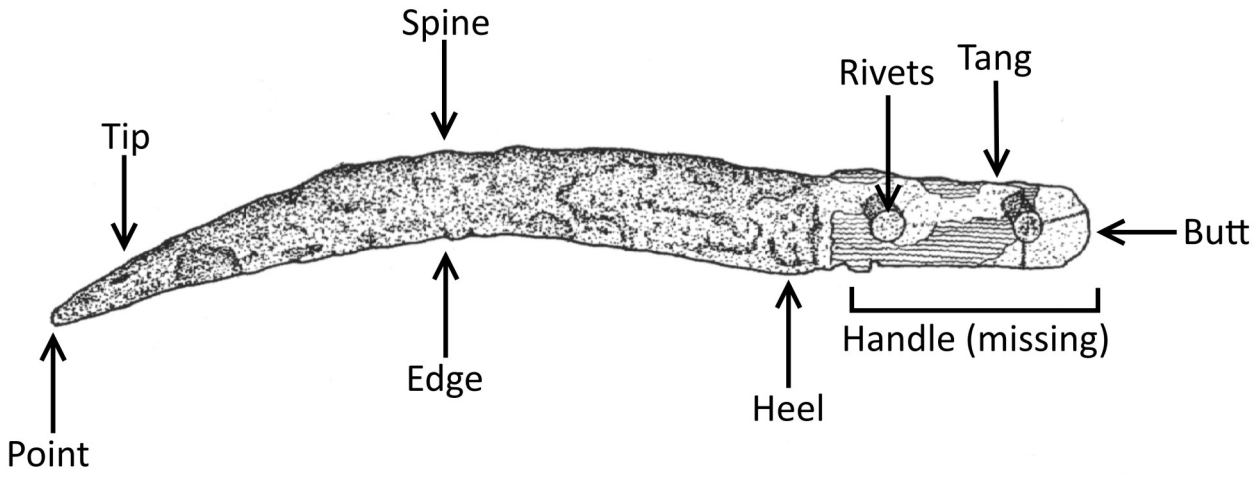


Figure 49. The anatomy of a knife

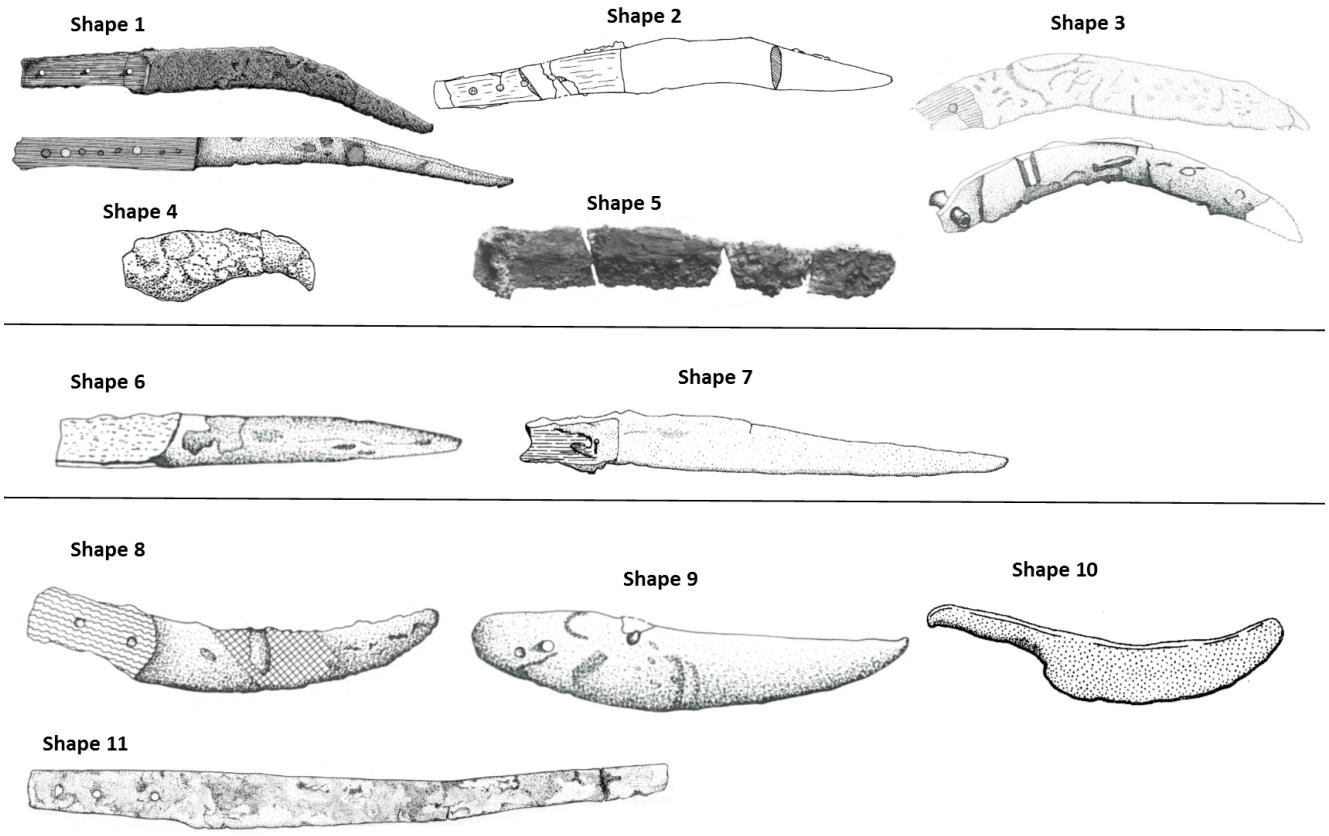
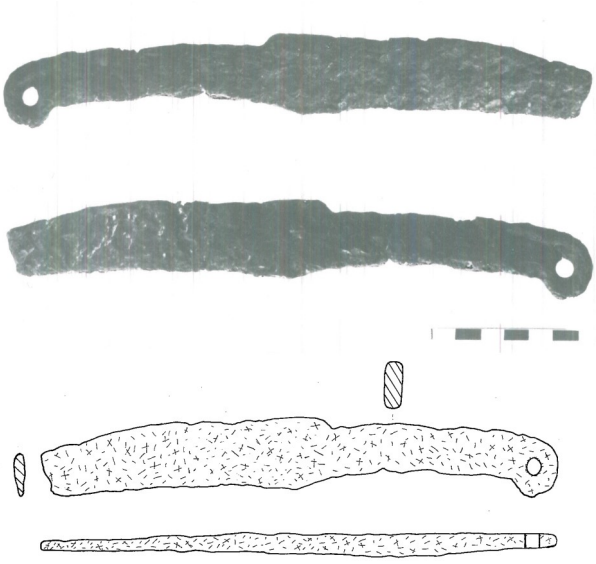
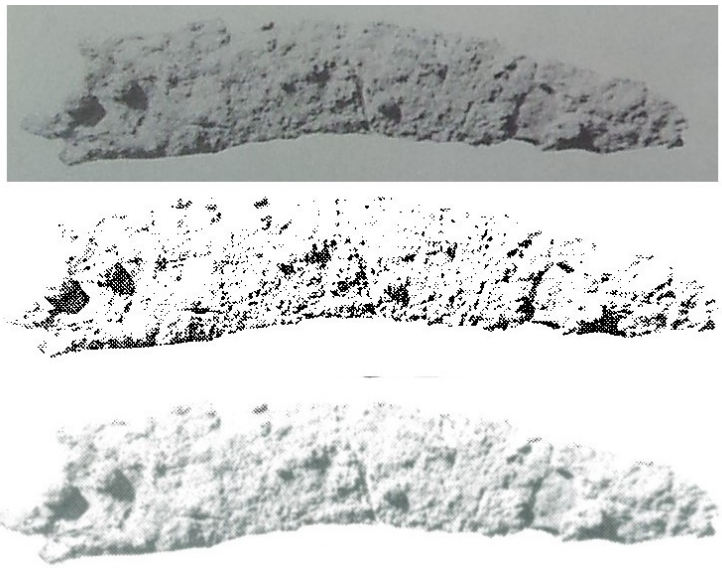


Figure 50. Iron knife typology

Shape 1



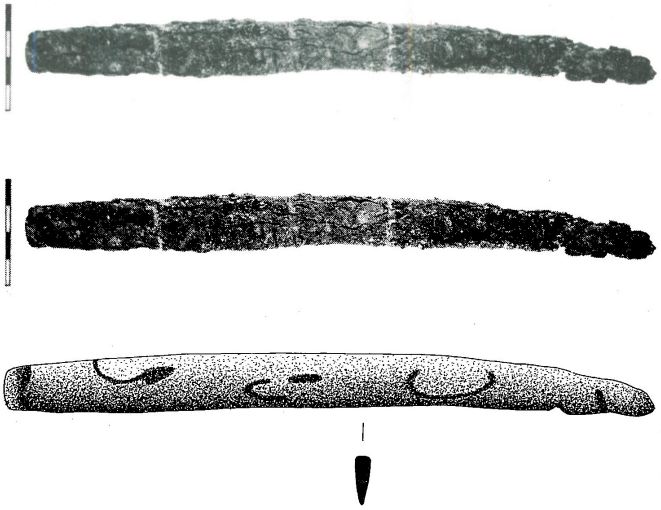
C.20, Enkomi Tomb 108



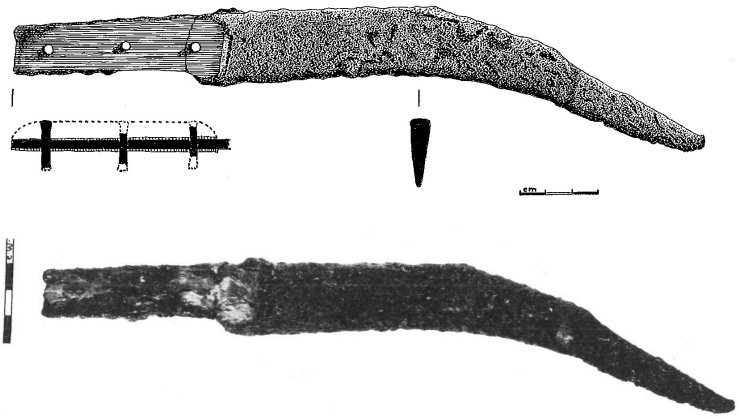
C.180, Enkomi Q.6W

Figure 51a
Iron knives of Cyprus
(see Table 8 for references)

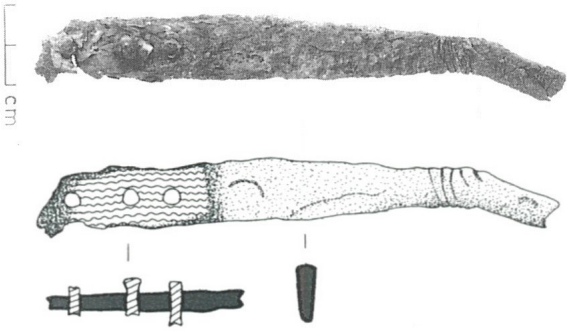
Shape 1



C.330, Kition Area II



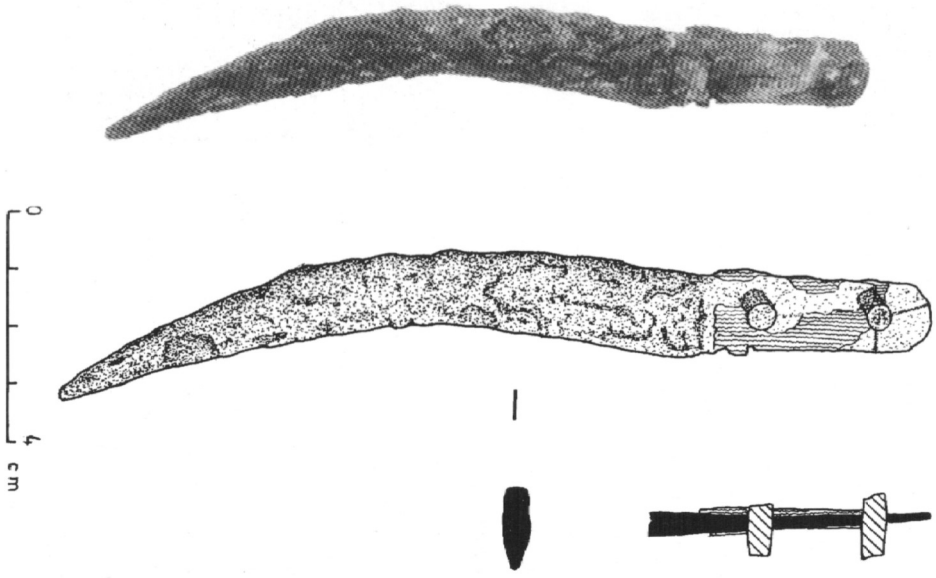
C.380, Salamis Tomb 1



C.420, Kouklia Skales Tomb 89



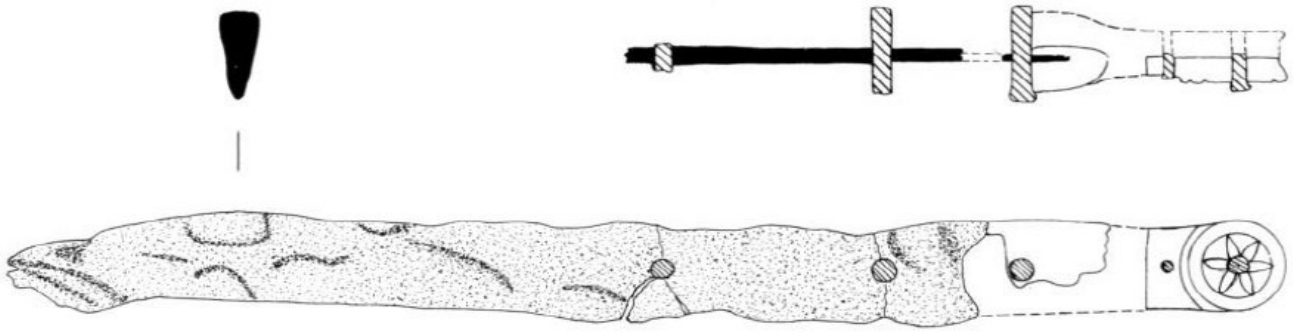
C.470, Lapithos Tomb 420



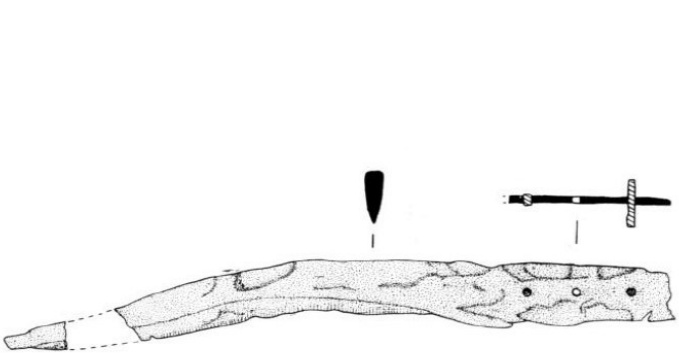
C.490, Palaepaphos Xylinos Tomb 132

Figure 51b
Iron knives of Cyprus
(see Table 8 for references)

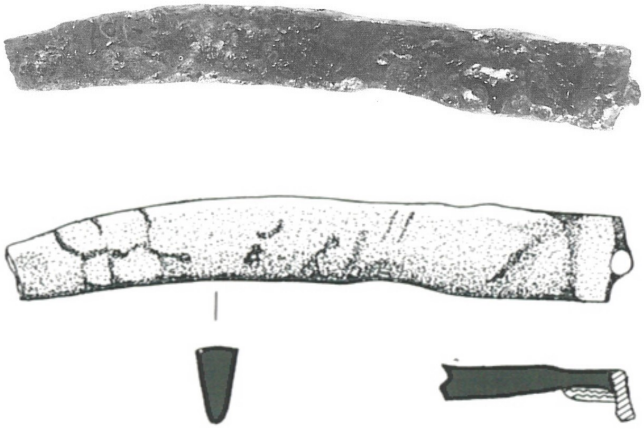
Shape 1



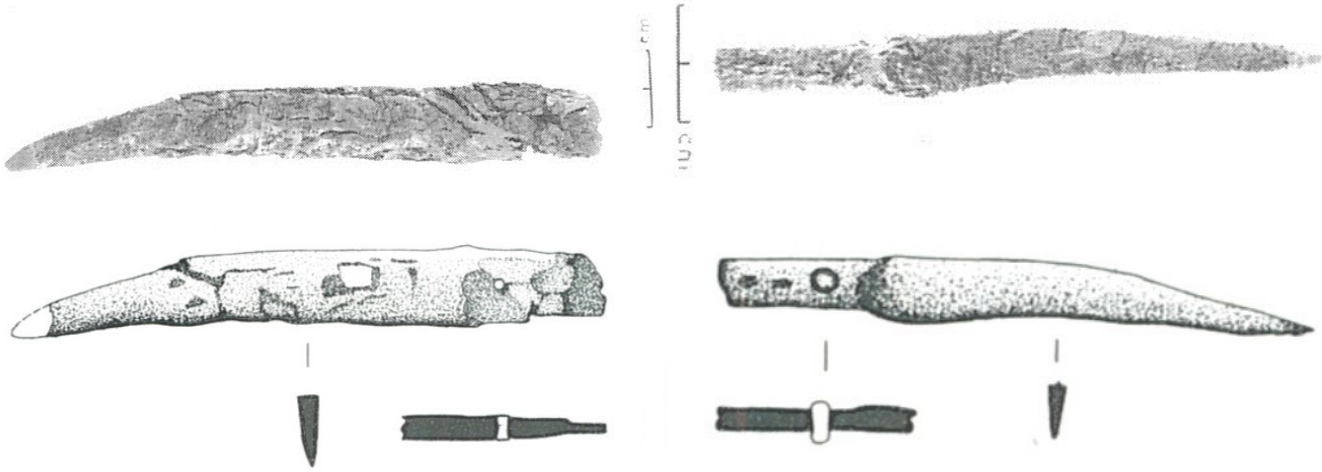
C.540, Amathus Tomb 523



C.550, Amathus Tomb 523



C.570, Kouklia Skales Tomb 49

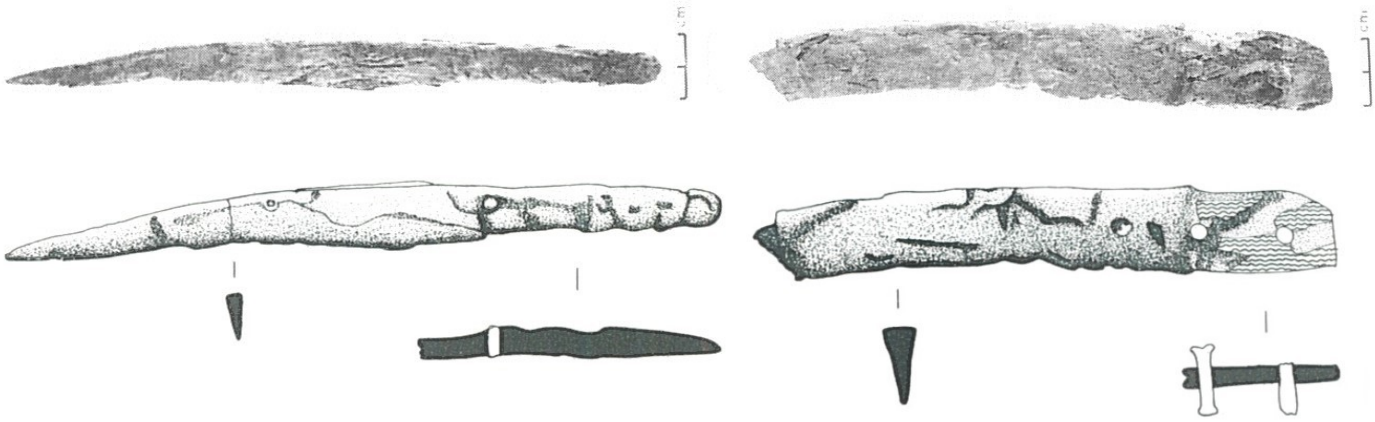


C.590 Kouklia Skales Tomb 76

C.610 Kouklia Skales Tomb 76

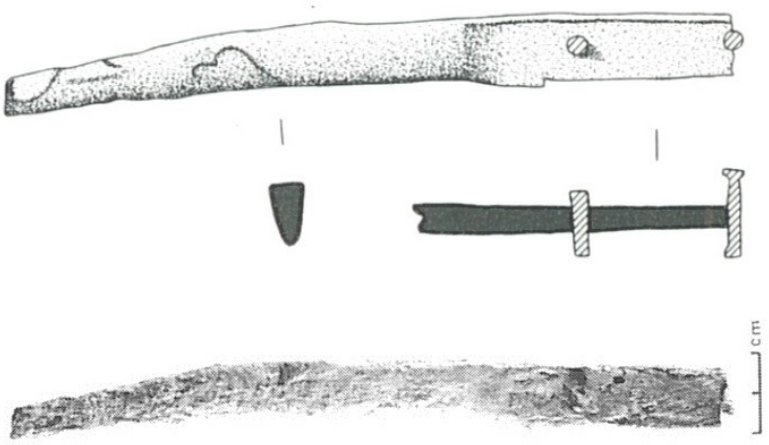
Figure 51c
Iron knives of Cyprus
(see Table 8 for references)

Shape 1

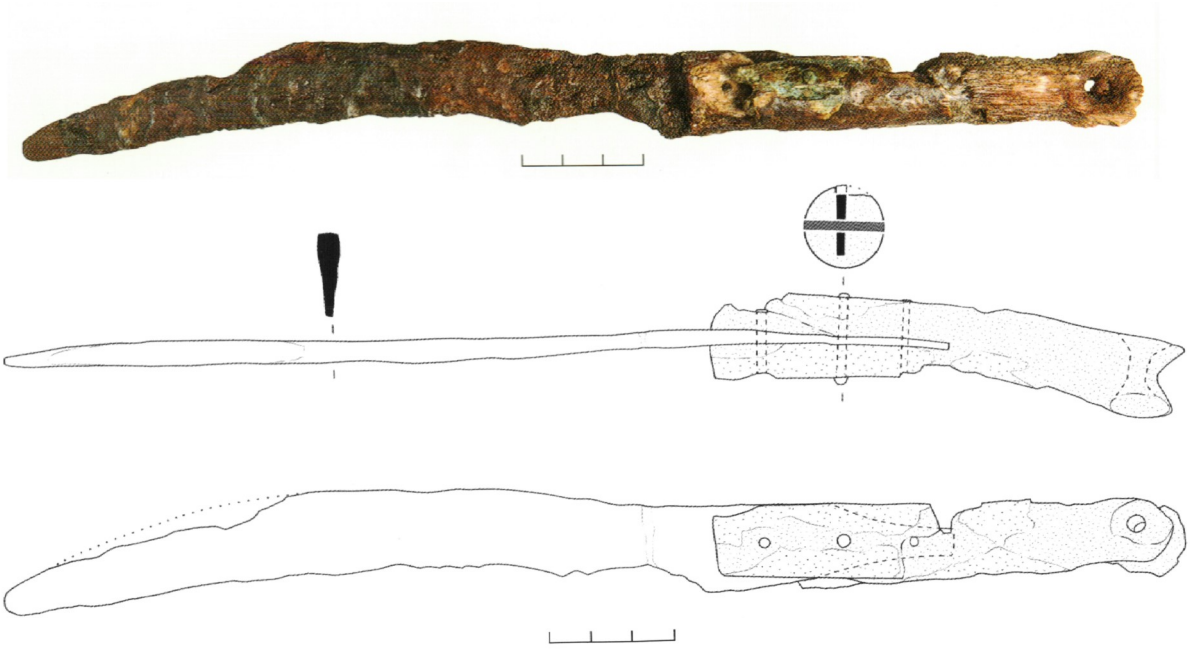


C.600 Kouklia Skales Tomb 76

C.620 Kouklia Skales Tomb 76



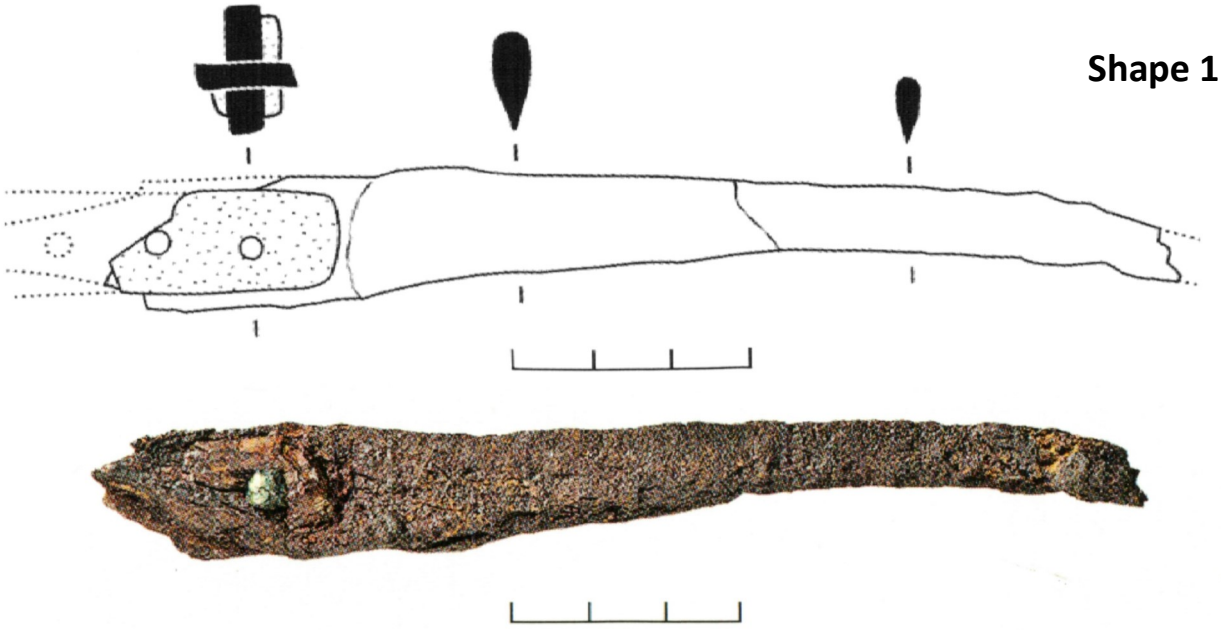
C.630 Kouklia Skales Tomb 76



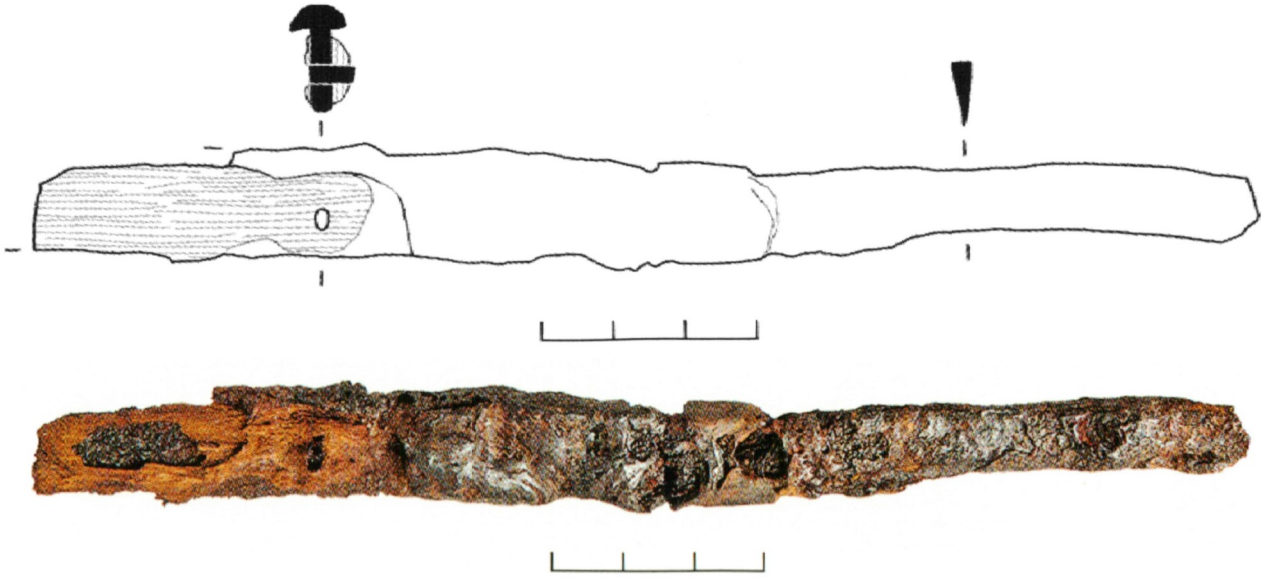
C.660 Palaepaphos Plakes Tomb 142

Figure 51d
Iron knives of Cyprus
(see Table 8 for references)

