

Copper Vessels in the Indus Valley Civilization: A Case Study in the Light of Harinagar Hoard*

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Abstract

The Harappan or the Indus Valley civilization flourished as a manifestation of urbanised Chalcolithic culture in the regions of Punjab, Haryana, parts of Rajasthan, Sindh, Gujarat and in adjoining areas with a high level of standardisation in more or less every aspect of life and also with certain degree of formalism. Gold, silver, lead and copper were the metals that the Harappans had mastered and used for ornaments, tools and vessels. The recent chance find from village Harinagar (Teh. Chandpur, Dist. Bijnor) is the first find of the Harappan artefacts east of Ganga. The find – a mix of vessels, tools and implements; and weapons – is very interesting as it not only the largest collection of copper objects outside the Harappa but also is the second largest of all the collection/hoard of Harappan copper objects found so far. The paper is an attempt to critically study the objects in the context of find, context of typology, in the context of composition as well as in the context of technology used in forging them.

Key words: Composition and technology, Copper vessels, East of Ganga, Harappan, Hoard, Implements, Typology, Weapons.

1. INTRODUCTION

Chalcolithic cultures in the north western part of the subcontinent grew into a highly formalised and standardised urban expression under the Harappans. Self-sufficiency (and surplus) in subsistence led to the growth, development and excellence in specialised crafts and technology, metal working was one such specialised craft cum technology that had reached to a very high level where the smiths had started experiments in alloying/adding tin with copper to produce bronze. Harappan civilization, therefore, is called the Bronze Age civilization. The authority-induced standardisation, which was the hallmark of the Civilization, is clearly seen in the uniformity of the shapes and sizes and typology of copper/bronze objects produced under it. Though the present paper focuses on the vessels

of copper, a look into the copper technology and general picture of the range of copper objects known so far is important as the background information available, in order to better understand the extent and range of occurrence of copper objects in general and to suitably explain the Harinagar Find.

Harappan metallurgist worked upon gold, silver and copper for making ornaments, but it was only copper in which they produced vessels and vessels of daily household use; implements and tools for everyday activities and crafts; and, weapons for ceremonial or functional use. Commonly occurring copper objects among different categories such as tools and implements are axes, adzes, knives, chisels, celts, fishhooks, nails, rods, etc.; among ornaments and jewellery are beads, ring (ear/finger), tiara or crown, fillets,

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bangles, etc.; mirrors and a few other rod like objects are classed as toiletries. Harappans had a very feeble weaponry comprising only wafer like arrow-heads, spear-heads and knives/daggers. The category of vessels is no exception in terms of shape and size which are not many. It includes carinated vessels (*hāndis*), goblets (narrow and tall; and, squat and globular), tumblers, *lotā*, and boxes/containers of varying shapes and sizes.

The metal technology of the Harappans has been explained as 'simple type' lacking the sophistication of the west Asia (Agrawal, 1970) with exception of fishhooks which are of 'superb craftsmanship' and are of 'best perfection of all the fishhooks at similar sites in Egypt and Mesopotamia' (Sarkar, 1953, pp. 133-39). For forging the metal Harappans used 'sinking', 'raising', 'cold-work', 'annealing', 'running-on' and 'riveting' and casting (open and closed). These processes have been properly studied and explained in detail by Marshall (1931) and, Kenoyer and Miller (1997). Sand casting and *cire perdue* (lost wax) were used mainly for casting figures, mid-ribbed spear-heads, swords, mirrors and not so much for pots. Vessels were made using sinking and raising techniques in combination with other techniques in the process. Most of the cooking pots followed the shapes already in use in the earthen ware, however, there are some copper vessels which do not follow the earthen shapes indicating either the forger had experimented beyond his mandate or the limitations imposed by metal itself, however, box like containers as found at Mandi¹ (Tewari, 2004) were the deliberate creations for the specific purpose.

Most of the copper objects, be they of any category, are found at settlements which were comparatively bigger and economically sound

