The Copper Hoards Problem: A Technological Angle

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I. The Problem

The Copper Hoards are difficult to define. Copper artifacts discovered from sites as distant as Shalozan in the northwest, Bhagrapir in the east and Kallur in the south have all been lumped together under the designation, "Copper Hoards." Tool types also are equally varied: they include socketed axes, trunnion axes, flat celts, anthropomorphs, rings, and harpoons, among others. The problem of definition is further compounded by the fact that all these finds are unstratified, and they have no association with other artifacts.

The earliest discoveries were reported by V. A. Smith (1905, 1907). R. Heine-Geldern (1936) equated them with the Indo-Aryan culture on the basis of typological considerations alone. He proposed that the trunnion axes came from Transcaucasia, the axe-adze from the Danube and the antennae sword from the Koban region. He surmised that these artifacts came to India through Persia around 1200–1000 B.C. In this equation he was at first supported by S. Piggott (1944), but subsequently the latter proposed that they were perhaps the relics of the Harappan refugees (Piggott 1950).

In a brilliant analysis, B. B. Lal (1951) pointed out that the trunnion axe, the Fort Monroe sword, the socketed axe-adze and the axe had a westerly distribution, whereas the harpoon, the barcelt and the anthropomorph were confined to the Doab and never occurred west of it. But undeterred by Lal's criticism, Heine-Geldern repeated (1956) his arguments and declared that the Copper Hoard-Aryans, coming from the West, invaded India between 1200 and 1000 B.C. and destroyed the Harappan civilization. Lal (1951), however, was emphatic on the indigenous origin of the Copper Hoards, and he was supported by Gupta (1963, 1965). He (Gupta 1963) further distinguished two zones in the distribution area of the Copper Hoards: the eastern zone with simpler types and the central Doab with the advanced types. He also emphasized the typological links of the Copper Hoards with the Harappans, the Chalcolithic cultures and even the Neolithic cultures. Recently Allchin and Allchin (1968)

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have revived the Aryan equation of the Copper Hoards without much fresh evidence. Even if the western hoards had some connection with the various immigrant waves, the Copper Hoards of the Doab and the Eastern zones are a different class altogether, as we will show below.

The problem has so far been discussed only on typological grounds. On circumstantial evidence, however, both Lal (1951) and Gupta (1965) have associated Ochre Coloured Pottery (henceforward referred to as OCP) with the Copper Hoards. In the following pages, I propose to reexamine this problem from a technological angle, mainly on the basis of chemical and metallographic data. The typology too will be discussed with a functional bias. I will try to define the genuine types of the Copper Hoards; their use; the milieu in which these tools were used, and the metallurgical techniques employed. I hope that the present study gives some important clues to their origins and affiliations, authorship and age.

II. Types and Their Distribution

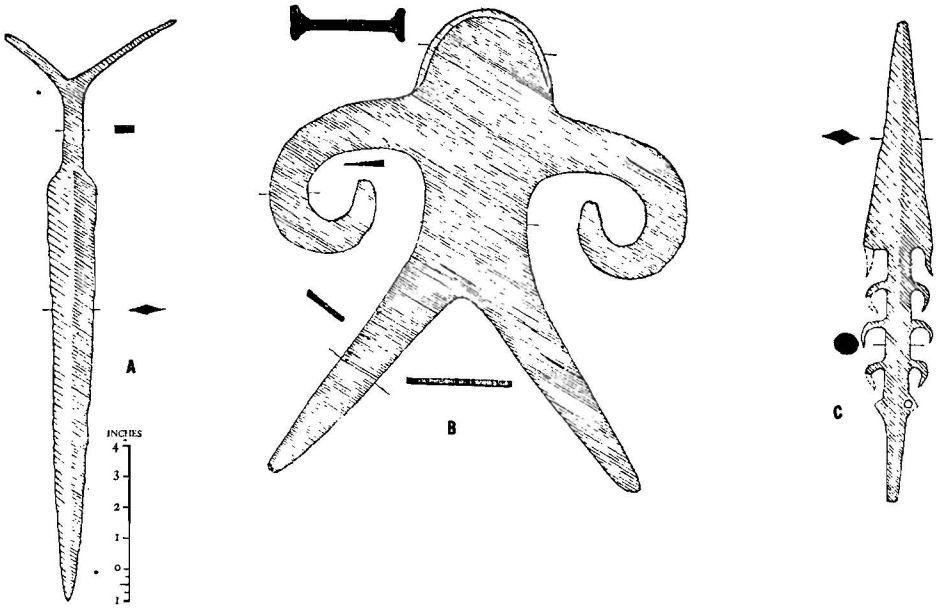
The distribution map published by Lal (1951) is still valid, despite the new discoveries. The trunnion axe, the socketed axe-adze and the Fort Monroe sword do not form part of the Copper Hoards, as the former are confined to the northwest and are mostly single stray finds. (It should perhaps be pointed out, however, that the author noticed a flat axe with two flat lugs from a collection of the Copper Hoards from Sitapur district.) Gordon (1958) has reported an ornamented socketed axe from Kurukshetra but it appears to be very late. Nor do we attach much importance to the socketed examples as they occur in Mundigak III_6 (Casal 1961), Chanhu-Daro, Jhukar period (Mackay 1943, Pl. LXXII, 25), Mohenjodaro (Mackay 1937–38, Pl. CXX, 27) and a terracotta model from a depth of 41 ft (Mackay 1937–38, Pl. CXII, 1).

