

# Silvered and gilded copper metalwork from Loma Negra: manufacture and aesthetics

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**Figure 1** Map of the north coast of Peru (courtesy of Adam Hart).

**Abstract:** The Moche, who inhabited the north coast of Peru in the Early Intermediate Period, had a rich metallurgical production that employed, for the most part, hammered sheet of various metals joined by mechanical means. The artisans who produced the metal grave goods deposited in Moche burials at Loma Negra used an electrochemical replacement plating process to apply precious metal layers to copper substrates, a method that was unique to the Piura Valley, where the site is located, far from the Moche heartland on the other side of the formidable Sechura Desert. Considered here are two types of objects in the Loma Negra corpus - disk ornaments and fox head headdress ornaments- assembled from copper sheet plated using this remarkable method, which allowed the deposition of extremely thin layers of gold and silver of any composition. In addition to construction and surface treatment, this paper considers how these colorful, animated three-dimensional ornaments might have been perceived by the ancient observer.

**Resumen:** Los Moche, pobladores de la costa norte del Perú durante el período Intermedio Temprano, tuvieron una rica producción metalúrgica para la cual emplearon principalmente láminas martilladas de varios metales que unieron por medios mecánicos. Los artesanos que produjeron los bienes metálicos depositados en los entierros Moche de Loma Negra, usaron un procedimiento de plateado por reemplazo electroquímico para aplicar capas de metal precioso a superficies de cobre. Este método es único para el Valle

de Piura donde se localiza el sitio de Loma Negra, lejos del corazón de la tierra Moche, al otro lado del formidable desierto Sechura. Aquí se consideran dos tipos de objetos del corpus de Loma Negra - ornamentos en forma de discos y adornos para la cabeza con forma de cabezas zorros -, ensamblados a partir de láminas de cobre plateadas por medio de este notable método, que permitió la deposición de niveles muy delgados de oro y plata de cualquier composición. Además de considerar el método de manufactura y tratamiento superficial de los artefactos este trabajo tiene en cuenta cómo el colorido y animación de estos ornamentos tri - dimensionales, pudieron ser percibidos por el antiguo observador.

In the last thirty years, following discoveries of large amounts of metal objects in elite Moche burials in the Piura Valley (Disselhoff, 1972; Lapiner, 1976, pp. 112-115 & plates following; Jones, 1979), and in the Lambayeque (Alva, 1988; Alva 1990; Donnan, 1990) and Jequetepeque Valleys (Donnan, 1990, pp. 29-32; Donnan, 1993b) on the north coast of Peru, art historians and archaeologists have greatly expanded their knowledge of Moche culture. During the same three decades, technical studies of Moche metalwork have allowed us to recognize the high level of metallurgical expertise attained by the Moche of the Early Intermediate Period that facilitated the production of some of the most visually sophisticated works of art in metal known from the ancient Americas (Lechtman, et. al., 1975 & 1982; Lechtman, 1984a, p. 15; Lechtman, 1988, p. 349; Schorsch, 1998).

The first documented extensive find of Moche metalwork occurred in 1969 when a site in the Vicús area of the Piura Valley known as Loma Negra was looted by local *huaqueros*. Until that time significant archaeological remains attributed to the Moche culture (ca. A.D. 100 - 800) had been found only at sites further to the south, across the Sechura Desert, within a coastal area bordered by the Lambayeque and Nepeña rivers (fig. 1). When the artifacts from Loma Negra appeared archaeologists and art historians were puzzled. Not only could they find few parallels for individual objects or types of objects, the large number of metal finds from a single context was difficult to explain (Jones, 1979; Schaffer, 1985). Scholars speculated as to the function of the site because such large finds of precious metalwork in the Andean region as a whole were undocumented. More recent finds, in particular the on-going scientific excavations in the Lambayeque Valley at Sipán (Alva & Donnan, 1993; Alva, 1994), have provided materials analogous to the metalwork associated with Loma Negra which now can be recognized as a place of burial for Moche individuals of the highest status (Jones, 1992).

Approximately eighty percent of the more than five hundred objects documented in the Loma Negra Archive are now in the collection of the Department of the Arts of Africa, Oceania and the Americas in The Metropolitan

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Museum of Art.<sup>1</sup> The collection includes objects of personal adornment, as well as several hundred "ornaments" of unknown function.

In the manufacture of the Loma Negra metalwork, the three metals of early Peruvian metallurgy—gold, silver and copper—were alloyed, and the alloys combined as surface and substrate. These high status objects were made almost exclusively from hammered sheet, variously of gold, silver, silvered gold, gilded copper, silvered copper and copper, used alone or in combination, and with non-metallic inlays of various colors. The joining most frequently was mechanical, which is typical of Moche metalwork as a whole (Lechtman, et. al., 1982, p. 7; Lechtman, 1988, p. 334). All of the objects that combine these three metals can be placed on the basis of their manufacture into one of two groups; the first consists of objects made using ternary gold alloys and binary or ternary silver alloys (fig. 2), while the objects in the larger group were made from hammered sheets of unalloyed copper bearing surface layers of precious metal (fig. 3).<sup>2</sup>

Combining gold and silver, or the colors of gold and silver, was of paramount interest to Moche metalsmiths and their audience. In a previous study of Loma Negra metalwork, objects that juxtapose solid gold and silver sheet were considered together with objects—primarily disk ornaments—where gold and silver layers had been applied to copper substrates (Schorsch, 1993; Schorsch, 1998). Ultimately ten methods used by the Moche to combine gold and silver, mostly in the form of sheet metal, but involving

**Figure 2:** Nose ornament, gold and silver, Moche, from Loma Negra. The Metropolitan Museum of Art, The Michael Rockefeller Collection, Bequest of Nelson A. Rockefeller, 1979 (1979.206.1236).



