STUDIES IN PRE-COLUMBIAN ART & ARCHAEOLOGY NUMBER THIRTY

AXE-MONIES AND THEIR RELATIVES

DOROTHY HOSLER, HEATHER LECHTMAN, AND OLAF HOLM

Dumbarton Oaks Research Library and Collection Washington, D.C. 1990

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Introduction

The two articles, now classics, that brought American axe-monies to the attention of scholars of New World prehistory were published virtually simultaneously: Olaf Holm's discussion of the Ecuadorian variety, which comments upon its closeness to similar artifacts from Oaxaca, Mexico (Holm 1966/67), and Dudley Easby's more metallurgically technical look at the Oaxacan types, which comments upon their closeness to similar artifacts from Ecuador (Easby et al. 1967). Easby and his coworkers conclude their study thus: "Virtually every author who has written about the examples from Ecuador and Peru considers axe-money to be clear proof of maritime commerce between that area and [the] western [coast of] Mexico. . . . Axe-money has not been reported from the intervening area, so that conclusion strikes us as entirely reasonable and probable" (Easby et al. 1967: 132). Holm, on the other hand, looks southward, suggesting that in the Peruvian region some related phenomenon is to be expected: "The presence of copper money-axes is not safely established in the Peruvian cultures, but we do suspect their presence in f[or] inst[ance] Lambayeque, although in a different presentation" (Holm 1966/67: 142).[1]

Since those publications, the literature concerning axe-monies has been sparse. They have occasionally been reported from Ecuador as issuing

[1]The article by Easby, Caley, and Moazed (1967) concentrates on two aspects of Mexican axe-monies: their use and the methods by which they were made. The small corpus of objects these investigators studied came from the present Mexican state of Oaxaca where such items were reported to have been found in hoards or caches. On the basis of eyewitness accounts at the time of and immediately after the Spanish invasion, and after an exhaustive review of the subsequent available literature, Easby maintained that Mexican *hachuelas* were, without doubt, ". . . a kind of money or unit of exchange in the famous *tianquiztli* or Indian markets. No other possible use is mentioned in any of their [the chroniclers'] accounts of New Spain" (Easby et al. 1967: 110). Caley and Lowell Shank performed chemical analyses of six Oaxacan axe-monies. Their most interesting result (1967: table II) was the determination of arsenic, at concentration levels ranging from 0.30 to 0.51 weight percent, in four of the six, the remainder of the metal being copper with a variety of trace impurities. Moazed's metallographic examination of cross sections removed from four Oaxacan axe-monies demonstrated that the objects had been hammered, not cast to shape, a result that was confirmed later when Easby and Leonard Heinrich fabricated a typical Oaxacan axe-money. Having cast a blank of copper roughly to the shape of an *hachuela,* they hammered and annealed the metal until the final form and appropriate thicknesses of blade, shank, and flanges were achieved.

Holm's 1967 article on Ecuadorian axe-monies draws entirely upon internal evidence presented by the objects themselves, since he knew of no ethnohistoric sources then—nor do we know of any now—that describe the use of such axe-monies in Ecuador at the time of the Spanish invasion. Nevertheless, their axe-like shape, their thinness, and the presence of raised flanges along their borders were all features close enough to those of the Mexican variety for him to suggest a similar function. He presents a typology of the basic axe-money shapes, describes all the types as having been fashioned by hammering, plots their distribution within the Manteño/Huancavilca culture area of the central Ecuadorian coast (where they are found in large quantities) and down as far as Tumbes on the far north coast of Peru, and sets the Ecuadorian material chronologically within the Integration period (ca. A.D. 800/900–1500). Concerned to discover any standard unit against which these objects had been made, Holm examined several hundred examples and attempted to seriate them by weight. He reports that the weights appeared to concentrate in groups around a quinary system—5, 10, 15 . . . grams—and speculates upon whether or not such fractionary values might have been of commercial or measuring significance. Considering the possible monetary use of these items, Holm remarks: "All the specimens which we have described do fit well into the basic requirements of primitive money, they are portable, they do have intrinsic value and they are well recognizable . . . " (1967: 138). With respect to the last of these characteristics, he singles out the raised flanges and hammered superficial striations on Ecuadorian axe-monies as legitimating devices. Like the Mexican variety, Ecuadorian axe-monies were found in hoards, often in graves, indicating that wealth in copper was accumulated as well as traded over considerable distances.

