The Chalcolithic hoard from Nahal Mishmar, Israel, in context

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The discovery in 1961 of a large hoard of copper objects in a cave in Nahal Mishmar, west of the Dead Sea in Israel, was not one of those archaeological landmarks that immediately capture the public imagination and forever remain conspicuous in the published record. Had it been of gold and silver it might well have been a very different matter, but the exceptional age, quantity and variety of its contents were not sufficient to project their significance far beyond the closed world of specialists. This hoard of 429 objects, all but thirteen of them made of copper, dating to the earlier fourth millennium BC, was finely published by Pessah Bar-Adon within ten years of discovery; but as his text was in Hebrew the volume's currency was inevitably restricted. Since 1980 this well-illustrated report has been available in an unrevised form in English entitled *The Cave of the Treasure*. This essay, which seeks to set the hoard in context after a further quarter-of-a-century's research, draws very heavily on Bar-Adon's account.

Whereas base metal 'hoards', a catch-all term for a variety of deposits, are a well-known phenomenon in the European Bronze Age, they have never been systematically studied in the Near East, where they appear to be a more elusive phenomenon (see Philip in this volume). The Nahal Mishmar hoard is not only the oldest, but also by far the largest and most varied. It spectacularly illustrates the recurrent restrictions of the surviving material record as evidence for ancient metallurgy and dramatically reinforces the dangers of assuming, for any material so readily recycled, that poverty of evidence is evidence for poverty of production, even at an early stage of metalworking.

The immediate context of the hoard and its date

The hoard was discovered by a team directed by Bar-Adon in March 1961, during the second season of a systematic archaeological survey of the wadis along the western shores of the Dead Sea in Israel (Fig. 1). The entrance to Cave 1 in the Nahal Mishmar, originally called the 'Scouts Cave' but soon to be 'The Cave of the Treasure', is about 650 feet up the precipitous side of the wadi and may only be reached by dropping a rope from the scarp above, a distance of some 130 feet. The cave had been occupied twice for any period of time, first in the fourth millennium BC and then again at the time of Bar Kokhba's Revolt against Rome in AD 132–135. The objects constituting the hoard were

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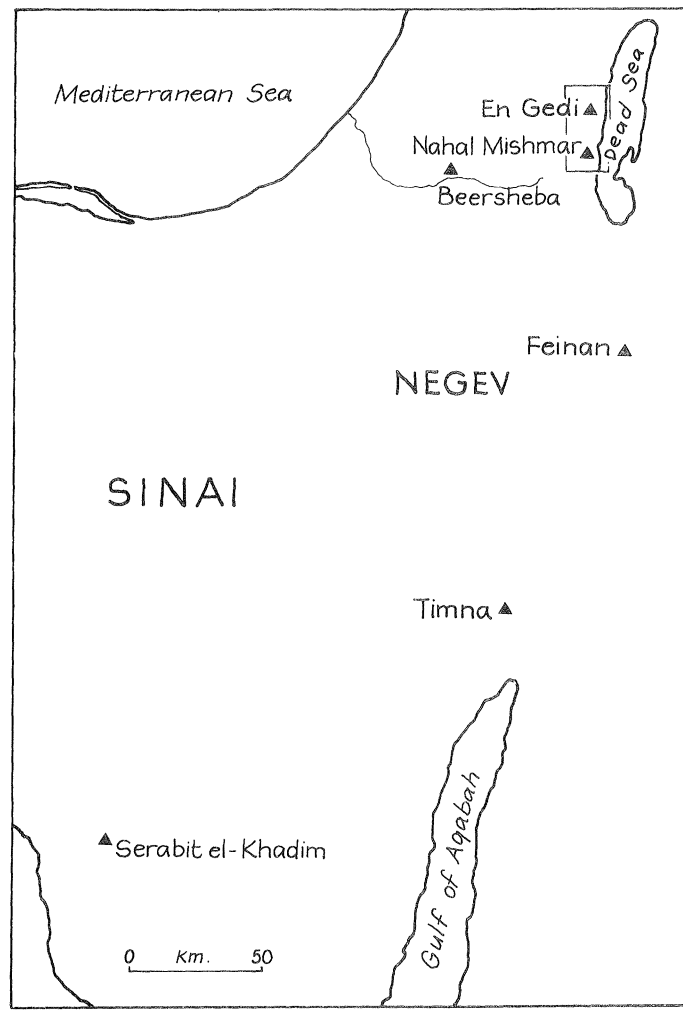

Figure 1 Map of the main sites and regions mentioned in the text.

found wrapped in matting in a natural crevice, concealed by a sloping stone, well within the cave in Hall B (Pl. 1):

> There is no doubt that the treasure was hidden towards the end of the occupation of the cave in the Chalcolithic period. At that time, in order to gain access to the crevice, a pit was dug in front of it, starting from the top of the Chalcolithic deposits. (Bar-Adon 1980:7)

When placed in the crevice some objects remained covered by a mat of Cyperus reeds, whilst others spilled out, as if hastily deposited. Chalcolithic pottery sherds were found in the bottom of the crevice.

At first dating the objects in the hoard proved controversial, since some scholars believed they could not possibly be so early. But, as Bar-Adon (1980:7) pointed out,

Plate 1 The hoard *in situ* in a crevice in the north wall of Cave 1 in Nahal Mishmar, some of it still wrapped in a mat (photograph by courtesy of Werner Braun).

though the majority of the items were exotic and previously unknown (from any period in Israel or elsewhere), there were sufficient parallels between a minority and copper and other objects from Chalcolithic settlement sites in Israel to establish a relative date typologically. Three laboratories have provided Carbon-14 dates for pieces of matting or wood associated with the hoard. Except for BM-140, on reed matting, the calibrated dates cluster in the second quarter of the fourth millennium BC indicating that the objects in the hoard are not likely to date after 3500 BC and might be considerably older (Weinstein 1984:335):

Lab. No.	*Sample*	*C-14 Date BP (bc)*	*CRD–1σ date*
BM–140	Reed (inner part)	5390 ± 150 (3440)	4425–3920 BC
W–1341	Reed (outer part)	4880 ± 250 (2930)	3885–3490 BC
I–285	ibid.	4780 ± 100 (2830)	3675–3485 BC
I–353	Wood	4760 ± 120 (2810)	3670–3475 BC

The hoard is a millennium or more older than the more famous Sumerian metalwork from the 'Royal Cemetery' at Ur and without parallel for range of artefacts, artistry and casting versatility among contemporary surviving copper artefacts from Israel or anywhere in the world. The comparable metal objects from sites within the same cultural

context in Israel may only be counted in tens, are in general far less well-preserved, and parallel only the most mundane items in the hoard. For that very reason they are best taken first.