<sup>1</sup> The Loma Negra Archive, also now in the Metropolitan Museum, was assembled in the early 1970s by Anne Schaffer, under the direction of Julie Jones, at that time curator of Pre-Columbian art at the Museum of Primitive Art, New York.

<sup>2</sup> Because most of the copper sheet objects from Loma Negra have not been cleaned, the original colors of their surfaces are obscured by massive layers of copper corrosion and archaeological accretions.

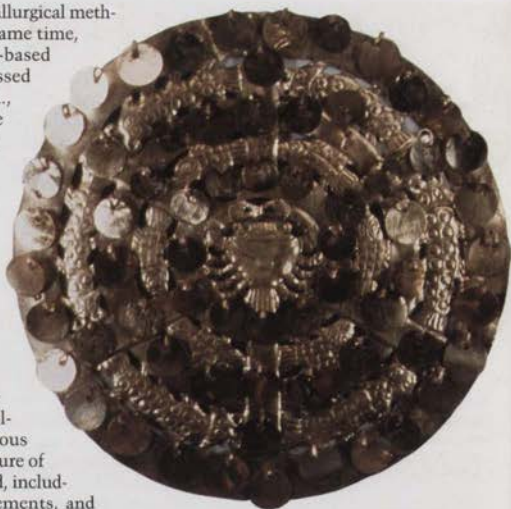


different mechanical, adhesive and metallurgical methods of joining, were identified. At the same time, as systematic examination of copper-based metalwork from Loma Negra progressed (Howe, et. al., 1993; Schorsch, et. al., n.d.), it became apparent that far more types of objects combined gilded and silvered copper sheet than the disks that were examined in-depth for the previous study. On the basis of this additional information, objects that juxtapose precious metal surface layers can be recognized as expressions of an aesthetic different than that which shaped the ornaments made of solid gold and silver sheet.

Among metal objects attributed to the Moche culture, the greatest sophistication and elaboration in style and technology, and the most lavish use of precious metals, were employed in the manufacture of items for personal adornment of the head, including earflares, headdresses, necklace elements, and nose ornaments (figs. 2, 4-6). Of the various types of objects known from Loma Negra, the composite gold and silver nose ornaments exhibit the greatest diversity in their manufacture. In fact, the relatively frequent occurrence of nose ornaments in material culture and imagery, the sophistication and variety of their design, and their lavish use of precious materials, suggest that nose ornaments, although not unknown among other Andean cultures, can be recognized as a particularly Moche form of expression in metal.

The association of gold and silver with the right and left sides of the human body has been demonstrated in burial contexts at Sipán (Donnan, 1993a, pp. 172-180; Alva & Donnan, 1993, pp. 221-223) and can be observed in Moche nose ornaments such as a hammer-welded example from Loma Negra (fig. 5). This crescent juxtaposes adjacent, mirror-image fields of gold and silver. Scholars of Moche culture have suggested that the metals symbolize basic human dualities, such as male and female or sun and moon (Alva & Donnan, 1993, p. 223), just as the visual relationship between these differently colored fields is one of opposition. This type of spatial relationship tends to communicate balance and stability, perhaps immutability, and the nose ornaments, although in many cases quite small, are imposing, suggesting the heft and rigidity of the hammered precious metal sheet.

This relationship of opposition is continued in other spatial schemes in which there is no clear "right" and "left", and for which Moche specialists



**Figure 3:** Disk, gilded copper, Moche, from Loma Negra. The Metropolitan Museum of Art, Bequest of Jane Costello Goldberg, from the Collection of Arnold I. Goldberg, 1986 (1987.394.46).



