CUADERNOS DE ARQUEOLOGÍA MEDITERRÁNEA

VOL. 14 2006

PUBLICACIONES DEL LABORATORIO DE ARQUEOLOGÍA
UNIVERSIDAD POMPEU FABRA DE BARCELONA

Edita:

Edicions Bellaterra
Navas de Tolosa, 289bis
08026 Barcelona
Tel.: 34+ 933 499 786
Fax: 34+ 933 520 851
E-mail: ed-bellaterra@terra.es

Correspondencia e intercambios:

Laboratorio de Arqueología
Facultat d'Humanitats
Universitat Pompeu Fabra
Ramon Trias Fargas, 25-27
08005 Barcelona
Tel.: 34+ 935 422 695
Fax: 34+ 935 421 690
E-mail: eugenia.aubet@upf.edu

Pedidos y suscripciones:

Pórtico Librerías, S.A.
P.O. Box 503 / Muñoz Seca, 6
50080 Zaragoza (España)
Tel.: 34+ 976 557 039 - Fax: 34 + 976 353 226
E-mail: portico@porticolibrerias.es

Depósito legal: B. 49.844-2006
ISBN: 84-7290-341-9
Impreso por: Gradisa. Gráficas y Diseño, S.A. Av. Apel·les Mestres, 40-42. 08820 El Prat de Llobregat

La revista **Cuadernos de Arqueología Mediterránea** se publica con una periodicidad anual y se intercambia con publicaciones científicas afines para incrementar los fondos de la Biblioteca de la Facultad de Humanidades de la Universidad Pompeu Fabra de Barcelona. Asimismo recibe libros para recensión, relacionados con temas de Protohistoria, Colonizaciones y Teoría y Método en Arqueología.

Michal Artzy

THE JATT METAL HOARD IN NORTHERN CANAANITE/ PHOENICIAN AND CYPRIOTE CONTEXT

Manuscript Editor: Gil Tsioni

This book is dedicated to my father and mother,
Professor Rafael and Elly Artzy

INDEX

LIST OF FIGURES

LIST OF TABLES

PREFACE

I was first introduced to a small part of the assemblage of metal objects originating in Jatt in the early 1990's while visiting the offices of the then Israel Department of Antiquities. I had been asked if certain metal objects that had come to their attention originated at Tel Nami, where numerous magnificent Late Bronze bronze objects were found. While similarities existed between the two groups, the differences outweighed them, and I felt that the objects in question did not originate at Tel Nami. A few weeks later, I offered to conserve the objects in the laboratories of the University of Haifa's Center for Maritime Studies, but was informed that they had been returned to the collector who had purchased them. Several years later, I happened upon another part of the Jatt hoard. It was kept on the other side of a wall in the basement of the Hecht Museum at the University of Haifa, where my laboratory was ensconced at the time. It was then that I realized that such an important collection of bronzes deserved to be presented to the archaeological public, despite the problems associated with the history of their excavation. The private collector, who asked not to be identified, gave me permission to see, sample, photograph and draw the objects. Ofra Rimon, the museum's director and curator, and the Board of Governors of the Reuven and Edith Hecht Museum allowed me to publish the objects in their collection and helped along the way, for which I am grateful.

The study went beyond the realm of a mere catalogue when it became clear that the objects, as a group, are to be dated, not to the Late Bronze period, but to the Iron Ib period (or in conventional dating, the second part of the 11th and possibly the first years of the 10th centuries BCE.) With this new understanding, I plunged into a study of the period and the possible carriers of the trade in metals. it was clear that the objects were influenced by eastern Mediterranean, especially the northern Canaanite and Cypriote bronze production centers, the *koine*, dated to the of the last of the Bronze Age. The answer to the question as to who utilized the technological knowledge, produced and distributed the objects or their counterparts in the 11th century, centered on the Phoenicians, the cities of Tyre or Sidon and possibly others. The list of sites in which Phoenician influence was noted became long and new publications, such as Yoqne'am and the more recent Megiddo IV, were only partially incorporated into the study. The manuscript was already in press when new publications as to the importance of the Feinan copper mines in the economy of the area appeared. I don't think that I would have changed my conclusions as to the Northern Canaanite/Phoenician involvement in the metal trade of the 11th and very early 10th ceturies BCE had they been fully incorporated.

Benny Breitman, Itzik Hershko and Henri Feldman carried out the radiographic work with commendable devotion and interest. Meir Shimshon Rapaport volunteered, at the last minute, to examine a bowl with the Scanning Electronic Microscope. George Papasavvas and Shlomo Eisenberg gave of their time to explain metal-oriented questions. A visit by Noel Gale in 1998 for an international meeting at the University of Haifa, «Recycling, Hoarding and Trade in Bronze», gave an opportunity to collect some samples from the Jatt hoard as well as from some of the Nami material. These were analyzed by means of Lead Isotope and included in appendix b contributed by Zofia Stoss-Gale. The results emanating from these gave me the necessary incentive to continue the objects' context.

Thanks are due to many. Ragna Stidsing masterfullly drew the objects and photographed them on short no-

tice. Gil Tsioni helped immensely as a technical and manuscript editor. Both contributed greatly from their knowledge, especially in discussions of the weapons such as arrowheads and spears of which I had little or no prior knowledge and much more. Originally Noa Sheizaf photographed some of the objects and some of her photos were used in the study. Advanced students in my laboratory including Arad Haggi who shares my enthusiasm for the Phoenicians on the coast, especially now that we are co directing the underwarter excavation of the Phoenician harbor at Athlit. Shalom Yanklevitz, and Yossi Salmon listened patiently to my musings, which were not always coherent. Svetlana Zagorski drew the map and along with Anna Emelina helped in preparing the object photographs for print, Dina Shalem helped in the original search for the objects that lead us, at times, into surprising venues. Discussions with Eli Yanai, Ayelet Gilboa, Israel Finkelstein, Amihai Mazar, Yuval Goren, Guy Bar-Oz and Noa Raban-Gerstel were most helpful. Just before sending the manuscript, Amani Abu Hamid of the Israel Antiquities Authorities and Ibrahim Abu-Ahmad Muassi from Baqa el Gharbiyeh helped me avoid rumors and pitfalls. I would also like to thank Daniel and Shira Hillel: each helped in his and her own way.

I have a great debt to Susan Sherratt whose constant encouragement and discussions throughout this study and its preparation for publication cannot be overrated. Susan and Andrew were intellectually always there for me, even in the lowest moments. I wish Andrew could have seen this manuscript.

When Maria Eugenia Aubet heard that I was working on this topic she immediately offered to consider the manuscript for publication. A visit to her city, Barcelona, encouraged me to finish writing it. Now that it is ready for publication, I hope she does not regret the decision. Of course, I bear sole responsibility for the contents of the study.

The study was partially funded by the Frankel Foundation and the preparation of the manuscript by the Mediterranean Archaeological Trust to whom I am endebted.

CHAPTER I: INTRODUCTION

The Tel Jatt assemblage, which consists mainly of bronzes, first surfaced in the early 1990s. It originated in an illicit excavation at the site of Tel Jatt, which lies under the modern village of Jatt and is located ca. 120 meters above sea level and 10 km east of the Mediterranean coast, with the Sharon Plain on its west and the Samarian Hills on its east (Fig. 1.1). The distinctive nature of the Middle Bronze rampart is clearly visible from almost all the sides of the site. In recent years, numerous salvage excavations have taken place at this «living site» (Fig 1.2) revealing material dating from the Early Bronze to the medieval periods. Numerous illicit excavations have come to the notice of the Israel Antiquities Authorities, although it can be assumed that there have been others which have not been recorded and the finds of which have been dispersed. Tel Jatt is situated in a geographically favorable position, close to arable land and with a view extending over the Mediterranean coast, the Carmel, Samaria and the route to the sea via Megiddo.

Tel Jatt was originally identified by Alt (1925: 48 n.3) as Ginti-kirmil of the Amarna letters (EA264-66). Over the years, there have been other suggestions as to the identification of the site, but the modern village of Jatt has recently been re-established as the ancient site of Ginti-kirmil following a historical, archaeological and petrographic study of the tablets sent to el-Amarna from this ancient site (Goren *et al.* 2004: 257).

Salvage excavations have been carried out inside the modern village/town and several graves excavated and published, especially by Yannai (Fig. 1.3; Porat *et al.* 1999; Yannai 2000, Yannai 2005). The exact location of the cave from which the Jatt «hoard» emanated is known. It is situated on the southwestern slope of the Tell where several tombs have been noted. The cave in which the «hoard» was found was most likely a burial cave, although at this juncture this assumption is cannot be confirmed.

The objects found in the cave are currently divided between two different collections. They include metal objects, weapons, utilitarian and cultic objects as well as a group of ceramics and a bone object (see chapter II). Dating has necessarily been arrived at through a typological study of the ceramics and the objects (see chapter III). The ceramic vessels have been inspected to see if they bear any signs of their ancient depositional context, and, indeed, signs of metallic oxidation and incrustations are clearly visible on them (Plate 26).

A study of metal objects belonging to the period between the later part of the Late Bronze Age and the early Iron Age (Late Cypriote IIC to Cypro-Geometric I in Cyprus) and found in the geographical triangle formed by the northern coast of the Levant, Ras Shamra/Ugarit, the Carmel Coast and Cyprus forces us to confront the idea of a *Koine* in metal production.

Metalwork during this period can be divided into two chronological horizons. The earlier stage, associated with the transition from the 13th to the 12th century BCE, is exemplified by finds from Ras Shamra-Ugarit and Tel Nami, which were both destroyed in the first quarter of the 12th century BCE. Among other metal finds from Tel Nami were segments of bronze scrap from at least one rod stand, ready for recycling (Artzy 1994: Fig. 5). The stands were thus produced and recycled during the Late Cypriote IIC period at the latest. Since both Cyprus and most of the northern coastal Canaanite/Phoenician sites, such as Sidon, Sarepta, Tyre, Akko, and Dor (see chapter IV), sur-

Figure 1.1: Map of sites mentioned in the text

Figure 1.2: The modern settlement of Jatt

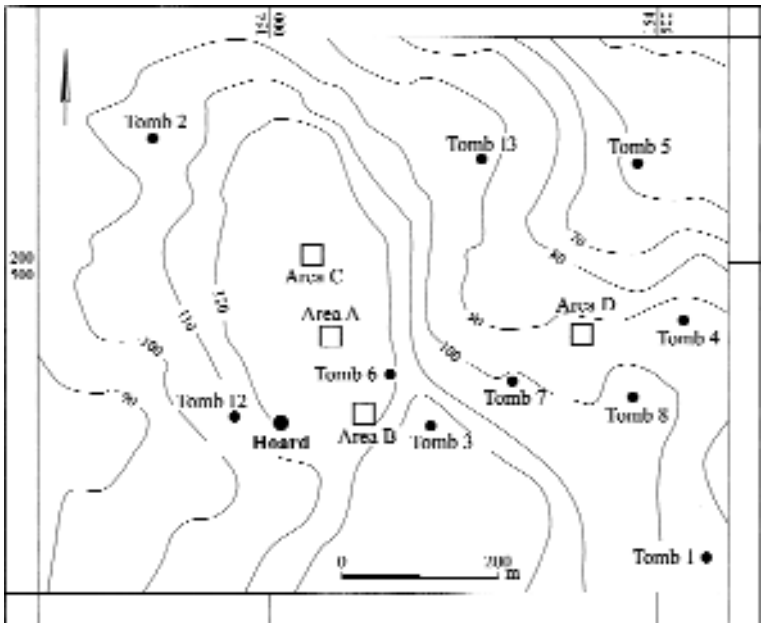


Figure 1.3: Areas of excavations in Jatt (based on Yannai 2005: 13)

vived the upheavals at the time of the demise of Ras Shamra-Ugarit, production of finished bronze objects could well have continued in these regions - and in Cyprus clearly did. Sites such as Enkomi, Hala Sultan Teke and Kition may well have played an active role in filling in the void left by the fall of Ras Shamra-Ugarit and some of its subsidiaries, and continued to produce metal objects within the tradition prevalent in the eastern Mediterranean, though there is a possibility of some decline in the late 12th century due to the disruption in economic networks. A later, 11th-10th century, production of metal objects is associated with Stratum VIa at Megiddo and the finds from Cypriote sites such as Salamis, Kourion-*Kaloriziki* (Benson 1973) and Palaepaphos-*Skales* (Karageorghis 1983). The appearance of bronze rod stands in Cyprus has been dated to LCIIC, which Papasavvas has argued represented the

peak of a long-term process to which he also attributed the Ingot God and the Horned God from Enkomi (2003: 23). He has pointed to chronological problems associated with metal objects, such as the fact that they are found in «hoards» whose date provides only a *terminus ante quem* since there may be a lengthy interval between their production and their deposition. The dating of ceramics between the end of the 13th century and the early 12th century is often problematic as well (Papasavvas 2004: 24). However, the argument that the stands ceased to be produced in Cyprus after the mid 12th century is questionable, since 11th century finds have now surfaced in Cyprus, especially in the south western area.

Cyprus had a long tradition of bronzework, and Muhly has convincingly shown the significance of metals to the economy of Cyprus. Texts reveal that Alashiya had already started in the Middle Bronze period to supply measured quantities of copper to distant Mari on the Euphrates.. The identification of Alashiya as Cyprus has long been the subject of lengthy discussions though most, if not all, scholars accept it. Previous NAA studies established that the Alashiya letters did not originate in Enkomi, but could have come from other areas of Cyprus, particularly the south western part of the island (Artzy 1976), while more recent petrographic studies have shown that at least some, and probably all, of the Alashiya letters found at Amarna and Ras Shamra-Ugarit originated in Cyprus (Goren *et al.*, 2004: 48-53).

The involvement of Cyprus with copper distribution in the late Bronze Age is borne out not only by the copper consignments reported in the Amarna texts, but also by lead-isotope analyses which have indicated the Cypriote origin of copper found in Cyprus and elsewhere (Gale and Stos-Gale 1992; Gale and Stos-Gale 1989; Knapp 1990; 1994: 288). The ox-hide ingots, which appear in a number of places in the eastern Mediterranean and even as far west as Sardinia, are usually referred to as Cypriote products, although in the past some have attributed them to Crete. The stone ox-hide ingot mould found at Ras ibn Hani has drawn renewed attention to the question of where these objects were made. There are no copper mines in the vicinity of Ras Shamra-Ugarit, for which Ras ibn Hani was one of the port cities, but this area was part of the economic network in which Cyprus played an increasingly important role during the Late Bronze Age. However, the manufacture of ox-hide ingots did not necessarily take place in Cyprus itself. These objects, as Muhly has noted, were made of a very pure metal, averaging about 99 % copper (Muhly 1996: 45). It is quite possible that at least in the later part of the Bronze Age, at the end of the 14th century and in the 13th century, copper was shipped from Cyprus in the form of bun ingots, the shape used in the primary production of copper, to be refined on the Levantine coast and shipped from there in the form of ox-hide ingots, which weighed ca. 30 kgs (about a talent). The quantities of wood (or rather charcoal) needed for the processes of copper production and refinement also need to be taken into account. Although the island of Cyprus was extensively forested, heavy demand in the localities where production took place necessitated the use of wood from wider areas, especially during the late 15th-early 12th centuries BC, when the production of copper was increasing. It has been pointed out that the time needed for regeneration of a deforested area is ca. 80-100 years (Constaninou 1992: 72; Muhly 1996: 46). Considering the geographical nature of the Troodos mountains where the copper originated and also considering the active trade networks of the period, it is possible to suggest that bun ingots were shipped to the mainland, refined and transformed into ox-hide ingots there to save Cypriote fuel, and shipped in that form to various recipients.

Although re-cycling was not a new practice in the later part of the Late Bronze Age, it became much more prevalent at that time. Bronze was exchanged in individually small quantities, at least along the coasts, and probably inland as well. Various socio-economic changes, which took place, albeit in slow motion, dictated this change in the trade in metals. No longer were the centralized élites the only clients obtaining metals, in bulk talent-sized modules of ca. 30 kg; individuals or small groups, whether with cult associations or not, could also now exchange small scraps of metal for other goods and thus increase their accumulation of metals in general. The circulation of scrap bronze occurred because of the changing nature of demand for copper and its alloys, and just as importantly *vice-versa* (Artzy 1997 or Sherratt 2000: 87; 2003: 41). Scrap metal, including bronze, became an attainable commodity for the subélite in the 13th-12th centuries BCE.

The northern workshops in Area II at Kition provide a good case study of recycling (Karageorghis and Demas 1985; Karageorghis and Kassianidou 1999). But this practice is also found at other Cypriote sites, such as Athienou (T. Dothan and Ben Tor 1983) and Enkomi where large amounts of slag and scrap metal have been found along with bronze cultic objects (Dikaios 1969). Levantine coastal sites at which recycling has been noted include, among others, Sarepta (Pritchard 1975: 127-128; Bell 2005a: 142), Tel Akko (Artzy 2006a), and Tel Nami situated on the Carmel coast. The international nature of the mariners frequenting the anchorage of Tel Nami is well represented by the different rituals which seem to have taken place in the sanctuary on the summit of the tell. There are remains of Canaanite, Syrian, Cypriot and Aegean cults (Artzy 1991; 1994; 2000), The 13th century BCE Cape Geli-

donya shipwreck, referred to as a «foundry ship» by its excavator (Bass 1967: 117-121), provides yet another example of recycling activities. Its cargo included ox-hide ingots, as well as objects identified as scrap metal shipped for its metal value, the trade tools of a bronze smith, and finished products. It also carried slab ingots, found by the excavators in the vicinity of the «captain's cabin» with other personal belongings for daily use (Bass 1967: 78-82). One of those ingots was analyzed and found to contain a fair amount of tin, which would mark it as the product of recycled bronze.

According to Zaccagnini (1987: 29; 1977) and Liverani (1987: 69), in the Late Bronze Age the status of a merchant was that of a palace dependent. Liverani proceeds to postulate that during the 13th century BCE this relationship with the palace underwent some changes. His suggestion is that, in the Late Bronze Age, the merchant's own profit was only as a sideline of his trading activity, while in the Iron Age it became the major basis for his trade (Liverani 1987: 72). Clearly, the period of transformation from the Late Bronze to the Iron Age was already slowly underway at least during the 13th and the 12th centuries, if not earlier (Artzy 1997: 4-5). Thus, during and following the collapse of royal palaces, such as Ugarit, «merchants were in a position to survive without the Palace organization, and to continue their personal activities in a different framework» (Liverani 1987: 70). Those involved in «sailor's trade» (Artzy 1985; 2001a) or «entrepreneurial trade» in the 14th and 13th centuries BCE expanded their activities, as did the intermediaries who were responsible for much of the maritime transport (Artzy 1997: 7-9). The crews of ships, like the captain of the Cape Gelidonya vessel, and possibly his earlier counterpart on the Ulu Burun ship, had in their possession scrap metal that was not part of the main cargo (Pulak 2005: 85-86; Bass 2006: 24-25). It may not just be a coincidence that the later Gelidonya shipwreck, which is dated to the second half of the 13th century BCE, carried very much more scrap metal than the Ulu Burun shipwreck, dated to the end of the 14th century BCE (Pulak 1997). Those responsible for these enterprises could easily have exchanged their goods along the maritime routes. Scrap metal, in varying amounts, could be an additional element of cargo, which added little tonnage and took up no noticeable space on small vessels. Since it could be bartered in very small measured units, scrap metal was an easy commodity to dispose of. Priests, or cultic attendants, at coastal sites such as Nami and Kition (Karageorghis and Kassianidou 1999) had the capital necessary to afford to obtain some of the shipments as raw material and the wherewithal to produce bronze ingots and finished goods of bronze or any other metals, thus adding value. The presence of the metal smith's tools found in the environs of the sanctuary at Tel Nami might be explained in this way (Artzy 1994: 24). It has been argued that the end of the 13th century and the beginning of the 12th century were characterized by shortages of metals in the eastern Mediterranean (Negbi 1991: 218; Snodgrass 1971: 354 among others), although others do not see the situation in the same light. On the contrary, Knapp, Muhly and Muhly have argued that use of scrap metal, viewed by some as signifying shortage, is to be seen «as a sign of the expanding metal industry, a development prompted by a great increase in the amount of metal in circulation and in daily use» (Knapp, Muhly and Muhly 1988: 257). They take as an example the case of Mycenaean Pylos and those Linear B tablets which mention copper (or bronze) allocations. While Chadwick felt that the amounts of metal signified shortage (Chadwick 1976: 141), they see it as a reflection of the size and importance of the bronze industry (Knapp, Muhly and Muhly 1988: 257). Given the number of metal smiths and the amounts of copper or bronze mentioned, it is likely that the metal allocated by the palace was to be used for repairs and renewal rather than for the production of new objects, for which re-cycled metals were utilized (Halstead 1981: 333 and Knapp, Muhly and Muhly 1988: 257). There is, however, no reason why the copper/bronze allocated to the smiths in Pylos should have only been used for repair and renewal. It could just as well have been used in the production of complete objects.

The impressive number of metal objects found in the Jatt cave/grave discussed in this study raises some issues about the use of the term «hoard». «Hoarding» of metals, especially bronze, seems to have become a common phenomenon in the 13th-11th centuries BCE, although earlier examples are also known (Knapp, Muhly and Muhly 1988: 234) and many almost certainly did not survive. Several «hoards» have been found in Cyprus (Catling 1964: 278-298; Mätthaus and Schumacher-Mätthaus 1986). Noticeably, most of the «hoards» dealt with in the literature up to the mid-1980s originated in the eastern part of Cyprus. Since then, collections of bronzes from the south-western part of Cyprus have been published. Many of these, however, originate in graves and are not usually thought of as «hoards» in the same sense, though there is arguably some rationale for seeing them in this way - as deliberately deposited collections of metal objects. While the eastern Cypriote «hoards» are usually dated to ca. 1200 BCE +/– 50 years, the assemblages of metal from the south-western part of the island are generally of a slightly later date. Why there were «hoards» and what their purpose was has been discussed by several scholars. Some have felt that these were deposited for safekeeping (Catling 1964: 264; Lagarce 1971: 427), while others have regarded the Cypriote «hoards» as related in some way to cultic practices in this copper-rich island. (Matthäus and Schumacher-Matthäus

1986). Muhly (1988) and Knapp (1997) see hoarding activity as taking place in a «…broader eastern Mediterranean context of a degenerating interregional economic system, and a destabilized social order» (Knapp, Muhly and Muhly 1988: 258). They further divide «hoards» into two major types, «utilitarian» (including merchants' and founders' hoards) and «non-utilitarian». It is impossible to assign the Jatt «hoard» to the first of these types, and it is not at all clear that it belongs to the second either, unless perhaps we are willing (as some do) to regard the deposition of large quantities of metal in graves as a kind of «non-utilitarian» hoarding behavior. While many of the pieces are multiples of what seem to be newly made objects, others appear to be older objects, conserved either for their scrap value or for some other use altogether, perhaps as models for the production of new objects, a possibility not usually considered in discussions of hoards. The possibility of a later rather then earlier dating of the Jatt hoard, and its comparison to most of those from Cyprus, might have some bearing on this additional category. Yet it is with some misgiving that the term «hoard» is being used in this study for the assemblage of metals objects found at Jatt.

The changes in the copper trade of the 13th century eastern Mediterranean had broader reasons than can be accounted for by any problems that Cypriotes might have had resulting from the increase in their rate of production and their increasing geographic contacts, both direct and indirect. The radius of production centers with input into the Mediterranean trade expanded. Sherratt has shown that, in the 13th century, products of the Alpine bronze industry were already making their way into the Aegean and the eastern Mediterranean (Sherratt 2000: 84-87; see also Bouzek 1985: 120-167). These «Urnfield» bronzes have often been associated with possible mercenaries or invaders (Bouzek 1985: 242-3; Wells 1992: 38), but against this it can be argued that, because the «…objects found in the eastern Mediterranean fall overwhelmingly into status-defining categories of personal ornaments and weapons…» (Sherratt 2003: 41), they are best interpreted as traded goods. But the influx of the bronze from the north was not the only influx in the 13th century, especially towards its end. At least one more production center relevant to this study started to supply the area of the eastern Mediterranean with copper.

With the erosion of Ugarit in the last few decades of the 13th century BCE, well before its actual demise and the weakening of the Egyptian authority, geo-political and economic changes took place. As Sherratt has already suggested, the northern coastal Canaanite/Phoenician cities were in a position to function independently (Sherratt 2003: 38). These cities, Sidon, Sarepta or Tyre – acting as financiers and middlemen – may not have been able to support the kind of scale of trade in bulk copper and of copper refining as seen at Ugarit in its heyday. However, with their encouragement, production centers, such as that in Feinan, which had been dormant during a good part of the 2nd millennium, were able to become active again in the 12th-11th centuries BCE. The local population around Feinan, whether Edomites or Midianites, whose expertise in mining extended to earlier periods in the Timna area, entered the production chain (Rothenberg 1972;1988; Rothenberg and Glass 1983). Which of the northern Canaanite/Phoenician cities were involved in the trade networks is hard to distinguish. While Sidon and probably Sarepta took the lead at first, Tyre likely became the pre-eminent Phoencian economic force eventually.

The Feinan district in Jordan was a center of copper production in the Early Bronze Age (Hauptmann 2000: 137-138; Levy *et al.* 2002; Adams 2002; Philip *et al.* 2003: 86-89; Levy *et al.* 2004: 865). It represents the continuation of the same copper vein as that of Timna in the Arabah district, now located in the modern state of Jordan. This did not mean that Cyprus ceased to produce or distribute its own copper. As a result of its maritime location, its maritime tradition and proximity to commercial states, as well as its forests which supplied the necessary sources of fuel, it remained a pre-eminent producer of copper in the eastern Mediterranean. It was just not the only one.

Knauf has pointed out that, when the Cypriote copper supply broke down, the «Palestinian» copper market turned to the ore deposits in Wadi Arabah (Knauf 1991: 184-5). New excavations at Khirbat en-Nahas in the «Edomite» area of modern Jordan have revealed an early Iron Age copper-producing center which is dated to ca. 1200-1000 BCE. Signs of mass production abound. According to Levy *et al.*, ca. 50.000-60.000 tons of slag were left by those working at the site. A much smaller amount was found at the metal-producing site of Timna (Levy *et al.* 2004: 867). At least in one area of the excavation, namely Area S, a metalworking building revealed several strata, the earliest of which, Stratum 4, has been radiocarbon dated to ca. mid-13th century and 12th-11th centuries BCE. Above it is a layer, Stratum 3, representing a major industrial phase in this part of the site, which is dated to the mid 11th to the 10th centuries BCE. The material goods reported agree well with the radiocarbon dates for the layers and include ceramics and scarabs. The quantities of slag at Khirbet en-Nahas indicate the importance of metal production during this period in the Feinan area. At Tell es-Sa'idiyeh, Tell deir 'Alla and Pella there are remains dating to the end of the Bronze and to the Iron Ages. These sites lie in the Succoth Valley, where the metal vessels for the Solomon Temple were said to have been produced (I Kings VII: 46). Metal workshops have been noted at Deir 'Alla (Franken 1969: 21-22), numerous bronze objects have been found as grave goods in the excavations of Sa'idiyeh, both by Pritchard (1980) and Tubb (1988b), and there are metal objects at Pella (Bourke *et al.* 1999; Philip *et al.* 2003).

With the new data emanating from Feinan, the question as to why the Northern Coastal Canaanites/Phoenician metal smiths or distributors had an interest in the area of modern Jordan is now more easily resolved.

While shipping and other trading mechanisms are important for our topic, it is the final result, the objects, which above all interest us in this study. Metal objects, mostly bronzes, occur in considerable numbers along the Syro-Lebanese coast and in its hinterland: at Ugarit, Byblos and Kamid el-Loz, as well as in Israel, at major sites such as Hazor, Megiddo, Beth Shean, Lachish and most recently at Nami. In Cyprus, Late Bronze metalwork follows the tradition of the Early Bronze and especially the Middle Bronze period, but there is no question but that it was towards the end of the Late Bronze Age that an acme in the production of objects was reached. While there may be some disagreement as to the dating of some of the bronze rod stands, some at least can be dated to Late Cypriote IIC, which represents the peak of a very long tradition of production (Papasavvas 2001: 265). Bronze objects from Cyprus are not limited to these stands, however. The transitional Late Cypriote IIC/IIIA «hoard» from Sinda, datable to ca. 1200 BCE (Karageorghis 1973: 78; Furumark 1965: 105-107), contains 11 pieces, among them a bronze wall bracket, a shape well known in ceramic form in Cyprus, although recently some wall brackets produced outside Cyprus have also been noted (Panitz-Cohen2006). A hoard, recently discovered at Galiporni in the Karpas peninsula in Cyprus seems to be of similar date to the hoard from Sinda, and contains various types of bronzes, such as incense burners, more typical of the Levantine coast.

In Cyprus, where the upheavals of around 1200 were not so destructive, and where sites such as Enkomi (Catling 1964: 278ff), on the eastern side of the island, continued and actually filled in the void left by the demise of the mercantile Ras-Shamra Ugarit, it is not always easy to assign a date before or after 1200 BCE, although at sites such as Kalavasos-*Ayios Dhimitrios*, there is no question but that the hoard is earlier than this date. The metal objects in the graves at Palaepaphos-*Skales*, on the south-western side of the island, date to well after 1200 BCE, and show a continuation of the tradition of earlier smiths (Karageorghis 1983). It is often hard to distinguish between Late Bronze Age objects and those of the early Cypro-Geometric period. Thus in the period which in Levantine terms is called Iron I (namely the 12th century and the first half of the 11th century BCE), Cypriote smiths continued to produce objects in the traditions of their ancestors. In the past, scholars such as Catling have considered that the increase in production of bronze objects in Cyprus was due to the arrival of Levantine artisans (Catling 1964: 221-2). In the Syro-Palestinian *milieu*, a number of variations can be expected because of geo-political changes. At Tel Nami, which did not survive long (if at all) after the demise of Ugarit in the first quarter of the 12th century BCE, the metal objects bear a close resemblance to Ugaritic ones, and their date of production cannot have been any later than ca. 1200, like those from Ugarit. Yet, at sites which were not dramatically affected at the transition from the Late Bronze to Iron Age, such as Megiddo (Load 1948: 112, 150; Yadin 1970: 77) and Beth Shean (Pritchard 1980; Oren 1973: 116-117), «hoards» of bronze objects dating to Iron I have been found. The situation at other sites, including Tell Dothan (Gershuny 1985: 31; Cooley and Practico 1994), Tell es-Sa'idiyeh (Pritchard 1968: 108 ff. and Tubb 1988b) seems to be the same.

Thus, any attempt to show that the production of metal, especially bronze or any other copper alloy, is to be attributed to foreign influence, and in particular to «Sea Peoples» or Aegean refugees, seems very hard to sustain. The bronze assemblages found in Stratum VIA at Megiddo in the 1960s were attributed by their excavator to Philistine-Canaanite metalworking craft; yet others have attempted to attribute production of these objects to an intrusive or new population, particularly one of Aegean origin. The competition among the Phoenician cities could well explain some of the destructions along the coast. However, a quick glance at any of the objects assigned to the later (Iron Ib) period reveals that they are clearly descendants, at least in terms of form, of the earlier (13th century) Late Bronze Age objects found on the northern coast and in Cyprus. Not all Cypriote bronzes can be securely dated since many were found in graves and could have had a long life among the living before they were deposited in these graves or combined to form «hoards». However, the implications of the appearance of these metal assemblages at several sites at much the same time, as well as in stratigraphical excavations such as those at Megiddo, cannot be ignored.

There are differences, as one might expect, between bronze assemblages in the Levant and in Cyprus, both in the late 13th-early 12th centuries and in the 11th century BCE. Some degree of regional production is certain in the earlier period, but nevertheless there is a clear *koine* relationship between the products of Cypriote and Ugaritic smiths, doubtless brought about by the closely entwined distributions of both of these. In the 11th century BCE, with the involvement of what we can now begin to call Phoenicians, and against the background of active competition between their different cities, that metal *koine*, though still visible, is perhaps so to a lesser degree, and the bronze objects found in south western Cyprus and Jatt, though similar, are clearly different. This is indicative of the continuation of the bronze working industries of the northern coastal sites and Cyprus, but with regional changes.

According to Zaccagnini (1987: 29; 1977) and Liverani (1987: 69) in the Late Bronze Age the status of a merchant was that of a palace dependent. Liverani proceeds to postulate that during the 13th century BCE this relationship with the palace underwent some changes. His suggestion is that, in the Late Bronze Age, the merchant was active for his own profit only as a sideline, and in the Iron Age became active mostly for his own sake (Liverani 1987: 72). Clearly, the period of transformation from the Late Bronze to the Iron Age was already slowly underway at least during the 13th and the 12th centuries, if not earlier (Artzy 1997: 4-5). Thus, during and following the collapse of royal palaces, such as Ugarit, «merchants were in a position to survive without the Palace organization, and to continue their personal activities in a different framework» (Liverani 1987: 70). Those involved in «sailor's trade» (Artzy 1985a; 1985b) or «entrepreneurial trade» in the 14th and 13th centuries BCE expanded their activities, as did the intermediaries who were responsible for much of the maritime transport (Artzy 1997: 7-9). The crews of ships, like the captain of the Cape Gelidonya vessel, and possibly his earlier counterpart on the Ulu Burun ship, had in their possession scrap metal which was not part of the main cargo (Pulak 2005: 85-86; Bass 2006: 24-25). It may not just be a coincidence that the later Gelidonya shipwreck, which is dated to the second half of the 13th century BCE, carried very much more scrap metal than the Ulu Burun shipwreck, dated to the end of the 14th century BCE (Pulak 1997). Those responsible for these enterprises could easily have exchanged their goods along the maritime routes. Scrap metal, in varying amounts, could be an additional element of cargo, which added little tonnage and took up no noticeable space on small vessels. Since it could be bartered in very small measured units, scrap metal was an easy commodity to dispose of. Priests, or cultic attendants, at coastal sites such as Nami and Kition (Karageorghis and Kassianidou 1999) had the capital necessary to afford some of the shipments as raw material and the wherewithal to produce bronze ingots and finished goods of bronze or any other metals, thus adding value. The presence of the metal smith's tools found in the environs of the sanctuary at Tel Nami might be explained in this way (Artzy 1994: 24). It has been argued that the end of the 13th century and the beginning of the 12th century were characterized by shortages of metals in the eastern Mediterranean (Negbi 1991: 218; Snodgrass 1971: 354 among others), although others do not see the situation in the same light. On the contrary, Knapp, Muhly and Muhly have argued that use of scrap metal, viewed by some as signifying shortage, is to be seen «as a sign of the expanding metal industry, a development prompted by a great increase in the amount of metal in circulation and in daily use» (Knapp, Muhly and Muhly 1988: 257). They take as an example the case of Mycenaean Pylos and those Linear B tablets which mention copper (or bronze) allocations. While Chadwick felt that the amounts of metal signified shortage (Chadwick 1976: 141), they see it as a reflection of the size and importance of the bronze industry (Knapp, Muhly and Muhly 1988: 257). Given the number of metal smiths and the amounts of copper or bronze mentioned, it is likely that the metal allocated by the palace was to be used for repairs and renewal rather than for the production of new objects, for which re-cycled metals were utilized (Halstead 1981: 333 and Knapp, Muhly and Muhly 1988: 257). There is, however, no reason why the copper/bronze allocated to the smiths in Pylos should have only been used for repair and renewal. It could just as well have been used in the production of complete objects.

The impressive number of metal objects found in the Jatt cave/grave discussed in this study raises some issues about the use of the term «hoard». «Hoarding» of metals, especially bronze, seems to have become a common phenomenon in the 13th-11th centuries BCE, although earlier examples are also known (Knapp, Muhly and Muhly 1988: 234) and many almost certainly did not survive. Several «hoards» have been found in Cyprus (Catling 1964: 278-298; Mätthaus and Schumacher-Mätthaus 1986). Noticeably, most of the «hoards» treated in the literature up to the mid-1980s originated in the eastern part of Cyprus. Since then, collections of bronzes from the south-western part of Cyprus have been published. Many of these, however, originate in graves and are not usually thought of as «hoards» in the same sense, though there is arguably some rationale for seeing them in this way – as deliberately deposited collections of metal objects. While the eastern Cypriote «hoards» are usually dated to ca. 1200 BCE +/- 50 years, the assemblages of metal from the south-western part of the island are generally of a slightly later date. Why there were «hoards» and what their purpose was has been discussed by several scholars. Some have felt that these were deposited for safekeeping (Catling 1964: 264; Lagarce 1971: 427; Snodgrass 1988), while others have regarded the Cypriote «hoards» as related in some way to cultic practices in this copper-rich island. (Matthäus and Schumacher-Matthäus 1986). Muhly (1988) and Knapp (1997) see hoarding activity as taking place in a «…broader eastern Mediterranean context of a degenerating interregional economic system, and a destabilized social order « (Knapp, Muhly and Muhly 1988: 258). They further divide «hoards» into two major types, «utilitarian» (including merchants' and founders' hoards) and «non-utilitarian». It is impossible to assign the Jatt «hoard» to the first of these types, and it is not at all clear that it belongs to the second either, unless perhaps we are willing (as some are) to regard the deposition of large quantities of metal in graves as a kind of «non-utilitarian» hoarding behavior. While many of the pieces are multiples of what seem to be newly made objects, others appear to be older objects, conserved either

for their scrap value or for some other use altogether, perhaps as models for the production of new objects, a possibility not usually considered in discussions of hoards. The later dating of the Jatt hoard by comparison with most of those from Cyprus discussed in studies of Cypriote hoards might have some bearing on this additional category. It is with some misgiving that the term «hoard» is being used in this study for the assemblage of metals objects found at Jatt.

The changes in the copper trade of the 13th century eastern Mediterranean had broader reasons than can be accounted for by any problems that Cypriotes might have had resulting from the increase in their rate of production and their increasing geographic contacts, both direct and indirect. The radius of production centers with input into the Mediterranean trade expanded. Sherratt has shown that, already in the 13th century, products of the Alpine bronze industry were making their way into the Aegean and the eastern Mediterranean (Sherratt 2000: 84-87; see also Bouzek 1985: 120-167). These «Urnfield» bronzes have often been associated with possible mercenaries or invaders (Bouzek 1985: 242-3; Wells 1992: 38), but against this it can be argued that, because the «…objects found in the eastern Mediterranean fall overwhelmingly into status-defining categories of personal ornaments and weapons… « (Sherratt 2003: 41), they are best interpreted as traded goods. But the influx of the bronze from the north was not the only one in the 13th century, especially toward its end. At least one more production center having relevance for this study started to supply the area of the eastern Mediterranean with copper.

With the erosion of Ugarit in the last few decades of the 13th century BCE, well before its actual demise and the weakening of the Egyptian authority, geo-political and economic changes took place. As Sherratt has already suggested, the northern coastal Canaanite/Phoenician cities were in a position to function independently (Sherratt 2003: 38). These cities, Sidon, Sarepta or Tyre –acting as financiers and middlemen– may not have been able to support the kind of scale of trade in bulk copper and of copper refining as seen at Ugarit in its heyday. However, with their encouragement, production centers, such as that in Feinan, which had been dormant during a good part of the 2nd millennium, were able to become active again in the 12th-11th centuries BCE. The local population around Feinan, whether Edomites or Midianites, whose expertise in mining extended to earlier periods in the Timna area, entered the production chain. Which of the northern Canaanite/Phoenician cities were involved in the trade networks is hard to distinguish. While Sidon and Sarepta took the lead at first, it was probably Tyre which became pre-eminent.

The Feinan district in Jordan was a center of copper production in the Early Bronze Age (Hauptmann 2000: 137-138; Levy *et al.* 2002; Adams 2002; Philip *et al.* 2003: 86-89; Levy *et al.* 2004: 865). It represents the continuation of the same copper vein as that of Timna in the Arabah district, now located in the modern state of Jordan. This did not mean that Cyprus ceased to produce or distribute its own copper. As a result of its maritime location, its maritime tradition and proximity to commercial states, as well as its forests which supplied the necessary sources of fuel, it remained a pre-eminent producer of copper in the eastern Mediterranean. It was just not the only one.

Knauf has pointed out that, when the Cypriote copper supply broke down, the Palestinian copper market turned to the ore deposits in Wadi Arabah (Knauf 1991: 184-5). New excavations at Khirbat en-Nahas in the «Edomite» area of modern Jordan have revealed an early Iron Age copper producing center which is dated to ca. 1200-1000 BCE. Signs of mass production abound. According to Levy *et al.*, ca. 50.000-60.000 tons of slag were left by those working at the site. A much smaller amount was found at the metal producing site of Timna (Levy *et al.* 2004: 867). At least in one area of the excavation, namely Area S, a metalworking building revealed several strata, the earliest of which, Stratum 4, has been radiocarbon dated to ca. mid-13th century and 12th-11th centuries BCE. Above it is a layer, Stratum 3, representing a major industrial phase in this part of the site, which is dated to the mid 11th to the 10th centuries BCE. The material goods reported agree well with the radiocarbon dates for the layers and include ceramics and scarabs. The quantities of slag at Khirbet en-Nahas indicate the importance of metal production during this period in the Feinan area as noted above.

In Cyprus, where the upheavals of around 1200 were not so destructive, and where sites such as Enkomi (Catling 1964: 278 ff.), on the eastern side of the island, continued and actually filled in the void left by the demise of the mercantile Ras-Shamra Ugarit, it is not always easy to assign a date before or after 1200 BCE, although at sites such as Kalavasos-*Ayios Dhimitrios*, there is no question but that the hoard is earlier than this date. The metal objects in the graves at Palaepaphos-*Skales*, on the south-western side of the island, date to well after 1200 BCE, and show a continuation of the tradition of earlier smiths (Karageorghis 1983). It is often hard to distinguish between Late Bronze Age objects and those of the early Cypro-Geometric period. Thus in the period which in Levantine terms is called Iron I (namely the 12th century and the first half of the 11th century BCE), Cypriote smiths continued to produce objects in the traditions of their ancestors. In the past, scholars such as Catling have considered that the increase in production of bronze objects in Cyprus was due to the arrival of Levantine artisans (Catling

1964: 221-2). In the Syro-Palestinian *milieu*, a number of variations can be expected because of geo-political changes. At Tel Nami, which did not survive long (if at all) after the demise of Ugarit in the first quarter of the 12th century BCE, the metal objects bear a close resemblance to Ugaritic ones, and their date of production cannot have been any later than ca. 1200, like those from Ugarit. Yet, at sites which were not dramatically affected at the transition from the Late Bronze to Iron Age, such as Megiddo (Load 1948: 112, 150; Yadin 1970: 77) and Beth Shean (Pritchard 1980; Oren 1973: 116-117), «hoards» of bronze objects dating to Iron I have been found. The situation at other sites, including Tell Dothan (Gershuny 1985: 31; Cooley and Practico 1994), Tell es-Sa'idiyeh (Pritchard 1968: 108 ff. and Tubb 1988b) seems to be the same.

Thus any attempt to show that the production of metal, especially bronze or any other copper alloy, is to be attributed to foreign influence, and in particular to «Sea Peoples» or Aegean refugees, seems very hard to sustain. The bronze assemblages found in Stratum VIA at Megiddo in the 1960s were attributed by their excavator to Philistine-Canaanite metalworking craft; yet others have attempted to attribute production of these objects to an intrusive or new population, particularly one of Aegean origin. The competition among the Phoenician cities, could well explain some of the destructions along the coast. However, a quick glance at any of the objects assigned to the later (Iron Ib) period reveals that they are clearly descendents, at least in terms of form, of the earlier (13th century) Late Bronze Age objects found on the northern coast and in Cyprus. Not all Cypriote bronzes can be securely dated since many were found in graves and could have had a long life among the living before they were deposited in these graves or combined to form «hoards». However, the implications of the appearance of these metal assemblages at several sites at much the same time, as well as in stratigraphical excavations such as those at Megiddo, cannot be ignored.

There are differences, as one might expect, between bronze assemblages in the Levant and in Cyprus, both in the late 13th-early 12th centuries and in the 11th century BCE. Some degree of regional production is certain in the earlier period, but nevertheless there is a clear *koine* relationship between the products of Cypriote and Ugaritic smiths, doubtless brought about by the closely entwined distributions of both of these. In the 11th century BCE, with the involvement of what we can now begin to call Phoenicians, and against the background of active competition between their different cities, that metal *koine*, though still visible, is perhaps so to a lesser degree, and the bronze objects found in south western Cyprus and Jatt, though similar, are clearly different. This is indicative of the continuation of the bronze working industries of the northern coastal sites and Cyprus, but with regional changes.

CHAPTER II: CATALOGUE OF THE JATT HOARD

The catalogue contains a physical description of all the Jatt hoard objects, categorized according to shape and type. It begins with the metal objects, presented in open to closed forms order, and continues with weapons, «tools», weights and cultic vessels. The catalogue concludes with the description of the ceramic vessels, and the single bone object. The description of each item starts with the study's item number; fFollowing it, in parenthesis, the Hecht Museum's registration number for the objects now ensconced in the museum's exhibition and storerooms; following that, the figure numbers of the drawings and radiography for those items which were analyzed and the plate numbers of the photographs.

The text includes technical description of the item shape, decoration, measurements, color of ware and decoration of the ceramics and when possible mode of production, as is seen by the naked eye. Fuller descriptions and a discussion of the shapes and types and their contexts, as well as detailed study of selected objects, their parallels, dating, physical analysis results, etc. are presented in chapter III.

I. BRONZE OBJECTS

BOWLS

1. HEMISPHERICAL AND ROUNDED BOWLS

J-77 (Figs. 2.1: 1, 6.1; Pl. 1: 1): Small hemispherical bowl with internally thickening, triangular-sectioned, beveled rim. The modeling of the rim created a shallow groove at the outside of the lip. Thin walls, uniform in thickness except for a square protrusion, ca. 1.8 × 1.8 cm. wide and 0.2 cm. high at the inside of the bowl, in the center of the rounded base. Complete. Good state of preservation. Height 6.1 cm. Rim diameter 11 cm.

J-79 (Fig. 2.1: 2; Pl. 1: 2): Small hemispherical bowl with thickened rounded rim. The wall is relatively thick but uniform in thickness. Complete. Good state of preservation. Height 5.7 cm. Rim diameter 11.3 cm.

J-42 (H-2673, Fig. 2.1: 3; Pl. 1: 3): Medium sized rounded bowl with direct stance and rounded, slightly thickened rim. Rounded, inward thickening base. Complete. Good state of preservation. Height 5 cm. Rim diameter 14.5 cm.

2. ROUNDED PINCHED BOWLS

J-71 (Fig. 2.1: 4; Pl. 1: 4): Large, rounded, deep bowl. The bowl was deformed by pressing its rim inward from two opposite points along the circumference in order to form a wide U-shaped nozzle of ca. 1/3 body length. Thicke-

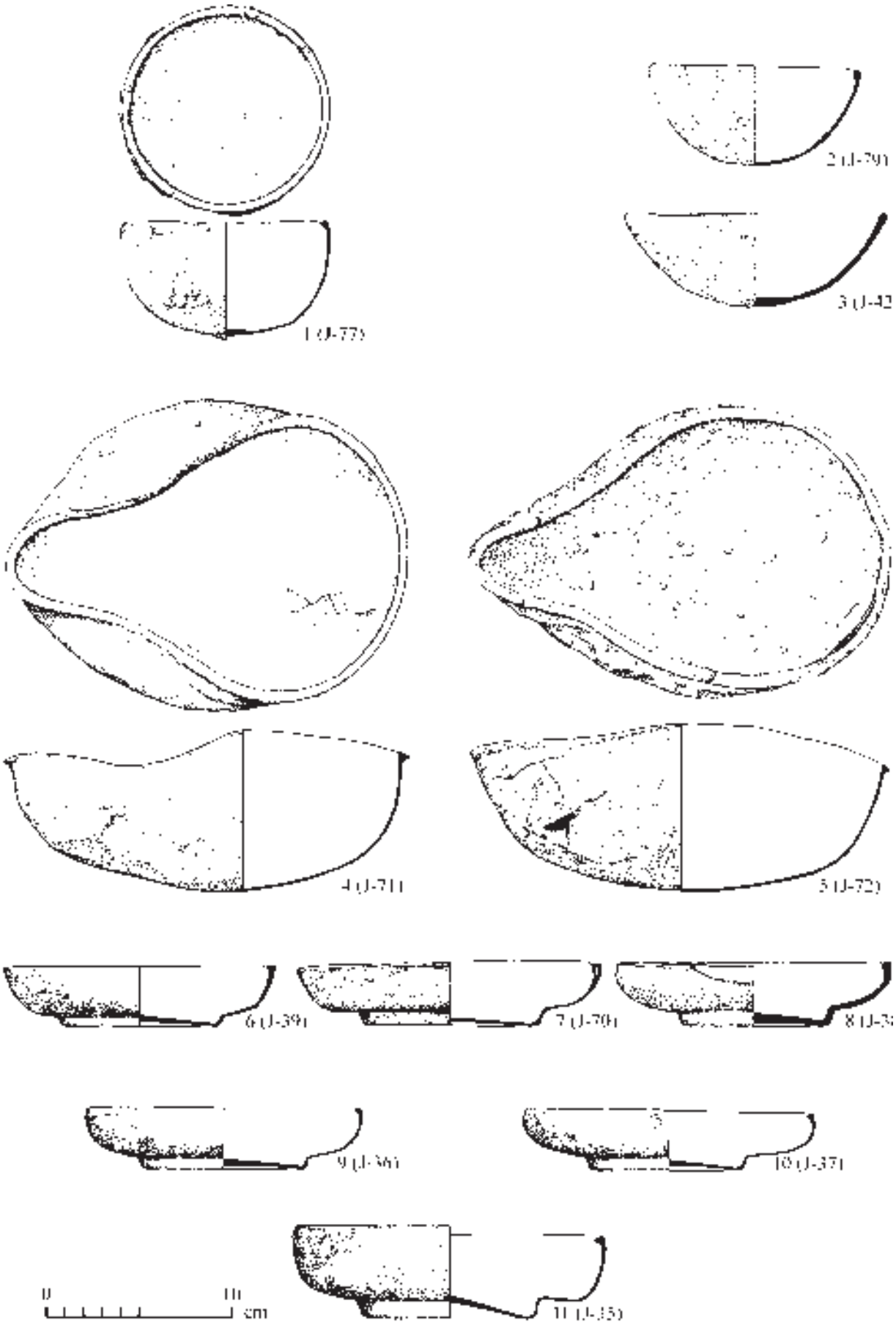


Figure 2.1: Hemispherical, rounded, pinched and curved bronze bowls

ned curved-out, triangular sectioned rim, with flat lip. Wide, slightly rounded base. Nearly vertical upper body. Thin walls, uniform in thickness. Complete. Some cracks and holes but relatively in a good state of preservation. Height 7.9 cm. Maximum diameter at the rim 21.8 cm.

J-72 (Fig. 2.1: 5; Pl. 1: 5): Large, rounded, deep bowl. The bowl was deformed by pressing its rim inward from two opposite points along the circumference in order to form a V-shaped nozzle of ca. 1/4 body length. Thickened curved-out, triangular sectioned rim with flat lip. Wide, slightly rounded base. Outwards inclining upper body. Thin walls, uniform in thickness. Complete. Heavily corroded, two holes due to corrosion. Height 8.5 cm. Maximum diameter at the rim W. 22.8 cm.

3. CURVED BOWLS

a) Curved bowls with discoid base and vertical or inverted rim

J-39 (H-2672, Fig. 2.1: 6; Pl. 2: 1): Medium sized curved bowl with wide discoid base. Vertical, inward thickening rim with flat horizontal lip. Sharp carination at lower - upper body transition. Complete. Highly corroded. Height 3.6 cm. Rim diameter 15 cm. Base diameter 8.5 cm.

J-70 (Fig. 2.1: 7; Pl. 2: 2): Medium sized curved bowl with wide discoid base. Slightly inverted, hollowed, inward thickening rim with rounded lip. Part of the rim is missing due to corrosion. Height 3.2 cm. Rim diameter 16.5 cm. Base diameter 9.3 cm.

J-38 (H-2674, Fig. 2.1: 8; Pl. 2: 3): Medium sized curved bowl with relatively narrow discoid base, thickening toward its center. Slightly inverted, inward thickening rim with rounded lip. Thick wall profile. Complete. Height 3.8 cm. Diameter 15 cm. Base diameter 6.5 cm.

J-36 (H-2670, Fig. 2.1: 9; Pl. 2: 4): Medium sized curved bowl with wide discoid base. Inverted thickening, triangular sectioned, flat rim. Complete. Height 3.5 cm. Rim diameter 15 cm. Base Diameter 8.7 cm.

J-37 (H-2671, Fig. 2.1: 10; Pl. 2: 5): Medium sized curved bowl with wide discoid base. Internally thickening, triangular sectioned, beveled rim. Complete. Height 3 cm. Rim-* diameter 16 cm. Base Diameter 8.4 cm.

J-35 (H-2675, Fig. 2.1: 11; Pl. 3: 1): Medium sized, deep curved bowl. Internal thickening, triangular sectioned, beveled rim. Wide, very curved discoid base, thickened toward its center. Relatively sharp carination at lower-upper body transition. Slightly distorted. Complete. Height 4.4-5.4 cm. Rim diameter 16.5 cm. Base diameter 9.5 cm.

b) Curved bowls with discoid base and curved out rim

J-41 (H-2676, Fig. 2.2: 1; Pl. 3: 2): Medium sized curved bowl with wide discoid base. Curved-out rounded rim. Complete. Height 3.5 cm. Rim diameter 18.8 cm. Base diameter 11.4 cm.

J-40 (H-2678, Fig. 2.2: 2; Pl. 3: 3): Small curved bowl with curved out, thickened rounded rim. Base not preserved. Rim diameter 13.1 cm.

4. MISCELLANEOUS BOWLS

a) Handled bowls

J-46 (H-2669, Fig. 2.2: 3; Pl. 3: 4-4b): Medium to large, deep hemispherical bowl with direct stance and slightly thickened rim. Two vertical, raised loop handles are attached below the rim and curved above it. Each handle ends in two discs, which are attached to the bowl by two rivets each. On the upper part of each handle there is a decorative figure. The base was not preserved. Rim diameter 19.3 cm. Analyzed by means of Lead Isotope and ED XRF.

J-65 (Fig. 2.2: 4; Pl. 1-1c): Large, curved bowl with wide convex base and incurved, beveled rim. The modeling of the rim created a shallow groove around the lip, from outside. One large, Ω-shaped handle hangs from two ring suspensions, which expand at a right angle from cross-shaped bases. These bases are fastened to the bowl by two rivets each and decorated by incised lines. The edges of the handle were flattened by hammering. Complete. Well preserved. Height 6.9 cm. Rim diameter 25.2 cm. Base diameter 15 cm.

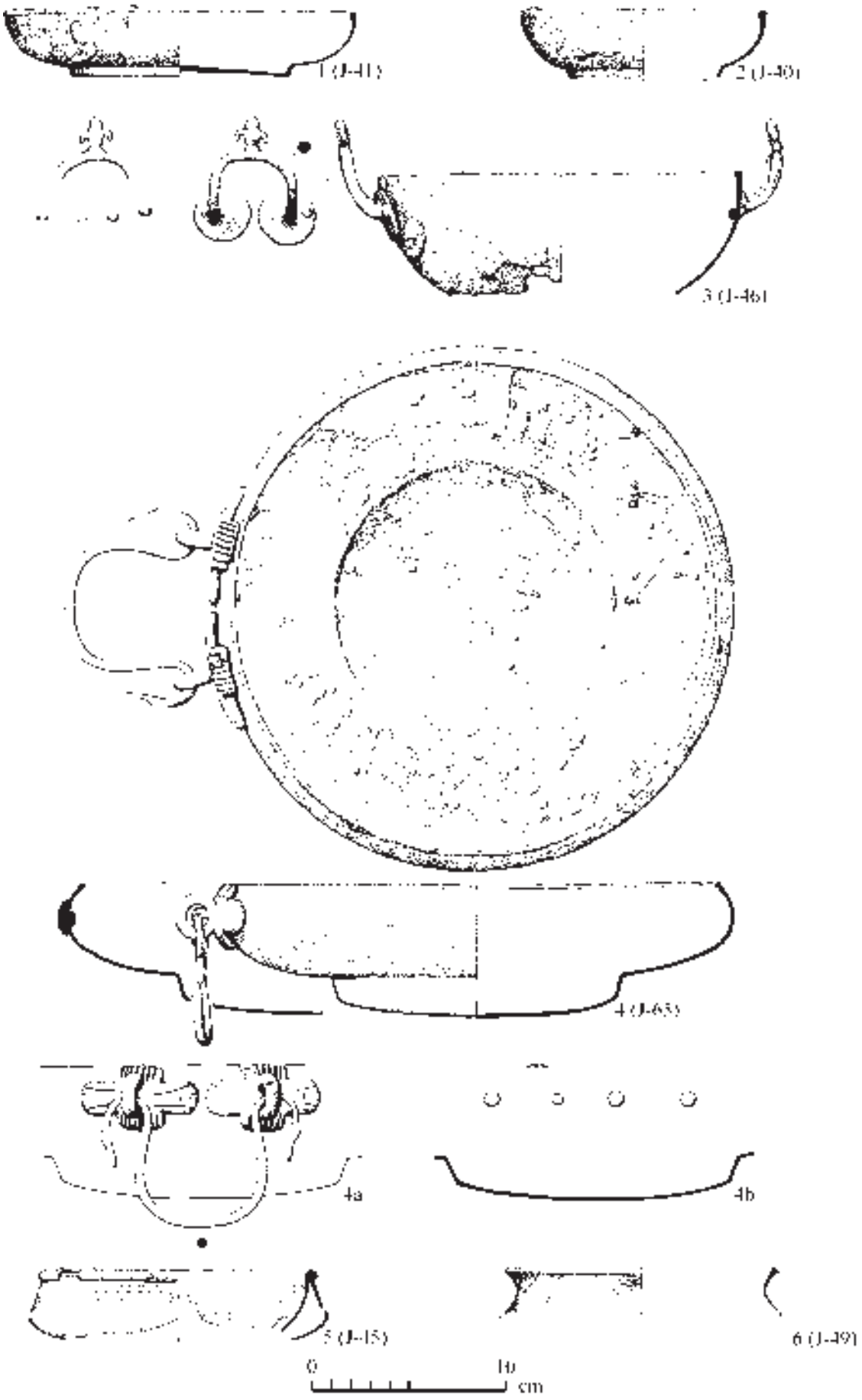


Figure 2.2: Handled and miscellaneous bronze bowls

b) «Closed» bowl

J-45 (H-2677, Fig. 2.2: 5; Pl. 4: 2-2b): A rounded or hemispherical bowl (J-45a) concealed inside a sharply carinated closed bowl (J-45b). The rounded bowl has an outturned rim, which is positioned on the carinated bowl's thickened, flat rim. Neither base was preserved. On the outer side of J-46b has an incised geometric decoration. Rim diameter 14.7. cm.

J-49 (H-3294, Fig. 2.2: 6; Pl. 4: 3): Flaring, short neck and externally thickened, triangular-section.

CAULDRON

J-48 (H-2652, Fig. 2.3: 1; Pl. 5): Large, deep cauldron with short, flaring, plain rim, rounded carination at about mid-body height and rounded, wide base. There were two handles, which were not preserved, but were likely hung. The rings expand perpendicularly from a couple of double-spiral bases that were anchored to the vessel by two rivets each (compare to J-65, Fig. 2.2: 4). The body of the cauldron is twisted but complete. Analyzed by means of Lead isotope and ED XRF.

STRAINERS

J-63 (Fig. 2.3: 2; Pl. 6: 1): Upper part of strainer with a wide, circular, flat rim with up-curving, short lip. A single tapering ribbon handle extends from the rim, rising above it and then folds downwards to be joined by a rivet to the underside of the rim. Only the upper part of the rounded, pierced body was preserved, presenting 4 rows of punctures. Part of the rim is missing due to corrosion. Rim diameter 10 cm.

J-47 (H-2679, Fig. 2.3: 3; Pl. 6: 2): Upper part of strainer. Wide, circular, flat rim with sharply uplifted, short lip. A single tapering ribbon handle extends horizontally from the rim, then folding downwards to be joined by a rivet to the underside of the rim. Only the uppermost part of the pierced body was preserved, presenting 1 row of punctures. Likely rim diameter 10.5 cm.