The distribution of the Copper Hoards covers mainly the present day Uttar Pradesh, Bihar, Orissa and Madhya Pradesh.

In the eastern Plateau zone, south of 24°N, only simpler types like the flat celts and barcelts occur. But in the Doab zone, between 78°–84°E longitude and north of 24°N, we have the more advanced types: the anthropomorph, the antennae sword and the barbed harpoon. These three types (see Fig. 1) alone are diagnostic of the Doab zone as, first, they have been found together and can be ascribed to the Copper Hoards proper and, second, typologically they are distinctive. Thus, a division into the Doab zone type and the Plateau zone type is justified both ecologically and typologically.

I have not attached much significance to the rings, the flat and shouldered celts, and the double axes. The rings and celts are ubiquitous, and without distinctiveness. The double-axes could be late historical pieces meant for land grants (Gordon 1958). Their size and thickness precludes their use as axes ($18\frac{1}{2}$ inches $\times$ $15\frac{3}{4}$ inches, with thickness varying from $\frac{1}{8}$ inch to $\frac{1}{20}$ inch). These double axes are reported only from Bhagrapir and there is no evidence to relate them with the Copper Hoards. Gupta (1965) has searched for parallels everywhere: in the oblong celt from Lothal; in the so-called edgeless double axe from Harappa; and in the triangular bladed axe from Hallur. Even morphologically these are types in themselves and do not stand comparison.

The so-called Lothal anthropomorph (Fig. 2) also has been compared with the Copper Hoards' anthropomorphic figure (Gupta 1965). A basic feature of the latter is its thickened top, giving it the appearance of a nail-head in section (Fig. 1); this feature is absent in the



Antennae-Sword Anthropomorph Harpoon

Fig. 1 The Doab Zone Copper Hoard types: *a*, antennae-sword; *b*, anthropomorph; *c*, harpoon.

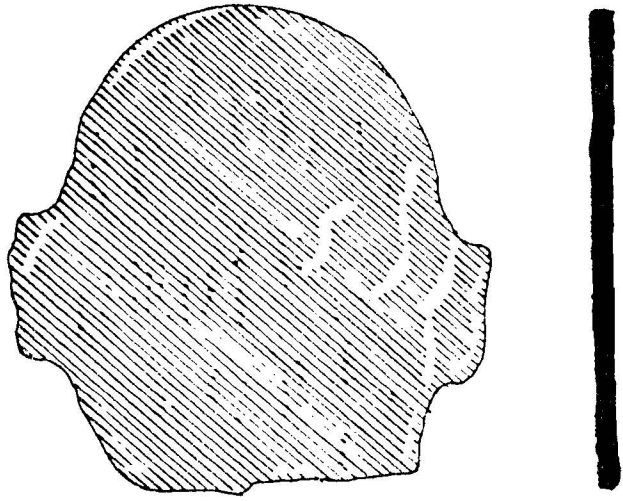


Fig. 2 The so-called Lothal anthropomorph showing a flat section.

former, as it has a flat section. Moreover, if it had incurved arms, it would not break so near the body. Whatever else it was, the Lothal specimen could never be an anthropomorphic figure.