The copper objects and problems of function

(a) Tools and weapons (Pl. 2)

There are thirteen flat axe- or adze-blades (Bar-Adon 1980: nos 164–9, 172–8; as 'chisels') plus what is a damaged one or possibly a blank not fully manufactured (Bar-Adon 1980: no. 179). Another flat adze-blade is pierced with a flanged shaft-hole towards the blunt end (Bar-Adon 1980: no. 171). Such tools are amply documented on contemporary sites both within Israel and further afield (Bar-Adon 1980:112). More exceptional are: a copper shaft-hole axe-head that seems to be an exact replica in metal of a stone axe-head complete with the leather or rope binding thongs; a shaft-hole hammer; and two axe-heads cast in one with short shafts (Bar-Adon 1980: nos 163, 170, 148–9). The only other concentration of flat axes/adzes in the Near East at this time is to be found in a cemetery at Susa in Iran, in the earliest period of settlement there towards the end of the fifth millennium BC (Amiet 1986:35–6), but these graves contain nothing else to match the remarkable repertory of copperwork from Nahal Mishmar.

This hoard contains in addition over 240 copper mace-heads, primarily spherical or pear-shaped, 'no two of them exactly alike' (Bar-Adon 1980:116, nos 180–429), with six of haematite and one of limestone (Pl. 2). The metal ones differ in size from 3 to 6cm in diameter, and from 110 to 619gm in weight. A few are grooved or ridged, but most have plain or polished surfaces. These mace-heads vary considerably in structure and only a few have been studied in detail. They are all lost-wax castings. Some have thin walls and retain remains of the ceramic investment used in the casting process (Potaszkin and Bar-Avi 1980:235–7; Tadmor 1986); some have thick walls; some are solid metal save for the shaft-hole. These variations are unexplained, though it has been suggested that the thin-walled maces are hardly strong enough for weapons. Traces of wooden shafts were found in a number of them and a folded fragment of linen had survived in at least one case. Black incrustations suggest a fixative of some kind, presumably of bitumen, readily available locally. Only isolated mace-heads of this type are known from Chalcolithic sites in Israel (Bar-Adon 1980:116; Hanbury-Tenison 1986:151–3). Elsewhere, with one notable exception, they remain virtually unknown as early as this. At least a millennium older, however, is a round copper mace-head from level 2B at Can Hasan in southern Turkey, dated to about 5000 BC. It is made of very pure, perhaps native, copper and its shaft-hole, which has not received expert examination, may have been bored rather than cast (de Jesus 1980:II, pl. 22.4). In addition the hoard contained one triangular and nine disk-shaped mace-heads (Bar-Adon 1980: nos 136–47), as well as six disk-shaped mace-heads cast in one with short tubular shafts (Bar-Adon 1980: nos 130–5).

But why so many? Were such weapons community property issued from a central repository as required? Or were they a form of bullion passing by weight? Or were they symbols of authority deposited in one place as tokens of good faith or subservience? In

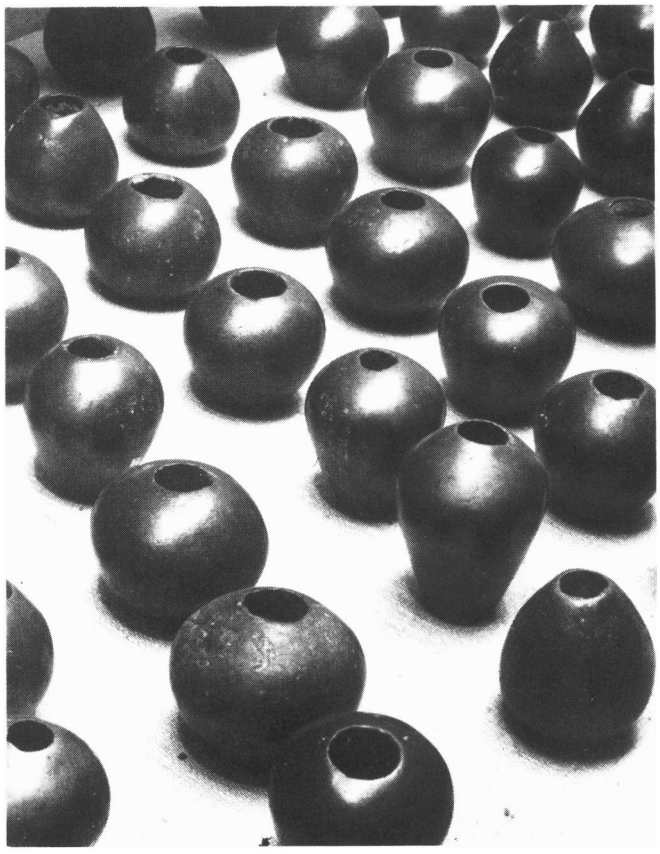

Plate 2 A selection of the copper maceheads from the Nahal Mishmar Hoard (Israel Museum; photograph by courtesy of David Harris).

pre- and proto-dynastic Egypt stone mace-heads symbolized power and authority and many were deposited there in temples (Hoffman 1980:302). In Sumer stone mace-heads are conspicuously absent from graves, yet numerous in temple votive deposits (cf. Delougaz and Lloyd 1942: passim). In both Egypt and Sumer exceptionally large mace-heads were carved with scenes in low relief and bore royal inscriptions (Baumgartel 1960:106ff., pls 8–10; Frankfort 1935). In both regions metal mace-heads seem, for the moment, to be unrecorded in the surviving material record at this time.