**Figure 4:** Nose ornament, gold and silver, Moche, from Loma Negra. The Metropolitan Museum of Art, The Michael Rockefeller Collection, Bequest of Nelson A. Rockefeller, 1979 (1979.206.1228).

have suggested no cultural association. For example, a nose ornament in the Museo del Oro de Perú (Tushingham, et. al., 1979, pls. 75-76) thought to be from Loma Negra presents the repeated alternation of gold and silver fields, also on both sides of a central axis. The gold and silver fields in opposition can also function as foreground versus background (figs 2, 6) or top versus bottom (fig. 4).<sup>3</sup>

In contrast to the bold juxtaposition achieved with gold and silver sheet, the disk ornaments, with their gold and silver surface layers,

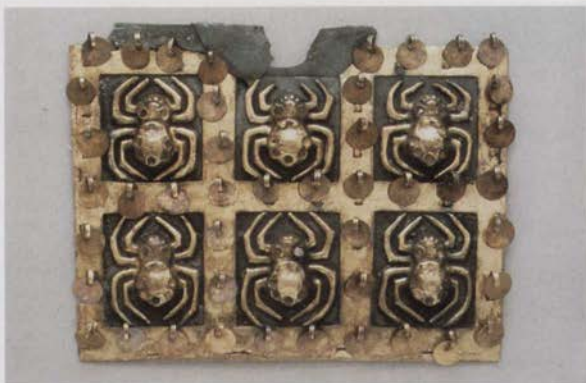
are characterized by subtle transitions in color, texture and depth. An observer could not know per se that the metal was copper with gold and silver surface layers rather than solid gold and silver sheet but a perception of the "filminess", inherent in what have been found to be extremely thin layers of precious metal, is clearly communicated. A characterization of two different visual systems created using gilded and silvered copper sheets, sometimes with the contribution of the reddish pink color of unadorned copper, forms the basis for the current publication. For the purpose of this investigation two classes of objects found at Loma Negra—disk ornaments and fox head headdress ornaments—are considered.

**Figure 5:** Nose ornament, gold and silver, Moche, from Loma Negra. The Metropolitan Museum of Art, The Michael Rockefeller Collection, Bequest of Nelson A. Rockefeller, 1979 (1979.206.1332).



<sup>3</sup> For nose ornaments from La Mina that juxtapose rows of gold and silver from top to bottom, see Donnan, 1993a, figs. 127, 130-131.

**Figure 6:** Nose ornament, gold and silver, Moche, from Loma Negra. The Metropolitan Museum of Art, The Michael Rockefeller Collection, Bequest of Nelson A. Rockefeller, 1979 (1979.206.1230).



There are ten examples of disk ornaments attributed to Loma Negra in The Metropolitan Museum of Art (figs. 3, 7-10, 12-13). Other examples can be found in the American Museum of Natural History in New York and additional disks have been documented in the Loma Negra Archive. This type of ornament is thus far unique to the Piura Valley. The disks in the Metropolitan Museum vary greatly in size, from 15.5 to 31.0 cm. All have one or more holes for suspension or attachment. The function of the disks is not known, though they have been described as pectorals (Jones, 1993) or heraldic devices (Schaffer, 1985, p. 100, n. 4).

In spatial organization the disks, like many other types of gilded and silvered copper sheet objects from Loma Negra, range in complexity from a single sheet articulated with scored linear decoration and/or *ajouré* work, to constructions involving layered elements within a shallow three-dimensional space. Two gilded copper disks (1987.394.34 & 1987.394.112), measuring 21.5 cm and 30.3 cm in diameter, display a similar *ajouré* repetitive pattern representing deer (fig. 7). A third gilded copper disk (1987.394.129) (diameter 27.2 cm) presents a simple radial design traced onto its surface. All three disks are embellished with dangles suspended from flat wires. These small, usually circular, attachments are characteristic of Moche metalwork.

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Several of the more ambitious disks juxtapose gilded and silvered copper sheet, and display images of great complexity. The joining of the gilded and silvered sheets is quite simple, and as is the case for the vast majority of objects attributed to Loma Negra the joins are mechanical, depending heavily on the use of tabs and slots. This simple joining method, however, was combined with a sophisticated use of metal color and surface treatment, and a scheme of spatial organization that, with the addition of movable components, convey a specific Moche, or perhaps even Loma Negra, aesthetic. Although these gilded and silvered copper disk ornaments are fashioned from dense, rigid and opaque materials they appear lightweight and animated.





**Figure 7:** Disk, gilded copper, Moche, from Loma Negra. The Metropolitan Museum of Art, Bequest of Jane Costello Goldberg, from the Collection of Arnold I. Goldberg, 1986 (1987.394.112).

This spatial organization, characterized by the layering of formal elements within a shallow three-dimensional space, is particularly apparent in the manufacture of the disk ornaments, which by their very nature have a clearly defined rear plane that supports all of the superimposed layers. The smallest Loma Negra disk (diameter 15.5 cm), bearing a representation of the “decapitator” with outspread arms holding a knife and trophy head in each fist (1982.392.8) (fig. 8), can be used to illustrate this concept. In addition to dangles in three different sizes, this gilded and silvered copper assemblage consists of twelve components made from hammered sheet. The disk itself has only the simplest scored decoration that defines a band following the circumference of the disk, and which is covered with large dangles. The decapitator, with his body and head in different levels of relief, fills the field demarcated within the disk (fig. 9). Details of his clothing are scored, while his chest is decorated with small dangles and his eyes, mouth and earflares are inlaid. In each hand he holds a curved knife, each a separate sheet with a narrow raised border, while the trophy heads were attached in a manner of dangles. His “octopus” headdress is a flat sheet decorated with an owl head doubling as the staple that attaches the head-dress to his forehead. Four “rays” that emanate from his body are each made from a separate sheet with scored decoration and dangles. The disk, from the backplate to the tip of the decapitator’s nose, measures less than 1.5 cm in depth, but within that shallow envelope multiple, overlapping





**Figure 8:** Disk, gilded and silvered copper, Moche, from Loma Negra, The Metropolitan Museum of Art, Gift of Jane Costello Goldberg, in memory of Arnold I. Goldberg, 1982 (1982.392.8).

levels or layers of sheet have been assembled. Layering—within individual objects and as an organizational principle in burials—has been cited as a significant component of the Moche culture (Lechtman, 1993; c.f. Alva & Donnan, figures following pp. 59, 144 & 168).