On the basis of the superficial similarity of the Chandoli dagger with the Copper Hoard antennae an inter-relationship has been proposed. But the two are quite dissimilar in the forging techniques used. The Chandoli dagger was cast with a tang the end of which was cut-

split, and the antennae produced by beating it. On the other hand, in the case of the Copper Hoard swords, there are very well developed antennae, cast in one piece with the blade. In the Doab specimens the ratio of total length to blade is 5, whereas in the Chandoli dagger it is only 1.6. In total length the Copper Hoard types are also much longer, from 42 to 75 cms. Therefore we cannot lump them together simply on the basis of superficial typological similarity. For their long blades, the Kallur swords have just 1-inch long antennae. Furthermore, the discovery of Andhra coins from the nearby excavations (Annual Report, 1938–39) gives no more than historical association to the finds. (Professor H. D. Sankalia informs me that a modern vandal had hidden these swords there; their original provenance is not known.)

The hooked sword is also important and occurs in association with the three Doab diagnostic types. The mid-rib in the Copper Hoard (henceforward referred to as C-H) examples is sharp, unlike the diffused rib of the Navdatoli fragment (Sankalia 1963). In Mohenjodaro also the mid-ribbed swords (Mackay 1937–38, Pl. CXIII, 3) occur, though they have holes on the tang for hafting, unlike the hooks of the C-H types. The hooked sword, however, is a general weapon of thrust and is not of much comparative value.

To summarize, the distinctive C-H types of the Doab zone are: the anthropomorph, the antennae sword and the barbed harpoon. The barcelt is characteristic of the Plateau zone. The flat and shouldered celts are common to both zones. The main C-H types are characteristic and have no affinities with the Harappa culture or the other Chalcolithic cultures. The distinctive typology of the Copper Hoards indicates cultural isolation.

III. Technological Considerations

Depending mainly on the analysis of the Bisauli anthropomorph, which was of pure copper (98.77%), Lal (1951) emphasized that the Copper Hoards were of pure copper. However, Smith (1905) had reported analyses of four objects with tin content varying from 6% to 13%. That evidence is not completely reliable, however, as most of these objects belonged to British museums and their provenance was not exactly known.

Samples of Shahabad celt and harpoon, Kamdera, Dhanbad and Dargoma celts showed the virtual absence of tin (see Table 1). The present evidence shows that the objects of definitive Copper Hoard association do not indicate deliberate tin alloying. In contrast, the Harappans practiced deliberate alloying with tin (1–23%), lead, arsenic and even nickel (Agrawal 1970). In the Chalcolithic cultures (Malwa and Jorwe) also there is evidence of 1–5% tin alloying (Hegde 1964).

Thus we see that in alloying techniques the C-H form a class by themselves, unrelated to the Harappan or the Chalcolithic traditions.

In metal forging techniques, the creators of the C-H did not use the various methods for making vessels, as no pots and pans are associated with them. The Harappans, however, did have a developed vessel-forging technology. Though the C-H show closed-casting techniques, they do not show use of cold work and annealing as indicated by several metallographic analyses of our C-H samples (Agrawal 1971). On the other hand, the Chalcolithic cultures do not show any evidence (Hegde 1964) of closed casting. In metal forging also, the Copper Hoards stand as a class apart from the Harappan and the Chalcolithic cultures. That the C-H people could close-cast with pure copper speaks for their dexterity, as it is a very difficult thing to achieve.

TABLE 1
SEMI-QUANTITATIVE SPECTROSCOPIC ANALYSIS

No.	Site	Artifact	Sn%	As%	Pb%
TF-Cu-10	Shahabad	Celt	0.0025	>0.1	>0.1
TF-Cu-9	Shahabad	Harpoon	0.01	0.1	>0.1
TF-Cu-25	Kamdera	Celt	<0.0025	<0.05	0.0025
TF-Cu-27	Dhanbad area	Celt	0.0025	<0.05	0.0025
TF-Cu-29	Dargoma	Celt	<0.0025	>0.1	>0.1

In abundance of metal they stand next only to the Harappa culture and far exceed the Chalcolithic cultures. From the Gungeria hoard alone 424 objects weighing 829 pounds were reported.