(b) Ornamental tubes ('standards'/'sceptres') (Fig. 2; Pls 3–5)

It is the mace-heads which offer a direct introduction to one of the more enigmatic categories of object in the Nahal Mishmar hoard, the ninety so-called 'sceptres' or 'standards' (Fig. 2; Pls 3–5). It is important to bear in mind that whatever the decorative splendour of many of this series most of them are basically disk or pear-shaped mace-heads cast-in-one with a long tubular shaft (Bar-Adon 1980:23–113), whilst some are simply knobbed or spiked variations on the mace-head type (Bar-Adon 1980; not 114–23, 127–9, 150–2). Only a very few are particularly distinguished by anthropomorphic or zoomorphic decoration to the point where the concept of a shafted mace-head is transformed significantly (Bar-Adon 1980:17–22, 124–6, 153–4). For the most part the

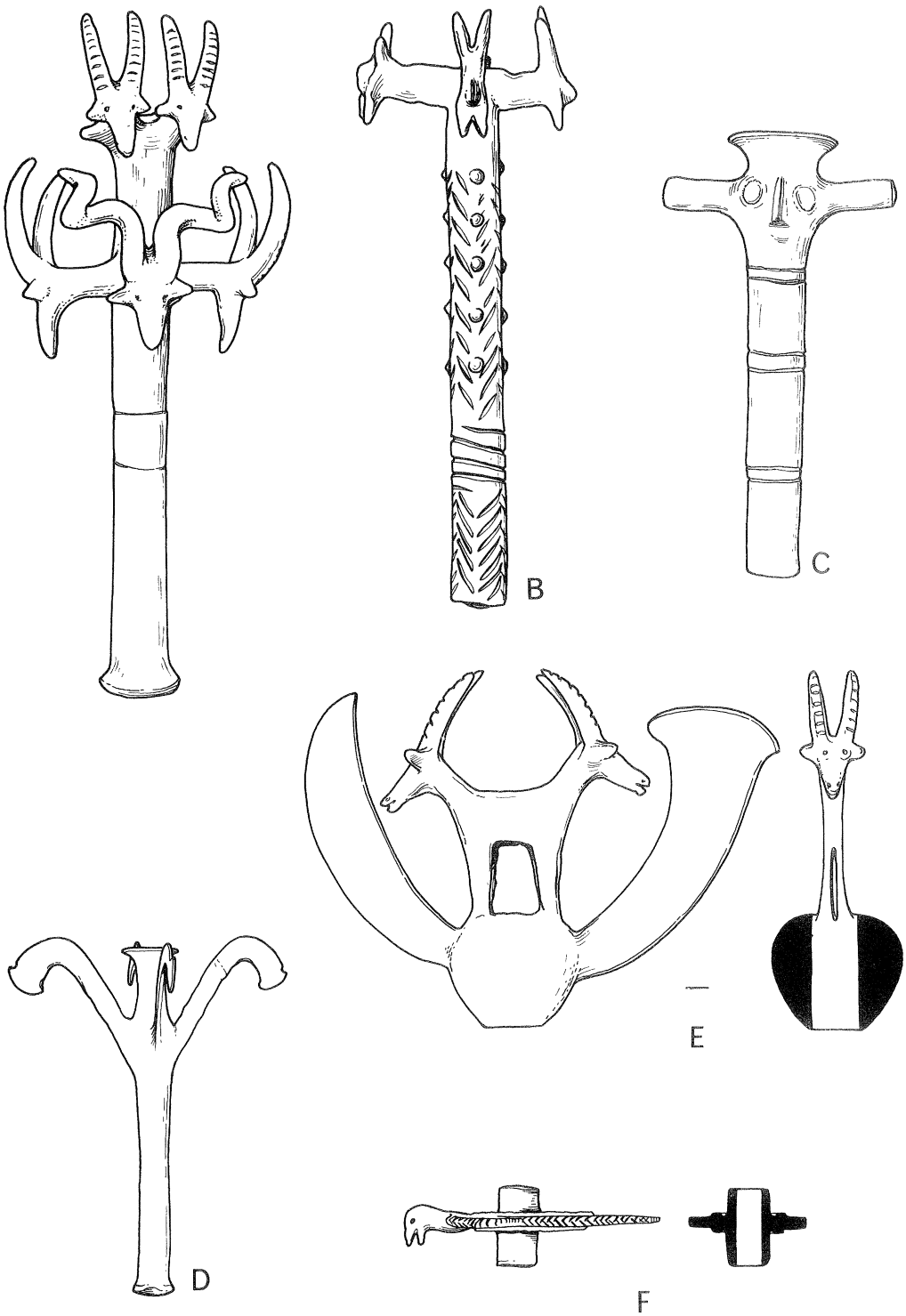

Figure 2 A selection of copper 'standards' from the Nahal Mishmar Hoard (not to scale; after Bar-Adon 1980: no. 17 (= A: 27.5cm high), 19 (= B: 18.2cm high), 21 (= C: 13.2cm high), 22 (= D: 22.5cm high), 153 (= E: 11cm high), 154 (= F: 15.3cm high).

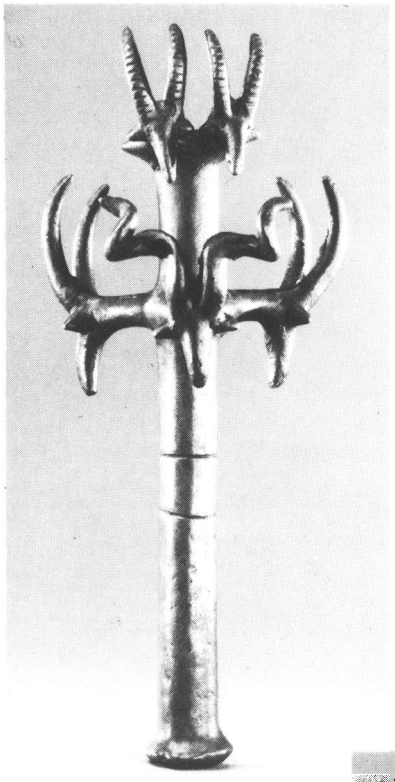

Plate 3 above, left Copper 'standard' from the Nahal Mishmar Hoard (27.5cm high; Israel Museum: photograph by courtesy of the Museum).