The juxtaposition of gold and silver, that is to say, the colors of gold and silver, either in the form of solid sheet or as surface layers, is a common visual theme in the metalwork of ancient Peruvian cultures and, as noted earlier, the Moche in particular applied much technical ingenuity to achieve this effect. A juxtaposition of precious metal surface layers can be seen on the decapitator disk, as well as on the two largest Loma Negra disk ornaments in the Metropolitan Museum.<sup>4</sup>

One of these disks displays a warrior in full regalia surmounted by a double headed “moon creature” holding a prisoner in each of its jaws (1987.384.54) (fig. 10). These elements are made of silvered copper sheet, supplemented with a generous amount of inlay—orange and white shell, green and black stones and gilded copper—and mounted with tabs to the disk, which itself is gilded copper. The silvered copper rim is also held in place on the gilded disk by tabs, and by dangle wires.

<sup>4</sup> Analyses of all precious metal surface layers on the decapitator disk have not yet been completed.



**Figure 9:** Detail of disk, 1982.392.8, fig. 8.

Precious metal layers on Moche copper artifacts from Sipán were applied using a depletion method (Eckmann, 1993) that had widespread application in pre-conquest Peru and throughout the Andean regions of South America (Lechtman, 1973; Lechtman, 1984b, pp. 60-63; Scott, 1983). Other than in the manufacture of two exceptions thus far discovered—the shaft and backplates from a pair of earflares (Lechtman, et al., 1982, pp. 7-10) and a pair of

“decapitator” earflare frontal ornaments (1979.206.1234-1235)—this method is not known to have been used in the manufacture of gilded or silvered copper metalwork from Loma Negra.

The examination of the more typical precious metal surface layers on copper objects from Loma Negra was undertaken by Heather Lechtman and her co-workers, who proposed that an electrochemical deposition process had been used to apply consistently thin layers measuring 0.5 - 2.0 microns in thickness onto copper substrates (Lechtman, 1979; Lechtman, et al., 1982; Lechtman, 1984b). Studies carried out at the Metropolitan Museum provide support for this hypothesis and suggest that the same method was used by both the Moche at Loma Negra and their indigenous Vicús neighbors in the Piura Valley (Centeno & Schorsch, in this volume). This electrochemical deposition method has not been observed on Moche metalwork from other sites or on Andean metalwork attributed to cultures situated outside of the Piura Valley.



Electrochemical-deposition plated gold and silver surface layers on copper substrates from a variety of Loma Negra objects were analyzed using EDS and INAA.<sup>5</sup> The results indicate that this innovative method was useful in applying a wide range of gold-silver alloys,

**Figure 10:** Disk, gilded and silvered copper, Moche from Loma Negra. The Metropolitan Museum of Art, Bequest of Jane Costello Goldberg, from the Collection of Arnold I. Goldberg, 1986 (1987.394.54).

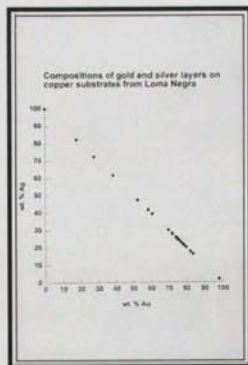
**Figure 11:** EDS and INAA analyses of Loma Negra precious metal surface layers on copper substrates.

as the compositions of precious metal layers thus far analyzed range from 98 % gold with 2 % silver, to 100 % silver (fig. 11). When considering the compositions of the surface layers on several disks that combine gold and silver layers, however, we find a narrower range of alloys.

Pure gold and silver are distinctive in their color, and mixtures of the two metals display a range of hues between the warm yellow of gold and the cool gray of silver.<sup>6</sup> Replication samples duplicating the alloy composition of the gold layer on the "moon creature" disk, which contains approximately 31 % silver, and the silver layer on the figural details, with about 37 % gold, show that the difference between their colors was subtle, and that both are fairly cool in tone.<sup>7</sup> Their close juxtaposition would have animated the surface of the disk, increasing the viewer's sense of the continuous movement that is suggested by the concentric arrangement of the images and the multiplicity of detail.

Another disk uses a similar concentric arrangement and also juxtaposes different metal colors. In this case the apparent difference in color is due to surface texture rather than metal composition: this *ajouré* disk consists of circular bands of fish, densely packed and decorated with chased and punched ornament, alternating with highly polished, undecorated bands (1987.394.46) (fig. 3). The adjacent surfaces are identical in composition, but the different optical qualities of polished versus textured surfaces cause the viewer to perceive them as different in color. The *ajouré* work imparts an impression of lightness and airiness that belies or contrasts to the inherent weight and opacity of metal, as does the undulating, almost film-like surface.