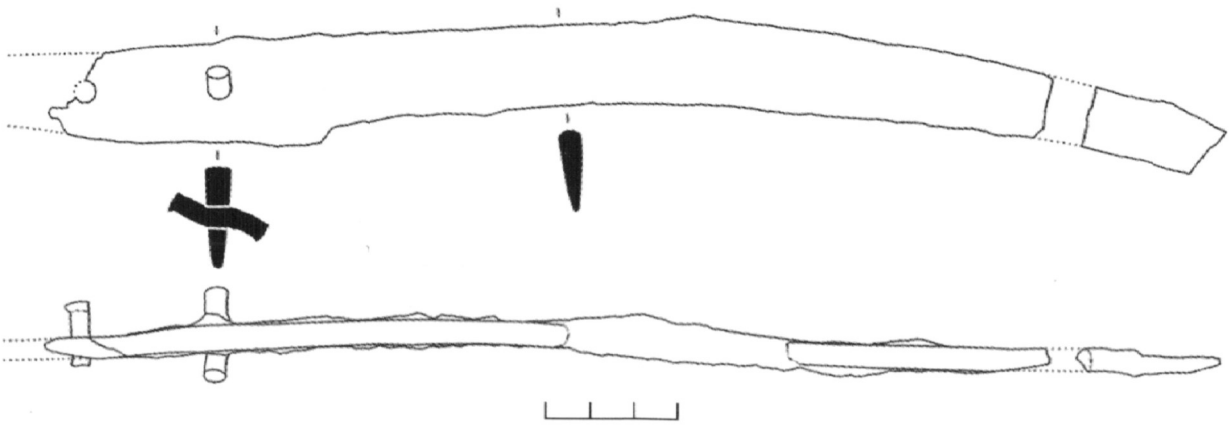
Shape 1



C.680 Palaepaphos Plakes Tomb 144



C.690 Palaepaphos Plakes Tomb 144



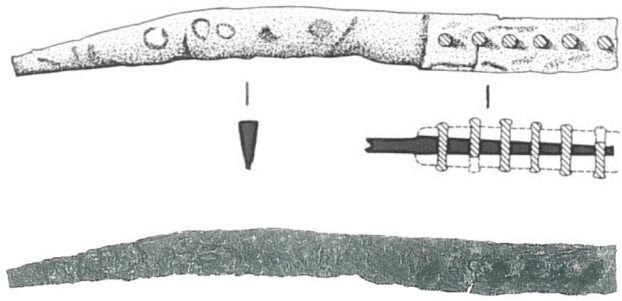
C.780 Palaepaphos Plakes Tomb 146

Figure 51e
Iron knives of Cyprus
(see Table 8 for references)

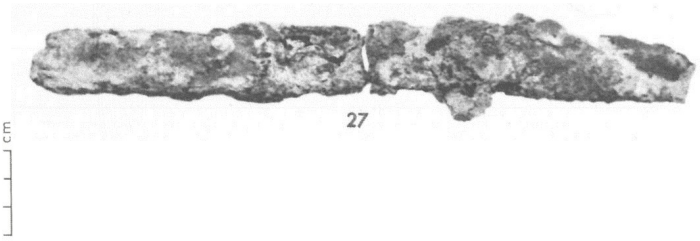
Shape 1



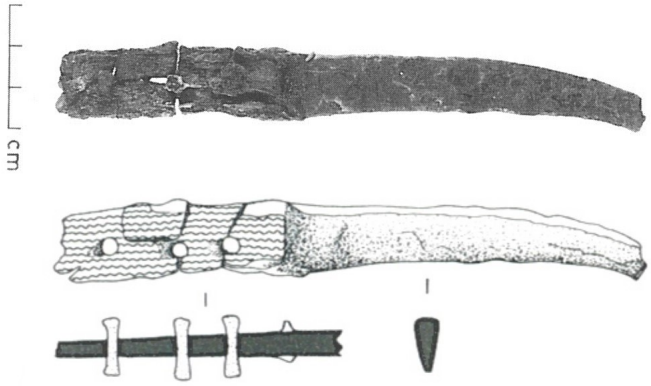
C.700 Palaepaphos Plakes Tomb 144



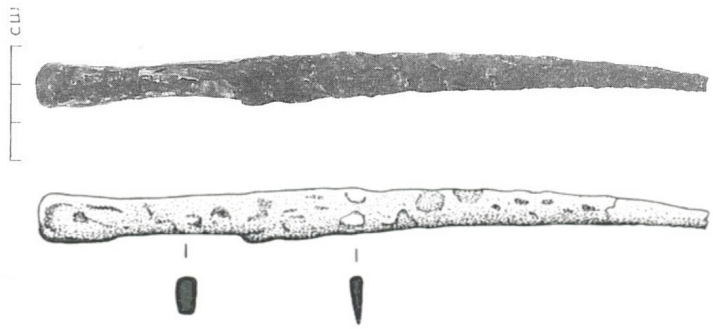
C.800 Kouklia Skales Tomb 48



C.810 Lapithos Plakes Tomb 602



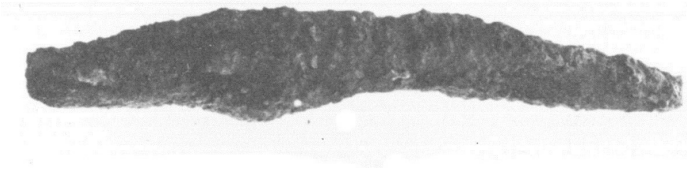
C.830 Kouklia Skales Tomb 83



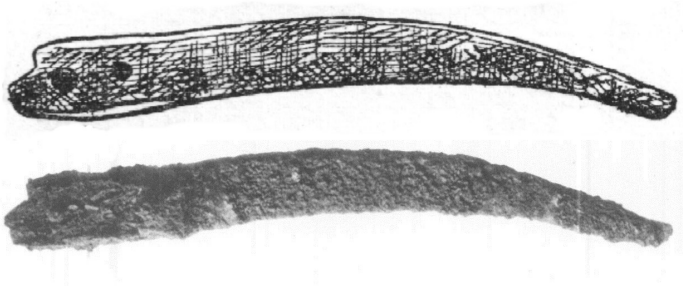
C.820 Kouklia Skales Tomb 83

Figure 51f
Iron knives of Cyprus
(see Table 8 for references)

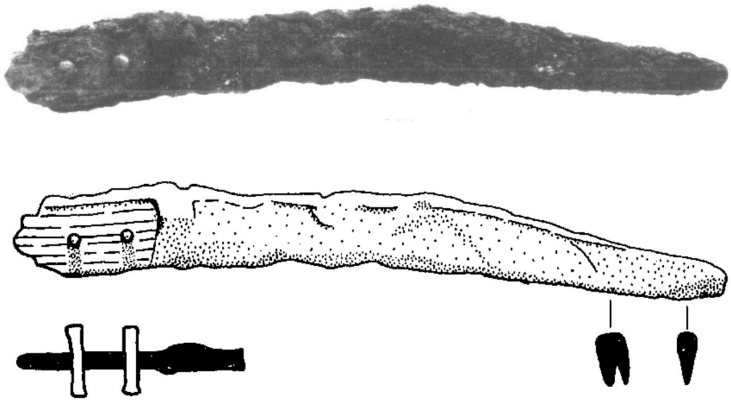
Shape 1



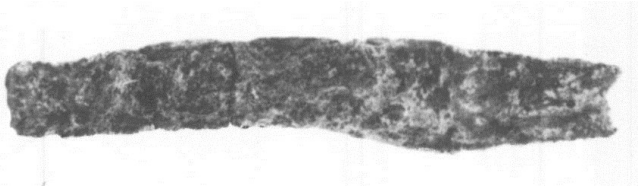
C.870 Amathus Tomb 19



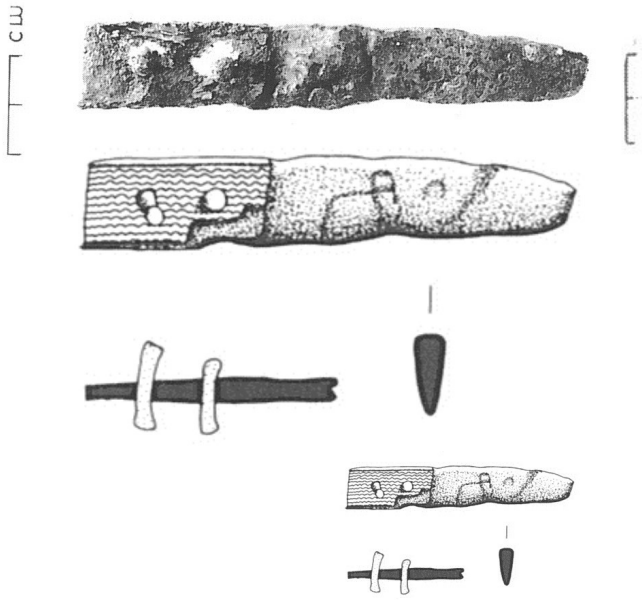
C.910 Lapithos Kastros Tomb 409



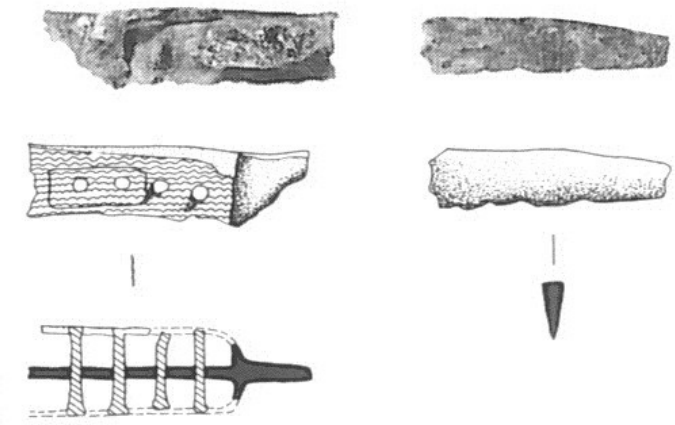
C.960 Amathus Tomb 311



C.990 Amathus Tomb 329



C.1000 Kouklia Skales Tomb 63

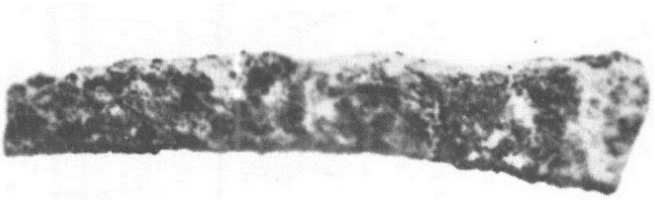


C.1140 Amathus Tomb 310

Figure 51g
Iron knives of Cyprus
(see Table 8 for references)

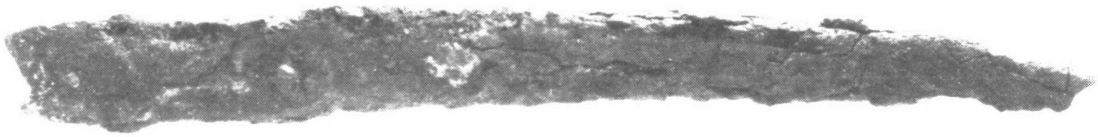
Shape 1

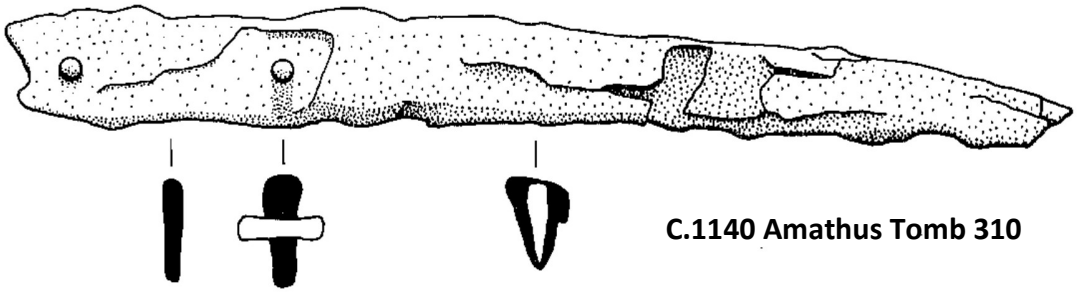




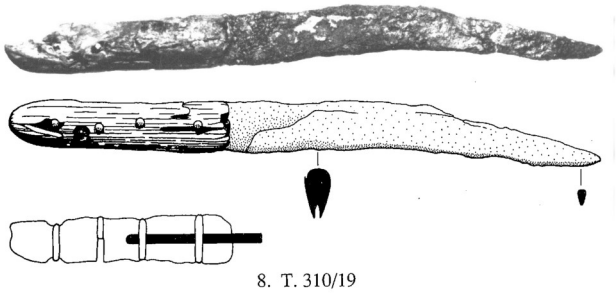
C.1110 Amathus Tomb 23

C.1050 Palaepaphos Plakes Tomb 145

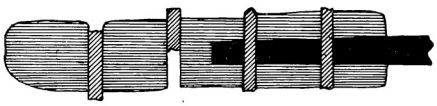




C.1140 Amathus Tomb 310



8. T. 310/19



C.1120 Amathus Tomb 310

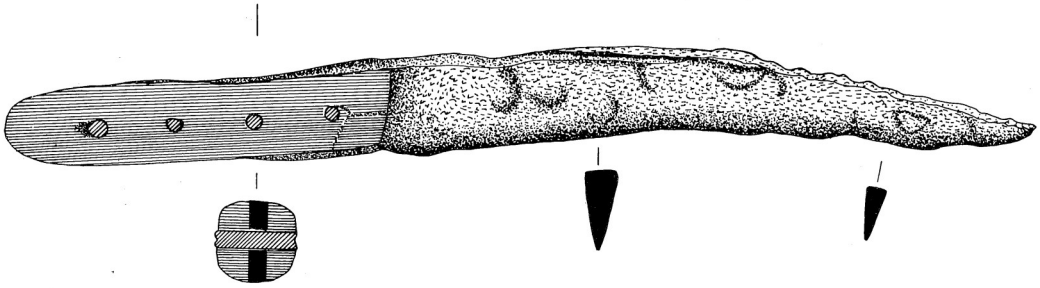
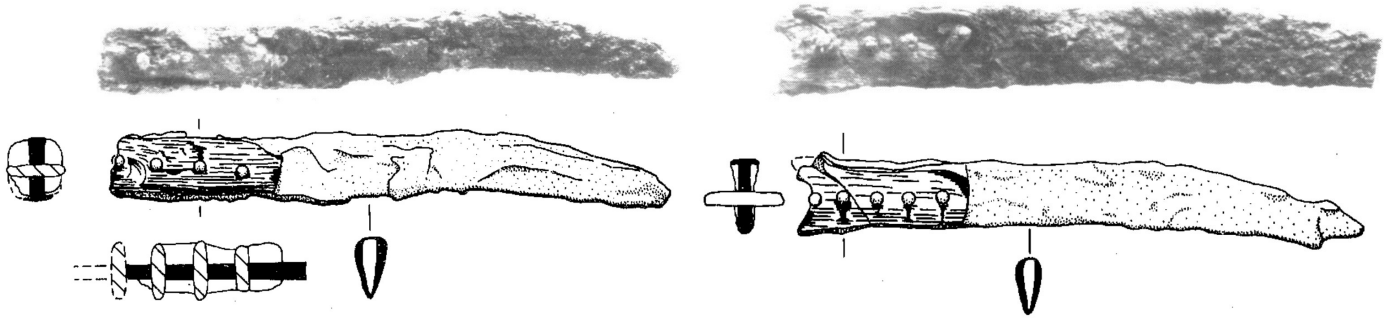


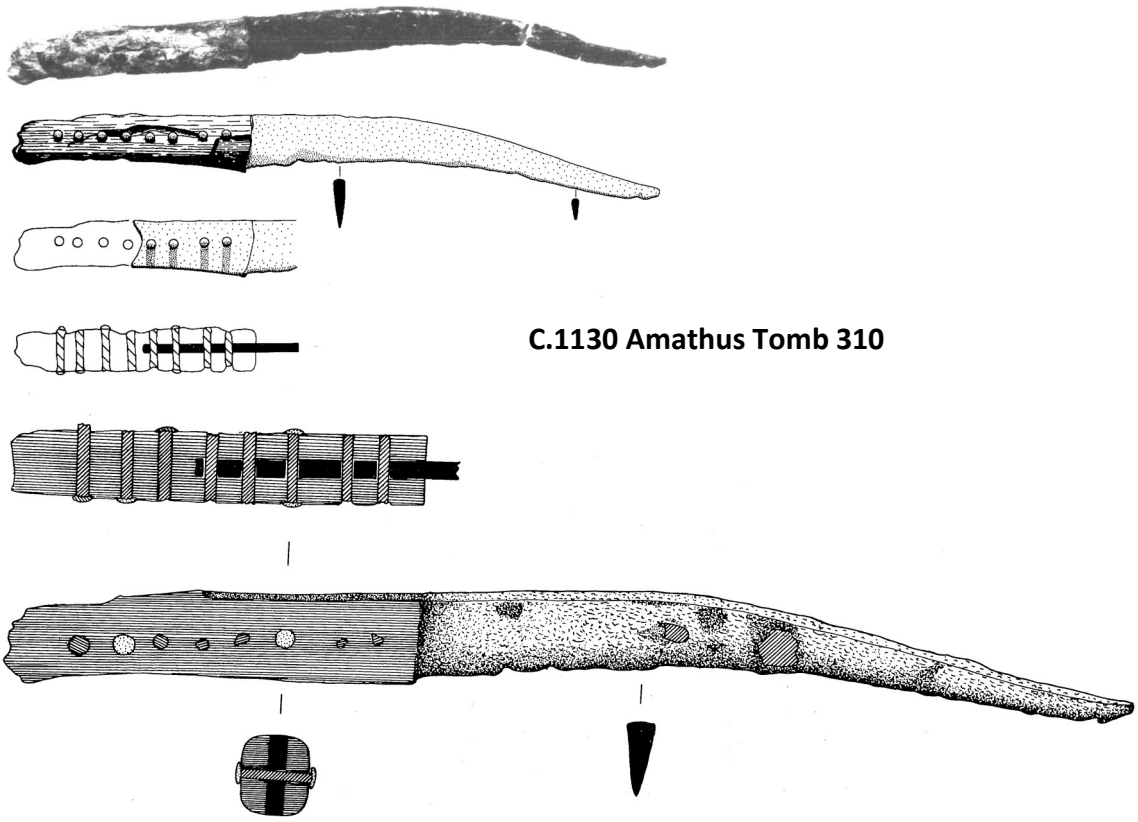
Figure 51h
Iron knives of Cyprus
(see Table 8 for references)

Shape 1

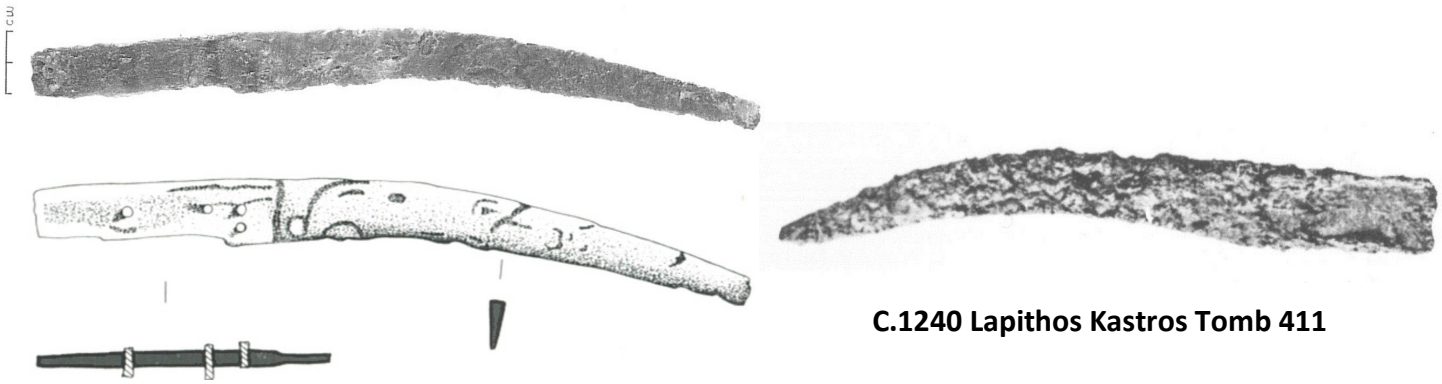


C.1160 Amathus Tomb 313

C.1170 Amathus Tomb 313



C.1130 Amathus Tomb 310

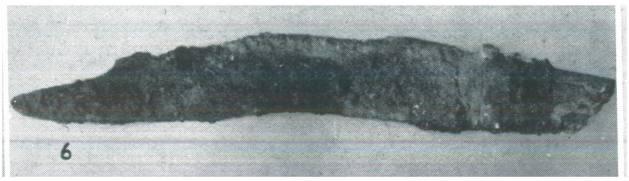


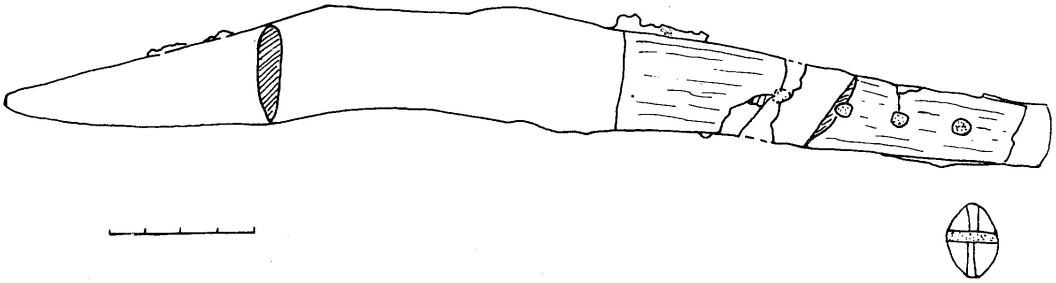
C.1240 Lapithos Kastros Tomb 411

C.1230 Kouklia Skales Tomb 64

Figure 51i
Iron knives of Cyprus
(see Table 8 for references)

