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INTRODUCTION

ARTIFICIAL FORMS evolve through different kinds of material and not exclusively through one. This fact is evident if we remember how often an artifact reproduces in a given substance the form proper to another substance. Examples from classical archaeology are abundant: it suffices to mention here the wood ceiling architecture copied in stone in Etruria, Greece, and India.

But these reproductions are real "form borrowings," since the changes run in both senses: the material which borrowed a form will give it back to that which lent it, with modifications conditioned by its own quality (the quality of the borrower's material). We have the clearest illustration of this phenomenon in the celts and club heads from ancient Peru.[1] In these objects, the original form in stone was taken by the bronze, the malleability and tenacity of the metal refining that form. Then stone workers imitated the innovations in spite of the fact that they were not suitable to the nature of stone. These modifications took place purposely and also unconsciously.

Such give-and-take brings about the evolution of a style incorporating in its changes technical impositions of distinct materials. This evolution may be represented by a sinusoid which traces the relationship between the stone, the metal, the wood, the textiles, etc.

Thinking of style more as a stamp of an epoch or a people than as functional changes in the forms, scholars have always admitted that a style manifests itself in all the materials made use of by the different arts.

When one defines functional forms[2] as a consequence of the aims, the material, and the media utilized in order to adapt that material to the aims, it is easy to understand how such forms, in changing the material in cross evolution, become emasculate and inadequate until they cease to be functional. To ascertain with what modifications the forms are inherited from generation to generation, and with what modifications they are diffused from region to region is the principal task of archaeology.

Classical as well as American archaeology will benefit greatly if, in its study, we always keep in mind that the form of architecture and that of the specimens preserved in the museums bear influences from objects which owing to the nature of their material have not survived until our time, or have survived only in a small and incomplete quantity.

The unavoidable assumption of repeated and varied technomorphic[3] influences in a style is bound to help us greatly, especially in Peru. There the stone ruins of

[1] J. C. Muelle, Algunos Ejemplos de Prestaciones en el Antiguo Perú. Paper presented to the 1939 Congress of Americanists, Session in Lima.

[2] After the days of Louis Sullivan, we hear in modern art, especially in architectural terminology, the phrase: functional forms. But it was Gottfried Semper (Der Stil in den technishen und tektonischen Künsten, Frankfurt a. M., 1860) who gave the definition of "technique product": "*. . . erstens das Werk als Resultat des materiellen Dienstes oder Gebrauches, der bezweckt wird, sei dieser nun thatsächlich oder nur supponirt und in höherer, symbolisher Auffassung genommen;—zweitens das Werk als Resultat des Stoffes, der bei der Production benutzt wird, sowie der Werkzeuge und Proceduren, die dabei in Anwendung kommen*" (1:8).

[3] Walter Lehman (The Art of Old Peru [London, 1924]) distinguishes a "technomorphic style" from a "technogenic style."

the Sierra are so impressive that we tend to ignore the mud architecture of the Coast, of which only vestiges remain; here the enormous quantity of magnificent ceramic art stored in public and private collections impresses us to the point of making us forget that other arts existed at the same time.

The functional analysis of the Peruvian styles constitutes the key for interlinking them. Very different in their formal aspect, the styles are tied by their determinants in technique since many of these differences or changes of form were caused by changes of material. If we are capable of separating their distinct elements, we can explain the form through the material employed, or describe the original material by an examination of the form. We shall see that in the earliest stages—Early Tiahuanaco (Bennett), Proto-Chimú and Proto-Nazca (Uhle), Proto-Lima (strain "C," Gayton), Atacama, Paracas—there is, underlying each, a characteristic unsuitably named "geometric" that cannot have been engendered except by the technique of basketry. We shall also observe that a typical ichthyomorphic motif of Proto-Nazca decoration, the *Orca gladiator*,[4] common to Proto-Chimú ceramics, in passing from a pictorial treatment on surfaces to that of three-dimensional sculpture is transformed into the anthropomorphic monster found as frequently in the black pottery as in the bichrome ware.[5] We shall dicsover, furthermore, that this same fish motif of Nazca is represented in Chavín (stone of Yauya,[6] and obelisk of San Marcos University[7]), with the modifications imposed by the new substance, in the same way as the stela Raimondi and the *"lanzón"*[8] represent this deity after his anthropomorphization, with the skew alterations which the shape and quality of the material impressed upon him. The lavish and baroque style of other stones of Chavín is caused by the treatment of stencils which repeat and reverse the motifs. Similarly the style of the stones of Tiahuanaco acquired its rectangularity through the technique of tapestry; the textile technique likewise distorted the principal motifs brought from the Early Nazca (the predaceous bird[9]), or from the Early Chimú (feline with a halter,[10] and the running man with wings[11]). It will be evident, too, that the clay goblets of Tiahuanaco, frequently having a characteristic round molding at the waist, are utensils originated in wood, having a cord which encircled the goblet in order to prevent or repair cracks and splits.