Supplementing dynamic compositions with surfaces animated through the use of subtle variations in color, texture and depth, the latter due to layering, Moche metalwork, and particularly the objects made of gilded and silvered copper sheet, often incorporates the actual movement of formal components, accompanied by the distinctive sound of metal striking metal. The highly reflective layers glittered and altered in color as they shifted in their orientation to sources of light and adjacent reflective metal surfaces. To these moving parts belong the ubiquitous dangles, though far more complex assemblages can be cited; among the disks, a large example adorned with an owl can be considered the embodiment of a dynamic aesthetic typical of some of the highest quality Moche objects made of gilded and silvered copper sheet.



EDS analyses were carried out at the Sherman Fairchild Center for Objects Conservation using a Kevex model Delta IV energy-dispersive x-ray spectrometer with a modified Amray model 1000 (1600T) scanning electron microscope operating at a voltage of 30 kV. The data were quantified using MAGIC IV ZAF corrections for standardless analysis and are reported in relative weight percentages. Samples in the form of surface scrapings and polished sections were analyzed. Additional analysis were carried out using instrumental neutron activation analysis (INAA) in the Department of Chemistry at the University of Michigan, Ann Arbor, by Adon A. Gordus. The objects were sampled using quartz rods; for a description of the technique and operating conditions, see Gordus & Shimada, 1995, p. 12. The data presented in figure 11 also includes two electron microprobe analyses carried out on Loma Negra objects by Lechtman, et al. (1982, p. 21). It is clear from polished sections of Loma Negra gilded and silvered copper artifacts (Lechtman, et al., 1982; Centeno & Schorsch, in this volume) that annealing was the final step in



Whereas the "warrior" and "decapitator" disks juxtapose silvery images on golden backgrounds, the owl disk (1987.394.56) (fig. 12) has a silvered copper background. The surface layers on the owl itself, the dangles and their attachment wires, and the rim are golden. The gold layer contains 20 % silver and the silver-rich layer contains 53 % gold (fig. 13). Replication samples of the alloys indicate more clearly how similar in color they appeared to the ancient observer. Form is built up using a combination of flat sheet, sheet in relief and fully sculptural form. The flat rim is attached to the disk using tabs and dangle wires. The owl's body, itself raised in high relief, was made from a single sheet of metal with the flat tail feathers and claws articulated with scored linear details, and was secured to the disk with tabs. The scored wings are also continuous with the body but were not attached to the disk, and would have flapped when the disk was moved, just as the head, executed in the round from two crimped sheets of gilded copper and set on a copper rod attached to the inside of the body, would have rotated from side to side. The cool reflective surfaces of the moving parts, including the dangles of different shapes, would have glittered and jingled.

their manufacture. One expects, therefore, to find a small amount of copper in the precious metal layers, particularly at the interfaces due to the interdiffusion between the substrate and the surface layer during thermal treatment. However, the copper detected in these analysis is due overwhelmingly to the proximity of the bulk copper substrate and copper corrosion products overlaying and within the precious metal layers. For this reason, the percentages of copper detected are not reported and the gold and silver values have been normalized to total 100 %.

A broad understanding of the physical and working characteristics of precious and base metals and an eagerness to experiment led Moche metalworkers to develop highly sophisticated and varied solutions for the manufacture of objects that evoked different visual effects. The Loma Negra nose ornaments made of solid gold and silver sheet encouraged a perception of

**Figure 12:** Disk, gilded and silvered copper, Moche, from Loma Negra. The Metropolitan Museum of Art, Bequest of Jane Costello Goldberg, from the Collection of Arnold I. Goldberg, 1986 (1987.394.56).







**Figure 13:** Detail of disk, 1987.394.56, fig. 12, showing juxtaposition of gilded and silvered sheets in area between bottom of owl's proper left wing and proper left leg.

the metallic nature of gold and silver, emphasizing such qualities as weight, solidity, rigidity, while placing these two metals, quite different in their colors, not merely in contact, but in opposition (figs. 2, 4-6).

A different aesthetic shaped the manufacture of the disk ornaments. Color, specifically the juxtaposition of similar metal colors and the illusion of movement elicited by variations in surface texture, coupled with the actual movement of formal components, the distinctive sounds of metal striking metal, a sense of lightness, a multiplicity of detail, and the elaboration of form through layering, all contribute to their distinctive appearance. The Moche preference for sheet metal facilitated the attainment of some of these aesthetic aims. Mechanically joined copper sheet, which could be surfaced with any of a wide range of alloys, provided a flexible means for juxtaposing fields of color that altered in appearance as they moved, and as perceived by the eye moving from layer to layer, from substrate to image to attribute to dangle.