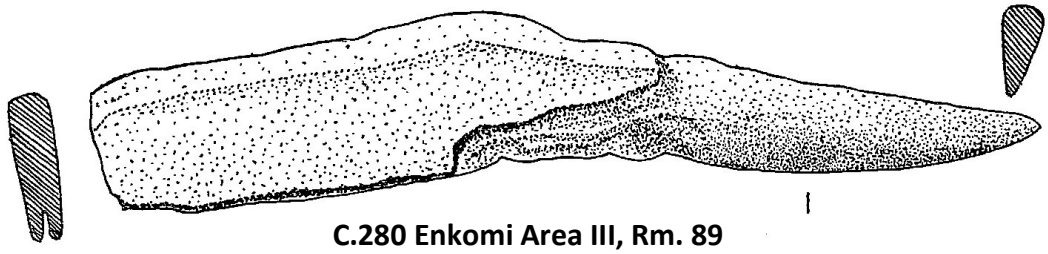
Shape 2



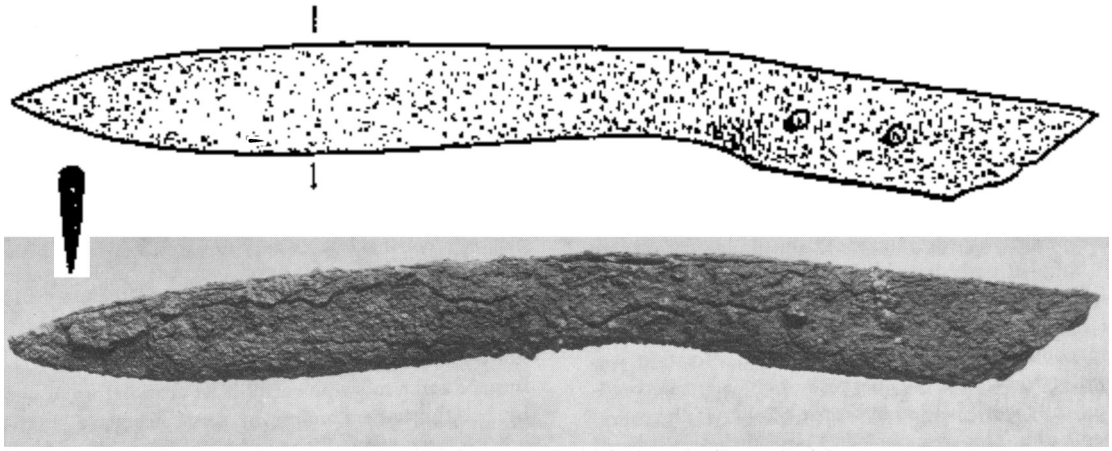




C.40 Enkomi Tomb 58

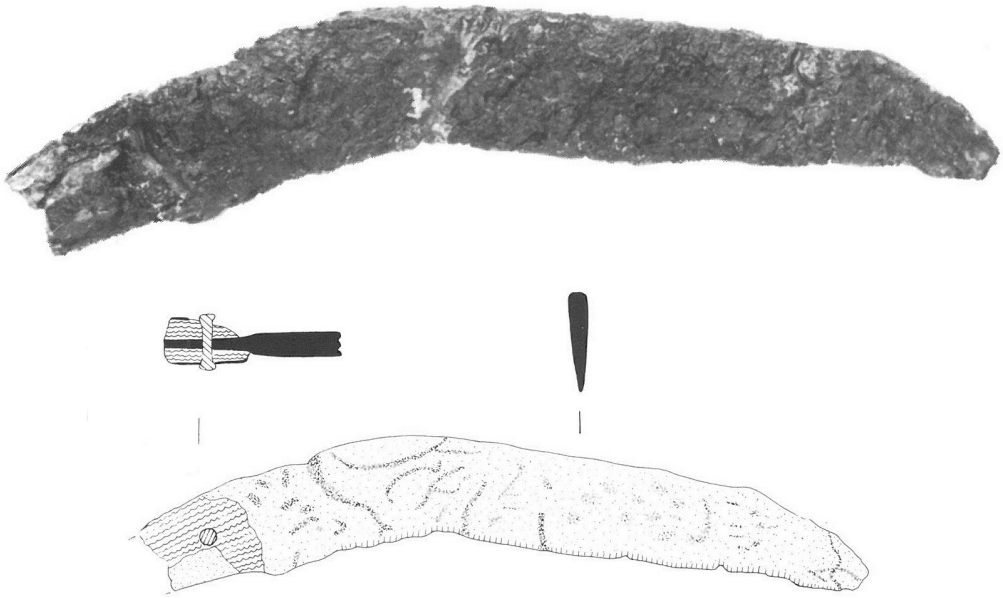


C.280 Enkomi Area III, Rm. 89

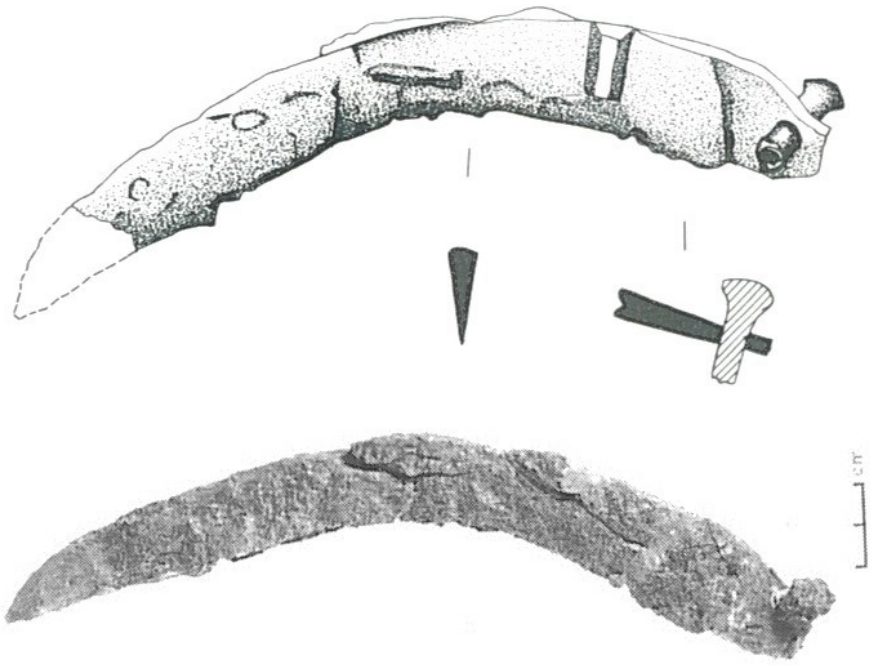


C.290 Idalion, North of Rm. XLVIII

Figure 51j
Iron knives of Cyprus
(see Table 8 for references)

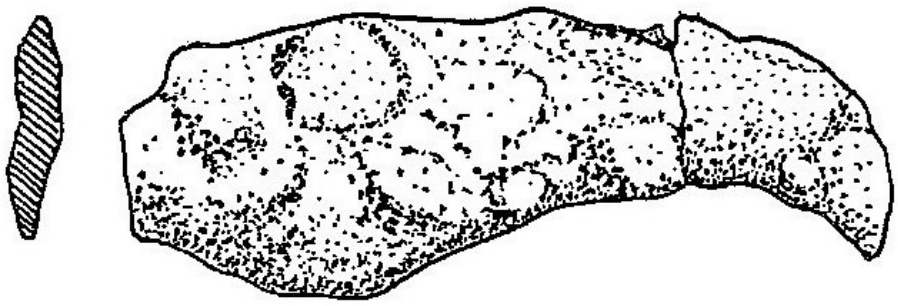


C.10 Kouklia Eliomylia Tomb 119

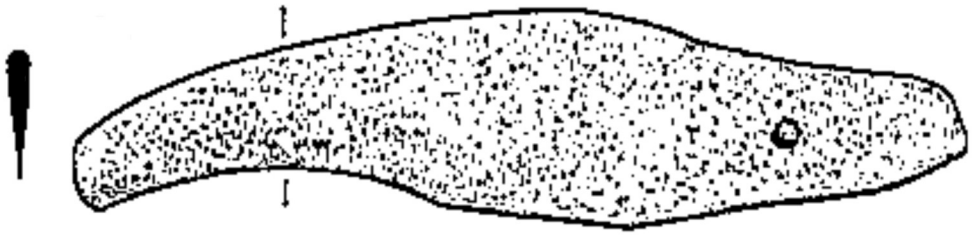


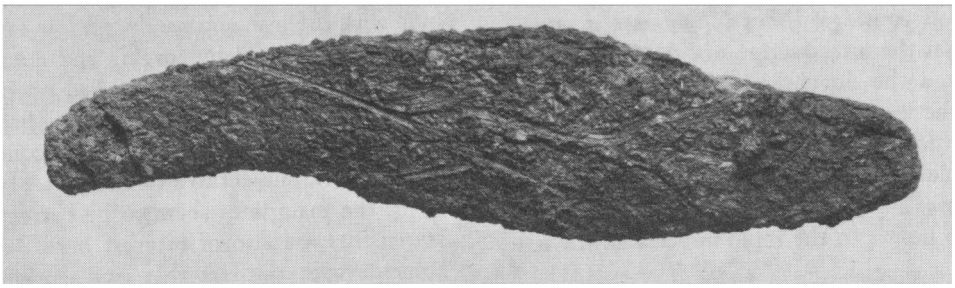
C.640 Kouklia Skales Tomb 76

Figure 51k
Iron knives of Cyprus
(see Table 8 for references)



C.250 Enkomi Area I, Ashlar Building





C.310 Idalion Room XXXV A

Figure 51l
Iron knives of Cyprus
(see Table 8 for references)

Shape 5

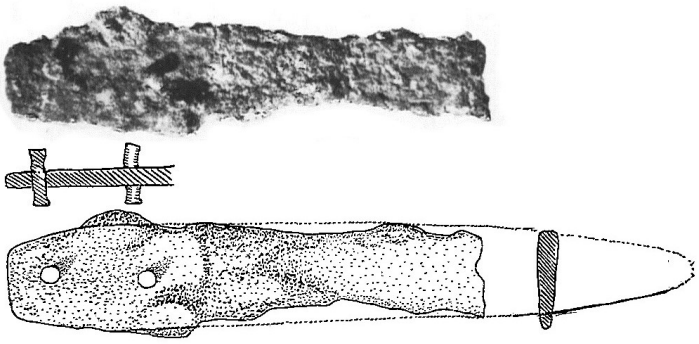


C.350 Kourion Kaloriziki Tomb 19

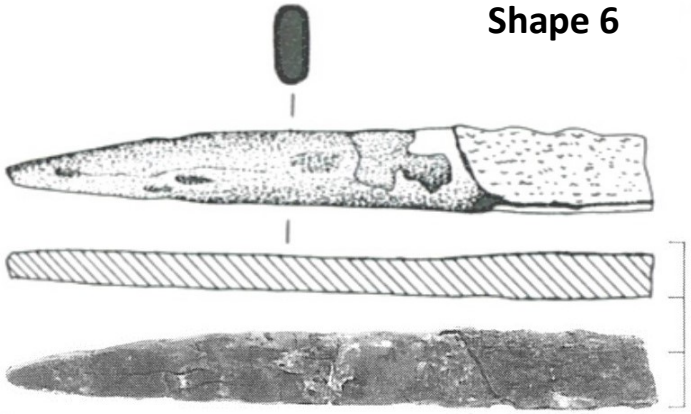


C.400 Kourion Tomb 19

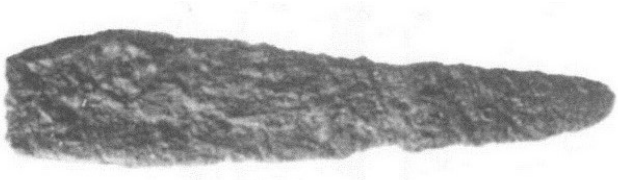
Shape 6



C.260 Enkomi Area I, Ashlar Building Rm. 13



C.840 Kouklia Skales Tomb 83

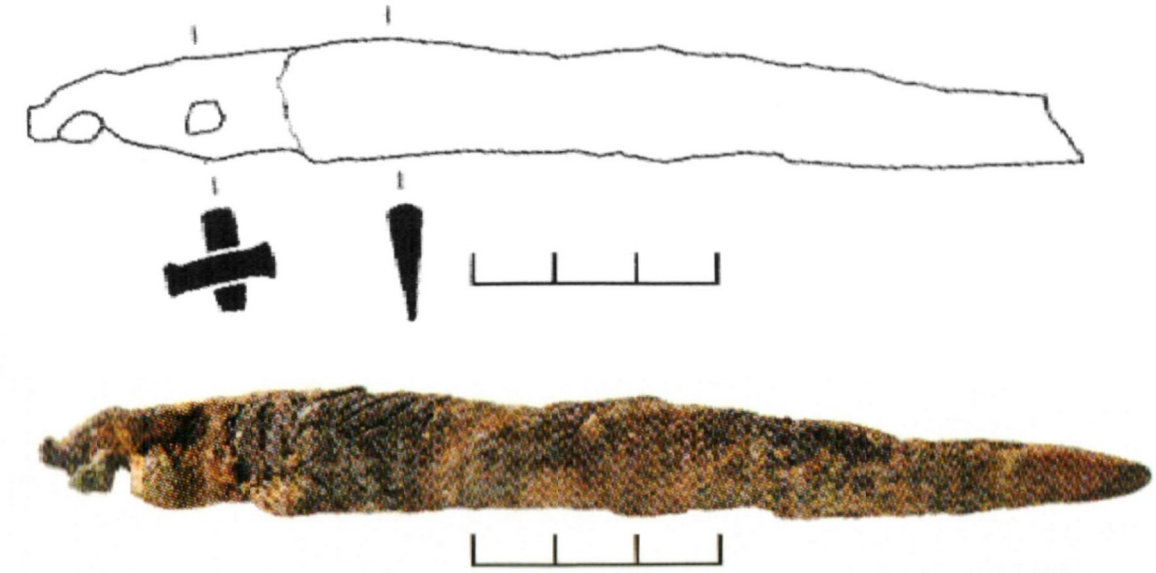


C.920 Lapithos Kastros Tomb 409

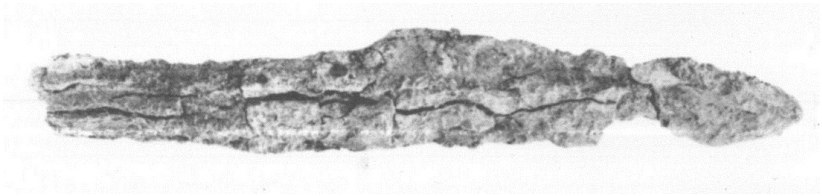


C.1040 Myrtou-Pighades, Kastro deposit

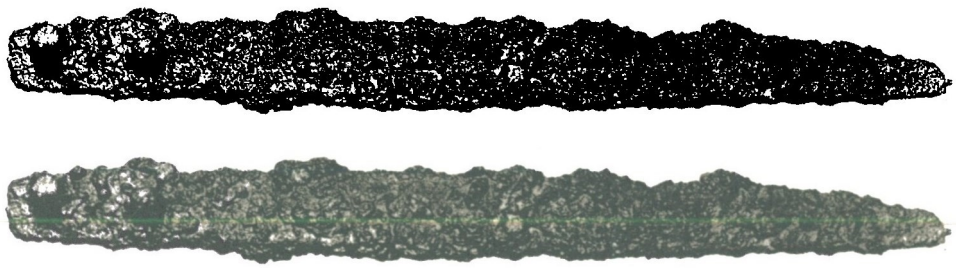
Figure 51m
Iron knives of Cyprus
(see Table 8 for references)



C.1060 Palaepaphos Plakes Tomb 145



C.1220 Amathus Tomb 21



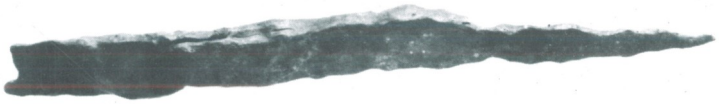
C.1250 Lapithos Kastros Tomb 429

Figure 51n
Iron knives of Cyprus
(see Table 8 for references)

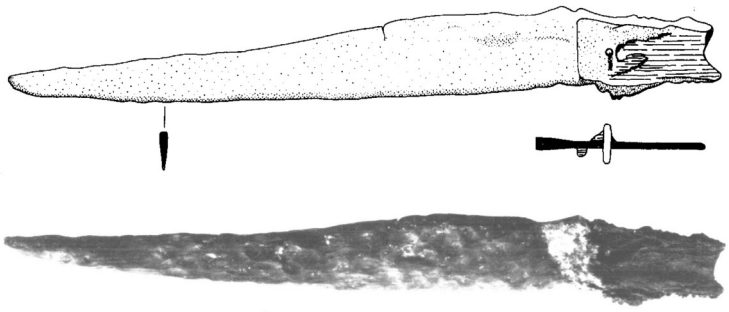
Shape 7



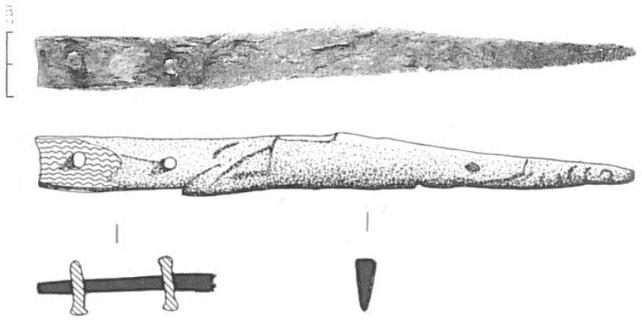
C.880 Amathus Tomb 6



C.1070 Amathus Tomb 379



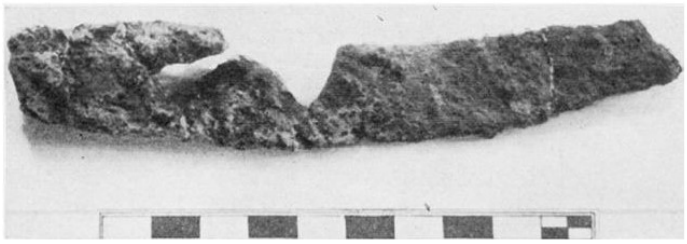
C.1180 Amathus Tomb 313



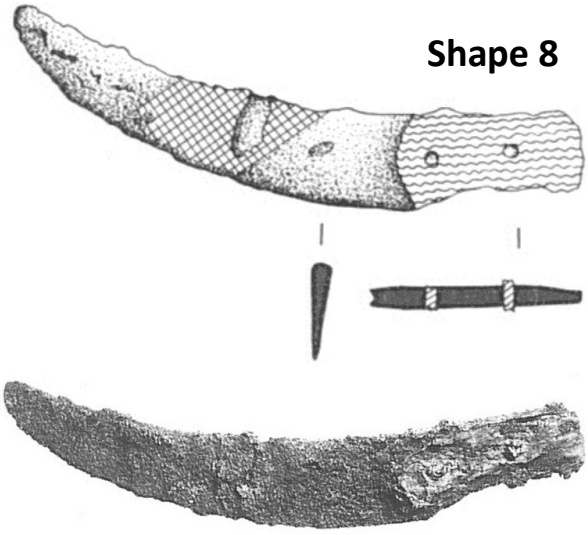
C.1200 Kouklia Skales Tomb 79, lower burial

Shape 8

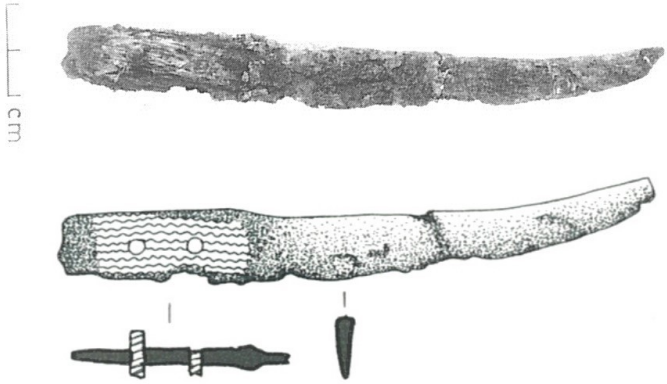




C.210 Kourion Bamboula Area A, Rm. 20



C.410 Kouklia Skales Tomb 84



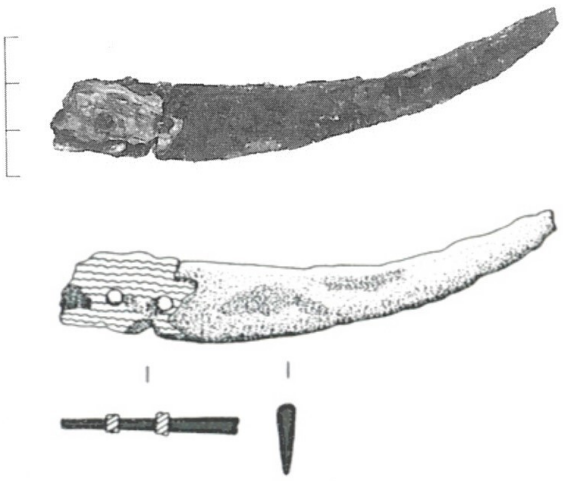
C.430 Kouklia Skales Tomb 89



C.460 Kourion Kaloriziki Tomb 39

Figure 51o
Iron knives of Cyprus
(see Table 8 for references)

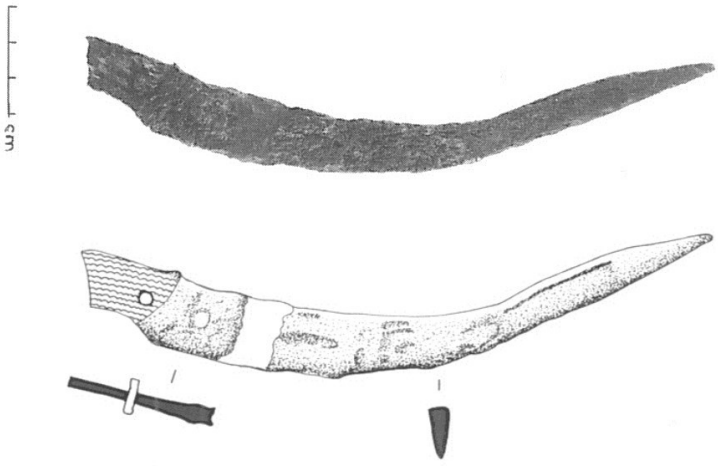
Shape 8

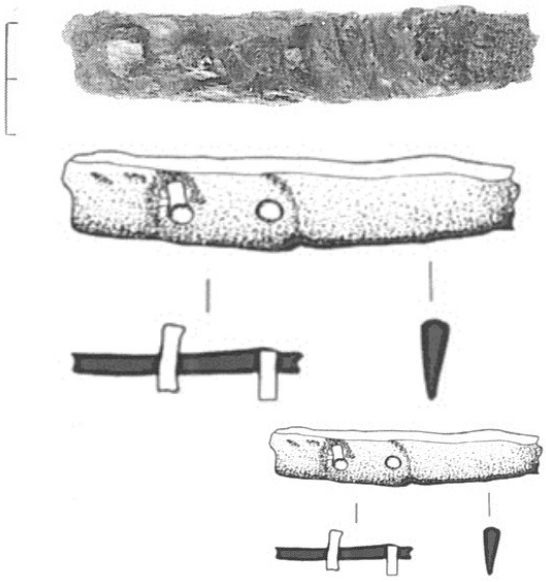




C.950 Lapithos Plakes Tomb 601

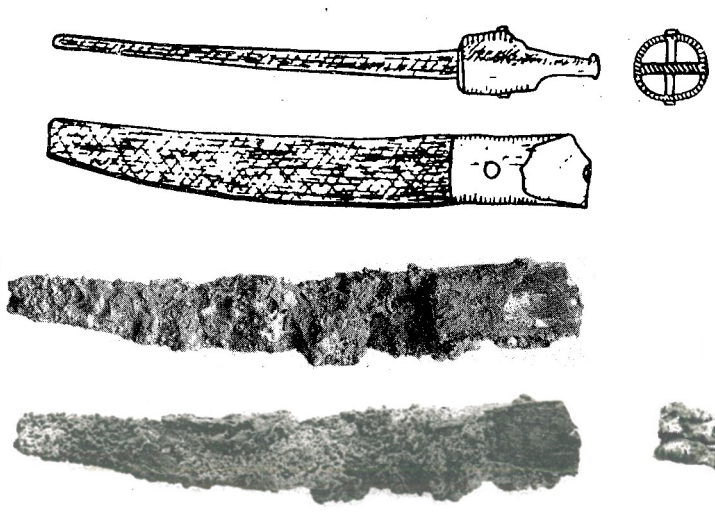
C.850 Kouklia Skales Tomb 83

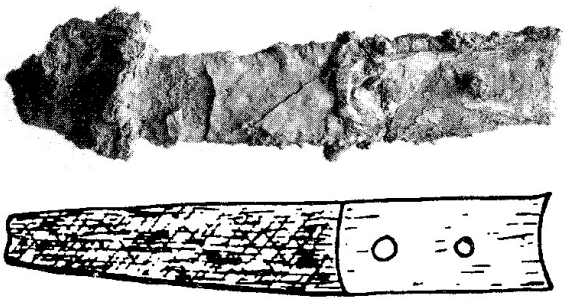




C.1030 Kouklia Skales Tomb 80

C.1020 Kouklia Skales Tomb 77





C.1090 Ktima Tomb VIII

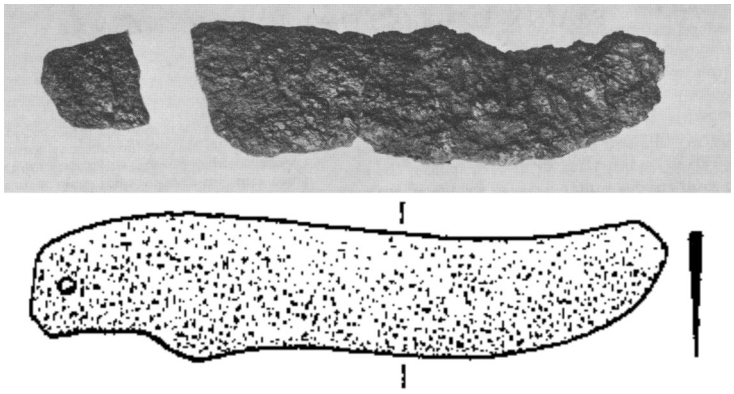
C.1080 Ktima Tomb VIII



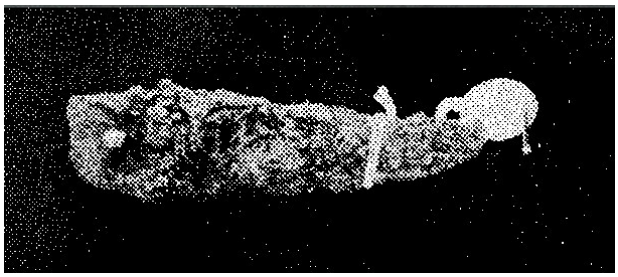
C.1270 Amathus Tomb 7

Figure 51p
Iron knives of Cyprus
(see Table 8 for references)