J-66 (Fig. 2.3: 4; Pl. 6: 3): A tapering ribbon handle of a strainer. The handle rises from a rim fragment, too small to be accurately described, then folding downwards to be joined by a rivet on the underside of the rim. Badly corroded.

JUGLETS

1. GLOBULAR JUGLETS WITH ROUNDED BASE

J-82 (Fig. 2.4: 1; Pl. 7: 1): Globular juglet with straight neck and out-thickened rim, only slightly pinched. Double loop handle begins at rim and ends in double spirals attached to upper part of body. Complete, good state of preservation. Height 11.8 cm. Body diameter 7.7 cm. Neck height 4.3 cm. Neck diameter 3.3 cm. Rim diameter 3.7 cm.

J-81 (Fig. 2.4: 2; Pl. 7: 2): Globular juglet with long straight neck and out-thickened rim, only slightly pinched. Double loop handle begins at rim and ends in double spirals attached to upper part of body. Complete, good state of preservation. Height 12 cm. Body diameter 7.4 cm. Neck height 5.4 cm. Neck diameter 3.3 cm. Rim diameter 3.6-3.9 cm.

J-78 (Figs. 2.4: 3, 6.2; Pl. 7: 3): Globular juglet with straight neck and out-thickened, slightly pinched rim. Single ridge, collar, at the base of the neck. Double loop handle begins at rim and ends in double spirals attached to upper part of body. The base was repaired in antiquity (see appendix b, radiography). Complete, good state of preservation. Height 11.3 cm. Body diameter 6.9 cm. Neck height 4.8 cm. Neck diameter 3.1 cm. Rim diameter 3.3-3.9 cm.

J-14 (H-2625, Fig. 2.4: 4; Pl. 8: 1): Globular juglet with straight, oval neck and thickened, slightly pinched rim. Single ridge, collar, at the base of the neck. Double loop handle begins at rim and ends in double spirals attached to upper part of body. Bad state of preservation, part of body missing. Height 12.3 cm. Body diameter 7.7 cm. Neck height 5.1 cm. Neck diameter 3.6 cm. Rim diameter 3-5.7 cm.

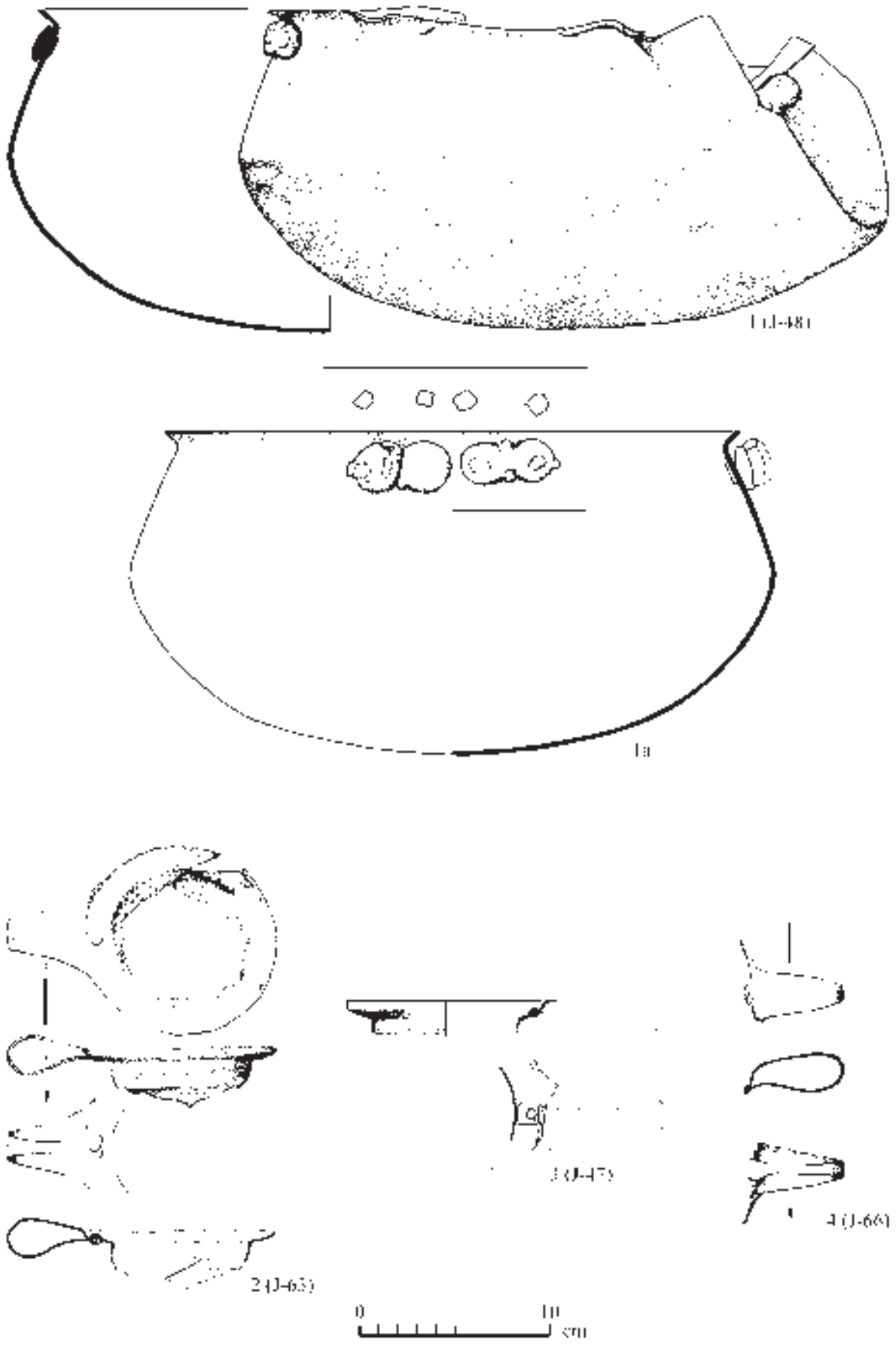


Figure 2.3: Bronze cauldron and bronze strainers

2. GLOBULAR JUGLETS WITH POINTED BASE AND A RIDGE AT THE BASE OF THE NECK

J-16 (H-2630, Fig. 2.4: 5; Pl. 8: 2): Juglet with oval body, straight neck and out-thickened square rim, only slightly pinched. Double loop handle begins at rim and ends in double spirals attached to upper part of body. Complete. Height 12 cm. Body diameter 6.8 cm. Neck height 5.7 cm. Neck diameter 2.8 cm. Rim diameter 3.3-3.6 cm. Analyzed by means of Lead Isotope and ED XRF.

J-17 (H-2632, Fig. 2.4: 6; Pl. 8: 3): Juglet with piriform body, long straight, pinched neck and out-thickened square rim, also slightly pinched. Double loop handle begins at rim and ends in double spirals attached to upper part of body. Complete. Height 13.5 cm. Body diameter 7.3 cm. Neck height 5.1 cm. Neck diameter 3.3 cm. 3.3-3.9 cm. analyzed by means of Lead Isotope and ED XRF.

J-15 (H-2628, Fig. 2.4: 7; Pl. 9: 1): Juglet with oval body, straight neck and out-thickened, slightly flared and slightly pinched rim. Single ridge collar at the base of the neck. Double loop handle begins at rim and ends in double spirals attached to upper part of body. Complete, good state of preservation. Height 12.1 cm. Body diameter 6.9 cm. Neck height 5.1 cm. Neck diameter 3 cm. Rim diameter 3-3.3 cm. Analyzed by means of Lead Isotope and ED XRF.

3. OVAL JUGLETS WITH POINTED BASE AND STRAIGHT NECK

J-11 (H-2624, Fig. 2.5: 1; Pl. 9: 2): Juglet with elongated, narrow oval body, pointed base and a straight neck. Double ridged rim, slightly pinched. Double loop handle begins at rim and ends in double spirals attached to upper part of body. Part of body missing. Height 12.9 cm. Body diameter 6.3 cm. Neck height 3.6 cm. Neck diameter 3 cm. Rim diameter 3.6-3.9 cm.

J-12 (H-2629, Fig. 2.5: 2; Pl. 9: 3): Juglet with elongated oval body, short straight neck, narrow rounded base and pronounced shoulders. Single ridge, collar, at the base of the neck. Inwards and outwards thickened rim. Double loop handle begins at rim and ends in double spirals attached to upper part of body. Complete. Height 12.7 cm. Body diameter 6.8 cm. Neck height 3.6 cm. Neck diameter 2.7 cm. Rim diameter 3 cm.

4. OVAL JUGLETS WITH POINTED BASE AND CONCAVE NECK

J-64 (Fig. 2.5: 3; Pl. 10: 1): Juglet with elongated oval body, short concave neck and pointed base. Out-thickened, flared, slightly pinched rim. Two ridges, collars, at the base of the neck. Bad state of preservation, most of the handle missing. Height 13 cm. Body diameter 7.2 cm. Neck height 3 cm. Neck diameter 3.3 cm. Rim diameter ca. 3.6 cm

Fig. 2.5: 4. J-80: Juglet with piriform body, short concave neck and out-thickened, pinched rim creating a triangular orifice. Single ridge, collar, at the base of the neck. Double loop handle begins at rim and ends in double spirals attached to upper part of body. Complete, good state of preservation. Height 11 cm. Body diameter 6.9 cm. Neck height 3.6 cm. Neck diameter 2.8 cm.

J-13 (H-2631, Fig. 2.5: 5; Pl. 10: 3): Juglet with elongated oval body, short concave neck and pointed base. Out-thickened, slightly pinched rim, creating a triangular orifice. Single ridge (collar) at the base of the neck. Double loop handle begins at rim and attached to upper part of body, probably ends with spirals. Complete. Height 12.9 cm. Body diameter 6.6 cm. Neck height 3.3 cm. Neck diameter 2.7-3.6 cm. Analyzed by means of Lead Isotope and ED XRF.

5. BAG-SHAPED JUGLET

J-18 (H-2627, Fig. 2.5: 6; Pl. 11: 1): Small bag-shaped juglet with short straight neck and simple, direct rim. Bad state of preservation, handle missing. Height 10.7 cm. Body diameter 5.5 cm. Neck height 3 cm. Neck diameter 2.8 cm. Rim diameter 2.8 cm.

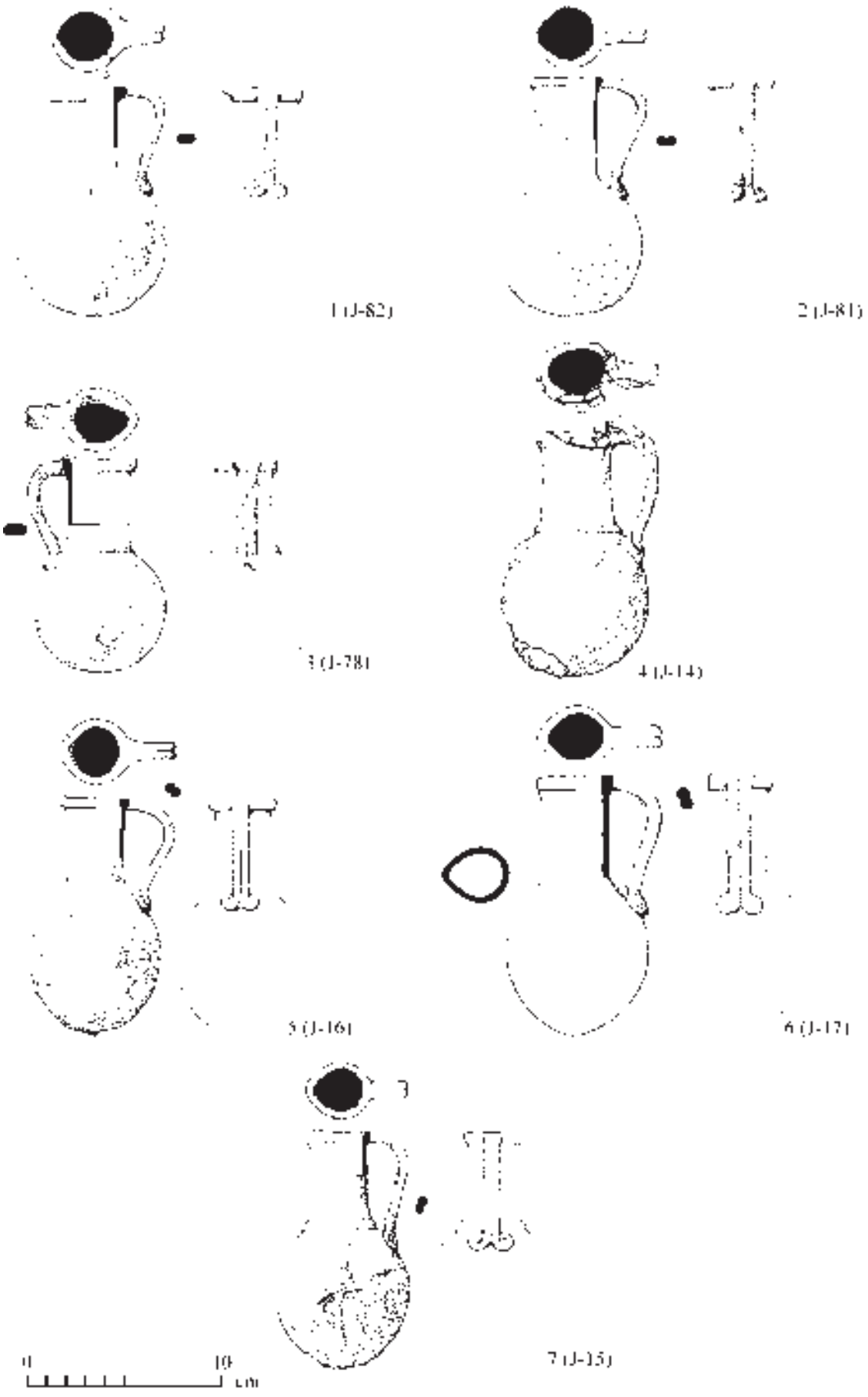


Figure 2.4: Globular and oval bronze juglets

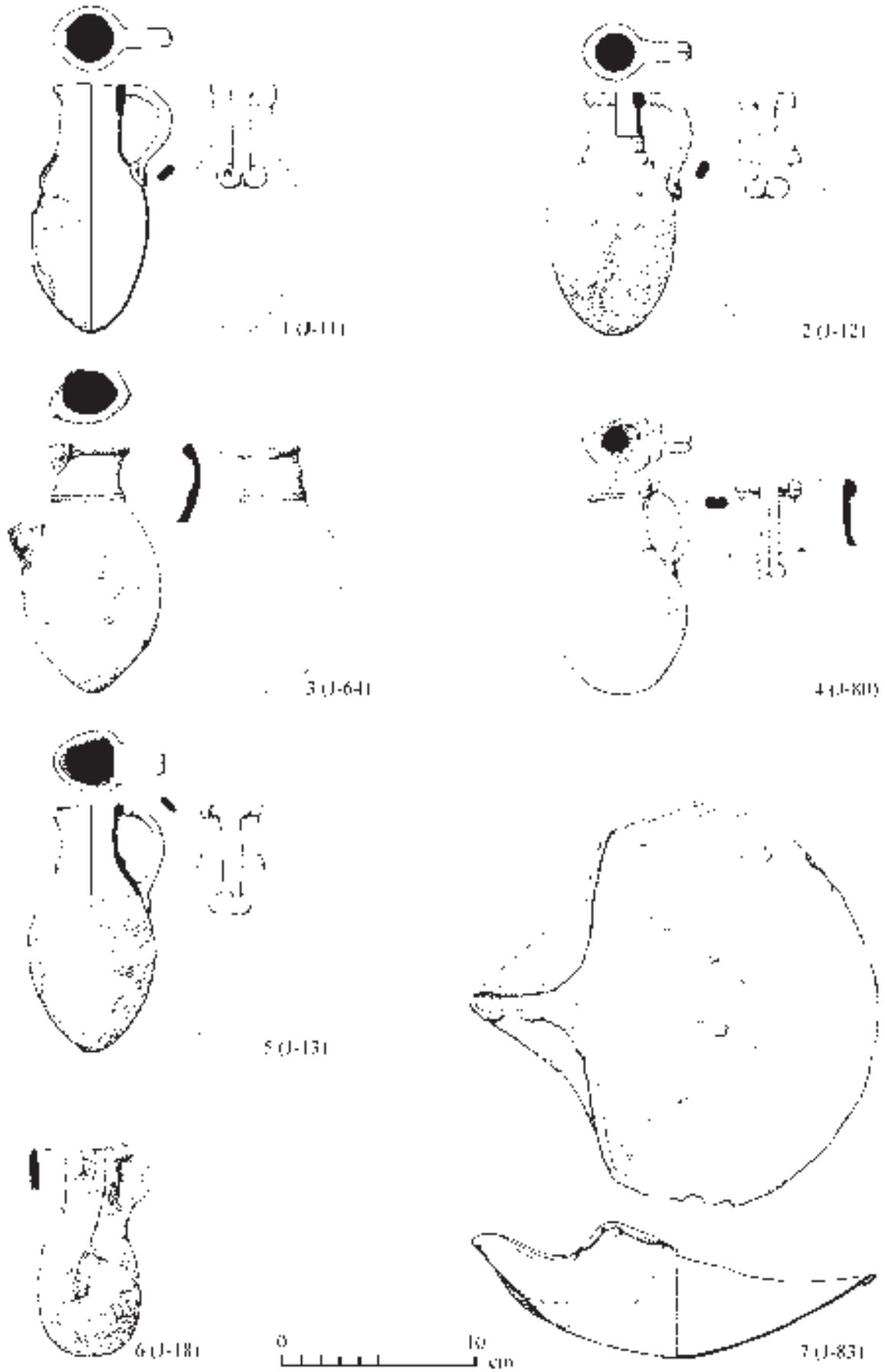


Figure 2.5: Oval and bag shaped bronze juglets and a bronze oil lamp

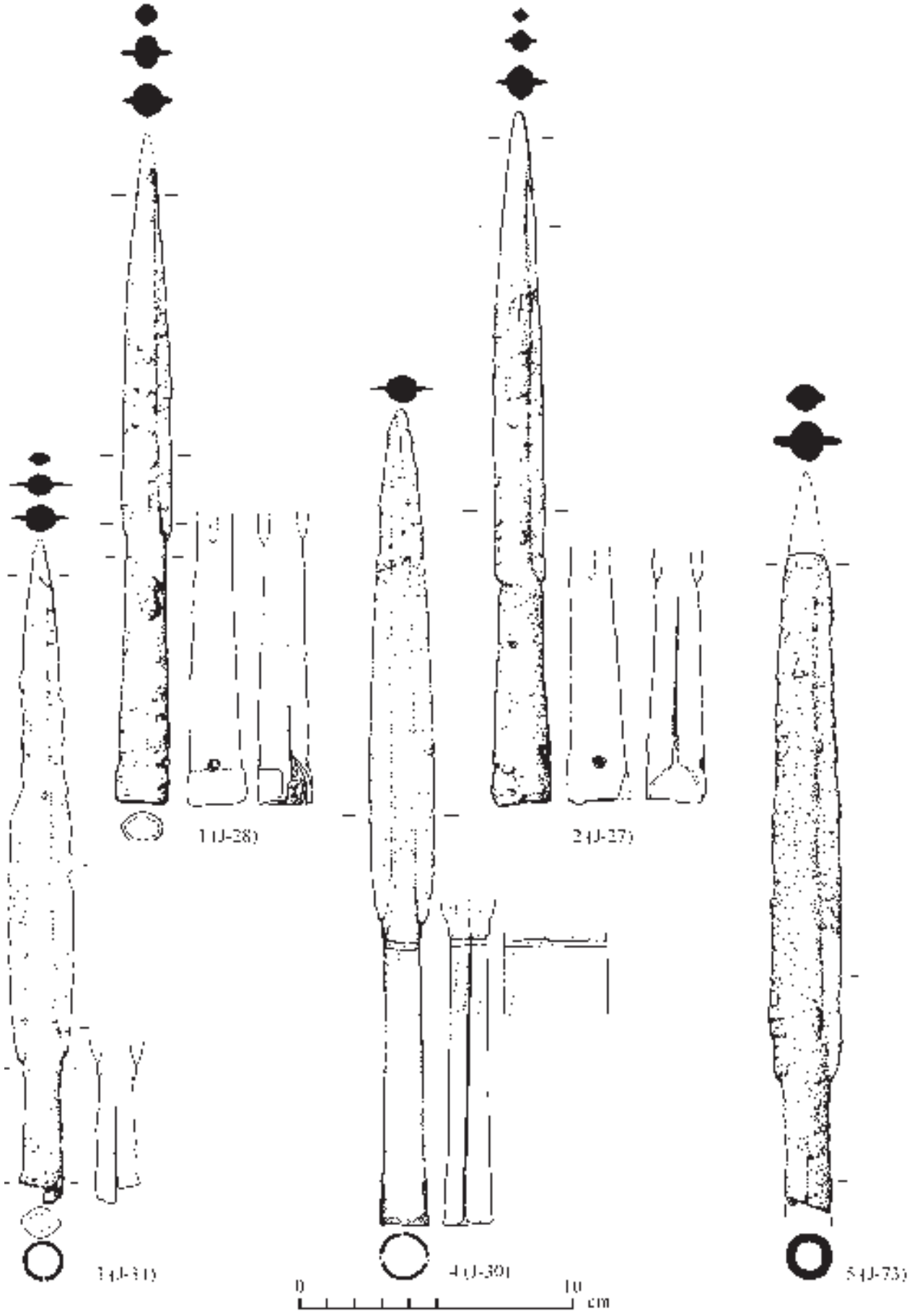


Figure 2.6: Bronze spearheads with long sockets

OIL LAMP

J-83 (Fig. 2.5: 7; Pl. 6: 4): Deep oil lamp with crudely out folded, canalled rim, rounded base and narrow, deep and short, spout. Complete, although corroded. Maximum height 7 cm. Maximum rim diameter 20.8 cm.

WEAPONS

1. SPEARHEADS WITH LONG SOCKET IN COMPARISON TO BLADE AND ROUND TO PRISMATIC CROSS-SECTION OF MID-RIB

J-28 (H-2636, Fig. 2.6: 1; Pl. 11: 2): Spearhead. Prominent mid-rib with cross-section changing from hexagonal near the socket to elliptical to square near the point. Tubular, divided socket, elliptical at the open edge rim, which is thickening or folded toward outside. Two rivet holes just above this thicker rim. Part of the rivet and remains of the wooden shaft were preserved. The Point is missing. Full length 23.1 cm. Socket length 9.6 cm.

J-27 (H-2633, Fig. 2.6: 2; Pl. 11: 3): Spearhead. Prominent mid-rib with cross-section changing from hexagonal near the socket to square near the point. Tubular, divided socket rounded at rim with two rivet holes. Nearly complete. Full length 25.3 cm. Socket length 8.2 cm.

J-31 (H-2649, Fig. 2.6: 3; Pl. 11: 4): Spearhead. Prominent mid-rib with cross-section changing from hexagonal near the socket to oval near the point. Incomplete tubular, divided socket. Badly corroded blade. Point is missing. Full length 23.8 cm. Socket fraction length 5 cm.

J-30 (H-2648, Fig. 2.6: 4; Pl. 11: 5): Spearhead. Prominent mid-rib with hexagonal cross-section. Tubular, divided socket with two rivet holes and Incised geometrical decoration of wavy lines, straight lines and dots on the sockets, near the transition to the blade. Complete. Full length 30 cm. Socket length 11.2 cm. Analyzed by means of Lead Isotope and ED XRF.

J-73 (Pl. 6: 5; Pl. 12: 1): Spearhead. Prominent mid-rib with rounded cross-section. Rather bulky blade. Incomplete tubular, divided socket. Point is missing. Full length 24 cm. Socket fraction length 4.8 cm.

J-76 (Fig. 2.7: 1; Pl. 12: 2): Spearhead. Prominent mid-rib with changing, elliptical cross-section. Tubular, divided incomplete socket. Corroded edge. Full length 24 cm. Socket section length 4.9 cm.

J-29 (H-2635, Fig. 2.7: 2; Pl. 12: 3): Spearhead. Prominent mid-rib with cross-section changing from rectangular near the socket to oval near the point. Tubular socket, badly preserved. Full length 25 cm. Socket section length 7.2 cm.

2. SPEARHEADS WITH SHORT SOCKET IN COMPARISON TO BLADE AND RECTANGULAR CROSS-SECTION OF MID-RIB

J-32 (H-2650, Fig. 2.7: 3; Pl. 12: 4): Spearhead. Prominent mid-rib, short tubular socket. Complete. Full length 30.7 cm. Socket length 3.8 cm.

J-33 (H-2634, Fig. 2.7: 4; Pl. 12: 5): Spearhead. Prominent mid-rib with cross-section changing from rectangular near the socket to round near the point. Broken socket, probably tubular with incised geometric decoration on lower part of blade. Incomplete. Full length 38 cm. Socket fraction length 2 cm. Analyzed by means of Lead Isotope and ED XRF.

J-34 (H-2647, Fig. 2.7: 5; Pl. 12: 6): Upper part of spearhead blade with prominent mid-rib and cross-section changing from rectangular to round near the point. Fraction length 23.5 cm.

3. ARROWHEADS

a) Arrowheads with widest area of blade near tang and a mid-rib

J-19 (H-2643, Fig. 2.7: 6; Pl. 13: 1): Leaf shaped arrowhead with triangular cross-section. Square to rectangular cross-sectioned tang. Complete. Full length 11.2 cm. Tag length 3 cm. Maximum width 2 cm. Analyzed by means of Lead Isotope and ED XRF.

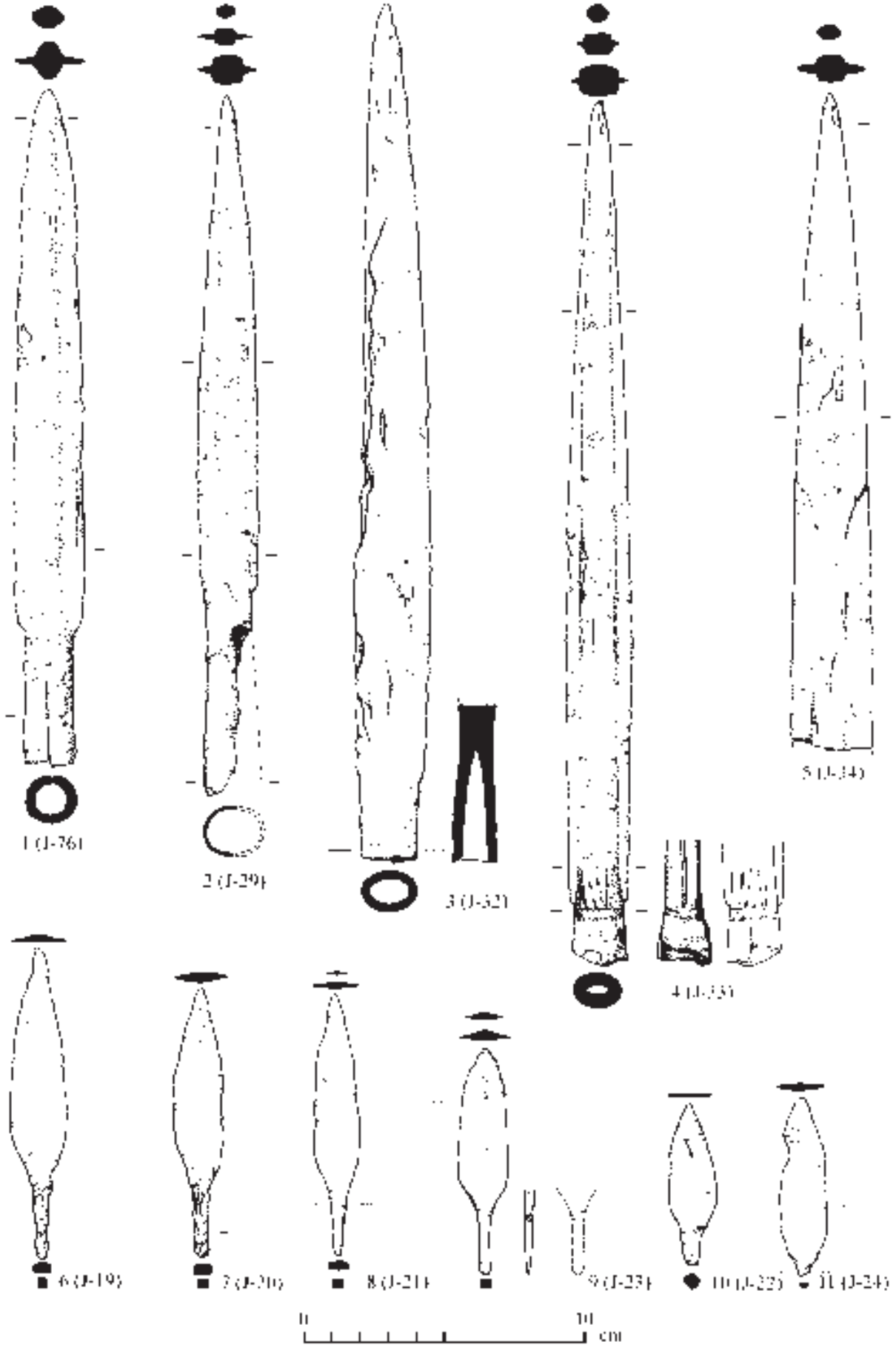


Figure 2.7: Bronze spearheads with long or short socket and bronze arrowheads

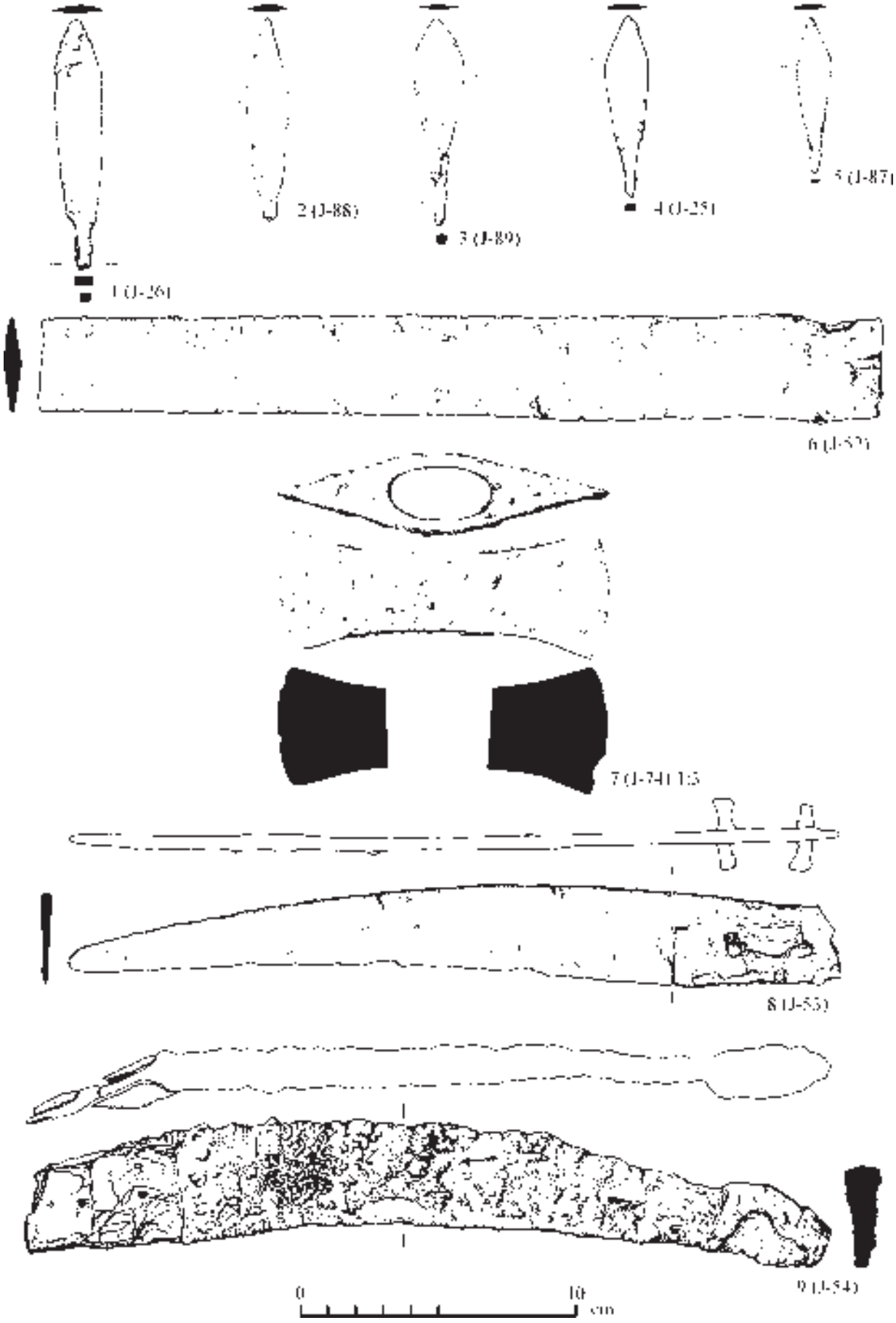


Figure 2.8: Bronze arrowheads, sword, double axe and knives

J-20 (H-2639, Fig. 2.7: 7; Pl. 13: 2): Leaf shaped to hexagonal arrowhead with rhombus cross-section. Square to rectangular cross-sectioned tang. Complete. Full length 9.6 cm. Tag length 2.4 cm. Maximum width 1.8 cm.

J-21 (H-2637, Fig. 2.7: 8; Pl. 13: 3): Leaf shaped to hexagonal arrowhead with rhombus cross-section. Square to rectangular cross-sectioned tang. Complete. Full length 9.3 cm. Tang length 2.4 cm. Maximum width 1.7 cm.

J-23 (H-2640, Fig. 2.7: 9; Pl. 13: 4): Hexagonal arrowhead with triangular to rhombus cross-section. Square cross-sectioned tang, incised on its upper part. Complete. Full length 8 cm. Tag length 2.4 cm. Maximum width 1.8 cm.

J-22 (H-2641, Fig. 2.7: 10; Pl. 13: 5): Leaf shaped arrowhead with no mid-rib and therefore flat cross-sectioned. rhombus tang cross-section. Tang edge broken. Preserved fraction length 5.8 cm. Maximum width 1.8 cm. Analyzed by means of Lead Isotope and ED XRF.

J-24 (H-2638, Fig. 2.7: 11; Pl. 13: 6): Leaf shaped to hexagonal arrowhead with rhombus cross-section. Tang is missing. Preserved fraction length 6.3 cm. Maximum width 1.8 cm.

b) Arrowheads with widest area of blade near point

J-26 (H-2644, Fig. 2.8: 1; Pl. 13: 7): Rhombus arrowhead with rhombus cross-section.. Broken tang with square to rectangular cross-section. Preserved fraction length 9 cm. Tang fraction length 1.8 cm. Maximum width 1.7 cm.

J-88 (Fig. 2.8: 2; Pl. 13: 8): Rhombus arrowhead with flattened hexagonal cross-section. Broken tang. Corroded edges. Slightly bent at tang-head transition. Preserved fraction length 7.4 cm. Maximum width 1.7 cm

J-89 (Fig. 2.8: 3; Pl. 13: 9): Rhombus arrowhead with protruding flattened mid-rib and slender blade edges. Rounded tang cross-section. Complete but very corroded. Full length 7.6 cm. Tang length cm. 2.8 Maximum width 1.9 cm.

J-25 (H-2642, Fig. 2.8: 4; Pl. 13: 10): Rhombus arrowhead with rhombus cross-section. Broken tang with square cross-section. Preserved fraction length 6.4 cm. Tang fraction length ca. 1.4 cm. Maximum width 1.8 cm.

J-87 (Fig. 2.8: 5; Pl. 13: 11): Small rhombus arrowhead with rhombus cross-section. Broken tang with rectangular cross-section, otherwise in a good state of preservation. Preserved fraction length 5.8 cm. Tang fraction length ca. 1.2 cm. Maximum width 1.4 cm.

4. SWORD

J-52 (H-2651, Fig. 2.8: 6; Pl. 14: 1): Middle part of a straight sword with rhombus cross-section. Both edges missing. Length of preserved fraction 20.5 cm. Width range from 3.8 to 3.4 cm. Analyzed by means of Lead Isotope and ED XRF.

TOOLS AND MISCELLANEOUS

1. DOUBLE AXE

J-74 (Fig. 2.8: 7; Pl. 14: 2): Double axe with elliptic shaft-hole. The arms are equal in size widening from the socket towards the bowed cutting edges. Some corrosion. Length 18 cm. Shaft measuring ca. 5.5 × 2.8 cm.

2. KNIVES

J-53 (H-2646, Fig. 2.8: 8; Pl. 14: 3-3a): Slightly curved bronze knife, tapering from handle to point, triangular in section. The butt is a continuation of the outline of the blade. Remains of the wooden haft and the two nails that fixed it in place were preserved. Length 28 cm. analyzed by means of Lead Isotope and ED XRF.

J-54 (H-2654, Fig. 2.8: 9; Pl. 14: 4-4a): Slightly curved iron knife, tapering from handle to point, triangular in section. The butt is a continuation of the outline of the blade. Remains of the wooden haft were preserved, but not the nails. Two nail holes are observed, no extant rivets. Corroded. Length 29 cm.

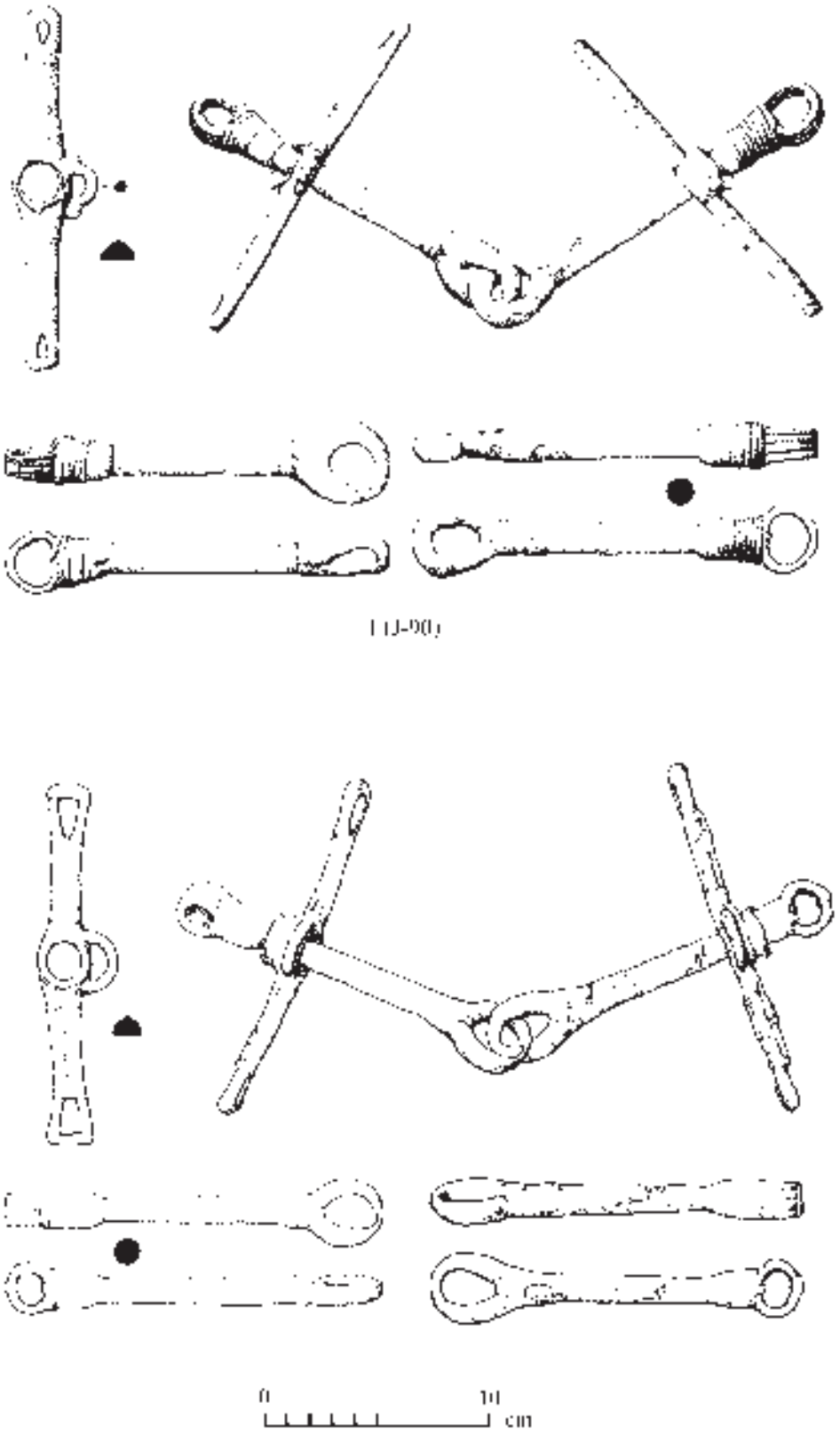


Figure 2.9: Horse bits

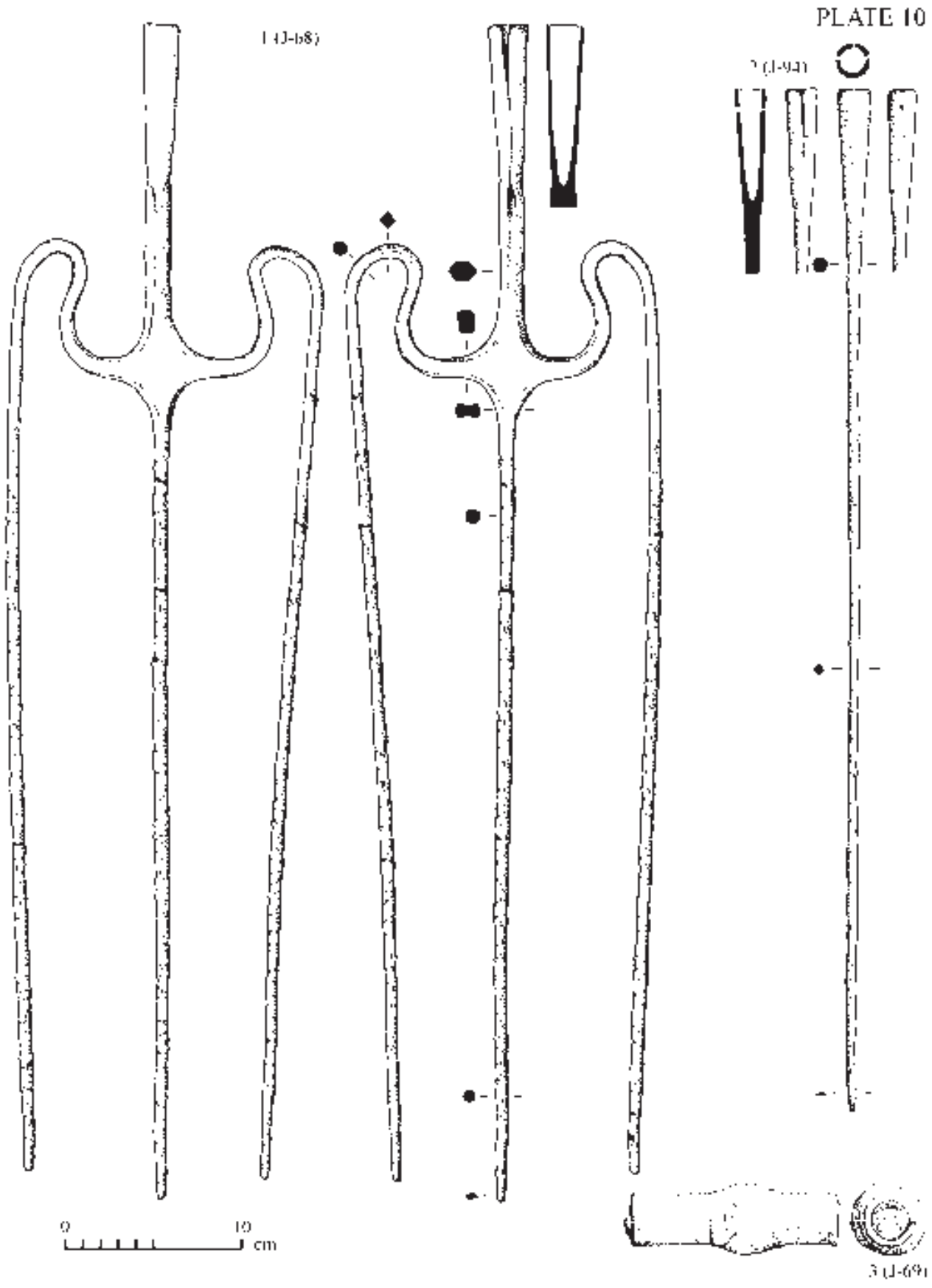


Figure 2.10: Trident, spit and macehead

3. HORSE BITS

J-90 (Figs. 2.9: 1, 6.4, 6.5; Pl. 15): Horse bit with smooth joined canons and long, flat, un-studded cheekpieces. The canons are interlocked by two loops. They pass the cheekpieces thorough a central, collared hole. The cheekstraps were attached to the cheekpieces in three places: egg shaped hole on each side of the cheekpiece and a half ring that was soldered above the central hole. The rein rings are rounded, made as coiled wire and fixed in place by another wire, which is warped around the canon head. The bit is complete and well preserved. Canon Length 32.5 cm. Cheekpieces Length 15 cm.

J-92 (Figs. 2.9: 2, 6.3, 6.6; Pl. 16): Horse bit with smooth joined canons and long, flat, un-studded cheekpieces. The canons are interlocked by two loops and the joined area shows clear signs of wear. The canons pass the cheekpieces thorough a central, collared hole. The cheekstraps were attached to the cheekpieces in three places: triangular hole on each side of the cheekpiece and a half ring that was soldered above the central hole. The rein rings are rounded, made as coiled wire and fixed in place by another wire, which is warped around the canon head. The bit is complete, well preserved. Canons Length 32.7 cm. Cheekpieces Length 16.4. cm.

4. TRIDENT

J-68 (Fig. 2.10: 1; Pl. 17: 1): Trident with long, tubular, divided socket leading to a central, square base, from which three prongs spread. The two side prongs are folded backward and then re-folded forward. The middle prong spreads directly forward and is somewhat longer then the other two. All three prongs are plain, rounded in section and tapering at the edge into a point. Complete, although in bad state of preservation. Length 66-67.5 cm. Maximum width 17.7 cm.

5. SPIT

J-94 (Fig. 2.10: 2; Pl. 17: 2): Spit with short, tubular, divided socket with two rivet holes. Rounded in section and tapering into a flattened edge. Complete, good state of preservation. Length 58 cm.

6. MACEHEAD

J-69 (Figs. 2.10: 3, 6.7; Pl. 18: 1): A tube like object with slight, smooth knobbing somewhat off-center. Remains of the wooden shaft are present. Length 12.3 cm. Diameter 2.7 cm. Knob maximum diameter 4 cm.

7. MIRRORS OR «FAN» SHAPED OBJECTS

J-75 (Fig. 2.11: 1; Pl. 18: 2): Elliptical or sub-rounded mirror with a rectangular sectioned handle. Part of the handle is missing due to corrosion. Mirror diameter 14.7-16.2 cm. Handle fraction length 5.8 cm.

J-43 (H-2626, Fig. 2.11: 2; Pl. 18: 3): Rounded, wide disc, thickened at center. Maybe a mirror, although no handle is preserved. Diameter 9.5 cm.

Unidentified Objects

J-51 (H-3295, Fig. 2.11: 3; Pl. 18: 4): Unknown object.
J-50 (H-2680, Fig. 2.11: 4; Pl. 18: 5): Jug? Funnel? Only upper/lower? part exists.
J-67 (Fig. 2.11: 5; Pl. 18: 6): Nail.

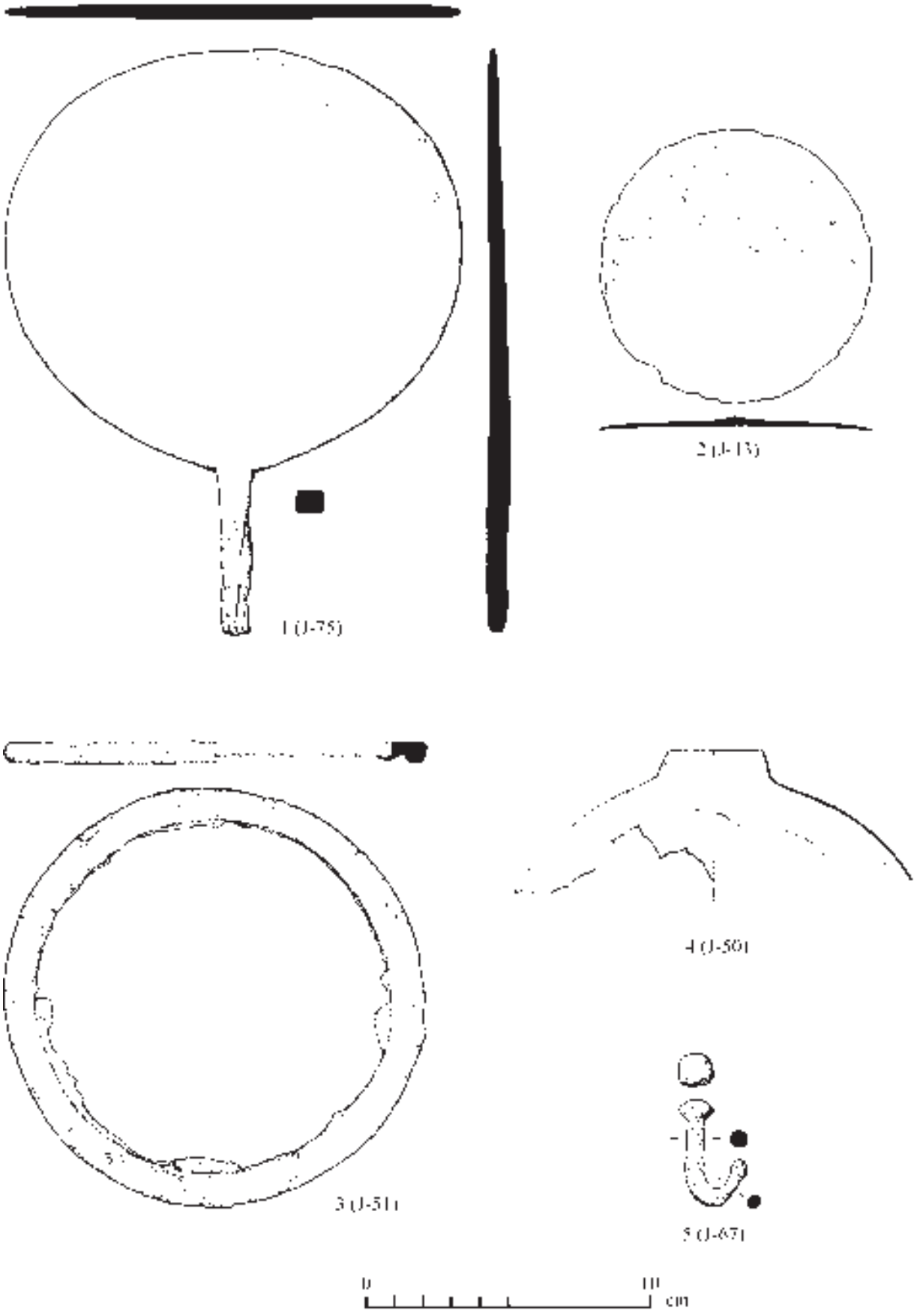


Figure 2.11: Mirrors and miscellaneous bronze objects

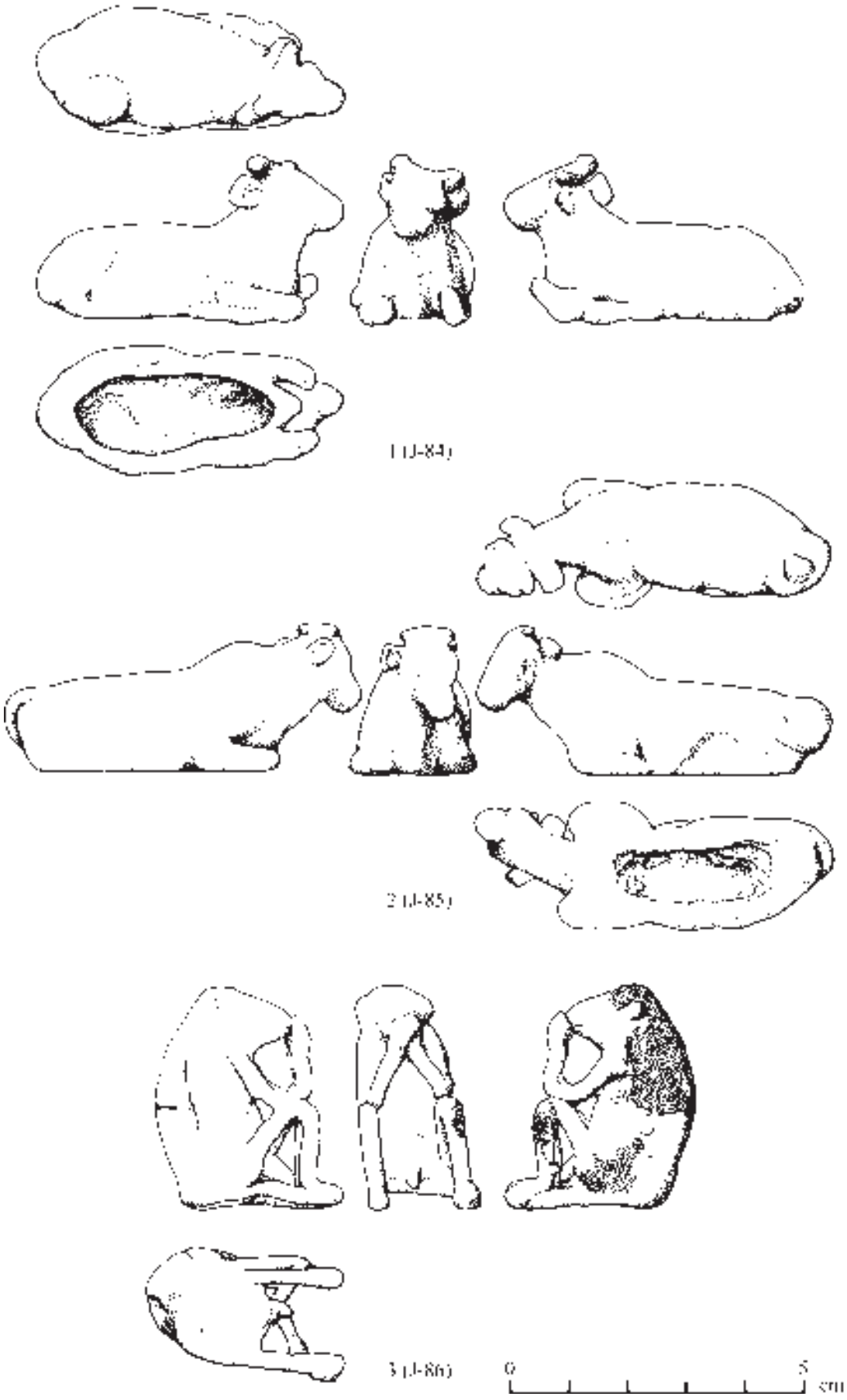


Figure 2.12: Zoomorphic weights

ZOOMORPHIC WEIGHTS

1. BOVINE WEIGHTS

J-84 (Fig. 2.12: 1; Pl. 19: 1): Weight depicting a cow, lying slightly to the left, its head on the same axis as the body. The tail shown in relief curved over the hindquarters. Complete, well preserved, although the lead (?) is missing Length 5.4 cm.

J-85 (Fig. 2.12: 2; Pl. 19: 2): Weight depicting a cow, lying slightly to the left, its head to the left. The tail shown in relief curved over the hindquarters. Complete, well preserved, although the lead (?) inside is missing. Length 6.1 cm.

2. MONKEY WEIGHT

J-86 (Fig. 2.12: 3; Pl. 19: 3): Weight depicting a monkey sitting with elbows on knees and hands together close to mouth. Cloth remains stuck to body. Complete, cracks on its back due to corrosion. Height 3.7 cm.

CULTIC VESSELS

1. ROD TRIPOD

J-62 (Figs. 2.13: 1, 6.8-6.10; Pls. 20-21): Small rod tripod with shallow bowl fastened to its ring, probably in a secondary phase of use. The composite tripod ring is made of four rods, one above the other. The second rod from top is decorated in low relief in a rope pattern and the other three are plain. The ring rests directly (i.e., without spacer bars) on three wide, rectangular sectioned legs that coil at the top into two spirals, one at each side of the leg. The legs are decorated with an additional rod on the outside, which is decorated as rope in low relief. The leg foot is outwards thickening but too corroded to determine its past shape. Between every two legs runs an inner strut (i.e., three inner struts in all) made of plain rod, rounded in section. These struts are attached to the legs somewhat lower then their mid-height and curved upwards to join the tripod ring at mid distance between the legs. At the struts curve, below the ring, there are pendant rings. The pendants themselves were not preserved. The legs are further supported by three inner struts, badly preserved, attached to the leg at the same level as the outer struts and probably used to join an inner ring, the remains of which are preserved only at the edge of one of the struts. Two animal *protome*s protrude from the top of two legs, a third did not survive.

A bowl shallow rounded bowl with simple rim is fastened to the ring by six thin metal cords. These penetrate the bowl through six puncture holes. They are folded around the ring inside and outside the pendant rings. The metal cords are open and flattened inside the bowl. Parts of the bowl rim are missing due to corrosion.

Height without bowl: 8.4cm., with bowl 10.3 cm. Tripod ring diameter 9.6 cm. Bowl diameter 14.5 cm.