By way of comparison it is informative to look briefly at another visual effect exhibited by some objects from Loma Negra, which was also created through a juxtaposition of metal sheets bearing different surface colors. Many of the Loma Negra objects made from copper sheet represent animals of one kind or another, particularly sea creatures, such as crayfish and crabs, and insects (Lapiner, 1976, nos. 369, 376, 378-379). Different types of felines and canines, some quite fantastic in their appearance, are also frequently occurring motives. The functions of most of these animal images are as yet unknown, but one type—three-dimensional illusionistic representations of fox heads—has been attributed a specific function. A fox head ornament was found as part of a headdress in the burial of a "Warrior-Priest" excavated in the Virú Valley (Strong & Evans, 1952; Jones, 1979, pp. 75-78). In addition to fragments of a metal fox head and paws, an actual fox jaw and the remains of an animal pelt were found. In a discussion of a fox head in Dumbarton Oaks said to be from Loma Negra, Donnan (1996, p. 160) states that at least ten more such ornaments are in various museum collections, in addition to several in private collections. Of these, one was found at Huaca de la Luna at Moche and is now in the Linden-Museum in Stuttgart (Sutorius Collection 119 154) (Jones, 1979, fig. 19). In addition to the Dumbarton Oaks fox head, several mentioned by Donnan are attributed to Loma Negra or more generally to the Piura Valley and three are said to be from Sipán (Alva & Donnan, 1993, fig. 199). There are two fox head ornaments from Loma Negra in the Metropolitan Museum, which in overall shape are quite similar to the Piura Valley fox head in the Didrichsen Art Museum, Helsinki (Jones, 1979, fig. 20).

The larger of the two fox heads in the Metropolitan Museum (1982.392.10) (fig. 14) measures 15.9 cm in length and is among the more elaborate Loma Negra three-dimensional constructions employing metal components that juxtapose a variety of different surface colors. The head itself is a single piece of gilded copper sheet. It is folded and an overlapped seam runs along the underside of the chin to the back of the head, which is open. The sheet was cut and the edges folded in to create the opening of the mouth. Another folded sheet forms the inner surfaces of the mouth. The only surface decoration is found on the end of the snout, which is scored with nostrils.

There are several gilded and silvered copper sheet components attached to the head. Each ear was made from two triangular sheets of gilded copper crimped together on two sides. Two tabs extend from the bottom edge of each sheet. The tabs are paired with those on the matching half of the ears and each pair is inserted into a slot. On the interior of the head the tabs are loosely fixed and together they function as hinges that hold the ears in place but allow them to flop forward and back. Two strips of silvered copper teeth—a full mouth including canines—are fixed in the upper and lower jaws using a conventional tab and slot arrangement. A reddish pink tongue, made from a slightly curved strip of unadorned copper sheet, dangles from the fox's jaw and moves from side to side. The whiskers, each formed by the insertion of a round wire through a pair of holes, one on each side of the



**Figure 14:** Fox head ornament, gilded copper, silvered copper and copper, Moche, from Loma Negra, The Metropolitan Museum of Art, Gift of Jane Costello Goldberg, in memory of Arnold I. Goldberg, 1982 [1982.392.10].

muzzle, were made of unadorned copper as well. Round gilded copper dangles are suspended from the inside of the ears and under the chin.<sup>8</sup> The eyes consist of white shell inlays held in place with a natural resin bulked with a mixture of ground inorganic materials. The pupils are now filled with such a resin but it is possible that they originally were inlaid with stone or metal.

The smaller fox head is constructed in a similar manner (fig. 15). The main components are gilded copper, and the tongue, the inside of the mouth, the eyes and the whiskers are plain copper.<sup>9</sup> Lacking are the white teeth of silvered copper. It appears that the teeth were originally inlaid, probably with white shell, as in the case of the fox head from Huaca de la Luna (Jones, 1979, fig. 19). Evidence of this is seen in the slight zigzag impressions in the remains of a granular brown adhesive present on the inside of the lower jaw.<sup>10</sup>

The fox heads are not only three-dimensional, but extending toward the viewer from a headband, turban or other support, they have substantial depth. Projecting parts, such as the ears and the dangles, and especially the

<sup>8</sup> On the Loma Negra metalwork virtually all dangles have not only identical suspension wires, but identical means of suspension: each dangle has a round hole near the top and is attached by means of a flat wire strip threaded through two slots in the substrate. By contrast, on the fox each dangle wire is threaded through a flat wire loop with both ends inserted into a single round hole in the chin. This method of attachment appears typical in the rare cases where dangles are suspended from the undersides of three-dimensional forms. Here, as generally is the case on Moche metalwork, the surface of the dangles matches that of the metal from which they are suspended. Dangles were made of gold, silver and gilded and silvered copper; dangles of silvered gold and plain copper are unknown. The dangles suspended from the chins on most other Moche fox heads are not round.

<sup>9</sup> The metal sheet that forms the inside of mouth of the large fox could not be observed under magnification and has not yet been sampled for elemental analysis.