from controlled excavations (Ubelaker 1981; Marcos 1981); they have been suggested as examples of the kind of copper money Chincha merchants are reported to have used in their maritime commerce between the central coast of Peru and Ecuador (Oberem and Hartmann 1982; Shimada 1985a; Rostworowski 1970, 1988); and a fruitless attempt has been made to establish a relation between Ecuadorian axe-monies and the ancient Mexican system of weights, known ethnohistorically, based on the cacao bean (Szászdi 1980). Very recently a few publications have paid somewhat closer attention to these unusual artifacts. Mayer (1982a) considers them in a brief survey of ancient American money and related goods made of metal; Morse and Gordon (1986) report on their metallographic examination of three typical Oaxacan axe-monies; and Prümers (n.d.) presents arguments for including artifacts with provenience as far south as the Chillon valley, on the central coast of Peru, in a broadly drawn definition of axe-monies.

There are several good reasons to reconsider axe-monies at this time, from a fresh vantage point. Chief among them is the publication of a major study by Dorothy Hosler on the origins, technology, and social construction of metallurgy in ancient West Mexico (Hosler 1986, 1988a, 1988b, 1988c, n.d.). Hosler establishes unequivocally that metallurgy was introduced directly to West Mexico from Ecuador and Peru via a maritime route and that that introduction included not only a certain constellation of object types but almost the entire range of metals and alloys in common use in the central and northern Andes. What moved from the Andes to Mesoamerica was neither finished objects (with a few exceptions) nor stock metal. Rather, the knowledge and technical know-how behind mining, smelting, and the manipulation of metal; an interest in producing certain classes of objects, such as needles, tweezers, open rings, and axe-monies; and specific attitudes about the qualities of metal as a material—its color, for example—that were important in channeling West Mexican cultural investment in the new medium, were what West Mexicans took from their distant neighbors to the south.

Axe-monies were among the Andean object types that interested West Mexican peoples, which is not surprising in view of the cultural significance of the metal axe among Mexican societies. Axes made from metal appear frequently in ethnohistoric documents as items of ritual paraphernalia associated with gods and rulers (Hosler 1986). Mexican smiths tended to make axe-monies from copper-arsenic alloys,[2] the same alloy system that typifies the Ecuadorian variety of axe-money (see Table 2), though the Mexican shapes are quite distinct. Some time around A.D. 800–900, just at the time that West Mexico had its first experience with metal (Pendergast 1962; Hosler 1986, 1988b), a certain style in handling this material became prominent along the Peruvian north coast and in coastal Ecuador. The production of relatively small objects which could be stacked, packeted, tied, or bundled, from metal sheet that was at times paper thin, became joined to the elite use of such objects, to their circulation and eventual hoarding in large numbers, and to some system of

[2]There is no commonly accepted terminology which describes the binary alloys of copper and arsenic. Metallurgists refer to all such alloys as arsenical copper, regardless of the amount of arsenic alloyed with the copper. Lechtman (1981) introduced the term arsenic bronze to refer to alloys of copper and arsenic whose mechanical properties are close to those of the tin bronzes. Throughout this article we have adhered to a terminology which relates the arsenic concentration of a copper-arsenic alloy to the mechanical properties of the alloy, in the most general sense: arsenical copper ($<\approx 0.1\%$ As); low arsenic copper-arsenic alloy ($\approx 0.1\%$–$\approx 0.5\%$ As); arsenic bronze (≈ 0.5–$\approx 10\%$ As). Alloys containing more than 10 weight percent arsenic are arsenic bronzes, but they rapidly become too brittle to work cold. Such alloys were used in West Mexico, for example, for casting objects such as bells. These alloys and the objects cast from them are a rich silver color (see Hosler 1986, 1988a).

We consider arsenical copper as copper containing arsenic in concentrations lower than about 0.1 weight percent. Such alloys are impure coppers whose electrical properties are markedly affected by the presence of arsenic but whose mechanical properties are similar to those of copper alone. Mechanical properties of copper-arsenic alloys, such as hardness and malleability, begin to change appreciably with arsenic concentrations of about 0.5 weight percent. At these relatively low arsenic levels the overall strength of the alloy increases, with considerable gains in hardness especially when the alloy is cold worked (Lechtman, personal communication). At arsenic concentrations of about 0.5 weight percent and higher, copper-arsenic alloys can be considered bronzes (Lechtman 1981).