It is worth the trouble, then, to examine most carefully the functional factors in each local and cultural process of a style. In the following paragraphs, it is my intention to study the ceramics of the Chimú region.

[4] Eugenio Yacoleff, La Deidad Primitiva de los Nasca, Revista del Museo Nacional (Lima, 1932), vol. 1, no. 2.

[5] Cf.: A. Baessler, Ancient Peruvian Art (Berlin, 1902–1903), vol. 3, pl. 102; A. L. Kroeber, The Uhle Pottery Collections from Moche, Univ. of Calif. Publ. in Amer. Arch. and Ethn. (Berkeley, 1925), vol. 21, pl. 56, *h*; Luis E. Valcárcel, El Personaje Mítico de Pukara, Rev. del Mus. Nac. (Lima, 1932), vol. 1, no. 1.

[6] Julio C. Tello, Wira-Kocha, *in* Revista Inca, (Lima, 1923), no. 2, pl. 2.

[7] *Ibid.*, fig. 72 and pl. 1.

[8] *Ibid.*, pl. 3–4.

[9] Eugenio Yacoleff, Las Falcónidas en el Arte y en las Creencias de los Antiguos Peruanos, Rev. del Mus. Nac., 1:72, 73, 1932.

[10] See Gösta Montell, Dress and Ornaments in Ancient Peru (Göteborg, 1929), p. 140, fig. 68; Wendell C. Bennett, Excavations at Tiahuanaco, Am. Mus. Nat. Hist., 34:415, fig. 15*c*. The monster with ax, in both figures, is the same devil, originated in Early Chimú: the technique of tapestry has not yet distorted his lines, and the brush treatment is still conserved.

[11] A transition between the Early Chimú cat and the same motif, but decadent, from Tiahuanaco is the Pucara (Puno) feline; observe the halter in the clay trumpet on pl. 71, *b* from the Muestrario de Arte Peruano Pre-Colombino, by J. C. Muelle and Camillo Blas (Rev. del Mus. Nac. vol. 7, no. 2, 1938). The running man with wings has good representatives in Gösta Montell, *op. cit.*, p. 105, or in Baessler, *op. cit.*, 1: pl. 46.

I

One typical form frequent among the black ware of the latest periods in the North Coast of prehistoric Peru is a more or less globular receptacle, with two conical spouts joined by a bridge handle and placed divergently in the upper part. In like form and position we find such spouts among the polychrome ceramics of the Tiahuanacoid period, along the Central Coast as far south as the Nazca area. The geographical continuity between this site of the oldest related form and the point where the most recent type abounds can make us, and has made us, think hastily and erroneously. In short, it is the current idea that this type of vessel extended gradually northward, the conical polychrome spouts of the departments of Ica and Lima being transitional between the black ware of the northern zone and the type of Early Nazca A (Kroeber). Nevertheless, in Nazca the two spouts—although united by a bridge which is flat as in the majority of the other cases—are cylindrical and parallel. How and why were they transformed into the conical form, and how and why did they acquire the divergent position of the Tiahuanacoid period? Between these two types the change is sharp; in the findings up to the present time, there is no reason to suspect that we shall discover intermediate forms among the ceramics of the south-central coastal region. The answer to the foregoing questions can help us answer the where and the when.