<sup>10</sup> Like the example from Huaca de la Luna, the Loma Negra small fox appears to have had only lower teeth.



whiskers, add to this illusion of a creature inhabiting space. Moving components, with their glittering metal surfaces and characteristic sounds were important in the conceptions of both the fox head and disk ornaments, while the sense of lightness or airiness, the subtly layered spatial organization, and the use of color to unite and animate surfaces, are typical of only the disks. Observers of the fox heads are not meant to be aware of the filmy character of the gold and silver layers conveyed by the disk ornaments, and the colors of gold, silver and copper are used in a different way.

These animal images are not intellectual constructions conveying information about the nature of surfaces, they are living creatures with physical attributes that are part of their identity as foxes. The metal colors help to delineate these attributes: yellow gold to indicate fur, reddish pink copper to highlight the whiskers and tongues, and the flesh on the inner mouth, and the whitish silver (or shell) to show the teeth. Moche imagery is full of visual abstractions, and is far from any system of representation that could be called realistic. Yet in the case of the fox head ornaments, metal color is used to create some sense of verisimilitude, to highlight the features that make it a fox, not to convey an accurate coloration, but some illusion of a living creature and its natural attributes.



The presence of a few depletion-gilded copper sheets among the Loma Negra corpus is intriguing. Is the brilliant but short-lived use of an electrochemical deposition method on the Loma Negra metalwork reflective of indigenous Piura Valley traditions, and how does its use correspond to aesthetic goals of artisans working on the Loma Negra corpus? Lechtman (1984b, p. 63), in a discussion comparing electrochemical deposition with depletion gilding, describes the two techniques as "cover and hide" and "development and enhancement", respectively. The precious metal surfaces attained using enrichment techniques that concentrate gold and silver in the substrate on the surface "... merely enhanced an aspect of the metal that is inherent to it ..." (Lechtman, 1984b, p. 63). As mentioned earlier, both the disk ornaments and the electrochemical deposition plating method used to create them are unique to the Piura Valley. The gold and silver layers do not cover or hide the copper substrate. Rather, the viewer's perception of thin, filmy surfaces was a part of the desired result, and we can recognize the copper sheet as their physical support rather than something meant to be hidden or disguised. The fox heads—whose production is not limited to the Piura Valley—juxtapose precious and base metal surfaces to attain different ends. Perhaps they belong to a more pan-Moche aesthetic. These speculations are just that, speculative; investigations into the manufacture of other types of gilded and silvered Moche metalwork from Loma Negra are on-going.

**Figure 15:** Fox head ornament, gilded copper and copper, Moche, from Loma Negra, The Metropolitan Museum of Art, Gift of Jane Costello Goldberg, in memory of Arnold I. Goldberg, 1982 (1982.392.3).



## Bibliography

ALVA, W. 1988. Discovering the New World's Richest Unlooted Tomb. *National Geographic*, 174 : 510-548.

ALVA, Walter. 1990. Splendors of the Moche: New Royal Tomb Unearthed. *National Geographic* 177 : 2-15.

ALVA, Walter. 1994. *Sipán*. Lima: Cerveceria Backus & Johnson, S.A.

ALVA, Walter y Christopher B. DONNAN. 1993. *Royal Tombs of Sipán*. Los Angeles.

CENTENO, Silvia A. & Deborah SCHORSCH. Caracterización de depósitos de oro y plata sobre artefactos de cobre del valle de Piura (Perú) en el período intermedio temprano. En *Boletín del Museo del Oro*. Bogotá : Banco de la República. (in this number).

DISSELHOFF, Hans-Dietrich. 1972. Metallschmuck aus der Loma Negra, Vicús (Nord-Peru). *Antike Welt* 3, 43-53.

DONNAN, Christopher B. 1990. Splendors of the Moche: Masterworks of Art Reveal a Remarkable Pre-Inca World. *National Geographic* 177, 16-33.

DONNAN, Christopher B. 1993a. Oro en el arte Moche. *Oro del antiguo Perú*, 119-193, José Antonio Lavalle, (ed.). Lima: Banco de Crédito del Perú en la Cultura.

DONNAN, Christopher B. 1993b. The Royal Moche Tomb at La Mina, Jequetepeque Valley. Paper presented at *Andean Royal Tombs, Works of Art in Metal Colloquium/Workshop*, May 10, 1993, The Metropolitan Museum of Art. New York.

DONNAN, Christopher B. 1996. Fox Head (catalogue entry). *Andean Art at Dumbarton Oaks*, 2 vols., I: 159-160, Elizabeth Hill Boone (ed.). Washington, D.C.: Dumbarton Oaks, The Trustees for Harvard University.

DROST, Ernst & Jürgen HAUßELT. 1992. Uses of Gold in Jewellery. *Interdisciplinary Science Reviews* 17, 271-280.

ECKMANN, Christian. 1993. Gilding Processes and Surface Treatment of Gold-Silver-Copper Alloys from the Royal Tomb of Sipán. Paper presented at *Andean Royal Tombs, Works of Art in Metal* Colloquium/Workshop, May 10, 1993, The Metropolitan Museum of Art. New York.