Plate 4 above, right Two copper 'standards' from the Nahal Mishmar Hoard (25.5 and 28.8cm high; Israel Museum: photograph by courtesy of the Museum).

Plate 5 right Copper 'standard' from the Nahal Mishmar Hoard (11cm high; Israel Museum: photograph by courtesy of the Museum).

decoration is linear, horizontal or spiral ridges on a tubular shaft, with a marked protuberance towards one end and a flanged top.

Each one is unique and all, to judge from the selection that have been X-rayed, were lost-wax castings in one piece including the ornament, with a hollow shaft in almost every case. As with the mace-heads remains of wood and dark adhesive remain inside some of

them to indicate that they had once been mounted on wooden shafts, though a few have casting obstructions in the tube that have not been cleaned out to allow for this. Such objects could have been most effective as weapons, but, as with a modern field-marshal's baton, or with similar weapons held by military officers shown in file on Iron Age reliefs at Arslan Tash in Syria (Thureau-Dangin et al. 1931: pls 8–10), they might equally well serve to denote rank or office. Fragments of plainer 'ornamental tubes' have occasionally been found on contemporary settlement sites in Israel (Hanbury-Tenison 1986:151–3). In a wall painting found in 1977 during Hennessy's excavations at Teleilat Ghassul, about 2km northeast of the Dead Sea, the leading person in a file of three figures in robes and perhaps wearing masks, carries what might be a 'standard' (Cameron 1981: fig. 14).

Further afield, for want of better parallels nearer home, it has become customary to compare these objects to somewhat similar, if equally enigmatic, decorated copper tubes either those excavated at Tepe Hissar in northeast Iran or those attributed to Luristan in central western Iran in the last quarter of the third millennium BC (Elliott 1978:43–4; for originals: Schmidt 1937: fig. 16; Calmeyer 1969:20–7, 117–22). The similarities are superficial and allow for no clearer understanding of the Nahal Mishmar 'standards'. In each case the objects in question, whatever they may have signified to their makers, should be set into the local cultural context at a particular time. The only thing that links them is a tendency to cast base metal mace-heads of various types in one with their shafts and then to ornament the result until a functional role is obscured by decoration and imagery.

Only one of these ornamented tubes has anthropomorphic traits (Bar-Adon 1980:21), whilst four of them feature the whole body or the horned heads of what are probably types of goat and sheep rather than the more exotic animals named in Bar-Adon's report (Bar-Adon 1980: nos 17–19, 153). There is a single bird in flight, probably a vulture, made to be mounted through a hole pierced in the centre of its body (Bar-Adon 1980: no. 154). The floral decoration evident on a number of the other tubes is too stylized to allow for any definition of which species were intended.

Claire Epstein (1978), particularly, has attempted to integrate this range of imagery with a coherent interpretation of the religious iconography of Chalcolithic Palestine as a whole. Many traits, notably the prominent human nose, the preoccupation with goats and sheep, and certain structural features, extend across a whole range of distinctive artefacts. These include the terracotta ossuaries of the coastal region of Israel (Perrot and Ladiray 1980), the basalt figures of the Golan heights (Epstein 1978) and the carved ivory figures of the Beersheba region (Barnett 1982:23–4, with bibliography). Whether or not Epstein's contention that they all share an 'intrinsic circularity of form through which was expressed the idea of a godhead and, by association, the idea of the temple and the practice of the cult' (Epstein 1978:32) is accepted, the most persuasive studies of this imagery, like hers and Bar-Adon's pioneer attempt, demonstrate its local origin and its relevance to the socio-economic conditions of Chalcolithic Palestine. This is a key point, of course, in any assessment of the hoard's ultimate origin.

(c) Rings ('crowns') (Fig. 3; Pl. 6)

If the ornamental tubes are enigmatic they may at least be set into a broader context, not

so the ten open, high-sided circular objects rather unfortunately known since their discovery as 'crowns', which still have no parallels outside this culture (Fig. 3; Pl. 6). All are of cast copper measuring from 15 to 19cm in diameter and from 8 to 10cm in height (Bar-Adon 1980:24–39, nos 7–16). Three are entirely plain uninterrupted circular bands with flanged edges and the slightly concave section they all share; two have simple linear designs on the sides. Three have this linear ornament as well as traces of projections on the rim, now broken off; one of these has a single human face with prominent nose on the upper side, as have some of the Palestinian Chalcolithic baked clay ossuaries (cf. Epstein 1978: pl. VI). The damage is a significant feature; but does it indicate wear and tear in use, breaks when they were concealed, or is it intentional defacement? Nothing similar is evident elsewhere in the hoard. One ring has plain sides, but has a pair of horned animal heads peeping over the top, as if from the inside of a circular byre (Bar-Adon 1980: no. 10; cf. Elliott 1978: fig. 6). This is reminiscent of a contemporary fragment of a terracotta model of a circular town wall, with people peering over it, from a grave at Hu in Egypt (Baumgartel 1960:135, pl. XII.1–2). The tenth ring is the only one to have retained elaborate decoration on the rim and to have a rectangular opening, with a projection at each end of the lintel, in the sides (Fig. 3a; Pl. 6). On the rim in relief are set, on opposite sides, as it were flanking the entrance, two tall rectangular 'door frames' with four knobs set vertically on each side and crowned at the top with a pair of horns like those of animals featured on the tubes. Between these projections, opposite the 'entrance' are two birds (?vultures), whilst above it were originally a number of projections only one of which, a cotton-reel shape on a shaft, now survives (Bar-Adon 1980: no. 7).