The globular receptacle with two spouts of the Nazca A substyle has an ovoid form, a natural result of its manufacture. Modeled skillfully by rotating it between the hands, the semispherical form of its base—an easy consequence of these movements—was kept because the final aim was to place the object on soft sand, which rendered flattening for stability unnecessary. The process began with a concave disk of clay, the edges of which rose little by little during the manipulation. The final steps in forming the interior wall of the vase were as follows: four fingers of one hand were inserted into the vase while the palm of the other hand reduced the thickness on the exterior walls; one by one the fingers were withdrawn and the upper part of the wall closed. By this method the fingers modeled on the interior wall a depression, not visible on the exterior wall but seen when one of the vessels is broken. This method resulted in an egg-shaped vessel which was placed on the floor while the clay was still fresh in order to produce a slightly flat base (fig. 1, *a*). Then, in the upper part a pointed instrument was used to produce two perforations into which were partially inserted the tubular spouts. The flat bridge, slightly arched to prevent sagging, served as a mutual reinforcement. The narrowness of the spout is explained by the desire to avoid excessive evaporation of the contents in hot climates and to prevent the penetration of dust and sand. Obviously two spouts are indispensable in order that air may enter through one to replace the liquid poured through the other.

This Nazca type is, as we see, a perfect example of functional form. Even its decoration is functional since it covers only the upper two thirds, being designed to be viewed from above when the receptacle rested on the floor (fig. 1, *a*).

In Moche we likewise have forms functional for ceramics: a long cylindrical neck on the globular bottle;[12] the flat base, intended to be placed on a hard surface, such as a floor of compact earth, or, better, niches in the walls; and, to a certain degree, the stirrup handle.

In the case of the cylindrical neck the diameter is sufficiently widened to avoid conflicts of air and liquid, and its length permits the hand to grasp it. However, a problem arose: the neck might be broken or separated at its point of insertion,

[12] Kroeber, *op. cit.*, pl. 57, *a–c*.