2. OFFERING STANDS/INCENSE BURNERS

a) Tubular Offering stand/Incense burner

J-44 (H-2653, Fig. 2.14: 1; Pl. 22: 1): Offering stand/incense burner. A shallow, carinated bowl with flaring, simple rim fastened in its base by five rivets to a high, tubular, slightly conical foot. The base of the foot was only preserved in its upper most part, which starts widening probably in order to form a trumpet base. The bowl is twisted. Height of preserved fraction 22.5 cm. Bowl height 2.7 cm. Bowl diameter 16.8 cm. Foot diameter 3.2-5 cm.

b) Rod Offering Stand/Incense Burner

J-61 (Fig. 2.14: 2; Pl. 23: 1): Offering stand/incense burner. A shallow bowl with everted, flat, broad rim, fastened by three rivets to a disc situated on the top of a round-sectioned thick stem the upper edge of which is thickened

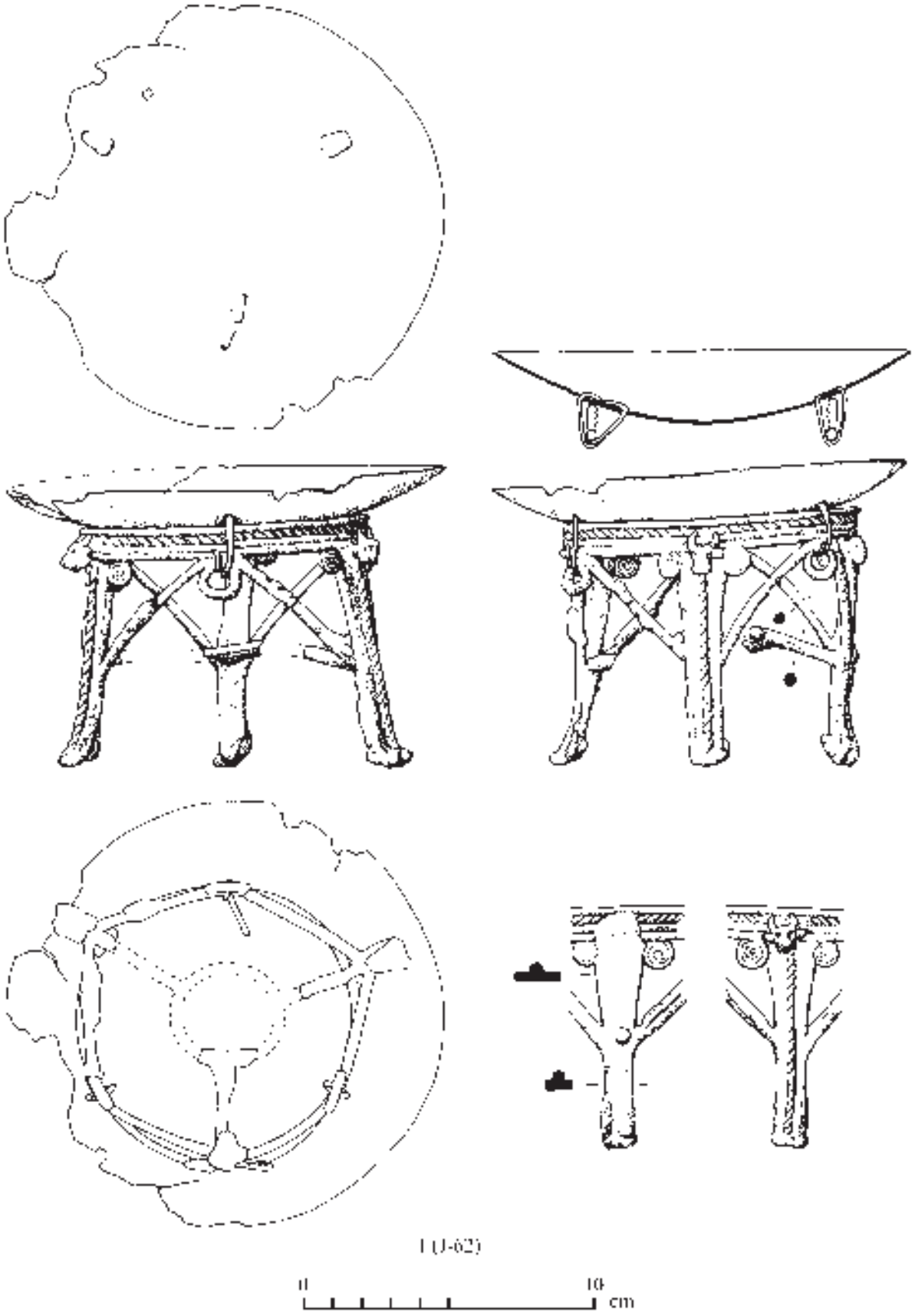


Figure 2.13: Rod tripod

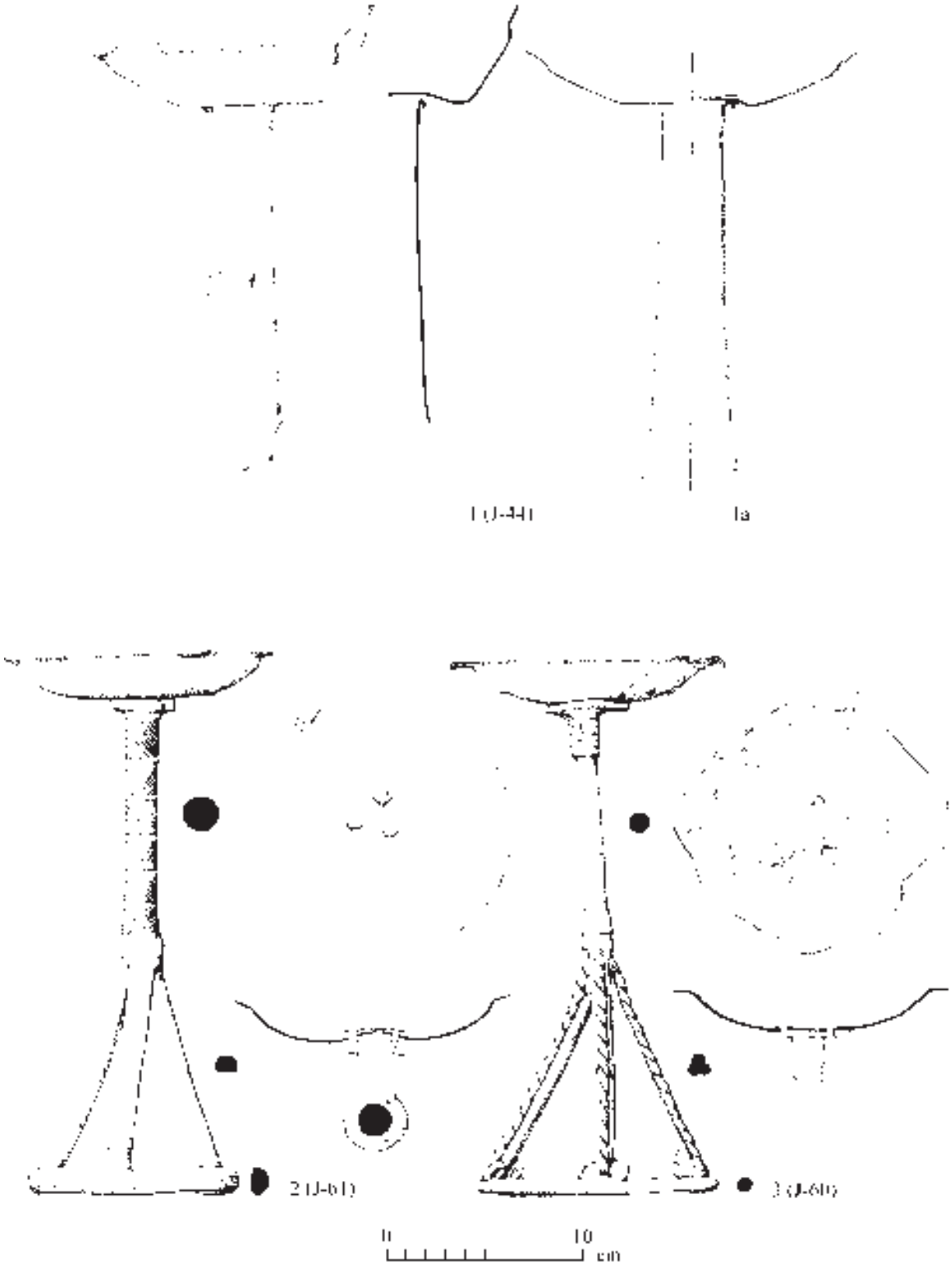


Figure 2.14: Tubular and rod offering stands/incense burners

creating a small horizontal flat disc on which the bowl rests and where the rivets were inserted. The stem is decoratively divided into six horizontal *metopes* in each one of which there is an opposing diagonal, incised decoration. The stem thickens forming a ring at its bottom, parting into three simple rod legs attached to an undecorated ring forming the base. Part of the bowl rim is missing due to corrosion. Full height 27.6 cm. (ca. 12 cm. legs, 12.8 cm. stem and 2.8 cm. bowl). Bowl diameter 14.1 cm. Base diameter (ring) 11 cm.

J-60 (Figs. 2.14: 3, 6.11-13; Pl. 23: 2): Offering stand/incense burner. A shallow bowl with everted, broad, flat ledge rim. The bowl is attached by three rivets to the top of a round-sectioned, somewhat tilted stem whose upper edge is sharply flaring creating a small horizontal flat disc on which the bowl rests and in which the rivets are inserted. Below the flat disk the stem is coiled, either as a decorative element or the result of the technology of production. The rest of the stem is smooth, thickening at its bottom just above the point in which it is partitioned into three legs. Each of the legs is made of three adjusted rods in a triangular formation in cross-section. The rod facing outside is rope decorated. The two flat rods facing inwards end in a sideward volute attached to an open ring forming the base of the offering stand/incense burner. The bowl is highly corroded and missing a large part of its rim. The incense burner is somewhat distorted. Height 27.3 cm. (ca. 12.5 cm. legs, 12.5 cm. stem and 2.3 cm. bowl). Bowl diameter 13 cm. Base diameter (ring) 12 cm.

II. CERAMICS

BOWLS

J-2 (H-2290, Fig. 2.15: 1; Pl. 24: 1): Open rounded bowl with direct, slightly thickening, rounded rim and narrow flat base. Light brown ware (Munsell: 7.5YR 6/4), white calcite grits up to 4mm in diameter, outside encrustation caused by conditions in the cave as well as signs of organic material due to standing water. Complete. Rim diameter 17.7 cm. Height 5.7 cm. Base diameter 4.5 cm. Analyzed by means of petrography.

J-4 (H-2292, Fig. 2.15: 2; Pl. 24: 2): Slightly closed bowl with incurving rim stance, rounded lip and contracted flat base. Brown-reddish ware, black core (Munsell: 5YR 5/6; core, 10YR 5/2). Small part of the rim missing. Rim diameter 16.8 cm. Height 4.4 cm. Base diameter 5.9 cm. Analyzed by means of petrography.

J-3 (H-2291, Fig. 2.15: 3; Pl. 24: 3): Slightly closed bowl with slightly in-slanting, thickening rim stance. Straight-sectioned sloping walls, thickening towards the low, contracted discus base. Brown-reddish ware, dark gray core (Munsell: 2YR 6/6; core, 10YR 4/1), occasional white calcite grits up to 3 mm in diameter, few shiny grits, quartz up to 5mm in diameter. Blue-green remains from metal can be seen on the base of the bowl. A small part of the rim missing. Rim diameter 20.4 cm. Height 7.5 cm. Base diameter 6.6 cm.

J-5 (H-2295, Fig. 2.15: 4; Pls. 25: 1, 26: 5-6): Large, deep, closed bowl/krater with high, rounded body-carination, direct to vertical out-folded rim and out-slanting disk base. Red-brown ware (Munsell: 2.5YR 5/6-2.5YR 6/4), occasional white calcite grits up to 7 mm in diameter. Signs of encrustation outside and standing water inside. Complete. Rim diameter 27.6 cm. Height 16.5 cm. Base diameter 11.4 cm.

JUGLETS

J-9 (H-2287, Fig. 2.15: 5; Pls. 24: 4, 26: 3-4): Oval body juglet with high flaring neck, simple, slightly flaring, rim and a shallow ring base. An oval-sectioned handle springs from shoulder to mid-neck. Reddish ware (2.5YR 6/6-5YR 6/6), Occasional areas with white calcite grits up to 5mm in diameter. Clear signs of metal deposits on the ware, both blue-green and dark brown-black. Complete. Height 23.4 cm. Body diameter 13.8 cm. Neck height 7.2 cm. Neck-rim diameter ca. 3.3-4.4 cm.

J-10 (H-2286, Fig. 2.15: 6; Pl. 24: 5): Beer jug with oval body, trough-like strainer-spout positioned above maximum body diameter and a ring base. An oval-sectioned handle springs from shoulder to mid neck at a right angle to the spout. Traces of vertical burnish resulting in reddish hue. Reddish ware (7.5YR 7/6-2.5YR 6/6), white calcite grits up to 5 mm in diameter. Signs of metal as well as encrustations on the vessel, due its position in the hoard and conditions in the cave. Part of neck and rim missing. Height of preserved fraction 16.8 cm. Body diameter 10 cm. Analyzed by means of petrography.

J-7 (H-2294, Fig. 2.15: 7; Pl. 24: 6): Dipper juglet with wide oval body, short concave neck and rounded base. An oval-sectioned handle springs from shoulder to mid neck. The trefoil mouth ends with externally bevelled

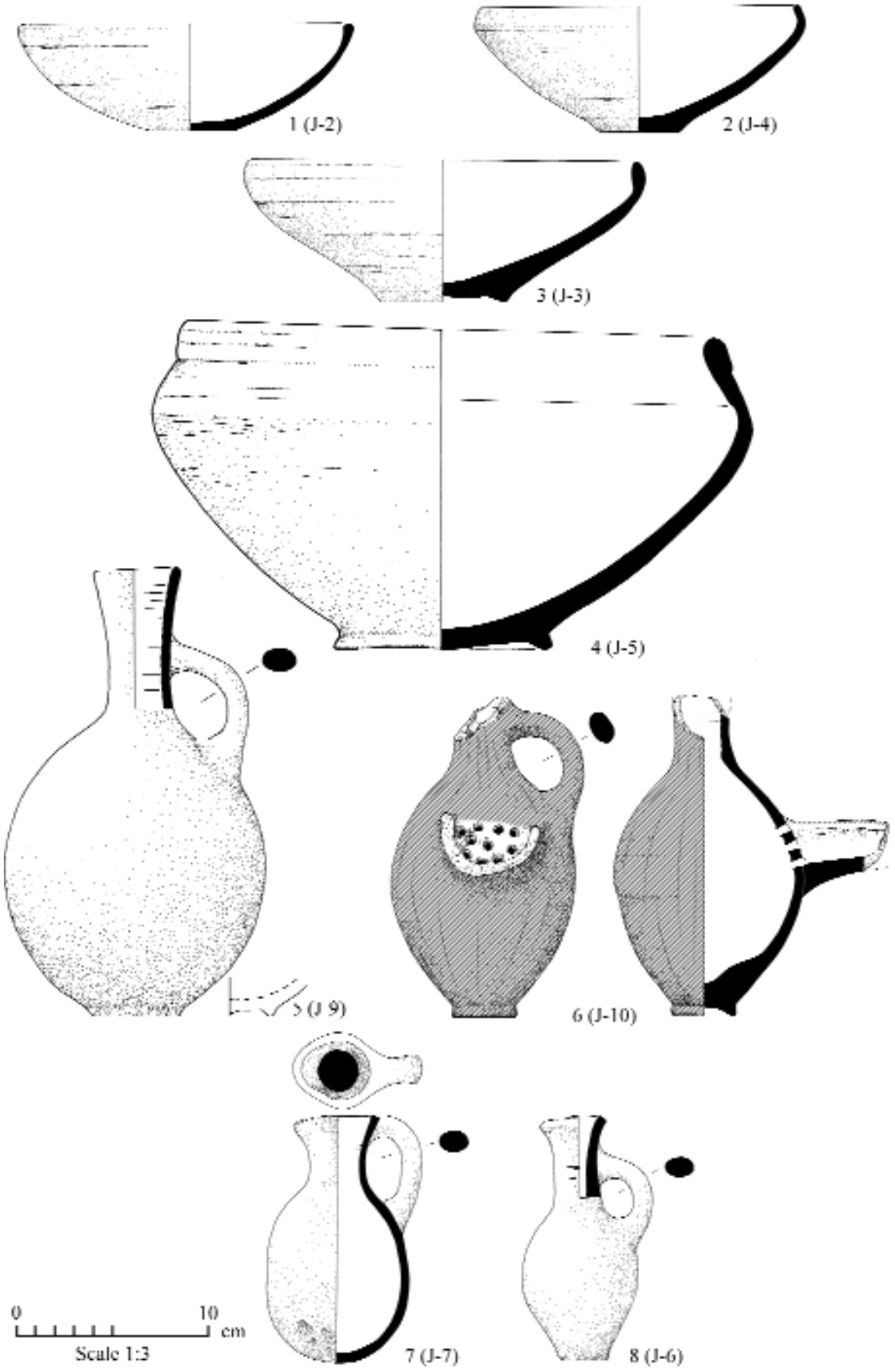


Figure 2.15: Ceramic bowls, jugs and juglets

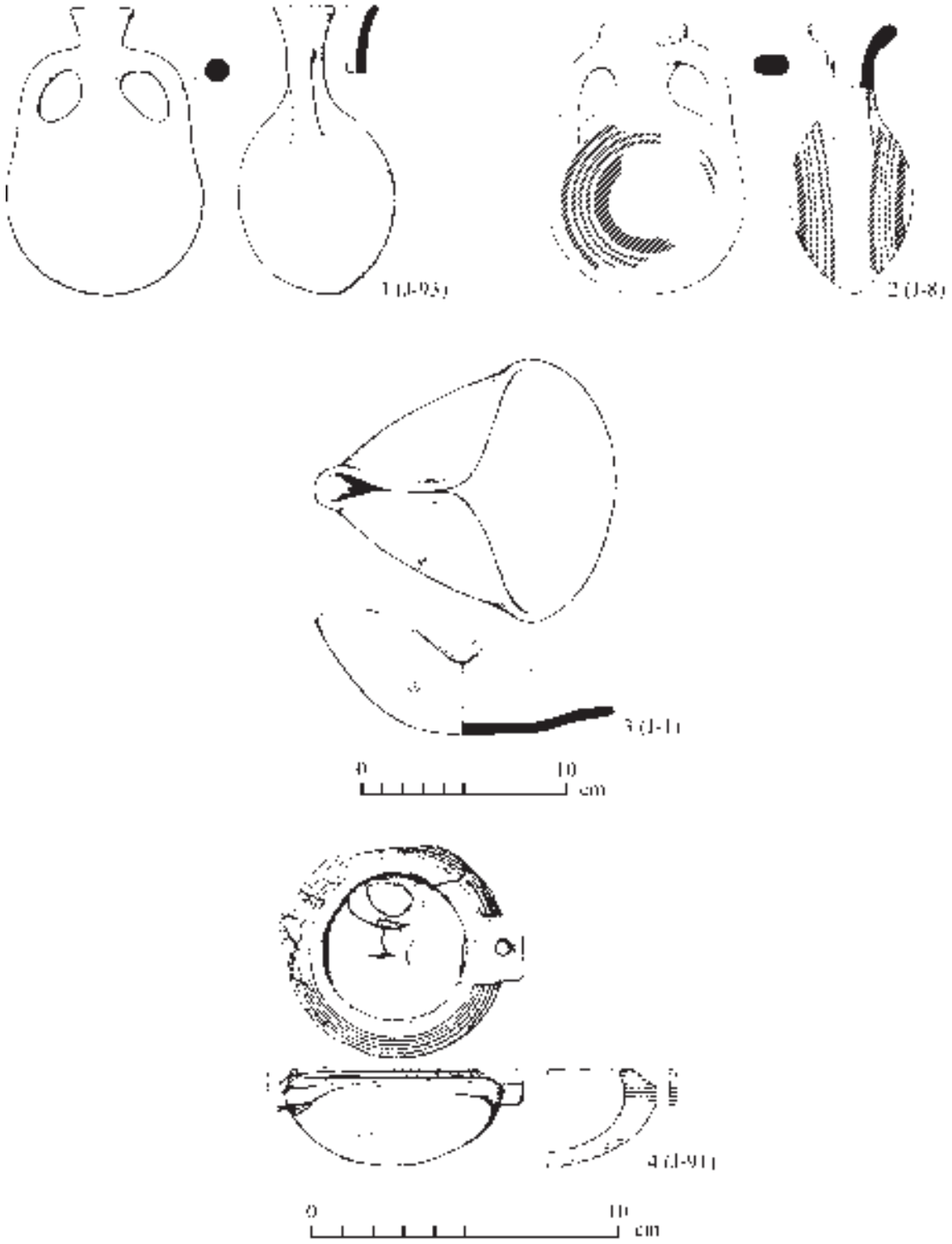


Figure 2.16: Ceramic flasks ceramic lamp and Ivory pyxis

rim. Red-yellow ware (Munsell: 5YR 6/6-5YR 7/6), white calcite grits up to 5 mm in diameter. Blue-green remains of metal on rim and body of the juglet. Complete. Height 12.9 cm. Body diameter 5.6 cm. Neck height ca. 3.5 cm. Neck-rim diameter ca. 3-4.5 cm.

J-6 (H-2293, Fig. 2.15: 8; Pl. 24: 7): Dipper juglet with narrow oval body, relatively high straight neck that ends with externally beveled, slightly flaring rim and a pronounced, contracted flat base. An oval-sectioned handle springing from shoulder to mid neck. Light red-brown ware (Munsell: 2.5YR 6/6-2.5YR 6/4), occasional grits up to 5 mm in diameter as well as holes caused by organic material in the clay. Signs of remains of metal on the juglet. Complete. Height 12.8 cm. Body diameter 6 cm. Neck height ca. 4.5 cm. Neck-rim diameter 2.5-3.6 cm.

FLASKS

J-93 (Fig. 2.16: 1; Pls. 25: 2, 26: 2): Two-handled flask with relatively globular body, long neck and simple flaring rim. Undecorated. Complete. Height 14.8 cm. Body diameter 9.7 cm.

J-8 (H-2289, Fig. 2.16: 2; Pl. 25: 3): Two-handled Pilgrim flask with lentoid body, short neck and simple flaring rim. Pink ware, decorated with red painted concentric circles on body (Munsell: ware, 5YR 7/6-7.5YR 7/4; decoration, 10R4/6), small number of white grits, up to ca. 1mm. Blue-green remains of metal on the flask. Complete. Height 13.5 cm. Body diameter 9.8 cm. Analyzed by means of petrography.

LAMP

J-1 (H-2288, Fig. 2.16: 3; Pl. 25: 4): Oil lamp with pronounced, high spout, direct simple rim and wide flat base. Brown-reddish ware (Munsell: 2.5YR 6/6-5YR 5/3), white, calcite grits of varied size up to ca. 2mm in diameter. Remains of metal deposits on the lamp, especially the outer side of it. Complete. Diameter 14.7 cm.

III. IVORY PYXIS

J-91 (Fig. 2.16: 4; Pl. 25: 5): Small, hemispherical ivory pyxis with two pierced knob handles positioned on the slightly incurved rim, one opposite the other. Its rim is decorated on the upper surface with five incised concentric circles. There may have been an attempt of extra decoration in the form of lines between the second and third circles; however, the state of preservation is not very good and it is impossible to see the complete decoration. It has a rounded body, flat rim, flat base and an inner rounded depression. Partially broken. Lid was not preserved. Height 3 cm. Diameter 7.4 cm

CHAPTER III: COMPARABLE TYPOLOGY AND CONTEXTS OF OBJECTS

The shapes and types of objects found in the Jatt hoard are discussed in this chapter. Detailed studies of selected objects from the hoard, possible parallels and dates, as supplied by their excavators or those who studied them, are presented. A catalogue dealing with the technical description of the items appears at the end of the publication. Drawings and photos of the items, as well as their registration numbers, are to be found in the catalogue.

The dates appearing with the parallel objects are those used by the excavators or in the publications in which the objects were introduced. Some of the parallels are from excavations of the early 20th century, such as Schumacher's Megiddo excavations. We have therefore tried to incorporate the later excavations, publications and studies of Megiddo such as that of the Chicago team, published in the 30's and 40's and recently in a volume by Harrison; of the Hebrew University's small excavations directed by Yadin; and of Tel Aviv University's current excavation, headed by Finklestein, Ussishkin and Halpern. Publications dealing with assemblages of metal objects, used in this study, are also not all up to date since much has changed, especially in methodologies of excavation and analysis of objects. An example is the monumental volume Catling published in 1964, which was very useful for this study, but even Catling noted its limits in his 1984 publication.

Since many of the comparable objects were found in graves, the dating of the excavators often appeared in a range of two or more centuries, «from the 13th to the 11th century BCE», or «from the late 13th to the 12th century BCE». With time, however, more refined dating appears and was utilized in this study whenever possible. It should be borne in mind that during the period between the 13th and the 11th centuries BCE several major economic and geopolitical changes took place in the eastern Mediterranean, and the indiscriminate attribution to this lengthy period is problematic. In addition the demographic changes brought about in this period, for which we have fragmented archaeological and written data, arouses understandable personal agendas bearing on the interpretations. As often happens in archaeology, assumptions become facts and when quoted the original intention of the original scholar is forgotten. Therefore, whenever possible a short discussion as to the reason an object is attributed to one or another stratum appears.

The variation in nomenclature of periods and subperiods, both in the Levant and Cyprus, has undergone some changes over the last decades as well. The same is true of the dates associated with the periods. Yet another problem associated with nomenclature is that of the geographical differences in the attribution of the end of the LB and the beginning of the Iron Age in Cyprus, Greece and the Levant. In the Levant, it is dated to ca. 1200 BCE, although recent attempts are being made to change the nomenclature, at least in the coastal areas and the valleys, where the LB seems to continue at least until the end of the Egyptian involvement in the area, ca. 1130 BCE. In Cyprus and the Aegean, the period named LB, or its local variations, continues until the beginning of the 11th century BCE, when the Geometric period begins.

Many new data have increased our knowledge over the last decade or two, especially for the early Iron Age in Israel, Jordan and the LC and CG Ages. However, with the newer information new disagreements as to the stratigraphies, chronologies and dating have arisen, especially of the Iron Age period. Gilboa and Sharon (2003) have

recently tried to tackle this problem and published an article in which they constructed ceramic sequences based on artifactual details of the Early Iron Age. Their work focused on the finds from Tel Dor, but compared them with other sites in Phoenicia, Cyprus and Greece. Gilboa also addressed issues of comparative ceramic typologies of ceramics from Tel Dor and the Cypro-Geometric imports in what she names Southern Phoenicia (Gilboa 1989; 1999b). A. Mazar has contributed data to the chronological debate (1994:39-58; 2002:264-282; 2004; Coldstream and Mazar 2003) especially from his excavations at Beth Shean (1993) and Rehov (1999).

Recent C^{14} analyses of short living samples have been added over the last few years to the studies consisting of artifact comparisons and possible «historical» attributions, although even there no consensus has been reached as to the absolute dates of the period, and we will have to await further developments in claims concerning the absolute dating of the period. Recent publications include data from Rehov, Megiddo and Dor (Carmi and Segal 2000; Gilboa and Sharon 2001; Sharon 2001; Bruins, van der Plicht and Mazar 2003; Finkelstein and Piesetzky 2003, Harrison 2004; Mazar 2005), among others. Attempts to lower the chronologies are often accompanied by other changes, associated not only with time. Complete objectivity is not a simple matter when dealing with limited data stretched over several hundred years in comparative ceramic traditions, and regionalism, and with problems associated with specific, geographical or chronological trade and texts.

Comparable chronological horizons of the Levant, Cyprus and Greece are presented below. The data are taken from Mazar (1992), Bell (2005a) and Gilboa and Sharon (2003).

Table 1: Comparable chronological horizons of the Levant, Cyprus and Greece

Approximate dates BCE	Conventional Terminology in the Levant	Gilboa and Sharon (2003)	Cyprus	Greece
1300-1200/1190	Late Bronze IIB		LCIIC	LHIIB
1200/1190-1130	Iron IA	LB/Iron	LCIIIA	
1130-1090	Iron IB	Iron 1a	LCIIIB	LHIIC (early)
1090-1050	Iron IB	Iron 1a/b	CGIA	LHIIIC (middle)
1050-1000	Iron IB	Iron Ib	CGIA-mid	EPG/MPG

This study will not attempt to settle the stratigraphical-chronological differences that were mentioned. However, at times, to overcome past assumptions that are no longer viable, decisions as to attributions of specific loci into specific contexts had to be made.

The selection of names of objects is also not uniform. Their names differ according to the area of excavation. An attempt was made both to use the names given by those who excavated or studied the objects in the different geographical and cultural areas, as well to incorporate them into a cohesive nomenclature in order to avoid confusion.

I. BRONZE OBJECTS

VESSELS

1. BOWLS

The 17 bowls of the Jatt hoard are divided into several typological groups: the first, small hemispherical and rounded bowls; the second, bowls with a discoid base, which is further sub-divided; and the third consists of two bowls with handles of which one is a laver; the last represents miscellaneous bowls of which there are only fragments. The bowl section contains a cauldron.

a) HEMISPHERICAL and ROUNDED BOWLS

Three bowls belong to the hemispherical and rounded bowl category (J-77, J-79 and J-42, Fig. 2.1: 1-3, PL. 1: 1-3). Two of these are hemispherical bowls that are fairly similar in general body shape. They measure ca. 6 cm in height and 11 cm in diameter. The third one is a rounded bowl, a bit larger and shallower than the previous two, measuring ca. 5 cm in height and slightly more than 14 cm in diameter. All three are well preserved.

Inside the base of bowl J-77 is a square protrusion, which is a special feature that is not paralleled elsewhere. There is no likely functional explanation for this protrusion, and hence it is assumed to be a technical feature, a leftover that was not removed or an attempt to fix a defect in the bowl by a patch.

Comparable bowls of this shape appear in the metal hoard of 1739 in the Megiddo stratum VIA (Loud 1948: Pl. 189: 9, 10; Harrison 2004: 2, 3), Beth Shean (James 1966: Fig. 104: 21), locus 1724, described as mixed strata, VI and V (James 1966: 13), tomb 90 of Beth-Shean (Oren 1973: Fig. 45: 1) and Tel Zeror (Ohata 1967: 41, Pl. 1: 3). The shape is relatively common in the eastern Mediterranean, including Egypt where it is dated to the 19th dynasty (Gershuny 1985: 2-3). Similar bowls are known from the later part of the LB Age in tomb 101 of Tell es-Sa'idiyeh, where they constitute part of a «wine set» (Pritchard 1980: Fig. 4: 16, Pl. 49: 1).

Similar dating for this type of bowl is supported by the finds in Cyprus, where they extend from the end of the LB Age, i.e., LCIIC and the transition to LCIII (or the 13th to the beginning of the 12th century BCE), until the CGI, 11th century BCE. The earlier date is best demonstrated by the bowls from grave 119 in Paleapaphos-Eliomylia (Karageorghis 1990: Pl. LXXXII: 8, 9, 12, 24, 25). The later date is demonstrated by the grave goods from the cemetery of Palaepaphos-Skales, where numerous round and hemispherical bowls were found in the CGI tombs. In one of these, grave 49, an *obelos* was found with a Greek inscription dating the grave to the 11th century BCE (Karageorghis 1983: 370, Fig. LXXXIX: 3, Pls. LX-LXI). The bowls from tomb 39 in Kaloriziki (Benson 1973: 49, Pl. 41) are also attributed to a later date. In addition, LC round and hemispherical bowls were found in Tomb 23 of Hala Sultan Tekke (Niklasson 1983: 169-213, Fig. 489), Lapithos-Ayia Anastasia (Catling 1964: Fig. 17: 2), in the Swedish and French tombs in Enkomi, where they were dated from LCIIC to LCIII (Catling 1964: 147-8; Courtois *et al.* 1981: 268-269, 273-274) and in Kouklia, where Catling enumerates 27 such bowls, which he attributes to the LCIII context (Catling 1964: 148). Catling suggested that an earlier date, namely LCIIA, is possible although, as he remarked, the earlier date cannot be taken to be certain (1964: 147-8).

Catling's view (1964: 147-148) that this shape of bowl originated in the Middle East is based on the notion that the Cypriote examples tended to be dated later than those from the mainland Levant. However, given that the shape is a rather simple one and Cyprus had a long tradition of bronze production, it seems likely that the production of this shape of bowls appeared concurrently on both sides of the sea, Cyprus and the coastal areas of the mainland, and continued from the LB to the Iron Age, or CG period and beyond.

b) PINCHED ROUNDED BOWLS

The two vessels in this category, J-71 and J-72 (Fig. 2.1: 4-5, Pl. 1: 4-5) are large deep rounded bowls. Their upper body part was deformed/pinched in order to form a single, wide U-shaped nozzle. This kind of deformation is very similar to the one that was applied to bronze or ceramic oil lamps of the period.

No exact parallels to the pinched bowls were found, although a deep rounded lamp and a comparatively large rounded bowl from tombs 101 and 119 at Tell es-Sa`idiyeh (Pritchard 1980: Figs. 4: 19, 24: 10) may reflect either the technique or the size of Jatt bowls. However, at Tell es-Sa`idiyeh the vessels are either unusually large or pinched. They do not include both features of size and technique simultaneously. A bronze bowl from Lachish (Tufnell 1958: Pl. 42: 1), reminiscent of the scoops dealt with extensively by Gitin (1993), might be related in its function to the Jatt bowls. However, the Lachish bowl has an inverted base, a handle and a pointed orifice instead of nozzle. It is difficult to fathom how such a vessel was utilized. Perhaps it was used as a very deep oil lamp or a pouring or scooping vessel, as was suggested by Gitin for clay examples. They, however, are quite a bit shallower than the Jatt bronze pinched rounded bowls (1993).

c) CURVED BOWLS

Eight curved bowls have been found at Jatt, J-35-J-41 and J-70 (Figs. 2.1: 6-11, 2.2: 1-2, Pls. 2: 1-5, 3: 1-3). All of them are medium sized with in-curving walls and a wide, slightly concave discoid base. Six of the bowls are grouped by

their vertical or slightly inverted and inwardly-thickened rim. These bowls are fairly uniform in size (ca. 14.5-16.5 cm rim diameter, 8.5-9.5 cm base diameter, 3-4 cm height), although, one of them (J-35) is noticeably deeper than the others and has a more concave base. The remaining two bowls are not similar, having a curved out rim and different proportions (see catalogue). Most of the curved bowls from Jatt are complete, although J-70 has part of its rim missing and J-40 had lost much of it base.

While analogous bowls were found in several sites in the southern Levant such as Megiddo, in tomb 912 A1 (Guy and Engberg 1938: Pl. 123: 19) and in level VIA, locus 1729 (Loud 1948: Pl. 190: 11; Harrison 2004: 32: 4, 5), and in Sahem (Fischer 1997: 72, Fig. 28: 5, PL. 40), the curve of their bases is not the same as those from Jatt. Similar bowls were found in Dothan (Gershuny1983: Pl. 4: 45, 48-52), but they tend to have slightly different and rounder bodies. According to Gershuny (personal communication), some of the bowls from the Iron I burials at Tel Dover (Wolff 1998: 775; Rapuano 2001)) belong to the curved bowl group as well. A similar bowl, although the drawing may be misleading, was found in grave 1029 at Achziv, a cist tomb dated to the 11th century BCE (Prausnitz 1997: table 2: 1).

In Cyprus, this bowl shape is not prevalent. One possible example is a bowl with a discoid base excavated in Tomb 49 in Palaeopaphos-*Skales* (Karageorghis 1983: Fig. LXXXIX: 6). The dating of the bowl is of the CGI, 11th century BCE.

Although curved bowls are not common in Cyprus, the resemblance between them and the Cypriot lavers –curved bowls with rounded sunken bases– might be significant to the search for the origin of the shape. Catling suggested that the laver shape is Mycenaean in tradition. Indeed, a «classical» *laver* (J-65, see below) was found in Jatt side by side with the curved bowls.

d) HANDLED BOWLS

Two bowls with handles were found in the hoard (Fig. 2.2: 3-4, Pls. 3: 4, 4: 1). J-46 is probably a hemispherical bowl, although its base was not preserved. The other, J-65, is a curved bowl or a laver.

The hemispherical bowl has two vertical loop handles attached to two circular disks. Each handle is fastened to the vessel by two rivets. The handles are curved to well above the rim, where a decoration resembling either a bird with two wings or a human figure appears. The bowl was tested by means of Lead Isotope and the results seem to indicate that it was produced from copper originating in the area, namely the Feinan vein (see Stoss-Gale, appendix b).

A wider bowl with two loop handles attached to disks, each held by two rivets but bearing no decoration, was found in Grave 101 of Tell es-Sa'idiyeh, in the Jordan valley (Pritchard 1980: Fig. 4: 15). This bowl is dated to the 2nd half of the 13th century, or the end of the LB Age. Two bowls were found at Gezer in cave 28 II and dated by Macalister to his third Semitic period (1912: Vol. 2, 46, Fig. 242bs). Another bowl, similar to J-46, was found in Tomb 132 in Palaepaphos, Cyprus (Flourentzos 1977: Fig. 2). An extra band joins the two disks at the handle's ends and the disks' shape is likened, by the excavator, to bull heads. The decoration on the top of the Palaepaphos bowl handles bears a liking to a lotus flower. Additional hemispherical bronze bowls with decorated loop handles were found in other graves in Palaeopaphos-Skales, for instance in Graves 49 and 58 (Karageorghis 1983: Pls. LX: 1, LXXXIX: 90). The examples from Palaepaphos-Skales are dated to the CGI period, the 11th century BCE.

The second, handled bowl is inwardly curved with a sunken, noticeably rounded base - a shape previously termed «*laver*» by Catling (1964: 153-154). The *laver* from Jatt has one handle, freely hanging from two incised decorated disks in the shape of a bird, or just wide cross shape fastened to the body of the vessel's wall by two rivets. Each disk bears an outward loop where the handle was positioned. The handle itself ends on both sides in what might be viewed as bird or duck heads. The Cypriot lavers have two fixed vertical plain handles.

The unusual arrangement of the handle on the laver from Jatt is of special interest and has few parallels. A similar method of handle attachment was found only on a shallow bowl with rounded profile from Tel Dan (Gershuny 2002: 200, Pl. 2.154: 113). In Cyprus, suspended handles, although of different type, were found on *situlae* or cauldrons (Catling 1964: Pl. 21: a, Fig. 17: 9).

The lavers from Enkomi were found in the old excavations of grave 66, predating the modern excavations. Murray, Smith and Walters already published some of these lavers in 1900. Sjöqvist (1940: 22-23) suggested dating the tomb in Enkomi to his LCIIB period. Later, Catling argued that LCIII, i.e., post 1200 BCE, is a more likely date for the tomb since among the grave goods that appear in the 1900 publication is a Bucchero vase (Catling 1964:

153, footnote 6). In his discussion of the lavers, Catling notes that the type originated in the Aegean (1964: 153) and that the rounded base was produced to facilitate placing the lavers on a stand.

2. CAULDRON

A single cauldron, J-48, was found in the hoard (Fig. 2.3: 1, Pl. 5). It has a short flaring rim, a slight carination on its mid-body and a rounded base. Although only the stubs of a single handle remain, they were suspended from two double-spiral bases on each side. These, in turn, were fastened by four rivets each to the wall of the vessel much like the method used in laver J-65 (see above). The cauldron's metal was sampled and analyzed by means of Lead Isotope analysis. The results indicate that the metal originated in the Feinan copper vein (see appendix b).

A possible cauldron was found at Gezer in Cave 28 II, although it is hard to discern its exact shape from the photograph in the publication (Macalister 1912: Vol. 1, 122). A similar cauldron was found in grave 101 at Tell es-Sa'idiyeh (Pritchard 1980: Fig. 4: 14), although it has different handles. Instead of being suspended, the continuations of the handles are attached directly to the vessel walls by rivets. Cypriot bronze cauldrons differ from those of Jatt J-48 and Tell es-Sa'idiyeh. Catling (1964: 168, Fig. 18: 6) presents a carinated cauldron from Tiryns with a slightly flaring rim and a round base. However, its carination is situated slightly higher than that in J-48, i.e., above the vessel's center of gravity. Also, the handles are clearly different. Despite these dissimilarities, it is hard to negate a possible indirect influence. Pritchard dated the Tell es-Sa'idiyeh cauldron to the end of the second half of the 13th century BCE and the Tiryns cauldron is dated to the LHIIIC.

3. STRAINERS

Remains of three strainers were found in the hoard (Fig. 2.3: 2-4, Pl. 6: 1-3). All are incomplete; two in a very fragmentary state. Of the three, the most complete is J-63, which has almost all its wide everted rim and the remains of four, possibly five, concentric circles of perforations. The handle is of the ribbon type and is a continuation of the rim. It is folded and fastened to the rim by a rivet. Only one concentric circle can be discerned on the remains of J-47. J-66 cannot be discussed since only the handle and the rivet of the strainer remains.

At least two of the strainers, J-47 and J-63, found in the hoard at Jatt could be discerned as belonging to Gershuny's type A. Type A strainers were found in Megiddo stratum VIA, in locus 1739 (Loud 1948: Pl. 190: 15, 16; Harrison 2004: Pl. 33: 6, 7). Strainers of this type were found in Tell es-Sa'idiyeh tomb 101, which is dated by Pritchard to the 2nd part of the 13th century BCE (Pritchard 1980: Fig. 4: 17), and in grave 32, which is dated by Tubb to the transition between of the 13th and the 12th centuries BCE (Tubb 1988b: 65, Fig. 50), and in tomb 90 of Beth Shean northern cemetery, where it is assigned to a rather lengthy period - from the late 13th to the end of the 12th century BCE (Oren 1973: Pl. 45: 3).

In the LB Age, especially the last part of it, strainers make their appearance in the Levant. They are usually found alongside jugs, *situlae* and bowls (Gershuny 1983: 16). These sets are referred to as «wine sets» following a scene on a decorated ivory box from Tell el-Farah south, showing the use of the three vessels (Petrie 1930: Pl. LV) and thought to bear Egyptian influence.

Interestingly, strainers are more prevalent in Cyprus during the CGI period than in the LCII or III. At Maa-*Palaeokastro*, a strainer was found on floor II of building II in area III. It is a large strainer in the shape of a hemispherical bowl, with a plain rim and no handle (Karageorghis and Demas 1988: 107, Pl. LV: 204). This object, however, looks much like a bowl to which the holes for the strainer were added as an afterthought. Floor II is dated from LCIIC and destroyed during LCIIIA:1, according to the excavators (Karageorghis and Demas 1988: 259-260). Two strainers were found in Kaloriziki. One from Tomb 40 (K-1086, Pl. 41), dated to LCIIIB (Benson 1973: 50, 123) and the other, from Tomb 39 (K-1086, no photograph), dated to CGIA (Benson 1973: 49, 123). Two more strainers were found at Palaepaphos-*Skales* in tomb 48 (Karageorghis 1983: 76), also dated to the CGI period. These are quite different from the ones described above as Gershuny's type A, as both are of bronze and are «shallow, with a sunken semi globular sieve, flat-out rim» (Karageorghis 1983: 60). One of the strainers has two opposing flat horizontal loop handles (Tomb 48: 9) and the other has three loop handles, but they are of iron and the rivets attaching them to the strainer are of bronze (Tomb 48: 197).

Thus, the scarcity of strainers in the Jatt hoard is quite surprising. The hoard contains numerous bowls as has been shown above, as well as juglets, which are to be dealt with below. The question asked at this juncture is why

there are so few strainers in the hoard and whether they were part of «wine sets». One reason might be the brittle nature of the strainers and the low chance of their being preserved in the geographical area in which they were found. Another angle to consider may have to do with the date of the hoard. Most, if not all, the wine sets found are dated to the 13th – early 12th centuries BCE while the Jatt hoard may be of a later period.

4. JUGLETS

Of the 13 juglets in the Jatt hoard, 12 follow the same general shape, having a rounded to oval body. An attempt was made to divide them into separate types, although there is more than one way this could be achieved. The 13th juglet is a small bag-shaped juglet in a bad state of preservation. The similarity in shape may indicate, in this case, that the juglets were produced in one workshop, thus, accounting for the same technology, typology, and chronology. Where the workshop was situated is not possible to establish, although, as will be noted below, the copper's origin locates it in the general area and not in Cyprus. It is assumed that the juglets were produced for some particular usage, but how they were utilized also remains an enigma.

a) GLOBULAR TO OVAL BODY SHAPED JUGLETS

The globular to oval body shaped juglets (Figs. 2.4: 1-7, 2.5: 1-5, Pls. 7-10; types 1-4) have trefoil, or pinched, rims and double strand handles. Their handles are cast together with the thickening rim at the top and attached to the vessel's shoulder at the bottom, though, in one case, J-12, the shoulder is short and the handle is attached to the widest area of the body of the roundest juglet of the group. At the area of attachment to the shoulder, just below the neck, each strand of the handle is spiral formed.

The division of the globular to oval body shaped juglets into the types was mainly based on the shape of body and neck. Further features considered were the neck to body-length proportion, the manner in which the handle is attached to the rim, and the appearance of the ridge around the base of the neck. On the basis of these criteria, four types have been defined:

1. Juglets with globular body, round base, cylindrical straight neck, with or without ridge. Four juglets fall into this category: J-14, J-78, J-81 and J-82.
2. Juglets with globular body, pointed base, cylindrical straight neck, with or without ridge.
   Three juglets were assigned to this type: J-16, J-17 and J-15. They are similar to the juglets of the previous type, differing only in the shape of the base. A ridge at the base of the neck and an inwards incline neck are unique to J-15. Three juglets were analyzed by means of Lead Isotope and while the copper of J-16 and J-17 originates in the Feinan copper vein (see Stoss-Gale, appendix b), that of J-15 is problematic and a definition of re-cycled metal should probably be considered. J-15 has also a lower tin content and as noted above, has a slightly different neck from the other juglets. This is the one juglet which might not have been produced in the same workshop as the others.
3. Juglets with elongated, oval body, short straight neck and pointed base:
   There are two members in this group: J-11 without a ridge and J-12 with a ridge. They are quite similar to the juglets of the previous type, but their body is more elongated and their neck is shorter.
4. Juglets with elongated, oval body, short concave neck and pointed base:
   There are three juglets in this category: J-64, J-80 and J-13. They differ from the previous type in their concave neck. Another element that distinguishes these from all the other juglets is the way the handle is attached to the rim. It gives the impression that each strand of the double strand handle was attached separately to the rim and later placed side by side until it reaches the shoulder of the juglet where it is divided into two parts/spirals. The spiral of J-64 is absent and those of J-13 look more like disks of metal. All three have ridges and, in the case of J-64, there is a double ridge. A comparable multiple ridged juglet was found at Tell es-Sa'idiyeh (Pritchard 1980: Fig. 4: 18). J-13 was analyzed by means of Lead Isotope and found to be of the Feinan vein (see Stoss-Gale, appendix b).

b) BAG SHAPED

One juglet, J-18, was assigned to this form (Fig. 2.5: 6, Pl. 11: 1). Unlike the juglets in the previous category, its body is bag shaped, i.e., it has a low center of gravity. Its rim is not trefoil and is probably simple and its handle does not end with spirals. It is also smaller than the rest. Unfortunately, the juglet is quite corroded. No exact parallel to this jug, in bronze, has been found; however, this type of juglet is common in ceramics belonging to the 11th century BCE, including a sample from the hoard.

As similar as the juglets are, minor variations in shape have been found even between juglets attributed to the same type. These variations are probably the result of individual production processes of the juglets, as opposed to the more commercialized production of ceramic vessels. Some variations, e.g., the variation in wall thickness, may well point to the fact that the artisans who produced these juglets had not mastered the production technique to perfection. Note, for instance the thin walls of J-81 compared with the thick ones of J-64. Given that by using less metal, less energy is needed for the production and the profit is augmented, it is very reasonable to assume that thinner walls were preferred, although rarely achieved due to the technological complexity.

While similar juglets have been found in neighboring sites, they are not numerous and none is an exact parallel. Two bronze juglets, of our type A3, were found in stratum VI of Megiddo, in the bronze hoard 1739 (Loud 1948: Pl. 190: 4, 5; Harrison 2004 Pl. 33: 1, 2), dated by the excavators to the early Iron Age. Harrison included locus 1739 in Level VIA dated to the 11th century BCE (Harrison 2004: 20). Another similar juglet was found in Tell es-Sa'i-diyeh and was dated to the 2nd half of the 13th century BCE, or the end of the LB Age (Tubb 1988b: 65, Fig. 50: 2).

The similarity among the juglets, noted above, might suggest that they all originated in the same or similar workshop, except, possibly, J-15. They were all cast to a mold, although it is hard to ascertain the exact technique that was used. While the lost wax technique is usually the favored assumption for the casting technique in ancient time, the fact that no signs of rivets were found, even with the aid of X-Ray photography of four of the vessels, forces us to consider other possibilities (appendix a). If the lost wax process was used in spite of the missing nits, the thick rims could have been used for the escape of the gases, as could the high shoulders. Thus, the thick rim could well have been where the mold was and the investments were held together for the pouring of the bronze. If another technique was used, pouring of the bronze could have been made through the rims, which are wide enough to have supported the runners (Papasavvas, personal communication). Yet another possibility is that the juglet mold was placed upside down and the pouring of the metal was through the base of the vessel, using vents in the mold mass. This suggestion may find support in an addition of metal at the inner side of the base of juglet J-78. The addition, observed only by X-Ray photographs (Figure 6.3), was fixed in place by hammering, probably with aid of a chisel or like instrument in a form of cold brazing. The added metal might have served to close a runner or to close damage caused be exaggerated polishing of runner leftovers. It could, however, be a possible repair of some other production fault.

5. LAMP

Only one oil lamp (J-83, Fig. 2.5: 7, Pl. 6: 4) was found in the hoard. Bronze lamps are not common in the LB or Iron I periods. Since Gershuny's publication of the bronze vessels found in Israel and Jordan in 1983, the largest assemblage of bronze lamps was found at Tel Nami (Artzy 1995: 27, Zioni 2005). The bronze oil lamps copy the prevalent shape of the clay lamps of the period, although their shape is necessarily influenced by the technological limitations of their production. It is, for instance, nearly impossible to find two identical bronze oil lamps. While the nozzle and canalled rim of the Jatt lamp could be compared to one lamp from Tel Nami (Artzy 1995: 27), these features are not enough to suggest compatibility.

WEAPONS

The group of weapons found in the Jatt hoard consists of ten spearheads, 11 arrowheads, and one sword. The hoard's one double axe is described in the tool category, but it can be regarded as a weapon just as well, as can one macehead. The Jatt macehead is too degenerate to be a weapon and was therefore described in the tool category. The two knives found are incorporated into the tools category, although they too could also be considered as weapons, as in the latest publications of Megiddo VI (Harrison 2004: 85 ff., Plates 34-35).

1. SPEARHEADS

The spearheads from the Jatt hoard are of two types: long-socket spearheads (Figs. 2.6: 1-5, 6: 1-2, Pls. 11: 2-5, 12: 1-3) and lanceolate, short socket spearheads (Fig. 2.7: 3-5, Pl. 12: 4-6). Jatt's socket spearheads have slender blades and a prominent mid-rib. They are 20-25 cm. long and have two distinct segments: a blade and a long, tubular and divided socket. The shafts of these spearheads were secured by rivets, piercing the sockets at two opposing points usually near the base (see J-28, J-27, J-30). Remains of the wooden shaft were preserved in J-28. Jatt's lanceolate spearheads (J-32, J-34) are longer and more massive than the socket spearheads. They have conical sockets, short in comparison to the blade or the total length of the item. The blade and socket of these spearheads form a single segment with a continuing outline from socket to point, although only one (J-32) in the Jatt hoard is complete. No sign of the technique used for the attachment of shafts was preserved on the lanceolate spearheads. We must, therefore, rely on the lanceolate spearheads found at Enkomi, Cyprus for any elucidation about the attachment. In those cases, a rivet and two opposite holes in the socket were noted (Dikaios 1969: Pl. 163: 45; Catling 1964: 122, type h). However, the absence of rivet holes in J-32 might point to it having been deposited before ever having been used. A slightly different variant of the lanceolate spearheads is Spearhead J-33, which has a divided socket. Its length is unknown due to its poor preservation. The socket's thickness is noticeable. The base area of the socket bears a bordered herringbone incised decoration connected to a triangular «teeth-like» decoration collared on the base of the spearhead.

Parallels from the southern Levant to the cast, long-socket spearheads are scarce. The best examples have been found in an Early Iron Age context in tombs VI and VIII at the site of Tel Zeror (Ohata 1970: Pl. LXIII: 6-7; defined as javelins), a site positioned between Jatt and the coast and like Jatt, associated with the West to East route. Another was found in stratum VIA of Megiddo (Loud 1948: Pl. 173: 11-13, bigger). Yet another was found in cist grave 1029 at Achziv (Prausnitz 1997: 20, Fig. 2), which is dated to the 11th century BCE. The earlier socket spearheads of the LBIIB in this area tend to be smaller, have a less profound mid-rib, and be shaped (or partly shaped) by hammering (e.g., James and McGovern 1993: 212, Fig. 158: 3; Ben-Dov 2002: 121, Fig. 2.89, 2.90: 120; Loud 1948: Pl. 173: 10; Pritchard 1980: 24-25, Fig. 31: 5; Tufnell 1958: 78, Pl. 23: 11, 12; Artzy 1995: 24; Zioni 2005: Fig. 14: 12). These hammered spearheads, however, continue into the Early Iron Age, e.g., in stratum XI of Tell Qasile (Mazar 1985: 4, Fig. 1: 2).

Lancealote short socket spearheads are known in Cyprus from LCII until LCIIIA (Catling 1964: 119-120, Fig. 13: 11-16; Dikaios 1969 Pl. 163: 49, wider blade), although they continue to appear in the Iron Age, CGI period (Catling 1964: 121, 13: 17; Karageorghis 1983: Figs. LXXXIX: 15, CXCIII: 82, 108). The hammered sockets are rare in Cyprus and have been regarded by Catling as being influenced by foreign elements and copied in Cyprus (1964: 118-119, Fig. 13: 8, Pl. 13: d): «On the assumption that socketed spearheads were imported to Cyprus before the first hesitant local attempts at making the new weapon using the non-Cypriot socket design» (Catling 1964: 119).

Lanceolate spearheads are rare in the Levant. In Cyprus, few 12th century BCE examples are known (Catling 1964: 122-123, PL. 14: 4, 5; Dikaios 1969 Pl. 163: 44). Catling lists parallels to the Lanceolate spearheads in Crete, Greece and Rhodes. Considering their shape, it is assumed that both Jatt types were cast rather than hammered into shape, much like the ones discussed by Catling (1964: 119). Cast weapons were often afterwards hammered even in earlier periods (Kan-Cipor-Meron 2003: 71). Philip has shown that in the MB, the evidence of molds showed that standard designs of weapons were already produced in different workshops located in an extensive geographic spread (Philip 1991: 93), and thus should not be regarded as culturally distinctive.

The tradition of socketed spearheads is long. In the southern Levant, as in the Rishon LeZion MBII cemetery in coastal southern Israel, several cast spearheads were found (Kan-Cipeor-Meron 2003). Their sockets were produced as leaves on both side of the stem, which were then fastened to the wooden handle. A good example of this technique can be seen in the form of the trident discussed below (J-68). The form of fastening the spearhead to the handle continues and its vestiges can be seen as a double socket, although it is cast in J-76. While the fastened leaves type is the technology used in the Bronze Age, the Iron I spearheads sockets tend to be cast and fastened to the handle. Shalev postulated that the changes in the sockets might have to do with the changes in the metal content with a larger proportion of tin being included in the metal (Shalev 1997: 349).

The combined casting of the socket and the spearhead blade in one pouring to their final shape is different technologically from prior practices known in this area. The augmented usage of metal for the sockets should be noted. In order to achieve this form, the smith used far more metal than he would have with the folded sockets, or divided leaf sockets, as can be seen in the drawing of the section of J-32. This seems to indicate plentiful amounts of metal in the area, which allowed for the production of these types of sockets. While only a few of the objects

were analyzed by means of lead isotope, the fact that at least one of the spearheads, J-33, was found to be of the Feinan vein (see Stoss-Gale, appendix b) might indicate that dearth of copper/bronze was not considered by the smith who produced these objects.

An explanation of the origin of this type of socket might be found in the Aegean spearheads of European influence that Bouzek presents (1985: 136-137). This type of socket technique also appears in a spearhead from the Ulu Burun wreck, coined «northern» type by Pulak (1997: Fig. 23), in that the knowledge was already available in the eastern Mediterranean in the closing years of the 14th century BCE. Examples of the technique and its usage, as well as the possible trading route of the Ulu Burun wreck, has been discussed by S. Sherratt who also felt that they can be traced from the 13th century into the early 1st Millennium in the eastern Mediterranean (2000: 84-84).

2. ARROWHEADS

The eleven arrowheads of the Jatt hoard may be clustered into two main groups. The first group comprises lanceolate arrowheads with the widest point of the blade near the tang (Fig. 2.7: 6-11, Pl. 13: 1-6). The second comprises oblanceolate arrowheads with the widest area of the blade near the point (Fig. 2.8: 1-5, Pl. 13: 7-11), which Catling attributes to javelins (1964: 133, Fig. 16: 12-13). None of the arrowheads from Jatt has a stem between the blade and the tang, unless the evidence was obliterated by corrosion, as is possible in J-89 or J-19. Most of the arrowheads seem to be cast, although some show signs of having been finished by hammering. Evidence of LB casting of arrowheads in Cyprus (Hala Sultan Teke) was shown in a study of Buchhloz (2003: 123, abb. 5: j).

The typology and nomenclature of arrowheads in the southern Levant is usually the one used by Cross and Milik in their 1956 article, although other names have been used, e.g., by Oren who calls the oblanceolate arrowheads «spatulate» (1973: 117) or by Ben-Arieh (1981: 125) who used the term «spatulate» to describe «elliptical» arrowheads. Since confusion about the names might arise, we chose to keep Cross and Milik's terminology and not to use the term «spatulate» at all. Unfortunately, arrowheads are not always drawn to scale or photographed with a scale, which makes comparative studies problematic. We will present only some of the sites where the antecedents of the types appear, hoping that a deeper study will be made in the future.

Jatt's six lanceolate arrowheads form a heterogynous group. Variations are noted in the length of the blade – short (J-22, J-23, and J-24; Fig. 2.7: 9-11, Pl. 13: 4-6) or long (J-19, J-20 and J-21; Fig. 2.7: 6-8, Pl. 13: 1-3) and in the way the blade is tapered towards the point. Some of the blades are tapered more or less symmetrically from their widest part toward the point (J-19; Fig. 2.7: 6, Pl. 13: 1). The tapering of others begins moderately at the widest part and then, closer to the point, the tapering become more acute (J-21; Fig. 2.7: 9, Pl. 13: 3). Unfortunately, the corrosion of the objects renders the exact tapering pattern of each arrowhead difficult to resolve. All the lanceolate arrowheads, except J-22 (Fig. 2.7: 10, Pl. 13: 5), have a rhomboid cross section, which is due to the effect of the mid-rib. J-22 lacks the mid-rib and therefore is flat in cross-section. Tangs are rectangular or rhomboid. One of the short arrowheads (J-22) and one of the longer ones (J-19) in this group were analyzed by means of Lead Isotope and the coppers are both said to have originated in the Feinan copper vein (see appendix b). Analyses of these arrowheads reveal inconsistency in the amount of tin in the alloy: J-22 has 18 %, while J-19 has less than 0.2 % (see appendix b).

The second group, the oblanceolate arrowheads, consists of five arrowheads that have the widest area of blade near the point (J-25, J-26, J-87, J-88 and J-89; Fig. 2.8: 1-5, Pl. 13: 7-11). The group is relatively homogeneous in shape, although size varies. Variation is also apparent in the mid-rib, which is either rhomboid (Fig. 2.8: 1, 4-5) or flat (Fig. 2.8: 2-3) in cross-section. When the mid-rib is flat, the cutting edges of the blade tend to be slender. Jatt's oblanceolate blades have sharp carination at their widest point, and rectangular or rhomboid tangs.

The Jatt hoard type of arrowheads can be attributed to the LB Age tradition, and most of the parallels to them being from contexts dating to that period (Cross and Milik 1956; Guy and Engberg 1938: Pl. 135: 10; Loud 1948: Pls. 175: 38, 41, 42; 176: 50, 51; Yadin *et al.* 1958: 99, Pl. CX: 15; Oren 1973: Figs. 42: 29, 45: 7, 9-11; Ben-Arieh and Edelstein 1977: 14, Fig. 21: 9, 10, with stem; Ben-Arieh *et al.* 1981: Fig. 6: 12-14, different stems; James and McGovern 1993: Fig. 157: 11, with stem; Ben-Dov 2002: 119), yet most of their shapes continue into the Iron Age. Parallels for both types of Jatt arrowhead were found in Early Iron Age context at Megiddo stratum VIA (Harrison 2004: Pl. 34: 1-5), Beth Shean tomb 66 (Oren 1973: 118, compare to J-89, Fig. 2.8: 3, Pl. 13: 9) and Tell Qasile stratum XI (Mazar 1985: Fig. 1: 3, flat mid-rib). According to Catling, lanceolate arrowheads appear in Cyprus for the first time in the beginning of the 13th century BCE and become more common only in the LCIII (1964: 130, Fig. 16: 1-6). Since these types of arrowhead are also rare in the Aegean, Catling (1964: 131) resolved that they originated in the Levant.

While the arrowheads from the Jatt hoard can be attributed to the LB Age tradition and most of the parallels are from contexts dating to that period, most of the shapes continue into the Iron Age. This is true especially of the arrowheads in which the arrow and the stem are cast concurrently. Both types appear in Megiddo VIA, as has been stated above, and this encourages us to propose that these are the likely parallels to the Jatt arrowheads.

3. SWORD

Little can be said about the sword (J-52, Fig. 2.8: 6, Pl. 14: 1) since only a part of it remains. It was analyzed by means of Lead Isotope and found to be produced from copper whose origin is still questionable, although the Feinan vein cannot be ruled out (see appendix b).

4. DOUBLE AXE

Only one axe was found in the hoard (Fig. 2.8: 7, Pl. 14: 2). It is a double axe with oval shaft-hole and equal size arms that widen from the socket toward the bowed cutting edges. It might be viewed as either a tool or a weapon.