GORDUS, Adon A. & Izumi, SHIMADA. 1995. Neutron Activation Analysis of Microgram Samples from 365 Gold Objects from a Sicán Burial Site in Peru. *Materials Issues in Art and Archaeology IV*, 127-142, Pamela V. Vandiver, James R. Drusik, José Luis Galvan Madrid, Ian C. Freestone & George Segen Wheeler (eds). Materials Research Society Symposium Proceedings, vol. 352 (Pittsburgh: Materials Research Society).

HOWE, Ellen G., Deborah SCHORSCH, Mark T. WYPYSKI, Samantha ALDERSON, Sarah NUNBERG & Leesa VERE-STEVENSON. 1993. Technical Overview of Loma Negra Metalwork. Paper presented at *Andean Royal Tombs, Works of Art in Metal* Colloquium/Workshop, May 10, 1993, The Metropolitan Museum of Art. New York.

JONES, Julie. 1979. Mochica Works of Art in Metal: A Review. *Pre-Columbian Metallurgy of South America*, 53-104, Elizabeth P. Benson, (ed). Washington, D.C.: Dumbarton Oaks, Trustees of Harvard University.

JONES, Julie. 1992. Loma Negra—A Peruvian Lord's Tomb, exhibition pamphlet, Oct. 13, 1992 - July 4, 1993, The Metropolitan Museum of Art. New York: The Metropolitan Museum of Art.

JONES, Julie. 1993. Welcome, and More on Loma Negra. Paper presented at *Andean Royal Tombs, Works of Art in Metal* Colloquium/Workshop, May 10, 1993. The Metropolitan Museum of Art. New York.

LAPINER, Alan. 1976. *Pre-Columbian Art of South America*. New York: Harry N. Abrams, Inc.

LECHTMAN, Heather N. 1973. Ancient Methods of Gilding Silver: Examples from the Old and New Worlds. *Science and Archaeology*, 2-30, Robert H. Brill (ed.). Cambridge: MIT Press.

LECHTMAN, Heather N. 1979. A Precolumbian Technique for Electrochemical Replacement Plating of Gold and Silver on Objects of Copper. *Journal of Metals* 31, 154-160.

LECHTMAN, Heather N. 1984a. Andean Value Systems and the Development of Prehistoric Metallurgy. *Technology and Culture* 25, 1-36.

LECHTMAN, Heather N. 1984b. Pre-Columbian Surface Metallurgy. *Scientific American* 250, 56-63.

LECHTMAN, Heather N. 1988. Traditions and Style in Central Andean Metalworking. *The Beginning of the Use of Metals and Alloys*, 344-378. Robert Maddin, (ed.). Cambridge: MIT Press.

LECHTMAN, Heather N. 1993. Additional Perspectives on Moche Metallurgy. Paper presented at *Andean Royal Tombs, Works of Art in Metal Colloquium/Workshop*, May 10, 1993, The Metropolitan Museum of Art. New York.

LECHTMAN, Heather N., Antonieta ERLIJ & Edward J. BARRY, Jr. 1982. New Perspectives on Moche Metallurgy: Techniques of Gilding Copper at Loma Negra, Northern Peru. *American Antiquity* 47, 3-30.

LECHTMAN, Heather N., Lee A. PARSONS & William J. YOUNG. 1975. Seven Matched Hollow Gold Jaguars from Peru's Early Horizon. *Studies in Pre-Columbian Art and Archaeology* 16, 5-46.

SCHAFFER, Anne-Louise. 1985. Impressions in Metal: Reconstructing Burial Context at Loma Negra, Peru. *Recent Studies in Andean Prehistory and Protohistory*, 95-119. D. Peter Kvietok & Daniel H. Sandweiss, (eds). Ithaca: Cornell Latin America Studies Program.

SCHORSCH, Deborah. 1993. Manufacturing Methods of Composite Gold and Silver Objects from Loma Negra. Paper presented at *Andean Royal Tombs, Works of Art in Metal Colloquium/Workshop*, May 10, 1993, The Metropolitan Museum of Art. New York.

SCHORSCH, Deborah. 1998. The Manufacturing Methods of Composite Gold and Silver Objects from Loma Negra, Peru. *Metropolitan Museum Journal* 33, 109-136.

SCHORSCH, Deborah, Ellen G. HOWE, Mark T. WYPYSKI & Samantha ALDERSON. Moche Metalwork from Loma Negra: Materials, Fabrication and Surface Treatment, forthcoming.

SCOTT, David A. 1983. Depletion Gilding and Surface Treatment of Gold Alloys from the Nariño Region of Ancient Columbia, *Journal of the Historical Metallurgy Society*, 17, 2, 99-116.

STRONG, William D. & Clifford EVANS, Jr. 1952. *Cultural Stratigraphy in the Virú Valley, Northern Peru*, Columbia Studies in Archaeology and Ethnology, vol. IV. New York: Columbia University Press.

TUSHINGHAM, A.D., Ursula M. FRANKLIN & Christopher TOOGOOD. 1979. *Studies in Ancient Peruvian Metalworking History, Technology and Art* Monograph 3. Toronto: Royal Ontario Museum.