while the other settlements have yielded comparatively very few copper objects. It is quite obvious that the copper technology was an elaborate one and involved larger inputs and as such must have been quite expensive too, secondly, the copper/bronze tools, perhaps, meant efficient working and refined and greater output, therefore, must have been closely controlled. Interestingly, majority of the copper objects of all category have been found at Harappa and Mohenjodaro while the other settlements, big or small, have yielded relatively small quantities, especially in the case of copper vessels scarcity is very prominent. Dholavira, one of the five large and elaborate city centres of the Harappan Empire, has produced only one small frying pan (illustrated in report) whereas in the tools and implements segment large variety and number of tools have been found and reported (Bisht, 2015). Rakhigarhi, another one of the big five, also has not reported any pot in copper (Nath, 2014). At Chanhudaro, a factory site described as 'Sheffield of Ancient India' (Illustrated London News, 1936, Nov. 21st), excavation has brought to light 521 copper objects containing 333 (64%) tools, 135 (26%) ornaments, 36 (7%) vessels and 16 (3%) included miscellaneous (Shinde, 2016). Small numbers of copper vessels clearly emphasises the greater significance of copper tools and implements which had a direct effect on the economy and prosperity of the society while the copper pottery surely showed the elite status of the users. Most of the copper objects have been found during excavation as individual 'object in the context' i.e. non-hoard context, with various degrees of use mark but some hoards or collections of copper objects stashed away in pots have also been found but their numbers are not many and have been found at sites like Harappa where the largest known collection (100 pieces including 91 objects) was found in a

¹ The material kept in the treasury consists of two copper containers, and a large number of beads made of gold, banded agate, onyx and copper (1). One of the containers is a large bowl with convex sides and flat base. Its radius is about 21 centimetres and its internal and external depths are 14.8 and 15.3 centimetres respectively. The second container is rectangular in shape, 47.5, 9.5, and 4.5 centimetres in length, width, and inner depth respectively.

ledged metal pot (*hāndī*, recorded as Jar No. 277) covered with a straight-sided dish inverted over it as a lid (Vats, 1940, pp. 85-90, 383; Pl. XXII-b & CXXIV-28) besides it, few more collections containing smaller number of objects were also reported. From Mohenjodaro three smaller collection were found from Block 14-15 of DK Area in 1930-31 and Chanhudaro altogether four large hoards of copper objects containing sixteen to twenty-eight object in each, were unearthed (Mackay, 1943, p.174). However, all these collections or hoards contained only assorted tools kept inside pots. In this context, the Hoard from Harinagar is significant not only because it contains 78 objects of copper (excluding the big copper cauldron in which these were kept) comprising a mix of variety of vessels as well as set of functional tools and weapons of war (Fig. 1) but also because it is found at a location to the east of Ganga which hitherto is considered outside the pale of Harappan influence. With this understanding at hand, Harinagar find can be better understood.



Fig. 1. The Big Cauldron with finds

2. THE FIND

Harinagar village (Mubarakpur), Post Heemapur Deepa can be approached from Jalilpur Block crossing on Chandpur-Mawana road towards north along a canal. The find spot ($29^{\circ}11'16.75''$ N and $78^{\circ}10'27.59''$ E) is an agricultural field measuring 0.144 hectares. It was an uneven field with a two metre terrace, over which earth from the canal was further piled up. It was during levelling the field that a big copper cauldron was chanced upon. The local administration emptied the cauldron using iron bar celt, only to find more copper objects, some of them, however, suffered damages in the processes. The finds stashed inside a big copper pot and buried in the sandy soil remained safe in their stable environment and as such maintain very good state of preservation.

In the big cauldron a total of 78 objects (as estimated so far) were found which included 55² vessels weighing 44824g, 20 tools and weapons weighing 6902g and a mirror 245g. In per cent share of vessels and other objects in number is 73% and 27%, and, in weight is 86% and 14% respectively. The big cauldron has been excluded in number as well as in weight as it alone stands for 75000g in weight and measures 72 cm at rim diameter and 71cm in height (central object in Fig. 1) i.e. its share in the combined weight is 59% and those of vessels and others is 35% and 6% respectively (Fig. 2).

The spear-head, axes, celts, saws and choppers, the stiletto sword and the mirror are not the subject of concern here so their details are spared here. The details of the vessels are given in the following paragraphs.

The 55 copper pots inside the big cauldron can be grouped as (i) goblets 26 (33.33%), (ii) *hāndī* 17 (21.79%), (iii) dishes and pans 9

² Earlier, a count of 57 pots have been published by the authors in *Purātattva* 47, but, later on, during further study one of the dishes as well as the indeterminate object with perforation turned out to be the base of a large *hāndī*. So the count has come down to 55 vessels.

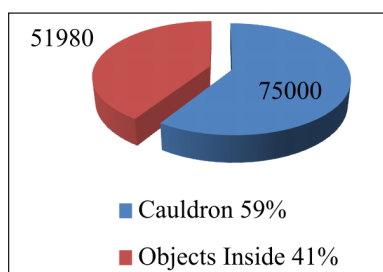


Fig. 2. Weight of Cauldron and other objects in grams

(11.53%), (iv) tumbler 2 (2.56%) and (v) *lotā* 1 (1.28%) (Fig. 3). Vessels from the Harinagar find have not been chemically cleaned so far restricting the proper study of manufacturing technique used. On close examination these pots show certain marks which help in understanding the basic process used in forging them.