Many scholars (cf. Bar-Adon 1980:132; Epstein 1978:26; Tadmor 1986) have related the structural traits on these rings to what have every appearance of being architectural features on the contemporary baked clay ossuaries (cf. Perrot and Ladiray 1980: fig. 12) and in a wall painting found at Teleilat Ghassul in early excavations there (cf. Cameron 1981: fig. 2, lower right; Bar-Adon 1980: fig. on p. 133). The ten Nahal Mishmar 'crowns' may well then be miniature models of circular structures, perhaps no more than animal byres in some cases, like those regularly encountered in the religious iconography of fourth millennium Sumer (Hamilton 1967: figs 1–3), whilst others represent open-air shrines. Some might even be models of enclosures where bodies of the dead were exposed to the elements and to vultures prior to the burial of the disarticulated bones in the manner customary at this period. For the moment there seem to be no ceramic parallels from contemporary sites in Palestine; but in the later third millennium BC pottery models of shrines are a distinctive feature of some ceramic industries in Cyprus (Karageorghis 1982: pls 31–2). On the copper models features that would have been set within the perimeter of the sacred enclosure in reality are set on the top of the model walls. Attempts have been made to assemble some of these 'crowns' into single units, with the individual elements set one upon the other, but the hypothesis lacks any supporting evidence so far (Amiran 1985).

In 1983 at Neve Noy, in the vicinity of Beersheba, five copper objects were found corroded together in the second level of a courtyard associated with subterranean rooms of the kind characteristic of the Chalcolithic period in that area (Eldar and Baumgarten 1985:137, figs on 134–5). Two flat axe- or adze-blades and two ornamental tubes of the

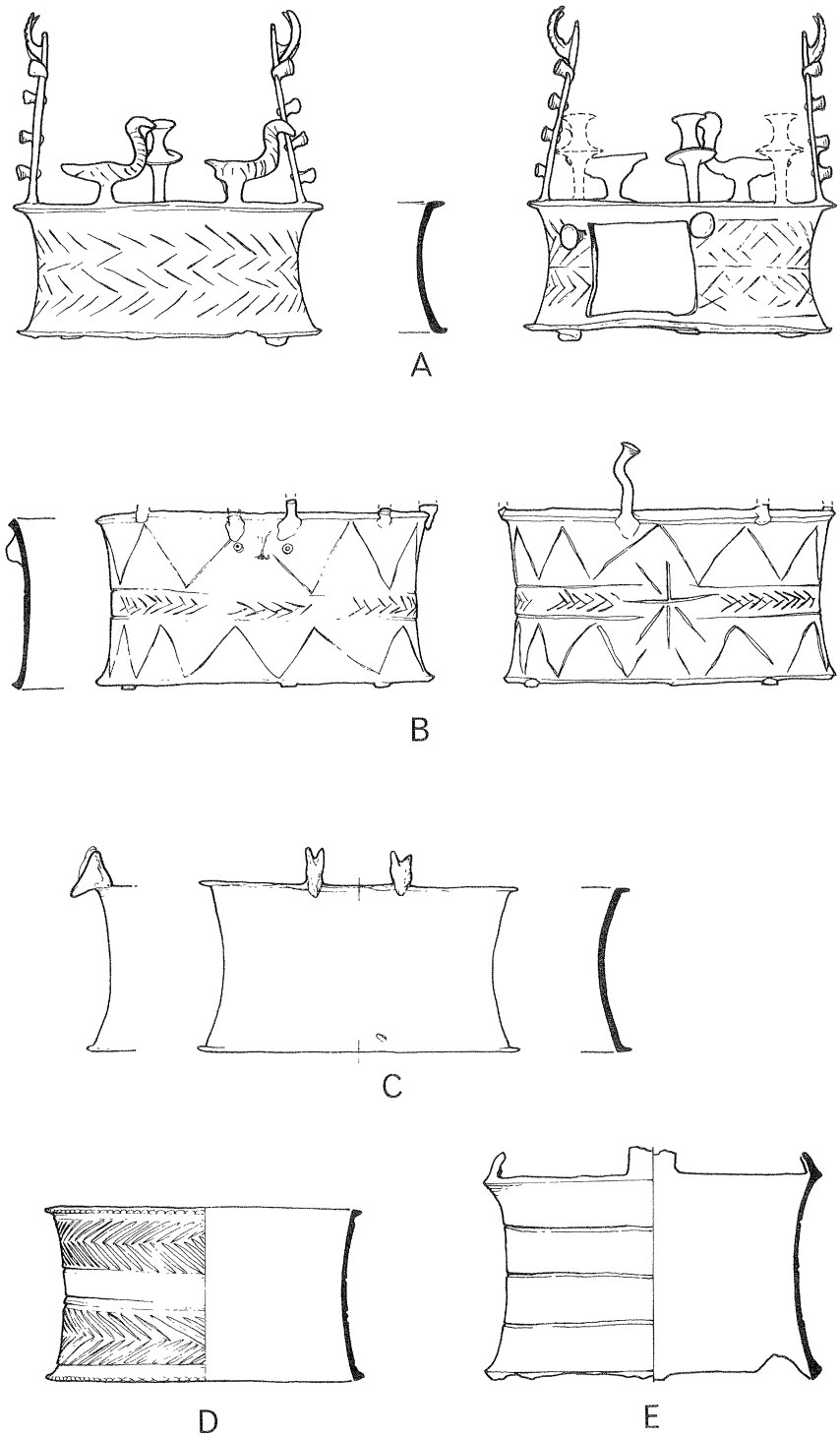

Figure 3 A selection of copper 'crowns' from the Nahal Mishmar Hoard (not to scale; after Bar-Adon 1980: no. 7 (= A: 17.5cm high), 9 (= B: 9.7cm high), 10 (= C: 9cm high), 14 (= D: 9.1cm high), 16 (= E: 11cm high).