Shape 9



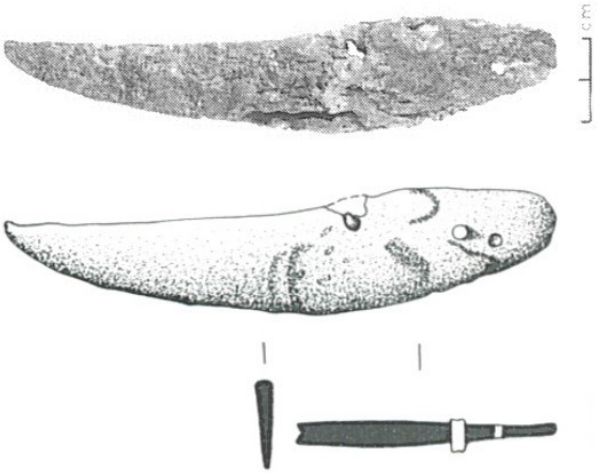
C.300 Idalion near cult house



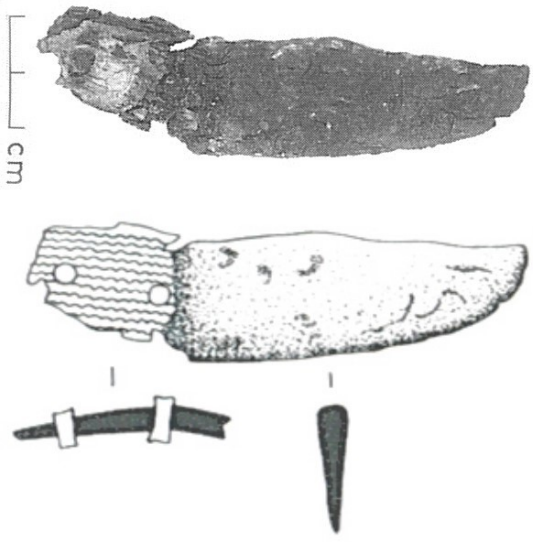
C.320 Katydhata Tomb 89



C.360 Kourion Kaloriziki Tomb 19



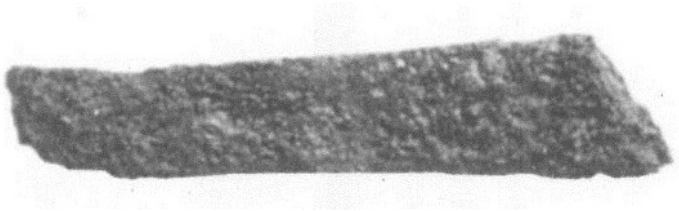
C.650 Kouklia Skales Tomb 76



C.770 Kouklia Skales Tomb 48

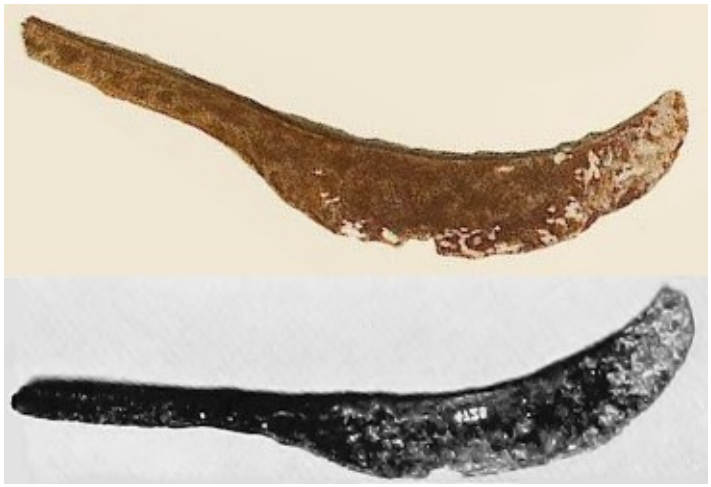
Figure 51q
Iron knives of Cyprus
(see Table 8 for references)

Shape 10

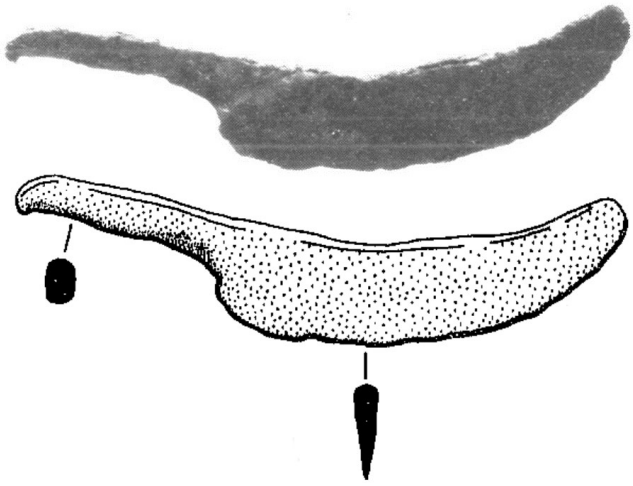


C.930 Lapithos Kastros Tomb 409

Shape 11



C.1190 Kition, Cesnola Collection



C.970 Amathus 311

Figure 51r
Iron knives of Cyprus
(see Table 8 for references)

Central Europe

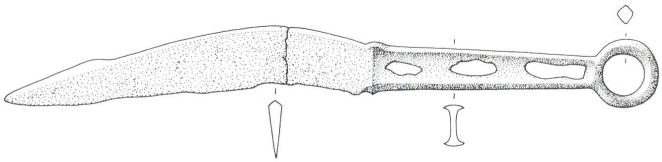


Bavaria, no. 1.1

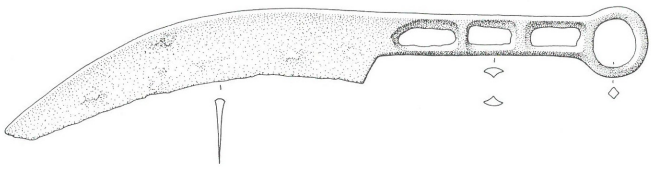


Baierdorf, no. 1.2

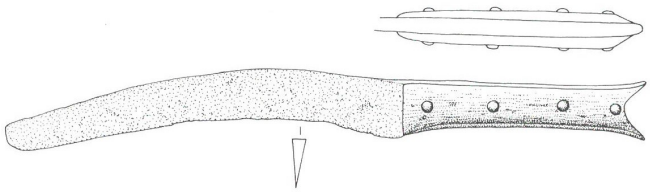
Italy



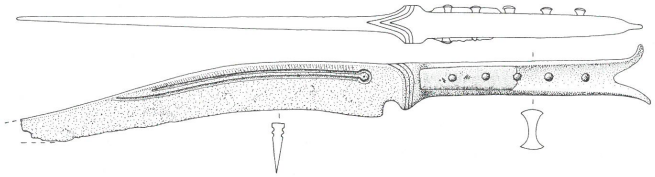
Verona province, Baierdorf type, no. 1.3



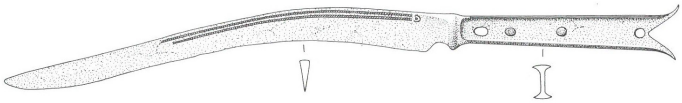
Area around Venice, Montegiorgio type, no. 1.4



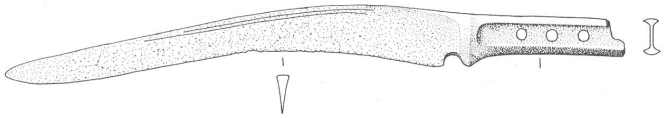
Scoglio del Tonno, no. 1.5



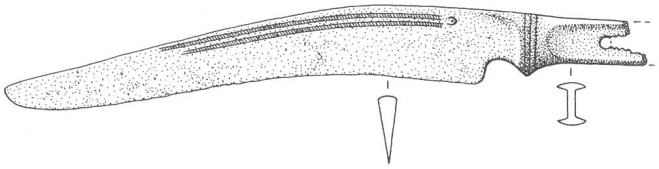
Monte Tesoro, Matrei type, no. 1.6



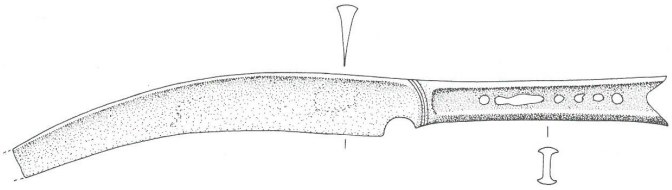
Celano, Matrei type, no. 1.7



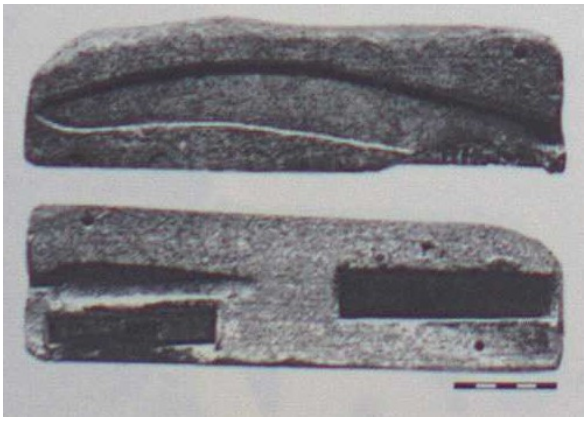
Celano, Matrei type, no. 1.8



Ortucchio, Matrei type, no. 1.9



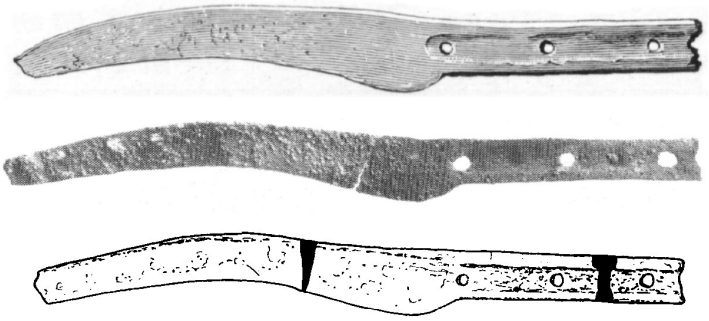
Torbole, Matrei type, no. 1.10



Knife mould, Rocca Vecchia, Apulia, no. 1.11

Figure 52. Shape 1 antecedents: Central Europe and Italy (Karageorghis 1971, Figs. 82a.D, F; Bianco Peroni 1976, Pls. 1.6, 7; 2.16, 23; 3.28, 29, 31, 32; Bietti Sestieri 2008, fig. 18) (see Table 12 for references)

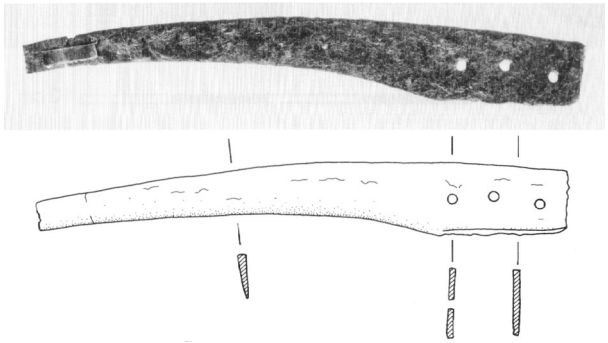
The Greek Mainland



Mycenae, no. 1.12



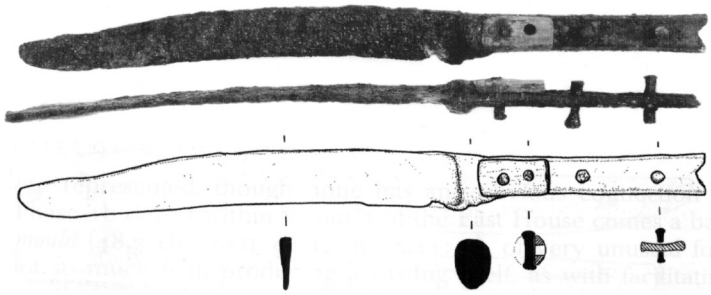
Oxylithos, Euboia, no. 1.14



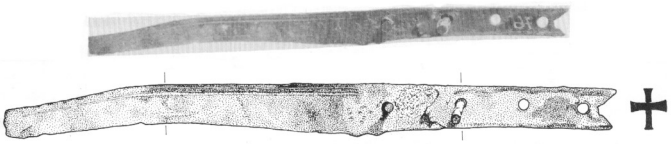
Aigera, Achaea, no. 1.15



Mycenae, no. 1.16

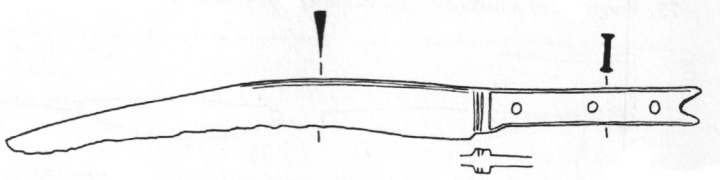


Lefkandi, Euboea, no. 1.18

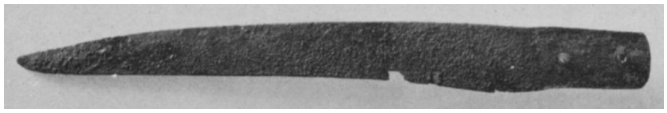


Mitopolis, Achaea, no. 1.17

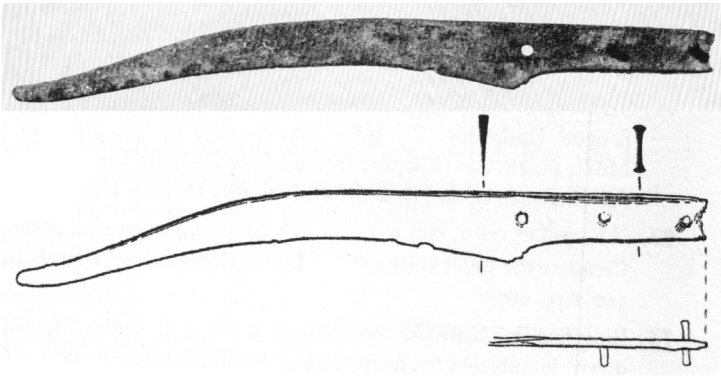
Crete



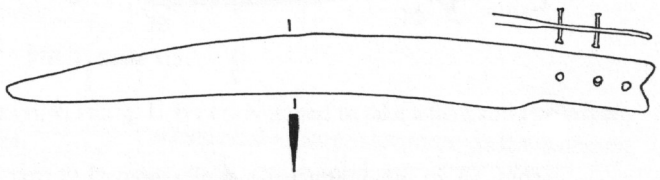
Dictaean Cave, no. 1.20



Upper Gypsades, no. 1.19



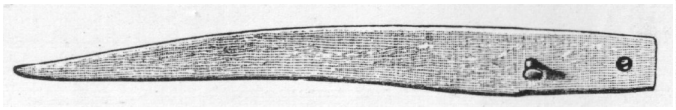
Dictaean Cave, no. 1.22



Dictaean Cave, no. 1.21

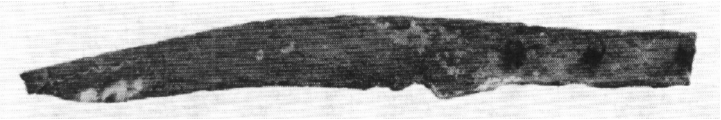
Figure 53. Shape 1 antecedents: Mainland Greece and Crete (Blegen et al. 1973, fig. 230.4; Sandars 1956, pL. 2.4; Xénaki-Sakellariou 1985, pls. 35, 97; Papavasileiou 1910, fig. 17; Alram-Stern 2006, pls. IX, 23; Papadopoulos 1979, figs. 308 (e.), 343 (b)) (see Table 12 for references)

The Cyclades



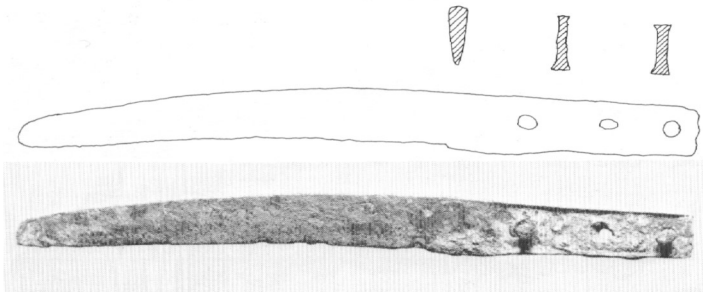
Syros, no. 1.24

Kos

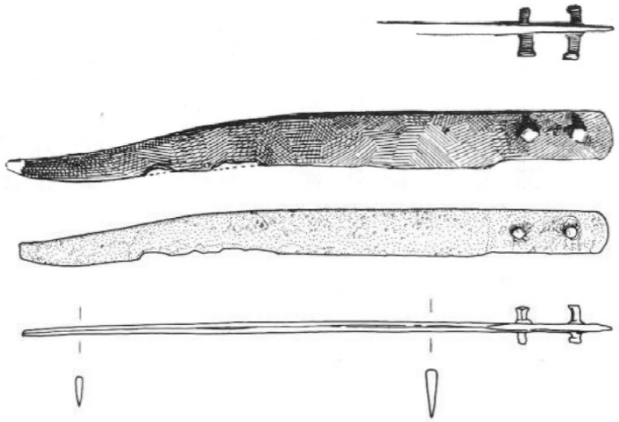


Serraglio, no. 1.25

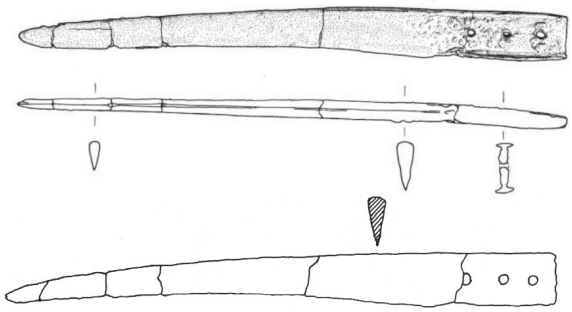
Rhodes



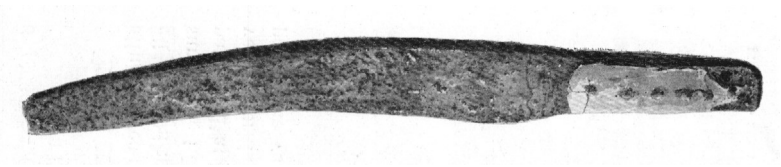
Ta Tzingani, Kattavia, no. 1.26



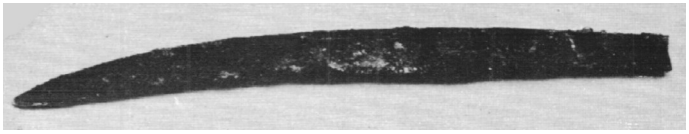
Apsaktiras, no. 1.27



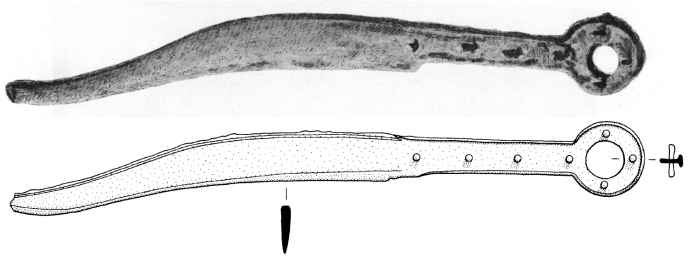
Apsaktiras, no. 1.28



Ialysos, no. 1.29



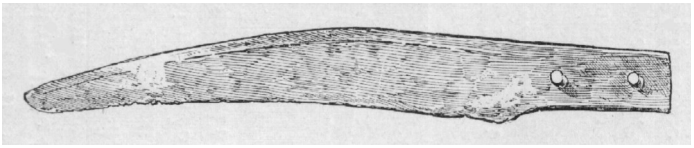
Ialysos, no. 1.30



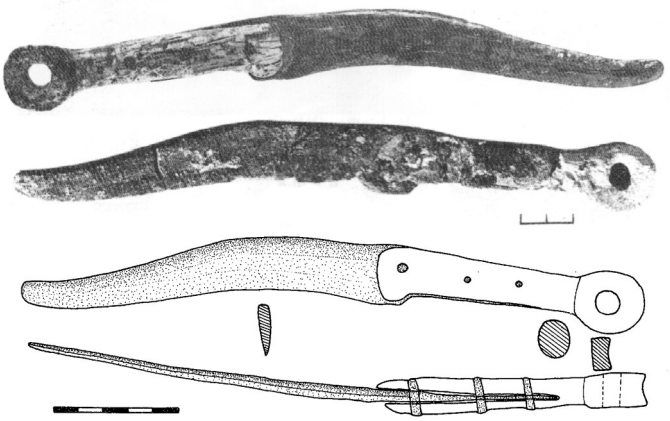
Ialysos, no. 1.31

Figure 54. Shape 1 antecedents: the Cyclades, Kos, and Rhodes (Dietz 1984, figs. 62, 108; Dietz et. al. 2015, 35, pl. 8; Maiuri 1923-1924, figs. 70, 147; Maiuri 1926, fig. 101; Macdonald 1986, fig. 7; Deshayes 1960, 321-322, pl. XLIV) (see Table 12 for references)

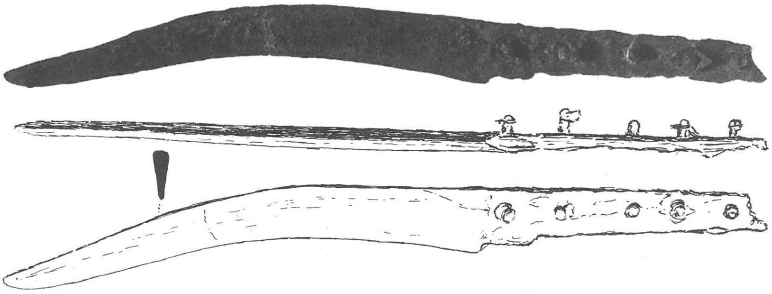
Cyprus, Iberian Peninsula, Levant



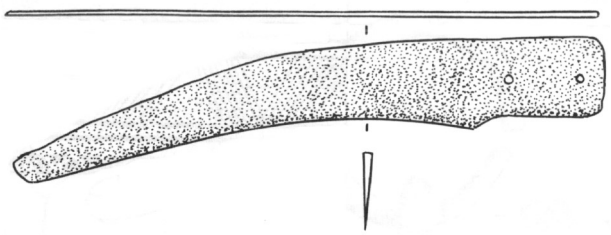
Sinda, no. 1.32



Enkomi, no. 1.33



Sinda, no. 1.34



Redondela, Pontevedra, Spain, no. 1.35



Megiddo, no. 1.37



Tell es-Sa'idiyeh, no. 1.38



Megiddo, no. 1.41



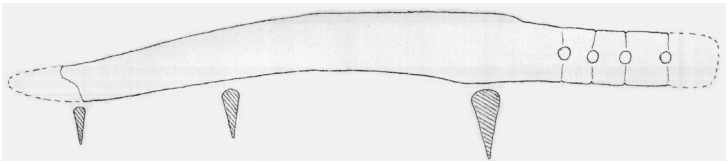
Megiddo, no. 1.39



Megiddo, no. 1.40



Megiddo, no. 1.43 (iron)

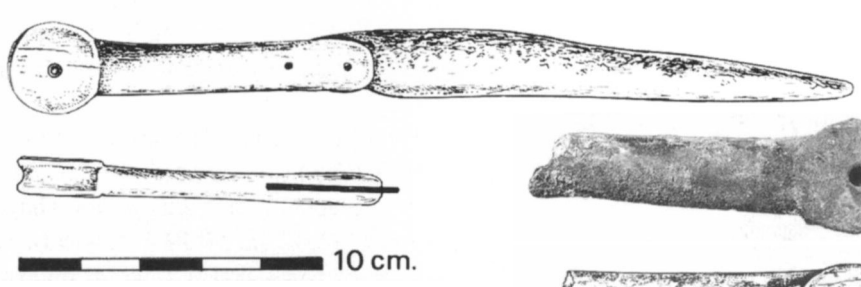


Tell el-Far'ah (Beth Pelet), no. 1.42 (iron)

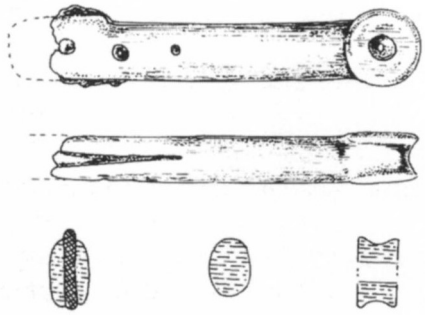
Figure 55. Shape 1 counterparts: Cyprus, Iberian Peninsula, Levant (Dussaud 1914, fig. 188.3; Karageorghis 1971, fig. 82b; Furumark 2003, pls. 19, 20 Br.1; Coffyn 1985, pl. XVIII: 1; Loud 1948 II, pl. 180.41, 55; D'Amato and Salimbeti 2016, 39; Guy and Engberg 1938, fig. 172.4, pl. 167.2; Lamon and Shipton 1939, pl. 83.3; Tufnell 1930, pl. XXI.96) (see Table 12 for references)



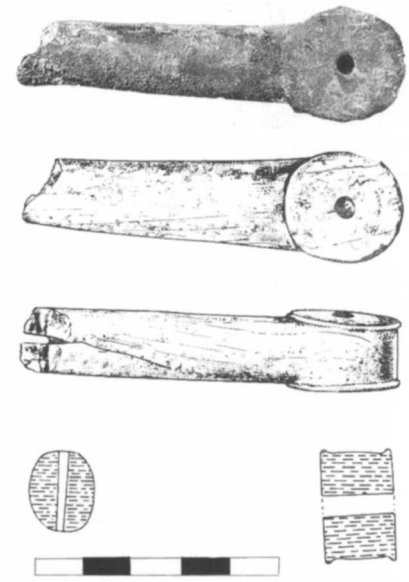
Figure 56. Bronze knife from the Dictaean Cave Hogarth 1899, fig. 44