It should be noted, however, that the term arsenical copper is used widely in the literature on ancient metallurgies to refer to all binary alloys of copper and arsenic, regardless of their composition.

value that apparently prized not just the objects but the copper-arsenic alloy of which they were made. This style of manipulating the alloy was played out in the northern Andes (Ecuador) in the manufacture of the prototypical axe-money (Figs. 1, 2) and, in the north central Andes (Peru), in the design of its closest relative, the *naipe* (Figs. 3a, 4), the Peruvian manifestation of "axe-money" whose presence Holm had predicted correctly (Holm 1966/67). When this metallurgical style reached West Mexico at about A.D. 1200 (Hosler 1986, 1988b), it was elaborated in the form of the axe-money (Figs. 5, 6, 7), not as *naipes* or as feathers, the two stack-packet forms that were prominent in the north central Andes at the time. Axe-monies may be particularly useful, then, in helping establish the north Andean role in disseminating metallurgical technologies and styles during this dynamic period of coastal Pacific interchange (see map, Fig. 8).

Another reason for a closer look at axe-monies stems from the clear picture we now have of the way in which they were made. The technical study of Oaxacan axe-monies carried out by Easby, Caley, and Moazed (1967) is still useful, though it does not examine any of the West Mexican artifacts, some of which are unique to these Pacific coast states and bear important similarities to Ecuadorian and Peruvian thin-style smithing. Hosler's metallurgical studies (1986, 1988a, 1988b) corroborate many of Easby's findings and go much further in establishing the near-exclusive use of copper-arsenic alloys for the production of both West Mexican and Oaxacan types (see Table 2). She deals with a large and diverse corpus of objects (see Table 3), with their function, both utilitarian and social, and with the question of standardization in production, and relates alloy composition to the probable use of these items. Hosler also provides additional ethnohistoric data, especially for West Mexico. Furthermore, we can provide for the first time a detailed reconstruction of the smithing sequences that resulted in the Ecuadorian corpus, by far the largest group of axe-monies available from the Americas. All, without exception, are made of copper-arsenic alloy (see Table 2), including the tiniest artifacts (Fig. 11) hammered into foil 20 microns thick (1 micron = 10^{-3} mm). Our laboratory examination of representative objects from Ecuador included also examples of their closest stack-packet, thin-style Peruvian relatives, *naipes* and feathers (Figs. 3a, 9). These too, we found, are made of extremely thin sheet, hammered from copper-arsenic stock metal (Table 2; see also Shimada 1985a for chemical analyses of *naipes*).

Finally, axe-monies and their relatives deserve particular scrutiny in view of the suggestion made recently by Izumi Shimada that the copper-arsenic alloys of which the Ecuadorian artifacts and the Peruvian *naipes* are fashioned were produced and distributed in the form of "blank sheets, ingots of copper and arsenical copper" (Shimada 1985a: 390) by the Middle Sican polity based in the Lambayeque valley of north coast Peru. The archaeological investigations of Shimada and his colleagues at various sites within the La Leche-Lambayeque river drainages (Shimada 1985a, 1987b; Shimada et al. 1982, 1983; Epstein and Shimada 1983) demonstrate clearly and conclusively the serious investment in the production of copper-arsenic metal at large ore smelting (or refining) centers closely linked to the Sican economic and ceremonial hub at Batan Grande. Shimada believes that *naipes,* which he likens to Ecuadorian axe-monies, were a form of primitive money and that their similarity to the Ecuadorian objects indicates trade between Ecuador and Peru during the tenth and eleventh centuries (Shimada 1985a, 1987a). He argues further that the alloy-producing Middle Sican polity probably controlled ". . . not only the goods being distributed but the transport mechanisms themselves" (Shimada 1985a: 391), trains of llamas and ocean-going balsa rafts off the Pacific coast. Whereas Hosler (1986, 1988c) has shown that such maritime traffic was the chief mechanism by which metallurgy as a technical and conceptual system moved from the northern Andes to Mesoamerica, we shall concentrate here on the axe-money as representative of that system and, perhaps, as the artifact type that bears best witness to its roots.