An axe of the same general type already appears in Megiddo in stratum XIIIB, the transition between the MBIIA to MBIIB, although it has a rounded shaft-hole and different side profile (Loud 1948: Pl. 182: 7). Better parallels were found in stratum VIA of Megiddo (Loud 1948: Pl. 183: 14-15), and possibly in stratum V, but their state of preservation is such that it is unsafe to assume their true shape (Loud 1948: Pl. 183: 24-25). They are likely to have been similar to the Jatt specimen but smaller. Yet another was found in cist grave 1029 at Achziv and dated to the 11th century BCE (Prausnitz 1997: 22, Fig. 2: 2). A narrower axe was found in the Cape Gelidonia shipwreck, which is dated to the end of the LB Age (Bass 1967: 94-95, 164-165, Fig. 107: 101). Three more axes from this wreck, in different states of preservation, belong to the same axe type (Bass 1967: 95, Fig. 108: 102-104).

The parallels from Cyprus are less convincing. Indeed, axes of the same general shape were found in Enkomi where they were dated to the LCIIIA Age or to the 12th century BCE (Dikaios 1969: Pl. 163; Catling 1964: Fig. 9: 1), but like most Cypriot shafted tools, they have a round rather than an elliptic shaft-hole (Catling 1964: 88). Furthermore, unlike the example from Jatt, the cutting edges of the Enkomi axe are not bowed and one of the items is «swollen» around the socket (Catling 1964: Fig. 9: 1) in a way not paralleled in Jatt.

Double axes were found in Europe and Anatolia, and according to Bouzek (1985: 46) are of «Mycenaean type». Bouzek reconstructed a double axe from a mold attributed to Troy VIIB (Bouzek 1985: Fig. 15: 5). In the case of this axe, its shaft hole is rounder and smaller than in the ones said to have been found in Europe and Anatolia, but its thickness and the large amount of bronze needed to produce it is similar to that of the Jatt hoard. Jatt's axe is of a type that, according to Deshayes, may have originated in Crete but is especially dominant in mainland Mycenaean Greece. The elliptical shaft-hole, however, is not typical of that type (Bass 1967: 95).

Whatever the initial origin of this type of axe, the practical aspect of it is obvious. It should be emphasized that the parallels are most, if not all, from areas associated with the Levant; however, the closest parallels are those attributed to the 11th century BCE from the general area, namely Megiddo VIA (Harrison 2004), Tell Qasile X (Mazar 1985) and Achziv (Prausnitz 1993) of the second part of the 11th century BCE.

TOOLS AND MISCELLANEOUS

1. KNIVES

Two knives were found in the Jatt hoard. One of them (J-53, Fig. 2.8: 8, Pl. 14: 3) is of bronze and the other (J-54, Fig. 2.8: 9, Pl. 14: 4) is of iron. Wood remains of the haft were preserved on both knifes. The two rivets used for the attachment of the haft to the butt were preserved only on the bronze knife, although two rivet holes on the iron knife butt indicate similar attachment.

We placed the knives in this category, although they could well have been placed in the category of weapons, due especially to the history of the study of this type of tool/weapon. The development of the shape is of interest as is the nomenclature. Weapons that are called daggers by Catling (1964: 59-62) are referred to as knives by Åström (1972: 139) as well as in the more explicit discussion in Philip's study (1991: 73-77). Philip mentioned the

interesting observation of Balthazar (1989:507) that knives underwent a greater amount of change in shape, composition, and possibly manufacturing techniques than other weapons, such as those termed «Hook tanged weapon forms», the «real» daggers of which there are no examples in the Jatt hoard (which is not surprising given their later date). Knives are, according to Binford (1972: 24), «technomic» objects, used on a regular basis, and thus needed sharp edges; technological innovations were part of the reason for the changes these tools underwent in the 2nd Millennium BCE.

In the area of the southern Levant, single cutting-edged iron knives are not common. The more recent discoveries are those which appeared in the «Philistine» areas of influence, namely at Tel Miqne, where a complete iron knife with bronze rivets and an ivory handle was found in a possibly cultic area (T. Dothan 1990: 32), and Tell Qasile where an ivory handle with remnants of an iron knife with bronze rivets was found in a cultic setting as well (Mazar 1985: 6-7). Other examples originate in Beth Shean, Megiddo, Gezer and Tell Farah (S), among other sites (Waldbaum 1978: 25). A slightly curved, or as it is at times called, re-curved bronze knife was found in stratum XVIII of Yoqne'am (late 12th - mid 11th century BCE) in the Jezreel Valley. In stratum XVII (second half of the 11th century BCE) the bronze knives were joined by iron knives with copper-based rivets (Yahlom-Mack and Shalev 2005: 372).

There are many more examples of single cutting-edged knives reported from Cyprus. Since his 1964 publication, in which Catling listed just a few, many more knives have been reported, mainly from graves. A number of double-edged knives were found in settlement areas already in the LCIA period (Swiny 1982: 69-71). Single cutting edge bronze knives dated to the LCIIC-LCIIIA were found at the site of Pyla-*Kokinokremos* (Karageorghis and Demas 1984: 33). The largest group of iron knives in Cyprus is from Palaeopaphos *Skales* (Karageorghis 1983: Figs. CXVIII: 1a, XCIX: 1, CXX: 8, CXXXV: 29, CXLII: 134, CLXVII: 70 and 72, CXCIII: 112), although there are numerous examples from other sites as well. The majority of the knives are dated to the CG period, from its very first to its last days, and the Cypro-Archaic dates (Sherratt 1994: 93-97). Sherratt compiled a list of the iron tools found in Cyprus during that period and many of them are knives (1994). She postulated that the early iron knives were designed primarily for status-enhancing novelty (1994: 68). They may have been attracted to the novelty of a knife made of iron, a new and more pliable metal, with the golden shine of the bronze rivets and an ivory handle, even if it did not perform as well as bronze.

The wooden handles of both of the knives in the Jatt hoard, compared to the ivory handles found at Tell Qasile and Tel Miqne, might be an indication of a decline in luxury. However, it could also be attributed to the dissimilarity in the contexts of deposition. The two parallels quoted above were found in cultic areas.

2. HORSE BITS

Two horse bits were found in the hoard (J-90 and J-92, Fig. 2.9, Pls. 15, 16). They are similar in shape to one another, with only minor differences. The mouthpieces consist of two cast bars, or canons, and a round section joined by interlinked elliptical rings. The rings for the snaffle reins were attached to the outer sides of the mouthpiece bars by a complicated method. These rings were made of looped wire the edges of which were pulled alongside the head of the bar. An addition of metal (J-92), or a wire, wrapped (J-90) around the head of the mouthpiece bar in a mushroom-like shape, anchored the rein rings in place (see appendix a).

Before closing one of their ends, the mouthpiece bars were inserted through a rounded hole in the center of the cheek pieces. The elongated cheek pieces have a semi-circular section, with the flat side towards the horse mouth. Triangular shaped holes on either side of the cheek pieces were used for bridle strips or for a curb. The triple cheek-strap was tied to a plain, semicircle-like ring (J-92) or omega-shaped ring (J-90) at the cheek-pieces center, just above the aperture. A string decoration appears on the outside of the J-92 cheek piece. It may suggest a lost wax casting.

The bits show signs of wear and tear, which can be clearly discerned in the X-ray photography of the rein ring(s), where pulling signs can be seen (Figures 6.4-6.6), as do the rings connecting the two canons, especially in J-92. The smooth canon types of bits, with cheekpieces and without spikes as found in Jatt, are better suited for chariot driving (Littauer and Crouwel 1979: 120). «Wire» canons are known from Egypt and Mesopotamia (Potratz 1966: 107-110) and are thought of as being more severe on the animal, an attempt for better control (Littauer and Crouwel 1982).

Bronze bits are known from at least the MBIIB, found on an equid buried at Tel Haror (Oren 1997: 265, Figs. 8.17 and 8.18; Littauer and Crouwel 2001: 329). The early bit has a single canon. Most, we are told by Littauer and Crouwel, were meant as driving bits, to enforce control from a vehicle. The type of bit with joined canons appears

in the second part of the 2nd Millennium BCE. An example was found at Gezer, attributed by Macalister to his third Semitic period (1912: Vol. 11: 13). Several bits of the type, usually wired, were found at Qantir-Piramesse in Egypt and published in a monumental study by Anja Herold (1999). These types of double cannon bit are usually twisted; however, there area examples of smooth canons as well (Herold 1999: Pls. 50, 52). Littauer and Crouwel present a bit from el-Amarna of the twisted double canon type, however. with a jointed mouthpiece and cheek-pieces (Littauer and Crouwell 2001: 333). According to them the type has no clear parallels outside the Levant, Egypt, and Greece.

The Gezer (Macalister 1912: Vol. II, 14), Qantir-Piramesse (Herold 1999: 19-20) and Jatt snaffles appear in pairs, which might indicate that they were part of chariot driving tackle. When first seen, the length of the bits seemed extraordinarily long, ca. 33 cm., with one (J-92) being slightly shorter. Macalister reported that each canon, at Gezer, was 6.5 inches, thus the two together would equal ca. 33 cm. Those from Qantir-Piramesse are ca. 25 cm. The wearing of the rings attaching the two canons, especially in J-92, is a likely indicator of the driving habits of the charioteer and equids.

3. TRIDENT

The decision to place the Jatt trident (J-68, Fig. 2.10: 1, Pl. 17: 1) in the tools category rather than the cultic one was taken as a precautionary measure. The possibility of its use in cult is strengthened by the fact that many of the tridents found were, in some way or another, connected to funerary instances and possible ceremonial purposes. Macalister considered the trident as a tool for hauling meat out of a pot (1912: Vol. II: 46), echoing, no doubt, the passage in the Biblical Book of I Samuel 2: 13-14 where rules as to the utilization of sacrifice were mentioned: «…the priest's servant would come while the meat was boiling with a three-pronged fork in his hand and he would thrust it into the pan or kettle or cauldron or pot; all that the fork brought up the priest would take for himself». Schaeffer (1956: 178) stated that the trident was used for the grilling of meat. Niklasson (1983: 179) considered the possibility that the tridents were used in fishing and mentions other utilitarian applications (1983: note 31) as well as earlier and later examples of tridents (1983: 174). Karageorghis stated plainly that tridents were used for sacrifice (Karageorghis 1982: 84), pointing out that the thin prongs could only be used for the roasting of meat (personal communication).

Only a few bronze tridents have so far been found in the southern Levant, starting in the 14th-13th century BCE cemetery at the Persian Gardens in Akko (Ben Arieh and Edelstein 1977: 30, Fig. 15: 2), in a LBII burial cave at Tell Judur, Hebron (Ben Arieh 1981: 120, Fig. 6: 1) and in Ugarit alongside a sword bearing the cartouche of Mereneptah, who reigned in the last decades of the 13th century BCE (Schaeffer 1956: 171-172, Figs. 122-124). The small barbed trident (24.6 cm. length) found in the Ulu-Burun wreck, which is dated to the last years of the 14th century BCE, may also be of Levantine origin (Pulak 1997: Fig. 19). A trident was found at Gezer in the early 20th century excavation and was dated by its excavator to the third Semitic period (Macalister 1912: Vol. II, 47). Considering the excavation methods used at the time, it is hard to date the Gezer trident in modern chronology schemes; however, the other metal objects, such as bronze and iron knives found in similar contexts in Gezer, could point to the 11th century BCE. An iron trident was found at Tell el-Hammah, near Beth Shean dating to the early 10th century BCE (Cahill and Tarler 1993: 562). A parallel found in Cyprus is a 86 cm. long trident from Hala Sultan Tekke (Nikalsson 1983: 206). It was found in a grave used for a short burial period, dated to the LCIIIA period, ca 1175 BCE (Nikalsson 1983: 183). Despite some similarities, its long, tubular and decorated socket is unlike that of Jatt. Possible tridents were found in the Aegean world as enumerated by Niklasson (1983: 183, note 31).

The Jatt trident is quite a bit longer than its parallels, and it ends are pointed. The spit seems to have a flattened base. The Akko trident is different in this respect: its three prongs end by thickening into tiny button-shaped edges, may be to avoid slippage, possibly of meat. The same is true of the Tell Judur trident. Otherwise, the technique used for the production of the socket and the lower part of trident from Akko and Judur is very similar to that of the one from the Jatt hoard.

4. SPIT

A single spit was found in the Jatt hoard (J-94, Fig. 2.10: 2, Pl. 17: 2). Only one other spit that was found in Yoqne'am was reported from sites near Jatt, in the general area of the southern Levant. The Yoqne'am spit was found

in stratum XVII, which dated to the 11th century BCE (Ben Tor, Zarzetcki-Peleg and Cohen-Anidjar 2005: Fig. I.18: 12). In its present state, it is more than 13 cm long. Yahalom-Mack and Shalev, in their description of the object which they call a «pointed rod», write: «This complete copper-based rod, round in section, pointed at one end and broken at the other…» (2005: 370). Thus, it is hard to estimate the actual length of the object and it might well be a spit. A ca. 50 cm spit was found on the Cape Gelidoynya wreck dated to the last part of the 13th to the early 12th century BCE (Bass 1967: 109), which might have originated in either the Levant or Cyprus.

The Jatt spit is similar to three spits, *obeloi*, as they are named, found in Tomb 49 at Palaeopaphos *Skales* (Karageorghis 1983: 61). Those are noticeably longer than the one in the Jatt hoard. They are: 87.2 cm (Tomb 49: 16), 86.5 cm (tomb 49: 17) and 76.5 cm (Tomb 49: 18). All three have inscribed signs on them (Masson and Masson 1983: 411-415). An iron spit was also found in Palaeopaphos *Skales* (tomb 67: 56&76) Its preserved length is 76 cm. Karageorghis mentioned another type of spit, a West Mediterranean *obelos*, found in Amathus, but its only comparable counterpart is in Sardinia and the type is associated with the Atlantic coast (Karageorghis and LoSchiavo 1989). They are dated to CGI. Spits, probably used for roasting meat, were found in other sites in Cyprus, such as Amathus and Lapithos, where an iron spit was also found, as well as slightly later in Crete. Karageorghis notes that other grave goods bearing Cypriote traditions and associated with «Heroic burials» were found in Crete and that the spits were introduced from Cyprus to Greece (2003: 342-3). Sherratt, in an article dealing with feasting in the Homeric epic, also traces the metal spits from Cyprus to Greece. She discusses meat roasting and the introduction of the bronze/iron spits to Greece (Sherratt 2004: 312, note 37). The reason for the inclusion of the spits in the tool category should be self-evident. They were probably used in ceremonies, including funerary ones. However, while some feasting might be considered as cultic, it could also be viewed as a luxurious pastime, indulged in by those who could afford it.

5. MACEHEAD

The Jatt macehead (J-69, Fig. 2.10: 3, Pl. 18: 1) was defined as such because of its resemblance to bronze maceheads from Cyprus (Kourou 1994: 210-212, Fig. 2). These are tubular objects with a ridged, knobbed center that were mainly found in graves. The Jatt shape appears in CG Age Cyprus. Earlier maceheads usually have knobbed heads. Kourou also compares the Cypriot types to 1st Millennium BCE maceheads excavated in Mesopotamia and especially Iran. The type is rare in the Aegean. In Israel, similar objects were found in other sites associated with the Iron I period, Megiddo and Qiryat Shmone, but have not been published (Yassur-Landau: personal communication). A stone mold of a macehead, dated to ca. 1500 BCE, was found at Tel Dan (Minoff 1992: 87*-89*).

Kourou (1994) attributed to these maceheads a symbolic rather than a utilitarian character. This attribution is accepted for this particular study and thus allows for the degenerate shape of the Jatt specimen, which has only slight, completely smooth knobbing, shifted a little from the center. There is no doubt that it does not qualify as having served as a weapon or utilitarian implement.

6. MIRRORS

A mirror with a handle (J-75, Fig. 2.11: 1, Pl. 18: 2) and another item that is assumed to be a mirror (J-43, Fig. 2.11: 2, Pl. 18: 3) were found in the hoard. Mirrors are common objects and is seems unnecessary to present all. Parallels to the Jatt mirrors are two from level VIA at Megiddo (Harrison 2004: Pl.33: 4, 5), dating to the 11th century BCE. One of them bears a handle different from the Jatt type and the other is a round object, comparable to J-43. A mirror found in Tomb 119 at Tell es-Sa'idiyeh compares well with the J-75 (Pritchard 1980: 22) as do two mirrors found at Gezer, in graves Macalister called «Philistine». One of the mirrors is from tomb 5, a plain mirror, rounder than the specimen from Jatt. It is 17.5 cm. in diameter and has a 12.5 cm. long handle (Macalister 1912: 294, Fig. 157: 5). The other mirror is of the same proportions, but smaller, and has grapes in relief on the back. It was found in grave 4 (Macalister 1912: 292, Figs. 145: 5, 155). The graves Macalister calls «Philistine» were rich in metals (bronze, silver and iron), alabaster vessels and scarabs, but apparently poor in ceramics, unless the ceramics, like those of Jatt, were of rather unimpressive type and quality and deemed unnecessary for publication. The date is, therefore, problematic, although the rectangular shape of the cists and the presence of iron knives, reported by Macalister (1912: 298), make the Iron IB Age date reasonable.

A comparable shape appears in Cyprus as well. Catling collected the ones known by the 1960's (1964: 225-

337). Other mirrors, such as one from the Tomb 104 at Palaeopaphos *Teratsoudhia* (Karageorghis 1990a: 65) and at Kition, where three mirrors were found in Tomb 9 (Karageorghis 1974: 90), have been published since that time. The Cypriote mirrors are dated from the LCIIC to the CGIA period, and are most widespread in the LCIII.

ZOOMORPHIC WEIGHTS

1. CALF/COW FORM WEIGHT

The bovine weights (J-84 and J-85, Fig. 2.12: 1, 2, Pl. 19: 1-2) appear in the Levant, Egypt and Cyprus. Examples are known from Megiddo (Guy and Engberg 1938: Pl. 128: 12-13), Tel Nami (Artzy: to be published), Sarepta (Anderson 1988: Plate 39: 12), Ugarit (Schaeffer 1939: Fig. 35; Weiss 1985: Fig. 127), Tell el Amarna (Peet and Wooley 1951: 109, 125, Pl. LXXVII: 1-2) and Cyprus, Tomb 19 in Maroni (Catling 1964: 251, Pl. 44: d, e), Kalavassos *Ayios Demitrios* (South *et al.* 1989: Fig. 25, Plate IX).

Technologically, the weights are quite similarly produced. All are fashioned as a bronze casing filled with lead, in order to achieve the required weight measure. In both of the Jatt bovine weights, the lead was removed or was never added, and only the casing remains.

Typologically, each one of these bovine figurines is individual. They differ mainly in the stance of the crouching cow/heifer, the position of its head, whether raised or lowered, the front legs, and the tail, which is shown either as a thickened area leading to the hind legs, or in relief, curled over the back. One weight, of Ugaritic provenance, has the weight measure incised on its back (Schaeffer 1939: Fig. 35). In a few cases an extra ring of bronze was placed around the neck of the figurine, such as in the case of a weights from Ugarit (Weiss 1985: Fig. 127) and Tel Nami (Artzy: to be published), possibly to attach the correct official weight to the object.

2. MONKEY SHAPED WEIGHT

The Jatt hoard squatting monkey weight (J-86, Fig. 2.12: 3, Pl. 19: 3) has its two elbows placed over its knees and its palms over its mouth. It is a male and depicted with an accentuated sexual organ. The cloth remains on its back and on one side suggest that the weight was deposited in a cloth, which was preserved at points where it came into contact with the bronze. Unlike the bovine weights, the lead is still extant, although the bottom of the object seems to indicate that it was cut or shaved, possibly to «fix» the weight to a certain standard.

Similar bronze weights were found both at Megiddo (Yadin 1970b: 78) and Ta'anach (Frick 2000: 116). Comparable examples of faience monkey shaped weights were found in Iron Age strata at Lachish (Tufnell 1953: Pl. 35: 31) and in Megiddo (Loud 1948: PL. 204: 62).

The monkey from Ta'anach, which looks more like a baboon, was found inside a cooking pot, and is placed in Ta'anach's Iron IB period, which is dated to the second part of the 12th century BCE (Frick 2000: 38; Rast 1978: 6, Fig. 91.1). The dating of the stratum in which the monkey was found has been questioned by Finkelstein The bronze monkey weight from Megiddo has one hand over his ear and the other holding a round object near his mouth. It was found, as was reported by its excavator, among other objects, hidden in a small cloth bag of which remnants were preserved. Yadin described the find and its stratigraphical position: «when we removed the level of ashes from stratum VIA with its pottery and all, on the threshold of the room and below the floor we encountered a woman's treasure…» (1970b: 78).

Yadin dated the treasure to stratum VIA, the 11th century BCE, feeling that the treasure was hidden under the threshold just before the conflagration that engulfed Megiddo VIA, a reasonable explanation given the position of the find. It is somehow surprising that of the three bronze monkey weights found so far in this general area, two have cloth remains on them.

Weights and their standards in the eastern Mediterranean have been studied, and the social implications of their appearance and are self-evident. Studies such as that of Pulak (2000) for the eastern Mediterranean and lately Galan and Ruiz-Galvez (2004), which attempt to connect the eastern and western Mediterranean both in the last of the Bronze Age and the Iron Age, should be mentioned. Unfortunately, two of the weights have had the lead removed and in the third one, the bottom was shaved, and thus it could not be incorporated into a growing and important study of weight standards.

CULTIC VESSELS

1. OFFERING STANDS/INCENSE BURNERS

Two different types of offering stands / incense burners were found in the hoard: the rod type and the tubular type. They will be described in that order.

a) Rod Offering Stands/Incense Burners

Jatt rod offering stands (J-60, J-61, Fig. 2.14: 2-3, Pl. 23) are of the same type and of nearly the same measurements, although they differ in workmanship and decoration (see catalogue). Both have a ring as base from which three legs in a pyramid design support a stem with a widening top to which a shallow bowl is attached by rivets.

We suspect that the stands were constructed from a number of rods, which were joined by soldering, brazing, or any other technique. If indeed this is the way they were assembled, the stands have a single rod as a base for each vessel, three rods for J-61 legs, six plain and three twisted rods for J-60 composite legs and one rod for each stem. The uniform cross-section of J-61 base and legs is probably the result of the use of the same type of rod for both.

Although the idea of the rod technique of manufacture was lately criticized in favor of the lost wax process (Papasavvas 2001, 2003), the term is used here in accordance with the common approach.

The Jatt specimens join a small number of offering stands which appeared mainly in the northern part of modern day Israel, as well as in Ugarit and in Cyprus. The earliest of those which have been dated are remains of several fragments from robbed graves in the 14th-13th century BCE «Persian Tombs» in Akko (Ben-Arieh and Edelstein 1977: 36, Figs. 4-7). Of safer contexts are the offering stands from the late 13th century BCE levels of Tel Nami (Artzy 1995: 28) and Ugarit (Schaeffer 1952: 65, Fig. 18). A late 13th century date is also suggested for some pieces of offering stand from the Cape Gelidonya shipwreck, being part of a cargo of scrap bronze pieces probably intended for re-cycling (Bass 1967: 108). The largest number of stands, however, was found in Megiddo. They were found in tomb 911AI (Guy and Engberg 1938: 189, Fig. 186: 4, Pl. 119: I; Catling 1964: 212), in Schumacher's trench (Schumacher 1908: 86, Figs. 117, 118 a, b, c, d; Catling 1964: 212-213, Pls. 37: d, e), and a bowl bearing three holes which was a part of an offering stand was found in locus 1739 by the Chicago excavation (Harrison 2004: Pl. 32: 6). A single stand that was found in Beth Shean, locus 1731 (James 1966: Fig. 102: 1), completes the finds on the mainland and is dated to the end of the 11th century BCE.

On the island of Cyprus, three similar specimens have so far come to light, one from a robbed grave in the area of Kouklia, the date of which is unknown (Catling 1964: 212, Pl. 36a), and two in Galiporni, the Karpas peninsula which were found in 2004. The dating of the Galiporni hoard is uncertain, although it does bear some resemblance to the hoard from Sinda (Karageorghis 1973: 78) and might be dated to the end of the 13th or early 12th century BCE.

Catling felt that the offering stands are of Near Eastern shapes. He accentuates the fact that at the time of his composition only one stand, that from Kouklia, had been found in Cyprus, and none in the Aegean. Therefore, the only reason for including this offering stand in his 1964 study of Cypriot bronze items was the similarity of its technique of manufacture and decoration to the technique used for the Cypriot rod stands. The Kouklia stand was excluded from Catling's later publication (1984). The new discovery of the hoard at Galiporni, Cyprus may call for a revised view.

Only one of the Megiddo offering stands, the one from tomb 911A1, is to be dated to the 13th century BCE. The rest should be assigned to stratum VIA, or the 11th century BCE as has been suggested by Negbi (1974: 166-167; Negbi 1991: 221) and Kempinski (1989: 136), in spite of Gershuny's attempt to re-date the specimens from Schumacher's trench to Stratum VIB (Gershuny 1985: 41-42). Negbi's view (1991: 222) that some of the items from Locus 1739 might be heirlooms is difficult to accept, especially since Negbi herself points out that the finds from locus 1739, assigned to stratum VIA, as well as those from Schumacher's trench, originate in the same workshop (1991: 224). In any case, it is hard to imagine that all of the items found there could be attributed to heirlooms.

Examples of metal offering stands are shown in Egyptian iconography in which «foreigners» are seen using them. The more common depiction is that of a besieged «Canaanite» city, a scene already appearing several times in the 13th century BCE, the time of Ramses II (Spalinger 1978; Artzy 1990: 48-51). The offering stands can be compared to some chalices carried as cultic objects aboard ships, already in 13th century contexts (Yoselevich 2005). Merchants on the boats depicted at Kenamon's grave in Egypt, dated to the 14th century BCE, use an offering stand upon safe arrival to shore (Daressy 1895: 286-292; Davis and Faulkner 1947: 40-46). It is unlikely that these offering stands are of Egyptian provenance, either culturally or technologically. The coast of Syria, Lebanon and the northern modern Israel are the likely candidates for the offering stands' production centers, although Cyprus should not be excluded.

Although statistically we are dealing with a small number of objects of this type, it should be noted that the earlier pieces, namely those dating to the end of the 13th or very early 12th century BCE, such as those from Nami and Ugarit, are different from those attributed to the 11th century BCE. The attention to detail in the earlier examples far surpasses that of the later ones, such as those from Megiddo and Jatt.

b) Tubular Offering Stand/Incense Burner

The tubular offering stand/incense burner (J-44, Fig. 2.14: 1, Pl. 22) was used in a similar manner to the rod offering stands presented above, although the manufacture technique is different. This tubular stand is produced from a single, folded bronze sheet forming an elongated tube-like, slightly conical stem. Its base was not preserved but is assumed to have had a trumpet base consisting of the same bronze sheet as that from which the stem was produced. The bowl was attached to the stem by rivets, much like in the rod stands.

Tubular stands are even less common than the rod stands. The stand found in the 14th century BCE cemetery in the «Persian Gardens» in Akko is the only one known from the southern Levant. Unfortunately, it was found out of context (Ben-Arieh and Edelstein 1977/1981: 36). The Akko stand is incomplete, but its profile, including the bowl, the preserved part of the stem and the rivets between the two, are enough to ascertain that it is parallel in form to the Jatt stand. A slightly different kind of a hollow offering stand was found at Palaepaphos-*Teratsoudhia*, tomb 104, Chamber N in Cyprus (Karageorghis 1990a: 64). The stem in this case consisted of tubular pieces inserted one into the other to form the stem. Unlike the Jatt stem, the Palaepaphos-*Teratsoudhia* one bears intermittent decorations of rings (Karageorghis 1990a: Fig. LV, Plate XXV), which we assume were added in the casting of the object. Karageorghis dates the material of chamber N in grave 104 to the earliest part of the LCIIIA period. If this specimen was produced by casting, which it seems to have been, yet another difference between it and the Jatt tubular offering stand is added. A complete tubular offering stand/incense burner was found in the *pithos* hoard in Galiporni in the Karpas region of Cyprus (personal communication).

The tubular stand/incense burner is very similar in form to the ceramic incense burners or chalices, many of which were already found in coastal areas in the LBII. In several cases, such as the anchorage of Tell abu Hawam, in modern Israel, they were shown by means of thin section petrography to have originated in the Syro-Lebanese coast and Cyprus, transported via the sea (Yoselevich 2005). Yoselevich further shows that the custom of using ceramic incense stands on board ships, as seen in the Kenamon scene, continued into the Iron II period on Phoenician ships, as found on the wreck Elissa dated to the 8th Century BCE (Stager 2003: 233-247).

The production method of the tubular rod stand is simpler than that of the rod stands. Hence, one would assume that they were more common. However, the facts based on the finds show a different picture. The flimsy nature of the sheet metal stem might have made this type of stand less desirable. In addition, its being less appealing to the patrons may have encouraged quicker recycling.

2. ROD TRIPOD

One small rod tripod was found in the Jatt hoard (J-62, Fig. 2.13, Pls. 20-21). In its measurements it belongs to Catling's small sized tripods category and in its shape to Catling's group AII (Catling 1964: 193-195, Pl. 29: a). It is similar in size and shape to a rod tripod excavated in Tomb 39 in the Necropolis of Kaloriziki and dated to the CGIA period (Benson 1973: 49). However, the two differ in the *protomes*, which appear on the Jatt specimen but not on the vessel from Kaloriziki. Protomes appear on another Kaloriziki tripod, this time from Tomb 40 and from Catling's group AII (Catling 1964: 194, Pl. 28: c, d, e). However, these protomes appear at mid-leg while in Jatt they appear at the top of the legs, just below the ring. The tripod from Kaloriziki's tomb 40 was dated to the Early CG (CGIA) period (Catling 1964: 195) or LCIIIB (Benson 1973: 50). Buitron-Oliver (1999: 70-73) discusses tombs 39 and 40 and their possible dating. She points to the fact that Tomb 40 contains a homogenous group of Proto White Painted ware, as well as an imported Phoenician lenticular flask (Bikai 1987a: 61) and that finds from the robbed Tomb 39 also include Proto-White Painted Ware ceramics. These ceramics date the graves to the transition of LCIIIB to the earliest part of the CGI period.

Tripods were probably intended to serve as bases for open forms, such as bowls or a *laver* with a sunken base or, in the case of the large stand from Kouklia-Evreti, tomb XIV, a large krater. The Jatt tripod was found with a bowl firmly attached to its ring by metal strings and it looks as if it was overhauled for a second lifespan as an incense stand when it was deposited in the hoard, equating it to the incense stands discussed above. Because of the change

made on the rod stand, an earlier date of production could be suggested, although, as seen above, similar rod tripods appear in 11th century BCE contexts in Cyprus. Rod tripods appear in earlier contexts, dating to the end of the 13th LCIIC, in Cyprus, as Papasavvas has shown (2003: 23). At Tel Nami on the coast of modern Israel, two pieces of rod tridents ready for recycling were found in late 13th early 12th century BCE (Artzy 2000: 27, Pl. 1: 13-14), and similar pieces were found on the Cape Gelidonya shipwreck which is dated to a similar period (Bass 1967: Fig. 119).

The mode of production of tripods has been previously discussed in the literature although without reaching conclusions that are acceptable to all. Catling felt that the rod tripods were produced by first casting their parts and then attaching the different parts together by means of hard soldering (brazing), which as he sees it, is an easier method than the laborious process of casting (Catling 1964: 191). Later he said «The critical element in all this was the mastery of the technique of joining several pieces of metal to one another, without the use of rivets, to make up a complex whole object from any number of simple components». He further states that this technique of brazing or hard soldering allowed composite objects to be made, an achievement that could not have been reached using any other method (Catling 1984: 72). Catling's conclusions were seconded by Matthäus, although he felt that more scientific work should be carried out (1985: 303). In a monumental work on the various stands, especially in Cyprus and Crete, Papasavvas came to another conclusion altogether (2001, the view was repeated in Papasavvas 2003). He argues that the stands were produced *in toto* in the lost wax technique and shows that it would be the easier method of manufacture. Papasavvas demonstrates, part by part, that there are no metallurgical joints showing any signs of hard brazing or other manner of attachment. Recent work by Schorsch and Hendrix using X-Ray Radiography and other analytical methods (2003) reached similar conclusions as those of Papasavvas. MacNamara and Meeks, who tested stands from the British Museum a few years ago, seem to question Catling's assumption as well (1987: 57-60).

The Jatt stand adds new information to the technological discussion. Unlike the rod stand presented by Schorsch and Hendrix, the Jatt rod stand seems not to have been produced *in toto* (see appendix a). In addition, the way in which the bowl was attached to the ring of the tripod for its secondary use is of some importance to our knowledge about the development of metal production. The ancient smith seems to have rolled a narrow bronze sheet around organic material, which produced bronze wire possessing the necessary elasticity to be handled and wrapped around. It was obviously strong enough to last until the present. These wires passed below the tripod ring, up through a hole punctured by the smith in the bowl, and then down through another hole, below the ring, to form a 360-degree loop. In the X-Ray Micro focus radiography done (Figure 6.11), the empty inner part of the string, where the organic material was once placed, is clearly seen. Another interesting element which can be seen is that of how the two edges of the string were connected to one another. The sheet bronze is open and the two edges are connected (Fig. 6. 11).

Catling felt that all rod tripods known to him were products of Cypriote workshops of the 13th-12th centuries BCE (1984: 72, 88). He further stated that even ones found in Greece and Crete, whose date is usually assigned to the 10th-8th centuries BCE, were manufactured in Cyprus at the earlier period and kept for hundred of years as heirlooms, only to be deposited in graves at a much later period. Matthäus (1988: 287), as Schorsch and Hendrix (2003: 55), feel that the Cypriote stands «served as inspirations» to productions elsewhere.

While there seems to be no reason to doubt the appearance of the rod tripods already in the 13th century BCE, both in Cyprus and in the Levant, as we have shown above, there seems to be no question that a substantial group of these rod tripods can be dated at least to the end of the LCIIIB and early CGI period. The most natural explanation would be Catling's, that the rod tripod stands were produced in an early period and placed in the later graves. However, an even more likely explanation would be that while an early production took place, possibly a trickle of production continued following the «crisis years», and the smiths, still having the expertise, continued producing rod tripods well into the 11th century, at which point the technological expertise was improved and used to produce tripods similar to those of the 13th century BCE. The possible cultic importance of these stands can best be seen in the 11th century production of clay examples of the tripods found in Cyprus in, among other places, the Palaepaphos area in Tomb 132 (Flourentzos 1997: 213, Plate XLII), especially in the Palaepaphos *Skales* necropolis (Karageorghis 1983: Figs. LX, LXXII, LXXXVI, CXXX) and at Kition (Georgiou 2003: 154) dated from the CGIA to CGII periods. A few examples were also found in the southern Levant, among them several at Tell Dothan which were seen by the author years ago in the basement of the St. George church in Jerusalem.

II. CERAMICS

Only eleven ceramic objects are extant from the Jatt hoard: 3 bowls, 1 large bowl/krater, 2 jugs, 2 juglets, 2 pilgrim-flasks and an oil lamp (Figs. 2.15, 16: 1-3, Pls. 24, 25: 1-4, 26). The ware type of all the objects, except of the

decorated pilgrim flask, seems to have a similar provenance. The ware includes very similar grits,, although in a variety of sizes. These, in some cases, are very unevenly distributed. In some cases there are holes above the large grits caused during the firing of the object. The clay was mixed with some organic material as well, and signs of the empty areas remaining after the firing can clearly be discerned.

Parallels to the ceramic objects were located in sites situated, much like Jatt, on main routes leading from east to west, from the Mediterranean to the Jordan River and beyond. Among the sites are, Beth Shean, Megiddo, Yoqne'am, Tel Zeror and Teibe, which is situated on Wadi 'Ara (modern Nahal 'Iron). The dating of these parallels is usually from the end of the 12th century and especially the second part of the 11th century BCE. This is true of the bowls, the krater, the jugs, the red slipped spouted strainer jug (beer jug), and the oil lamp.

Similar bowls were found in, among other places, the Beth Shean cemetery, in Tombs 66A-C and 90 (Oren 1973: Figs. 42a: 7 and 44a: 2), and in Ta'anach (Rast 1978: Fig. 8: 2). The handle-less krater, J-5, is similar to type KIA at Yoqne'am (Ben-Tor, Zarzecki-Peleg and Cohn-Anidjar 2005: 263-264) and possibly of a type found at Tell es-Sa'idiyeh (Tubb 1988b: Fig. 20: 6); however better parallels are from Megiddo VIA (Harrison 2004: Pl. 5: 13-15). The red burnished spouted strainer jug with its broken long spout has a counterpart at Tel Zeror (Ohata 1967: Pl. X: 8). A discussion on the origin of the shape and the various shapes and decoration appears in Mazar (1985: 64-67) and will not be repeated here. Of the two juglets, many comparable juglets to one, J-7, have been found in the area, the best of which is from Teibe (Yannai 2000: Fig. 7: 5); a juglet comparable to J-6 came from Cist Grave VI at Tel Zeror where other ceramics such as a lamp and a flask similar to the ones from Jatt were found (Ohata 1970: Pl. LX: 1). The pilgrim flasks have parallels in the graves at Beth Shean (Oren 1973: Figs. 41: 4-5, 44b: 26, 41: 3), as well as at Megiddo Stratum VIA (Harrison 2004: Pl. 3) and Tell Keisan 9c (Breind and Humbert 1980: Pl. 76). The decorated flask (Pl. 25: 3) finds good comparables among the flasks from Tell Qasile Stratum X (Mazar 1985: Fig. 37) and Megiddo Stratum VIA (Harrison 2004: Pls. 3 and 18). Of special interest is the oil lamp, J-1, a type absent in most of the sites along the Jezreel Valley and the Jordan River. Comparable lamps were found in Tel Zeror (Ohata 1967: Pl. X: 9, especially 10; Ohata 1970: Pl. LX: 4; Kochavi 1968: 128-130), at Baqa el Gharbiya (Badhi 2000: Fig. 2: 9) and in grave 6 at Teibe (Yannai 2002: Fig. 9: 11, 12). Yannai had, in the past, noted the fact that these types of oil lamps, in which the wick hole was closed, were regional variations of the northern Sharon area (Yannai 1995: 278-281). While the idea of production concerning the «closed wick hole» lamps repeats itself, the technique used to achieve the form differs. There are lamps in which the lips were plainly pinched together and others where extra clay was added to ensure the closure. Another difference has to do with the energy expended by the potter to achieve the final product. The oil lamp from Jatt is well produced, while the potters who produced those found in Teibe and Baqa el-Gharbiya seemed not to care about the aesthetics of the final product.

While there are signs of modern attempts to clean some of the ceramics with an abrasive rag or tool, most of them retain various degrees of remains from the environment in which the vessels were deposited. These remnants, i.e., calcium carbonate encrustation, water wear and traces of oxidized bronze, strengthens our belief that the vessels were part of a hoard deposited in a cave. Calcium and stagnant water encrustation were noticed, for example, inside the large bowl/krater J-5. From the outline of the encrustation it is evidence that a small bowl was once placed inside the krater (Pl. 26: 5). Another example of water wear and evidence of the wet environment is the base of bowl J-3, which started to disintegrate (Pl. 26: 1). Blue-green remnants of the oxidized bronze vessels, seen, for example, on J-8, J-3 and J-9, are signs that the ceramics were placed among the metal objects (Pl. 26: 1, 3). Burial in caves was a common practice in Jatt at the end of the LB and early Iron Ages (Yannai 2005), and given the wealth of the finds, a burial context for the hoard is a likely assumption. Considering the assemblage, it seems that the date of the deposition of the ceramics was in the last part of the 11th century.

III. IVORY PYXIS

A small ivory pyxis was found in the hoard, the lid which is not extant (J-91, Fig. 2.16: 4, Pl. 25: 5). Comparable bowls, dated to the LB period were found in Megiddo (Loud 1948: Pl. 200: 2), Lachish Fosse Temple (Tufnell 1953: Pl. XX: 30), Tel Dan (Biran and Ben-Dov 2002: Fig. 2.103), Tell es-Sa'diyeh (Pritchard 1968: 106, Fig. 2: 8), as well as in Ugarit (Schaeffer 1939: Pl. VIII: 2) and Kition Tomb 9 (Peltenberg 1974: 110, Pls. 88: 230, 163: 230). A similar bowl was found in Level X Tell Qasile, and therefore dated to the 11th century BCE, later than the previous parallels (Mazar 1985: Fig.3: 2), The dating of a Gezer parallel might also be later than the LB, although it is hard to judge (Macalister 1912: Vol. II: 342, Fig. 462).

CHAPTER IV: DISCUSSION

INTRODUCTION

The dating of a metal hoard is complicated, due not only to the dearth of parallels, but also to the slow rate of change of technological traditions, and to the intrinsic value of the objects and the metal, which may have led to continuous use over a long period. Heirlooms are not unusual, and hoarding of metal as accumulated wealth is to be expected. In the discussion of the context of the finds in the previous chapter, dates ascribed by various scholars to comparable objects were quoted. Dating and chronologies are undergoing constant adjustments, and some of the dates presented in the second chapter have been challenged. That the ceramics and the metal hoard were found together has been established without doubt. The exact location of the cave on the site of the modern village of Jatt is also known. What are not known are the dates of production and deposition of the individual objects in the hoard and the purpose of their deposition. It has not been possible to establish that the hoard was placed in a grave; although there are some rumors that bones were found in the cave as well; by the time the objects were noticed, none were to be seen. Complete painted «Phoenician» ceramics were shown to an archaeologist as having originated in the cave, and were dispersed afterwards. Since the present inhabitants of the area blocked the cave with cement, it is no longer possible to conduct a search for such remains.

In this chapter, an effort is made to consolidate the data of the general survey of the parallels of the metal objects from the hoard and propose a possible chronological and geographical context for them. The majority of the objects can be dated between the 13th century (probably the later part of it) and the end of the 11th century or possibly a bit later. The greater number can safely be dated to the 11th century, although some show clear typological relationships to counterparts dated to the end of the 13th or early 12th centuries BCE. The situation at the northern sites, including northern Sharon, the Carmel and western Galilee coasts, is quite different from that of those in the south. Most of the northern settlements do not show signs of destruction during the «Crisis Years» at the end of the 13th century, but, while they continued to function, they show signs of rejuvenation only in the 11th century BCE. Their status in the mid 12th century (immediately preceding Ramses VI and the withdrawal of the Egyptians) and the following decades is quite unknown. There was a different state of affairs at the sites in the south. There, in the area known as Philistia, a robust Iron I follows Late Bronze IIb, most notably at Ashdod and Ekron. Tell Qasile, situated on the northern bank of the Yarqon River, and geographically not part of «Philistia», was first settled in the 12th century BCE, according to its excavators. While the Philistine nature of its two early strata, XII and XI, is clear, Stratum X seems to see the addition of a very compelling «Phoenician» element, if not in the cultic area C at least in the dwelling area A. The finds from area C bear similarities to those from the northern sites, such as Megiddo VIa, Dor and sites around the Akko bay, in the 11th century. At these sites, painted wares, sometimes attributed to a plethora of «Mycenaean» sub-groups (IIIb if the paint is reddish, and IIIC if it is brown to black are often associated with groups of «Sea Peoples» other than the Philistines). However, the limited numbers of these pieces exacerbates the hopelessly vague nature of their classification, not to mention their chronology. In Philistia, the Myc.

IIIC1b and Philistine wares are better defined and so cause less confusion. This is not the place to deal with the problems associated with the chronologies of the northern sites and their relationships to those of Philistia. It is enough to point out that ambiguities exist, especially in the second half of the 12th and in the early 11th centuries BCE.

In the northern area of modern Israel several groups of metal hoards originate in contexts, which provide reasonable stratigraphical and chronological associations. One is from Tel Nami and several from Megiddo. The dating of the Tel Nami hoard is necessarily achieved through a comparison of the bronzes with those from Ras Shamra-Ugarit, and by a comparison of the ceramics with local wares as well as with imports, mainly from Cyprus (Artzy 1994; 1997; 1998; 2005; Artzy and Stidsing to be published). Like Ugarit, Tel Nami was destroyed in the first quarter of the 12th century BCE, according to comparative ceramic studies, and thereafter abandoned. The period associated with the appearance of the metal hoard at Nami coincides with one of active trade in which ceramics found their way to the site, as containers, table-ware, or «sailors' trade». The trade encompassed the eastern Mediterranean as a whole, including the Aegean, western Anatolia, the Syro-Lebanese coast, Egypt, and especially Cyprus.

At Megiddo the dating of bronzes is more complicated. Bronzes were found in levels associated both with the end of the 13th and the first part of the 12th centuries, preceding the Egyptian withdrawal in ca. 1130, and with the 11th-early 10th centuries BCE. Many bronzes have been found during the various excavation projects at Megiddo, most, if not all, of them originating in Stratum VIa and dated to the later part of Iron Ib. Stratum VIa has had an unusual history insofar as it has retained its relative «integrity» *vis-à-vis* the heated disagreements over strata and chronology that have abounded when the results from different projects at Megiddo have been discussed in the past. This is probably attributable to the special nature of its construction, which left a thick destruction layer.

When comparing the bronze objects from Jatt to those from other sites, one has to remember that bronze is worth recycling, and that thus not many parallels remain extant. Quite a few of the Jatt bronzes have parallels in Megiddo VIa, as noted in chapter II. The same is true of the ceramics. However, some of the bronze objects have earlier counterparts, and there are objects for which no comparanda were found or for which the parallels came from earlier contexts, such as the trident or the tubular offering stand. Some of the ceramics represent the continuation of earlier traditions, although the majority are clearly products of the Iron Ib local tradition, dated to the 11th century BCE, especially its second part. These are contemporary with the «Phoenician Bichrome ware», which is found at sites along the coast and in their economic hinterland. The «Phoenician», or Phoenician style, ceramics were found in association with ceramics from Cyprus, Greece and even Egypt, and are a useful tool for our study, especially since sites on the Phoenician coast seem, from the sparse data we possess, to have had contacts with all these areas.

Lead isotope analyses carried out on some of the objects from the Jatt hoard point mostly to the source of the copper as the Feinan region in modern Jordan (see Stos-Gale appendix b). Renewed survey and excavation projects have unearthed a vibrant copper production industry there, dating to the 11th century BCE (Levy *et al*. 2002), as have earlier excavations by Fritz (1994).

While no exact parallels for all the members of the collection of varied types of bronzes from Jatt have been found, there are some elements which might help us to identify the affiliations of the hoard. Some of the larger bronze bowls are reminiscent of the types we associate with Cyprus, while the smaller ones tend to be of a type rarely found there. There are not many bronze juglets, as found in Cyprus. The cultic incense burners are definitely a shape more prevalent in the Levant, while the rod tripod seems best placed in Cyprus, despite some of its more mystifying features. Only a few tridents were found, and those are from Ugarit, Akko, and Hala Sultan Tekke in Cyprus. These serve as a reminder of the element of chance, invariably associated with archeological finds, especially metal. Sites, such as Ugarit and Nami, which formed part of the manufacturing «*koine*» of the Levant alongside Cyprus at the end of the 13th and in the early 12th centuries BCE, have been excavated. Evidence from the Syro-Lebanese coast, where a revival of the «*koine*» subsequently took place in the 11th century, is totally missing, and we are forced to rely on the data from more peripheral sites, such as Achziv and Megiddo. Some 11th century sites on Cyprus have been excavated, and finds from others have been reported.

The «ethnic» compositions of populations in the general area, and the appearance (or absence, for that matter) of ceramics attributed to the particular elements identified with them by archaeologists – whether Israelites, Canaanites, Philistines, Midianites or Edomites – is an endlessly disputed topic, and the dangers associated with these «ethnic» identifications are also well known, if not always heeded. Finkelstein envisioned a «New Canaan» in which he placed Megiddo VI, as well as Tel Kinrot, Tel Rehov, and Tel Dor and possibly Tell Keisan on the coast. He felt that Kinrot replaced Late Bronze Hazor as the center of the upper Jordan Valley. Similarly, he suggested that Tel Rehov replaced Beth Shean, Keisan replaced Akko and that Dor could have replaced Late Bronze Gath, as the «main center in this region», although he qualifies this latter conjecture by adding: «…but the Iron Age finds from

Gath are too scant to allow us to draw firm conclusions». (Finkelstein 2003: 78). A «New Canaan», especially in the northern valleys and northern Sharon, would seem to have included the northern coastal Canaanites in a new guise, that of the Phoenicians, whose presence, as a part of the revival of the northern part of Israel in Iron I, has to be acknowledged.

Bronze objects have not been found at all the sites and in all the regions discussed in this chapter, but those that have been found all have some bearing on the Jatt objects, either chronologically or typologically. The discussions of sites in the following sections include the history of research as well as comments relevant to this study and their implications.

MEGIDDO

Excavations at Megiddo have taken place intermittently over the last hundred years. The first major excavation was by Schumacher, who published his results in 1908, followed by the excavations of the Oriental Institute in the 1930s, an excavation by Yadin in the 1960s and, in the last decade, an excavation by the University of Tel Aviv, directed by Finkelstein, Ussishkin and Halpern (Finkelstein *et al.* 2000). Metal objects from both the end of the Late Bronze Age (13th early 12th centuries BCE) and Iron Ib (11th and early 10th centuries BCE) have been found there.

Belonging to the earlier period is an incense burner excavated in grave 911A and dated to Late Bronze II (Guy and Engberg 1938: Fig. 186; May 1935: 19, Plate XVII). According to the excavators, the grave contained burials from three distinct periods: MBI, MB II and LBII. Along with the bronze objects, which included the bronze incense stand, bowls and a *situla* from grave 911 (Guy and Engberg 1938: Plate 119), there was a White Slip II bowl (Guy and Engberg 1938: Plate 30, 3). This particular White Slip II bowl is similar to White Slip bowls found at Tel Nami in contexts similar to those in which the Nami bronzes were found (Artzy 1995: 28) and dated to the transition between the 13th and the 12th centuries BCE.

Bronzes ascribed to the later period had already been found by Schumacher, who noted a metal hoard consisting of five incense stands and metal tools, including one knife (Schumacher 1908: 84-86). He assigned these to his fourth level, the level now accepted as Megiddo VIa. This group of bronzes consists of, among other things, incense stands with three or four legs rising from a ring. One has a caryatid holding a flute; another has three birds, possibly doves, where the legs meet the stem holding the bronze bowl. Schumacher wrote that the level from which these came was constructed of mud-brick and wood, forming a thick destruction layer. This context is generally accepted by other scholars and appears in later studies, such as those by Davies (1986: 72), Ussishkin (1992: 673) and Halpern (2000: 553). Another hoard was found at Locus 1739, excavated by the University of Chicago expedition. It was already dated then to Level VI (Loud 1948: Plates 189-190). The hoard was found in Area CC (Loud 1948: Fig. 410) and could not be associated with any architectural remains. In his brief description of the find spot, Loud (1948: 113) observes laconically that below Level VIa they found no signs of Level VIb and assigned Locus 1739, which was located in close proximity to Schumacher's hoard, to their level VIa. A more detailed description of the area in which the bronze hoard was found could be expected. The reason for Loud's laconicism, as Harrison points out, may have something to do with the fact that Guy, who had excavated the area and «successfully isolated Stratum VIa, culturally and stratigraphically, was dismissed from the staff of the Chicago team» (Harrison 2004: 19). The hoard includes, among other things, tools, bronze bowls (at least one with handles), a strainer, jugs, a bowl with three holes in it, part of an incense burner (which did not survive), an axe head, and spearheads. The hoard also contained a ceramic jug with a strainer spout.

Yet another hoard of bronze objects was found in 1969 by the expedition of the Hebrew University. This hoard was also associated with Level VIa, which Yadin, its excavator, assigned to the end of the 11th century BCE (Yadin 1970: 93; Yadin, Shiloh and Eitan 1972: 163). According to the excavators, the hoard, which was covered with cloth and pieces of ceramics, contained ivory objects, hundreds of beads, semi-precious stones, two bronze pomegranates which might have originated from a bronze four- or three-legged stand, and two zoomorphic weights, one in the form of a reclining horned quadruped and the other in the form of a sitting monkey.

Features of stratum VIa at Megiddo, in which the three hoards (Schumacher's, the Chicago, and Yadin's) were found, are worth addressing because of their special nature. The unusual elements of this stratum are important to this study since, as stated above, a good number of the Jatt bronzes and ceramics can be related to it.

Halpern best summarizes the nature of the stratum: «Schumacher also reports, and subsequent excavations have confirmed, a heavy association of thick timbers with the destruction layer of Stratum VIa. As the mound as a whole seems to have been covered with mud-brick construction, the concentration of timbers … must be unders-

tood as a construction element, as beams and joists for second stories….The choice of construction elements again reflects both a spreading of wealth and a decrease in display, relative to the preceding strata. Yet the techniques adopted were not splash-dash. The width of the wood beams is substantial. The mud-bricks are regular and large. Like the timbers, the material for the bricks of which the entire town was made was likely hauled up onto the site from a nearby stream-bed, a highly laborious undertaking when the stone including among other things the huge basalt blocks of the LB palaces and northern gate lay to hand» (Halpern 2000: 553-554). Halpern's explanation of the special construction is that Megiddo VI lacks the signs of an overbearing elite, and has no great public works, no palaces or temple compounds. «The choice of mud-brick as an idiom of construction may represent a rejection of the palace architecture of the LB. Stratum VI appears to reflect in sum a social prejudice against display. It in effect conceals its wealth in pedestrian forms of storage in distribution throughout the site» (Halpern 2000: 554).

Harrison (2004: 105-107) emphasizes the nature of the construction of the stratum, especially building 2072, which is not a continuation from stratum VIIa. The building and its thick walls are constructed of mud-brick on semi-hewn stones. The remains of wooden beams and pillars seems to be a common occurrence, to such an extent that Harrison suggests that in area CC, where the «…widespread presence of wood, particularly rows of wooden posts used as roof supports…» (Harrison 2004: 106) may indicate a feature reminiscent of the pillared houses found in Iron I highland settlements. Yet, following Wolff (1998: 450-52, Figures 1-2), he also notes the similarities of building 2072 to a building at 'En Hagit. He goes on to compare it also to a cluster of buildings in Tell Keisan Stratum 9a-c (Briend and Humbert 1980: 197-206; figs. 51-52, 54), the «Oil Maker's House» (structure 3035) in Yoqne'am Stratum XVII (Ben Tor *et al*. 2005: 19, 22-27), and possibly a number of buildings in area D, Stratum VIII at Tel Qiri (Ben Tor and Portugali 1987: 80-86). He also compares it with building 350 at Miqne/Ekron (T. Dothan 1998: 155-159), the only «southern» example of this type of building.

The question as to who were the people in Megiddo Strata VIb and VIa, and what were their cultural backgrounds, has often been discussed, especially by the excavators of Megiddo and by archaeologists/historians and theologians interested in the Biblical narrative. Albright (1936: 26-31; 1937: 22-27) suggested Israelites. Halpern, following a suggestion of Esse (1992: 96-102), points to the large numbers of Collared Rim Jars found in Area CC, which might indicate trade and intermarriage with the hill population to the south (Halpern 2000: 553-554). Megiddo VI also has pillared houses, which Halpern sees as evidence of contact with the hills, despite the fact that the pillars are of timber. Finkelstein, who is one of the directors of the current Megiddo excavations, believes that Megiddo VIa was a Canaanite city, as Engberg had argued in the past (Finkelstein 2003: 77). He assumes that the inhabitants came from nearby villages, which gradually recovered from the blow that shook the centers of power in the area. He calls this renewed settlement part of «New Canaan», to which he adds some other sites such as Tel Kinrot, Tel Rehov, Tel Dor and possibly Tell Keisan. Reasons for the new-found prosperity, Finkelstein notes, have to do with the stability of the rural sector and the vibrant trade with Phoenicia and Cyprus and beyond (Finkelstein 2003: 78). He also notes that the subsequent city of Megiddo is totally different (Finkelstein 2003: 76). Kempinski, who noted the wooden pillars as a particular characteristic of the buildings in Stratum VI and regarded the Philistines as the impetus behind the mud-brick construction, ascribed the method of using mud-bricks and wood to a probable European tradition (Kempinski 1989: 82-83, 126; 1992). Halpern's view as to who the settlers were adopts a wise stance: «Whatever the time of the layer, it involves a heavy economic mix of Philistines and coastal Egyptianized and local products. Stratum VI at Megiddo, neither Sea-Peoples nor Israelite, nor any longer classically LB Canaanite, is a *unicum*» (Halpern 2000: 555).

The analyses of Stratum VI should be looked at with new data in mind. The arguments seem to center on the appearance of the Collared Rim jars (Esse 1992), Philistine ware, and the use of pillars in construction. Finkelstein also adds the similarity in size to the city of VIIa and the similar area of Megiddo, which they occupied. The upper tell and the lower terrace, the position of the palace in the north near the gate, ceramic continuity and continuity in bronze objects, and similar courtyard houses as shown in area K all reveal continuities between the two strata. The ceramics of the Migdal temple indicate that it continued to function until the destruction of the stratum (Finkelstein 2003: 76). It has already been shown that Collared Rim jars appear to have little bearing on ethnic elements and already appear in coastal contexts at the end of the Late Bronze Age (Artzy 1994). As for the Philistines, I need only reiterate Mazar's observation that Megiddo has produced only a small amount of Philistine pottery (Mazar 2002: 273). Mazar further pointed out that other painted vessels at Megiddo, which T. Dothan (1982: 79-80) had assigned to one of her categories of Philistine ware, belong to the wider tradition of painted wares in the northern valleys and coastal areas and thus should probably not be discussed in relation to Philistine wares (Mazar 2002: 274). With reference to Finkelstein's emphasis on the similarities between the two strata, the completely different method of building seen in Stratum VI, using mud-brick as opposed to stone, cannot be ignored. On the contrary, it deserves

to be emphasized, since the techniques are so very different. Master stonemasons and builders had to be exchanged for their mud-brick counterparts. The changes in construction techniques are not limited to the mud-brick structures, which were prevalent in Megiddo VI. The prevalence of timbers alongside the large bricks, observed by Schumacher as well as by Halpern and Kempinski, have to be considered as a very special element in the town's construction. In his study of Megiddo, Kempinski attempted to address this issue. Since he attributed building 2072 in Stratum VIA to the Philistines, he looked for the source of the tradition in Europe. Halpern also perceived the importance of the alteration in construction methodologies, with stones used in stratum VII and mud-brick in stratum VI, despite (as he pointed out) the plentiful supply of stones. However, his explanation for the change seems rather flimsy.

This change in building technology is indeed important. Kempinski's observation that it was the result of some external impetus is right. However, his attempt to attribute it to Philistine connections is problematic at best. We would like to propose that, while the local population might have continued to be a mixture (as Halpern has suggested) or local Canaanites (as Finkelstein has posited), the impetus for revival came from the northern coastal Canaanites/Phoenicians for whom building in mud-brick with the use of structural timbers was a common practice.

Contact between Megiddo and the Phoenician coast in the 12th and 11th centuries BCE could have been achieved via two routes: the maritime route via Dor, or the northern overland route from Kamid el-Loz (Kumidi of the Amarna letters), with its links south-westward to Sidon. It is no surprise to find that the Late Bronze II temple at Kamid el-Loz is constructed of mud-bricks and timbers (Hachmann 1983: 34; Metzger 1991).

There is a symbiotic relationship between Dor and Megiddo in this period, due to the special nature of the former as an anchorage/harbor and of the latter as an agricultural centre and route node. As a result of this, northern coastal Canaanite/Phoenician contacts should be seriously considered. Megiddo was connected to the sea probably not, as some believe, via Wadi Milh, or, as Lernau suggests in his analysis of the fish found at Megiddo, via Wadi 'Ara/Nahal Iron (Lernau 2000:475). The long, 50 km route suggested by him is a road used by motor vehicles today. A route via the Carmel Ridge, very similar to one suggested in the case of Late Bronze connections between Megiddo and Nami on the coast, which was passable by men and beasts, should be considered here as well (Artzy 1998).