IV. RECONSTRUCTION

There are a few points which deserve attention. No big mounds have ever been associated with the Copper Hoards. Even the OCP levels (if one associated them with the C-H) are always flimsy and have a peculiar detrital appearance. The other point to be noted is a complete absence of pots and pans in the whole range of about a thousand artifacts. Both these facts indicate absence of sedentary life.

There is ample evidence (Stebbing 1922; Calder 1937; Agrawal 1968) to show that the Doab was a thick primeval forest and the present extensive plains are due to man-made denudation of the forests during all these millennia. The older alluvium, Bhangar, of the Doab is known to be Kankry and calcareous. To clear such monsoonal forests and to plough such tough soil, heavy metal tools in great abundance were needed. Copper was never abundant enough to accomplish a full scale colonization of the forested Doab. Therefore it is not unexpected to encounter no large settlements belonging to the Copper Hoards people.

In this connection let us examine their tool kit. The anthropomorph (Fig. 1) invariably has a blunted head, externally sharp forearms, and plain hind limbs. These features suggested to us its use as a missile. We tried a model of the anthropomorph in the field; when thrown, it goes in a whirling fashion. This missile has been designed in such a manner that when hurled at a bird, for example, if the head strikes it will be stunned, if the forearms strike they will cut it, and if it gets entangled in the curved forearms, the prey will come down with the missile. It also appears that there can be some manipulation of the center of gravity to give the missile a boomerang effect, though this point needs further experimental verification.

The harpoon is a unique weapon for killing big fish in the riparian country of the Doab. This could be used also to kill big game as indicated in Cockburn's figure (Lal 1951).

The axes of course were mainly used to cut wood, and probably to remove hide from the carcasses.

The antennae swords with their developed antennae (4–5 inches long) are positive handicaps for their use as swords. I propose that they were used to trap big game. If these sturdy swords are placed pointing upward in the pits, with the antennae hilt fixed in clefts made on wooden logs, and if the game is stampeded to fall into them, these swords will pierce the animals without buckling or getting buried in the ground. This is a probable, though conjectural, use for these developed antennae.

It is, however, obvious that this tool kit has a predominant hunting bias. The sturdy barcelt is clearly a tool of the miner, for use as a crowbar, the length providing leverage. It is significant to note that the barcelt is confined to the Eastern zone, rich in copper mines. Complete absence of pots and pans and lack of mounds belonging to the creators of the Copper Hoards further proves their hunting-nomadic pattern of living.

V. The Authorship and Age

The Copper Hoards are a unique and probably isolated phenomenon in Indian prehistory. They probably represent the original inhabitants of the tangled, wooded country of the Doab, before the Painted Gray Ware people started clearing the forests.

It may be noted that eastern India had contacts with Southeast Asia in Neolithic times (Dani 1960; Worman 1949). Latest research in Thailand (Solheim 1967) shows that bronze technology there starts by ca. 2300 B.C. as indicated by the radiocarbon dates for the Non Nok Tha site: TF-651, 2325±200 B.C. and GaK-956, 2290±90 B.C. [Copper socketed tool tentatively dated 3590±320 B.C. GaK 1034. Ed.] This suggests the probability of inspiration from Southeast Asia for the Copper Hoards although an independent origin is not precluded. But western contacts were impossible because of the forest barriers. Lal (1951) and Gupta (1963, 1965) identified the Hoards with the Mundas. It is worth noting that the eastern Austronesian tribes (forefathers of the Mon-Khmers, linguistically affiliated with the Mundas) independently developed the use of metal. And north-east India has been considered an integral part of Southeast Asia in the Neolithic period (Bongard-Levin and Deopik 1957).

If we take the Plateau zone as the primary center because of its simpler types (barcelt was a mining tool) the diffusion probability from Southeast Asia becomes more plausible. Those people possessing the mysterious skill of metallurgy were probably released from the kinship bonds of the tribes and thus became the itinerant smiths who later developed the Doab zone of the Copper Hoards.

The age of the Copper Hoards is more difficult to arrive at. If the OCP association of the Copper Hoards is accepted, they are pre-P. G. Ware and even pre-Black-and-Red ware in the Doab. For precision in dating one will have to await the testimony of the spade.

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