2.1 *Hāndīs*– Ledge Pots

Hāndīs are the traditional cooking pots with hemispherical base and tapering upper part forming a ledge at the junction. These pots continue with more or less same shape till present. In size the these *hāndīs* show a wide range – the biggest measuring 41.5cm dia. at rim and the extant height (with base missing) is 33cm (Fig.9A) while the smallest 14cm rim diameter and height of 11cm. Angle at carination also varies with size in the bigger vessels it is more vertical than inclined. Basal part is formed by sinking (Fig. 4G&H) while the upper portion appears to have been raised-on-stake or even lathed. Use of lath is more probable as the upper part is smoother, straighter and fine in finish, further the rims thin

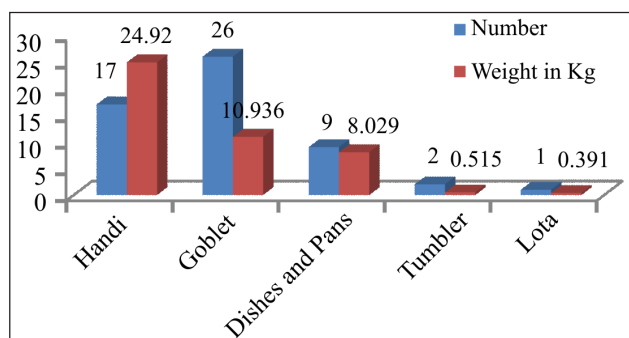


Fig. 3. Typological distribution of vessels

out gradually (Fig. 4B). The two pieces are joined together at the carination by hammering. In most of the *hāndīs* the upper part does not show hammer marks except at the carination (Fig. 4A), the point of joining. Whatever be the process, copper smithy was undoubtedly of high standard as the joint remains invisible (Fig.4C-D). The joining processes is interesting, it is neither riveting nor soldering rather appears to be a kind of ‘dove-tail’ or interlocking – by overlapping or by the fitting together of projections and recesses – the joint. *Hāndīs*, which are in better state of preservation, despite fine craftsmanship, still retain hammer marks as well as shallow ridge indicating alternate annealing and hammering. Two probable ways of interlocked joint for this kind of pots are proposed below (Fig. 5) where ‘B’ type appears to be stronger. In type ‘A’ bottom portion receives the beating and shows obvious marks, while in type ‘B’ both sides of carination are hammered and, as a result, form a distinct ledge on both sides (Fig. 4F).



Fig. 4. *Hāndī* types with hammer marks other details

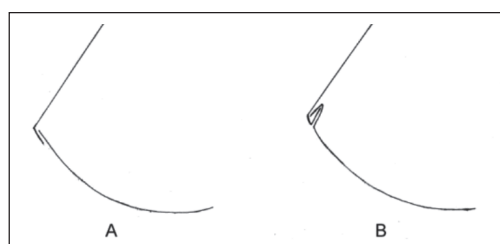


Fig. 5. Interlocking patterns

2.2 The Goblets

Goblets followed the shape of their counterpart in earthen ware attesting the importance of shape as well as the purpose of the pot. Of the 26 goblets twelve are of Type-I – narrow and tall with button base (Fig. 6) while fourteen are of Type-II – squat with wide open mouth and globular body which narrows down considerably to a button base (Fig. 7). A goblet of silver, similar in shape to Type-I, was found closed with a lid containing jewellery from Mohenjo daro [Marshall, (1931), p.519; Pl.CXLVIII-B]. Type-I goblets vary in rim diameter from 8.5cm to 6.5cm and in height from 18.5cm to 13.2cm, while the Type-II rim diameter range from 15.8cm to 13.2cm and the height varies from 17.3cm to 14.8cm in un-cleaned state. In both types of goblets the main body and the base are made separately then joint together, by hammering in the annealed state. In some cases, goblets are made in three parts and then lapped together (Fig. 6B). The body of the goblets appears to have been made by casting or using a lathe. Possibility of casting a pipe and then hammering it into desired shape also cannot be ruled out. Non-symmetric construction of some goblets do indicate hammering process adopted for forming the body or may be the vessel developed deformity at the time of joining process (Fig. 6B). It is interesting to note that two long pieces of copper tube, of one-inch diameter, were