Finkelstein's idea of the local Canaanite inhabitants returning to the site from the villages in what he calls «New Canaan» may have much to recommend it. However, there was more to it, as he himself indicates: in particular, the vibrant trade with Phoenicia and Cyprus at various sites, mostly in the north; or the fact that these are situated on routes connecting east with west, rather than north with south. Halpern has observed that Megiddo VI was quintessentially a mercantile settlement, and has suggested that it acted as a principal intermediary between small and relatively closed theaters of trade in the area, participating in the exchange of such goods as «imitation imports», lowland cereals and imported fish for local products such as olive(?) oil and wine (for which the numerous *pithoi* in areas CC, F, K and in front of the tell were perhaps intended). We feel that it participated not only in such local interregional trade, but also in a much wider international, overland and maritime, trading network, and that it was an important element in a renewed and growing trade involving east to west («desert to sea») routes via the interior valleys (a distance of usually no more than 100 kms) and articulating with maritime eastern Mediterranean trade. Northern coastal Canaanites/Phoenicians and Cypriots participated actively in this network, and we thus suggest that Phoenician trading activities and economic imperialism provided much of the impetus behind Finkelstein's «New Canaan». In particular, it is likely that northern coastal Canaanites/Phoenicians, along with other «ethnic» elements (including local Canaanites), were responsible for the changes which distinguish Megiddo VIa and which themselves seem to have occurred against a background of more general cultural continuity over the passage of time which separates it from the Late Bronze Age.

TEL DOR

In 1924-29 two seasons of excavations were carried out at Dor under the auspices of the British School of Archaeology in Jerusalem headed by J. Garstang (Stern 1995: 4-6). Subsequent excavations were carried out on the site, but none in levels associated with the Bronze or Iron Ages. Since the 1980s, excavations have been led by E. Stern and lately by I. Sharon and A. Gilboa. Garstang concluded that the site was settled in the Late Bronze I period, destroyed in the 13th century and resettled in the Iron I period. The present excavations have not added to our knowledge of the Late Bronze, but several strata associated with the Iron Age have been isolated and defined. In different areas of the site, G, B1 and D, remains of Iron I have been located.

Stern divided Area B into four stratigraphic phases, of which the earliest, phase 12, is dated to the second part of the 12th and the first part of the 11th centuries. He attributes this phase to the Sikil, a group associated with the «Sea Peoples» and with the tale of Wen Amon. This city, or at least the monumental building in Area B, which is described as having stone foundations and mud-brick walls, was destroyed. Interesting finds include a large decorated pilgrim flask and a *pithos*, of a type usually associated with Cyprus and the Phoenician coast, the like of which were also found at Tel Dan and Tel Akko. Following the destruction, a new city of Phoenician character was constructed, with the ceramic finds including Phoenician Bichrome pottery and the first imports of Cypriote wares following the hiatus in Cypriote ceramic imports in the 12th century BCE. The Cypriote imports include two main groups: White Painted I and Bichrome I. As Stern observes, these wares are found in Cypro-Geometric I contexts in Cyprus, dated to the second half of the 11th century BCE, a date which is also assigned to this phase at Dor (Stern 1998: 346; 2000: 155).

An architectural element assumed to be a harbor associated with the «Sea Peoples» was excavated and published by A. Raban (1995). Raban dated the initial stages of the harbor construction to the later part of the 14th or to the early 13th century BCE. He also stated that further construction, due to geomorphological changes, namely a rise in sea level, involved the replacement of the original quay over the course of the 200-150 years of the harbor's use (Raban 1998: 429). Two sections of the harbor quay remained, including the blocks on the western side, which Raban (1995: 313) estimates to have weighed 20 tons each. The dating proposed by Raban (1995: 313) was the end of the 13th and the early 12th centuries, a period yet not corroborated from finds on the tell itself. The ceramics which Raban associated with the wall (although the blocks were not removed) were a complete krater, the upper part of a *pithos* (the exact shape of which cannot be discerned, although it is probably the same as those associated with the first phases of B1), part of an oil lamp, and a strainer-spouted jug, probably to be dated in the 11th century BCE at the earliest. Red painted decorations on flasks and strainer-spouted jugs are common among the ceramics that Gilboa calls «destruction pottery» (Gilboa 1998: 414, Fig. 3: 4, 7-14). With its cross-hatched decoration, the strainer-spouted jug associated with the harbor wall could date even later, according to Ussishkin (1989: Fig. 7, 4). The eastern side of the wall is constructed of somewhat smaller stones with two courses of headers. Raban felt that this part was added in a period when the wave energy inside the bay was similar to that of today, producing smaller amounts of sand. The rubble associated with it contained water worn sherds, which Raban (1995: 315) dated to possibly the 11th century. It thus seems likely that the construction assumed to be have been used as a harbor should be dated to the transition between the 12th and 11th centuries at the earliest and possibly slightly later, and therefore associated with Stern's phase 12 of area B1. A further problem of dating arises from the refined stratigraphy now proposed by Gilboa, Sharon and Matskevitch (personal communication), which suggests that phase 12 was destroyed in ca. 1090, that phase 11 was a poor settlement, and that phases 10 and 9b are equivalent to the Megiddo VIa horizon.

The importance of a harbor or an anchorage at Dor is clear. Contacts with the agricultural hinterland in the valleys of the Carmel Ridge and with the economic hinterland of Megiddo and beyond have been discussed above, as have the routes (Artzy 1998). A route via the valleys in the Carmel Ridge (En Hagit), crossing Wadi Milh, makes it possible to leave Dor in the morning and be in Megiddo for a late lunch (Artzy 1998). The fish found at Megiddo (Lernau 2000: 475; Halpern 2000: 551) probably traveled by this route. They included Nile perch, which most probably arrived ready salted from Dor, where numerous examples of this fish were found (Raban-Gerstel 2006: 59-60).

The town of the Sikil, associated by Stern with phase 12 in area B1 and phase 9 in area G, was destroyed, and left an accumulation of ca. 2 meters of burnt debris, befitting the destruction layer of a town consisting of mud-brick architecture. The clayey mass divides this layer from the following one, which is the town associated with the Phoenicians in the second half of the 11th century BCE (Stern 2000: 198-199). This is the town, according to Stern, which was mentioned in the Tale of Wen Amon. Sharon and Gilboa, who have taken over the direction of the Dor excavations, feel that, apart from this massive devastation layer, there are no clear changes in the sequence of ceramic assemblages at Dor before and after the destruction (Gilboa 2005: 60).

The destruction, which befell Dor in the mid-11th century, is of importance to this study, and a summary and discussion of some of the problems arising from the assumptions of the excavators are therefore called for. Stern states that much of the material recovered from the rooms in Area B1 attests the presence of the «Sea Peoples». This includes the ceramics, although, as he himself emphasizes, these are of local manufacture. Among them is a large *pithos* decorated with relief design of wavy line. *Pithoi* like these have been found in the upper Galilee, for instance at Dan (Biran 1989: 75, 78-79), and on the coast, including Bikai's Stratum XIV at Tyre (Bikai 1978: 65-66; Plate XL). Biran uses the terms «Galilean» and «Phoenician» for their variants. The shapes, including their variants, are well

attested at many sites in Cyprus (Pilides 2000: 5-16). As for the painted wares, which Stern compares with those from the Philistine sites, these could equally well have been influenced by the local painted wares of the area as well as by wares from the northern coastal sites/Phoenicia. The assemblage from phase 12 in area G is compared to ceramics of Stratum 9c (10?) at Tell Keisan (Stern personal communication). Comparisons for the other elements found at Dor and associated by Stern with the «Sea Peoples», such as the bovine scapula with incised decoration and the bone handle of the iron knife (see discussion of knives in chap. II), should also be reconsidered in view of the wider context, particularly the triangle formed by Cyprus and Canaan, including the northern coast/Phoenicia. Iron knives with bone handles appeared in Cyprus (Sherratt 1994: 86-87), as did *scapulae*, before the 11th century as well as continuing in subsequent periods (Snodgrass 1994: 171-173).

A recent study of the animal bones originating in Area D2 supplies data, which clearly were not available to Stern at the time he was writing (Raban-Gerstel 2005). This study compares the bones from the two strata in Area D, namely the one attributed to the Sikil and the other attributed to the Phoenicians. Analysis reveals the two to be similar to one another in the ratios of different species of animals represented by the bones, and especially in the minimal number of pig bones, which amount to less than 1 % (Raban-Gerstel 2005: 40; 85-87). This is very different from the situation in the southern settlement areas of the Philistines, for example at Ekron-Miqne, where domesticated pigs supplied a large percentage of the meat consumption, ca. 18 % of the total (Hesse and Wapnish 1997: 248). It is also worth noting that the bones identified as those of pigs are of wild pig rather than the domesticated variety; these are common on the Carmel Ridge and could have derived from hunting. It is possible, of course, that some of the population of Iron I Dor did consume pork, but it appears that this was only a very small amount and mainly from occasional game. These new data call into question the close relationship of the Philistines and the Sikil, if indeed the phase attributed to the Sikil at Dor is to be attributed only to these as members of the «Sea Peoples».

A site that may have some bearing on this discussion is that of ʻEn Hagit, situated ca. 1 km north of Wadi Mileh, now and probably in certain periods in the past, a good pass through the Carmel Ridge, connecting the Carmel coast with Megiddo. It is situated on an alternative path through the Carmel Ridge, crossing a sumptuous agricultural valley (Artzy 1998). Stern also envisioned it as a Sikil settlement (Stern 2000: 203). In a salvage excavation carried out by S. Wolff (1998), a large building complex measuring 29.5 × ca. 17 meters and containing many Collared Rim jars was found in Area B. The ceramic assemblage has not yet been published and so it is hard to know what else was found in the building complex, although Stern notes that it seems to parallel the assemblage from Dor. Sherds, assumed by Wolf to be of Philistine origin, are shown in a photograph by Stern (2000: 203). They appear to belong to a painted ware, which typologically and technologically could have originated from sources other than Philistia, and thus caution should be exercised in ascribing them.

A more interesting element is the architecture at what seems to have been a short-lived site. Wolff (1998: 451) compares the building in ʻEn Hagit to building 2072 in Megiddo VI (Loud 1948: 37, Fig. 83, Kempinski 1989: 83), as well as to a building in Stratum 9 at Tell Keisan (Briend and Humbert 1980: 198-199, Fig. 51-52). He also compares it to those of other sites, such as Hazor, Tell Umeiri and Tell Fukhar. Harrison (2004: 19) adds a few more sites which might be regarded as having similar buildings, such as the «Oil Maker's House» (structure 3035) in Yoqneam Stratum XVII (Ben Tor *et al*. 2005: 19, 22-27) and possibly a number of buildings in area D, stratum VIII at Tel Qiri (Ben Tor and Portugali 1987: 80-86). The occupants of ʻEn Hagit were most likely beholden to a larger trade network, serving an economic interest connected with the agricultural nature of the area. The position, size and sturdy construction of the building invites the suggestion that this was an administrative building. Its proximity to Dor and Megiddo, as well as its resemblance to Megiddo building 2072, which in the past has been attributed to a «Philistine governor» (Kempinski 1989: 83), increases the probability that it served as a warehouse for an administrative, probably agricultural, interest. Whoever manned the building, it should be mentioned, consumed pork. The percentage of pig bones is 20 % (Hesse and Wapnish 1997: 245), although it is not specified whether wild boar or domesticated swine, which in this case is of special interest since the occupants could have hunted wild boar, available to this day, in the Carmel Ridge, as an additional source of protein in their diet.

While it is difficult to assign an ethnic group to the attributes used to describe Dor, some explanation is in order, since the one literary source, the Tale of Wen Amon, does indeed mention the Sikil at Dor. However, although this has been taken as a historical fact by many archaeologists, those interpreting the literary text have not always agreed as to the particulars in it, including the name of the Sikil king which could be interpreted as being Semitic. Even if we accept the text as deriving from an 11th century context, as we do in this particular study, questions as to the motives behind the story need to be addressed. Most of the sites on the northern coast of modern Israel and on the coast of Lebanon were left unharmed at that time, as has been pointed out by Bikai (1994) and more

recently Bell (2005b:365) and others. The excavations at Tyre and at Sarepta show continuity from the end of the Late Bronze to the Iron Age, as do other sites along the northern coast, among them Akko and Dor. In addition, at the beginning of the 11th century BCE, northern Canaanite coastal/Phoenician sites, including Sidon, were paying tribute to the Assyrian King Tiglat Pileser I (Pritchard 1969: 275). The lack of sympathy between the Egyptian authorities and the northern Canaanite coastal sites following the incursion of the «Sea Peoples» should perhaps be taken into consideration when reading Egyptian texts, and the behavior of the coastal sites, in the Egyptian memory, was unlikely to have been viewed with equanimity. The possibility that the Wen Amon text is a part of the Egyptian propaganda literature should not therefore be overlooked. The treatment meted out to Wen Amon by the rulers of several of the harbors he visited indicates the superiority they felt *vis-à-vis* their former Egyptian masters. As far as the Egyptians were concerned, Beder, the king of Dor, was a Sikil, a villan, in order to emphasize his infamy and treachery and the 15 Sikil boats, which pursued Wen Amon when he was in Byblos, were likewise described in a derogatory manner.

The transition from the 13th to the 11th century, geopolitically and economically, was significant, even at sites that did not suffer destruction and demise. The time element should also be considered: a hundred years is a lengthy period, allowing for great, although prolonged, changes. Treaties, familial contracts or trade networks among the ruling classes could change over much shorter periods. Some evolution in the composition of populations is to be expected, not only inland, but also (and maybe more so) along the coasts of the Levant. It would not be surprising if there were new elements of population among the northern coastal Canaanites/Phoenicians, among them a certain percentage of Sikil, the descendants of the Shiqala who lived on the boats, as appears from a late 13th or early 12th century letter sent to Ugarit by the king of Hatti (Yon 1992: 116). Following the demise of Ugarit –or maybe before, when Ugarit was already in a state of weakness– some of them joined the inhabitants of the coastal cities not directly affected by the «catastrophe». There is no reason why some of the descendants of the Shiqala could not have settled in Dor as part of the changes that took place in this period, but they were almost certainly well integrated with the Canaanites by the end of the 12th and the first part of the 11th century BCE. As to the destruction of Dor in the middle of the 11th century, attributed by Stern to the Phoenicians, another possibility worth entertaining is that the destruction was caused by warring coastal Canaanite/Phoenician cities, perhaps Tyre and Sidon. The importance of Dor as a gateway to the Jezreel and Jordan valleys encouraged quick rebuilding. A northern coastal Canaanite/Phoenician presence continued at Dor as well as inland, and the trade network did not cease. On the contrary, it intensified. In the 11th century BCE it encompassed not only agrarian exploitation, but copper from the mines of Feinan.

The northern coastal Canaanite/Phoenician involvement at the end of the 12th and in the first part of the 11th century was merely the revival and intensification of involvement in the area of the Akko Bay, the Carmel Ridge and the hinterland, as far as Megiddo and beyond. Grain and other agricultural produce were probably the main loads carried on ships leaving Dor and eventually the artificial harbor at Atlit. Metals and finished metal goods also found cargo space on the boats. In return, timber, expertise and finished luxury goods, the echoes of which are found in the Biblical texts, were dispatched inland.

TEL ZEROR AND TELL QASILE

Both Tel Zeror and Tell Qasile are situated in the Sharon plain, Tel Zeror on its northern edge and Tell Qasile on its southern edge. Both are placed slightly inland from the coast, but on rivers which may well have been used for navigation. While Middle and Late Bronze Age levels have been found at Tel Zeror, an apogee seems to have been reached in Iron Age I. At Tell Qasile, the earliest noticeable remains are dated to Iron Age I. Objects from the Jatt hoard have parallels at both of these sites.

Tel Zeror is situated on the edge of the Sharon Plain some 8 kilometers east of the coast, on the confluence of the Hadera River with two springs, Haviva and ʻIron. While it is usually described as part of the chain of sites on the western fringe of the Sharon (Kochavi 1993: 1525), we would like to add that its position on the Hadera river makes it a good candidate for close relations with Jatt as part of an east-west route, to which we might possibly add the site of Dothan, especially the graves in the Western Cemetery (Cooley and Pratico 1994). There are several parallels to the Jatt objects at Tel Zeror, although some of the descriptions appear only in Japanese. As far as a harbor or an anchorage connecting the overland route with a maritime counterpart is concerned, Nahal Hadera's outlet to the sea, the most likely geographical spot for such an anchorage, has undergone major changes in the 20th century, and any relevant archaeological data should now be considered lost.

K. Ohata and a Japanese team in association with M. Kochavi of Tel Aviv University excavated the site in the 1960s and 1970s. Several areas of the site, which is located on two hills connected by a saddle, were excavated. The Late Bronze Age is represented in Areas C and B on the southern hill by a public building, of secular nature according to Kochavi (1993: 1525). Near it, on the slope in area C, an industrial area with various installations, including furnaces, crucibles and bellows, was found. Ceramics of Cypriote origin were also found in this area, and Kochavi suggests that the raw materials and possibly the coppersmiths themselves came from Cyprus (Kochavi 1965: 254). In the light of more recent work, such as that at Tel Nami, the possibility of recycling should also be considered (Artzy 1994; 2000). After the Late Bronze, a layer of pits attributed to Israelite settlement is mentioned. Caution should be exercised, however, since both of the parameters used to identify this «ethnic» element, namely pits and Collared Rim jars, have already been shown to be associated with other groups, or are at least found in areas such as the coast (at Tel Nami and Tel Akko see Artzy 1994; Zagorski 2005; Artzy 2006b), in which the chance of Israelite settlement is minimal. The 11th century settlement includes a citadel built on the northern hill (Area A). The architecture is based on mud-brick construction, a feature typical of Megiddo VIa (see above).

The burials included cist graves, which contain grave goods of bronze and the special type of oil lamp, with a closed nozzle, comparable to the one from Jatt and dated to the 11th century by Yannani (2002). Also included, we are told, is some Philistine pottery, a rhyton in the shape of a lioness and a nude goddess identified as Astarte (Kochavi 1993: 1525). Kochavi considers it possible that the 11th century citadel and the cist graves belong to the Sikil; and his suggestion is taken one step further by E. Mazar (2001: 157), who attributes the early cist graves to the same people who settled at Achziv. However, with the new data originating from the excavation at Dor (see above), it seems highly likely that –even if there is an element of «Sikil»– it is the Phoenicians, rather than the «Sea Peoples» or Philistines, who should be considered responsible for the renewed settlement at Tel Zeror.

Tell Qasile: The site of Tell Qasile is situated about 150 meters from the northern bank of the Yarqon River, ca. 2 km from the coast. It was excavated in the 1950s by Benjamin Mazar (T. Dothan and Dunayevsky 1993: 1204-1207), and in the 1970s the excavation was taken over by Amihai Mazar (1980; 1985). The earliest settlement of Tell Qasile seems to have taken place slightly later than the Iron Age I settlement of the Philistine cities in the south. However, unlike these, the site was not previously settled. The earliest and smallest of the strata at Tell Qasile, Stratum XII, was constructed of mud-brick, unlike the two subsequent strata. An architectural element which area C at Tell Qasile appears to share with Megiddo VIa is the use of timbers as columns.

In Area A, Philistine objects (T. Dothan and Dunayevsky 1993: 1204-1205) were noted in the two earlier Iron I strata, XII and XI, although there are notable differences between the assemblages of the two strata and there seems to be some deterioration in the ceramics in Stratum XI, according the excavators. These two strata parallel Megiddo VIIa-VIb. In Area C, a cultic area, with a series of temples, was excavated. An iron knife with two copper alloy rivets and an ivory handle was found in Stratum XII (Mazar 1985: 7). In Stratum XI a *favissa* yielded numerous objects bearing clear Philistine attributes, including zoomorphic and anthropomorphic shapes and other wares with typical Philistine decorations (Mazar 1993: 1208). Changes in the temple precinct between Stratum XI and Stratum X, which is equated with Megiddo VIa, include not only an enlargement of the cultic area, but also the addition of two timber columns. While Philistine ceramics still appear among the objects found in Stratum X, especially in area C, it is the Phoenician elements in the ceramics (Mazar 1985) which are most noteworthy. These include red-slipped hand burnished vessels, of similar fabric to that of the strainer jug from the Jatt hoard. Mazar notes that in dwelling area A no painted Philistine pottery was found associated with Stratum X (Mazar 1985: 123), although it was found in the cultic area C. He attributes this to some changes in the composition of the population of Tell Qasile in the 11th century BCE, to include Canaanites whom he suggests should be called Phoenicians. This is the time in which clear signs of renewed international trade relations can be seen, including vessels imported from the northern coastal areas associated with the Phoenician heartland, a few storage jars from Egypt, and a very few representatives from Cyprus (Mazar 1985: 123). We should note here that this change came about after the withdrawal of the Egyptian presence.

In discussing the metalwork at Tell Qasile, Mazar emphasizes its strong connections with Cyprus during the 12th and 11th centuries BCE including the possible importation of the copper utilized in the furnace found in Building Q, Area A (Mazar 1985: 5). He compares some of the metal finds with objects found in Cyprus and posits that the copper originated there, as did the itinerant metal-smiths, like those on the Cape Gelidonya shipwreck. He goes so far as to suggest immigration of groups of metalworkers from Cyprus to the plains of Israel. Mazar (1985:6) shares Negbi's view that there is a continuation of the Canaanite tradition, with Aegean and Cypriote additions inherent in the bronzework of the period. He presents the example of the double axes found at Megiddo VIa and in the 11th century BCE cist grave in Achziv (see below). These axes are paralleled in our Jatt hoard. In addition he notes

spearheads with rounded shape and prominent midrib, also known from Megiddo and Achziv as well as Tel Zeror.

The origin of the metal in the 11th century is usually assumed to be Cyprus, despite the fact that very few contacts, if any, in the form of ceramic imports are noted for the early 11th century (Tell Qasile Stratum XI). There may be other sources for the copper or copper alloys used in the production of objects. One is of course recycling, as practiced along the coast already at the end of the 13th and in the early 12th centuries BCE, for instance at Tel Nami (Artzy 2000: 28), and probably other sites, among them Tel Akko (Artzy 2006a,b). Another possibility, which might better explain the thriving metal production industry, especially during the second half of the 11th century BCE, could well be a new source of copper in the Feinan mines. The contacts of Tell Qasile XI-X and Tel Masos III-II ought to be reconsidered in view of the revival of the copper trade from that area. As in the case of the Jatt hoard, the copper at Tell Qasile, at Tel Zeror as well as at Megiddo, could have originated in Transjordan, from the revived mines at Feinan.

Gadot, using Paynter's model, considers Tell Qasile a «frontier» [an «outpost»?] of some geographically coherent external homeland of a Philistine nature (Gadot 2006: 24). The special position of Tell Qasile with its important maritime role, as Gadot himself notes, suggests that it was something more than an intermediate station for surpluses transported out of Aphek and distributed to the main economic and political center (Gadot 2006: 31). Aphek was not necessarily the only economic contact of Tell Qasile. The change at Tell Qasile from Stratum XI to Stratum X, especially in Area A, needs to be considered with care, especially because of the change in the makeup of the ceramic assemblages in Stratum X, in which northern coastal Canaanite/Phoenician wares become common. An economic center should also be sought at Tel Gezer, especially in the 11th century BCE. Gadot mentions this possibility in his conclusion, but then dismisses it: «From there, trade was shipped by sea to the driving economic power behind the system, the core elite at a city-state, perhaps that of Ashkelon» (Gadot 2006: 32). This might have been true of the earlier strata at Tell Qasile, but Iron I extends over at least 100-150 years and this length of time, as well as various geopolitical changes, needs to be taken into consideration. While we do not have a complete plan of Tel Gezer during Iron Age I, the renewed excavations have succeeded in emphasizing its central position (Dever 1986). From the old excavations of MacAlister, we have shown parallels with the northern areas, the area of the northern coastal Canaanites/Phoenicians as well as with Megiddo VIa and the Jatt hoard. Tel Qasile seems, in one way or another, to have participated in the trade networks associated with the north. It appears to have been the northernmost coastal site with Philistine elements, and the southernmost with clear Phoenician ones, in the 11th century BCE.

THE AKKO BAY AND ACHZIV

There are at least two anchorages in the Akko bay, Tel Akko and Tell Abu Hawam. Achziv, located ca. 14 kms north of Akko, which was also a functional anchorage in antiquity. Another site of some importance to this study is Tell Keisan, situated barely 10 kms east of Akko in a sumptuous agricultural valley. Excavations have taken place at all four of these sites**.** The three anchorages actively participated in the eastern Mediterranean trade in the Bronze Age as well as in Iron Ib, although not necessarily concurrently. They were focal points of the maritime and the terrestrial routes leading to the agricultural hinterland, in which Keisan was situated. The three are, or were in the past, situated in the vicinity of river estuaries and their maritime activity could thus rely on the availability of coastal installations. However, their topographic and ecological settings were diverse, and to a large extent dictated the diversity of their development as communities engaged in transshipments and/or as trading centers.

The importance of these sites to the study of the Jatt material lies in their proximity to the northern coastal Canaanite/Phoenician sites, which probably ensured that they lay within the political and economic spheres of the latter during some of the Bronze and Iron Ages. The associations of these sites with maritime activity and with the routes leading from the coast towards Megiddo are of importance in the periods under discussion. Objects found in the Jatt hoard show similarities to those from Achziv, Keisan, and Akko.

Tel Akko is located on the northern side of the bay near the northern bank of the Na'aman river (once known as the Belos) which most likely ran close to the southern edge of the site in antiquity. It was excavated in the 1970s and 1980s under the direction of M. Dothan (Dothan 1976; 1985). Akko is one of the largest sites in the southern Levant. It was continuously settled from Middle Bronze IIa to the Hellenistic period, with possibly limited settlement only in the Early Bronze and Medieval periods. It was fortified by a rampart that characterized its settlement pattern. Settlement on the ramparts took place only at the transition between the Late Bronze and Iron Ia periods (Artzy 2006a). There is evidence of habitation in Late Bronze I and II, including letters found at el-Amarna and

written by its ruler to the Pharaoh, although no strata belonging clearly to these periods were properly excavated. Among the finds associated with the transition from the Late Bronze to the Iron Age are lined pits containing Cypriote imports in Area Ph (Zagorski 2005; Artzy 2006a), a stone altar with incised representations of boats in Area H (Artzy 2004), and an industrial area in which recycling of metal was practiced (Artzy 2006a). A scarab with the name of Queen Tausret (M. Dothan 1989: 63-64) was found in Area AB, an area on the summit of the tell in which industrial remains, including those of metal recycling and production and possibly of a purple dye industry, were found (Dothan 1989: 62-63).

The strata of the Iron I period have not yet been published. A study carried out on the remains from one area, Area Ph on the southern side of the tell (Zagorski 2005), shows that at least in that area no clear destruction took place. On the contrary, the remains indicate continuity from the end of the Late Bronze to the Iron Age. However, there seems to be no continuity in this area into Iron IIa. The 11th century remains seem to be concentrated in the eastern part of the tell, in Area K, excavated by D. Conrad. Recent work on material from the southeastern side of the site, in Area P, seems to have resulted in numerous finds also dating to that period (Be'eri, personal communication). M. Dothan attributed some forms and decorations of ceramics to the intrusion of the Shardan (Dothan 1986:107). He felt that these elements were similar to Myc. IIIC:1b pottery of Greece and Cyprus.

Tell Abu Hawam was located on the southern side of the bay, on the estuary of the Qishon River, although it is now ca. 2 kms inland. The site has been excavated repeatedly, although mainly by W. Hamilton in the 1930s (Hamilton 1934; 1935). It was «re-discovered» in the 1980s by J. Balensi, whose tenacious belief that part of the site still existed following the development of the area led to an excavation in the mid 1980s (Balensi 1985; Balensi *et al*. 1993). Salvage excavations in an anchorage took place in 2001 (Artzy 2004). The western edge (or «nose») of the Carmel ridge protects the area of the Qishon estuary, where boats could have found safe haven from the prevailing winds of the summer sailing season. Despite their advantages, however, Abu Hawam and the Qishon estuary served as an anchorage for only short stretches of time. The reasons for this are that the steep northern slopes of the Carmel ridge are situated near a geological fault line, and the Qishon River, which runs along the steep slopes, as well as sand brought by the sea, caused swamps in the area which left little room for agricultural hinterland and especially for a route leading towards the east. Level V of the site, if not completely abandoned at the transition from the Late Bronze to the Iron Age, seems at least not to have been involved in the events of the period (Artzy 2004). Balensi believes that some Philistine sherds were found in the Hamilton excavations at Tell Abu Hawam (Balensi 1980: 29, 372), but these have never been published. Gilboa *et al*. seem to question Balensi's observations concerning the appearance of the ware at Tell Abu Hawam (Gilboa *et al.* 2006: 319).

During a revival in the 11th century Tell Abu Hawam, although diminished in size, shows clear signs of contact with the northern coastal sites/Phoenicia. Hamilton already noted Phoenician Bichrome ware, which he attributed to his Level Vb (Hamilton 1935: 41), a rather problematic designation, due to the early date of the Stratum and the stratigraphy. Active contacts with Phoenicia continue well into Stratum III.

Tell Keisan is located in the basin of the Akko Plain, ca. 7 kms from Tel Akko. It is situated in the midst of an agricultural area, which was no doubt cultivated in antiquity. The proximity of Keisan to Tel Akko links it to the coastal trade network. It was surveyed and partially excavated in the 1930s by Garstang (Seton-Williams 1980). The majority of the finds from that excavation were from a Middle Bronze rampart (Seton Williams 1980: 386-388). In the 1970s excavations were resumed under the direction of J. Briend and J.-B. Humbert (1980; Humbert 1993: 863). In 2006, a salvage excavation under the direction of M. Artzy and A. Abu-Hamid took place.

Iron I levels 12-9 formed thick layers. One reason for the accumulation in this period is the types of construction materials used in some of these levels, particularly mud-brick. At least in Strata 10 and 9c stones and mud-brick were utilized, as was timber. The ceramics of Levels 12-10, covering the transition from Late Bronze to Iron I, were treated by Burdajewicz in an unpublished doctoral thesis (Burdajewicz 1995). Although Philistines are mentioned in the written reports (Humbert 1993: 864-865 and Burdajewicz 1995: 115), the amount of Philistine ceramics presented in the publications is negligible. Although Burdajewicz negates the possibility that these few sherds can be attributed to a foreign population, he does consider some of the items to be of Philistine origin and some to be of local production (Burdajewicz 2004: 153-161). Gilboa *et al.* (2006: 316-319) have re-checked the different wares attributed to Philistine Bichrome ware, and their conclusion was that those from Tell Keisan are similar to those of Tel Dor. Only 8 possible Philistine Bichrome candidates were located, a rather small sum considering the wealth of Tell Keisan during the Iron I period. According to Humbert, Stratum 10 showed considerable foreign influence (Humbert 1993: 864). A group of ceramics associated by him with this stratum was designated «Levanto-Mycenaean IIIC», and consisted of an assemblage of mostly closed shapes (Briend and Humbert 1980: Pl. 70, 1-1f, 2-4b and 74-76), including *pyxides*, pilgrim flasks and jugs of Cypriote Base Ring shape, although manufactured of local clay

(Gunneweg and Perlman 1991), which bears no resemblance to the special Cypriote clay used to produce the Base Ring family. Gilboa has pointed out that they actually resemble jugs of the Late Cypriote IIIB tradition (Gilboa 2005: 61), although the excavators felt that the jugs were of Mycenaean ceramic tradition. She emphasized that there is nothing Mycenaean about this group, a view which contrasts with that of Burdajewicz (1994: 77). She has demonstrated that some of the shapes have antecedents in the Canaanite tradition and that others, such as the *pyxides*, were already in vogue in the Late Bronze Age, even if their ultimate antecedents were originally Mycenaean, as Puech (1980: 221, 225) argued. Gilboa's and Sharon's observation that the jugs derive from a Late Cypriote IIIB and Cypro-Geometric I tradition (Gilboa and Sharon 2003: n.6) should be set side-by-side with the view of Koehl, who has studied the 12th century wares from Sarepta. He has offered several possible explanations for the appearance of Mycenaean style wares at Sarepta at that time. One is a continued trade relationship with Mycenaeans in Cyprus; an alternative is the procurement of ceramics from Cypriote centers by northern coastal Canaanite/Phoenician merchants (Koehl 1985: 146). In the last two decades, more analyses of ceramics attributed to wares of Mycenaean style have been carried out, and it has been shown that much of the «Mycenaean IIIB» which appears in the Levant in the 13th century BCE was also produced in Cyprus (Artzy 2005). It is also apparent that «Mycenaean» type wares found in 12th century contexts, particularly in the form of small stirrup jars, were produced locally along the coast. The northern coastal Canaanites/Phoenicians were well able to adapt these painted wares to their own assemblages. They did not need to be «ethnic Mycenaeans» to produce these wares; and there is no doubt that ceramic types previously associated with the Greek mainland continued to be produced locally well after the imports ceased.

Tel Achziv is located on a mound south of Nahal Keziv estuary, *ca*. 14 km north of Akko. To the south of the site is a natural bay, and the site itself was surrounded by a *fosse* (Prausnitz 1993: 32). Parts of Tel Achziv have been excavated, although its most famous finds are from the four Phoenician cemeteries found in the area. The majority of the graves, both looted and undamaged, were excavated by I. Ben Dor, M. Prausnitz and most recently E. Mazar, who published the results in 2001 and 2004. Dayagi-Mendels has reworked and published some the data from Ben Dor's excavations of the cemeteries in 1941-44 (Dayagi-Mendels 2002).

The graves of earliest type, the cist graves, were found on the eastern slope of the tell (Prausnitz 1997: 19-23) as well as in the southern cemetery (E. Mazar 2001: 16-18; Dayagi-Mendels 2002: 163). Tomb 1029, a wealthy tomb with two burials, a male and a female, contained a number of metal objects, including a bronze bowl, a bronze spearhead and a bronze double axe, similar in type to those of Jatt, as well as a fibula. A number of bichrome pilgrim flasks and an ivory bowl were also found in the same grave, associated with the female burial. The contents of the tomb are dated by Prausnitz to the 11th century BCE, comparable to Megiddo VIb or VIa (Prausnitz 1997: 22). The dating seems to be agreed upon by Gilboa, who places the grave in the Cypro-Geometric I horizon in her comparison of the chronology of Dor and Cyprus (Gilboa 1999a: 123). The male burial was referred to by Prausnitz, in an earlier article, as a warrior burial (Prausnitz 1993: 338). Mazar, in her publication of the southern cemetery (E. Mazar 2001: 16), presents descriptions and dates for the cist graves. The Phoenician nature of this type of grave, which occurs frequently in the Achziv area, is generally accepted by scholars. There is no reason to attribute the burials to «Sea Peoples», as did E. Mazar, the excavator and publisher of many of the graves from Achziv, when she compared these graves to those from Tel Zeror (E. Mazar 2001: 157; 2004). It should be noted that most of the burials reported by the various excavators of the site were inhumations; only a small minority are cremations, and these can be dated well into the 1st millennium BCE. Among the graves are some which are considered to be family graves (E. Mazar 2004). A particularly interesting phenomenon is the appearance of chamber tombs, which E. Mazar compared to graves at Ugarit and Enkomi, at least a hundred years or more earlier. She included in these comparisons the «feeding holes» in the ceilings of the graves, still practiced in Achziv, but «degenerate» (as she put it) in comparison to their Ugaritic counterparts (E. Mazar 2001: 75). Clearly, a continuation of the northern coastal Canaanite traditions of the Late Bronze is represented at Achziv in the early Iron Age, not only in material goods but also in burial practices. In his short resume of the cemeteries at Achziv, Prausnitz correctly observed that the four cemeteries bear archaeological witness to the cultural origins and currents, which were added step-by-step to the multifaceted culture, which, by the 6th-7th centuries BCE, we refer to as the «Phoenician culture» (Prausnitz 1997: 19).

BETH SHEAN, TELL ES-SA'IDIYEH AND DEIR 'ALLA

Beth Shean is located on the western side of the Jordan River, while Tell es-Sa'idiyeh and Deir Alla are on the eastern side. With the passage of time, the relationship between these sites saw alterations, as did their regional con-

tacts. Distant geopolitical – and geo-economic – changes influenced this area to a very large extent. Manufacturing of metal goods (and especially the distribution of copper) and the incense trade and its networks were some of the forces which played a role in the economic well-being of this region. Beth Shean was directly under Egyptian control until the later part of the 12th century BCE; the other sites were probably influenced by the Egyptians, particularly at the end of the 13th and in the early part of the 12th century.

Beth Shean: The problems associated with the dating of objects from Beth Shean are numerous. The site has been excavated and studied by several teams over a long period. In the 1920s and 1930s it was excavated by the University of Pennsylvania under several directors, including C.S. Fisher, A. Rowe and G.M. FitzGerald. The finds from the northern cemetery were published by Oren (1973), the Iron Age strata by James (1966) and the Late Bronze by James and McGovern (1993). In 1983, a short season was carried out by Y. Yadin and S. Geva (Yadin and Geva 1986) and, in 1989 and the 1990s, by A. Mazar of the Hebrew University in Jerusalem.

Among the finds at Beth Shean is at least one incense stand, found in the FitzGerald excavations (FitzGerald 1934: 133, Plate VII2). James, in her study, attributed it to the later part of her Level VI and thus placed it in the 11th century BCE (James 1966: Fig.103), after the time of the Egyptian domination. Other metal objects found at Beth Shean originate in the tombs, especially Tomb 90 (Oren 1973: 101). This tomb was used from the 13th century to the 11th century BCE, a rather lengthy period which witnessed great historical changes, especially in this area. Among the many objects found in the tomb was a juglet, which has been compared to a juglet from Tomb 101 at Tell es-Sa'idiyeh. In Gershuny's publication the juglets from the two tombs are placed side by side along with another juglet from Megiddo Locus 1739 (Gershuny 1983: Plate 13: 130, 131, cf. Plate 12: 129). From the drawings in Oren's and Pritchard's original publications of the Beth Shean and Tell es-Sa'idiyeh juglets (Oren 1973: 228: 2; Pritchard 1980: Fig. 4: 18), it is hard to believe that these three have much in common except for the fact that all are of bronze. However, the Megiddo juglet may also have been short-changed in the drawing. Oren felt that the bronze objects in Tomb 90 were to be dated to its earliest use in the 13th century BCE. The ceramics presented by Oren could belong to the end of the Late Bronze Age, but there are others, which continue well into the early Iron Age, and still others which cannot be dated any earlier than the 11th century BCE. Oren stated that the similarities to Pritchard's Tomb 101 at Tell es-Sa'idiyeh persuaded him to date the bronzes to the end of the 13th century (Oren 1973: 117), a conclusion rightly rejected by Negbi (1974: 166, note 33). Any attempt to establish a connection between Tell es-Sa'idiyeh and the Beth Shean cemetery is problematic, if for no other reason than the different nature of the burials and the problems associated with dating those at Tell es-Sa'idiyeh (see below).

Tell es-Sa'idiyeh: Tell es-Sa'idiyeh is located in modern Jordan, ca 2 kms east of the Jordan River and between the Sea of Galilee and the Dead Sea. Several attempts have been made to identify it with sites mentioned in the Bible, but none of these has been substantiated (Tubb 1993: 1295). The Early Bronze Age is well represented in the excavations, as is the early Iron Age. Numerous graves were uncovered, both in the excavations carried out by the University of Pennsylvania under the direction of J.B. Pritchard (1980) and in the British Museum excavations directed by J. Tubb, in which luxury goods, among them numerous bronzes, were found (Tubb 1988a,b). These were associated by Tubb to Aegean («Sea Peoples») presence in the area and in Tell es-Sa'idiyeh in particular (Tubb 1995:136-145), a view not shared by all scholars. According to Tubb, the cemetery is contemporary with Stratum XII of the site, and thus dates from the second part of the 13th century to the mid-12th century BCE (Tubb 1988b: 65). This dating, especially of the cemetery, has been questioned both by Mazar, who rightly queries the date of Tubb's Stratum XII, the level on the tell associated by the excavator with the transitional Late Bronze-Iron I period (Mazar 1992: 401, note 21, 7), and by Negbi, who questioned the dating of the objects from the cemetery and placed many of the Tell es- Sa'idiyeh finds in the 11th century BCE (Negbi 1974: 161). There seems little doubt that, once a comparison of the graves and their finds with those from Beth Shean, Megiddo and other sites is made, many of them will be found to date to the 11th and possibly the early 10th centuries BCE. Presently, Tubb and a PhD student, J. Green, are re-working the chronology of the necropolis in area BB (Green, personal communication). The fact that the Feinan mines were being made use of in the Early Bronze as well as in the earliest part of the Iron Age should be taken into consideration when trying to establish the economic networks associated with the site of Tell es-Sa'idiyeh.

Tell Deir 'Alla: Tell Deir 'Alla is located ca. 8 kms south of Tell es-Sa'idiyeh and 5kms east of the Jordan River. Archaeological investigations have not aided in attempts to identify the ancient name of the site. A team from the Netherlands, directed by H.J. Franken from the University of Leiden, started excavating in 1960. Since then, further projects have taken place under the direction of Franken and G. van der Kooij from the University of Leiden as well as M.M. Ibrahim of Yarmouk University (Franken 1964a; 1964b; 1964c; Van der Kooij 1993: 338-339). Late Bronze remains have been found, within which four phases have been distinguished. A faience vase with the cartouche

of the Egyptian queen Tausret found in the final Late Bronze destruction layer dates it to ca. 1200 BCE. Finds from the same context include several clay house models (Franken 1961: 365, Pls 6-7; 1964: Pl. X: a) as well as Mycenaean pottery and a small bronze armor plate. Several clay tablets with an unidentified incised script were also found in the «temple». Mineralogical tests carried out on the ceramics seem to indicate that many of the pieces found in the cultic area were not produced locally. The temple was constructed at the beginning of the Late Bronze Age, although most of the remains belong to the final stage of that period. Franken suggested that the site was used as a center of trade between the mountains of Gilead and Egypt.

The architectural remains of the temple are meager, but, from the finds, contact with the north, particularly with the Galilee and the Syro-Lebanese coast, ought certainly to be considered. Epstein has shown that the closest parallels for the Deir ʻAlla terracotta models are from Kamid el-Loz in the Lebanese Beqaʼa (Epstein 1989: 25-29). Negbi has indicated that they are also similar to models from Hazor and Ugarit, and recently a new study has added examples from the sites of Tel Dan and Tel Hadar (Katz 2006: 48-49). The find of a bronze armor scale further emphasizes the connection between Deir ʻAlla and Kamid el-Loz, where several hundred of these were found (Hachmann 1989: 111, Fig. 29; 1983: 117). Recently, a cartouche of the Egyptian queen Tausret has also been found at Sidon, the most likely site to have been used as the coastal link with landlocked Kamid el-Loz.

The temple at Deir ʻAlla was not rebuilt following its destruction, which was caused, according to Franken, by an earthquake. Instead, Franken reported, remains of furnaces, blowpipes and other paraphernalia associated with metalworking were noted (Franken 1969: 21-22). His suggestion was that semi-nomads used the area during the rainy period for herding, seasonal agriculture, and metalworking. The occupation layers attributed to the metalworking area were dated by the excavators to the Early Iron Age. Some Philistine bichrome sherds were also reported in these contexts, modifying the dates to the later 12th or 11th centuries BCE. Franken further suggested that the copper ore was imported to the area from the distant Arabah, with the forests available in the Gilead providing energy supplies. Equating the dates of the sites and copper production in the Timna region, which seems to have come to a standstill shortly after the mid-12th century, following the final withdrawal of the Egyptians, is a problem. On the other hand, the Feinan region should seriously be considered as the origin of the copper supply, especially now that there is evidence for the revival of exploitation of these mines during this period.

EDOM, FEINAN AND TEL MASOS

Feinan is located in the area geographically identified as Edom, the southernmost of the three kingdoms, which arose in Transjordan at more or less the same time as the Biblical Israel. What the exact boundaries were between Edom and Moab is questionable, but its northern border is usually placed in the Wadi Haza and its southern one at Wadi Hisma (Bienkowski 1992: 1). Lead isotope analyses carried out on some of the metal objects from the Jatt hoard associate the majority of those tested with a provenance in the Feinan copper mines (see appendix b). Not surprisingly, results of lead isotope tests carried out on two objects from Pella seem to suggest that the copper of which they were made originated in Feinan (Philips *et al.* 2003: 91). Copper alloys originating in Khirbet edh-Dharih in Jordan indicate a Feinan origin as well (Klein and Hauptmann 1999: 1079).

In his 1935 publication, N. Glueck already recognized Bronze and Iron Age occupation at Feinan (Glueck 1935: 20-34). In the 1980s, Knauf and Lenzen observed that, although there were at the time of writing no clear settlement remains attributable to the Iron I period, certain ceramics could have belonged to earlier periods than Iron II, even as early as the 13th century BCE (Knauf and Lenzen 1987: 85). They also mentioned an important reason why some of the activities in the mines following the Early Bronze age had not been noticed. According to them, the Early Bronze miners had exhausted the visible ore deposits by using horizontal tunnels, and so the later users had to excavate shafts from ground level (Knauf and Lenzen 1987: 85). Macdonald, following his extensive survey, published Iron I ceramics from the area (Macdonald 1992: Plate 18: 1-10). From explorations and excavations carried out in 1980 and 1990 by the Bochum Bergbau Museum (Bachmann and Hauptmann 1984; Hauptmann and Weisgerber 1992; Fritz 1994) and excavations carried out at Barqa el-Hetiye by himself, Fritz reached the same conclusion. Large slag heaps, originally associated only with the Early Bronze, were found, but there was also a free-standing building with ceramics dating to 1200-1000, the Iron I period (Fritz 1994: 136-150; 1996; 2002: 96-97). The recent project at Khirbat en-Nahas, which included extensive mapping and ^{14}C dates of samples from stratified excavations, showed that it was an active copper working site from at least the 11th century BCE, if not earlier (Levy *et al.* 2002).

Bartlett assumed that the Biblical authors viewed the area south of the Beer-Sheba Valley as part of Edom (Bartlett 1989: 42-44). The dearth of archaeological data from the area associated with Edom has hampered past attempts to understand its nature fully. Most of the literary sources are Biblical and concentrated in the 1st millennium BCE. The Egyptian sources call the area Kushu, ruled by chiefs of clans. The earliest mention of Edom, so far, is in Papyrus Anastasi VI: «We have finished with allowing the Shasu clansfolk of Edom to pass the fort of Merenptah that is in Succoth…» (Kitchen 1992: 27). Bienkowski emphasizes that, in the references to Moab, Senir and Edom from the time of Ramesses II to Ramesses III, «…the picture in Edom appears to be one of pastoralists with their livestock, while in Moab there are at least some settlements» (Bienkowski 1992: 3). Disagreements as to the settlement pattern in Edom in the earliest part of the Iron Age have been the subject of a few exchanges between Bienkowski and Finkelstein in the past (Bienkowski 1992 a, b; Finkelstein 1992a, b). The question as to the rise of the Edomite state has also been a matter of contention. It was assumed that the establishment of the Kingdom of Edom occurred in the 7th century BCE, as a result of Assyrian interests, although there might have been occupation dating to the Late Bronze and early Iron Ages in the northern part (Bienkowski 1992: 8). The lack of archaeological data has hindered observations, but additional data on the geographical area known as Edom are now fast becoming available.

Knauf and Lenzen wrote in the 1980s that Edomites might have been involved in the production of copper in the 1st millennium BCE (Knauf and Lenzen 1987: 874). Levy *et al.* attribute the rise of Edomite complex society to the Iron I settlement at Khirbat en-Nahas in the 11th century BCE, pre-dating the «Assyrian Imperialistic» interests of the 8th-7th centuries BCE, in order to fill the void caused by the disruption of copper production in Cyprus, caused, in turn, by the collapse of the «complex societies» of the eastern Mediterranean (Levy 2004: 866). Fritz proposes Midianite involvement in the renewed copper works at Feinan, following the cessation of mining in the area of Wadi el-Mene'iyeh (modern Timna) on the western edge of the Arabah, which was abandoned by the Egyptians in the mid-12th century BCE (Fritz 2002: 100). The Midianites, or at least so-called Midianite ceramics, have been noted in copper working areas at Barqa el Hetiye, at Tel Masos Stratum II (Kempinski 1993: 989), at Tell Jadur in the Hebron hills, where a bronze trident was found (see above), and at Amman (Fritz 2002: 98-99). The assumption that it was these people, whatever their names might have been, who were specialists in the exploitation of metal ores and the production of the metal, still does not account for the producers of the finished goods or for the distribution network.

Knauf wished to see Philistine «pivotal status» as the important factor in the growth of the 11th century sites in the Rift Valley (Knauf 2000: 84-85). Yet the Philistine monopoly should be re-evaluated, especially as Knauf himself wrote that the period in which the site of Tel Kinrot chiefly flourished (Levels VI, VA and VB) coincides with that of Dan VI and possibly V (not Vb?) and with that of Megiddo VIa (Knauf 2000: 85), whose northward connections with the Lebanese coast cannot be ignored. Of course an early Philistine interest and eventually a Phoenician take-over are also possibilities. A particular problem associated with Knauf's scenario, however, concerns his attempts to use the low chronology, as can be seen in another of his publications (Knauf 1998: 226-229). We shall just have to wait for the final publication of the important site of Tel Kinrot.

The reasons for the changes in production centers or, in our case, the renewed interest in the Feinan mines, should also be sought on the northern Canaanite/Phoenician coast. Some disruption in the maritime network occurred in the first part of the 12th century BCE following the demise of Ugarit, although the eastern Mediterranean by no means came to a standstill. Although no Cypriote ceramics seem to have reached sites on either side of the Jordan River during most of the 12th and part of the 11th century BCE, many sites along the northern coast continued to function well beyond the «crisis years». The data now available from the site of Dor as well as from sites in Cyprus, such as Enkomi/Salamis, and later Kouklia, Skales and Kaloriziki, seem to negate the argument that the maritime network was not functioning at all. Ceramics termed «Phoenician» wares found at Skales, for instance, were published as originating on the Lebanese coast (Bikai 1978), and Instrumental Neutron Activation Analysis corroborates that conclusion.

The site of Khirbet el Meshash (Tel Masos), situated in the Negev desert ca. 12 kms east of Beer Sheba, where metal workshops were found dating to the 11th century, is of special interest for this study. The provenance of the copper found there is assumed by the excavators, Fritz and Kempinski, to have been the Feinan mines (Fritz and Kempinski 1983; Fritz 2002: 95) – a plausible assumption, considering the proximity of the mines to the site. While Levy sees the re-commencementof copper production in the Feinan region as a by-product of the rising Edomite state (Levy *et al.* 2004), Finkelstein dates the emergence of Edom as an entity to ca. 800 BCE, when it is mentioned in the records of the Assyrian king, Adad-nirari III (Finkelstein 2005). He connects the rise in copper production in the Iron Ib period with contact between Khirbet en Nahas and what he calls the Chiefdom of Tel Masos

(Finkelstein 2005), where evidence of copper/bronze production industry has been noted. This Chiefdom is seen by him as acting as an intermediary with the Philistine coast, for which the trade in copper from Khirbet en-Nahas was a major element – an idea already proposed by Knauf (1995: 112-113). In doing this Finkelstein negates the possibility of the early rise of the Edomite State, proposed by Levy, and of contacts between Khirbet en Nahas and the highlands of Edom. The arguments presented by Finkelstein as to the important position of Tel Masos and Beer Sheba *vis a vis* Khirbet en-Nahas are as follows: «… the few (late?) Iron I sites of the Edomite highlands represent only half of the Khirbet en-Nahas sequence (the Iron I), while the much stronger, and longer late Iron I-IIA activity in the Beer-Sheba Valley, mainly at Tel Massos, fits perfectly the period of occupation of Khirbet en-Nahas» (Finkelstein 2005) .

The possibility that changes in trade networks as well as in geopolitical transformations took place over a period of ca. 100 years should certainly be considered. While no clear provenance can be determined for the copper used at the northern sites of Tel Dan and Megiddo in the Iron I period, the results of lead isotope analyses of the Jatt hoard, containing objects stylistically similar to ones from Megiddo, Tel Zeror and Achziv (the latter clearly a coastal Canaanite/Phoenician site), have shown that the copper of which they were made originated in the Feinan area (see appendix b). The Midianite ceramics, which seem to go hand-in-hand with copper production in these periods, may be associated with groups with a tradition of copper prospecting and producing. However, we propose that the artisans who manufactured the objects should be sought elsewhere, on the northern coast of Canaan (the area known as Phoenicia), where the production of metal goods, among other technological industries, was part of the Bronze Age inheritance. The Phoenician Bichrome ceramics found at Tel Masos (Kempinski 1993: 998) join the Black on Red ware noted by Fritz at Barqa el-Hetiyeh. With the excavation at Tell en-Nahas, the appetite for more data on habitation and metal production in the Feinan region increases.

TEL DAN

A. Biran started excavating Tel Dan as an extended project in the 1960s (Biran 1994; Ben Dov and Biran 2002). Dan/Laish is integrated into this study not only because of its very active metal industry; another reason for its inclusion is its setting near the source of the Jordan River with connections north and south as well as east and west. Its geographical relationship to the Phoenician coast, via Kamid el Loz and the Beqa' Valley, as well as to the sites on the eastern side of the Jordan River and to Megiddo, equipped the site with tremendous economic advantages. Its pivotal position may be seen in the house model which compares well with ones from Tel Hadar as well as Hazor, Kamid el-Loz, Ugarit and Deir Alla' (see above).

Connections with the northern Canaanite/Phoenician coast are already well evidenced in the 14th-13th centuries BCE. In a rich built tomb dating to that period, Mycenaean ceramics of Argolid provenance, including a «chariot krater», were found (Biran and Ben Dov 2002: 110; Gunneweg *et al*. 1992: 58*). Bell has favorably compared the Mycenaean imports at Dan with those at Sarepta on the coast, and has in turn compared those at Sarepta to the Mycenaean ceramics found in the temple at Kamid el-Loz in the Beqa' Valley in Lebanon. She supports Koehl's proposal that Sarepta was, at least during the 13th century, a distribution center of these imported wares to inland sites (Koehl 1985: 144; Bell 2005a:108;2005b:366). Undecorated «local» ceramics from the Tel Dan tomb were also analyzed by neutron activation and found to have originated on the northern Canaanite coast/Phoenicia (Gunneweg *et al*. 1992: 61*). The contacts between Tel Dan/Laish and the coast via Kamid el Loz and the Litani route cannot be ignored in any study of the area.

In Tel Dan Stratum VI, dated by Biran to the 12th century, storage pits and bronze workshops were already noted, indicating a mode of life, which shows changes from the previous stratum (Biran 1994: 132). Biran attributes the changes to the settlement at the site, previously called Laish, of the tribe of Dan, although no consensus has been reached as to the date of the conquest (Biran 1994: 125). The greatest change from the previous stratum (VII), associated with Canaanite traditions, is the appearance of large deep storage pits, some of them lined, which were found in clusters over the tell, especially in area B where they were dug into the debris of the earlier strata. The local ware is characterized by the appearance of large amphorae and *pithoi*. This is the stratum in which *pithoi* of the Galilean type, known from Dan (Laish) and Hazor in the Late Bronze Age, appeared alongside Collared Rim jars originating in several localities besides Dan (Yellin and Gunneweg 1989: 133- 141). Biran further states that, whatever the occupations of the Danites (the inhabitants of Stratum VI) were, they were also involved in metalworking (Biran 1994: 135). In courtyard 7026 of Stratum VI and its environs clear evidence of metalworking was noted (Biran 1994: 147-151). It was located alongside *pithoi* of the Collared Rim type, very like the ones at Tel Nami (Artzy

1994; Salmon 2001). Also found were an ivory handle and a metal blade (although Biran does not say which metal). He dates the finds to the beginning of the 12th century BCE (Biran 1994: 151).

In the next occupation level, Stratum V, the remains also indicate extensive metalworking. In area B (although in a later stratum, Stratum IVB) a complete crucible, with bronze slag clearly visible, was found inside a stone installation, while in the vicinity were parts of *tuyerès* (Biran 1994: 147), clear evidence of metalworking. These were associated with bichrome jugs dated to the end of the 11th century or the beginning of the 10th century BCE, and compared with those of Tell Qasile Stratum X (Biran 1994: 155, Fig. 115). In the following stratum, Stratum IVa, there was a decline in metalworking activities (Biran 1994: 157).

Special attention is paid in the publication to the metalwork of the Iron Age, associated by the excavator with Biblical stories involving the tribe of Dan. There are, however, signs of earlier metallurgical activities, particularly in Late Bronze I (Biran 1994: 147). Biran makes a point of the fact that an analysis carried out by Shalev showed that the mineral composition of the slag and metal of the two periods, Late Bronze I and Iron I, were not the same, and that this complicated the picture. As will be shown in the discussion, however, it seems that it does not necessarily complicate the picture; rather it enhances it, since the origin of the metal in the different periods is not the same. Dan/Laish should be considered as a pivotal site on the route leading from the Lebanese coast to areas both west and east of the Jordan River. The economic interests of the northern Canaanite coast/Phoenicians already in the 13th-12th centuries, especially those of the southern cities, Tyre, Sidon and Sarepta, also need to be considered. These interests, among other things, could well have included Feinan copper.

NORTHERN COASTAL CANAANITE SITES/PHOENICIA

The terms «Phoenicia» and «Phoenicians» as used by archaeologists and historians have given rise to numerous misconceptions. The terms are indigenous to neither the region nor the people to which they are applied. «Phoenicians» was a name given to the inhabitants of the northern coastal Levant by the Greeks, and those so designated as members of that perceived group did not use it for themselves. The meaning of the name has been discussed extensively in previous studies (Aubet 1994: 6-9), and only a brief summary is given here. By the Late Bronze Age, several cities in the area more or less equivalent to modern Lebanon, in which coastal Canaanites lived, were settled, had harbors, and corresponded with the Egyptian Pharaoh. These people were named after the individual city in which they resided: Sidonians, Tyrians, and so on. Aubet (1994: 11) mentions that the word Canaan has a dual meaning, ethnic and toponymic, and the color red or purple. She further suggests that the Mycenaeans had already translated the latter meaning as the Greek word *phoinix*, also meaning red, which could well be the origin of the name among the Greeks. The Egyptians had several names for the area, among them Djahy, which appears in the annals of Thutmosis III, where harbors, ships and timber are described, as well as luxury cargoes such as olive oil, incense, and finished metal goods (Bikai 1992:134; Mizrahi 2005: 470-472). Bikai also reintroduces the Egyptian term *Fenkhu*, based on an interpretation of Vandersleyen dating from 1971. This term was used to describe a group settled in the north that was connected in some way with the battle of Megiddo. Thutmosis is described as having gone up north towards Erkatu/Irqata (identified with Tell Arqa [Goren *et al.* 2004: 122] and recently excavated by J.-P. Thalmann [2000]), to put down a rebellion of the *Fenkhu*. The identification of *Fenkhu* as Phoenicians is not certain, but should be considered seriously. Bikai further introduces the designation *Hau-nebut*, which, following Vandersleyen, she seems to accept as one of two names for the same geographical entity, that is the area we identify as Phoenicia Bikai 1992:134-135). As to their linguistic identification, we know from the literary sources that northwestern Semitic was the official written language of the people who inhabited the area in the 2nd and 1st millennia BCE.

The best-known Late Bronze city in the area was Ras Shamra-Ugarit, located in modern Syria, just across the sea from the tip of the Cypriote Karpas peninsula. The extensive archival material found at the site and the continuing excavations have established not only its importance in the Bronze Age, but also its dominance according to our concept of the area. The written documents indicate that Ugarit was both a major player in the trade network of the eastern Mediterranean, and the foremost established trading center in the northern coastal Levant. It is situated near the bay of Minet el-Beida and 4 km north of Ras Ibn Hani, a logistically strategic position for a maritime center. Its demise, in the first quarter of the 12th century BCE, is attributed to the «Sea Peoples», although signs of the changing winds of fortune and problems from the western borders were noticeable in the later part of the 13th century. The documents often cited as connecting the «Sea Peoples» with upheavals in the eastern Mediterranean and the final destruction of Ugarit come not only from Egypt, but from Ras Shamra-Ugarit itself in the form of letters from its allies, the Hittites, Carchemish and Alasiya (Yon 1992: 116-118).

The military superpowers in the southern part of the eastern Mediterranean in the 13th century were no doubt Egypt and Hatti, and the result of the international battle of Kadesh ensured that they had to continue to accept one another's presence. Ugarit and Cyprus (or parts of it), although not equal in military capabilities, were nonetheless economic powers to be reckoned with and, at times, depended on. Competition for markets necessitated effective management of the maintenance and construction of sea-going vessels, the keeping open of routes and anchorages, and the availability of required merchandise. It also demanded enough manpower. The upkeep of maritime routes and their outlets was an arduous chore. It kept mariners and merchants away from their homes for very long periods of time (sometimes years), not to mention exposing them to the grave dangers associated with maritime travel, even in the few navigable months of the year. By the second half of the 13th century BCE Ugarit was either paying for or hiring others to fulfill tasks which its own inhabitants did not wish to carry out. These included military mercenaries for guard duties (Heltzer 1983: 13) as well as most probably hirelings who took part in their flourishing trade (Artzy 1997). Even the building of seagoing vessels, a task of foremost importance, was at times consigned by Ugarit to Byblos (Lambrou-Phillipson 1993: 170).