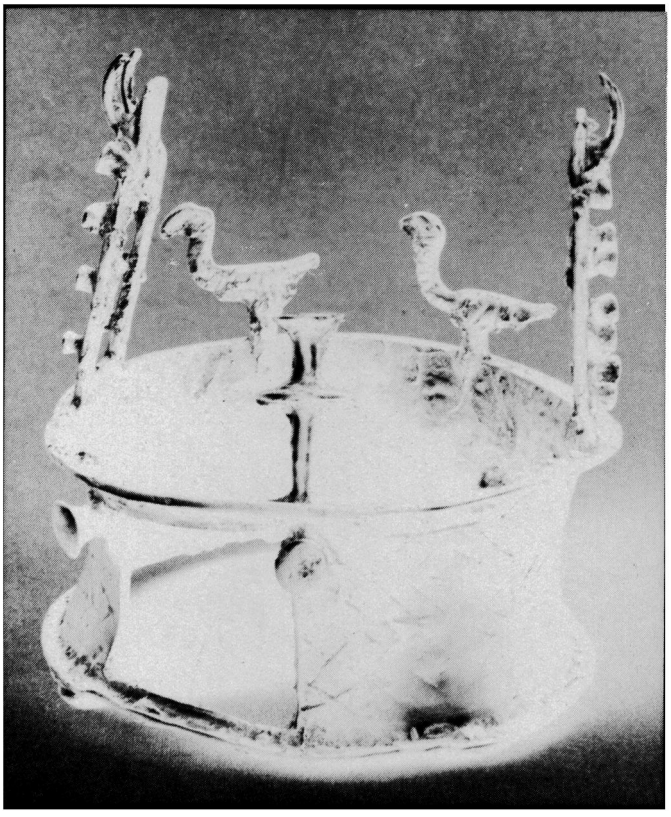

Plate 6 Copper 'crown' from the Nahal Mishmar Hoard (17.5cm high; Israel Museum: photograph by courtesy of the Museum).

simpler type were corroded together within a fragmentary circular band closely resembling the Nahal Mishmar 'crowns'. Close by were said to be the remains of a copper-working installation. This find re-inforces attribution of the Nahal Mishmar hoard to the Chalcolithic period, whilst further relating its entire repertory to the craft traditions of settlements in the Beersheba region.

(d) Vessels

The hoard contained three horn-shaped vessels with zoomorphic and anthropomorphic decoration; one jar; three basket-shaped vessels and one deep bowl, all with incised linear decoration (Bar-Adon 1980: nos 155–62). These may well be skeuomorphs of containers in wood or basketry. In general neither the shapes nor the linear ornament falls outside the known range of contemporary pottery. However, in metallurgical terms these vessels are remarkable in being lost-wax castings. Throughout the Bronze Age, and perhaps earlier, in Egypt and other parts of the Near East vessels were made of hammered sheet copper or bronze and the only ready-cast elements were ancillary pieces, like spouts and handle fittings, rivetted onto the sheet metal body of a vessel.

(e) Objects not of metal (apart from stone mace-heads)

The hoard also included five enigmatic sickle-shaped objects of hippopotamus ivory perforated all over with small circular holes and with a central perforation with a collar, presumably for mounting in some way (Bar-Adon 1980: nos 1–5). A fragment of thread was attached to one of the perforations. These objects, for want of any plausible function, are regarded as 'ritual'. With them was a long cylindrical box cut from the tusk of an elephant (Bar-Adon 1980: no. 6). Although neither of these categories of object is precisely paralleled elsewhere, they fit easily into the growing evidence for a specialist craft of ivory working in the Chalcolithic settlements of the Beersheba region (cf. Barnett 1982:23–4; Hanbury-Tenison 1986:161–2).

The problem of the hoard's original home and significance

As these objects were inserted into a cavity cut into domestic debris, there is nothing to suggest that this was a votive deposit associated with religious rituals performed in the cave. It is, broadly speaking, a utilitarian hoard: a concentration of wealth intentionally concealed at a time of stress that survived entirely by accident, since its owners were never in a position to recover it. The contents, however, are neither those to be expected in a foundry hoard (broken implements and scrap assembled for recycling) nor in a merchant's hoard (newly-made objects of standard types awaiting delivery to customers). In other words it is a hoard that appears to have nothing to do with the organisation of a metal industry. It is then best identified, for the moment, as the 'treasury' of a community, originally housed in a major public building.

Ussishkin (1971, 1980), regarding the hoard in this light, associated it directly with a Chalcolithic temple he excavated in 1962 and 1964 at En-Gedi, to the north of Nahal Mishmar on a terrace overlooking the Dead Sea (Fig. 4). Unfortunately not a single find from this shrine links it directly with the contents of the hoard, though ibex bones and horns among the debris recall the imagery of the ornamental tubes. Certainly the idea of a religious context is the most plausible and this particular association has been widely accepted (cf. Epstein 1978:26; Coogan 1987:3–4). Bar-Adon (1980:202) himself was cautious about the specific En-Gedi link, since some fragmentary ruins immediately above Cave 1 in Nahal Mishmar might have been the site of a comparable cult-place (Bar-Adon 1980:12–13) and could have been the source of the objects in the hoard.

In any attempt to assess the source and significance of the hoard it is instructive to note those copper items in the contemporary metal repertory not found in it: personal ornaments; awls and fish-hooks; pins and needles; and knife-blades (cf. Hanbury-Tenison 1986:151–3). If it were just scrap these might be expected, whilst in such a situation the ivory, haematite and limestone objects would not. The value of metal to the Chalcolithic communities of Israel may be assessed to a degree by its virtual absence from contemporary graves, the major source of material evidence for metallurgy at other times and places in the Near East.