Fig. 6. Type-I Goblet variants with details of base caps

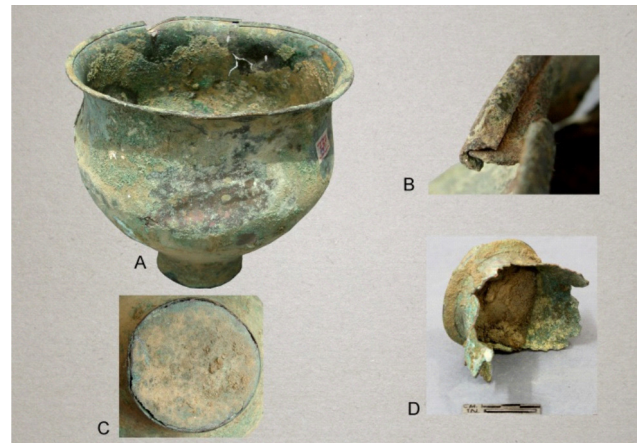


Fig. 7. Type-I Goblet with details of extra molding on rim and base details

found at Mohenjo daro and described as coppersmiths' blow-pipes (Marshall, 1931, p.198, Pl.CXLIV-10). In the Type-I the bottom end of the main body is inserted into the base-cap (Fig. 6F-G), while in a few specimen of Type-II the base-cap or base-plate is inserted into the bottom end (Fig. 7C) as also the base cap is outside (Fig. 7D); then both are annealed and hammered to a fine seamless joint. Generally, rims of goblets are featureless and flayed-out, but in one Type-I goblet case sharp in-turned form is noticed (Fig. 6C). Rim of one of the type-II goblets has an applique copper moulding at the rim (Fig. 7A). A long thin strip of copper is folded longitudinally and fixed along the edge of the rim overlapping almost to 3mm (Fig. 7B). Whether it was style statement or a necessity to strengthen the fragile rim is hard to say. As a style statement it gave prominence to the rim by making it thick and bold, but if it was a remedy to thin and fragile rim that could have cracked (due to beating), become sharp and dangerous to use, it was done with such artistic fervour, masterful skill and with ingenuity that it appears as style statement.

2.3 Dishes and Pans

In this category 08 objects are found in the hoard and are further sub-classified as pans (4 nos.) and dishes (4 nos.). The Pans were prepared

from thick sheet of metal and have slightly tapering side, while the dishes are simple slightly rounded base with thick, flat-topped rims. Pans, bear thick soot on the exterior suggesting their role as cooking/frying pans. The smallest is 21 cm and the biggest is 33cm in diameter. One of the pans has a large, circular rivet patch fixed at the base indicating repair (Fig. 8) as well as the significance of the metal. Rivet is not a pin rather a thick circular piece of copper plate laterally sliced and inserted and then hammered to fine finish (Fig. 8 C). Dishes are smaller and lighter than pans and also do not have soot. The dish type includes four specimens measuring 14cm – 17.3cm, out of these, three are intact, while the remaining one is broken in two parts with some portion missing. Dishes appear to have been cast made.

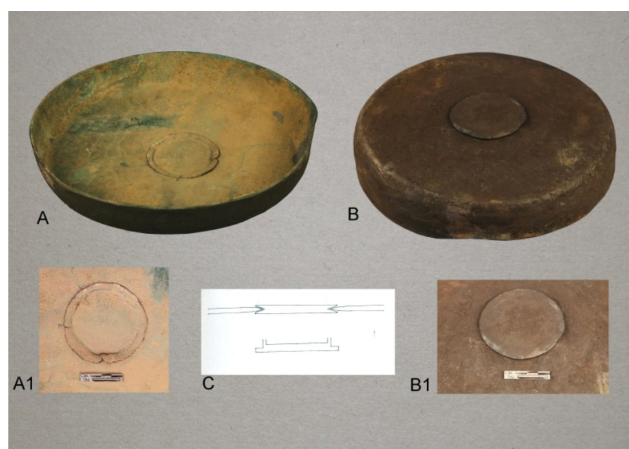


Fig. 8. Pan with details of repair patch

Another pan, wrongly placed in this class earlier, has shallow, curved base and below the rim, on the inside, has a series of rivets attaching another copper sheet (Vikrama, 2017). After further study this 'pan' (Fig. 9. C-D) is found to be a consolidated base of the large *hāndī* (Fig. 9B), which got detached, perhaps, during the forced extraction of pot by the local, by overlapping the lower part into the pan and fixed with 25 rivet evidenced on the border of the lower part of *hāndī* (upper part of the pan). The hammered rivet-ends measure about 8 mm in dia. while the hole for