13th century BCE Ugarit was smaller than it was in the 14th century. The number of inhabitants is estimated as 8,000-10,000 (Liverani 1987; Yon 1992: 113), with 25,000 peasants/villagers (Heltzer 1976). During most of the 13th century it was under the suzerainty of the Hittites, who required it to supply military contingents. The city seems to have evaded contributing some of its men to the Hittites by making financial arrangements instead. A further weakness, as we learn from a letter written by the Hittite king to the prefect of Ugarit (Lehmann 1979; Yon 1992; Klengel 1993; Heltzer 1999), was the inexperience of its very young king at the end of the 13th century BCE. In a frequently quoted tablet (UT 2062), 150 boats are mentioned. This has been taken to mean that the navy of Ugarit was large and domineering (Linder 1981). However, Lambrou-Phillipson has shown that the text can be understood in a very different manner to indicate, not the strengths of the king and Ugarit in the last days of the city, but their weaknesses (Lambrou-Phillipson 1993: 165).

In a recent PhD thesis Bell (2005a) discusses the various theories and studies concerning Ugarit's trade and its internal organization, especially in the 2nd half of the 13th century BCE. Included in this discussion are studies by Heltzer (1976; 1999), Liverani (1987; 2003) Sherratt and Sherratt (2001), Schloen (2001) and Monroe (2000). Suffice it to add here that internal problems within Ugarit and its close familial neighbors, such as Ras ibn Hani and Ras Basit, contributed greatly to its demise. Strangely, following the destruction, Ugarit was not re-settled. It was completely deserted, and although there are some signs of temporary settlement, possibly of squatters or shepherds, following its destruction, this was sparse and temporary (Yon 1992: 119).

A tablet alleged to have been found in a kiln in the Ugaritic palace is a letter (RS20.238) sent by the last king of Ugarit to the king of Alashiya. He relays the message that seven enemy ships are causing great damage to Ugarit. This has led to the destruction being attributed to the «Sea Peoples», but other participants in the destruction should be looked for, possibly in closer proximity to the site. Re-examination of the archeological data from the early excavations indicates that the «kiln texts», often seen as indicators of a «Sea Peoples» destruction, were not actually placed in the kiln. The kiln was an oven constructed by the squatters after the destruction of the site, and the tablets fell from the second floor where they were stored (Singer 1999: 705). With this in mind, a further question needs to be raised on account of the curious fact that the site did not recover, despite its favorable position on the coast. The hypothesis that only the «Sea Peoples» were involved in the destruction of this major trade center ought to be re-considered as a result of the increasing grounds for questioning the assumption that the enigmatic «Sea Peoples» caused total havoc along the coast. The sites near Ugarit may have been destroyed, but both Ras Ibn Hani and Ras Basit seem to have been re-settled (Caubet 1992: 125-127). The complete abandonment of Ugarit (and Ugarit alone), as well as the question of what happened to its populace, should give rise to further thought. Could the destruction have been caused by internal strife and the abandonment by some directing force, which did not wish to see a revived Ugarit?

Although the significance of the economic supremacy of Ugarit should not be minimized, the importance of other sites in the northern coastal Canaanite/Phoenician area should also be taken into consideration. Besides Ras Shamra-Ugarit, other coastal cities, such as, for instance, Tyre, Sidon and Byblos, vied for economic advantage. It should be remembered that the coastal plain in the northern coastal areas was very narrow, not allowing much scope for natural population growth or the ability to accumulate surpluses, and that this encouraged the cities to seek other economic means. Prospecting for other commercial opportunities, among them copper sources, would have been only natural, and in the slightly later history of Tyre and Sidon, for which we have more written evidence, their interests in copper (as well as silver) mines across the sea is documented (Aubet 2001: 124). Wealth accumulated by the southern Phoenician cities is already documented in the Amarna texts (EA89). Rib Addi of Byblos wro-

te to the Pharaoh about the great wealth of Tyre, whose palace he compared favorably with that of Ugarit (Moran 1992: 162). But the wheels of fortune were erratic and capricious. As the result of competition, alliances between the cities could be warm and yet change rapidly to cold aversion. Abi-Milku, the king of Tyre, wrote to the Pharaoh (Ea 151): «I am indeed guarding carefully the city of the king that he put in my charge. My intention has been to go to see the face of the king, my lord, but I have not been able, due to Zimredda of Sidon. He heard that I was going to Egypt, and so he waged war against me» (Moran 1992: 238).

There were close familial relationships between Byblos and Tyre, which are worth considering in evaluating the balance of power in the area. At the same time, close relations between Ugarit and Sidon in the 14th century should also be kept in mind. Sidon (EA144 and 145), along with others, joined Suppililiuma I of the rising Hittite empire, while Tyre (EA146-155, especially EA 148) and Byblos (EA 101-140) stayed in the Egyptian camp. The distances between Alalah and Ugarit, the sites most involved in western Anatolian trade, on the one hand, and Sidon and Tyre, on the other, is more than 250 kms. Thus, despite the familial relationships as well as the cultural ones, it is impossible to believe that the southern northern coastal Canaanites/Phoenicians did not develop their own commercial activities, independently of Ugarit. Commercial prospecting carried out by the southern city states was not done in tandem, and disagreements would not have been unusual occurrences.

From the 13th century BCE, Sidon emerges, from the few written sources –as well as, so far, the limited archeological data– as a leading city. Aubet has shown that in letters from Tyre and Sidon to Ugarit, which are assumed to have been written in the later part of the 13th or very early 12th centuries BCE, the king of Sidon referred to himself as the king of a country equal to Ugarit, while the king of Tyre was still referred to as the king of a city. In Papyrus Anastasi I, Sidon seems to be coupled with the port city of Sarepta (Pritchard 1969: 477; Anderson 1988: 35). Texts found more recently at Ugarit indicate that Sidon was considered the other pre-eminent northern coastal Canaanite/Phoenician city besides Ugarit (Arnaud 1992: 182). It is at this time that the commercial activities of Sidon seem to have been increasing (Aubet 2000: 72). By the end of the 12th and the beginning of the 11th centuries BCE, Sidon is the city, along with Byblos, mentioned in Assyrian texts as paying tribute to Tiglat Pileser I (Pritchard 1969: 275).

Our natural tendency is to view the commercial expansion of the northern coastal Canaanites/Phoenicians as focused, above all, on the maritime network, and rightly so; but their overland commercial activities should not be forgotten. At its height, the site of Kamid el-Loz (Kumidi of the Amarna letters) in the southern Beqa'a valley of the Lebanon must have played an important role. The site is situated on the route which crosses the mountains from Sidon to Damascus (Hachmann 1983: 25-37; 1989: 93; Heinz *et al.* 2001), as well as on the route south to the northern Galilee, where the sites of Dan and Hazor are located. Three clay house models, at Kamid el Loz, Ugarit, and Hazor seem to show that there are contacts, which may have included cultic practices (Negbi 1998: 186). Contacts with the north are also seen in ivory items found at Deir Alla.' At Kamid el Loz quite a few ivory objects were found, among them duck pyxides (Homès-Frederique 1987: 91). The origin of the workshops producing these exceptional ivory objects has not been established, but out interest here is in the distribution network which includes Deir Alla' in modern Jordan. Numerous bronzes were also found in Late Bronze II strata at Kamid el Loz, although there is no report of industrial activity. Could the metal Industry at Deir Alla' be in some way connected with the Feinan copper mines, with Kamid el-Loz and ultimately with Sidon on the coast and beyond? Analyses of metal objects from various sites dating to that period might help to answer this question.

The dearth of written evidence from the 12th century BCE is equaled by the limited results from archaeological excavations, especially in Sidon and Tyre. Excavations, past and present, in the area of modern Lebanon have shown that there are few, if any, signs of destruction datable to the first part of the 12th century BCE, the period in which the «Sea Peoples» were active according to Egyptian writings. Bikai's excavations at Tyre, although small in proportion to the importance of the site, indicate that there was no clear destruction level between Stratum XV (the Late Bronze Age) and Stratum XI (the 9th century BCE) (Bikai 1978: PL 64-66). In the volume, which deals with the «crisis years», she has indicated the existence of problems in attributing complete destruction to the coast (Bikai 1992). She quotes Stern, with whom she agrees at least in this case: «…neither Phoenicia nor any of its main centers –Tyre, Sidon, Byblos or Arvad– was ever conquered by the Sea Peoples». Sarepta, as we have noted earlier, shows no signs of destruction or conquest in the transition between the 13th and 12th centuries BCE (Bell 2005a: 204-205; 2005b:365), and neither does Sidon (Doumet-Serhal, personal communication). While the great amounts of Cypriote wares which found their way to the coastal sites in the 13th century greatly diminish, there is still evidence for some contacts in the 12th century BCE, including Canaanite storage jars in Cyprus and small amounts of fine Cypriote wares at coastal sites (Bikai 1992: 133). The lack of evidence for destruction of coastal sites further south, such as Akko, Dor and Keisan, has been shown above, and here we merely reiterate that no clear destruction le-

vels in the transition between the Late Bronze and early Iron Ages have been found. Strangely, on the Carmel Coast, only the site of Tel Nami, in the close vicinity of Dor, was destroyed.

Bikai offers an appealing interpretation of the events of the period, through a creative reading of the Ramses III inscriptions. She quotes (Bikai 1992: 136): «All the plains and all the impenetrable hill countries [of] the Fenkhu, who know not Egypt, are under the feet of this good god», and attributes this quotation to a possible Phoenician rebellion against the Egyptians, in which the «Sea Peoples», as she has argued previously, might also have been involved. The coast was no longer under Egyptian control following Ramses II, and already, during his reign, there were signs that Egyptian control over the coast, as in the area of the Carmel Ridge, was waning (Artzy 2006b). Some contacts with the Egyptians seem to have continued, if we consider the occurrences of Queen Tausret's cartouche at Deir Alla, Akko and Sidon. However, such contacts were probably of a commercial rather than a military nature. Sherratt has pointed out that the Egyptians were no longer in a position to interfere in the functions of the Phoenician cities before the beginning of the 12th century BCE (Sherratt 2003: 50). All this is clearly echoed in the Tale of Wen Amon, in which the Phoenician cities, including Dor (see above), are denounced as being inhabited by «Sikil», members of the «Sea Peoples», perhaps not particularly surprising since some of the cities, such as Sidon and Byblos, were already paying tribute to Tiglat Pileser I of Assyria (1115-1076) (Pritchard 1969: 275), and clearly no longer beholden to the Egyptians.

The area commonly regarded as «Phoenicia» is narrow, but ca. 400 kms long. It extends from opposite the northern to southern shores of Cyprus and beyond. Bikai (1987: 126) has written: «If you ask a Tyrian fisherman today how he gets to Cyprus he will recite the following: you begin in the afternoon and go north until the mountain of Lebanon is on your right (just about the 34th parallel) then you turn toward the mountain of Cyprus and in the morning you are in Larnaca». While this might be true of a sailor heading for Cyprus from Tyre or Sidon, it is not true of one leaving Ugarit or Byblos. There was more than one maritime route between the Phoenician coast and Cyprus, and we should expect that the coastal sites, from the Carmel Coast to Ugarit, had diverse contacts on the Cypriote coasts. Some neutron activation analyses have been carried out on Cypriote imports at the coastal sites and these do indeed show variations. 12th and 11th century ceramics found at Akko and Tell Keisan seem to have originated in the Palaepaphos (Kouklia) area (Gunneweg and Perlman 1994: 561;D'Agata *et al*. 2005: 375). Those from Beth Shean originate on the eastern coast of Cyprus, and D'Agata *et al.* compare these to ceramics found at Milia. Since the controls used for comparison are from early Late Bronze (Bichrome) wares and there are no ceramics from Milia comparable in date to those from Beth Shean, it is suggested that the city of origin of the samples from Beth Shean tested by D'agata *et al*. is actually Enkomi. The situation in Philistia is quite different. Tests carried out on the pottery called Mycenaean IIIC1b from Ashdod show clearly that it was locally produced (Perlman *et al*. 1971: 216-219), and the same is true of similar ware from Tel Miqne/Ekron (Gunneweg *et al.* 1986: 3-16). Strangely, the ceramic tradition at Ras ibn Hani appears to be closer to that of Philistia than to that of other northern sites. While the ceramics associated with the new 12th century settlement following the destruction of Ugarit, continue the tradition of the previous period (Lagarce and Lagarce 1988: 154-155), alongside them appears 'Mycenaean IIIC:1, which, like that of Philistia, undergoes a transition from monochrome to bichrome (Lagarce and Lagarce 1988: 153). No analyses of the wares from Ras ibn Hani have been published, and thus it is not known whether they were imported or locally produced, although it has been suggested that they are a local development (Caubet 1992: 127). Schreiber has recently published a new study of the Cypro-Phoenician pottery which amalgamates previous studies (Schreiber 2003).

It is impossible to lump together the various cities and groups that make up the northern coastal Canaanites/Phoenicians. It is equally impossible to amalgamate their trade networks. Their geographical positions and the geo-political changes which took place within the period between the 13th century and the end of the 11th century BCE produced a different history for each of the cities. While there might have been some standardization of behavior among the cities under the influence of a strong foreign element, such as the Hittites, the Egyptians, and eventually the Assyrians, normally what drove the cities was competition with one another, encouraging them to change their alliances from time to time and develop their own trade networks. Cultural continuity alongside strategic change is to be expected in the northern coastal area from the end of the 13th into the 12th and 11th centuries. The 13th century metal industry in the triangle formed by the coast, including the Carmel Ridge and Akko Bay area in modern Israel, the southern Phoenician area in modern Lebanon, the important sites in modern coastal Syria, and Cyprus, can best be described as a *koine* of metalwork. There are some regional differences, especially in the distribution of types of objects. In any one area there might be more oil lamps and juglets, and in another more weapons or cultic paraphernalia; and even in the regional subdivision of the cultic objects there are preferences. In Cyprus rod stands are far more numerous than incense stands, in contrast to the Levant; but they make their appearance in both areas. The transmission of technological expertise was a natural development among the cities

of the northern coastal areas/Phoenicia, as were their cultural affinities. In a period characterized by individual human mobility, it is also only natural that some changes took place, whether technological or typological. Change within a context of continuity is to be expected, and not only in metal production. It is not always easy to distinguish between a member of one group and a member of another, between objects dating to the transition from the 13th to the 12th century BCE, such as the incense burners from Ugarit and Nami, and those attributed to the 11th century BCE, such as the ones from Megiddo Stratum VIa and Jatt.

CYPRUS

Cyprus was a prosperous island in the 14th and 13th centuries BCE, and, while the upheavals in the Mediterranean at the end of the 13th century may have left their mark on the island, they did not bring a halt to its internal economic growth or its international trade. Although the enigmatic «Sea Peoples» have traditionally had their share of the blame for disturbances on the island, it is worth pointing out that the situation in Cyprus in the 13th and 12th centuries was by no means uniform, just as its Late Bronze settlement patterns were far from homogeneous. Late Cypriote IIC brought with it some new settlements, such as Pyla-*Kokkinokremos* (Karageorghis and Demas 1984), and possibly a bit later Maa-Palaeokastro, as well as new prosperity to others, such as Kalavasos-*Ayios Dhimitrios*, Maroni-*Vournes*, Alassa-*Pano Mandilaris* and Kition. While at some places, such as at Kalavasos-*Ayios Dhimitrios*, abandonment seems to have taken place during the LCIIC period, at Pyla-*Kokkinokremos* it was at the transition from LCIIC to LCIIIA. Enkomi, Hala Sultan Tekke, Kition and Palaepaphos all seem to have weathered any crisis at the end of the LCIIC period and continued into LCIIIA. Karageorghis wrote that there were changes at Enkomi in LCIIIA following the destruction of the prosperous LCIIC city, which introduced ashlar masonry in Enkomi Level IIIA as well as radical reorganization (Karageorghis 1990b: 19-20). However, there seems to have been ashlar masonry at Enkomi in LCIIC, and its level IIIA is in many ways a continuation and intensification of its Level IIB, as Courtois *et al.* have shown (Courtois *et al.* 1986: note 7). The site of Maa-*Palaeokastro*, on the western side of Cyprus was established, according to its excavators, at about the same time as the demise of some of the sites mentioned above. Its foundation is dated to the very end of LCIIC, although its occupation continued well into LCIIIA:1 (Karageorghis 1990b: 26).

Not all these sites were settled at one time, nor were they destroyed or abandoned simultaneously. Scholars differ as to the causes of the destructions or abandonments as well as their dates. Our concern is to show that Cyprus should not be treated as a monolith, and that industries and commerce continued despite any problems associated with this general period in the eastern Mediterranean. It should be added here that the demise of such sites as Maroni-*Vournes* and Kalavasos-*Ayios Dhimitrios* took place at about the same time as the changes on the Carmel coast and the cessation of use of the anchorage at Tell Abu Hawam, probably at the end of Level V (Artzy 2005; 2006b).

Bronze hoards have been found at several sites in Cyprus, and a number of these appear to have been deposited during the LCIIC and LCIIIA periods. There are several explanations as to why so many were deposited, especially during this time. Metal hoards are known from other periods, as shown by Knapp, Muhly and Muhly (1988: 234-235), but the number of hoards of this date found in Cyprus is impressive. Catling (1964: 278-289) lists eight hoards, Matthäus and Schumacher-Matthäus (1986: 173-177) list 19 and Knapp *et al.* (1988: 244) add two more. Catling, who devotes a whole chapter to the hoards in his monumental study, concluded that they were to be dated to the 12th century, although he pointed out that not all of them had proper archaeological contexts and must therefore be dated by comparison with other hoards (Catling 1964: 279). His original dating was closely bound up with the arrival of Achaean settlers or colonizers (Catling 1964: 299-302) who contributed their expertise to the metal industry of Cyprus in the LCIIIA period – hence the name of his book, *Cypriot Bronzework in the Mycenaean World*. However, there seems little doubt that a bronze industry was already an important part of Cypriote economic growth in the LCIIB and IIC periods of the later 14th and 13th centuries (Knapp, Muhly and Muhly 1988: 246). Indeed, Catling in a 1984 paper conceded that the Cypriot metal industry preceded the arrival of the Achaeans (Catling 1984: 88). Papapasavvas, in his studies of the rod stands, has shown that some of these must be dated to LCIIC (Papasavvas 2001: 91-124; 2003: 23). The finds from the Cape Gelidonya shipwreck (Bass1967: 105) and from Tel Nami (Artzy 1994: 126) accord with his conclusion. The Gelidonya wreck has contributed greatly to our knowledge of the period in general and of the international nature of the metal industry in particular. Bass concluded that the cargo was Cypriote, that some of the items may have had their origins either in Cyprus or in the Levant, and that others originated in the Levant. None showed any clear signs of Aegean provenance (Bass 1967: 117).

From the early 13th century BCE Cyprus witnessed steady changes which, as we have seen, included new or renewed urban centers, such as Kalavasos-*Ayios Dimitrios*, Maroni-*Vournes* and Enkomi, which were associated with international maritime trade. It is thus very hard to imagine that a «general lack of many metals and prestige goods formerly available from [the eastern Mediterranean], wreaked socio-political havoc on Cyprus», as Knapp, Muhly and Muhly (1988: 169) suggest. Their proposal that increased competition between sites, with Kalavasos-*Ayios Dhimitrios*, Maroni-*Vournes*, Alassa-*Pano Mandilaris*, Kouklia-*Palaepaphos* and Hala Sultan Tekke-*Vyzakia* joining the changing trade networks, seems a reasonable explanation for changes in conditions in this period, although not necessarily for the hoarding phenomenon.

While the classifications envisaged by Knapp (1988) might not fit all hoards, there seems little reason to suppose that all the Cypriote hoards were of a cultic nature, as proposed by Matthäus and Schumacher-Matthäus (1986: 170). The «miniature hoard» which consists mainly of small pieces, including some miniatures (Catling 1964: 288-289;), should also be viewed in relation to Salamis Tomb I, which is quite close to it in date (Dikaios 1969: 296; 1971: 469). Although there are not many pieces of metal in Tomb 1 (Yon 1971: PL LII-LV), the interesting practice of depositing metal among grave goods is now seen at Salamis, which is barely 3 km north-east of Enkomi. Yon (1999: 18) dates the grave to the mid-11th century BCE. She states that the habitation at Salamis started at the beginning of the Cypro-Geometric period, when the urban centre at Enkomi was not yet completely abandoned. Tomb 1 contained local Cypriote wares, including Proto White Painted Ware as well as ceramic vessels whose origin lies in modern Lebanon, on the northern coast of the Levant (Yon 1999: 18-19).

The data from Enkomi and Salamis indicate that the eastern coast of Cyprus maintained contact with the northern coastal Canaanite/Phoenician cities during the 12th century, following the demise of Ras Shamra-Ugarit, and on into the 11th century. The city of Salamis was a well organized town with an established wealthy class in whose material culture, according to Yon (1999: 23), Aegean traditions dominated. A number of shapes in the locally produced ceramic repertoire descended ultimately from Aegean types (Iacovou 1988; Yon 1999: 19), although shapes of Levantine origin were also present. Aegean type wares, locally produced in Cyprus and in the coastal Levant, had already made their appearance in the 13th century BCE. These ceramics did not necessarily mean that their producers or those who used them were of Greek lineage or thought of themselves as Greeks. The shift from Enkomi to Salamis is also marked by some change in burial customs. While at Enkomi some burials were found below and around the houses, at Salamis all the graves were placed outside the settlement, except for the Levantine practice of burying newborn babies in jars in the settlement (Yon 1999: 22). Bikai has identified early Phoenician Red Ware in LCIII to CGIA contexts. Thus northern coastal Canaanite/Phoenician pottery in Cyprus can be dated to the 11th century at Salamis and Alaas (Karageorghis 1975: 57, Pls. VII: 13, XV: 26, XIX: 25) and probably a little later in tombs at Kourion-*Kaloriziki* and Palaepaphos-*Skales* (Bikai 1987: 125).

In the Cypro-Geometric period burials rich in metals are found, especially at Palaeopaphos-*Skales* in the southwestern part of the island (Karageorghis 1983). The practice of placing metals in graves in Cyprus and in the coastal Levant was not new in this period. In Cyprus, Late Bronze examples include Palaepaphos-*Teratsoudhia* (Karageorghis 1990a: Pls. LII-LV) and early Iron Age examples Kourion-*Kaloriziki* (Benson 1973: 121-123; Buitron-Oliver 1999: 70-73); in the Levant, the Late Bronze includes the Persian Garden at Akko and Nami, and the later Iron Ib period Tell es-Sa'idiyeh and Jatt. One explanation might have to do with the abundance of bronze from the late 13th century onwards, because of the increased production and availability of the metal in the eastern and probably also the central Mediterranean and possibly other areas.

The wealth of metals placed in graves has, in the past, been attributed to a certain type of «heroic burial». As Karageorghis (2003: 339) has written: «The exceptional social standing and personal character of kings and heroes warranted exceptional burials…» This was already true of members of the ruling classes in the Bronze Age, but Karageorghis has drawn a distinction, pointing out that, although in the Late Bronze Age there were exceptionally wealthy graves (for instance, in Enkomi Tombs 93 and 18 as well as in Kalavasos-*Ayios Dhimitrios* Tomb 11), it was in the later tombs that weaponry seemed to find greater importance. The phenomenon of rich burials accompanied by weapons (for males), equids and possibly occasionally human sacrifice exists not only in Cyprus, according to Karageorghis, but in Crete and Greece already in the 11th century BCE, although these practices are said to have disappeared in Cyprus and to have reappeared only in the Cypro-Archaic I period (Karageorghis 2003: 341). Among the objects found in the graves are bronze tripods, bronze or iron *obeloi (*spits) and knives, although other weapons are not so plentiful. If we accept the definition, it is clear that members of an elite occupied these graves, whether we like to call them warriors, princes (Muhly 2003), wandering heroes (Catling 1994:134), or even traveling samurai (Coldstream 1998: 8). Muhly approaches the topic mainly from an Aegean point of view, stating that these warrior princes could well have been aware of «…the fact that the warrior princes of Crete, Cyprus and Euboea in the

11th and 10th century BCE were familiar with some version of stories contained within the Iliad and Odyssey, not necessarily the text as we know it today, and almost certainly not in written form» (Muhly 2003: 25). Although he does not subscribe to the wandering heroes scenario, he does put them in a wider geographical context, adding Anatolia as part of the main focus of activity of these people (Muhly 2003: 31).

As Muhly has remarked, «…these warrior princes…went in for a great deal of ritual or convivial feasting and drinking. They imported not only pottery but complete drinking sets and dining equipment». The element of feasting has been dealt with by both Muhly and Karageorghis. Both relate it to feasting associated with the Homeric world. Muhly mentions tripod stands, four-sided bronze stands, roasting spits, and bronze amphoroid kraters used to hold cremations, but used previously for containing wine (Muhly 2003: 26-31). Examples of all these objects have been found in the Jatt hoard, which, however, can hardly be described as containing Greek elements.

In an article published in the 1980s, Karageorghis suggested that *obeloi* were transmitted from the Greek world to Cyprus (Karageorghis and Lo Schiavo 1989). In a later study, however, he changed his mind and noted that spits appeared earlier in Cyprus than they did in Greece, and thus the transmission was from Cyprus to the Greek world, possibly via Crete where, as he noted, «…*Orientalia* begin to appear in rich tombs of warriors in the 11th-10th centuries BC…» (Karageorghis 2003: 343). While it cannot be shown unequivocally that spits were transmitted from the coastal Levant to Cyprus, this is the more likely direction of transmission.

Feasting on the northern Canaanite coast certainly had a long tradition, long pre-dating the end of the Late Bronze Age, and any influences probably came from the east, from Mesopotamia, and perhaps specifically Mari. Banquets associated with burial, *Kispum*, were known in the 2nd millennium, as a recent discovery at Qatna has shown (Pfälzner 2005). The Biblical accounts of feasts echo Near Eastern ones (King and Stager 2001: 355-357). Feasting should be viewed as a widespread practice, spread across seas and continents. In this case, Cyprus could well have been one avenue of transmission in what eventually, as Karageorghis notes, became the Greek *symposion* (Karageorghis 2003: 344), but with the direction of transmission from east to west.

In the 16th century BCE, coastal sites, from Cilicia in the north to the Gaza Strip in the south, were already importing Bichrome Ware kraters from Cyprus (Artzy 1973; 2001b). In a study carried out recently (Artzy and Hein to be published), it has been noted that far more imported Cypriote Bichrome kraters are found in excavations at Levantine coastal sites than on Cyprus. The same seems to be true of the Cypriote Bichrome Ware bowls with wishbone handles, which probably formed parts of feasting sets. S. Sherratt has pointed out that the appearance of ceramic kraters on the Greek mainland coincides with the rise of the Mycenaean palaces in the 14th century, and that these then continue uninterrupted on down to the 8th century (Sherratt 2004: 326). Interestingly, Mycenaean IIIA2/B1 (late 14th and early 13th century) kraters, including those depicting chariots, seem to be more common in the Levant and Cyprus than in Greece. This is an indication of production for a specific market, a possible ancient practice addressed in the past by Gjerstad (1926), Epstein (1966), and lately Sherratt (1999: 187-189).

Rupp has written that contacts with the Aegean are attested in the CGI period, and states that copper was probably still a major export from Cyprus. Cypriote merchants may have been active participants in these exchanges with the west along with Phoenicians from Tyre (Rupp 1987: 148-9). Bikai has observed that the earliest Phoenician pottery found in Cyprus, the «Red Ware», occurs already in LCIII/CGIA contexts and that its wide distribution is unlikely to have been the result of a casual Phoenician presence (Bikai 1987: 125). Cyprus, or Cypriote sailors played an important role in the 13th century maritime trade, as hired mercenaries as indicated by the augmented numbers of Cypriote wares, White Slip II and Base Ring II, found especially in northern coastal sites and the eastward routes, from the northern Sharon to Ugarit. These should be viewed as products of a Cypriote cottage industry distributed by the mariners as «sailors' trade» (Artzy 1998: 107-114). Since Enkomi continued to flourish well after the fall of Ugarit in the first quarter of the 12th century, it found its counterparts in other northern coastal Canaanite/Phoenician sites, Ras ibn Hani or possibly sites further south, such as Sidon, Sarepta or Tyre, which show no sign of destruction. In the 11th century BCE, Salamis (particularly Tomb I) indicates a continuation of contacts with the northern coastal Canaanites/Phoenicians as do Kaloriziki, Episkopi and *Palaepaphos-Skales* in the 10th century BCE.

The maritime routes changed little between the Late Cypriote and Cypro-Geometric periods. One might imagine that Ugarit, in the Late Bronze Age would have been more closely connected with the eastern sites, such as Enkomi and the Karpas, Nitovikla and the Anatolian coast. As Sidon, Sarepta and Tyre joined the commercial race and following the demise of Ugarit, connections with the south and south-west of the island became stronger, at which point Kition, Amathus, and Palaepaphos flourished.

This is obviously a simplified model of the changes envisioned in the period spanning the 12th and 11th century BCE, and other coastal cities, such as Byblos or Arwad, which have hardly been mentioned, joined the development which took place in the eastern Mediterranean. The sea routes did not change greatly between the 13th and

the 11th centuries BCE. Not only the geographical positions of the northern coastal Canaanite/Phoenician cities, but also their economic objectives and destinations, influenced the direction they traveled. The shift in prominence among the different sites on the Levantine coast and their distant trade networks influenced Cyprus far more than did the Greeks in the 11th century BCE.

It is clear that in Cyprus, where the raw materials, artisans and a tradition of production remained available, metal manufacturing continued beyond the fall of Ugarit. Any disruption in trade networks, which may have accompanied the changes, did not hamper the transmission of expertise. A similar situation seems to have prevailed on the Carmel coast, in northern Sharon and its economic «hinterland», including the site of Megiddo, at least until the final retreat of the Egyptians from the northern sites.

CHAPTER V: CONCLUSIONS

The metal hoard found at Jatt, the ancient *Ginti Karmil*, consists mainly of complete objects. These fall into several different categories, as follows:

open vessels: bowls of different sizes (with and without handles), a cauldron, a «laver», strainers and a lamp;
juglets;
weapons: spearheads, arrowheads, and a sword;
tools and miscellaneous objects: a double axe, knives, horse bits, a trident, a macehead, a spit and mirrors;
zoomorphic weights, in bovine and simian forms;
cult vessels: incense burners/offering stands of two different types, and a rod offering stand/tripod.

The hoard was deposited in a cave, alongside a bone pyxis and ceramics, which include bowls, juglets, flasks, and a lamp. Bronze oxidation residue was noted on most of the ceramics, along with calcium incrustations and organic residues. These substantiate the assumption that the assemblage was found in the cave which the local inhabitants indicated as its findspot. Since the cave, which is located in a residential yard, was illicitly excavated, it is impossible to ascertain that all the objects it contained were reported, found, and registered by the Israel Antiquities Authorities. Local inhabitants claim that the cave yielded yet another incense stand with figures on it, and gold sheeting, possibly from wooden furniture which did not survive the humid atmosphere of the cave. There were rumors that the cave had contained yet more ceramics, but these were refuted by some of the inhabitants. Additional miniscule remains of bronze, consisting of a bowl and fragments of strainers which seem to have broken off the strainer fragments listed in the catalogue, and a few faience beads (Figure 5.1) were shown to the author as having originated in a dump near the cave. It is likely that the cave was used for burial.

The dating of the «hoard» is largely dependent on the ceramic vessels. These without doubt belong to the Iron Ib period, that is the second half of the 11th century or the beginning of the 10th century BCE according to traditional absolute dating. The ceramic assemblage can thus be regarded as contemporary with Stratum VIa at Megiddo, Level 10-9c at Keisan and Stratum X at Qasile. The dating of the bronzes themselves is more complicated, not least because, particularly in the case of metal objects, the length of time between production and deposition can be considerable. There are also fewer objects to act as comparanda since metal, unlike pottery, was a material which could easily be recycled and thus taken out of the archaeological record. There is no simple chronological scheme into which the typologies of the metal objects can easily be slotted. In many instances metal objects found in graves, for instance at Beth Shean or Tell es Sa'idiyeh, have been dated to the period between the 13th and 11th centuries BCE, a comparatively lengthy span during which tremendous changes took place in this area. In Cyprus the situation is similar; and attempts to compare the two areas encounter problems associated with the relative chronologies of different regions of the eastern Mediterranean from around 1200 BCE, as well as the complications presented by their differing terminologies.

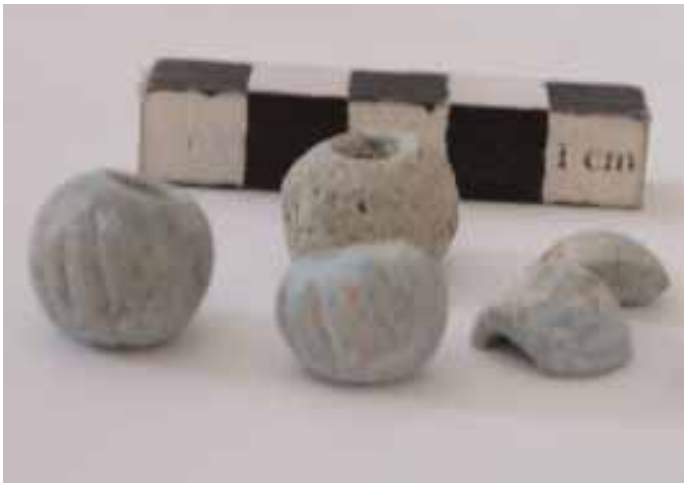


Figure 5.1: Faience beads from Jatt

There are now a few sites which enable us to distinguish bronze assemblages of the end of the Late Bronze from those of the Iron Ib period. The site of Ras Shamra-Ugarit and the small site of Nami, where numerous bronzes have been excavated, provide good representatives of the earlier examples from the Late Bronze IIb period. Bronzes known from this period include incense stands, which are found both at Ras Shamra-Ugarit and at Tel Nami. Similar incense stands were depicted in New Kingdom Egypt, on the ships manned by «Canaanites» portrayed in the Kenamon tomb as well as on Egyptian depictions of victories over «Canaanite» cities. The use and probably also the production of these objects is perhaps thus best attributed to the coastal Canaanites. The close relationship of the northern Canaanite cities, especially Ras Shamra-Ugarit, with the Cypriote copper industry, their close trading relationships with each other and with Cyprus, and the appearance of many comparable objects in both areas point to a *koine* in metal production in the triangle formed by the coast from the Carmel to Ras Shamra-Ugarit and Cyprus.

The next clear, stratigraphical and chronological horizon is supplied by the thick destruction layer of Megiddo VIa, the early Achziv graves, and graves at sites in southwestern Cyprus such as Palaepaphos-*Skales* and Kourion-*Kaloriziki*. The precise date span of the Iron Ib period is still a matter of dispute, but at least during its later part and the transition to Iron IIa, and in Cyprus in Cypro-Geometric I, a thriving production of bronze objects is evident. While there are clear similarities between the Levantine and Cypriote bronze assemblages and between these and the earlier ones, there are also differences, including changes in technology and in the origin of the copper used. In general, however, the northern coastal Canaanite tradition of bronze-working continues.

The renewed exploitation of Feinan copper sources in the early part of the Iron Age, following the withdrawal of the Egyptians and the abandonment of the copper mines at Timna, poses the question of who was involved, not just in the mining of the copper, but also in the production and particularly the distribution of bronze objects. The appearance of elements associated with northern coastal Canaanite/Phoenicians in Transjordan, already starting in the late 13th and 12th centuries BCE, points to these as the most likely initiators of this renewed trade network. The weakening of the previously dominant international maritime merchant city of Ras Shamra-Ugarit at the end of the 13th century and its demise in the early 12th century BCE, geopolitical changes in the area known as Philistia, as well as the disappearance of Egyptian control, first in the northern coastal areas and subsequently in the northern part of modern Israel, together left a void which was filled by the inhabitants of Sidon, Sarepta, Tyre and possibly other cities, who later came to be known by the Greeks as Phoenicians. The early history of these cities is not well known, although written sources at el-Amarna and Ras Shamra-Ugarit hint strongly at the rivalry among these cities. It would certainly be a mistake to regard them as a unified political and economic body. Each of them had its own economic interests and developed its own terrestrial and maritime trade routes. Their rivalry did not always necessarily take a peaceful form, and the remains of some destructions along the coast might well be attributable to the conflicts between them rather than to marauders from afar, such as «Sea Peoples» or Aegean invaders. Because of their common background, they shared much the same material and religious/ideological culture with other parts of the Levant and with Cyprus. However, with renewed excavations in the Phoenician cities, we may be

able to begin to observe distinctions which might help us separate the material culture of individual cities appearing in the periphery. It seems likely that Sidon and Sarepta were the cities involved in the initial development of the route via Kamid el-Loz and Dan towards Transjordan, and probably also the maritime route to Dor, but subsequently Tyre rose to pre-eminence. As maritime trade increased in volume, Dor, where the harbor was not deep, was replaced by the artificially built harbor of Athlit, now being excavated (Haggi 2004), which served as a funnel for produce from the Carmel Ridge and as a transit port for goods originating further up the coast and en route to Egypt.

The Jatt metal hoard provides one of the earliest signs of Phoenician activity in the area of modern northern Israel. Their commercial interests start well before the period of the United Monarchy and take in areas well beyond their immediate homeland in modern Lebanon. The contents of the hoard should be viewed as a continuation of the Late Bronze Age bronze-working *Koine* characteristic of the triangle formed by the northern coast of the Levant and Cyprus. At the same time, they indicate the changes brought about both in the Levant and in Cyprus, areas where Phoenician interests were clearly present, over the period between the early 12th and the 11th centuries BCE.

BIBLIOGRAPHY

Adams, R.B.

2002 From Farms to Factories: The Development of Copper Production at Faynan, Southern Jordan, During the Bronze Age. Pp. 21-32 in *Metals and Society*. B.S. Ottaway and E.C. Wagner (eds.). Oxford, Archaeopress.

Alt, A.

1925 *Das Institute im Jahre 1924*.

Anderson, W.P.

1988 *Sarepta I: The Late Bronze and Iron Age Strata of Area II, Y*. Beyrouth, University of Lebanon.

Anonymous

2006 The Ancient Site of King Hill. Coretta, *Cyprus Turkish Airline*, July: 76-87

Arnaud, D.

1992 Les Ports de la 'Phénicie' à la fin de l'age du Bronze Récent (XIV-XIII Siècles) d'après les textes cunéiformes de Syrie. *Studi Micenei ed Egeo-Anatolici* 30: 1979-191.

Artzy, M.

1976 Alasiya of the Amarna Letters. *Journal of Near Eastern Studies* 35: 129-134.

1985 Supply and Demand: A Study of Second Millennium Trade of Cypriote Ceramics in the Levant. Pp. 93-99 in *Prehistoric Production and Exchange*. A.B. Knapp and T. Stech (eds.). Los Angeles, Institute of Archaeology, UCLA.

1987 On Boats and on 'Sea Peoples'. *Bulletin of the American Schools of Oriental Research* 266: 75-84.

1991 Conical Cups and Pumice, Aegean Cult at Tel Nami, Israel. Pp. 203-206 in *Thalassa, the Prehistoric Aegean and the Sea*. R. Laffineur and L. Basch (eds.). Liège, Université de Lèige.

1994 Incense, Camels and Collared Rim Jars: Desert Trade Routes and Maritime Outlets in the Second Millennium. *Oxford Journal of Archaeology* 13(2): 121-147.

1995 Nami: A Second Millennium International Maritime Trading Center in the Mediterranean. Pp. 17-40 in *Recent Excavations in Israel, View to the West*. S. Gitin (ed.). Atlanta, Archaeological Institute of America.

1997 Nomads of the Sea. Pp. 1-17 in *Res Maritimae, Cyprus and the Eastern Mediterranean from Prehistory to Late Antiquity*. S. Swiny, R.L. Hohlfelder and H.W. Swiny (eds.). Atlanta, American Schools of Oriental Research Archaeological Reports, Cyprus American Archaeological Research Institute Monograph Series, vol. 1. Atlanta, Scholars Press.

1998 Routes, Trade, Boats, and 'Nomads of the Sea'. Pp. 439-448 in *Mediterranean Peoples in Transition: Thirteenth to Early Tenth Centuries BCE*. S. Gitin, A. Mazar and E. Stern (eds.). Jerusalem, Israel Exploration Society.

2000 Cult and Recycling of Metal at the End of the Bronze. Pp. 27-32 in *Periplus, Festchrift für Hans-Günter Buchholz*. P. Åström and D. Sürenhagen (eds.). Jonsered, Paul Åströms Forlag.

2001a White Slip Ware for Export? The Economics of Production. Pp. 107-116 in *The White Slip Ware of Late Bronze Age Cyprus*. V. Karageorghis (ed.). Wein, Öaterreichischen Akademie der Wissenschaften.

2001b A Study of the Cypriot Bichrome Ware: Past, Present and Future. Pp. 157-174 in *The Chronologies of Basering and Bichrome Wares*. P. Åström (ed.). Stockholm, The Royal Academy of Letters, History and Antiquities.

2004 Mariners and their Boats at the End of the Late Bronze and the Beginning of the Iron Age Eastern Mediterranean. *Tel Aviv* 30: 323-246.
2005 *Emporia* on the Carmel Coast? Tel Akko, Tel Abu Hawam and Tel Nami of the Late Bronze Age. Pp. 355-362 in *Emporia, Aegeans in the Central and Eastern Mediterranean*. R. Laffineur and E. Greco (eds.). Liège, Université de Lèige.
2006a 'Filling in' the Void: Observation on Habitation Pattern at the End of the Late Bronze Age at Tel Akko. in *Abiah chidot minei kedem: Archaeological and Historical Studies in Honor of Amihai Mazar*. P. Miroschedji and A. Maeir (eds.). Winona Lake Indiana, Eisenbrauns.
2006b The Carmel Coast during the Second Part of the Late Bronze Age: A Center for Eastern Mediterranean Transshipping. *Bulletin of the American Schools of Oriental Research* 343: 45-64.
Åström, P.
1972 *The Late Cypriote Bronze Age: Architecture and Pottery*. Lund, Berlingska.
2001 *The Chronologies of Basering and Bichrome Wares*. Stockholm, The Royal Academy of Letters, History and Antiquities.
Åström, P., E. Åström, A. Hatzianoniou, K. Niklasson and U. Obrink.
1983 *Hala Sultan Teke*. Goteborg, Paul Åströms Forlag.
Åström, P. and D. Sürenhagen (eds.).
2000 *Periplus, Festchrift für Hans-Günter Buchholz*. Paul Åströms Forlag.
Aubet, M.E.
1993 *The Phoenicians and the West. Politics, Colonies and Trade*. Cambridge, Cambridge University Press.
2000 Aspects of Tyrian Trade and Colonization in the Eastern Mediterranean. *Müenstersche Beitrege zum antiken Handelsgeschichte* XIX: 70-120.
Bachmann, H.-G. and A. Hauptmann.
1984 Zur alten Kupfergewinung in Fenan and Hirbet en-Nahas im Wadi Arabah in Südjodanien. Ein Vorbericht. *Der Anschnitt* 36: 110-123.
Badhi, R.
2000 An Iron Age II Burial Cave at Baqa el-Gharbiya. *'Atiqot* XXXIX: 7*-12*.
Balensi, J.
1980 *Les fouilles de R. W. Hamilton à Tell Abu Hawam: Niveaux IV et V*. Ph.D. dissertation Thesis. Université des Sciences Humaines. Strasbourg.
1985 Revising Tell Abu Hawam. *Bulletin of the American Schools for Oriental Research* 257: 65-74.
Balensi, J., M.D. Herrera and M. Artzy.
1993 Abu Hawam, Tell in *Encyclopedia of Archaeological Excavations in the Holy Land*. E. Stern (ed.). Jerusalem, Israel Exploration Society.
Balmuth, M. (ed.).
1986 *Studies in Sardinian Archaeology*. Ann Arbor, University of Michigan Press.
Balthazar, J.W.
1989 *Copper and Bronze Working in Early through Middle Bronze Age Cyprus*. Goteborg, Paul Åström.
Bartlett, J.R.
1989 *Edom and Edomites*. Sheffield, JSOT Press.
Bass, G.F.
1967 *Cape Gelidonya: A Bronze Age Shipwreck*. Philadelphia, American Philosophical Society.
2006 The Ship of Uluburun. Pp. 1-40 in *Uluburun Workshop*. Ü. Yalçin (ed.). Deutsches Bergbau-Museum Bochum., Deutsches Bergbau-Museum
Bell, C.
2005a *The Influence of Economic Factors on Settlement Continuity across the LBA/Iron Age Transition on the Northern Levantine Littoral*. PhD Thesis. Institute of Archaeology. University College. London.
2005b Wheels within Wheels? A View of Mycenaean Trade from the Levantine Emporia. Pp. 363-370 in *Emporia, Aegeans in the Central and Eastern Mediterranean*. R. Laffineur and E. Greco (eds.). Liege, Liège, Université de Liège.
Ben Arieh, S. and G. Edelstein.
1977 Tombs Near the Persian Garden. *'Atiqot* XII: 1-27.
1981 *Grave from the Late Bronze Age, Tell Jdur (in Hebrew)*. Israel Exploration Society.
Ben Tor, A. and Y. Portugali.
1987 *Tell Qiri: A Village in the Jezreel Valley. Report of the Archaeological Excavations 1975-1977*. Jerusalem, Institute of Archaeology, Hebrew University.
Ben Tor, A., A. Zarzecki-Peleg and S. Cohen-Anidjar.

2005 *Yokne'am II, The Iron Age*. Jerusalem, Institute of Archaeology, Hebrew University.
Benson, J.L.
1973 *The Necropolis of Kaloriziki*. Göteborg, Paul Åströms.
Bienkowski, P.
1992 *Early Edom and Moab: The Beginning of the Iron Age in Southern Jordan*. Sheffield, J.R. Collis.
1992a The Beginning of the Iron Age in Edom: A Reply to Finkelstein. *Levant* XXII: 167-169.
1992b The Beginning of the Iron Age in Southern Jordan: A Framework. Pp. 1-12 in *Early Edom and Moab*. P. Bienkowski (ed.). Sheffield, J.R. Collis Publications.
1992c The Date of Sedentary Occupation in Edom: Evidence from Um el-Biyara, Tawilan and Buseirah. Pp. 99-112 in *Early Edom and Moab*. P. Bienkowski (ed.). Sheffield, J.R. Collis Publication.
Bikai, P.M.
1978 *The Pottery of Tyre*. London, Warminster.
1987a *The Phoenician Pottery of Cyprus*. Nicosia, A.G. Leventis Foundation.
1987b Trade Networks in the Early Iron Age: The Phoenicians at Palaepaphos. Pp. 125-128 in *Western Cyprus: Connections*. D.W. Rupp (ed.). Gothenburg, Paul Åström.
1992 The Phoenicians. Pp. 132-141 in *The Crisis Years: The 12th Century B.C.* W.A. Ward and M.S. Joukowsky (eds.). Dubuque, Iowa, Kendall/Hunt Publishing Company.
1994 The Phoenicians and Cyprus. Pp. 31-38 in *Cyprus in the 11th Century B.C.* V. Karageorghis (ed.). Nicosia, A.G. Leventis Foundation.
Binford, L.R.
1972 Archaeology as Anthropology:. Pp. 30-32 in *An Archaeological Perspective*. L.R. Binford (ed.). New York, Seminar Press (reprinted from American Antiquity 28, 1962: 217-225).
Biran, A.
1989 The Collared-rim Jars and the Settlement of the Tribe of Dan. Pp. 71-96 in *Recent Excavations in Israel: Studies in Iron Age Archaeology*. S. Gitin and W.G. Dever (eds.). Winona Lake Indiana, Eisenbrauns.
1994 *Biblical Dan*. Jerusalem, Israel Exploration Society Hebrew Union College - Jewish Institute of Religion.
Biran, A. and R. Ben-Dov.
2002 *Dan II*. Jerusalem, Nelson Glueck School of Biblical Archaeology, Hebrew Union College- Jewish Institute of Religion.
Blake, E. and A.B. Knapp (eds.).
2004 *The Archaeology of Mediterranean Prehistory*. Malden, Mass.,Blackwell.
Bourke, S., R.T. Sparks and L.D. Mairs.
1999 Exploring Prehistoric Pella in Jordan. *Mediterranean Archaeology* 12: 147-156.
Bouzek, J.
1985 *The Aegean, Anatolia and Europe: Cultural Interrelations in the Second Millennium B.C.* Prague, Academy.
Briend, J. and J.-B. Humbert.
1980 *Tell Keisan (1971-1976): Une cité phénicienne en Galilée*. Fribourg, Switzerland, Editions Universitaires Fribourg Suisse.
Bruins, H.J., J. van der Plicht and A. Mazar.
2003 ^{14}C Dates from Tel Rehov: Iron-Age Chronology, Pharaohs and Hebrew Kings. *Science* (300): 315-318.
Buitron-Oliver, D.
1999 Kourion from the 11th to the 8th Century B.C. Pp. 69-77 in *Cyprus, The Historicity of the Geometric Horizon*. M. Iacovou and D. Michaelides (eds.). Nicosia, Archaeological Research Unit, University of Cyprus.
Burdajewicz, M.
1995 *La céramique palestinienne du Fer I - La contribution de Tell Keisan, site de la Galilée maritime*. PhD Thesis. Warsaw University.
Cahill, J. and D. Tarler.
1993 Tell el Hammah. Pp. 561-562 in *The New Encyclopedia of Archaeological Excavations in the Holy Land*. E. Stern (ed.). Jerusalem, Israel Exploration Society.
Campbell, S. and A. Green (eds.).
1995 *The Archaeology of Death in the Ancient Near East*. Oxbow.
Carmi, I. and D. Segal.
2000 Radiocarbon Dates. Pp. 502-503 in *Megiddo III: The 1992-1996 Seasons*. I. Finkelstein, D. Ussishkin and B. Halpern (eds.). Tel Aviv, Institute of Archaeology.
Catling, H.W.
1964 *Cypriot Bronzework in the Mycenaean World*. Oxford, Clarendon Press.

1984 Workshop and Heirloom: Prehistoric Bronze Stands in the East Mediterranean. *Report of the Department of Antiquities of Cyprus*: 69-91.
1994 Cyprus in the 11th Century B.C. - an End or a Beginning? Pp. 133-140 in *Cyprus in the 11th Century B.C.* V. Karageorghis (ed.). Nicosia, University of Cyprus.

Chadwick, J.
1976 *The Mycenaean World*. Cambridge, Cambridge University Press.

Cline, E.H. and D. Harris-Cline (eds.).
1998 *The Aegean and the Orient in the Second Millennium*. Lèige, Université de Lèige.

Coldstream, N.
1998 The First Exchanges between Eubboens and Phoenicians: Who Took the Initiative? Pp. 353-360 in *Mediterranean Peoples in Transition: Thirteenth to Early Tenth Centuries BCE*. S. Gitin, A. Mazar and E. Stern (eds.). Jerusalem, Israel Exploration Society.

Coldstream, N. and A. Mazar.
2003 Greek Pottery from Tel Rehov and Iron Age Chronology. *Israel Exploration Journal* 53(1): 29-48.

Constantinou, G.
1992 Ancient Copper Mining in Cyprus. in *Cyprus, Copper and the Sea*. V. Karageorghis (ed.). Nicosia, Leventis Foundation.

Cooley, R.E. and G.D. Practico.
1994 Tell Dothan: The Western Cemetery with Comment on Joseph Free's Excavations, 1953 to 1964. in *Preliminary Excavation Reports: Sardis, Bir Umm Fawakhir, Tell el-'Umeiri, The Combined Caesarea Expeditions, and Tell Dothan*. W.G. Dever (ed.) New Haven, American Schools of Oriental Research.

Coubet, A.
1992 Reoccupation of the Syrian Coast after the Destruction of the 'Crisis Years'. Pp. 123-131 in *The Crisis Years: The 12th Century B.C.* W.A. Ward and M.S. Joukowsky (eds.). Dubuque, Iowa, Kendall/Hunt Publishing Company.

Courtois, J.-C., J. Lagarce and E. Lagarce.
1986 *Enkomi et le Bronze Recent a Chypre*. Nicosia, A.G. Leventis Foundation.

Crielaard, J.P., V. Stissi and G.J.V. Wijngaarden (eds.).
1999 *The Complex Past of Pottery. Production, Circulation and Consumption of Mycenaean and Greek Pottery (Sixteenth to Early Fifth Centuries BC)*. Amsterdam, J.C. Gieben.

Cross, F. and J.T. Milik.
1956 A Typological Study of the el-Khadr Javelin and Arrow Heads. *Annual of the Department of Antiquities of Jordan* 1953(3): 15-23.

Curtis, J. (ed.).
1988 *Bronze Working Centres of Western Asia ca. 1000-538 BC*. Kegan Paul International.

D'Agata, A.L., Y. Goren, H. Mommsen, A. Schwend and A. Yasur-Landau.
2005 Imported Pottery of LHIIIC Style from Israel. Style, Provenance and Chronology. Pp. 351-380 in *Emporia, Aegeans in the Central and Eastern Mediterranean*. R. Laffineur and E. Greco (eds.). Liège, Université de Lèige.

Daressy, G.
1895 Une flottile phénicienne d'après une peinture récente. *Revue Archéologique*: 286-292.

Davies, G.I.
1986 *Megiddo*. Cambridge, Lutterworth Press.

Davies, N.D. and R.O. Faulkner.
1947 A Syrian Trading Venture to Egypt. *Journal of Egyptian Archaeology* 33: 40-46.

Davies, W.V. and L. Schonfield (eds.).
1995 *Egypt, the Aegean and the Levant; Interconnections in the Second Millennium BC*. British Museum Press.

Dayagi-Mendels, M.
2002 *The Akhziv Cemeteries, The Ben-Dor Excavations, 1941-1944*. Jerusalem., Israel Antiquities Authority Report 15

Dever, W.G.
1986 *Gezer IV: The 1969-1971 Seasons in field VI, The «Acropolis»*. Jerusalem, Nelson Glueck School of Biblical Archaeology.

Dever, W.G. (ed.)
1994 *Preliminary Excavation Reports: Sardis, Bir Umm Fawakhir, Tell el-'Umeiri, The Combined Caesarea Expeditions, and Tell Dothan*. New Haven, American Schools of Oriental Research

Dever, W.G. and S. Gitin (eds.).
Symbiosis, Symbolism and the Power of the Past. Winona Lake Indiana, Eisenbrauns.

Dikaios, P.

1969-71 *Enkomi*. Mainz am Rhein, Philip von Zabern.
Dothan, M.
1976 Akko: Interim Excavation Report First Season 1973/74. *Bulletin of the American Schools of Oriental Research* 224: 1-48.
1985 Ten Seasons of Excavations in Ancient Akko. *Qadmoniot* 18: 2-24 (in Hebrew).
1986 Sardinia at Akko? Pp. 104-115 in *Studies in Sardinian Archaeology II*. M. Balmuth (ed.). Ann Arbor, University of Michigan Press.
1989 Archaeological Evidence for Movements of the Early «Sea Peoples» in Canaan. Pp. 59-70 in *Recent Excavations in Israel: Studies in Iron Age Archaeology*. S. Gitin and W.G. Dever (eds.). Winona Lake, Indiana, Eisenbrauns.
Dothan, T.
1982 *The Philistines and Their Material Culture*. Jerusalem, Israel Exploration Society.
1990 Ekron and the Philistines: Part I: Where They Came From, How They Settled Down and the Place They Worshiped In. *Biblical Archaeology Review* XVI(No 1): 20-37.
1998 Initial Philistine Settlement: From Migration to Coexistence. Pp. 148-161 in *Mediterranean Peoples in Transition: Thirteenth to Early Tenth Centuries BCE*. S. Gitin, A. Mazar and E. Stern (eds.). Jerusalem, Israel Exploration Society.
Dothan, T. and A. Ben-Tor.
1983 *Excavations at Athienou, Cyprus, 1971-1972*. Jerusalem, Institute of Archaeology, Hebrew University.
Dothan, T. and I. Dunayevsky.
1993 Tell Qasile. Pp. 1204-1207 in *The New Encyclopedia of Archaeological Excavations in the Holy Land*. E. Stern (ed.). Jerusalem, Israel Exploration Society.
Epstein, C.
1966 *The Palestinian Bichrome Ware*. Leiden, Brill.
1989 Temple Models and their Symbolism (in Hebrew, English abstract). *Eretz Israel* 20: 154-163.
Esse, D.L.
1991 The Collared Rim Pithos at Megiddo: Ceramic Distribution and Ethnicity. *Journal of Near Eastern Studies* 51: 81-103.
Finkelstein, I.
1992a Edom in the Iron I. *Levant* XXIV: 159-166.
1992b Stratigraphy, Pottery and Parallels: A Reply to Bienkowski. *Levant* XXIV(171-172).
1996 The Stratigraphy and Chronology of Megiddo and Beth-Shean in the 12th-11th Century BCE. *Tel Aviv* 23: 170-184.
1997 Pots and People Revisited: Ethnic Boundaries in the Iron Age I. Pp. 216-237 in *The Archaeology of Israel*. N.A. Silberman and D. Small (eds.). Sheffield, Sheffield Academic Press.
1998 Notes on the Stratigraphy and Chronology of Iron Age Ta'anach. *Tel Aviv* 25(2): 208-218.
2003 City-States to States: Polity Dynamics in the 10-9th Centuries B.C.E. Pp. 75-83 in *Symbiosis, Symbolism and the Power of Propaganda*. W.G. Dever and S. Gitin (eds.). Winona Lake, Indiana, Eisenbrauns.
2005 *Tel Aviv*.
2005 Khirbet en-Nahas, Edom and Biblical History. *Tel Aviv* 32: 119-125.
Finkelstein, I. and N. Na'aman (eds.).
1994 *From Nomadism to Monarchy: Archaeological and Historical Aspects of Early Israel*. Jerusalem, Yad Izhak Ben-Zvi, Israel Exploration Society, Biblical Archaeology Society.
Finkelstein, I. and E. Piasetzky.
2003 Comment on «^{14}C Dates from Tel Rehov: Iron-Age Chronology, Pharaohs, and Hebrew Kings». *Science* 24(302): 568-570.
Finkelstein, I., D. Ussishkin and B. Halpern (eds.).
2000 *Megiddo III, the 1992-1996 Seasons*. Tel Aviv, Erery Emery and Claire Yass Publications in Archaeology.
Fischer, P.M.
1997 *A Late Bronze to Early Iron Age Tomb at Sahem, Jordan*. Wiesbaden, Harrassowitz Verlag.
FitzGerald, G.M.
1934 *Palestine Exploration Fund Quarterly Statement*.
Flourentzos, P.
1997 The Early Geometric Tomb No. 132 from Palaepaphos. *Report of the Department of Antiquities of Cyprus*: 205-217.
Franken, H.J.
1961 The Excavations at Deir 'Alla in Jordan, 2nd Season. *Vesum Testamentum* 11: 361-372.
1964a Clay Tablets from Deir 'Alla in Jordan 2nd Season. *Vesus Testamentum* 14: 377-379.
1964b The Stratigraphic Context of the Clay Tables found at Deir 'Alla. *Palestine Exploration Quarterly* 96: 73-78.
1964c The Excavations at Deir 'Alla, Season 1964. *Vesus Testamentum* 14: 417-422.
1969 *Excavations at Tell Deir 'Alla*. Leiden, Brill.