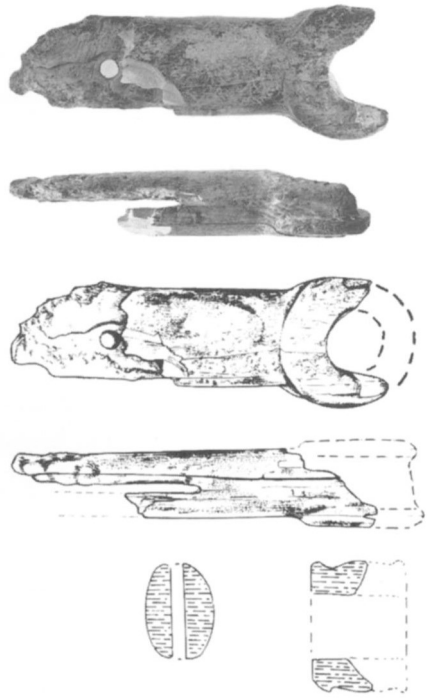
Gezer (bronze), Lev.10



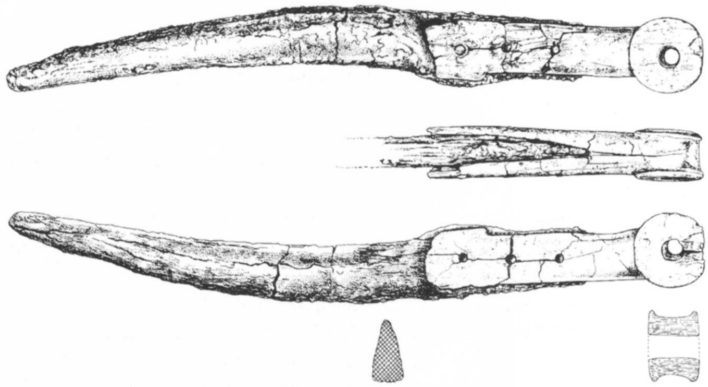
Tel Qasile (iron), Lev.30



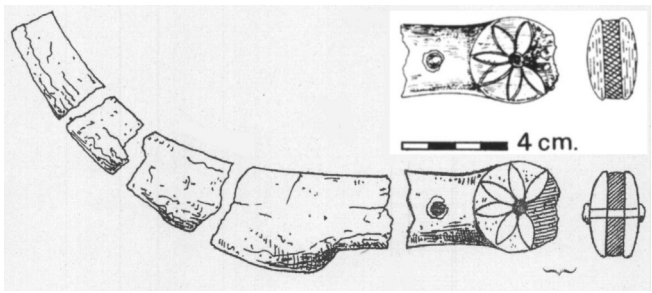
Tel Miqne-Ekron (iron), Lev.40



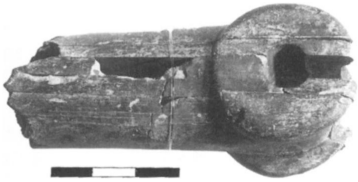
Tel Miqne-Ekron (iron), Lev.20



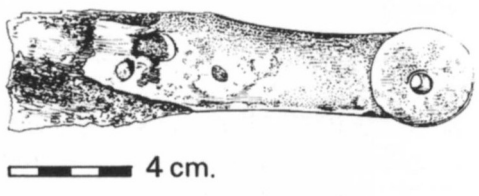
Tel Miqne-Ekron (iron), Lev.50



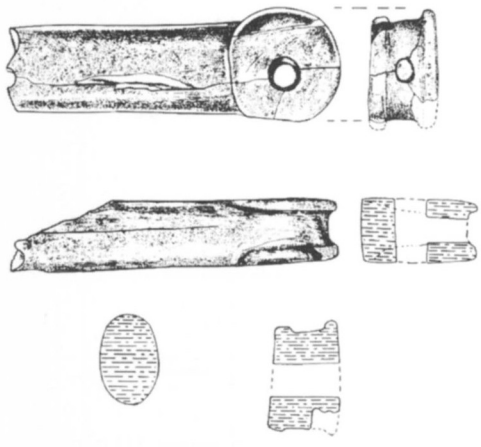
Meggido (iron), Lev.70



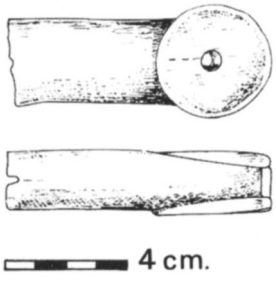
Sikil Dor (iron), Lev.60



Meggido (iron), Lev.80



Tel Miqne-Ekron (iron), Lev.90



Beth Shan (iron), Lev.120

Tell el-Far'ah (Beth Pelet) (iron), Lev.100 and 110

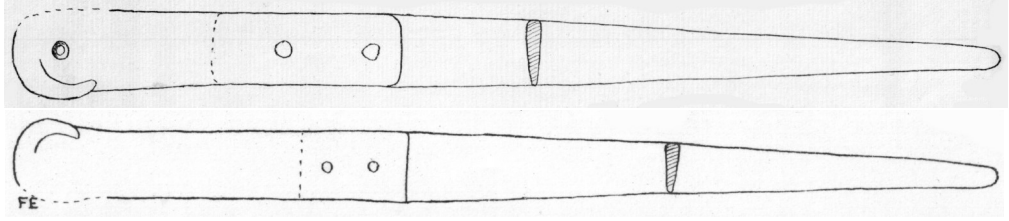


Figure 57. Levantine iron and bronze knives with ivory or bone ring pommels (see Table 13 for references)

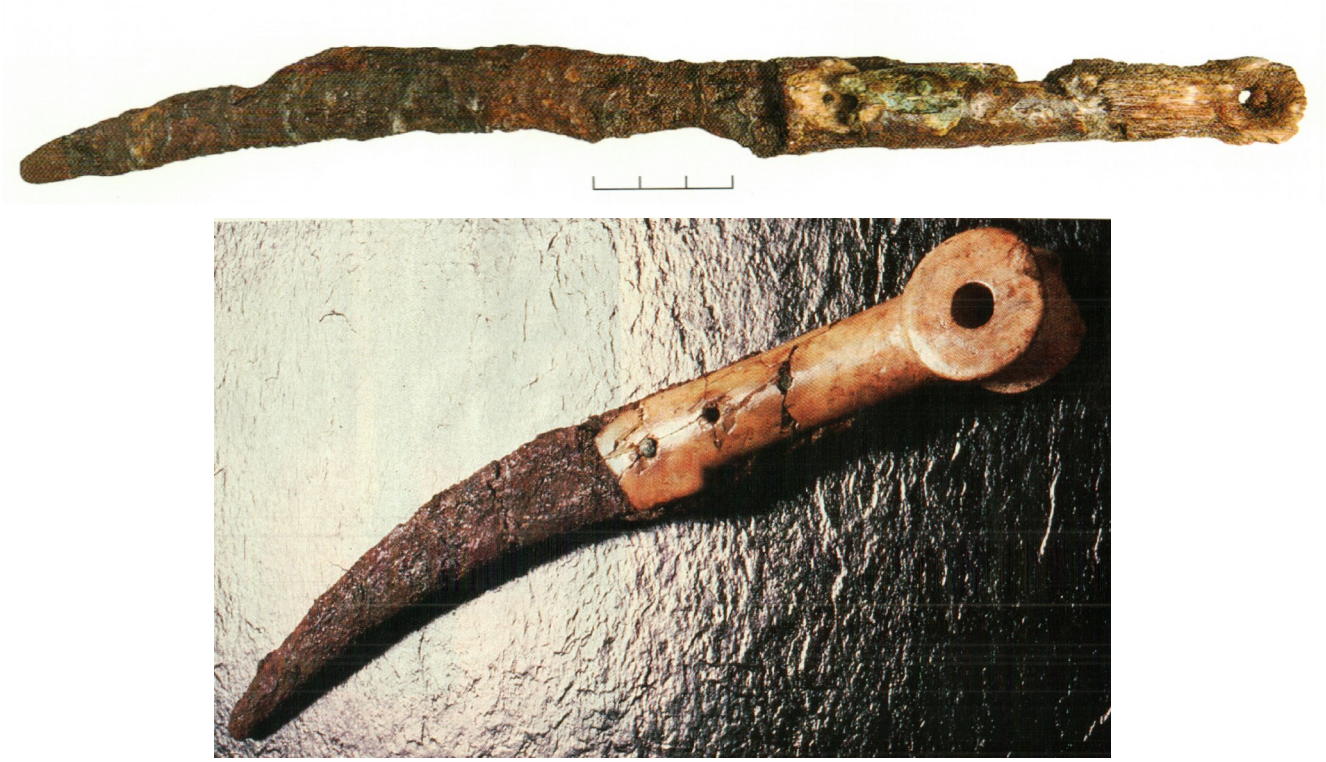
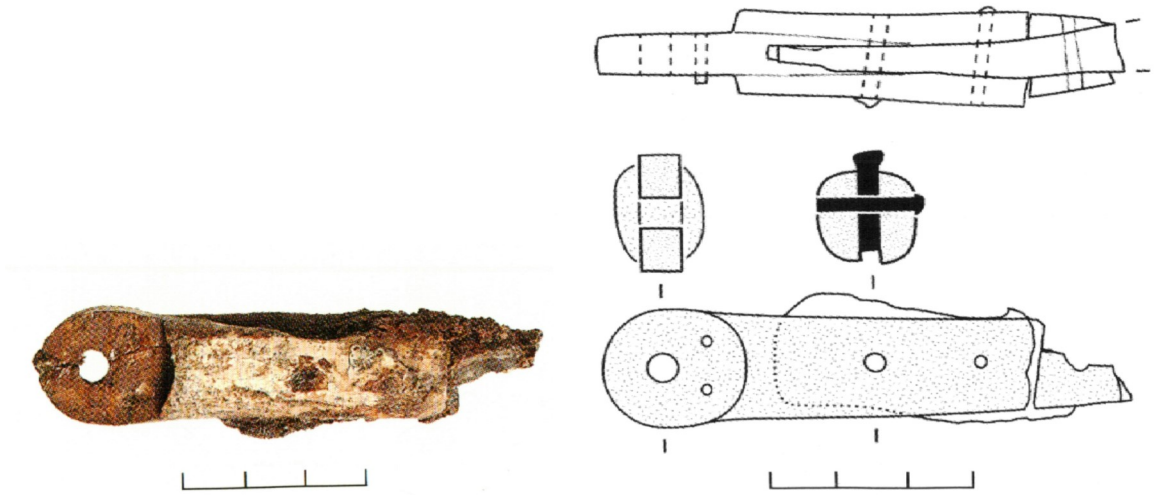
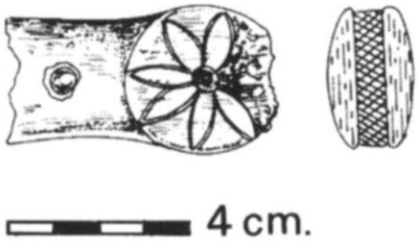


Figure 58. Palaepaphos Plakes, C.660 (top); Tel Miqne-Ekron, Lev.50 (bottom) (Karageorghis and Raptou 2014, pls. XII, LXXXII; Dothan 2002, figs. 2:3, 12-13)



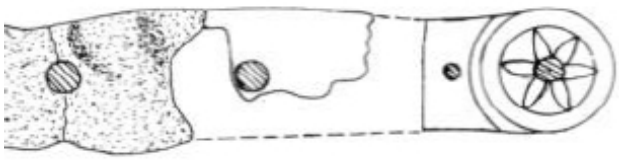
Palapaphos Plakes, C.710



Meggido (iron), Lev.70

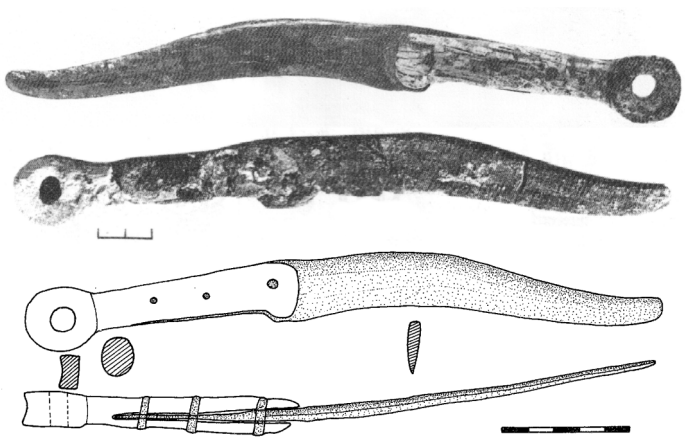


Amathus, C.500



Amathus, C.540

Figure 59. Ivory ring-pommels with rosette design discs or disc fixtures (see Tables 8 and 13 for references)

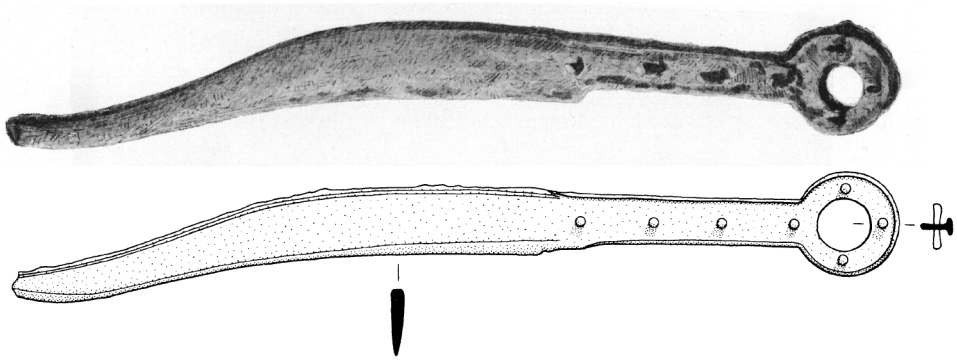


Enkomi, Cyp.10

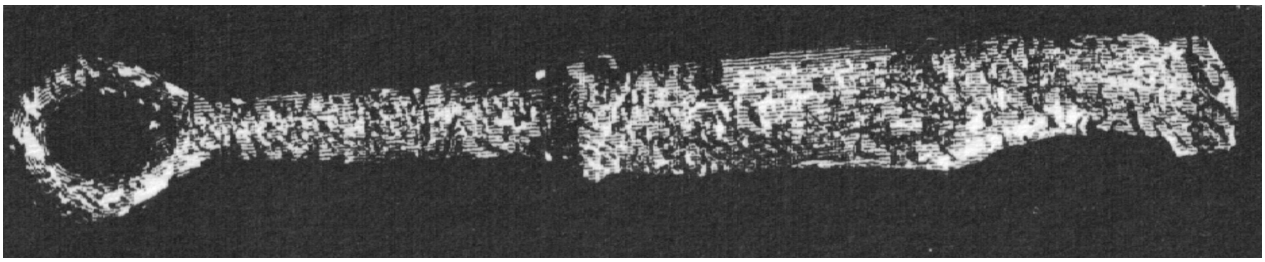


Enkomi, Cyp.20

Figure 60. Cypriot ring pommels of ivory from knives
(Schaeffer 1971, fig. 82b; Courtois 1986, pl. 17.2; Caubet 1987, fig. 5.57, pl. XI)

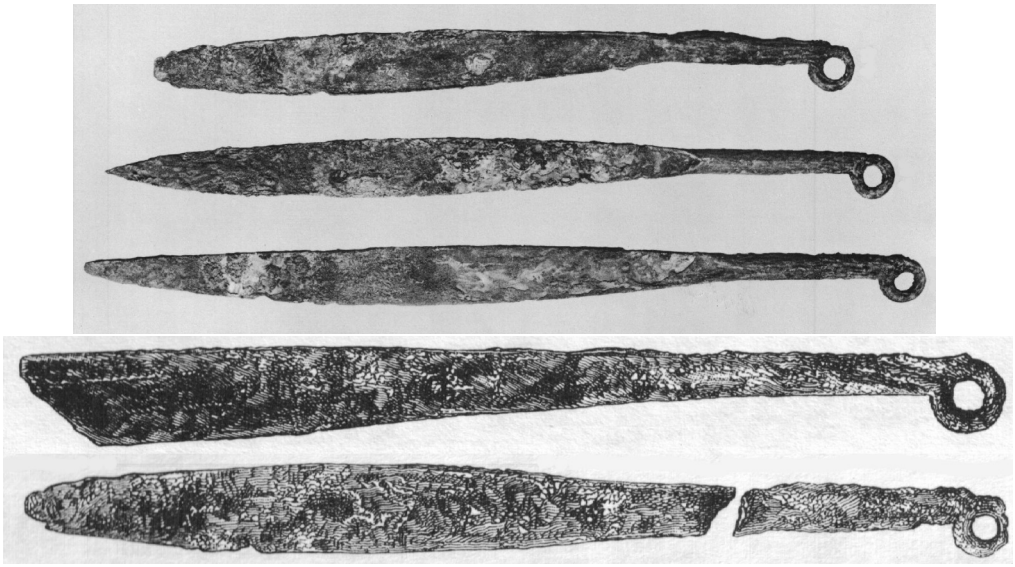


Ialysos, Rhodes, Rhod.10
(Maiuri 1926, fig. 101, no. 26/3579)

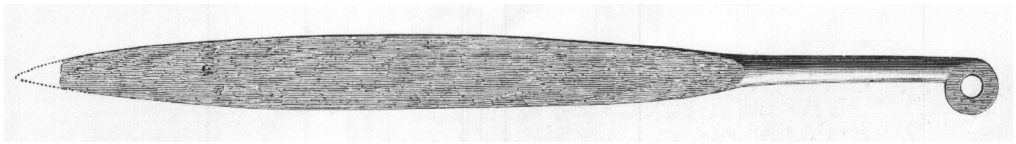


Mycenaean ring pommel knife
(Deshayes 1960, no. 2551; Harding 1975, 199; Schliemann 1976, 75, 143, no. 122)

Figure 61. Bronze knives with metal ring-end pommels
(see Table 13 for references)



Mycenae, Shaft Grave 4, Grave Circle A, nos. 445, 447, 443, 442a, 442 (top-bottom)
(Karo 1930, 103-104, pl. XCVII; Schliemann 1976, 279)



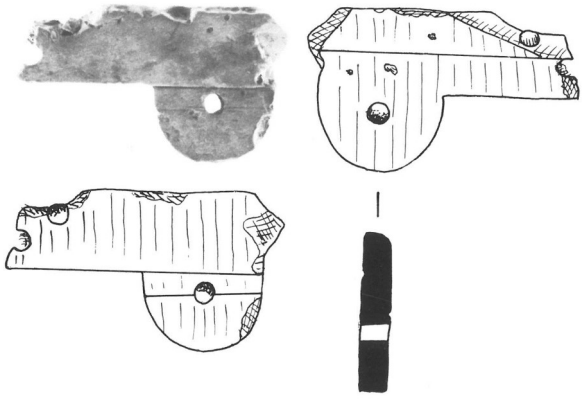
Mycenae, no. 11
(Montelius 1924, no. 11)



Pylos, Grave Circle, Pit 2, no. CM. 2197
(Blegen et al. 1973, fig. 229: 5)



Enkomi, C.20
(Courtois 1981, fig. 165/1 & 166/1)

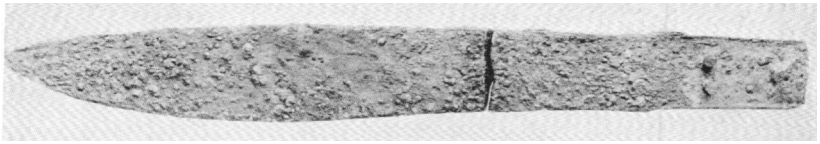


Kouklia Teratsoudhia, C.60
(Karageorghis 1990, pls. XX, LVII)

Figure 62. Mycenaean ring pommel *Schlachtmessern* and Cypriot ring pommels

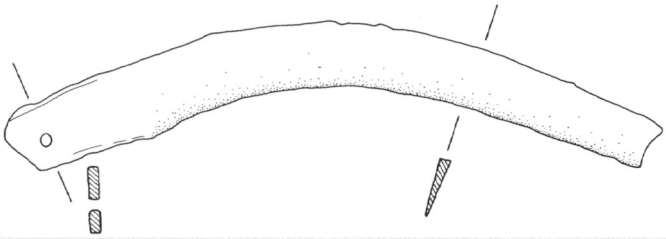


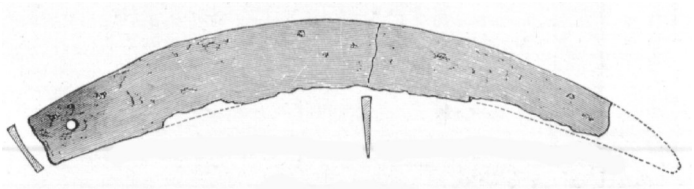
Mycenae, no. 2.1



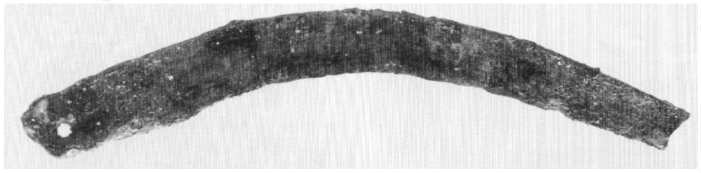
Prosymna, no. 2.2

Figure 63. Aegean Shape 2 knives
(Karo 1930, pl. LXXII.218; Blegen 1937, fig. 299)

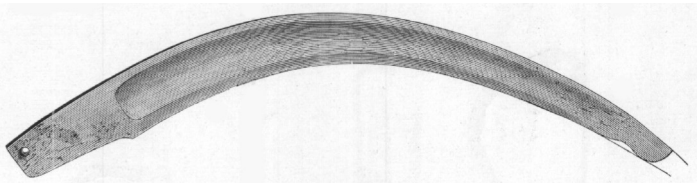




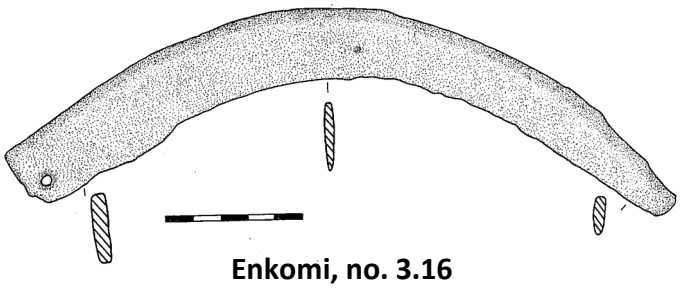
Athens Acropolis Hoard, no. 3.7



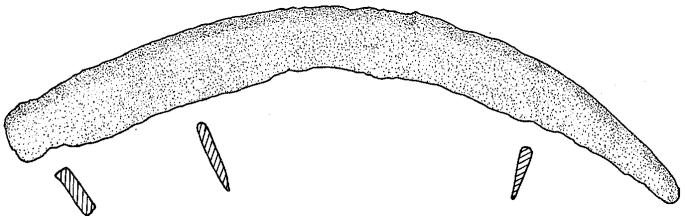
Aigera, Achaea, no. 3.4



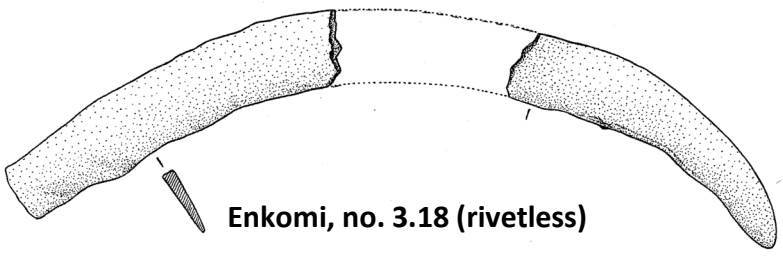
Corinth, no. 3.8



Enkomi, no. 3.16

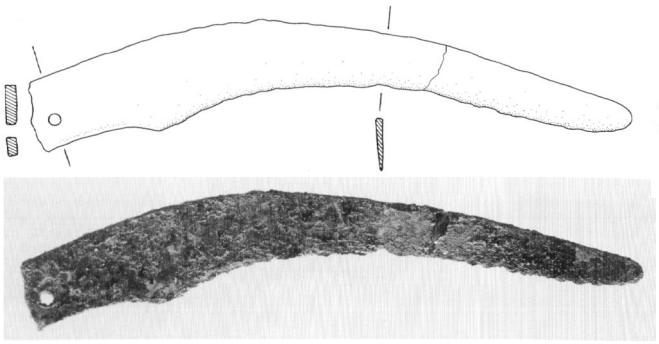


Enkomi, no. 3.17 (rivetless)

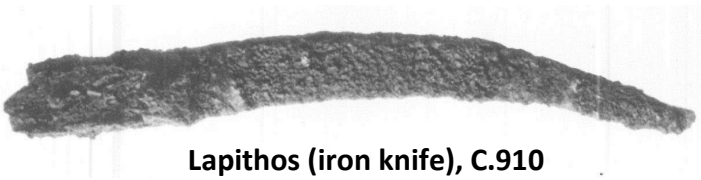


Enkomi, no. 3.18 (rivetless)

Figure 64. Aegean and Cypriot parallels to Shape 3 knives
(see Table 12 for references)