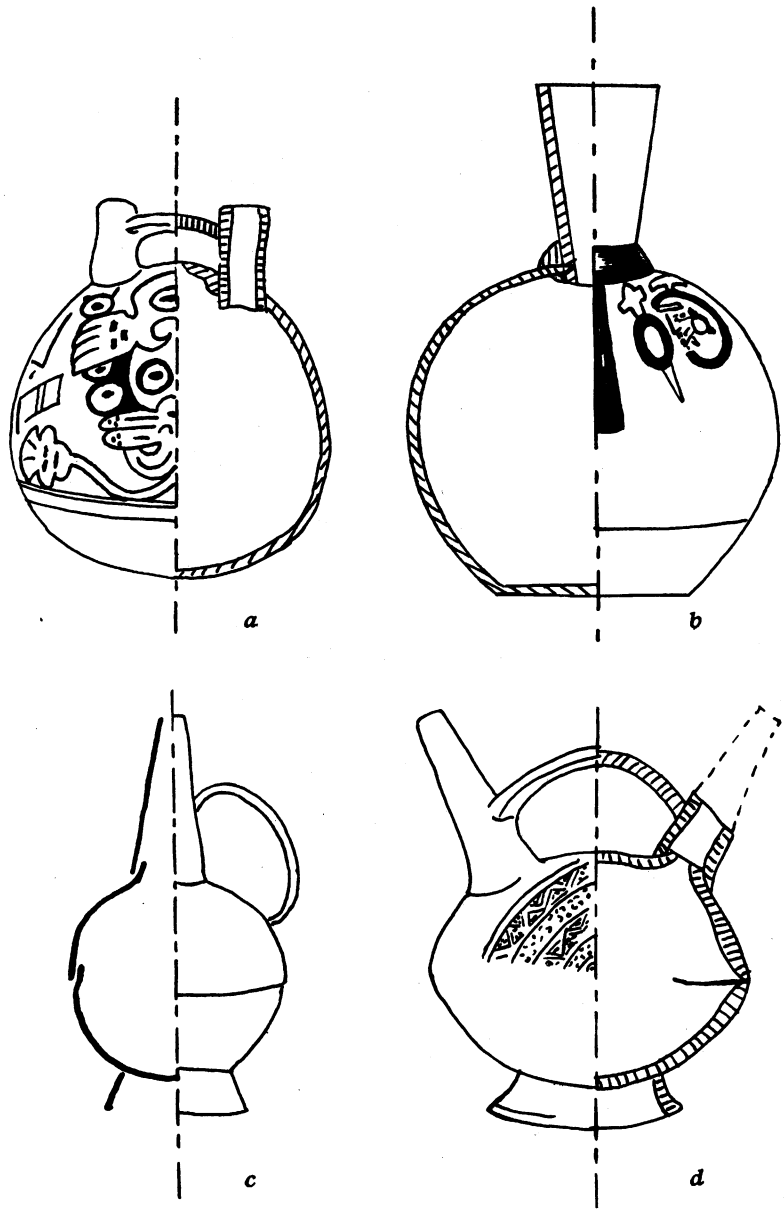

Fig. 1. Vessels. *a*, globular receptacle with two conical spouts joined by a bridge handle; Nazca A style. *b*, globular bottle with long cylindrical neck, around the juncture of which is painted vestige of cord of maguey fibers; Proto-Chimú style. *c*, globular bottle with conical spout and ring at base; from Lambayeque. (Specimen 6346 in University of Michigan Museum of Anthropology.) *d*, huaco (funerary vessel) with two divergent and conical spouts, ribbon bridge, and ring pedestal; Northern style. (Specimen 6341 in University of Michigan Museum of Anthropology.)

which was a weak spot. It was thus necessary to reinforce this juncture, and the artisan found inspiration in the small cord of maguey fibers with which it was the custom in this region to hang and hold bottles. He modeled in the fresh clay a ring which imitated the form of this small cord but in addition strengthened the union of the spout and the receptacle. We can see in many examples the loose end of this "cord" modeled on the body of the bottle;[13] in others it began disappearing because of its uselessness, and remains only as a painted vestige (fig. 1, *b*).

Mr. Eduardo Muelle, of Lima, has a few silver miniatures from Lambayeque. Among them is a bottle (fig. 1, *c*) which can illustrate the technique employed in making the same form in larger sizes. The globular body of this small bottle has been formed by the welding of two half spheres of laminated silver leaving slightly visible the union in the equator of the receptacle. In the center of one of the half spheres a hole was pierced, its edges raised to the exterior surface and a ring formed on which the spout was placed. A ribbon, likewise of silver, extends from the sphere to the middle of the spout to form a curved handle. For the purpose of giving stability to the bottle, a ring, slightly trunco-conical, was welded at the base. The spout, with a longitudinal welding, is frankly conical: 45 mm. long, 9 mm. in diameter at its opening, and 14 mm. at its point of insertion. Other measurements, also in millimeters, are: diameter of the receptacle, 50; diameter of the base, 31; width of the handle, 10; thickness of the material, 0.4.

As we have seen, the form of the bottle is a function of the material and technique employed, although it bears traces of the ceramic examined earlier. In both cases the form has but one spout and a globular body with a flat base. The problem of making a globe of only one piece of silver is an exceedingly difficult task even for the resources of a modern silversmith. The ancient artisan had to solve the difficulty by welding two half spheres. The problem of the flat base was resolved in silver by adding on the exterior a ring whose tendency toward a conical widening can be explained by the desire to give more area for the support of the object.

As regards the base of the spout in bottles of this same type but of utilitarian size, the metal worker met an obstacle analogous to the ceramist's and one that could not be solved in the same manner, that is to say, by a circular relief reinforcing the junction. Accordingly he chose to augment the circumference, but it was still necessary to keep the mouth small, with the result to be expected in a rolled sheet, that a cone was produced.

This form, proper for sheet metal, was copied in ceramics, where we find it abundantly in the style of the North, principally in the black ware although it is common to the "Cursive" and the "Three-color Geometric" varieties.[14] Likewise this form is frequent in Nievería and in the so-called "Southern Andean style." Closely linked to it in place, time, and characteristics, is the receptacle with two conical divergent spouts, a style which also abounds in the black ware.