Frick, F.S.
2000 *The Iron Age Cultic Structure*. Birzeit University, American Schools of Oriental Research.
Fritz, V.
1994 Vorbericht üÜber die Grabungen in *Barqa el-Hetiye* im Gebiet von Fenan, Wadi el-'Araba. *Zeitschrift des Deutschen Palästina Vereins*: 125-150.
1996 Ergebnisse einer Sondage in Hirbet en-Nahas, Wadi el-'Araba. *Zeitschrift des Deutsche Palästina Verein* 112: 1-9.
2002 Copper Mining and Smelting in the Area of Feinan at the End of the Iron Age I. Pp. 93-102 in *Aharon Kempinski Memorial Volume*. E.D. Oren and S. Ahituv (eds.). Beer Sheva, Ben Gurion University of the Negev Press.
Fritz, V. and A. Kempinski.
1983 *Ergebnisse der Ausgrabungen auf der Hirbet el-Masas (Tel Masos) 1972-1975*. Wiesbaden, Harassowitz.
Furumark, A.
1965 The Excavations at Sinda. Some Historical Results. *Opuscula Atheniensia* 6: 99-116.
Gadot, Y.
2006 Aphek in the Sharon and the Philistine Northern Frontier. *Bulletin of the American Schools of Oriental Research* (341): 21-36.
Galan, E. and M. Ruiz-Galvez.
2004 Writing, Ciphers, Self-consciousness and Private Trade at the Eve of the Phoenician Colonization. in *Heroes Mediterraneos: comercio, escriptura y pensamiento abrracto*, Vol. HUM2004-0437. M. Ruiz-Galvez (ed.). Madrid, Spanish Ministry of Education and Science.
Gale, N.H. (ed.).
1991 *Bronze Age Trade in the Mediterranean*. P. Åström Verlag.
Gale, N.H. and Z.A. Stoss-Gale.
1989 Archaeometallurgical Studies of Late Bronze Age Ox-hide Copper Ingots from the Mediterranean Region. Pp. 247-68 in *Archaeometalurgie der Altern Welt*. A. Hauptman, E. Perincka and G.A. Wagener (eds.). Bochum.
1992 Lead Isotope Studies in the Aegean. *Proceedings of the British Academy* 77: 63-108.
Georgiou, G.
2003 A Cypro-Geometric I Tomb from Kition. *Report of the Department of Antiquities of Cyprus*: 149-167.
Gershuny, L.
1983 *Bronze Vessels from Israel and Jordan*.
2002 The Bronze Vessels. Pp. 200-208 in *Dan II*. A. Biran and R. Ben-Dov (eds.). Jerusalem, Nelson Glueck School of Biblical Archaeology, Hebrew Union College - Jewish Institute of Religion.
Gilboa, A.
1989 New Finds at Tel Dor and the Beginnings of Cypro-Geometric Pottery Import to Palestine. *Israel Exploration Journal* 39(3-4): 204-218.
1998 Iron I-II Pottery Evolution at Dor. Pp. 413-425 in *Mediterranean Peoples in Transition*. S. Gitin, A. Mazar and E. Stern (eds.). Jerusalem, Israel Exploration Society.
1999 The Dynamics of Phoenician Bichrome Pottery: A View from Tel Dor. *Bulletin of the American Schools of Oriental Research* 316: 1-22.
1999 The View from the East - Tel Dor and the Earliest Cypro-Geometric Exports to the Levant. Pp. 119-139 in *Cyprus: The Historicity of the Geometric Horizon: Proceedings of an Archaeological Workshop, University of Cyprus, Nicosia, 11th October 1998*. M. Iacovou and D. Michaelides (eds.). Nicosia, University of Cyprus.
2005 Sea Peoples and Phoenicians Along the Southern Phoenician Coast - A Reconciliation: An Interpretations of Sikila (SKL) Material Culture. *Bulletin of the American Schools of Oriental Research* 337: 47-78.
Gilboa, A., A. Cohen-Weinberger and Y. Goren.
2006 Philistine Bichrome Pottery: The View from the Northern Canaanite Coast. Pp. 303-320 in *Abiah chidot minei kedem: Archaeological and Historical Studies in Honor of Amihai Mazar*. P. Miroschedji and A. Maeir (eds.). Winona Lake, Indiana, Eisenbrauns.
Gilboa, A. and I. Sharon.
2001 Early Iron Age Radiometric Dates from Tel Dor: Preliminary Implications for Phoenicia and Beyond. *Radiocarbon* 43: 1343-51.
2003 An Archaeological Contribution to the Early Iron Age Chronological Debate: Alternative Chronologies for Phoenicia and Their Effects on the Levant, Cyprus and Greece. *Bulletin of the American Schools of Oriental Research* 332: 7-80.
Gitin, S.
1993 Scoops: Corpus, Function and Typology. Pp. 99*-126* in *Studies in the Archaeology and History of Ancient Israel in Honor of Moshe Dothan*. M. Heltzer, A. Segal and D. Kaufman (eds.). Haifa, Haifa University Press.

1995 *Recent Excavations in Israel, View to the West*. Archaeological Institute of America. Dubuque, Iowa, Kendall/-Hunt
Gitin, S. and W.G. Dever (eds.).
1989 *Recent Excavations in Israel: Studies in Iron Age Archaeology*. Winona Lake, Indiana, Eisenbrauns.
Gitin, S., A. Mazar and E. Stern (eds.).
1998 *Mediterranean Peoples in Transition. Thirteenth to Early Tenth Centuries BCE, in Honor of Professor Trude Dothan*. Jerusalem, Israel Exploration Society.
Gjerstad, E.
1926 *Studies on Prehistoric Cyprus*. Stockholm.
Glueck, N.
1935 *Explorations in Eastern Palestine II*. New Haven, American Schools of Oriental Research.
Goren, Y., I. Finkelstein and N. Na'aman.
2004 *Inscribed in Clay*. Tel Aviv, Tel Aviv University.Emery and Claire Yass Publications in Archaeology
Gunneweg, J., F. Asaro, H.V. Michel and I. Perlman.
1992 On the Origin of A Mycenaean IIIA Chariot Krater and Other Related Mycenaean Pottery from Tomb 387 at Laish/Dan. Pp. 54*-63* in *Eretz Israel*. Jerusalem, Israel Exploration Society.
Gunneweg, J. and H. Michel.
1999 Does the Different Layout of the Late Bronze Age Tombs at Laish/Dan and Akko in Northern Canaan Reflect Different Trade Relations? *Journal of Archaeological Science* 26: 989-995.
Gunneweg, J. and I. Perlman.
1994 The Origin of a Mycenaean IIIC:1 Stirrupjar from Tell Keisan. *Revue Biblique* 101: 559-561.
Gunneweg, J., I. Perlman and T. Dothan.
1986 On the Origin of Pottery from Tel Miqne-Ekron. *Bulletin of the American Schools of Oriental Research* 264(3-16).
Guy, P.L.O. and R.M. Engberg.
1938 *Megiddo Tombs*. Chicago, University of Chicago.
Hachmann, R. (ed.).
1983 *Frühe Phöniker im Libanon*. Mainz am Rhein, Philipp von Zabern.
1989 Kamid el Lôz. *Berytus* XXXVII: 5-187.
Hadidi, A. (ed.).
1987 *Studies in the History and Archaeology of Jordan*. Department of Antiquities, Jordan, London, Routledge and Kegan Paul.
1992 *Studies in the History and Archaeology of Jordan*. Amman, Department of Antiquities Jordan.
Haggi, A.
2004 *The Phoenician Harbour at Atlit as an Expression of Phoenician Heritage and Harbour Planning in the Levant during the 9th-7th Centuries BCE (in Hebrew)*. MA Thesis. Maritime Civilization. University of Haifa. Haifa.
Halpern, B.
2000 Centre and Sentry: Megiddo's Role in Transit Administration and Trade. Pp. 535-575 in *Megiddo III: The 1992-1996 Seasons*. I. Finkelstein, D. Ussishkin and B. Halpern (eds.). Tel Aviv, Emery and Claire Yass Publications in ArchaeologyTel Aviv University.
Halstead, J.
1981 Counting Sheep in Neolithic and Bronze Age Greece. Pp. 307-339 in *Patterns of the Past. Studies in Honour of David Clarke*. I. Jodder, G. Issac and N. Hammond (eds.). Cambridge, Cambridge University Press.
Hamilton, R.W.
1934 Tell Abu Hawam: Interim Report. *Quarterly of the Department of Antiquities in Palestine* 3: 74-80.
1935 Excavations at Tell Abu Hawam. *Quarterly of the Department of Antiquities in Palestine* 4: 1-69.
Harrison, T.
2004 *Megiddo 3*. Chicago.
Hauptman, A., E. Perincka and G.A. Wagener (eds.).
1989 *Archaeometalurgie der Altern Welt*.
Hauptmann, A.
2000 Zur Frühen Metallurgie des Kupfers in Fenan/Jordanien. *Bochum: Der Anschnitt Beiheft* 11(65-67).
Hauptmann, A. and G. Weisgerber.
1992 Periods of Ore Exploitation and Metal Production in the Area of Feinan, Wadi 'Arabah, Jordan. *Studies in the History and Archaeology of Jordan* IV: 61-66.
Heinz, M., D. Bonantz, A. Gilibert, H. Heckmann, I. Hozer, C. Jauss, J. Kirchhofer, P. Krotzele, L. Petersen, M. Sommer and T. Zaven.

2001 Kamid el-Lôz in the Beqa'a Plain/Lebanon Continuity and Change in the Settlement of a Region. *Bulletin d'Archéologie et d'Architecture Libanaises* 5: 5-92.

Heltzer, M.

1976 *The Rural Community of Ancient Ugarit*. Wiesbaden, Reichert.

1983 The Serdana in Ugarit. *Israel Oriental Society* 9: 9-16.

1999 The Economy of Ugarit. Pp. 433-454 in *Handbook of Ugaritic Studies*. W.G.E. Watson and N. Wyatt (eds.). Leiden, Brill.

Heltzer, M. and E. Lipinski (eds.).

1988 *Society and Economy in the Eastern Mediterranean (c. 1500-1000)*. Leuven, Peeters.

Heltzer, M., A. Segal and D. Kaufman (eds.).

1993 *Studies in the Archaeology and History of Ancient Israel in Honor of Moshe Dothan*. Haifa, Haifa University Press.

Herold, A.

1999 *Streitwagentechnologie in der Ramses-Stadt*. Mainz am Rhein, Philipp von Zabern.

Hesse, B. and P. Wapnish.

1997 Can Pig Remains be Used for Ethnic Diagnosis in the Ancient Near East? Pp. 238-270 in *The Archaeology of Israel*. N.A. Silberman and D. Small (eds.). Sheffield, Sheffield Academic Press.

Homes-Fredericq, D.

1987 Possible Phoenician Influences in Jordan in the Iron Age. Pp. 89-96 in *Studies in the History and Archaeology of Jordan*. A. Hadidi (ed.). Amman, Department of Antiquities, Jordan, Routledge and Kegan Paul.

Humbert, J.-B.

1993 Keisan, Tell. Pp. 862-867 in *The New Encylopedia of Archaeological Excavations in the Holy Land*. E. Stern (ed.). Jerusalem, Israel Exploration Society.

Iacovou, M.

1988 *The Pictorial Pottery of Eleventh Century B.C. Cyprus*. Göteborg, Paul Åström.

1999 *Excerpta Cypria Geometrica*. Materials for a History of Geometric Cyprus. Pp. 141-166 in *Cyprus, The Historicity of the Geometric Horizon*. Iacovou M. and D. Michaelides (eds.). Nicosia, Archaeological Research Unit, University of Cyprus.

Iacovou, M. and D. Michaelides (eds.).

1999 *Cyprus, The Historicity of the Geometric Horizon*. Nicosia, Archaeological Research Unit, University of Cyprus.

James, F.

1966 *The Iron Age at Beth Shan*. Philadelphia, University Museum.

James, F.W. and P.E. McGovern.

1993 *The Late Bronze Egyptian Garrison at Beth Shan: A Study of Levels VII and VIII*. Philadelphia, Universities of Pennsylvania and Mississippi.

Jodder, I., G. Issac and N. Hammond (eds.).

1981 *Patterns of the Past. Studies in Honour of David Clarke*. Cambridge, Cambridge University Press.

Kan-Cipor-Meron, T.

2003 *Middle Bronze Age Metal Objects from the Rishon Le-Zion Cemetery*. MA Thesis. Maritime Civilizations. University of Haifa. Haifa.

Karageorghis, V.

1973 A Late Cypriote Hoard of Bronzes from Sinda. *Report of the Department of Antiquities of Cyprus*: 72-82.

1974 *Kition I: The Tombs*. Nicosia.

1975 *Alaas, A Protogeometric Necropolis in Cyprus*. Nicosia, Department of Antiquities.

1982 *Cyprus, From the Stone Age to the Romans*. London, Thames and Hudson.

1983 *Palaepaphos-Skales*. Konstanz GMBH, Universitätsverlag.

1990a *Tombs at Palaepaphos: 1. Teratsoudhia 2. Eliomylia*. Nicosia, A.G. Leventis Foundation.

1990b *The End of the Late Bronze Age in Cyprus*. Nicosia, Pierides Foundation.

1992 *Cyprus, Copper and the Sea*. Nicosia, A.G.Leventis Foundation.

1994 *Cyprus in the 11th Century B.C.* A.G. Nicosia, A.G. Leventis Foundation.

2000 Cultural Innovations in Cyprus Relating to the 'Sea Peoples'. Pp. 249-273 in *The Sea Peoples and Their World: a Reassessment*. E.D. Oren (ed.). Philadelphia, University of Pennsylvania.

2001 *The White Slip Ware of Late Bronze Age Cyprus*. Wein, Öaterreichischen Akademie der Wissenschaften.

2003 Heroic Burials in Cyprus and other Mediterranean Regions. Pp. 339-352 in *Sea Routes... Interconnections in the Mediterranean 16th-6th c. BC*. N.C. Stampolidis and V. Karageorghis (eds.). Athens, University of Crete, A.G. Leventis Foundation.

Karageorghis, V. and M. Demas.

1984 *Pyla-Kokkinokremos*. Nicosia, Department of Antiquities of Cyprus, Cyprus.
1985 *Excavations at Kition V*. Nicosia, Department of Antiquities of Cyprus.
1988 *Excavations at Maa-Palaeokastro 1979-1986*. Nicosia, Department of Antiquities, of Cyprus.
Karageorghis, V. and V. Kassianidou.
1999 Metalworking and Recycling in Late Bronze Age Cyprus - The Evidence from Kition. *Oxford Journal of Archaeology* 18: 171-188.
Karageorghis, V. and F. Lo Schiavo.
1989 A West Mediterranean Obelos from Amathus. *Rivista di Studi Fenici* XVII(1): 15-29.
Karageorghis, V. and D. Michaelides.
1996 *The Development of the Cypriot Economy*. Nicosia, University of Cyprus.
Karageorghis, V. and J.D. Muhly (eds.).
1984 *Cyprus at the Close of the Late Bronze Age*. Nicosia, A.G. Leventis Foundation.
Kassianidou, V. and A.B. Knapp.
2004 Archaeometallurgy in the Mediterranean: The Social Context of Mining, Technology, and Trade. Pp. 215- 251 in *The Archaeology of Mediterranean Prehistory*. E. Blake and A.B. Knapp (eds.). Oxford, Blackwell.
Katz, H.
2006 *Architectural Terracotta Models from Eretz Israel, from the Fifth to the Middle First Millennia BCE*. PhD Thesis, Archaeology Department. University of Haifa. Haifa.
Kempinski, A.
1989 *Megiddo, A City-State and Royal Center in North Israel*. Munich, C.H. Beck.
1992 How Profoundly Canaanized Were the Early Israelites. *Zeitschrift des Deutsche Palästina Verein* 108: 1-7.
1993 Masos, Tel. Pp. 986-989 in *The New Encyclopedia of t Archaeological Excavations in the Holy Land*. E. Stern (ed.). Jerusalem, Israel Exploration Society.
King, P.J. and L.E. Stager.
2001 *Life in Biblical Israel*. Louisville London, Westminster, John Knox Press.
Kitchen, K.A.
1992 The Egyptian Evidence on Ancient Jordan. Pp. 21-34 in *Early Edom and Moab*. P. Bienkowski (ed.). Sheffield, J.R. Collis.
Klein, S. and A. Huaptmann.
1999 Iron Age Leaded Tin Bronzes from Khirbet Edh-Dharih. *Journal of Archeological Science* 26: 1075-1982.
Knapp, A.B.
1988 Hoards D'Oeuvres: Of Metals and Men on Bronze Age Cyprus. *Oxford Journal of Archaeology* 7(2): 147-176.
1990 Copper Production and Mediterranean Trade: the View from Cyprus. *Opuscula Atheniensia* XVIII(7): 109-116.
1994 Emergence, Development and Decline of Bronze Age Cyprus. Pp. 271-304 in *Development and Decline in the Mediterranean Bronze Age*. C. Mathers and S. Stoddart (eds.). Sheffield, J.R. Collis.
1997 Hoards D'oeuvres: of Metals and Men on Bronze Age Cyprus. *Oxford Journal of Archaeology* 7: 147-176.
Knapp, A.B. and J.F. Cherry.
1994 *Proveneince Studies and Bronze Age Cyprus: Production, Exchange and Politico-economic Change*. Madison Wisconsin, Prehistoric Press.
Knapp, A.B., J.D. Muhly and P.M. Muhly.
1988 To Hoard is Human: Late Bronze Age Metal Deposits in Cyprus and the Aegean. *Report of the Department of Antiquities of Cyprus* part 1: 233-262.
Knapp, A.B. and T. Stech (eds.).
1985 *Prehistoric Production and Exchange*. Los Angeles, Institute of Archaeology, UCLA.
Knauf, E.A.
1991 King Solomon's Copper Supply. Pp. 167-86 in *Phoenicia and the Bible*. E. Lipinski (ed.). Leuven, Peeters Press.
1998 Kinneret and Naftali. Pp. 219-234 in *International Organization for the Study of the Old Testament*, Vol. LXXX. A. Lemaire and M. Saebo (eds.). Oslo, Brill.
2000 Jerusalem in the Late Bronze and Early Iron Ages: A Proposal. *Tel Aviv* 27: 75-90.
Knauf, E.A. and C.J. Lenzen.
1987 Edomite Copper Industry. Pp. 83-88 in *Studies in the History and Archaeology of Jordan III*. A. Hadidi (ed.). Amman, Department of Antiquities, Jordan, Routledge and Kegan Paul.
Kochavi, M.
1965 Tel Zeror. *Israel Exploration Journal* 15: 253-255.
1968 The Excavations at Tel Zeror. *Qadmoniyot* 1: 128-130 (in Hebrew).

1993 Tel Zeror. Pp. 1525-1526 in *The New Encyclopedia of Archaeological Excavations in the Holy Land*. E. Stern (ed.). Jerusalem, Israel Exploration Society.

Koehl, R.

1985 *Sarepta III. The Imported Bronze and Iron Age Wares from Area II, X*. Beyrouth, Publications de l'Université Libaniase.

Kourou, N.

1994 Scepters and Maces in Cyprus before, during and Immediately after the 11th Century. Pp. 203-226. in *Cyprus in the 11th Century B.C.* V. Karageorghis (ed.). Nicosia, A.G. Leventis Foundation.

Labrou-Phillpsen, C.

1993 Ugarit: A Late Bronze Age Thalassocracy? The Evidence of the Textual Sources. *Orientalia* 62(3): 163-170.

Laffineur, R. and L. Basch (eds.).

1991 *Thalassa, the Prehistoric Aegean and the Sea*. Liège, Université de LèigeLiege University.

Laffineur, R. and E. Greco (eds.).

2005 *Emporia, Aegeans in the Central and Eastern Mediterranean*. Université de Lèige.

Lagarce, J.

1971 La cachette du fondeur aux épées (Enkomi 1967) et l'atelier voisin. Pp. 381-432 in *Alasia I*. C.F.A. Schaeffer (ed.). Paris, Klincksieck.

Lagarce, J.A. and E. Lagarce

1988 The Intrusion of the Sea Peoples and Their Acculturation: A Parallel between Palestinian and Ras Ibn Hani Data. Pp. 137-169 in *Studies in the Histroy and Archaeology of Palestine*. S. Saath (ed.). Aleppo, Aleppo University Press.

Lehmann, G.A.

1979 Die Sikalayu - ein neues Zeugnis zu den 'Seevolker' Heerfahrten in spaten 13Jh. v. Chr. (RS34.129). *Ugarit Forschungen* 11: 481-94.

Lernau, O.

2000 Fish Bones. Pp. 463-477 in *Megiddo III*. I. Finkelstein, D. Ussishkin and B. Halpern (eds.). Tel Aviv, Emery and Claire Yass Publications in Archaeology.

Levy, T.E., R.B. Adams, A. Hauptmann, M. Prange, S. Schmitt-Stecker and M. Najjar

2002 Early Bronze Age Metallurgy: A Newly Discovered Copper Manufactory in Southern Jordan. *Antiquity* 76: 425-37.

Levy, T.E., R.B. Adams, M. Najjar, A. Hauptmann, J.D. Anderson, B. Brendl, M.A. Robinson and T. Higham.

2004 Reassessing the Chronology of Biblical Edom: New Excavations and 14C Dates from Khirbat en Nahas (Jordan). *Antiquity* 78(302): 865-879.

Levy, T.E. and T. Higham (eds.).

2005 *The Bible and Radiocarbon Dating*. London, Equinox.

Linder, E.

1981 Ugarit, a Canaanite Thalassocracy. Pp. 31-42 in *Ugarit in Retrospect*. G.D. Young (ed.). Winona Lake, Indiana, Eisenbrauns.

Littauer, M.A. and J.H. Crouwel

1979 *Wheeled Vehicles and Ridden Animals in the Ancient Near East*. Leiden, Brill.

1982 A Bridle Bit of the Second Millennium BC in Jerusalem. *Levant* 14: 178.

2001 The Earliest Evidence for Metal Bridle Bits. *Oxford Journal of Archaeology* 20: 329-338.

Liverani, M.

1987 The Collapse of the Near Eastern Regional System at the End of the Bronze Age in Case of Syria. Pp. 66-73 in *Centre and Periphery in the Ancient World*. M. Rowlands, M.T. Larsen and K. Kristiansen (eds.). Cambridge, Cambridge University Press.

2001 *International Relations in the Ancient Near East, 1600-1100*. London, Anthony Rowe.

Loud, G.

1948 *Megiddo II*. Chicago, University of Chicago Press.

Macalister, R.A.S.

1912 *The Excavations of Gezer*. London, John Murray.

MacDonald, B.

1992 Evidence from the Wadi el-Hasa and Southern Ghors and North-East Arabah. Archaelogical Surveys. in *Early Edom and Moab. The Beginning of the Iron Age in Southern Jordan*. P. Bienkowski (ed.). Sheffield, J.R. Collis.

Macnamara, E. and N. Meeks.

1987 The Metallurgical Examination of Four Late Cypriot Stands now in the British Museum. *Report of the Department of Antiquities of Cyprus*: 57-60.

Masson, E. and O. Masson.
1983 Les objects inscrits de Palaepaphos-Skales. Pp. 411-415 in *Palaepaphos Skales*. V. Karageorghis (ed.). Nicosia, University of Konstantz.
Matthäus, H.
1985 *Metalgefässe und Gefässuntersatze der Bronze zeit der feometrischen und arcahischen Periode auf Cypern*.
1988 Heirloom or Tradition? Bronze Stands of the Second and First Millennium BC in Cyprus, Greece and Italy. Pp. 285-300 in *Problems in Greek Prehistory*. E.B. French and K.A. Wardle (eds.).
Matthäus, H. and G. Schumacher-Mätthaus.
1986 Zyprische Hortfund Kult und Metallhandwerk in der späten Bronzezeit. *Marburger Studien zur Vor und Frühgeschichte* 7: 129-191.
May, H.G.
1935 *Material Remains of the Megiddo Cult*. Chicago, University of Chicago Press.
Mazar, A.
1980 *Excavations at Tell Qasile, the Philistine Sanctuary: Architecture and Cult Objects*. Jerusalem, Hebrew University of Jerusalem.
1985 *Excavations at Tell Qasile, The Philistine Sacntuary: Various Finds, the Pottery, Conclusions, Appendixes*. Jerusalem, Institute of Archaeology, Hebrew University of Jerusalem.
1992 *Archaeology of the Land of the Bible*. New York, Doubleday.
1993a Beth Shean in the Iron Age: Preliminary Report and Conclusions of the 1990-1991 Excavations. *Israel Exploration Journal* 43: 201-229.
1993b Iron Age Beth Shean in the Light of the Excavations in 1990-1991 (Hebrew). in *Eretz Israel: Malamat Volume*. Jerusalem, Israel Exploration Society.
1994 The 11th Century B.C. in the Land of Israel. Pp. 39-58 in *Cyprus in the 11th Century B.C.* V. Karageorghis (ed.). Nicosia, A.G. Leventis Foundation.
1999 1997-1998 Excavations at Tel Rehov: Preliminary Report. *Israel Exploration Journal* 49(1-2): 1-42.
2002 Megiddo in the Thirteenth Century BCE: A Review of Some Recent Studies. Pp. 264-282 in *Aharon Kempinski Memorial Volume*. E.D. Oren and S. Ahituv (eds.). Beer Sheva, Ben Gurion University of the Negev Press.
2004 Greek and Levantine Iron Age Chronology: A Rejoiner. *Israel Exploration Journal* 54(1): 24-36.
2005 Debate over the Chronology of the Iron Age in the Southern Levant. Pp. 15-30 in *The Bible and Radiocarbon Dating*. T.E. Levy and T. Higham (eds.). London, Equinox.
Mazar, A. and I. Carmi.
2001 Radiocarbon Dates from Iron Age Strata at Tel Beth Shean and Tel Rehov. *Radiocarbon* 43: 1333-1342.
Mazar, E.
2001 *The Phoenicians in Achziv, The Southern Cemetery*. Cuadernos de Arqueología Mediterránea 7. Labratorio de Arqueología, Universidad Pompeu Fabra de Barcelona.
2004 *The Phoenicians Family tomb N.1 at the Northern Cemetery of Achziv (10th-6th Centuries BCE)*. Cuadernos de Arqueología Mediterránea 10. Labratorio de Arqueologia, Universidad Pompeu Fabra de Barcelona.
Merrillees, R.S.
1987 *Alashiya Revisited*. Paris.
Metzger, M.
1991 *Kamid el Lôz*. Bonn, Dr. Rudolf Habelt.
Minoff, E.
1992 A Mace Head Mould from Tel Dan. Pp. 87*-89* in *Eretz Israel*. E. Stern and T. Levi (eds.). Jerusalem, Israel Exploration Society.
Miroschedji, P. and A. Maeir (eds.).
Abiah chidot minei kedem: Archaeological and Historical Studies in Honor of Amihai Mazar. Winona Lake, Indiana, Eisenbraus.
Mizrahi, Y.
2006 *Egyptian Foreign Policy in the Levant during the Reign of Thutmosis III - Continuity or Change*. PhD Thesis. Archaeology Department. University of Haifa, Haifa.
Monroe, C.
2000 *Scales of Fate: Trade, Tradition and Transformation in the Eastern Mediterranean ca. 1350-1175*. PhD Thesis, University of Michigan.
Moran, W.L.

1992 *The Amarna Letters*. Baltimore and London, The Johns Hopkins University Press.
Muhly, J.D.
1988 Concluding Remarks. Pp. 329-342 in *Bronzeworking Centres of Western Asia c. 1000-539 B.C.* J. Curtis (ed.). London, Kegan Paul International.
1996 The Significance of Metals in the Late Bronze Age Economy of Cyprus. Pp. 45-60 in *The Development of the Cypriot Economy*. V. Karageorghis and D. Michaelides (eds.). Nicosia, University of Cyprus.
2003 Greece and Anatolia in the Early Iron Age: The Archaeological Evidence and the Literary Tradition. Pp. 23-35 in *Symbiosis, Symbolism and the Power of the Past*. W.G. Dever and S. Gitin (eds.). Winona Lake, Indiana, Eisenbrauns.
Muhly, J.D., R. Maddin and V. Karageorghis (eds.).
1982 *Early Metallurgy in Cyprus, 4000-500 BC*. Nicosia, Pierides Foundation.
Muhly, J.D., R. Maddin and T. Stech.
1988 Cyprus, Crete and Sardinia: Copper Ox-Hide Ingots and the Bronze Age Metals Trade. *Report of the Department of Antiquities of Cyprus*: 281-298.
Muhly, J.D., T.S. Wheeler and R. Maddin.
1977 The Cape Gelidonya Shipwreck and the Bronze Age Metals Trade in the Eastern Mediterranean. *Journal of Field Archaeology* 4(1): 353-362.
Negbi, O.
1974 The Continuity of the Canaanite Bronzework of the Late Bronze Age into the Early Iron Age. *Tel Aviv* 1: 159-174.
1991 Were There Sea Peoples in the Central Jordan Valley at the Transition from the Bronze Age to the Iron Age? *Tel Aviv* 18(2): 205-243.
1998 Sea Peoples in the Jordan Valley, Once Again. *Tel Aviv* 25(2): 184-207.
Niklasson, K.
1983 A Shaft-Grave of the Late Cypriote III Period. Pp. 169-213 in *Hala Sultan Tekke 8*. P. Åström, E. Åström, A. Hatzianoniou, K. Niklasson and U. Obrink (eds.). Göteborg, Paul Åström.
Ohata, K.
1967 *Tel Zeror II*. Japan.
1970 *Tel Zeror III*. Japan.
Oren, E.D.
1973 *The Northern Cemetery of Beth Shan*. Leiden, Brill.
1997 *The Hyksos: New Historical and Archaeological Perspectives*. Philadelphia, University of Pennsylvania.
1997 The 'Kingdom of Sharuhen' and the Hyksos Kingdom. Pp. 253-283 in *The Hyksos: New Historical and Archaeological Perspectives*. E.D. Oren (ed.). Philadelphia, University of Pennsylvania.
2000 *The Sea Peoples and Their World: a Reassessment*. Philadelphia, University of Pennsylvania.
Oren, E.D. and S. Ahituv (eds.).
2002 *Aharon Kempinski Memorial Volume*. Beer Sheva, Ben Gurion University of the Negev Press.
Ottaway, B.S. and E.C. Wagner (eds.).
2002 *Metals and Society*. Oxford, Archaeopress.
Panitz-Cohen, N.
2006 "Off the Wall": Wall Brackets and Cypriots in Iron Age I Israel. in *Abiah Chidot Minei Kedem*. P. Miroschedji and A. Maeir (eds.). Winona Lake, Indiana, Eisenbrauns.
Papasavvas, G.
2001 *Bronze Stands from Cyprus and the Aegean (in Greek)*. Nicosia, A.G. Leventis Foundation.
2003 Cypriot Casting Technology I: The Stands. *Report of the Department of Antiquities of Cyprus*: 23-51.
Pare, C. (ed.).
2000 *Metals Make the World Go Round*. Oxford, Oxbow.
Peet, T.E. and W.L. Wooley, Sir (eds.).
1923-1951 *The City of Akhenaten*. London, Egypt Exploration Society.
Peltenberg, E.J.
1974 Ivory Objects. Pp. 110 in *Kition I*. V. Karageorghis (ed.). Nicosia, Department of Antiquities.
Perlman, I., F. Asaro and J.D. Frierman.
1971 Provenience Studies of Tel Ashdod Pottery Employing Neutron Activation Analysis. Pp. 216-219 in *Ashdod III*. M. Dothan (ed.). Jerusalem, Israel Exploration Society.
Petrie, W.M.F.
1930 *Beth Pelet (Tell Farah)*. London.

Philip, G.
1991 Cypriot Bronzework in the Levantine World: Conservatism, Innovation and Social Change. *Journal of Mediterranean Archaeology* 4(1): 59-107.
Philip, G., P.W. Clogg and D. Dungworth.
2003 Copper Metallurgy in the Jordan Valley from the Third to the First Millennia BC: Chemical, Metallographic and Lead Isotope Analyses of Artefacts from Pella. *Levant* 35: 71-100.
Pilides, D.
2000 *Pithoi of the Late Bronze Age in Cyprus*. Nicosia, Department of Antiquities of Cyprus.
Porat, Y., E. Yanai and A. Kasher.
1999 Archaeological Remains at Jatt (in Hebrew). *Atiqot* XXXVII: 1-78.
Potratz, J.A.H.
1966 *Die Pferdtrensen des alten Orient*. Rome, Pontificium Institutum Biblicum.
Prausnitz, M.W.
1993 Achzib. Pp. 32-36 in *The New Encyclopedia of Archaeological Excavations in the Holy Land*. E. Stern (ed.). Jerusalem, Israel Exploration Society.
1997 The Stratigraphy and Ceramic Typology of Early Iron Age Tombs at Akhziv. *Michmanim* 11: 17-30 (Hebrew).
Pritchard, J.B.
1969 *Ancient Near Eastern Texts*. Princeton, Princeton University.
1975 *Sarpta A Preliminary Report of the Iron Age*. Philadelphia, University Museum, University of Pennsylvania.
1978 *Recovering Sarepta, a Phoenician City*. Princeton, Princeton University Press.
1980 *The Cemetery at Tell es-Sa'idyeh, Jordan*. Philadelphia, University of Philadelphia.
Puech, E.
1980 Céramique des niv. 9c-11. Pp. 216-234 in *Tell Keisan (1971-1976): Une cité phénicienne en Galilée*. J. Briend and J.-B. Humbert (eds.). Fribourg, Switzerland, Editions Universitaires Fribourg Suisse.
Pulak, C.
1988 The Bronze Age Shipwreck at Ulu Burun, Turkey: 1985 Campaign. *American Journal of Archaeology* 92(1): 1-37.
1997 The Ulu Burun Wreck. Pp. 233-262 in *Res Maritimae, Cyprus and the Eastern Mediterranean from Prehistory to Late Antiquity*. S. Swiny, R.L. Hohlfelder and H.W. Swiny (eds.). Atlanta, American Schools of Oriental Research Archaeological Reports, Cyprus American Archaeological Research Institute Monograph Series, vol. 1. Atlanta, Scholars Press.
2000 The Balance Weights from the Late Bronze Age Shipwreck at Uluburun. Pp. 247-266 in *Metals Make the World Go Round*. C. Pare (ed.). Oxford, Oxbow.
2005 Das Schifwrack von Uluburun und seine Ladung. Pp. 55-102 in *Das Schiff von Uluburun*. Ü. Yalçin, C. Pulak and R. Slotta (eds.). Bochum, Deutches Bergbau-Museum Bochum.
Raban, A.
1995 Dor-Yam: Maritime and Coastal Installations at Dor in their Geomorphological and Stratigraphic Context. Pp. 285-354 in *Excavations at Dor, Final Report*. E. Stern (ed.). Jerusalem, The Institute of Archaeology, The Hebrew University.
1998 Near Eastern Harbors: Thirteenth-Seventh Centuries BCE. Pp. 428-438 in *Mediterranean Peoples in Transition*. S. Gitin, A. Mazar and E. Stern (eds.). Jerusalem, Israel Exploration Society.
Raban-Gerstel, N.
2006 *Faunal Remains from Tel Dor: An Early Iron Age Port City*. MA Thesis. Archaeology Department. University of Haifa, Haifa.
Rapuano, Y.
2001 Tel Dover. *Hadashot Arkhiologiyot-Excavations and Surveys in Israel* 113: 19*-21*.
Rast, W.E.
1978 *Taanach I, Studies in the Iron Age Pottery*. Cambridge, MAMassechusettes, American Schools of Oriental Research.
Rothenberg, B.
1972 *Timna, Valley of the Biblical Copper Mines*. London, Thames and Hudson.
1988 *The Egyptian Mining Temple at Timna*. London, Institute for Archaeometallurgical Studies.
Rothenberg, B. and J. Glass.
1983 The Midianite Pottery. Pp. 65-124 in *Midian, Moab and Edom*. J.F.A. Sawyer and D.J.A. Clines (eds.). Sheffield, University of Sheffield.
Rowlands, M., M.T. Larsen and K. Kristiansen (eds.).
1987 *Centre and Periphery in the Ancient World*. Cambridge, Cambridge University Press.
Ruiz-Galvez, M. (ed.).
2004 *Heroes Mediterraneos: comercio, escriptura y pensamiento abrracto*. Madrid, Spanish Ministry of Education and Science.

Rupp, D.W.
1987 Vive le roi: The Emergence of the State in Iron Age Cyprus. Pp. 147-168 in *Western Cyprus: Contacts*. D.W. Rupp (ed.). Gothenburg, Paul Åström.
Saath, S. (ed.).
1988 *Studies in the Histroy and Archaeology of Palestine*. Damascus.
Salmon, Y.
2001 *Collared-Rim Jars from the Coastal Site of Tel Nami as an Indicator of International Trade at the End of the Late Bronze Period*. MA Thesis. Maritime Civilizations. University of Haifa. Haifa.
Sanders, J.A. (ed.).
1970 *Near Eastern Archaeology in the Twentieth Century*. New York, Doubleday.
Schaeffer, C.F.-A.
1939 *Ugaritica*. Paris, Pual Geuthner.
1948 *Stratigraphie comparée et chronolgie de l'Asie occidentale, IIIe et IIe millenaires*. Oxford, Oxford University Press.
1952 *Enkomi-Alasia*. Paris, Maison Archeologique Francaise.
1956 *Ugaritica III*. Paris, Librairie Orientaliste Paul Geuthner.
Schloen, J.D.
2001 *The House of the Father as Fact and Symbol: Patimonialism in Ugarit and the Ancient Near East*. Winona Lake, Indiana, Eisenbrauns.
Schorsch, D. and E. Hendrix.
2003 Ambition and Competence in Late Bronze Age Cyprus. *Report of the Department of Antiquities of Cyprus*: 53-77.
Schreiber, N.
2003 *The Cypro-Phoenician Pottery of the Iron Age*. Leiden, Brill.
Schumacher, G.
1908 *Tell el-Mutesellim: Bericht über die 1903 bis 1905 mit Unterstutzung des deutschen Kaiser und der deutschen Orient-Gesellschaft / vom Deutschen Verein zur Erfoschung Palästinas veranstalteten Ausgrabungen*. Leipzig, Rudolf Haupt.
Seton-Williams, V.
1980 Tell Keisan 1935-1936. Pp. 381-390 in *Tell Keisan (1971-1976): Une cité phénicienne en Galilée*. J. Briend and J.B. Humbert (eds.). Fribourg, Switzerland, Editions Universitaires Fribourg Suisse.
Shalev, S.
1997 Metal Objects from Hazor. Pp. 348-352 in *Hazor V*. A. Ben Tor, R. Bonfil and A. Paris (eds.). Jerusalem, Israel Exploration Society.
Sharon, I.
2001 'Transition Dating'- A Heuristic Mathematical Approach to the Collation of Radiocarbon Dates from Stratified Sequences. *Radiocarbon* (43): 345-354.
Sherratt, A. and S. Sherratt.
2001 Technological Change in the East Mediterranean Bronze Age: Capital, Resources and Marketing. Pp. 15-38 in *The Social Context of Technological Change*. A.J. Shortland (ed.). Oxford, Oxbow Books.
Sherratt, S.
1994 Commerce, Iron and Ideology: Metallurgical Innovation in 12th-11th Century Cyprus. Pp. 59-107 in *Cyprus in the 11th Century B.C.* V. Karageorghis (ed.). Nicosia, Leventis Foundation.
1999 *E pur si muove*: Pots, Markets and Values in the Second Millennium Mediterranean. Pp. 187-189 in The Complex Past of Pottery. Production, Circulation and Consumption of Mycenaean and Greek Pottery (Sixteenth to Early Fifth Centuries BC). J.P. Crielaard, V. Stissi and G.J.V. Wijngaarden (eds.). Amsterdam, J.C.Gieben.
2000 Circulation of Metals and the End of the Bronze Age in the Eastern Mediterranean. Pp. 82-98 in Metals Make the World Go Round: Supply and Circulation of Metals in Bronze Age Europe. C. Pare (ed.). Oxford, Oxbow.
2003 The Mediterranean Economy: «Globalization» at the End of the Second Millennium B.C.E. Pp. 37-62 in Symbiosis, Symbolism and the Power of the Past. W.G. Dever and S. Gitin (eds.). Winona Lake, Indiana, Eisenbrauns.
2004 Feasting in Homeric Epic. *Hesperia* 73(2): 301-337.
Shortland, A.J. (ed.).
2001 *The Social Context of Technological Change*. Oxford, Oxbow Books.
Silberman, N.A. and D. Small (eds.).
1997 *The Archaeology of Israel*. Sheffield, Sheffield Academic Press.
Singer, I.
1999 A Political History of Ugarit. Pp. 603-733 in *Handbook of Ugaritic Studies*. W.G.E. Watson and N. Wyatt (eds.). Leiden, Brill.
Sjöqvist, E.

1940 *Problems of the Late Cypriote Bronze Age*. Stockholm.
Snodgrass, A.M.
1971 *The Dark Age of Greece*. Edinburgh, Edinburgh University Press.
1994 Gains, Losses and Survivals: What We Can Infer for the Eleventh Century B.C. Pp. 167-176 in *Cyprus in the 11th Century B.C.* V. Karageorghis (ed.). Nicosia, A.G. Leventis Foundation.
South, A., P. Russel and P. Keswani.
1989 *Kalavasos-Ayios Dhimitrios II*. Gothenburg, Paul Åström.
Spalinger, A.
1978 A Canaanite Ritual Found in Egyptian Reliefs. *Journal of the Society of the Study of Egyptian Archaeology* 8: 47-60.
Stager, L.E.
2003 Phoenicians Shipwrecks in the Deep Sea. Pp. 233-247 in *Sea Routes...Interconnections in the Mediterranean 16th-6th Centuries BC*. N.C. Stampolidis and V. Karageorghis (eds.). Athens, University of Crete and A.G. Leventis Foundation.
Stampolidis, N.C. and V. Karageorghis (eds.).
2003 *Sea Routes... Interconnections in the Mediterranean 16th-6th c. BC*. University of Crete, A.G. Leventis Foundation.
Stern, E. (ed.).
1993 *The New Encyclopedia of Archaeological Excavations in the Holy Land*. Jerusalem, Israel Exploration Society.
Stern, E.
1995 *Excavations at Dor, Final Report*. Jerusalem, The Institute of Archaeology, the Hebrew University of Jerusalem.
1998 The Relations between the Sea Peoples and the Phoenicians in the Twelfth and Eleventh Centuries BCE. Pp. 345-352 in *Mediterranean Peoples in Transition*. S. Gitin, A. Mazar and E. Stern (eds.). Jerusalem, Israel Exploration Society.
2000 The Settlement of Sea Peoples in Northern Israel. Pp. 197-212 in *The Sea Peoples and Their World*. E.D. Oren (ed.). Philadelphia, The University Museum, University of Pennsylvania.
Swiny, S.
1982 Correlation Between the Composition and Function of Bronze Age Metal Types in Cyprus. Pp. 69-80 in *Early Metallurgy in Cyprus, 4000-500 BC*. J.D. Muhly, R. Maddin and V. Karageorghis (eds.). Nicosia, Pierides Foundation.
Swiny, S., R.L. Hohlfelder and H.W. Swiny (eds.).
1997 *Res Maritimae, Cyprus and the Eastern Mediterranean from Prehistory to Late Antiquity*.. Atlanta, American Schools of Oriental Research Archaeological Reports, Cyprus American Archaeological Research Institute Monograph Series, vol. 1. Atlanta, Scholars Press
Thalmann, J.-P.
2000 Tell 'Arqa. *Bulletin d'Archéologie et d'Architecture Libanaises* 4: 5-74.
Tubb, J.N.
1988a The Role of the 'Sea Peoples': Bronze Industry of Palestine/Transjordan in the Late Bronze-Early Iron Age. Pp. 251-270 in *Bronze Working Centers of Western Asia ca. 1000-538 BC*. J.E. Curtis (ed.). London and New York, Kegan Paul International.
1988b Tell es-Sa`idiyeh: Preliminary Report on the First Three Seasons of Renewed Excavations. *Levant* XX: 23-88.
1993 Sa'idiyeh, Tell es-. Pp. 1295-1300 in *The New Encyclopedia of Archaeological Excavations in the Holy Land*. E. Stern (ed.). Jerusalem, Israel Exploration Society.
1995 An Aegean Presence in Egypto-Canaan. Pp. 136-145 in *Egypt, the Aegean and the Levant; Interconnections in the Second Millennium BC*. W.V. Davies and L. Schonfield (eds.). London, British Museum Press.
Tufnell, O.
1953 *Lachish III, The Iron AGe*. London, Oxford University Press.
1958 *Lachish IV, The Bronze Age*. London, Oxford University Press.
Ussishkin, D.
1989 Schumacher's Shrine in Building 338 at Megiddo. *Israel Exploration Journal* 39(3-4): 149-172.
1992 Megiddo. Pp. 666-679 in *Anchor Bible Dictionary*. D.N. Freedman (ed.). New York, Doubleday.
1995 The Destruction of Megiddo at the End of the Late Bronze Age and its Historical Significance. *Tel Aviv* 22: 240-267.
Van Der Kooij, G.
1993 Deir 'Alla, Tell. Pp. 338-342 in *The New Encyclopedia of Archaeological Excavations in the Holy Land*. E. Stern (ed.). Jerusalem, Israel Exploration Society.
Waldbaum, J.
1978 *From Bronze to Iron - the Transition from the Bronze Age to the Iron Age in the Eastern Mediterranean*. GotebergGothenburg, Paul Åström.
Ward, W.A. and M.S. Joukowsky (eds.).

1992 *The Crisis Years: The 12th Century B.C.* Kendall/Hunt Publishing Company.
Watson, W.G.E. and N. Wyatt (eds.).
1999 *Handbook of Ugaritic Studies*. Leiden, Brill.
Weiss, H. (ed.).
1985 *Ebla to Damascus*. Washington, Smithonian Insitution.
Wells, P.
1992 Crisis Years? The 12th Century B.C. in Central and Southeastern Europe. Pp. 31-39 in *The Crisis Years: The 12th Century B.C.* W.A. Ward and M.S. Joukowsky (eds.). Dubuque, Iowa, Kendall/Hunt Publishing Company.
Wertime, T. and J.D. Muhly (eds.).
1980 *The Coming of the Age of Iron*. New Haven, Yale University Press.
Wolff, S.R.
1998 An Iron Age I Site at 'En Hagit (Northern Ramat Menashe). Pp. 449-454 in *Mediterranean Peoples in Trasition. Thirteenth to Early Tenth Centuries BCE, in Honor of Professor Trude Dothan*. S. Gitin, A. Mazar and E. Stern (eds.). Jerusalem, Israel Exploration Society.
Yadin, Y.
1970a The Megiddo of the Kings of Israel. *Qadmoniot* (3): 38-56 (in Hebrew).
1970b Megiddo of the Kings of Israel. *Biblical Archaeologist* 33: 66-96.
Yadin, Y., Y. Aharoni, I. Dunayevksy, T. Dothan, R. Amiran and J. Perrot.
1958 *Hazor I*. Jerusalem, Israel Exploration Society.
Yadin, Y. and S. Geva.
1986 *Investigations at Beth Shean, the Early Iron Age Strata*. Jerusalem, the Hebrew University.
Yadin, Y., Y. Shiloh and A. Eitan.
1972 Megiddo. *Israel Exploration Journal* 22: 161-164.
Yahalom-Mack, N. and S. Shalev.
2005 Metal Production and Utilization. Pp. 367-376 in *Yoqne'am II, the Iron Age*. A. Ben Tor, A. Zarzecki-Peleg and S. Cohen-Anidjar (eds.). Jerusalem, Institute of Archaeology, Hebrew University.
Yannai, EE.
1995 A Group of Early Iron Age Lamps from the Northern Sharon Valley. *Tel Aviv* 22: 279-281.
2000 A Late Bronze Age Tomb at Jatt. *'Atiqot* XXXIX: 49-82.
2002 An Iron Age Burial Cave (No. 6) at Et-Taiyiba. *'Atiqot* XLIII: 27*-56* (Hebrew with English summary).
2005 Late Bronze Age Pottery from Tombs 12 and 13 at Tell Jatt, Sharon Plain (in Hebrew). *'Atiqot* 49: 13*-30*.
Yellin, J. and J. Gunneweg.
1989 Instrumental Neutron Activation Analysis and the Origin of Iron Age I Collared-rim Jars and Pithoi from Tel Dan. *Bulletin of the American Schools of Oriental Research* 49(: 133-141).
Yon, M.
1971 *Salamine de Chypre II. La Tombe T. I du XIe s. av. J.-C.* Paris, Editions E. de Boccard.
1992 End of the Kingdom of Ugarit. Pp. 111-122 in *The Crisis Years: The 12th Century B.C.* W.A. Ward and M.S. Joukowsky (eds.). Dubuque, Iowa Kendall/Hunt Publishing Company.
1999 Salamis and Kition in the 11th-9th Century B.C. Pp. 16-33 in *Cyprus, the Historicity of the Geometric Horizon*. M. Iacovou and D. Michaelides (eds.). Nicosia, Archaeological Research Unit, University of Cyprus.
Yoselevich, N.
2005 *The Utilization of Chalices as Incense Burners on Boats and in Coastal Sites*. MA Thesis. Maritime Civilizations Department. University of Haifa, Haifa, Israel.
Young, G.D. (ed.).
1981 *Ugarit in Retrospect*. Eisenbrauns.
Zaccagnini, C.
1987 Aspects of Ceremonial Exchange in the Near East during the late Second Millennium BC. Pp. 57-65 in *Centre and Periphery in the Ancient World*. M. Rowlands, M.T. Larsen and K. Kristiansen (eds.). Cambridge, Cambridge University Press.
Zagorski, S.
2004 *Tel Akko (Area Ph) From the Late Bronze IIB to the Iron IA Period (in Hebrew)*. MA Thesis. Archaeology. University of Haifa, Haifa.
Zioni, G.
2005 *Pithos Burials in the Southern Levant at the Late Bronze - Early Iron Age Transition*. MA Thesis. Archaeology. University of Haifa, Haifa.

APPENDICES: APPENDIX A

PROVENANCE OF METALS FROM TEL JATT BASED ON THEIR LEAD ISOTOPE ANALYSES

Z.A. STOS-GALE
Ifold, West Sussex, December 2005

INTRODUCTION

The lead isotope (LI) study of the sources of Bronze Age copper in the Mediterranean has been initiated over 20 years ago (Gale and Stos-Gale 1982). This method of metal analysis can provide an objective «fingerprint» of the metal that in turn can be compared with those of ores in the relevant mineral deposits to identify the matching source of metal. The full potential of lead isotope provenance studies is achieved only when there is available a reasonably comprehensive database of LI fingerprints of ores from ancient mines. This means that the lead isotope research has to be based on an extensive and expensive archeometallurgical fieldwork including geochemical characterization of ores and the history of mining. So far there are only a few mining areas of the Old World where such attempt has been made (for example Cyprus: Stos-Gale *et al.* 1997 and 1998), but even there the information is not fully comprehensive. Unfortunately this approach requires large teams of specialists, time, and a considerable amount of financial support; understandably these are not easily available.

The database of lead isotope and elemental analyses of Bronze Age metals and ores used in this paper (OXALID) was assembled in Oxford between 1978 and 2001. During this time more than 2,000 lead isotope analyses have been obtained on ore and slag samples collected during numerous archeometallurgical and geological surveys in Greece, Cyprus, Italy, Spain and Bulgaria. Together with the relevant lead isotope data published by other researchers it forms a database of over 2,600 entries that can be used for comparisons with the Mediterranean Bronze Age metals. This amount of data seems quite substantial, but unfortunately there are still very important gaps, including Egyptian and Middle Eastern ore sources (for full bibliography of LI data related to provenance studies see Gale and Stos-Gale 2000).

There is at present a reasonable amount of archeometallurgical and LI data for the copper ores from Greece, the Balkans, Cyprus and Sardinia (see for example: Stos-Gale *et al.* in *Archaeometry*, 1995a, 1996, 1998; Pernicka *et al.* 1993). On the other hand, the very important ore deposits in the Levant have been in many instances quite well researched from the archeometallurgical point of view, but the lead isotope characterization of these sites is quite insufficient (see for example: Pernicka *et al.* 1984, Wagner *et al.* 1989).

THE COPPER DEPOSITS IN THE ARABAH VALLEY

At present there have been two important archeometallurgical projects conducted in the Near East: by Beno Rothenberg in Israel (Timna) and by teams from Bochum and San Diego University in Jordan (Feinan). The archeometallurgical evidence from these two sites shows that both of them were very productive and important copper smelting sites for many centuries. Unfortunately, it seems that the thorough LI characterization of these deposits has not been undertaken as yet. The 39 lead isotope analyses of ores, slag and copper from Feinan published so far

lead the authors to the conclusion that: «*..The ores are very poorly characterised by the isotopic composition of their lead.*»., but that is followed by «*.. a unique fingerprint of Feinan … and the copper produced from these ores emerges when combining lead isotopy with trace element concentration*». (Hauptmann et al 1992, p. 1). By describing the fingerprint of the ores from Feinan as «poor», the authors of this very thorough paper meant that this group of lead isotope data shows a very complex geological history of the Feinan copper deposit. In principle this is not a problem for the lead isotope provenance studies, because the comparisons of ores and artifacts are done on the bases of one-to-one, and the chemical composition and information about the chronology of mining gives additional criteria for decision if a given artifact can have been made of copper from Feinan.

The Timna mines are situated about 120 km S-W from Feinan on the other side of the Wadi Arabah. It is not surprising that their geological history reflects closely that of Feinan mineralization. Sixty four lead isotope analyses of ores from Timna have been measured by Noel Gale between 1985 and 1991. Fourteen of them have been published and used in identification of iron and lead from Timna (Gale *et al.* 1990). However, all of the data have never been published in a scientific manner, relating the ore samples to the geology and geochemistry of this mineralization. The data, currently on the database of the Isotrace Laboratory in Oxford (OXALID), show a diversity with ratios falling into three lead isotope groups. The range of LI ratios in each of these groups is listed in Table 2.

Table 2: Groups of LI ratios for ores from Timna

LI Group	$^{208}Pb/^{206}Pb$	$^{208}Pb/^{206}Pb$	$^{208}Pb/^{206}Pb$
Group A1	1.88-1.97	0.78-0.81	20.17-19.3
Group A	2.07-2.08	0.852-0.856	18.34-18.24
Group B	2.10-2.131	0.864-0.874	18.142-17.9

Samples falling into groups A1 and A amount to only four in each of these groups and originate from archeometallurgically less significant areas (for example Sites 37 and 115). Group B consists of 56 measurements on samples from sites across Timna ranging from copper ores to Mn and Fe minerals and fossilized trees.

The lead isotope data published for Feinan also shows a great range of lead isotope ratios, and the geological explanation for this diversity has been discussed by Hauptman (*et al.* 1992). For this discussion it is enough to look at these data as forming two groups with the range of LI ratios listed in Table 3 (Hauptmann *et al.* 1992, p. 17, Table 4 and Table 7, p. 24).

Table 3: Groups of LI ratios for ores, slags and copper from Feinan

LI Group	$^{208}Pb/^{206}Pb$	$^{208}Pb/^{206}Pb$	$^{208}Pb/^{206}Pb$
MBS et al.	2.046-2.09	0.82-0.847	19.14-18.51
DLS	2.10-2.12	0.863-0.872	18.0-17.91

The lead isotope data for both mining areas place the majority of samples in the region delimited by the groups Timna B and Feinan DLS. In Figure 1, the data for these two groups of samples are plotted as mirror images of the 3D data-points on two planes. The diagram shows quite clearly that the range of LI ratios measured for the ores from Feinan is much smaller (effectively for $^{208}Pb/^{206}Pb$ 2.1188-2.1219) than those from Timna ($^{208}Pb/^{206}Pb$ 2.099-2.132). This picture is complicated somewhat by the sample JD1/18d, a copper ore from the Variegated Sandstone Formation lying over the Dolomite Limestone-Shale Unit (DLS) (Hauptmann *et al.* 1992, p. 17 and 4). The authors of this paper concluded that the DLS formation was the one that was chiefly exploited in the Bronze Age. Perhaps on this basis we can ignore the variations of lead isotope ratios in the other formations of the Feinan mi-

neralization. If this is a correct approach, then it seems that the overlap of ores from Timna with those from Feinan is quite minor, covering only about 25 % of the range of the LI ratios of the most important ore outcrops in Timna. Therefore it should be possible to distinguish between the artifacts originating certainly from Timna and those that can be labeled «Timna or Feinan».

On the other hand it seems that the Bronze Age mining of the ores of Timna included all of those described here as the isotopic group B. This point has been proven by the lead isotope ratios of 33 copper and iron artifacts excavated on the site T200 in Timna. It should be noted here that not all of the artifacts excavated there are made of copper from Timna. Amongst analyzed 26 copper based artifacts there were two figurines that show lead isotope ratios quite different to any of the local ores. However, the majority of copper and iron artifacts are fully consistent with the ores forming Group B. On Figure 1 the mirror images of the LI datapoints for ores from Feinan and Timna are compared with the datapoints measured for the artifacts from Timna. Additionally, a group of 17 copper based artifacts from various sites in the Near East (Ugarit, el Amarna, Quantir and copper ingots from Israel) and five artifacts from the cargo of Cape Gelidonya also are fully consistent with the Group B of Timna ores (but to preserve the clarity of the diagram they are not plotted in this Figure; see also Stos-Gale *et al.*1995b).

However, out of these 45 Bronze Age artifacts consistent with ores from Timna, at least 18 are also consistent with the origin from Feinan. And ten of those have been excavated in Timna. The remaining eight are the EBA copper ingots from Hebron Hills and Har Yeruham. What seems rather unusual is the fact that all these 18 objects have identical lead isotope ratios with only 2 ores from the DLS formation in Wadi Khalid (JD-1/18a and JD-3/13 in Table 4 of Hauptmann *et al.* 1992), but as many as 18 out of 24 copper smelting remain from Feinan analyzed (Table 7, in Hauptmann *et al.* 1992). These slags and copper come from smelting sites dated to Chalcolithic, EBA, MBA, Iron Age, Roman, and Mamluk periods. The site T200 in Timna is dated to the Late Bronze Age. Therefore it does not seem likely that these metal objects from Timna T200 are made of ores from Feinan. On the other hand there are only a few ores from Timna analyzed so far that could be said to match this tight cluster of data and they fall on the edges of this group. They are from various sites and they do not seem to be linked geographically.

On the basis of the lead isotope information currently available, Feinan seems to have a much smaller range of lead isotope ratios in comparison with Timna. But there was a similar case with ores from Cyprus: with 39 LI data published in 1985, the «Cypriot field» was quite small. Now we have nearly 700 analyses and the pattern of the lead isotope data is far more complex (Stos-Gale *et al.* 1998). The ore data from Timna are certainly not sufficient for a full characterization of this region and should be supplemented by geological information, so that the exploitation of different parts of the deposit can be related to the lead isotope pattern. And finally, for the identification of the origin of the MBA copper ingots from Hebron Hills and Har Yeruham, tests based on their trace elemental composition can provide additional information, as suggested by the authors of the paper by Hauptmann *et al.* (1992).

ELEMENTAL AND LEAD ISOTOPE ANALYSES OF ARTIFACTS FROM TEL JATT

Twelve samples of copper based artifact from Tel Jatt were analyzed in the Isotrace Laboratory in Oxford in 1998-2000. The semi-quantitative elemental analyses of the samples were done using the ED XRF, and lead isotope analyses were done by TIMS.

The ED XRF indicates the content of major elements without any correction for corrosion and therefore the quantities of the metals given in the table of the results might be somewhat higher than in the original metal. Additionally, the lead contents are given with a high error, because of a poor statistics of counts for this element if present in copper below, or around 1 %.

Out of 12 samples of artifacts 10 have been identified by ED XRF as high tin bronzes. Only the arrowhead (J-19) and the cauldron (J-48) are nearly pure copper.

The lead isotope analyses by TIMS have been of very good quality assuring the required ±0.1 % necessary for LI provenance studies (Stos-Gale *et al.* 1995a). The lead isotope ratios of these artifacts from Tel Jatt have been compared with all data for copper ores on the OXALID database. The copper ores matching most of them with the highest probability are the ores from Wadi Arabah.