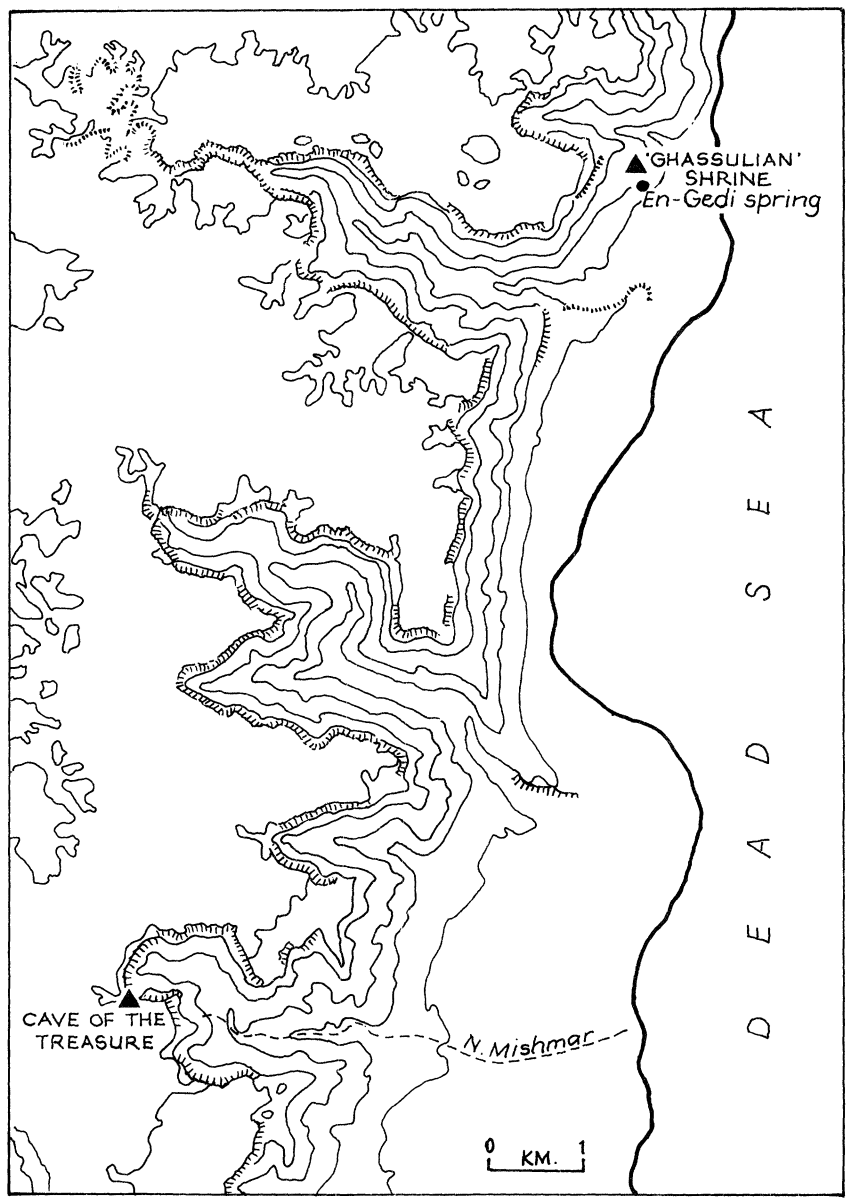

Figure 4 Map of the En-Gedi region to show the location of the 'Cave of the Treasure' in the Nahal Mishmar.

The Nahal Mishmar hoard dates to a time when an exclusively copper/lead metallurgy in the Near East was just giving way elsewhere in the area to a broader spectrum of metal exploitation: gold and silver, electrum and later tin. The concept of precious metals is, of course, relative. Chalcolithic Beersheba and related communities were, to put it crudely, on an essentially copper standard. In such a context this hoard represents a primary means of storing wealth. In a pre-monetary economy metal passing by weight, both

ingots and objects, intact or damaged, provided bullion and currency. If this hoard was the 'treasury' of a shrine, as seems most probable at present, its three major components may reflect three distinct aspects of life in the community served by that shrine.

1 Tools and weapons

In historic times in the Near East wherever texts survive, copper or copper-alloy tools were carefully controlled by administrators. Tools were issued to agricultural workers seasonally and recalled when necessary for checking and repair by a central authority (cf. Moorey 1971). Such tools were not only functional, but also repositories of wealth in terms of raw material that might at any time be exchanged by weight or recycled. The assembly of flat adze- or axe-blades in the Nahal Mishmar hoard might well be a community's reservoir of copper tools. This was the first period in which this tool category disappeared from the flint inventory (Rosen 1986). In much the same way the many mace-heads might represent not only a community armoury, too valuable for individual ownership (so issued in times of peril from a temple store-room), but also a means of storing and then distributing wealth in a form that conspicuously endowed status. In short, the presence of tools and weapons in a hoard with more obviously 'ritual' objects does not necessarily carry them into such a category, though all might ultimately come from a shrine.

2 Ornamental tubes or decorated mace-heads

The degree to which Palestinian communities were ranked in the Chalcolithic period is still debated, but the differential status of individuals is increasingly accepted, primarily on the basis of funerary evidence (cf. Levy 1986). The so-called 'standards' of Nahal Mishmar may illustrate two aspects of community life: symbols of rank or status carried by specific people on special occasions to indicate their social ranking or a particular political or religious role in society; or deity symbols carried in procession at religious rites and festivals as is perhaps depicted in the Ghassul frescoes. However, the fact that the plainer types appear on settlement sites suggests that many might simply be weapons like the mace-heads.

3 Cult furniture

Only the rings or 'crowns' really fit exclusively into this category, though it might be argued that some of the vessels and the ivories also do. On the one hand the 'crowns' epitomize the significance of goats and sheep, perhaps not only domesticated species, in the religious imagery of Chalcolithic Palestine, whilst on the other directing attention, as again does one of the ornamental tubes, to anthropomorphic conceptions of divinity.

Metal and metallurgy

An important role was played in the pioneer study of the metal objects in this hoard by

selective scientific investigation of their composition and technology (Potaszkin and Bar-Avi 1980; Key 1980). The analytical results were interpreted by Key to suggest that some of the metal, perhaps also the exotic objects, came from eastern Turkey or the adjacent parts of Iran (Key 1980:242–3). This was taken to reinforce arguments for foreign manufacture favoured on other grounds by some commentators (cf. Perrot 1968:441). But here, as always, it is essential to separate tentative interpretations of complex scientific results from wide-ranging cultural conclusions based on separate data.

Key (1980) initially analysed thirty objects from the hoard: eleven mace-heads, eleven 'standards', and eight flat axe- or adze-blades. There was a marked distinction between the metal composition of the tools and of the other objects. The tools were predominantly of such pure copper that Key thought it might be native copper, whilst the other objects, in all but two instances, contained a number of impurities, especially arsenic. Subsequent metallurgical studies of contemporary objects from Chalcolithic settlement sites in the northern Negev have indicated a comparable broad distinction between tools made of relatively pure copper, likely to have been smelted oxide ores rather than melted native metal, and elaborate objects of arsenical copper with a more highly developed technology involving specialized casting techniques (cf. Tylecote et al. 1974; Shalev and Northover 1987). With only restricted archaeological and scientific data at present available the precise relationship of these two 'traditions', the former almost certainly the older, is difficult to establish in actual working terms. Since relatively pure copper is on occasion used for 'standards' and arsenical copper for tools (Key 1980:239), and small amounts of scrap from prestige artefacts may have been recycled in local industries producing mainly tools (cf. Shalev and Northover 1987), separation of two industries may at present be more apparent than real or at least a more subtle difference than present evidence suggests.