A favorite body for the divergent spouts is the horizontal-lenticular shape provided with a conical pedestal.[15] Of course, such a vessel was not improvised, and one preliminary stage of its evolution is the spherical body with a similar foot. Let us consider two examples from the present collection in the University of Michigan, Museum of Anthropology (Ann Arbor).[16]

[13] For instance, Kroeber, *op. cit.*, pl. 59, *k*.

[14] On these styles see A. L. Kroeber, Archaeological Explorations in Peru, Field Museum of Natural History, Anthropology Memoirs, 1926, 1930.

[15] Kroeber, Arch. Explor. . . . , 1926, pl. 8, fig. 3; or Muelle and Blas, *op. cit.*, pl. 58, *a*.

[16] Dr. Frederick R. Matson wrote about these specimens in a letter: "I believe that the dark color of the paste is not caused by the addition of some coloring substance but is due to the very slight firing that the pieces received. . . . All raw clays contain organic materials because of decay-

Specimen 6341 is a gray-black huaco (funerary vessel) polished but without luster (total height of the receptacle and pedestal, 13 cm.; length of the spouts, 9 cm.), with two divergent and conical spouts, ribbon bridge, and ring pedestal with scotia profile (fig. 1, *d*); the huaco has been made by shaping in a mold two calottes which were united to form a somewhat flattened spheroid; the junction has not been well attained, the smooth rhythm of the outside curve being broken at the equator. To fasten the pedestal offered no great inconvenience because the entire operation was performed on the exterior. The problem of joining the spouts to the body of the bottle was solved by raising the borders of the holes pierced in the calotte, thus permitting them to be plugged into the tubes, a feature made visible in this specimen by a break. It is important to point out that this method of fastening tubes is a technique of the tinsmith, coinciding exactly with the technique employed in the little silver bottle of figure 1, *c*; to fasten a ring on the bottom in order to obtain stability is likewise a sheet-metal worker's device. But more important is the point that the method of constructing the globular body of a vessel is no longer a technique appropriate to ceramics—as was the case of the Nazca A receptacles or that of the Proto-Chimú bottle with only one cylindrical neck, described earlier.

The other piece of pottery, specimen 6346, is also black, provenience Pacasmayo, and differs from the former specimen in that the ring which makes the pedestal is higher and has a *cyma reversa* or "heel" profile (the height of the receptacle, pedestal included, is 12 cm.); the spouts (10.5 cm. long) are more divergent, and the body is now frankly horizontal-lenticular. The modeling techniques are the same.

The imitation of the metal forms in the black ceramic ware is a phenomenon which—although it seems a heresy to say so—is "universal." The bucchero Proto-Etruscan (*ca.* 700–500 B.C.), as we know, reproduces forms of bronze; the Greeks (Campania School) continued imitating metal vases in black ceramics during the third century B.C.; and in the Colonial period of Peru (sixteenth century), in the pottery called "Transitional" (native work but Spanish forms), the black ware copied the Mudejar metal vessels. In this last, one should note that the metal technique influenced ceramics to the extent that rivets are imitated not only on the exterior but also on the interior of some earthen pitchers, as is established by examples in the Museo Nacional de Arqueología, Lima. If it takes an effort to connect the Greek ceramics with the Etruscan, we can more easily consider that just as the black specimens of the Peruvian Colonial period are copies of metal forms, so are also the black ceramics of Chimú. This is not to say that each black terracotta vessel was deliberately an imitation of metal. Once the imitating had begun, a cultural process bifurcated the repetition: on the one hand, the black color freed itself somewhat from the characteristic form of the metal, and on the other, the metallic form was painted with different colors. Furthermore, the loss of control in the "reducing atmosphere" in the firing of the pottery changed many of those pieces intended to be black to an orange color. A good example of this is a sculptured receptacle with stirrup handle (UCMA 4–2911; Uhle collection), representing a pumpkin and a bat.