Table 4: ED XRF analysis of the samples of artifacts from Tel Jatt

Number	Description	As %	Ag %	Sn %	Fe %	Cu %	Pb %
J-46 (H-2669)	Handled bowl	<0.2	<0.2	9.9	0.1	89.9	0.2
J-48 (H-2652)	Cauldron	<0.2	<0.2	0.4	0.1	99.2	0.2
J-15 (H-2628)	Globular Juglet	<0.2	<0.2	7	<0.1	92.3	0.7
J-16 (H-2630)	Globular Juglet	<0.2	<0.2	10.3	<0.1	88.7	0.9
J-17 (H-2632)	Globular Juglet	<0.2	<0.2	8.5	0.1	90.4	0.9
J-13 (H-2631)	Oval Juglet	<0.2	<0.2	9.5	<0.1	90	<0.2
J-30 (H-2648)	Spearhead. Long socket	<0.2	<0.2	13.2	0.1	84.8	1.9
J-33 (H-2634)	Spearhead. Short socket	<0.2	<0.2	10.8	0.2	88.5	0.4
J-19 (H-2643)	Arrowhead	<0.2	<0.2	<0.2	0.1	98.5	0.7
J-22 (H-2641)	Arrowhead	<0.2	<0.2	18	0.1	81.5	0.4
J-52 (H-2651)	Sword	0.7	<0.2	13.7	0.1	85.2	0.2
J-53 (H-2646)	Bronze knife	0.4	<0.2	8.4	<0.1	91	0.2

Table 5: Lead isotope analyses of the copper based artifacts from Tel Jatt

Number	Description	$^{208}Pb/^{206}Pb$	$^{207}Pb/^{206}Pb$	$^{206}Pb/^{204}Pb$
J46 (H-2669)	Handled bowl	2.11704	0.86876	18.011
J-48 (H-2652)	Cauldron	2.12045	0.86965	18.013
J-15 (H-2628)	Globular Juglet	2.10544	0.86075	18.207
J-16 (H-2630)	Globular Juglet	2.11837	0.86883	18.007
J-17 (H-2632)	Globular Juglet	2.11965	0.86999	17.975
J-30 (H-2648)	Spearhead. Long socket	2.11977	0.87003	17.971
J-33 (H-2634)	Spearhead. Short socket	2.11912	0.86955	17.984
J-19 (H-2643)	Arrowhead	2.12027	0.86958	17.993
J-22 (H-2641)	Arrowhead	2.11939	0.86933	18.005
J-52 (H-2651)	Sword	2.09950	0.85748	18.267
J-53 (H-2646)	Bronze knife	2.10280	0.85769	18.277

The results of these analyses are plotted on Figure 1 together with the data from Timna and Feinan discussed above. The LI ratios of nine of these artifacts are identical in all three ratios with the ores from Feinan DLS published by Hauptmann (*et al.* 1992). Three of the artifacts (sword J-52 sword, knife J-53 and juglet J-15) are made of copper originating from a different mineralization – most likely occurring in the mines of Timna. However, two of them (sword and knife) are also consistent with the LI fingerprints of the copper ores of Iglesiente in Sardinia (Stos-Gale *et al.* 1995a). It might be significant that these two artifacts show also a little higher content of arsenic than the other objects from Tel Jatt analyzed in Oxford (Table 4 above). Only further lead isotope analyses of ores and slags from the Arabah Valley ancient mining sites can confirm if these objects are indeed made of copper brought from the Western Mediterranean. That such cases were not uncommon in the LBA has been already indicated by the presence of lead and copper from Sardinia in LC Cypriot towns and in Ugarit (Stos-Gale and Gale 1994). Another possible way of testing if these objects are from the Western Mediterranean or from the Arabah can be by a comparison of trace elemental compositions of the metals with the Arabah LI fingerprints. The pattern of trace elements might be able to help us decide whether these two objects are more similar to the metal obtain from the Sardinian or to Arabah ores.

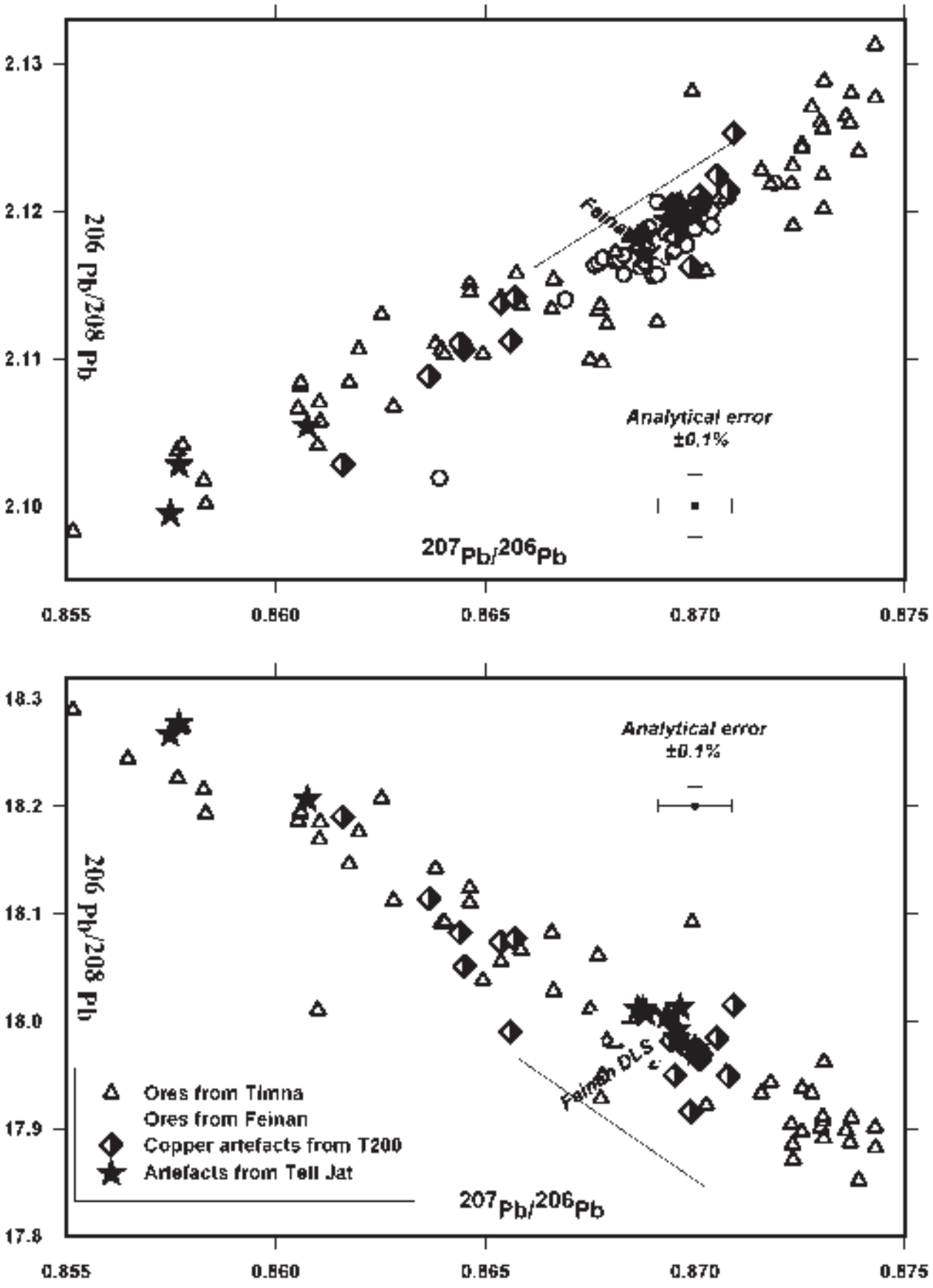


Figure 6.1: Lead isotope composition of metals from Tel Jatt and Timna

REFERENCES

Gale, N.H. and Stos-Gale, Z.A.
1982 «Bronze Age Copper Sources in the Mediterranean: A new approach». *Science*, Vol. 216, 11-19.
Gale, N.H., Bachmann, H.G., Rothenberg, B. and Stos-Gale, Z.A.
1990 «The Adventitious Production of Iron in the Smelting of Copper in Timna, W. Arabah». The Ancient Metallurgy of Copper. B. Rothenberg ed. IAMS, UCL London. 182-191.
Gale, N.H. and Stos-Gale, Z
2000 Lead isotope analyses applied to provenance studies. In Modern Analytical methods in Art and Archaeology. Eds. E. Ciliberto and G. Spoto. Chemical Analyses Series, Vol. 155. John Wiley and Sons, Inc. ISBN 0-471-29361-X. Chapter 17, 503-584.
Hauptmann, A., Begemann, F., Heitkemper, R., Pernicka, E. and Schmitt-Strecker, S.
1992 Early copper produced in Feinan, Wadi Araba, Jordan: the composition of ores and copper. Archeomaterials Vol. 6, No. 1. 1-33.
Pernicka, E., Seeliger, T.C., Wagner, G.A., Begemann, F., Schmitt-Strecker, S. Eibner, C., Oztunali, O., Baranyi, I.
1984 Archeometallurgische untersuchungen in Nordwestanatolien. Jahrbuch des Romisch-Germanischen Zentralmuseums 31. 533-599.
Pernicka, E., Begemann, F., Schmitt-Strecker, S. and Wagner, G.A..
1993 Eneolithic and Early Bronze Age copper artefacts from the Balkans and their relation to Serbian copper ores, Praehistorisches Zeitschrift 68(1), 1-54.
Stos-Gale, Z.A. and Gale, N.H.
1994 «The origin of metals excavated on Cyprus». Chapter 3 in B. Knapp and J. Cherry eds. Provenance studies and Bronze Age Cyprus: Production exchange and Politico-Economic change. Prehistory Press, Madison. 92-122 and 210-216.
Stos-Gale, Z.A., Gale, N.H., Houghton, J. and Speakman, R.
1995a «Lead isotope analyses of ores from the Western Mediterranean. Archaeometry 37, 2. 407-415.
Stos-Gale, Z.A., Gale, N.H. and Houghton, J.
1995b The origin of copper metal excavated in El Amarna. In W.V. Davies and L. Schofield eds. Egypt, the Aegean and the Levant: Interconnections in the 2nd millenium BC. British Museum Press, London 1995. 127-135.
Stos-Gale, Z.A., Gale, N.H. and Annetts, N.
1996 Lead isotope analyses of ores from the Aegean. Archaeometry 38 (2). 381-390.
Stos-Gale, Z.A., Maliotis, G., Gale, N.H. and Annetts, N.
1997 Lead isotope characteristics of the Cyprus copper ore deposits applied to provenance studies of copper oxhide ingots. Archaeometry 39 (1), 83-124.
Stos-Gale, Z.A., Gale, N.H., Annetts, N., Todorov, T., Lilov, P, Raduncheva, A. and Panayotov, I.
1998 Lead isotope data from the Isotrace Laboratory, Oxford: Archaeometry Database 5, Ores from Bulgaria. Archaeometry 40/1. 217-226.
Stos-Gale, S., Maliotis, G. and Gale, N.H.
1998 A preliminary survey of the Cypriot slag heaps and their contribution to the reconstruction of copper production on Cyprus. In Metallurgica Antiqua, in Honour of Hans-Gert Bachmann and Robert Maddin. Eds. T. Rehren, A. Hauptmann and J. Muhly. Deutches Bergbau Museum, Bochum. 235-262.
Wagner, G.A., Begemann, F., Eibner, C., Lutz, J., Oztunali, O., Pernicka, and Schmitt-Strecker, S.F.
1989 Archäometallurgische Untersuchungen an Rohstoffquellen des frühen Kupfers Ostanatoliens. Jahrbuch des Römisch-Germanischen Zentralmuseums Mainz 36: 637-686.

APPENDIX B: RADIOGRAPHY

G. TSIONI, B. BREITMAN, Y. HERSHKO, H. FELDMAN, AND M. ARTZY

Radiography is a nondestructive method used for examination of the internal structure of opaque objects by means of ionizing radiation. The inspected specimen is placed between a source of radiation and a film, or other image receptor. When the radiation penetrates through the specimen, it is attenuated. The film is exposed to radiation at different levels, and therefore a shaded black and white two-dimensional projection of the specimen structure is recorded on it. The shading is the function of the thickness and density, and the energy of radiation source. In that way, the lighter the area on the negative picture, the greater the object's thickness or density (i.e., the picture is a negative). Another method used was Neutron Radiography. In this method the attenuation of the neutron beam corresponds to the amount of hydrogen in the specimen. This is utilized in order to create a negative image as above.

In the case of the Jatt hoard radiography was used to enhance areas in which the production method of the objects might be observed, and to inspect for hidden flaws in the metal. The radiography was carried out, at the Soreq Nuclear Research Center in Israel, by B. Breitman, Y. Hershko, and H. Feldman. Their readings of the photos were followed by discussions with Gil Tsioni and Michal Artzy.

Four different techniques were applied:

1. X-ray Radiography with focal length of 1.2-2.5 mm. The vessels were attached to the film. The X-ray equipment used: Andrex 300KV.
2. Gamma-ray with focal length of 3mm. It has higher penetration abilities then the X-ray. The energy was generated by iridium 192 source of Nordion manufacture.
3. Micro-focus - an X-ray radiography with focal length of 30-70m (micron). In this system the specimen is placed further from the receptor, which is either film or digital. Micro-focus was used in order to obtain enlargements of details.
4. Neutron Radiography with a focal length of 50m was applied in order to inspect the hydrogen-rich corrosion of the vessels, and to search for organic matter.

Eleven objects from the Jatt hoard were subjected to radiographic examination: two of the rounded bowls (J-77, J-79), four of the juglets (J-78, J-80, J-81, J-82), two horse bits (J-90, J-92), the mace head (J-69), the rod tripod (J-62), and one offering stand (J-60). The results are summarized below.

BOWLS

The results of neutron radiography of the bowls agreed with the naked eye impressions. The curved irregularity seen in the base of bowl J-77 (Figure 6.2), marks an area of different corrosion on the vessel. Check by Scanning Electron Microscope verified the conclusion. The cause of that different corrosion is unclear, and the possibility that

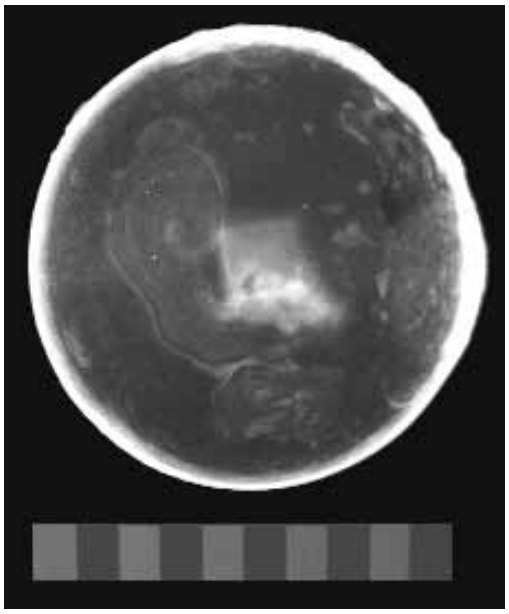


Figure 6.2: Neutron radiography of bowl J-77. View from above.

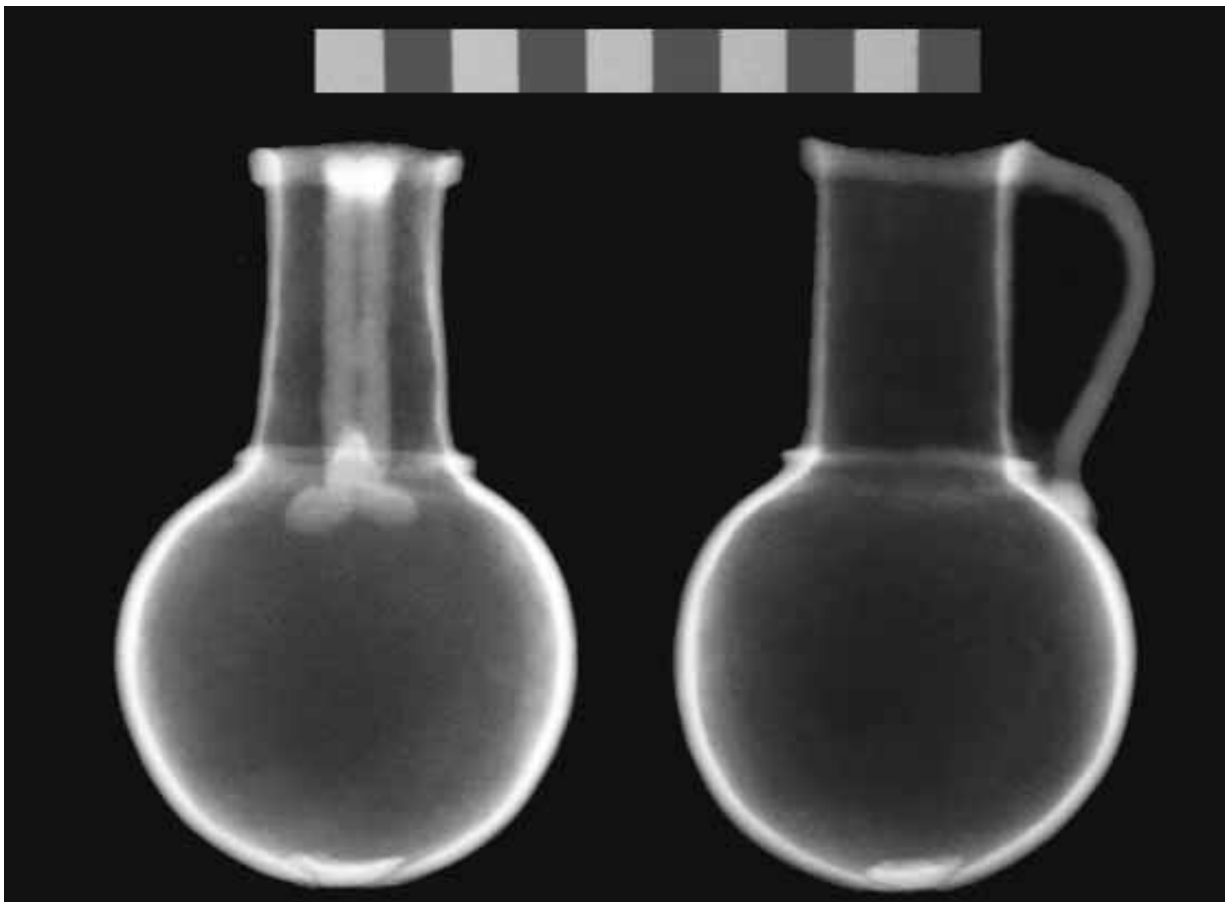


Figure 6.3: Gamma-ray radiography of juglet J-78. Front and side views.

it is a result of a modern conservation process cannot be overruled. The square protrusion, which is also visible to the naked eye, can be clearly seen.

JUGLETS

Gamma-ray radiography of the 4 juglets mentioned above and Neutron radiography of 3 of them (J-78, J-80 and J-82) did not reveal any gaps between the handles and the bodies or between the collars and the necks (e.g., Figure 6.3). These finds suggest that the juglets were cast all at once, including the body, neck and handle. No signs of rivets or chaplet holes were detected, thus the exact method of casting cannot be determined.

Repair on the base of juglet J-78 by application of a bronze patch was observed with the aid of radiography. The addition of metal at the inner side of the base can be clearly seen in Figure 6.3. The darker area between the patch and the juglet base suggests that the patch was hammered into place using a long chisel, or similar instrument inserted through the juglet mouth, probably without heating it. The question as to whether the defect in the juglet base is a result of faulty manufacture or the result of later damage cannot be safely answered at this stage in the research. A possibility to consider is that the patch was needed in order to seal a runner seam or to seal damage caused by over-polishing a runner's remains.

HORSE BITS

Jatt horse bits are made of six parts each: two mouthpieces, two cheek pieces and two rein rings. It was hoped that radiography would augment our understanding of how these parts were assembled.

The X-ray radiography of the connection between the rein ring and the mouthpiece cannons revealed details invisible to the naked eye. It was observed that the heads of the mouthpiece cannons were shaped like a mushroom in order to prevent the wrapping «wire», which firmly fastens the cannon and the rein ring, from slipping (Figures 6.4-6.6; the «wire» can also be seen in Figure 2.9 and Plates 15, 16). The void seen in the radiography pictures between the mushroom-shaped cannon and the wrapping «wire» is probably the result the bit being used in antiquity: the constant tugging of the reins is the most probable cause for the void, noted most clearly in Figure 6.6.

The results of the radiography of the joint rings of the two mouthpiece cannons were not as clear. The light area at the right cannon of J-90, just at the base of the ring (Figure 6.7), might suggest that the ring was shaped be means of welding. However, the physical shape of the object, as can be seen in Figure 2.9, suggests that the joining rings might have been connected to the cannons in a similar manner as the rein rings. The edge of what may be a wrapping «wire» is visible to the naked eye, especially in the ring itself (figure 2.9: 1,2). Furthermore, the radio-

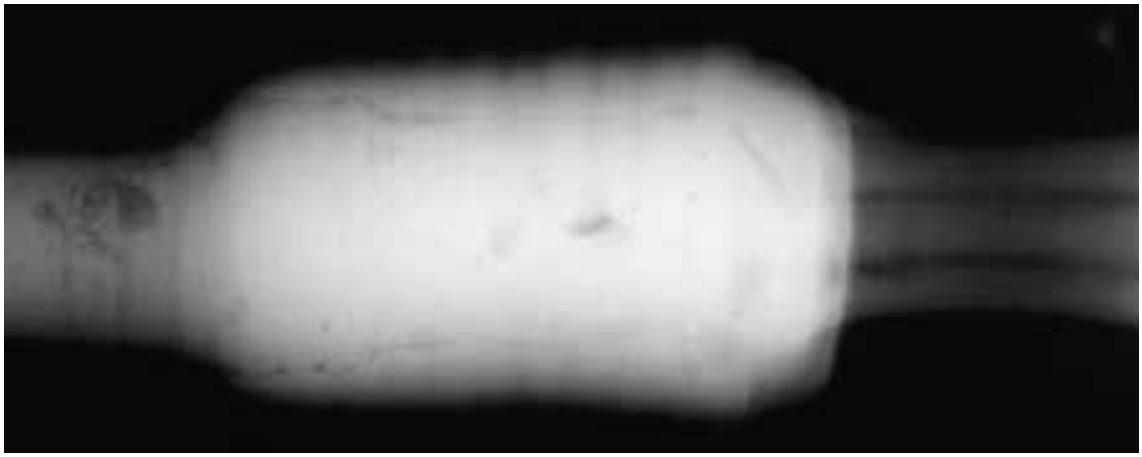


Figure 6.4: Micro-focus radiography of J-90 rein ring. Note the mushroom shape of the mouthpiece cannon below the wrapping «wire».

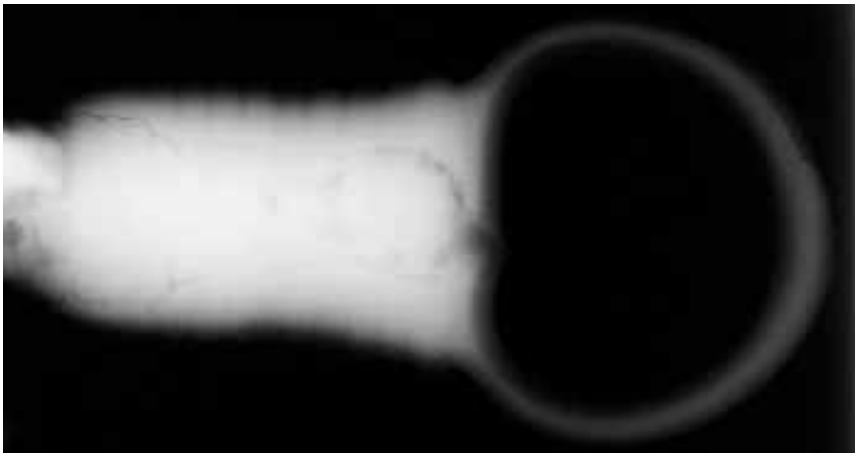


Figure 6.5: Micro-focus radiography of J-92 rein ring. Note the mushroom shape of the mouthpiece canon below the wrapping «wire» and the void between the two.

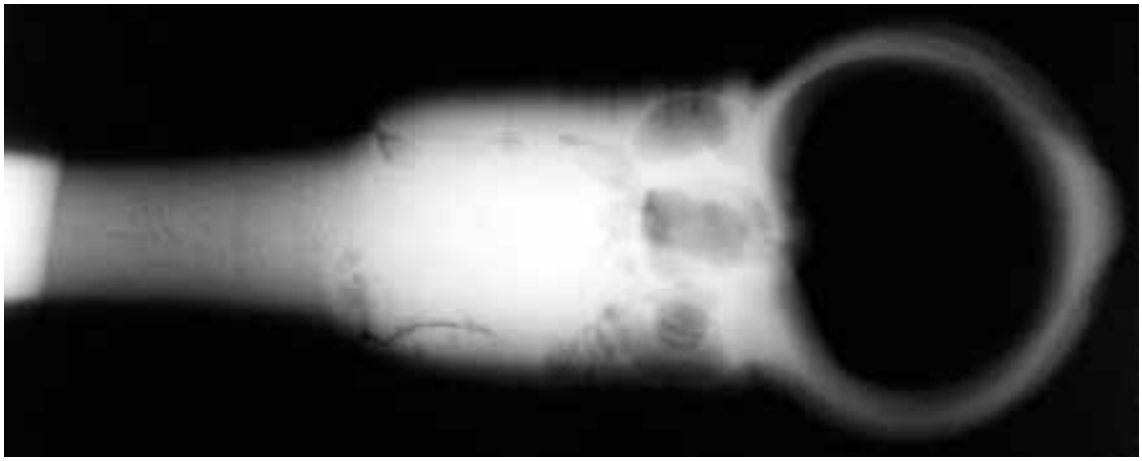


Figure 6.6: Micro-focus radiography of J-92 rein ring.

graphy of the other joint rings, both the left one of J-90 and both of J-92, do not reveal the same light area seen in the right cannon ring of J-90. The exact method of production is therefore still obscure.

Some defects, possibly air bubbles, are clearly seen in both joint rings of J-90 (Figure 6.7), and should be noted.

MACEHEAD

The Neutron radiography of mace head J-69 was conducted in order to establish the nature of core. It clearly shows wood in the macehead's core (Figure 6.8).

ROD TRIPOD

The rod tripod is of special interest since comparable tripods found in Cyprus have undergone studies (recently by Papasavvas 2003), the conclusion from which is that they were cast in one piece, and a few specimens underwent

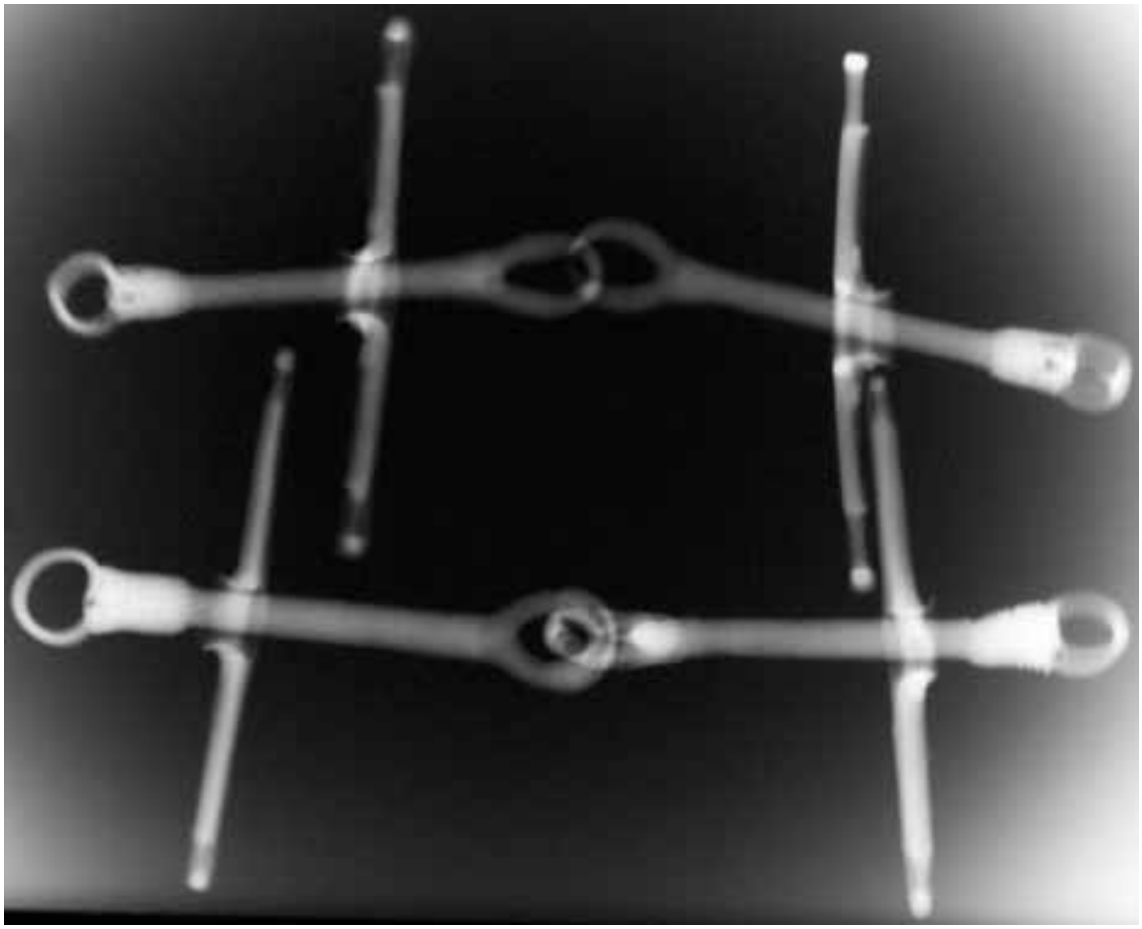


Figure 6.7: Gamma-ray radiography of J-90 mouthpiece cannons' joints.

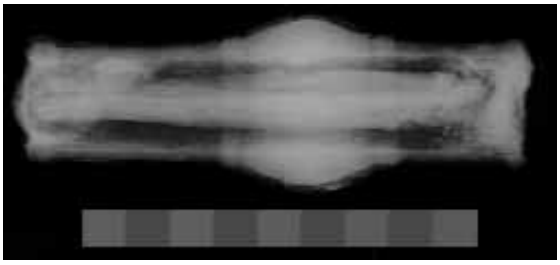


Figure 6.8: Neutron radiography of macehead J-69.

radiological tests (Schorsh and Hendrix 2003). The radiography of tripod J-62 composite ring indicates that it was more likely manufactured from four separate rods. The radio-transparent areas between the different rods can clearly be seen in Figure 6.9, even though it was recorded in low energy exposure. The attachment of the legs to the ring further supports this indication. The legs are attached to the rings, and above the attachments seem to be supplements of metal, overlapping the ring (Figure 6.10). This is not the case with the cast tripod rings that were radiographically studied by Schorsch and Hendrix (2004: 71, Figs. 37, 39, 40) and stands in contradiction to the view lately expressed by Papasavvas (2001, 2003).

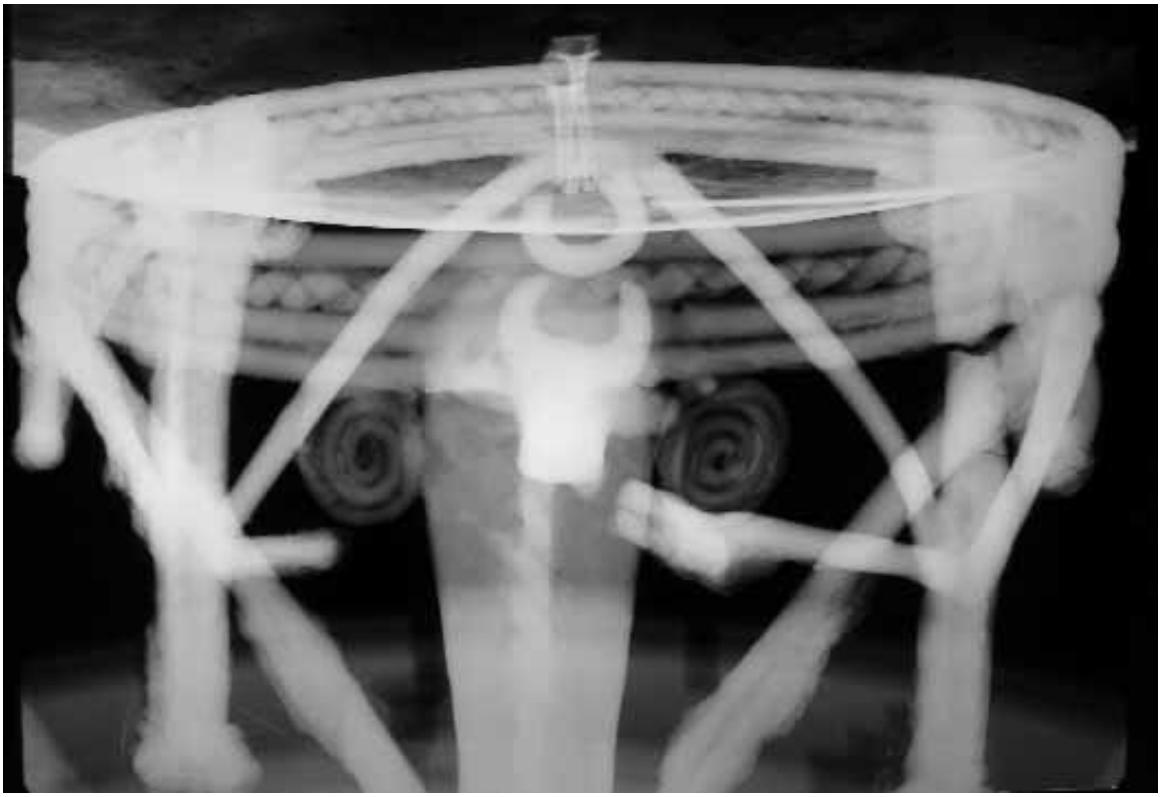


Figure 6.9: Micro-focus radiography of tripod J-62.

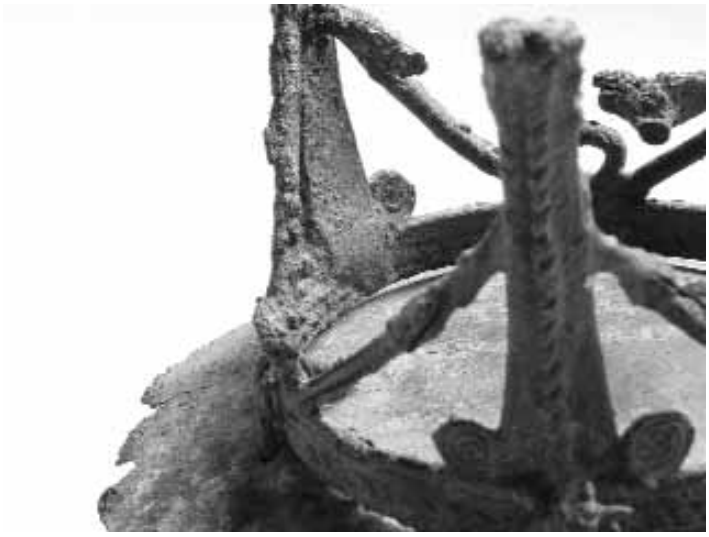


Figure 6.10: The attachment of legs to the ring on J-62 rod tripod: see inner side.

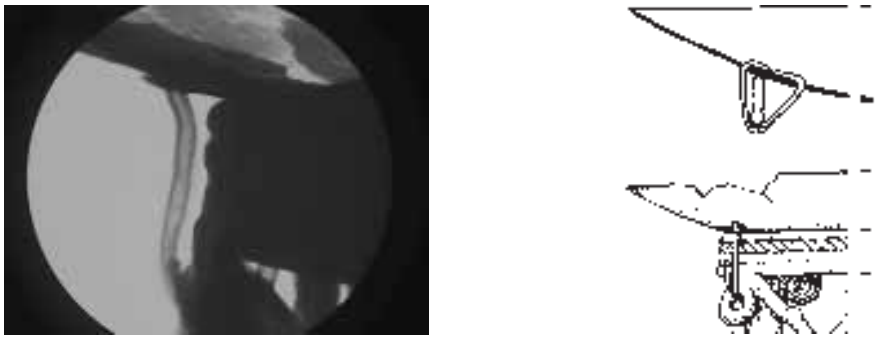


Figure 6.11: Micro-focus radiography of J-62 ring showing the bowl, the ring and the wire attaching them. On the right, line drawing of the area.

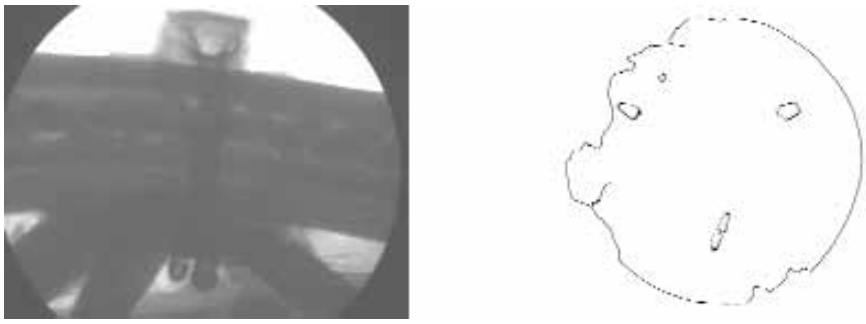


Figure 6.12: Micro-focus radiography of J-62 showing the ring, the rolled part of the «wire» and its open section just above the bowl, which became radio-transparent in the picture. On the right, line drawing showing top view of the bowl with the open, flattened wires (smaller scale then the photo).

Another mechanical joint that may be observed is that of the decorative coils of the legs to the ring. The «pulling» of material from the leg (best seen in the left coil in Figure 6.9) and the ring (best seen in the right coil in Figure 6.9) is visible. Some radiopaque alloy soldered between the loops of these decorative coils can best be seen in the right coil in Figure 6.9.

An attempt to clarify the method used for connecting the animal *protome*s to the legs, was made by means of radiography, but no clear conclusions were reached due to the thickness of the bronze.

The added bowl on the rod tripod from Jatt distinguishes it from comparable rod tripods in Cyprus. The bowl was attached to the ring of the tripod by tying, as can be seen by the naked eye. Using Micro-focus radiography, additional information was gathered. The ancient smith seemed to have rolled a thin bronze sheet around organic material, thus, producing a hollow bronze «wire» seen in figure 6.11. These «wires» were opened and flattened above the bowl, forming a wide nail-like head to augment the area of contact (figure 6.12).

OFFERING STAND

X-ray radiography of one of the offering stands (J-60) revealed some interesting points. There are no spaces between the braid and the leg, which indicates that the legs are of a single cast, rather then three mechanically joined (figures 6.13, 6.14). Gamma radiography of the upper, coiled part of J-60 stem did not penetrate the bronze, which is very thick at this point (figure 6.15).

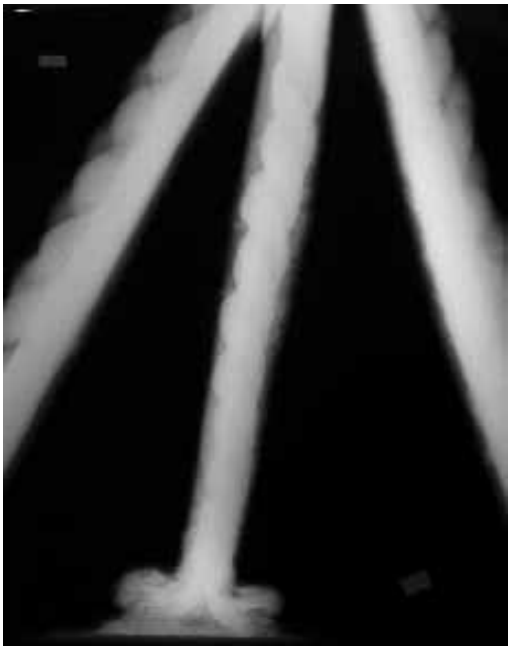


Figure 6.13: X-Ray radiography (Micro- focus) of J-60 legs.

Figure 6.14: X-Ray radiography (Micro-focus) of J-60 base ring and leg.

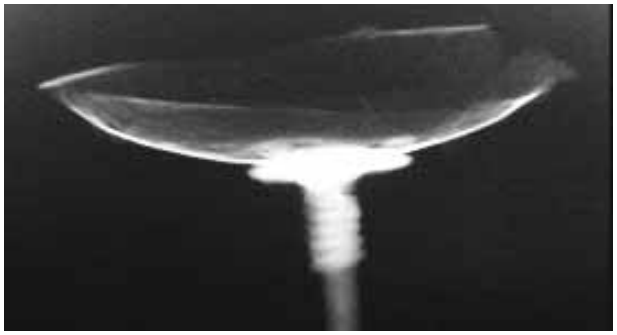


Figure 6.15: Gamma radiography of the upper, coiled part of J-60 stem.

APPENDIX C: A PETROGRAPHIC COMMENT ON FOUR VESSELS FROM JATT

Y. GOREN

METHOD

This short note deals with complete ceramic vessels from the ceramic assemblage of the hoard. The examination was inspired by the typologic study of the ceramic assemblage by M. Artzy who attempted to attribute some vessels to their geographic origins by their general fabric (as seen under a magnifying glass) and typologic parallels. In the course of the study, a small pilgrim flask (J-8) appeared to be somewhat different from the common fabric that typified the rest of the ceramic assemblage. Therefore, it was subjected to petrographic examination together with three other vessels, the latter representing the common fabric of this collection. The latter vessels included two bowls (J-2 and J-4) and a beer jug (J-10).

Due to their perfect state of preservation and their museological value, the vessels were sampled by the «peeling» technique that was presented by the present author elsewhere as the preferred sampling technique for cuneiform tablets and other delicate ceramic artifacts (Goren, Finkelstein and Na'aman 2004: 12). The samples (in form of shallow peels) were cut with the aid of a scalpel or a very delicate chisel from the inner parts of the necks (in case of the flask and the beer bottle) and from the bases of the bowls, without causing any visible damage. After impregnation in Buehler Epo-Thin™ low-viscosity thin section epoxy, the samples were polished flat on their largest surface and used for the preparation of standard petrographic thin sections. These were examined under a petrographic microscope, then described and interpreted by the common methods of ceramic petrography in archaeology (Goren, Finkelstein and Na'aman 2004: 15-16).

RESULTS

The results of the petrographic examination are as follows:

Vessels J-2, J-4 and J-10 (Fig. 6.16): The fabric of this group is easily defined even when examined merely by the naked eye. In fresh breaks, it is usually characterized by its dark reddish-brown color and a silty appearance that can be observed with a magnifying glass or stereomicroscope. Under the petrographic microscope, it appears as a silty, non-calcareous, ferruginous matrix that commonly exhibits isotropic properties. This is probably due to the high iron content that acts as flux, decreasing the sintering point of the clay body to lower firing temperatures. The inclusions consist of sand sized grains of quartz, limestone and chert and in differing proportions. Sharp, elongated voids within the matrix indicate the addition of some vegetal matter («straw»).

This petrographic group is identified as *Terra Rossa* soil, mixed with sand. *Terra Rossa* is widely exposed over the mountainous regions within the Mediterranean climatic zones of Israel including the Judean-Samarian hills, Mount Carmel and the Galilee. Therefore, the provenance of vessels belonging to this petrographic group cannot be determined on the basis of their clay matrix alone. The reference material from Levantine sites, however, indi-

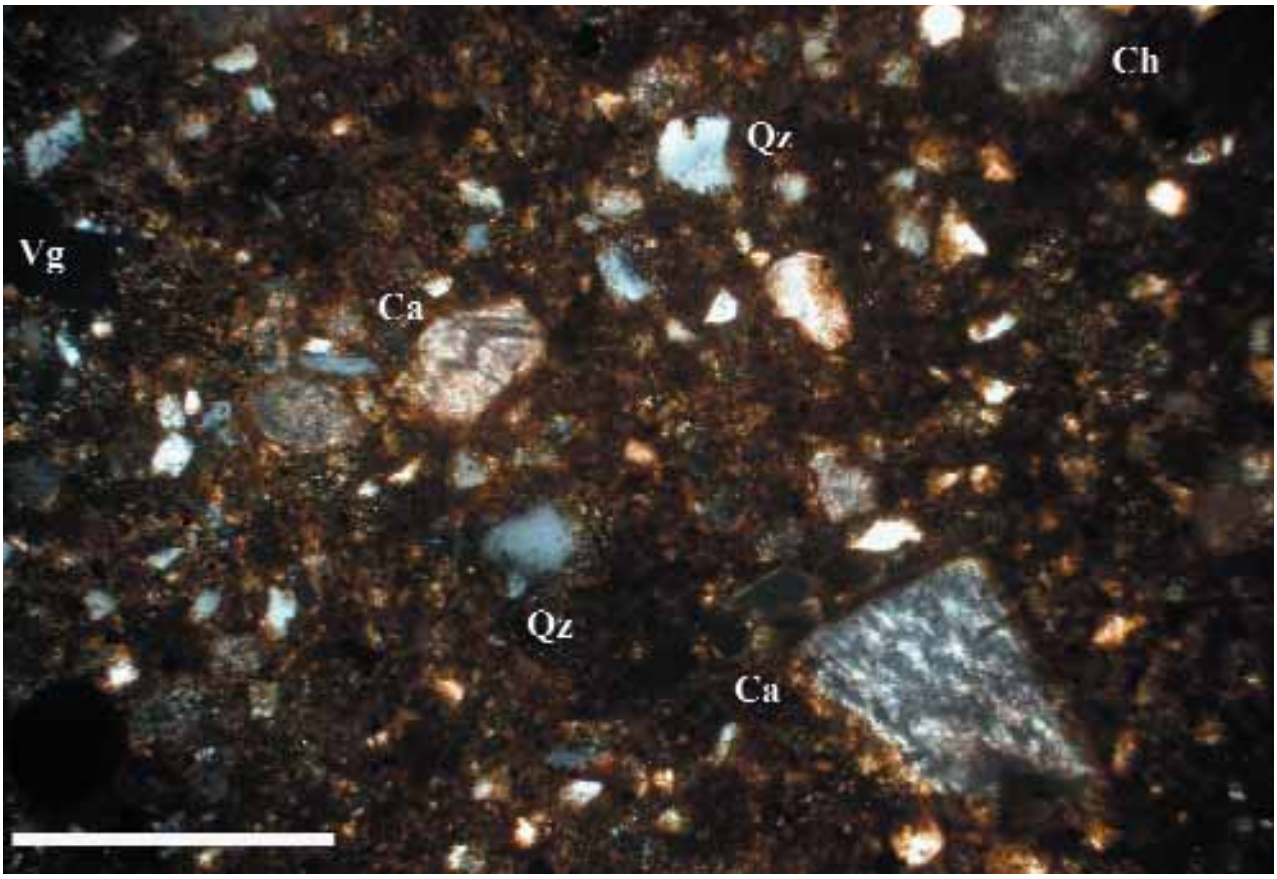


Figure 6.16: Bowl J-4, crossed polarizers. *Terra Rossa* group. Ferruginous, silty matrix tempered with calcite (Ca), chalk (Ch), quartz (QZ) and vegetal matter which left sharp voids in the groundmass (Vg). Bar size: 200 microns.

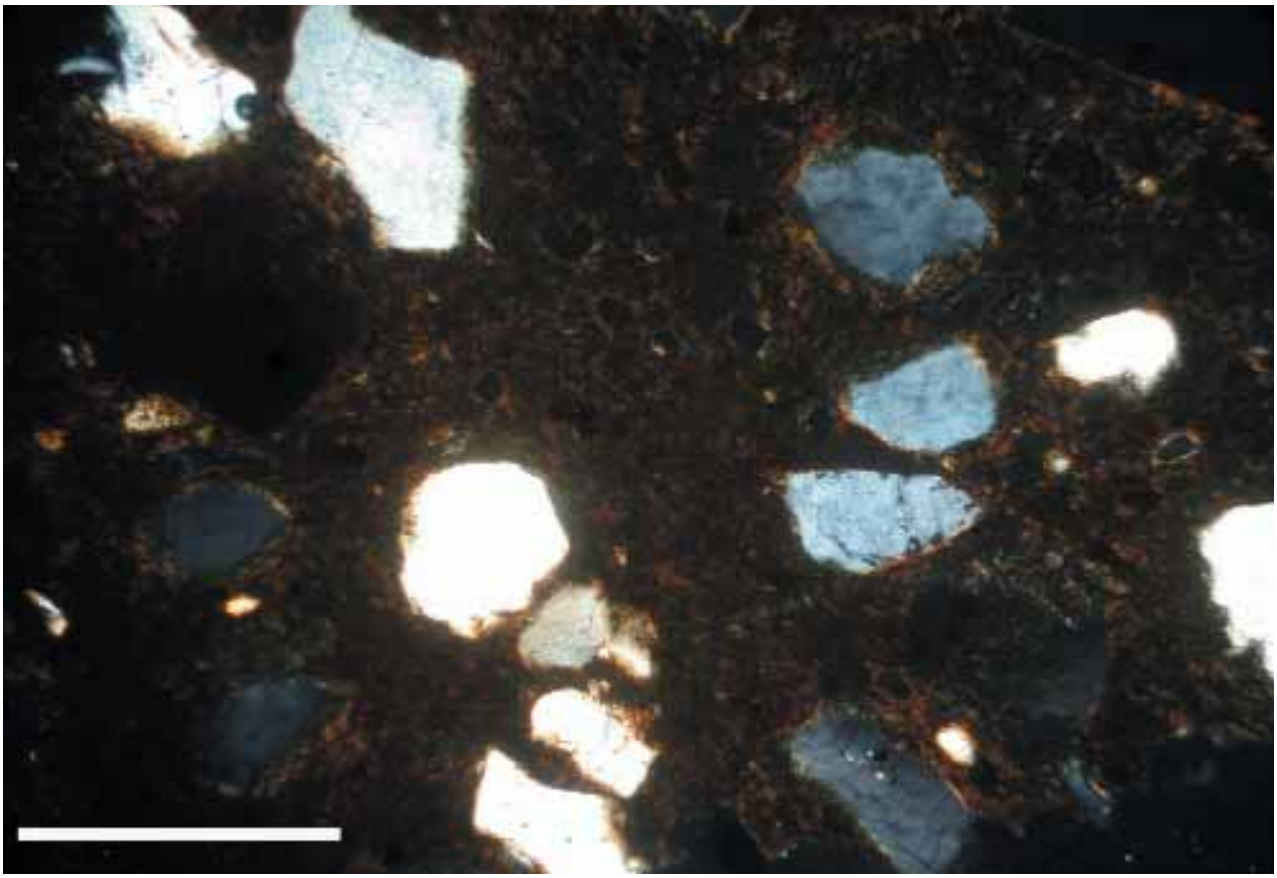


Figure 6.17: Flask J-8, crossed polarizers. *Hamra* group. Argillaceous, ferruginous matrix tempered with rounded quartz grains (no accessory minerals are seen in this view). Bar size: 200 microns.

cate a more specific provenance. The inclusions contain quartz, limestone or chalk and chert. This indicates that the sands were collected in wadis draining areas where either Senonian or Eocene formations are exposed, since these are the two major ages when chalk and chert were deposited in Israel. The quartz sand was probably swept inland by aeolian deposition. The combination of Terra Rossa, chalk and chert formations strongly suggests that the upper Shephelah should be preferred as the possible origin of this group. In this area, *Terra Rossa* soil appears alongside Eocene chalk rich in chert horizons. Wadis that cross this area drain the Senonian chalk and chert formations that are exposed on the slopes of the Judean ridge to the east. Thus, the combination of the matrix and the inclusions suggests an upper Shephelah origin for the vessels belonging to this group.

Vessel J-8 (Fig. 6.17): Petrgraphically it is characterized by mainly quartz sand of the southern Levantine coastal plain mixed with ferruginous, argillaceaus, fine clay. Fewer sand-sized grains of accessory minerals including mainly minerals of the feldspar, amphibole and pyroxene groups accompany the quartz sand. The nature of this group, together with its geographical distribution in Levantine sites, clearly point to a coastal origin. In this area, red to dark reddish-brown silts and sands appear as part of the Rehovot Formation, and the related ʻEvron Member in northern Israel (see Goren, Finkelstein and Naʼaman 2004: 112-113 for further discussion and references). It is most likely that this red soil, locally termed *Hamra* soil, was used here, perhaps after some purification by dilution of the sand component. *Hamra* soil is spread along the coastal plain of Israel from the Ashdod area northward. This coastal sand does not extend much beyond the ʻAkko area on the northern coast of Israel. Yet in sites located along the Carmel coast (Tel Nami, Dor) tuffs from Mt. Carmel rarely appear together with the coastal sand and significant contribution of the local, usually calcareous lithology. As for the more northern exposures (around ʻAkko), the Hamra loam of the ʻEvron Member is reported to contain only up to 10 % quartz. However, in this sample quartz is dominant, indicating a more southerly origin that extands between the Ashdod area and the Carmel coast.

CONCLUSION

The petrographic analysis of the four selected vessels from Jatt indicates that vessel J-8, the pilgrim flask, differs from the other three by its fabric and proposed provenance. It should be mentioned that although exposures of *Hamra* soil are found in the Sharon Plain west of Jatt, none of the vessels suit the geology of the immediate surrounding of this site (for details see Goren, Finkelstein and Naʼaman 2004: 256-258). Therefore, these vessels are presumably imported to the site from the Upper Shephelah and the Sharon Plain regions.

REFERENCES

Goren, Y., I. Finkelstein and N. Naʼaman
2004 *Inscribed in Clay, Provenance Study of the Amarna Tablets and Other Near Eastern Texts.* Tel Aviv.

PLATES

1 (J-77)

2 (J-79)

3 (J-42)

4 (J-71)

5 (J-72)

Approximate scale 1:3

1 (J-39)

2 (J-70)

3 (J-38)

4 (J-36)

5 (J-37)

Approximate scale 1:3

1 (J-35)

2 (J-41)

3 (J-40)

4a.

4 (J-46)

4b.

Items 1-4a: Approximate scale 1:3
Item 4b: Approximate scale 2:3

1 (J-65)

1a.

1b.

1c.

2 (J-45)

2a.

2b.

3 (J-49)

Items 1, 1a, 2 and 3: Approximate scale 1:3
Items 1b, 1c: Approximate scale 2:3
Items 2a, 2b: Not to scale

1 (J-48)

Approximate scale 1:3

1 (J-63)

2 (J-47)

3 (J-66)

4 (J-83)

Approximate scale 1:3

1 (J-82)

2 (J-81)

3 (J-78)

Approximate scale 1:2

1 (J-14)

2 (J-16)

3 (J-17)

Approximate scale 1:2

1 (J-15)

2 (J-11)

3 (J-12)

Approximate scale 1:2

1 (J-64)

2 (J-80)

3 (J-13)

Approximate scale 1:2

1 (J-18)

2 (J-28) 3 (J-27) 4 (J-31) 5 (J-30)

Approximate scale 1:2

1 (J-73)

2 (J-76)

3 (J-29)

4 (J-32)

5 (J-33)

6 (J-34)

Approximate scale 1:2

1 (J-19)

2 (J-20)

3 (J-21)

4 (J-23)

5 (J-22)

6 (J-24)

7 (J-26)

8 (J-88)

9 (J-89)

(J-25)

11 (J-87)

Approximate scale 1:1
Items 3 and 4 are damaged by corrosion

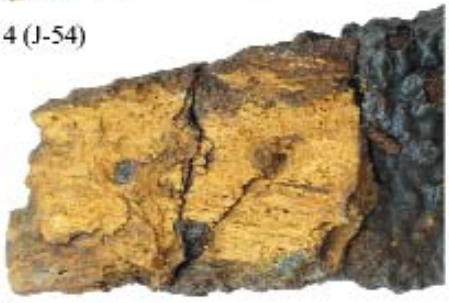
1 (J-52)

2 (J-74)

3 (J-53)

3a.

4 (J-54)



4a.

Items 1, 2, 3 and 4: Approximate scale 1:2
Items 3a and 4a: Not to scale

1 (J-90)

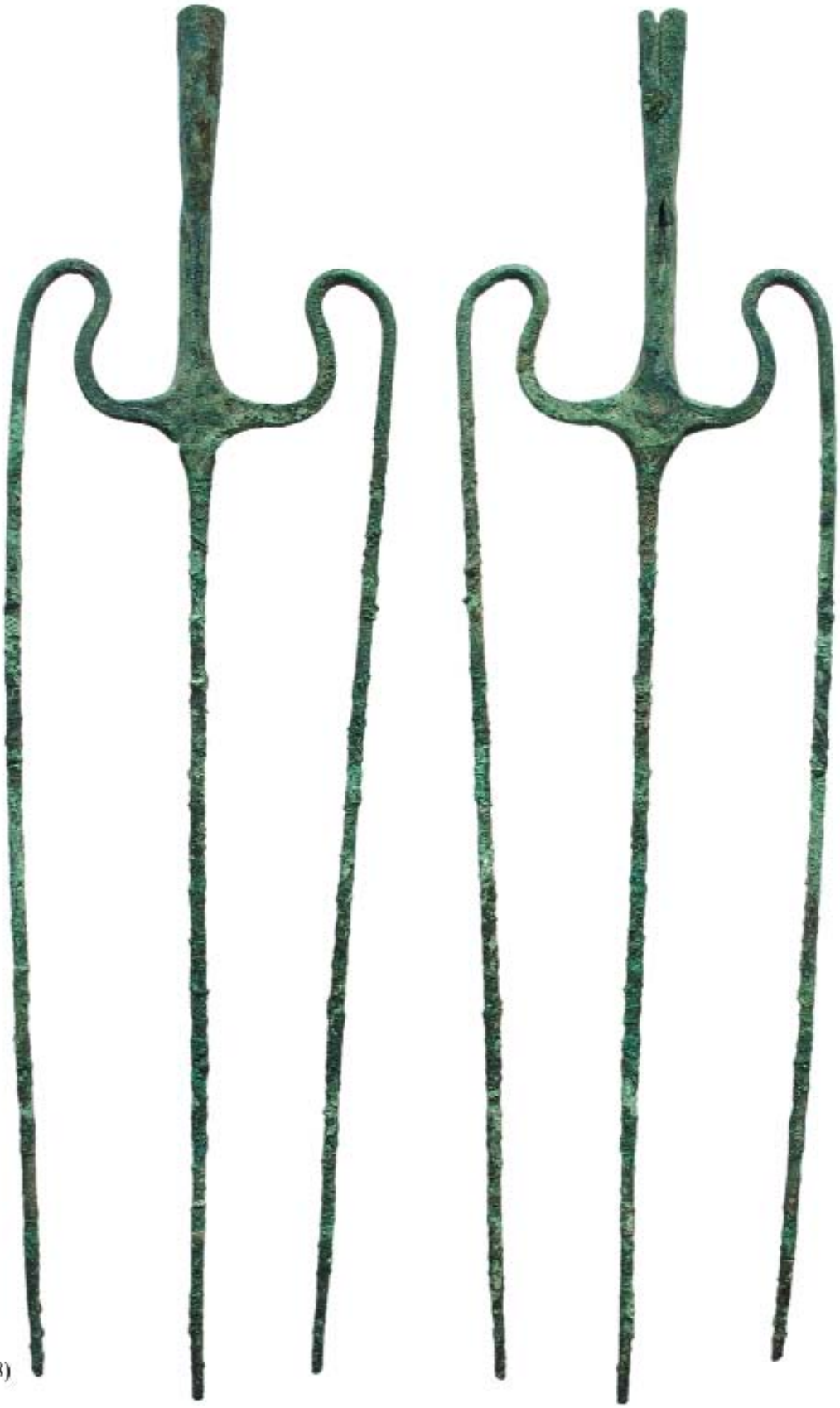
1a.

Approximate scale (measured at front cheek piece) 3:4

1 (J-92)

1a.

Approximate scale (measured at front cheek piece) 3:4



1 (J-68)

2 (J-94)

Approximate scale 1:3

1 (J-69)

2 (J-75)

3 (J-43)

4 (J-51)

5 (J-50)

6 (J-67)

Items 1-5: Approximate scale 1:3
Item 6: Approximate scale 1:2

1 (J-84)

2 (J-85)

3 (J-86)

Approximate scale 1:1

1 (J-62)

Approximate scale 1:1

1 (J-62)

1a.

1b.

Not to scale

1 (J-44)

Approximate scale 1:2

1 (J-61)

2 (J-60)

Approximate scale 1:3

1 (J-2)

2 (J-4)

3 (J-3)

4 (J-9)

5 (J-10)

6 (J-7)

7 (J-6)

Items 1-3: Approximate scale 1:4
Items 4-7: Approximate scale 1:3

2 (J-93)

3 (J-8)

1 (J-5)

4 (J-1)

5 (J-91)

Item 1: Approximate scale 1:4
Items 2-4: Approximate scale 1:3

1 (J-3)

2 (J-93)

3 (J-9)

4 (J-9)

5 (J-5)

6 (J-5)

Not to Scale