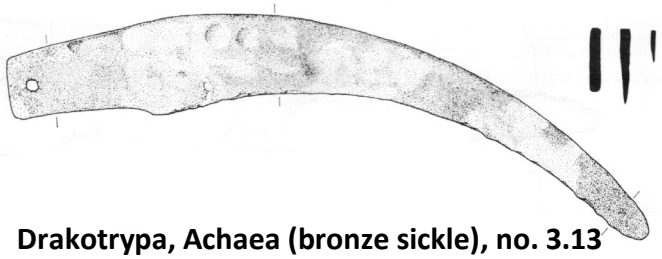
Aigera, Achaea (bronze sickle), no. 3.1



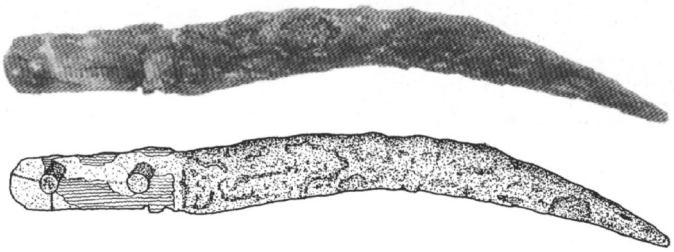
Lapithos (iron knife), C.910



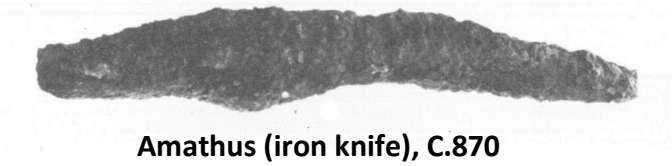
Lapithos (iron knife), C.1240



Drakotrypa, Achaea (bronze sickle), no. 3.13

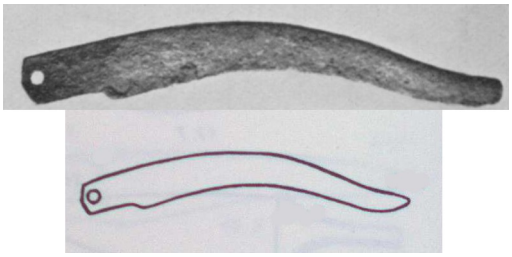


Palaepaphos Xylinos (iron knife), C.490

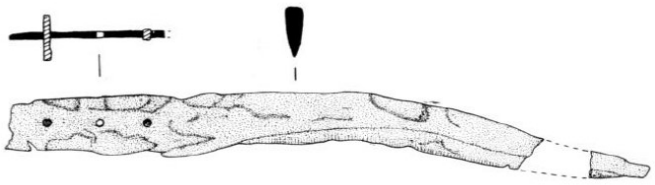


Amathus (iron knife), C.870

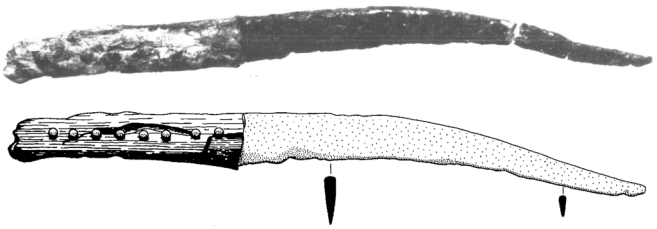
Figure 65. Sickles and Shape 1 knives
(see Tables 8 and 12 for references)



Mycenae Poros wall hoard (bronze sickle), no. 3.2



Amathus (iron knife), C.550

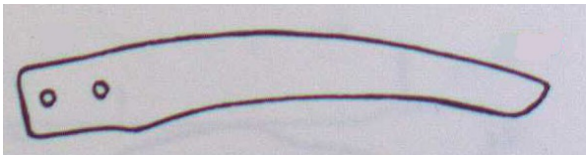


Amathus (iron knife), C.1130

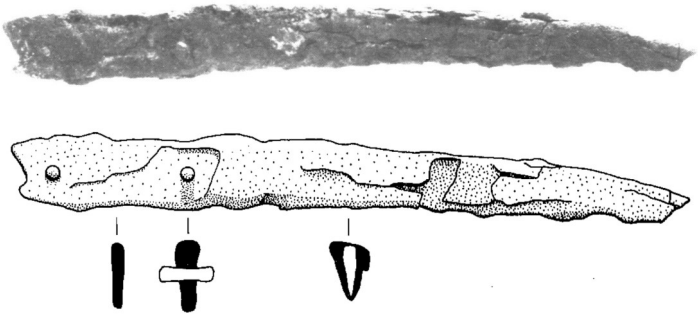


Palaepaphos Plakes (iron knife), C.700

Figure 66. Sickles and Shape 1 knives with upturned tips
(see Tables 8 and 12 for references)

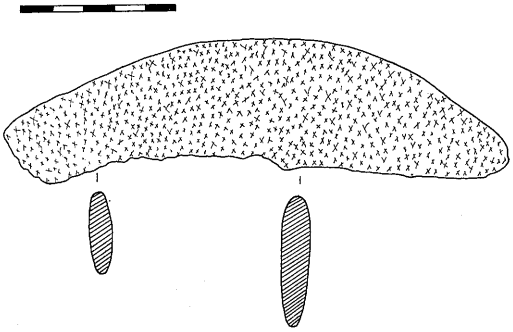


Knossos (bronze sickle), no. 3.15

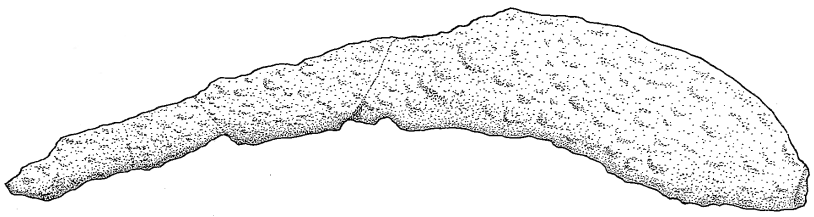


Amathus (iron knife), C.1140

Figure 67. Sickles and Shape 1 knives with two rivets
(see Tables 8 and 12 for references)



Enkomi (iron), C.2280



Enkomi (iron), C.2340



Maa-Palaeokastro (bronze), no. 2412



Enkomi Weapon's Hoard (bronze), no. 1276

Figure 68. Iron and bronze sickles from Cyprus
(see Tables 8 and 12 for references)



Figure 69. Kallimani, Khalkis, Euboea knife (bronze), no. 5.1
(Hankey 1952, fig. 9, no. 516B)



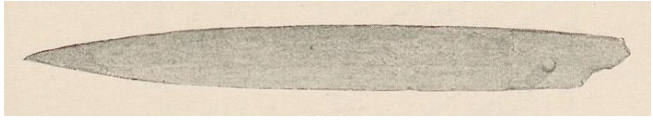
Mycenae, no. 6.15



Dendra, no. 6.23

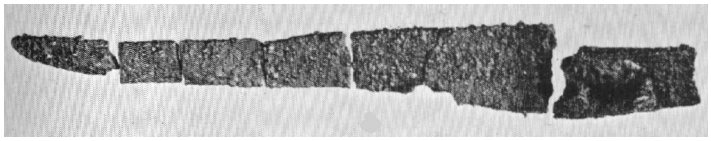


Khalkis, no. 6.22

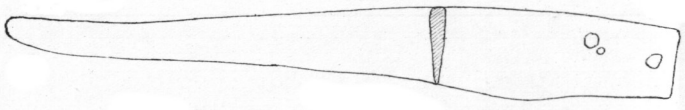


Isopata, no. 6.55

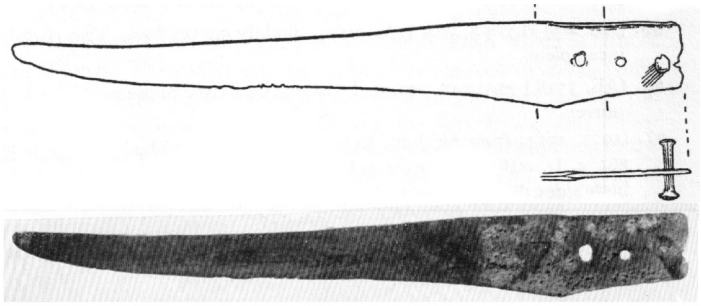
Figure 70. Shape 6 knives
(Xénaki-Sakellariou 1985, fig. 45, X, no. 2390; Persson 1931, pl. XXXII.5 bottom, no. 4; Hankey 1952, fig. 9, no. 536; Evans 1914, fig. 54.2e)



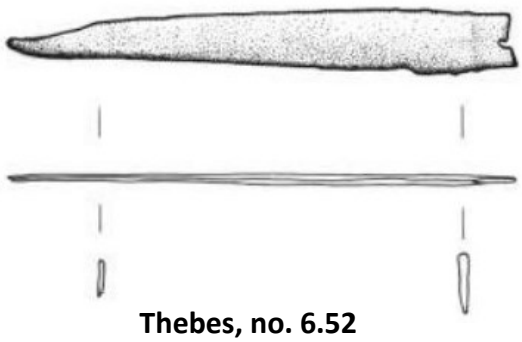
Prosymna, no. 6.30



Beth Pelet, no. 6.102



Dictaean Cave, no. 6.79



Thebes, no. 6.52

Figure 71. Shape 6A knives, flicked-up tip
(see Table 12 for references)



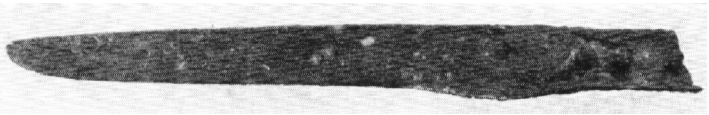
Khalkis, no. 6.37



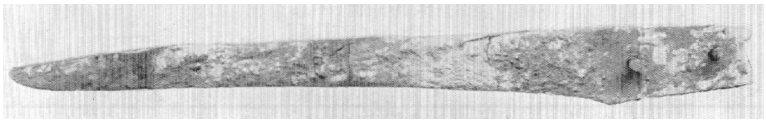
Mycenae, no. 6.34



Ialysos, no. 6.87



Serraglio, Kos no. 6.85

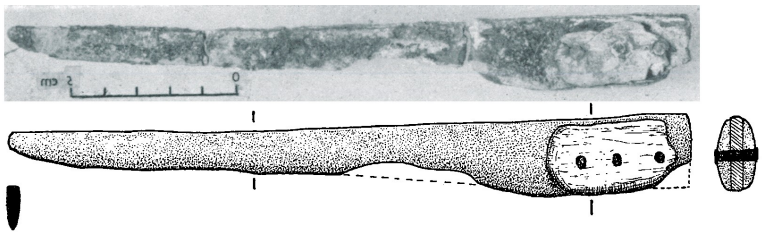


Prosymna, no. 6.39

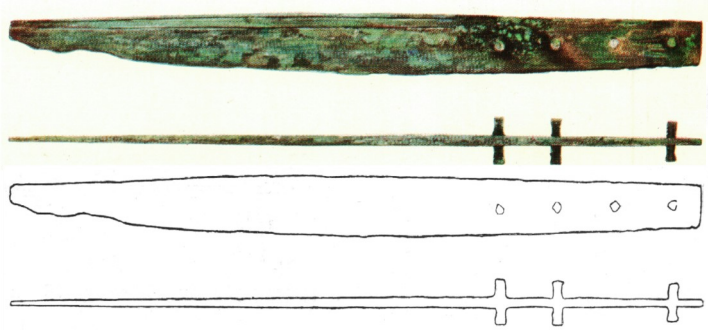
Figure 72. Shape 6A knives, straight tip
(see Table 12 for references)



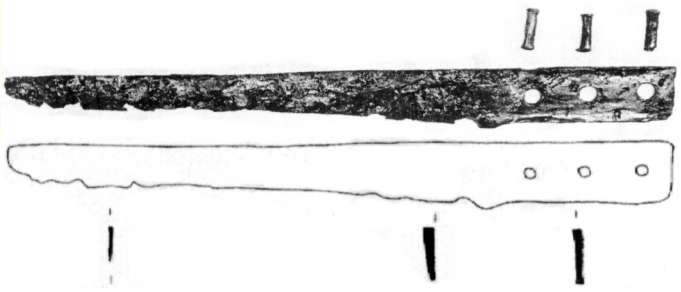
Dendra, no. 6.25, Shape 6



Enkomi, no. 6.97, Shape 6A

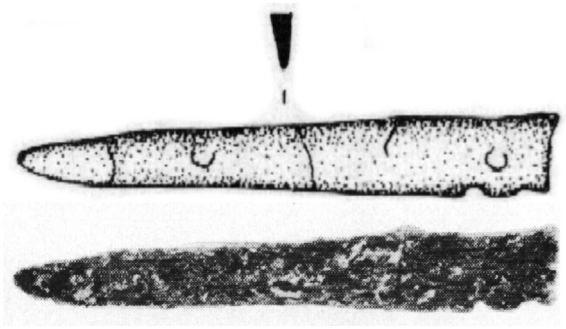


Mycenae, no. 6.18 Shape 6

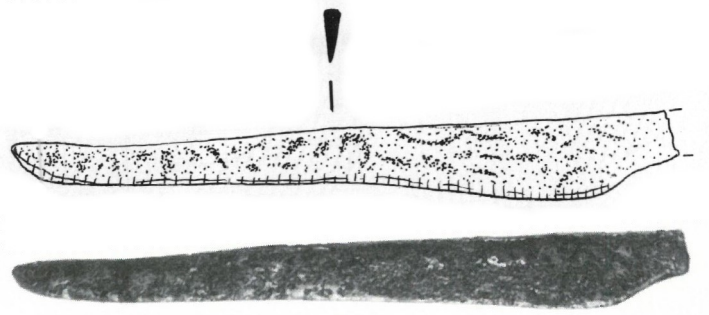


Pylona, Rhodes, no. 6.90, Shape 6

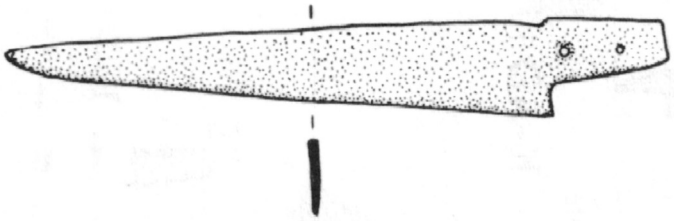
Figure 73. Shape 6 and 6A knives, straight spine
(see Table 12 for references)



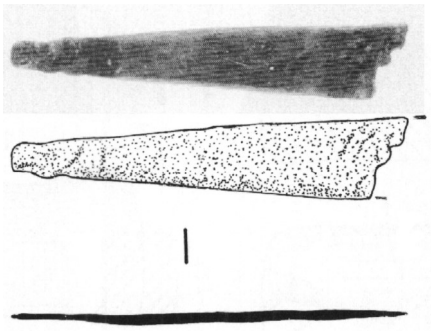
Maa-Palaikastro, no. 6.92



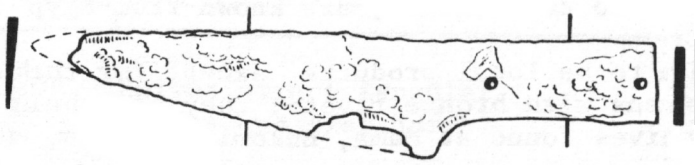
Maa-Palaikastro, no. 6.95



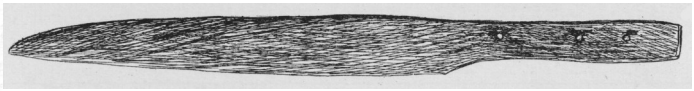
Kalavasos-Ayios Dhemitrios, no. 6.93



Maa-Palaikastro, no. 6.94

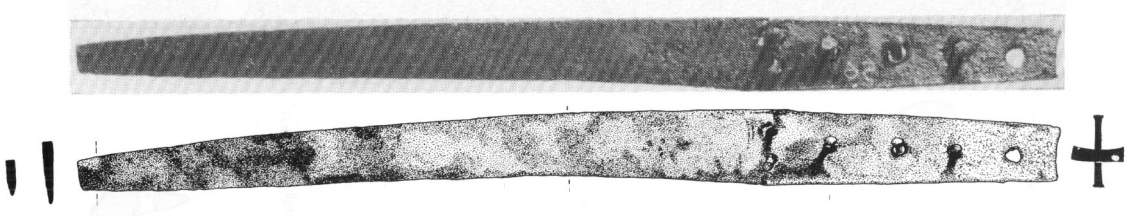


Perati, no. 6.53



Gezer, no. 6.101

Figure 74. Shape 6 and 6A knives outside the Aegean
(see Table 12 for references)

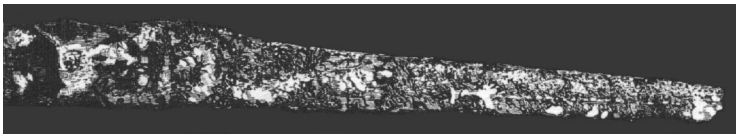


Katarraktis, Achaea , no. 6.104

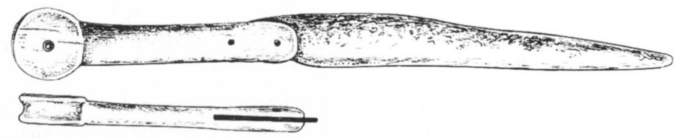


Thapsos, Sicily, no. 6.105

Figure 75. Shape 6B knives
(see Table 12 for references)



Mycaenae, no. 7.1



Gezer (bronze), Lev.10

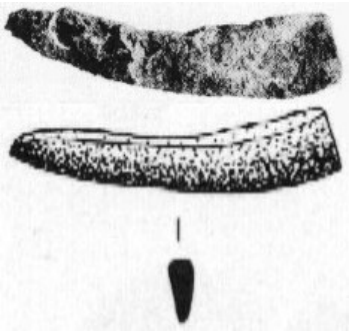
Figure 76. Shape 7 knives
(see Table 12 for references)



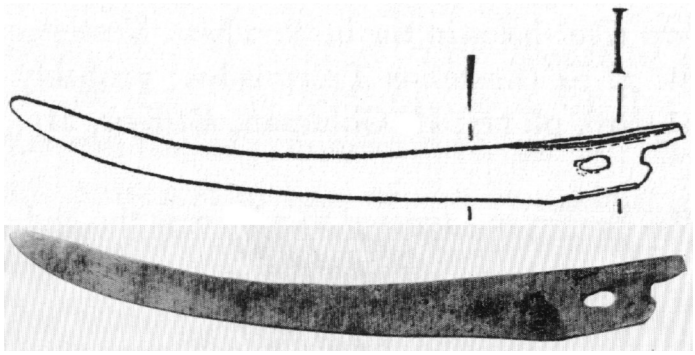
Polis, Ithaca, no. 8.1



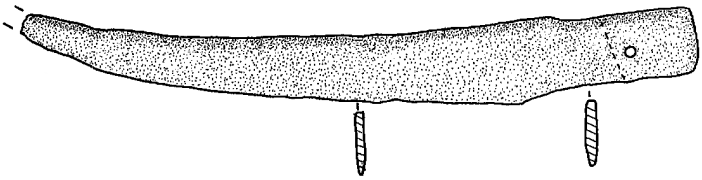
Koumasa, no. 8.2



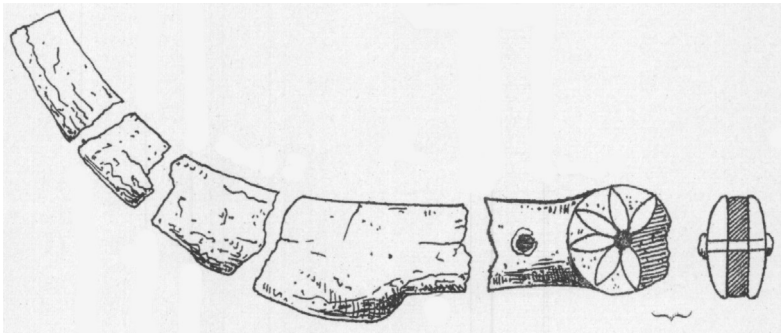
Kition, no. 8.4



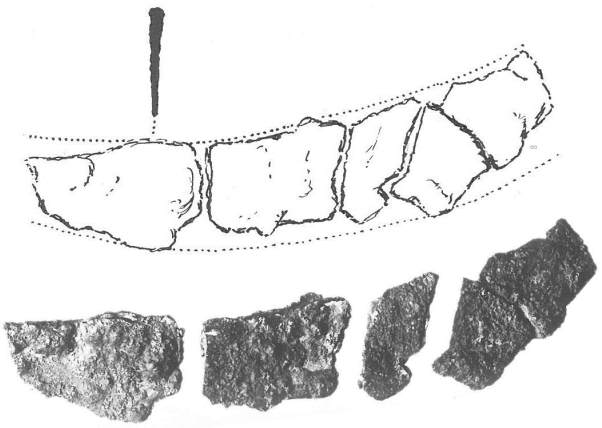
Dictean Cave, no. 8.3



Enkomi, no. 8.6



Megiddo, Lev.70



Sinda, no. 8.5

Figure 77. Shape 8 knives
(see Table 12 for references)



Lapithos, C.950



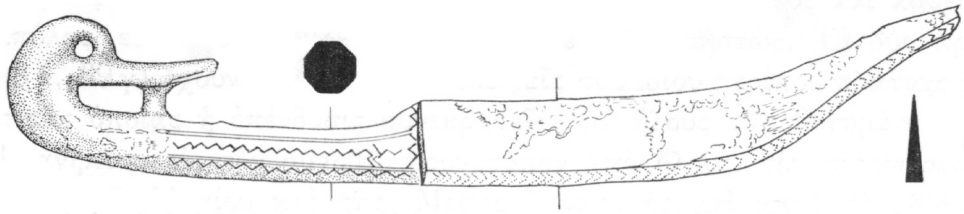
Thebes, Egypt, Anim.10



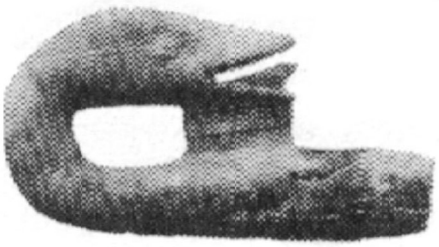
Abydos, Egypt, Anim.20



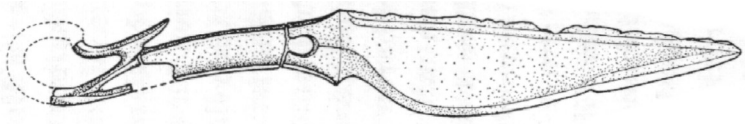
Egypt, Anim.80



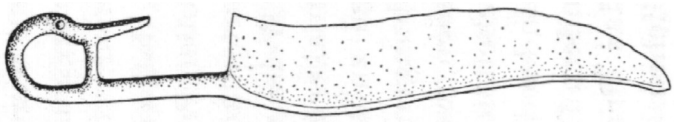
Perati, Anim.60



Kourion Bamboula, Anim.65



Riegsee, Upper Bavaria, Anim.40



Şpalnaca, Albania, Anim.85



Sidon ivory cosmetic box, Tomb 7, no. 33

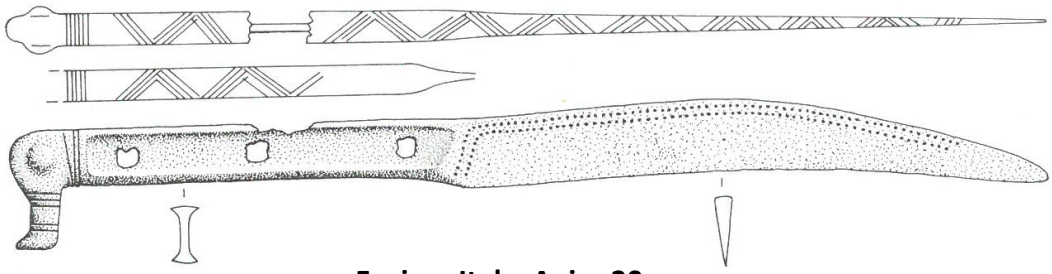


Levantine ivory cosmetic box, Beirut Museum

Figure 78. Bird-head knives from the eastern Mediterranean (see Table 14 for references)



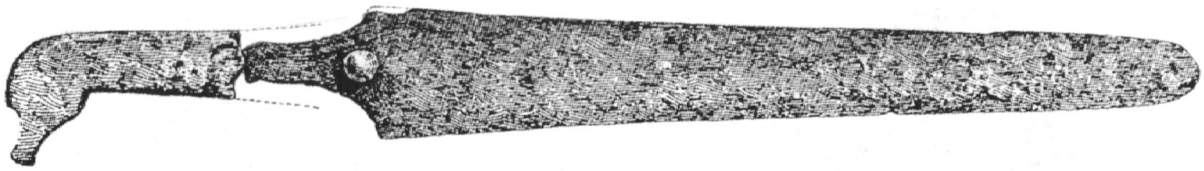
Lapithos, C.950



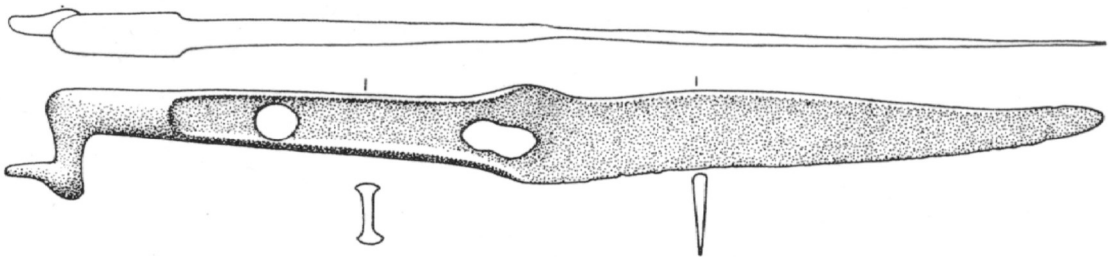
Fucino, Italy, Anim.30



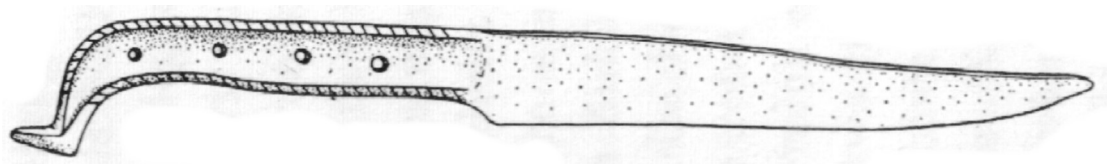
Pentalica, Sicily, Anim.75



Pentalica, Sicily, sword Tomb 68 North, Anim.75

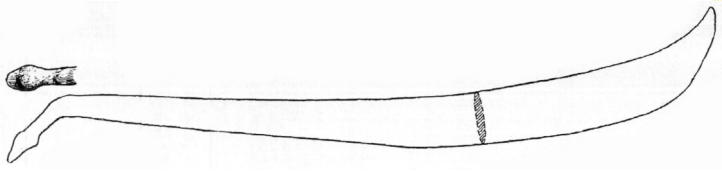


Wackonig, south Austria, Anim.70

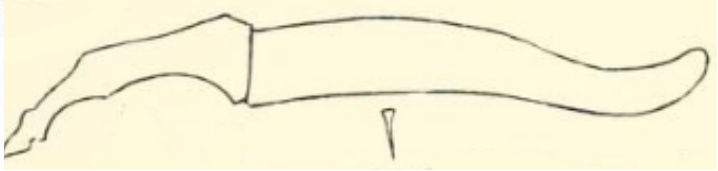


Hungary, Anim.50

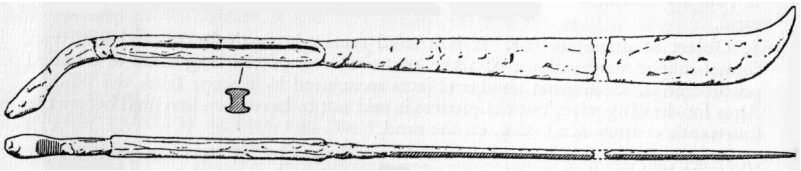
Figure 79. Bird-head knives from Italy and Continental Europe (see Table 14 for references)