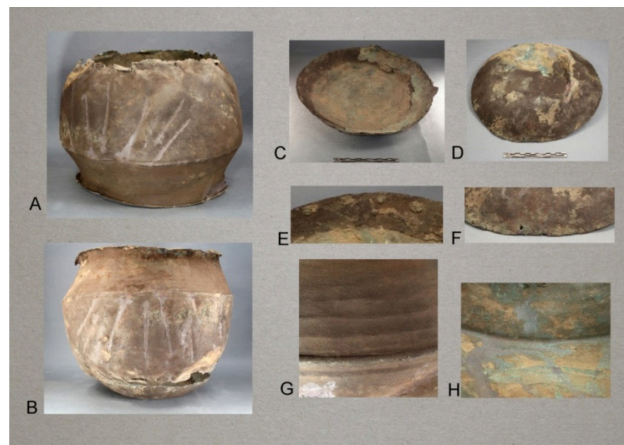


Fig. 9. Large handi with riveted base with details

inserting the rivet is 2mm (Fig. 9 E-F). The rivets are separated from one another by a distance of 2.8 cm to 2.9 cm. The copper sheet overlaps on inner side of the base for 5.5 cm (Fig. 9C). Remains of a layer of soot are found entrapped between the two sheets of copper. The *hāndī* has thickness of 2mm at rim and 1 mm near the riveted end while the riveted base is 1.5 cm to 2 cm in thickness. Altogether 10 horizontal depression are there between shoulder carination and neck which may be the result of lathe turning (Fig. 9G). A similar though smaller pot is reported from Lothal (Rao, 1985, p.536 & 552, Fig. 119).

2.4 Tumblers

Two tumblers of different sizes (7.1cm and 8.5 base dia.) are also included in the repertoire from Harinagar. These are flat and heavy based and have straight sides but the slightly narrowing neck and out-turned rim lends it an impression of concave profile, unfortunately one is de-shaped and the other is incomplete, however, enough portions have survived to give a fair idea of their shape, size and identification. Heavy and thick base and thin rim suggest it being the outcome of raising technique, but the fine finish and smooth surface indicates casting (Fig. 10). Even the use of lathe cannot be ignored, which can be confirmed only after the cleaning of the pots.



Fig. 10. Tumblers

2.5 Loṭā

A pot with globular body and short, upright and straight neck and slightly out-turned rim is also found in the hoard. It is quite intact but much battered. It is 12.4 cm high and 7.2 cm in diameter at the rim and weighs 391gm (Fig. 11). The body appears to have been made through the sinking and/or raising while the neck along with rim prepared separately and joined by interlocking perhaps and base-cap is fixed at the bottom end from outside (Fig. 11D)

Besides the above vessels, find inside the big cauldron from Harinagar also included eight spear-heads with midribs (24 cm–28 cm long), four saws (37.2 cm–51 cm long), one chopper (37.4 cm long), five celts (20.2 cm–25.5 cm long), one shouldered axe (20.5 cm), one mirror and a 1.2 cm thick square sectioned pointed sword measuring 37 cm in length. All the tools, after cleaning, appear to be of bronze. The sword and the shouldered axe have not been reported earlier. Further, all the weapons are strong and appear to be of practical use marks of which the bear too. In refinement and in craftsmanship all the objects are superior to most found so far, perhaps because of the circumstances of its storage, or else, these were



Fig. 11. Loṭa

for some special group. The find is unusual and significant primarily on two accounts: one, its composition is unique in terms of variety of vessels, functional tools and strong weapons of defence and attack; and, second – the way it was stashed away at a location far away from the Harappan zone. Its location across Ganga into the east is so far the eastern most extension of the Harappan material, although it may not prove to be Harappan site. Most importantly the find is convincingly placed in 23rd century BCE on the basis of two dates derived from the soot from two different pots and estimated through AMS (Vikrama, 2017, *Purātattva*, 47). Interestingly, on some vessels, apart from patina, smooth patches of greenish hue are noticed on the interior as well as exterior surfaces which are definitely not part of patina layer forming naturally due to oxidation; rather appear more like a result of deliberate human effort. Close examinations do affirm the existence of glossy surface, but to determine its nature and usage scientific attestations (underway) are required. The vessels have not been subjected to chemical cleaning. The foregoing is just a preliminary study of the unique find, many fragments are yet to be studied which may increase or decrease the number of vessels. Chemical cleaning and metallurgical analysis, which are underway, are likely to throw more surprise at us.

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