Although choice was exercised up to a point and a degree of control exerted over their raw materials by these Chalcolithic craftsmen, it is not yet possible to say exactly how the arsenical coppers were manufactured. It appears that it had been recognized pragmatically that the use of richly coloured, arsenic-bearing copper ores facilitated fluidity in more elaborate castings and perhaps also that it might improve the appearance of artefacts with a 'silvery' surface. Apparently, it had not yet been appreciated that arsenical copper was a harder, more durable material also well suited to tool production. Or, if it had, economic or social factors precluded its use. The variation in arsenic contents, from less than 2 to more than 12 per cent at Nahal Mishmar (Key 1980:239), may indicate the use of selected high-arsenic copper ore, in which the amount of arsenic would not be known, rather than true alloying with an arsenic-rich mineral added to copper, over which some greater control might have been exerted.

The question of whence came the copper ores used in Chalcolithic Palestine continues to engage wide interest without it always being fully appreciated how complex this type of investigation is and how controversial among archaeometallurgists. At most, trace-element analysis (that most widely used) allows a specific mining area to be ruled out as a potential source. Even then it is wise to keep an open mind when so few potential sources of copper ore in the Near East have been properly investigated. Nor is it only a matter of metallurgical debate in this case, since perhaps the most likely source for the oxide ores used for tools in the Beersheba area, the mines of Timna on the west side of the Wadi

Arabah, have been ruled out by some scholars on the grounds that the archaeological data at present available are not adequate to establish their exploitation in the fourth millennium BC (cf. Muhly 1984:285–8; 1986:33; contra Rothenberg et al. 1978). Other possible sources for some of the copper ores, to the southwest in Sinai, are no less problematic, though the fact that the vicinity of Serabit-el-Khadim might have provided the haematite used for a few mace-heads at Nahal Mishmar (cf. Beit-Arieh 1980:59) may raise the region's status once it is proved that local copper ores were indeed exploited in the Chalcolithic period (cf. Muhly 1984:289–91).

If, as is possible, both the purer copper from oxide ores and the arsenical copper from enriched ores used by the smiths of the northern Negev came from one and the same mining region, there is declining pressure to place it far to the north or northeast in Turkey. It is argued with increasing geological and archaeological force that mines on the eastern side of the Wadi Arabah, in the Nahal Feinan region of modern Jordan, are the likely source for both types of copper ore used in the Palestinian Chalcolithic (Shalev and Northover 1987; Hanbury-Tenison 1986:160; cf. Hauptmann et al. 1985).

This would not necessarily rule out a northern connection entirely. Key (1980:241) observed that at Nahal Mishmar 'metallic lead was in use and several of the artifacts have casting defects repaired with lead'. This base metal, whose history in the Near East by this time is closely linked to that of silver, which appears for the first time conspicuously in the fourth millennium BC (Prag 1978), is not known to occur closer than southeast Turkey (Moorey 1985:121–2). Silver is elusive in published reports of Palestinian Chalcolithic sites, but electrum rings and a number of gold ingots are said to be part of a recent find of this period. Obsidian may still have been reaching southern Palestine at this time from sources in Turkey (Hanbury Tenison 1986:101–2). There are also some relatively high lead percentages in the 'standards' analysed by Key (1980:239) raising the possibility that lead isotope analysis may in future help, in conjunction with other studies, to track down the source of the metals used in making the Nahal Mishmar prestige objects.

Concluding comments

The evidence of comparative typology, iconography and metallurgical study taken together now provide a strong case for arguing that all the objects in the Nahal Mishmar hoard were manufactured locally, perhaps in the Beersheba region, in the second quarter of the fourth millennium BC. At present there are no compelling reasons to invoke either northern sources for the enriched ores used in the production of the more exotic artefacts or foreign manufacture to explain their distinctive shapes and imagery. The find was exceptional; it does not follow that in their own time and place the contents necessarily were.

There is always a danger of allowing assumptions about this hoard too much weight in conclusions about the metalwork of Chalcolithic Palestine in general: 'the vast majority of copper objects dating to the Chalcolithic seem to reflect ceremonial and ritual functions' (Rosen 1984:504; cf. 1986:26). Even within this hoard, as this essay has sought to argue, the utilitarian element is likely to have been greater than inevitably simplistic

modern identifications of ceremonial and ritual objects might tend to imply. Whatever the reason, whether it was the inherent superiority of the metal or the restrictions of flint and ground stone in these particular cases, this is the time when smelted copper increasingly replaced stone in the tool-kits of many Near Eastern communities as the medium for needles and awls, and for flat axe- and adze-blades ('chisels'). By the earlier fourth millennium BC copper, where it was readily available, had penetrated to the heart of craft production as much for utility as for élite equipment.

The level of technical skill and artistry achieved at this period in metalworking in western Asia, or for that matter anywhere else in the world, would still be seriously underestimated were it not for the Nahal Mishmar hoard. It is fortunate that this find may now be seen within the framework of a dynamic programme of research, where proper geological study of potential metal sources and appropriate metallurgical examination of the manufacturing techniques is complemented by intensive archaeological investigation of the societies within which the industry that produced it could flourish (Hanbury-Tenison 1986; Levy 1986a). An ever tighter integration of information bearing on ideology and material culture, on exchange and subsistence, on social organisation and economic diversity, may be hoped in due course to provide an answer to the fundamental, still unanswerable, questions: how and why did such a sophisticated copper industry emerge in the villages of the northern Negev of Israel in the earlier fourth millennium BC?

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Abstract

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The Chalcolithic hoard from Nahal Mishmar, Israel, in context

The earlier fourth millennium BC hoard of over 400 copper objects and thirteen of other materials discovered in 1961 in a cave in the Nahal Mishmar, west of the Dead Sea in Israel, is of worldwide significance for the earliest history of copper metallurgy. This paper, in seeking to make the hoard's significance more explicit, argues that it is all the product of settlements in the northern Negev of Israel probably obtaining their copper from mines in the Wadi Feinan, Jordan. It may originally have come from a local temple treasury.