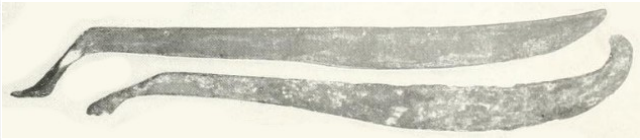
Lachish, Anim.100



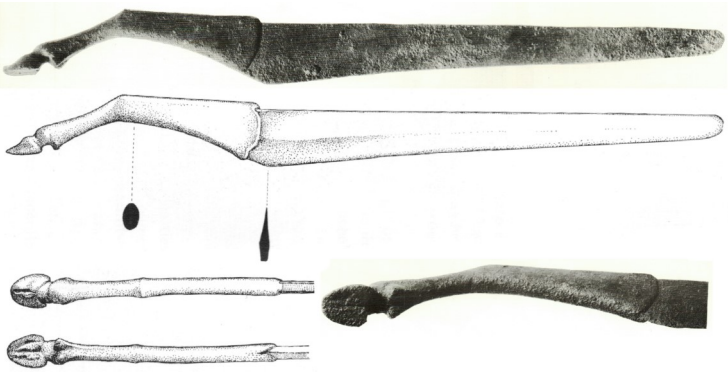
Egypt, Anim.140



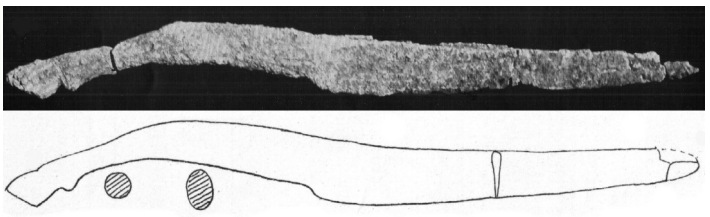
Tell Abu Hawam, Anim.130



Egypt, Anim.150, 160



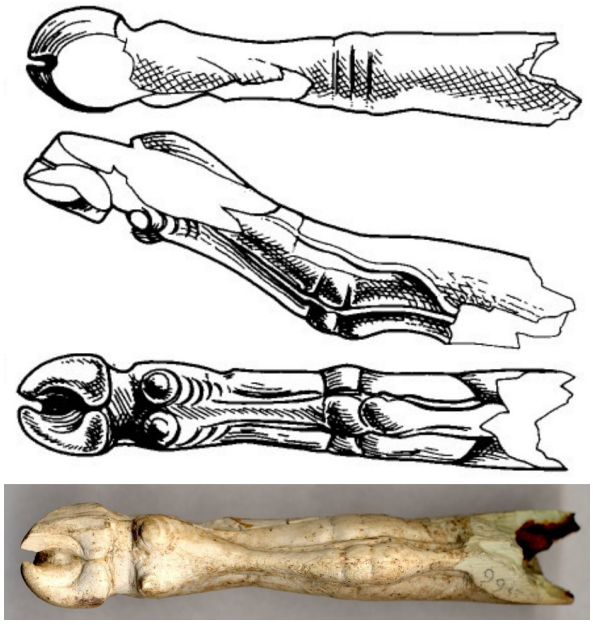
Deir el-Balah, Anim.110



Tell Jemmeh, Anim.170

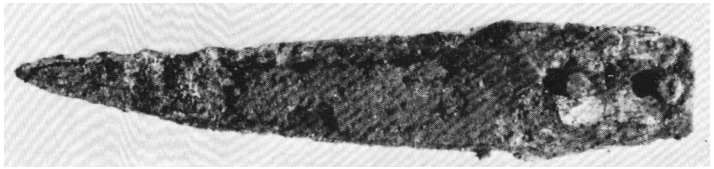


Megiddo, Anim.90

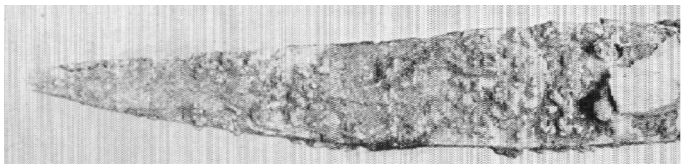


Enkomi, C.50

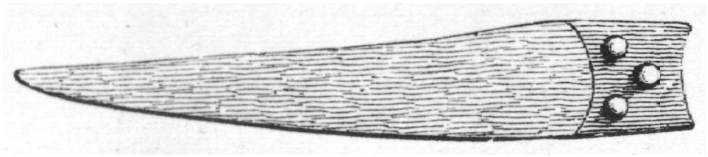
Figure 80. Animal-leg/hoof knives
(see Table 14 for references)



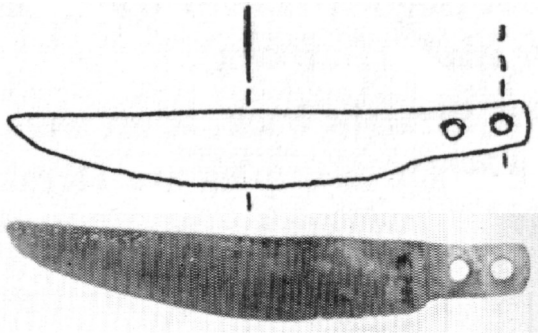
Mycenae, no. 9.1



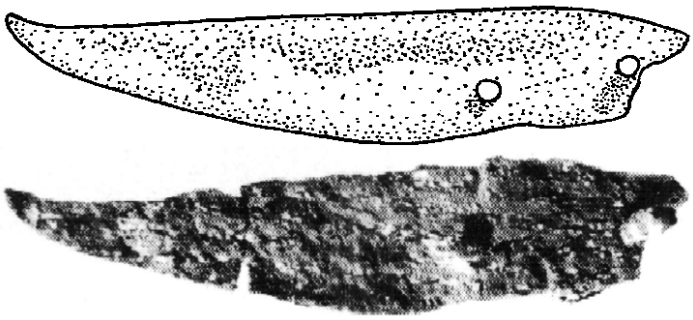
Prosymna, no. 9.2



Mycenae, no. 9.3



Dictean Cave, no. 9.4

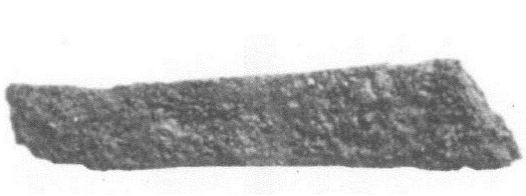


Enkomi, no. 9.5

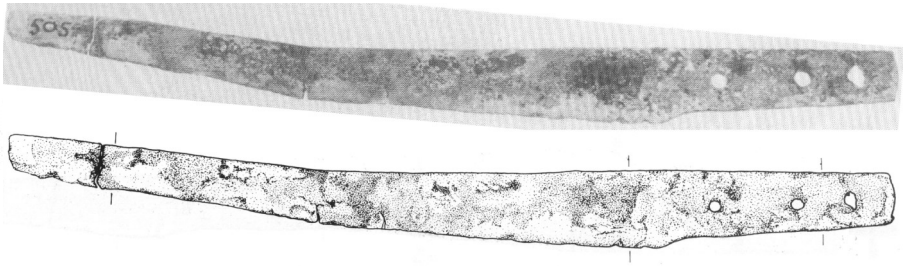


Beth Shan, no. 9.6

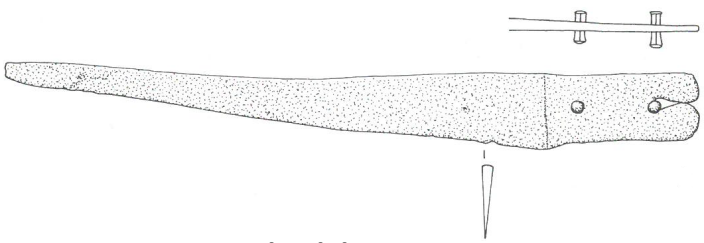
Figure 81. Shape 9 knives
(See Table 12 for references)



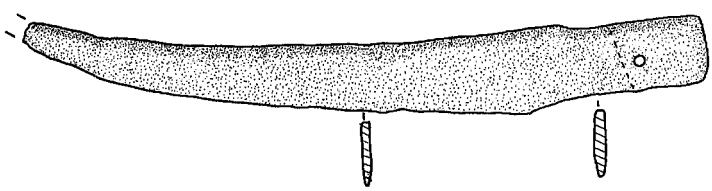
Lapithos, C.930



Katarraktis, Achaea, no. 10.1

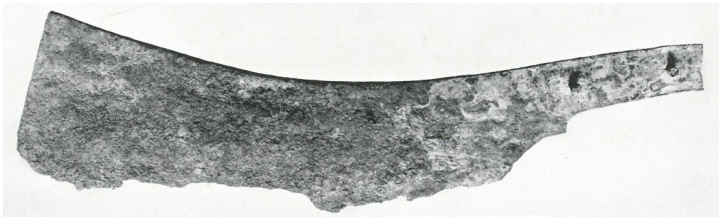


Scoglio del Tonno, no. 10.2

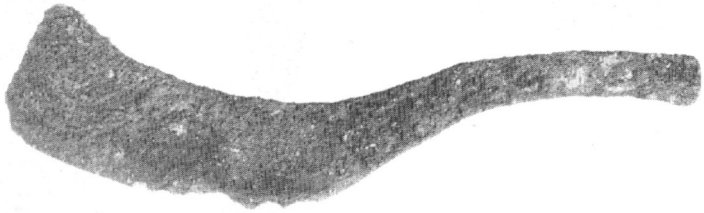


Enkomi, no. 10.3

Figure 82. Shape 10 knives
(see Table 12 for references)

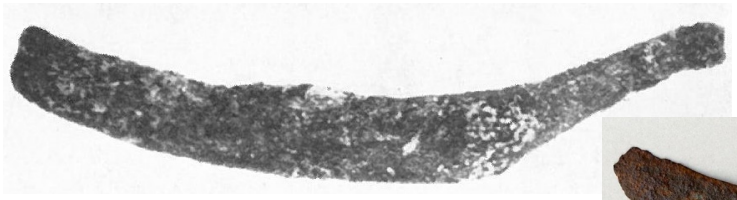


Prosymna
(Blegen 1937, fig. 512.4)



Mycenae
(Xenaki-Sakellariou 1985: no. 2876)

Figure 83. Aegean Late Helladic razors

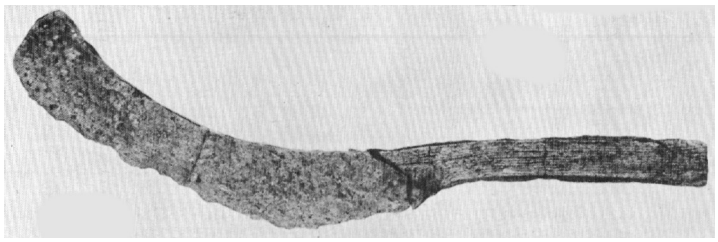


Enkomi, no. 11.8

Enkomi, no. 11.7



Figure 84. Shape 11 knives
(see Table 12 for references)



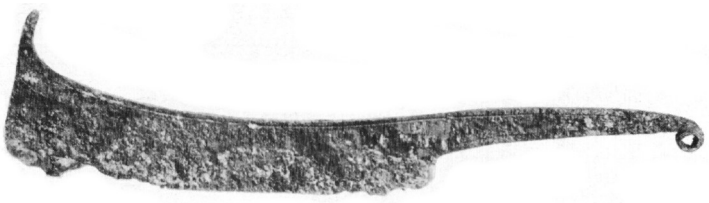
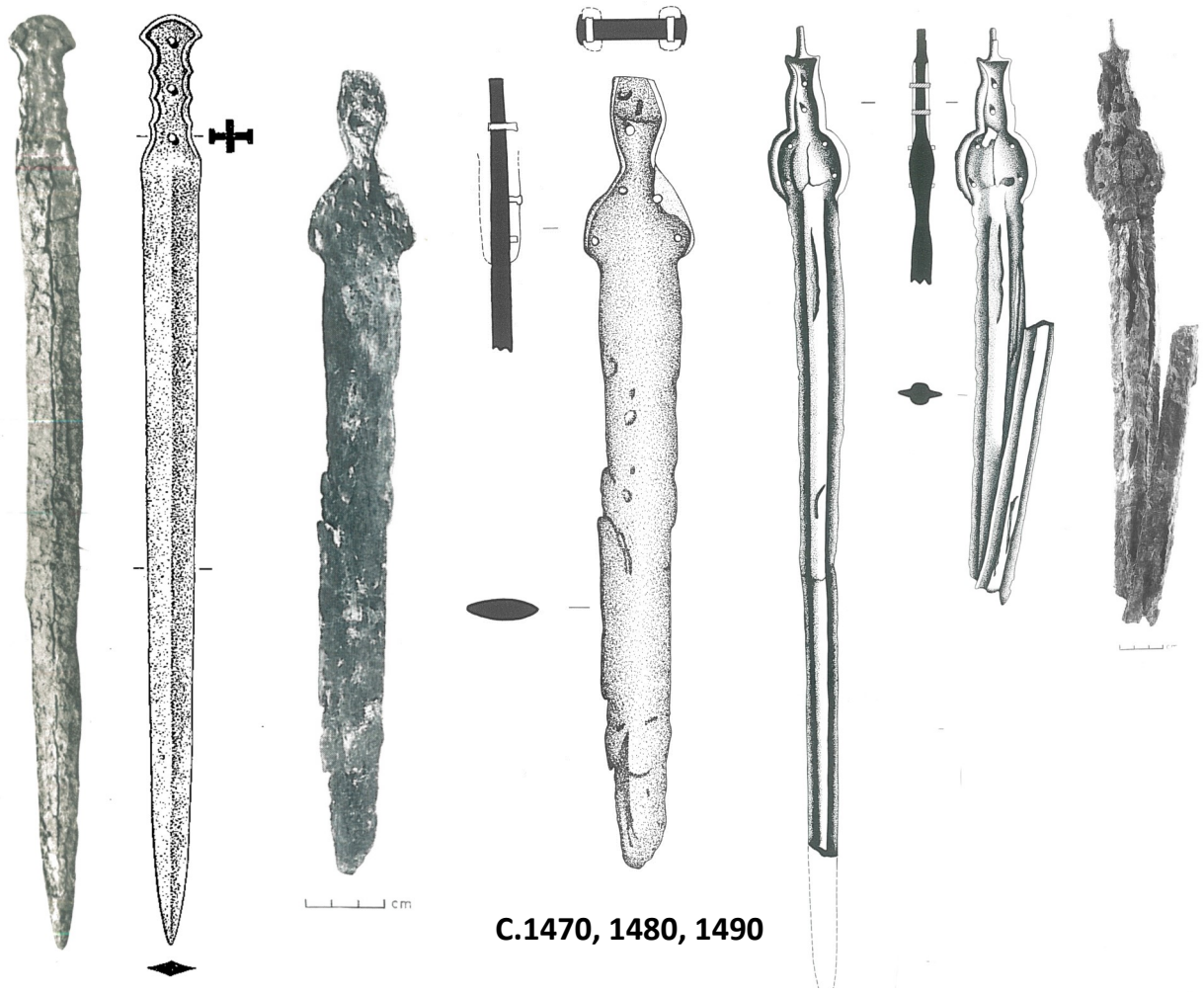


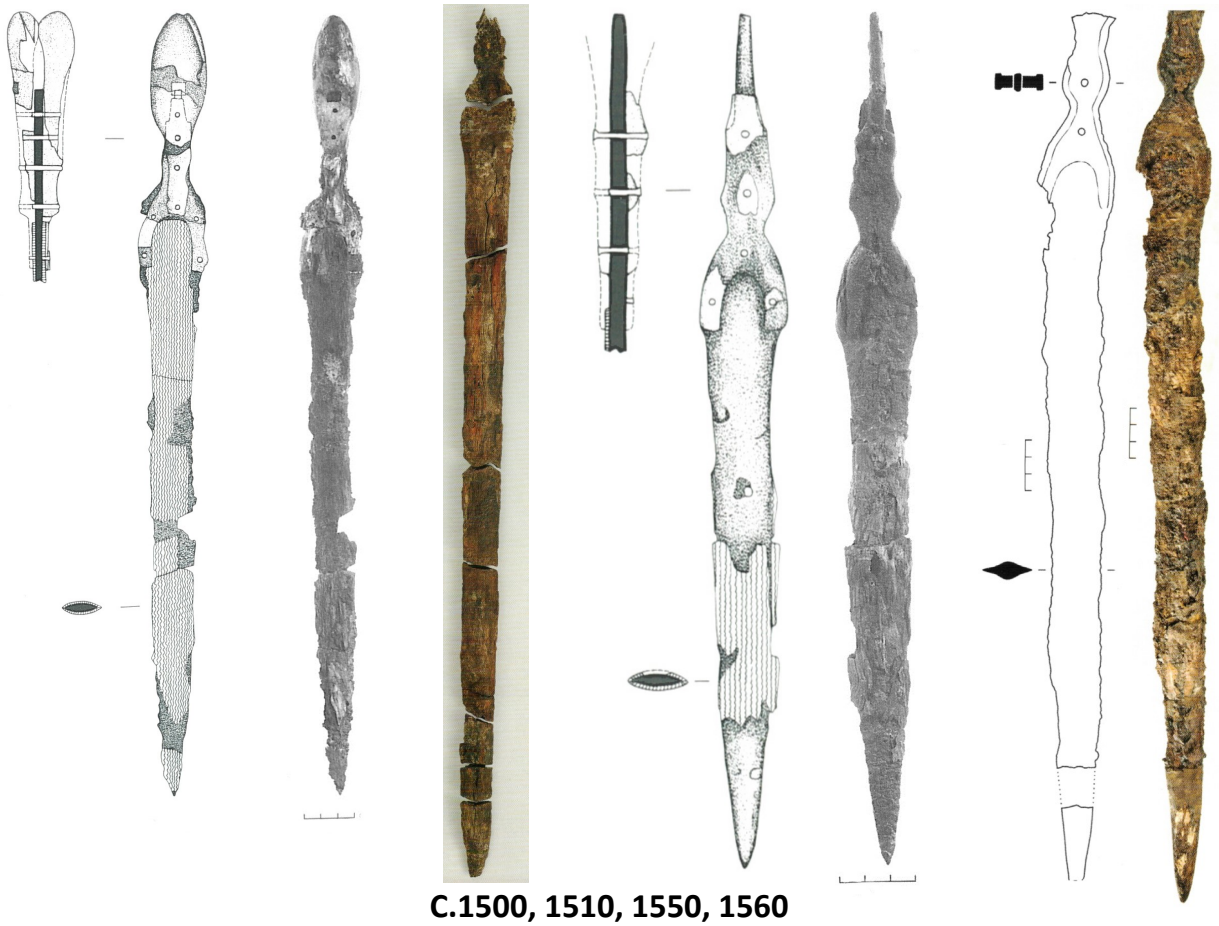
Figure 85. Perati razors no. 11.6 (left) and 11.65 (right)
(Iakovides 1969 III: pl. 128γ, M157; pl. 126δ, no. M151)



Figure 86. A.800, Agora, Athens Grave XXVII
(Blegen 1953, fig. 3.4)



C.1470, 1480, 1490



C.1500, 1510, 1550, 1560

Figure 87. Iron swords of Cyprus
(see Table 8 for references)

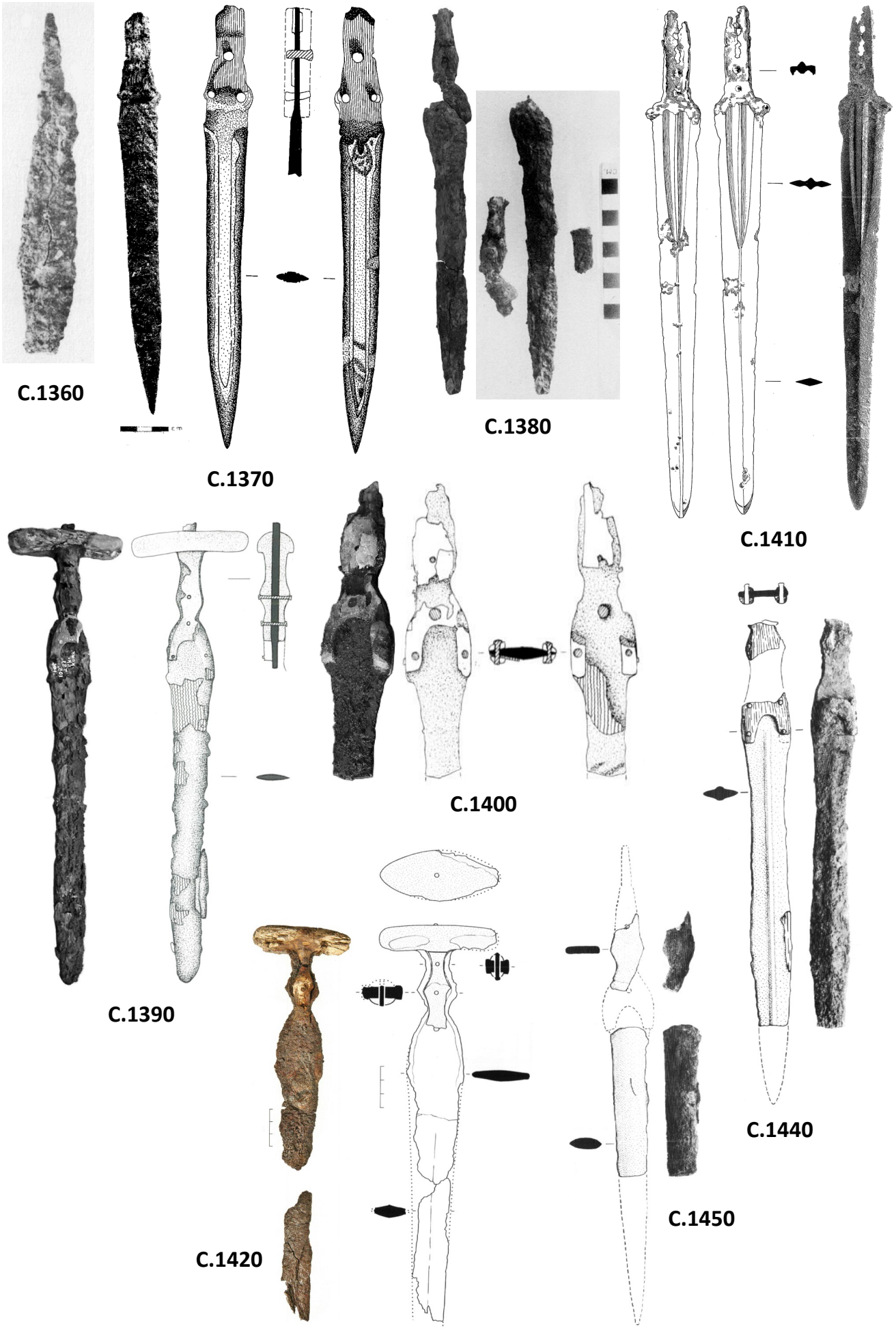


Figure 88. Iron daggers of Cyprus
(see Table 8 for references)

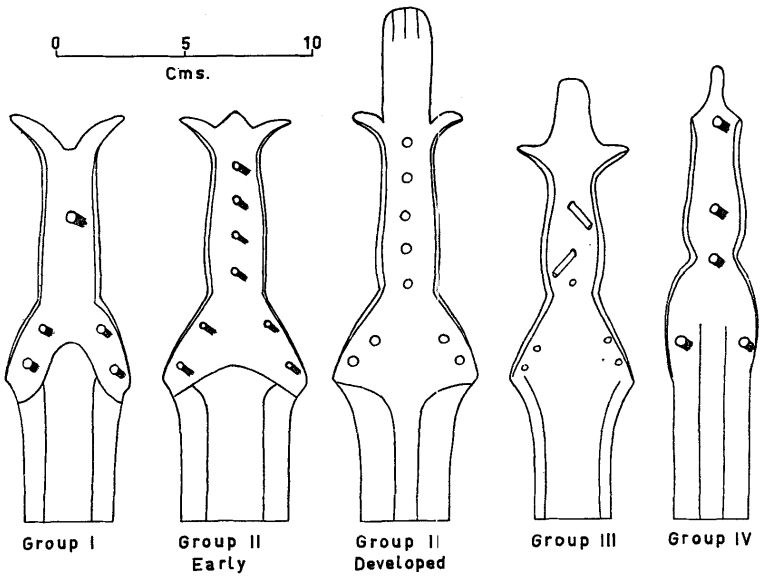


Figure 89. Naue II bronze swords types after Catling 1961, fig. 2

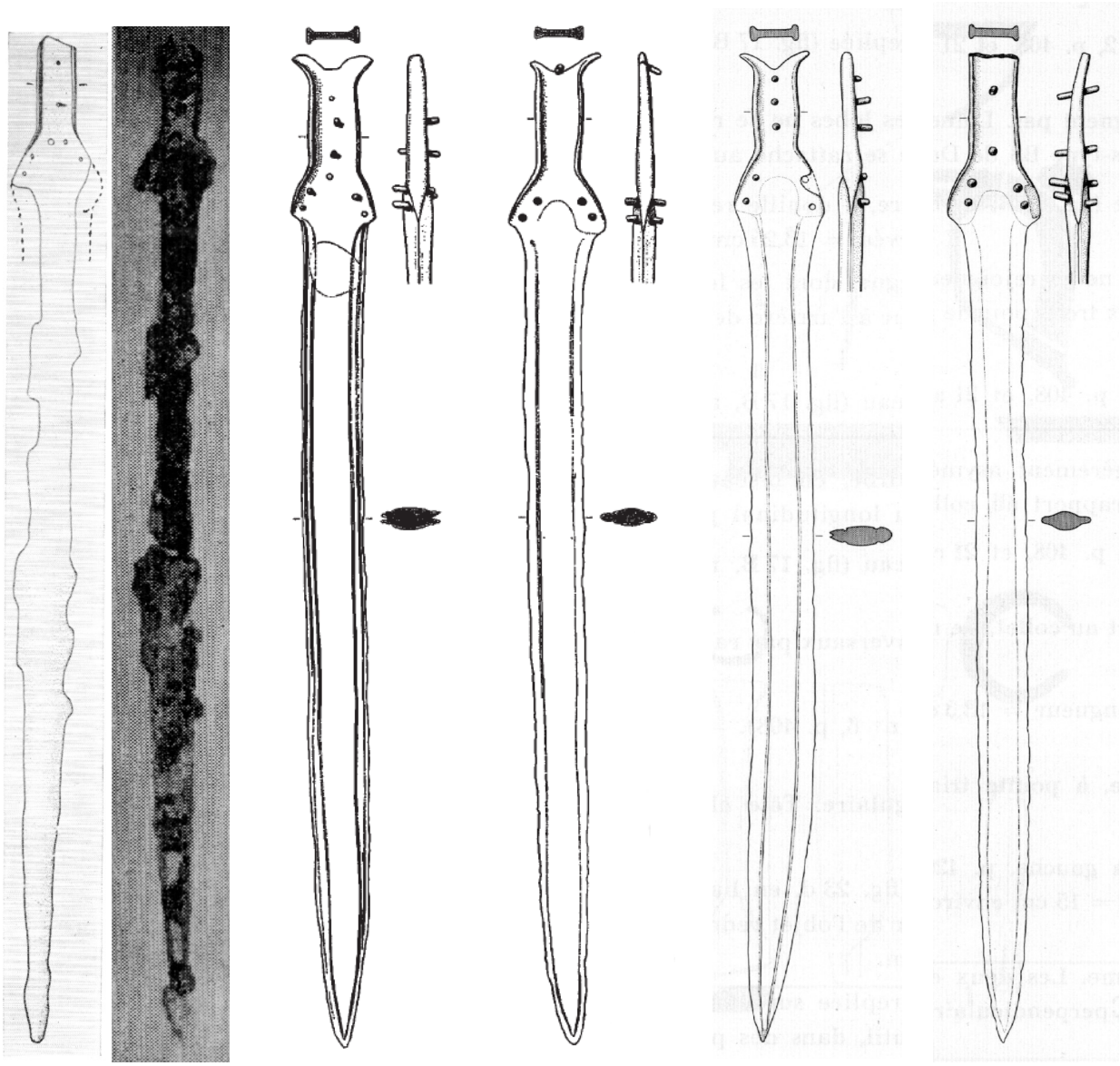


Figure 90. Naue II bronze swords in Cyprus
C.1750 Enkomi Tomb 18 (left); C.1760-90 Enkomi Well 212 (right four)
(Schaeffer 1952, fig. 107.1; Lagarce 1971, figs. 16c, 18:14, 19, 20; Mehofer and Jung 2008, figs. 5:1-2)

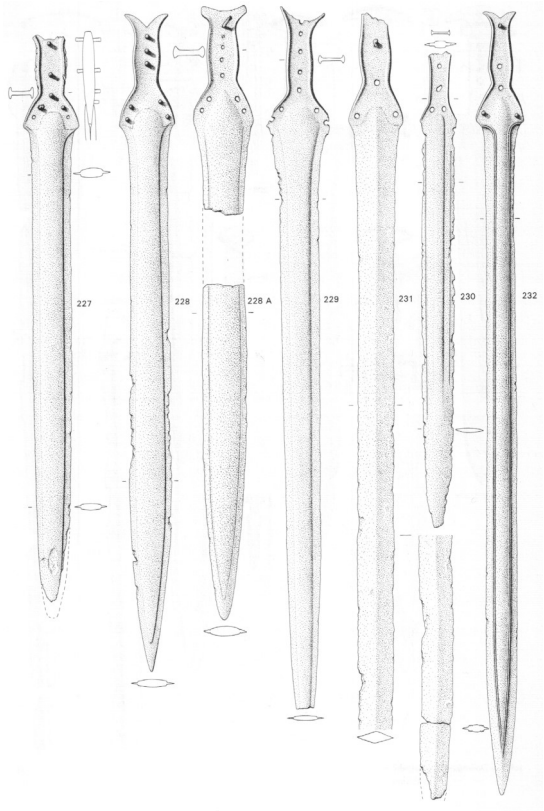


Figure 91. Naue II swords of the Aegean, with overlapping shoulders (Kilian-Dirlmeier 1993, pl. 34)

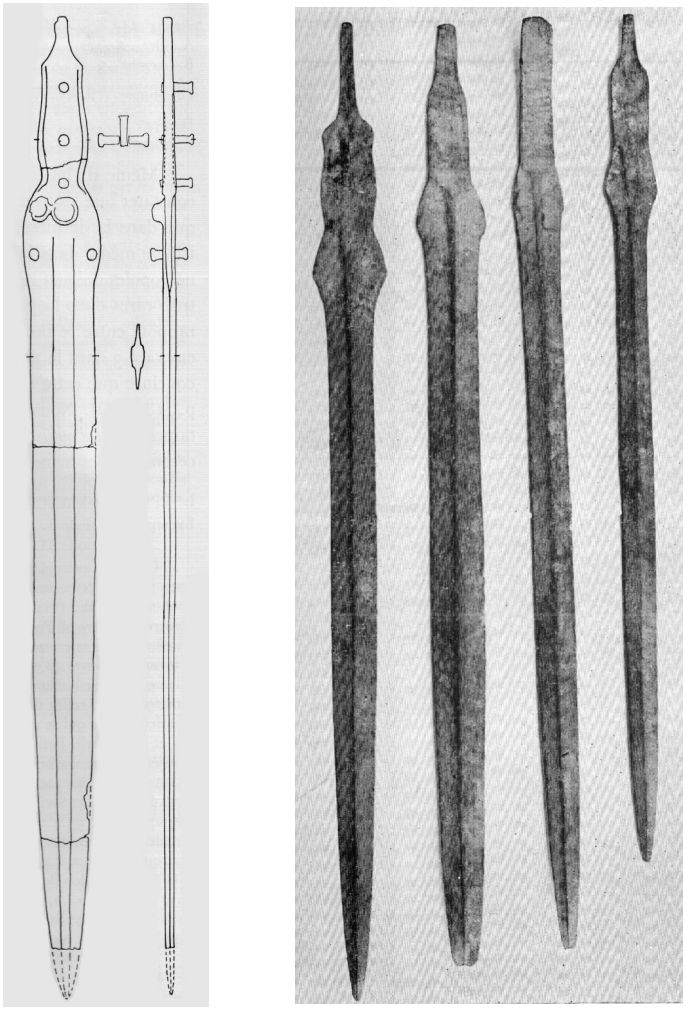


Figure 92. Naue II swords from Hama (left), Ugarit Hoard (three right) (Riis 1948, fig.136B; Schaeffer 1956, fig. 223)

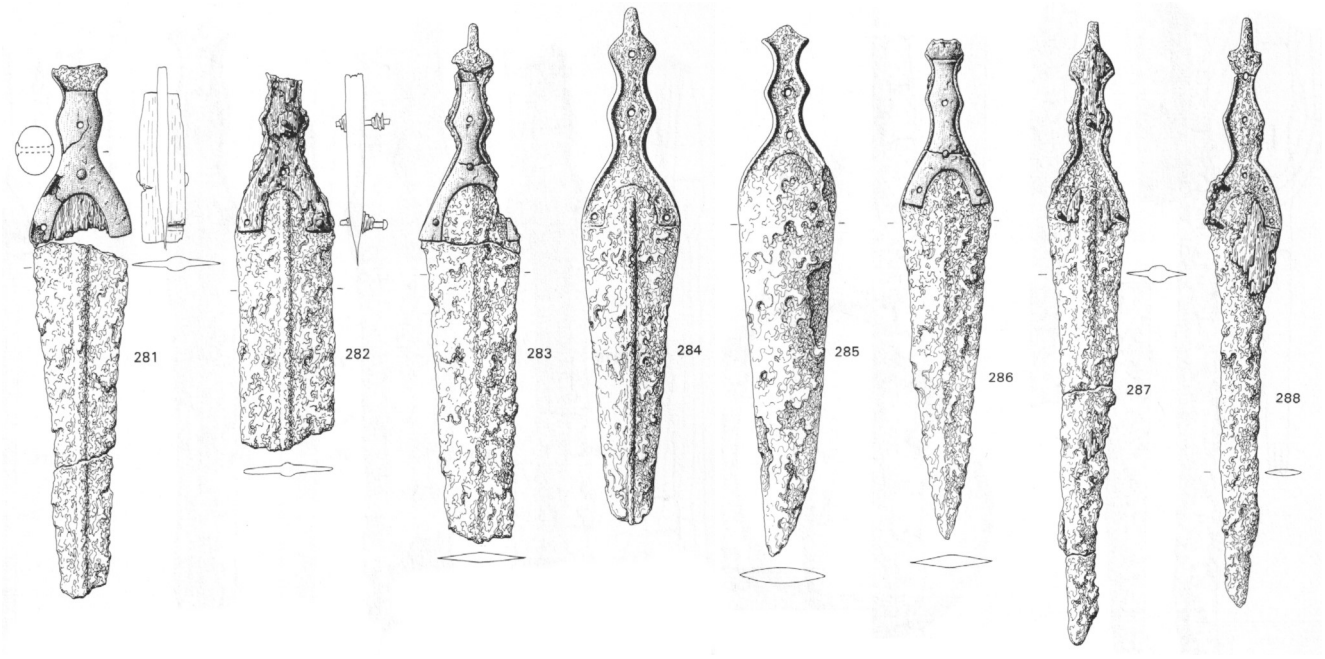


Figure 93. Type 3 Naue II swords of the Aegean
(Kilian-Dirlmeier 1993, pl. 42)



Figure 94. Naue II blades from Cyprus with rounded shoulders
Enkomi Tomb 47 sword (left), Kourion Kaloriziki Tomb 40 dagger (right)
(Schaeffer 1952, fig. 107.2; Matthäus 1985, no. 2, pl. 140:2; Vonhoff 2013, fig. 3)

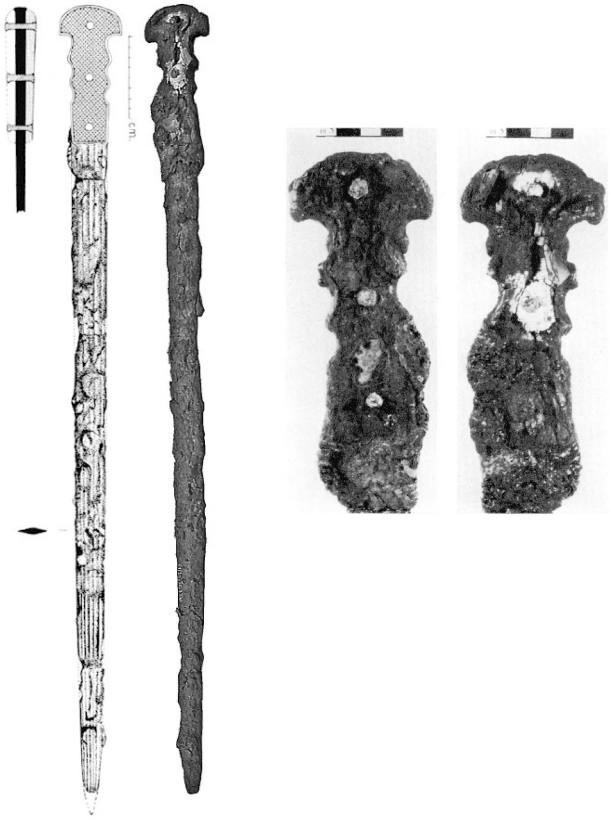


Figure 95. Iron sword C.1660 Kouklia Eliomylia, CA I
(Karageorghis 1966, fig. 59; 1967, figs. 21, 24, 25; Vonhoff 2013, fig. 10)

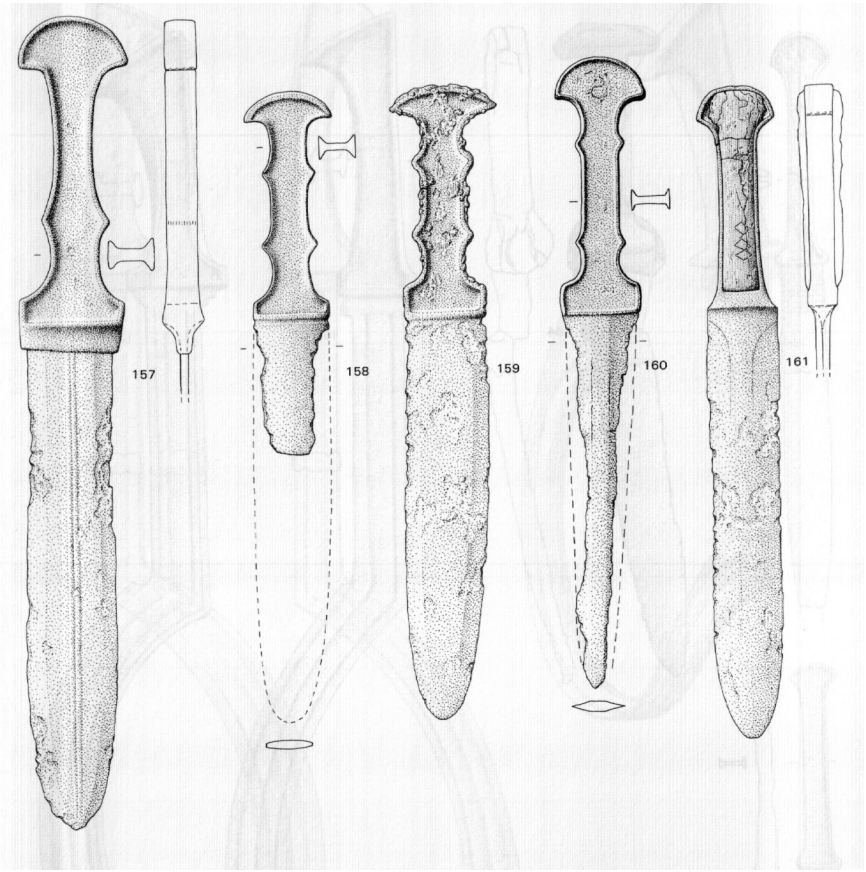


Figure 96. Cast Hilt Daggers Types 7G and 7H
(Shalev 2004, pl. 17.157-160)



Figure 97. Iron sword A.2150 Athens Agora Grave XXVII, LPG (Blegen 1952, fig. 3.1)

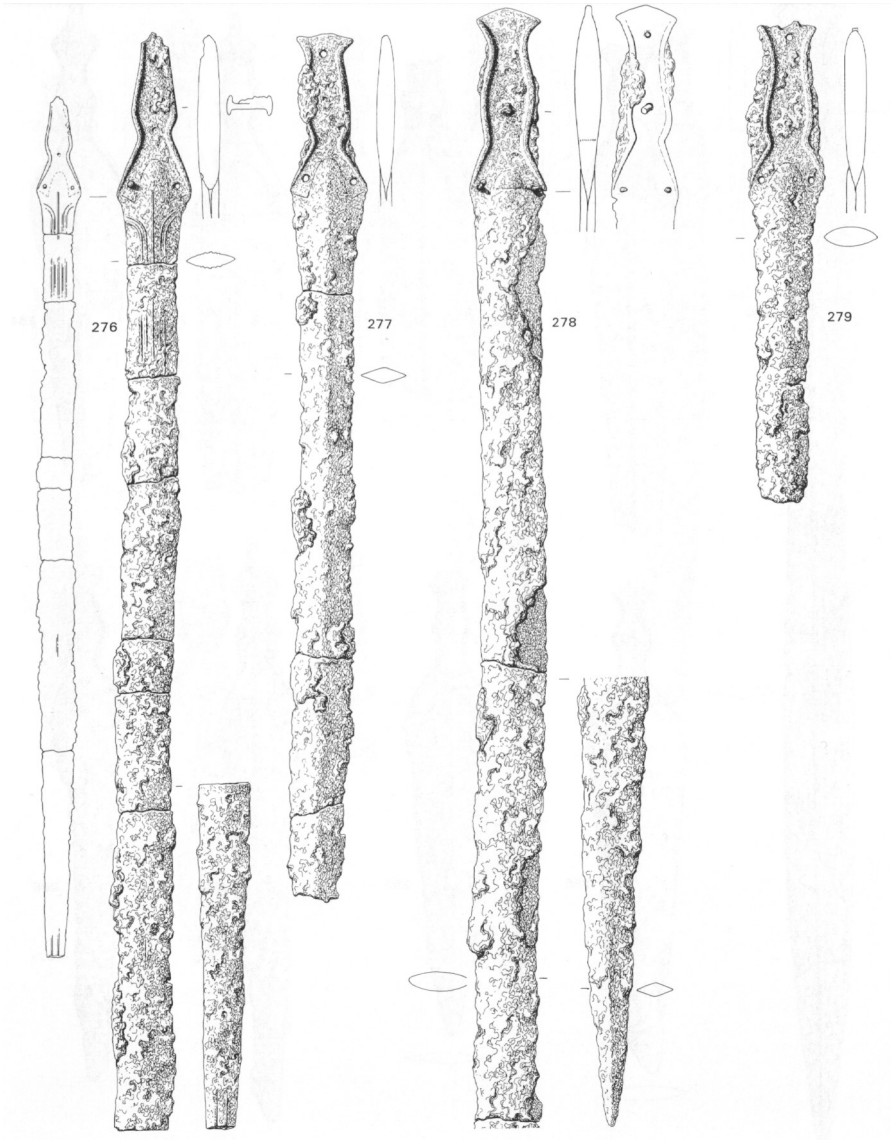


Figure 98. Type 2 Naue II swords of the Aegean (Kilian-Dirlmeier 1993, pl. 41)

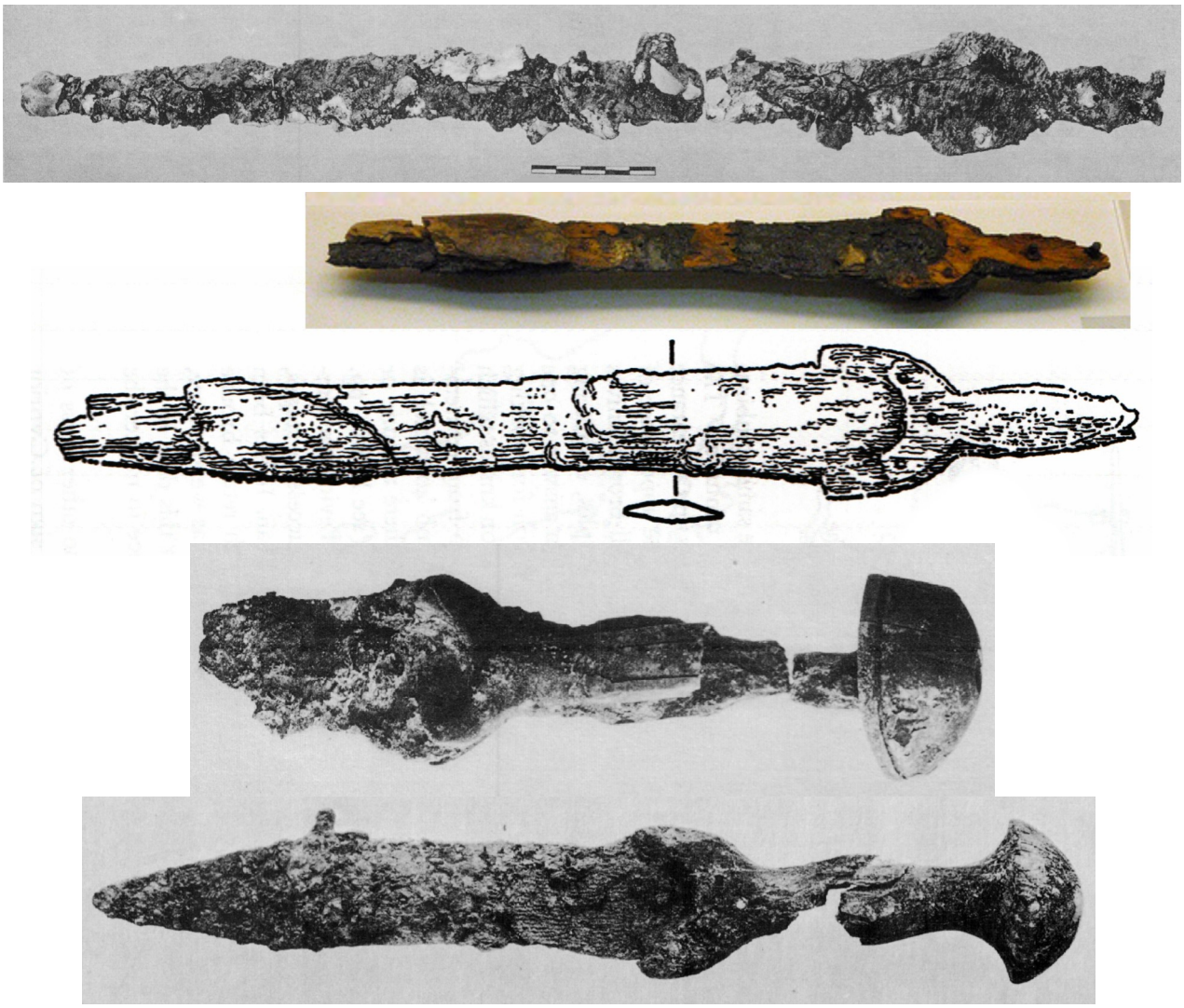


Figure 99. Iron Naue II blades with rounded shoulders and bowed grips
Top to bottom: Kerameikos Tomb 6 (sword A.1860), Tiryns Tomb 28 (dagger A.1250), Kerameikos Graves A & B (A.1270, A.1280)
(see Table 6 for references)

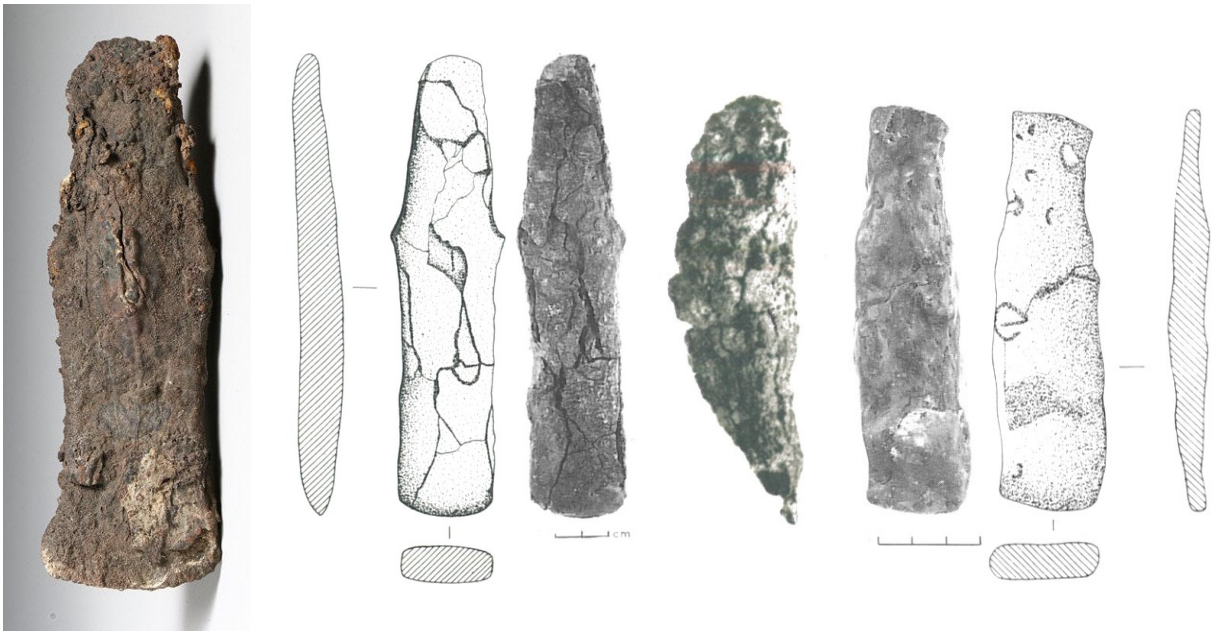


Figure 100. Iron axe heads of Cyprus
From left to right: C.2430, C.2490, C.2830, C.2840
(see Table 8 for references)