We cannot assert whether the bucchero originated the copying of the metal forms,

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ing vegetal matter, earth waters, etc. When clays are fired at a low temperature, the organic compounds are reduced to carbon, which naturally gives a black appearance to the clay. One of the vessels had a slightly lighter gray surface area than the interior of the core, which was black. This would indicate that the firing had progressed sufficiently so that the carbon near the surface was beginning to burn out of the clay. It is of course probable that these vessels were fired in a reducing or at least a neutral atmosphere. The temperature to which they were fired can only be estimated without further experiments, but I do not think that the black pottery such as I examined was fired much above 500° Centigrade."

or vice versa. Very probably an accident in the baking of the earthen pots, such as bad oxygenation, especially if the vessels were covered with dung, led to the discovery of the cause of these gray spots which we see in "badly fired" pottery in all the Proto-Chimú collections. Afterward, with the reducing atmosphere produced at will, the results in black or gray suggested the copying of forms already existent in silver. That the black color was given purposely to many of these forms patterned from the metal, is proved by the ceramics of the Tiahuanacoid epoch of Nazca, in which period surely the "secret" of the bucchero was not known. Specimen 1–2206 of the Museo Nacional de Arqueología, in Lima, a lenticular receptacle with two divergent spouts,[17] is *painted* black—except the bridge, which is polychrome—and specimen 4–8841 of the Uhle collection in UCMA, Berkeley, a globular vessel with equatorial angle, incised ornamentation, and likewise two divergent spouts,[18] is *covered* with a blackish slip. In the Late Chimú pottery it is not difficult to find that carbon and other substances have been added to the paste, while in the earlier periods the black color appears to have been obtained exclusively by means of neutral or reducing atmosphere, the tone being accentuated with ferruginous slips, as is easily visible in the Proto-Chimú pots of defective firing (for example, in UCMA specimen 4–2924).

One of the substances used to cover and give metallic luster to Late Chimú black ware is graphite; we know that this was employed in the Early Iron Age in Europe, and is used by African tribes. At least, we cannot deny that these applications were made independently in Peru and in the Old World, each culture being uninformed of what was happening beyond the sea.

Small barrel-like or, rather, pomiform spindle whorls, found among the textile implements of the central Peruvian coast, are preserved in the Museo Nacional de Arqueología, Lima. They are of crude clay and covered with a clear gray silvery pigment, which gives them a veritable appearance of metal. Examination of one of them, now in the Museum of Anthropology of the University of Michigan, by the chemistry laboratories of this university, indicated that the paint was graphite. The fact that the makers of these spindle whorls did not bake them, as they did others, proves that an effect was appreciated which they knew would disappear with the fire.

All this suggests that the Peruvian Indians had an objective: to obtain the appearance of silver for their huacos, and in an attempt to attain this end they tried out different materials. One of these was, very probably, a brownish powder, tiny flakes of a metallic glint, which are preserved in the Escomel collection of the Museo Nacional de Arqueología, Lima, under the label: "Purpurin [*sic*] used by the Incan people of Chuquibamba for painting their clay wares (*tejas*)." At Yale, the Hammond Metallurgical Laboratory (Prof. Milligan) proved by means of the spectrograph that the powder is iron. In the same Lima collection there is a piece of stone, which comes from the ruins of Itacc, "with which the aborigines painted their *objetos de juego* [?]." This piece of stone has the same micaceous appearance as the powder, the same metallic color, and it leaves a brown-red mark on the streak plate; Mr. Alan M. Bateman, of the Sheffield Scientific School, at Yale, certifies it to be specular hematite.

Among the substances employed in the preparation of pigments found at Pachacamac, there is a piece of hematite; J. Robert Wells[19] believes that the ancient Peruvians knew the property of the stone to turn into red pigment, and he is cer-

[17] Muelle and Blas, *op. cit.*, pl. 58, *a*.

[18] A. H. Gayton and A. L. Kroeber, The Uhle Pottery Collections from Nazca, Univ. of Calif. Publ. in Am. Arch. and Ethn. (Berkeley, 1925), vol. 24, pl. 19, E.

[19] J. C. Muelle and J. Robert Wells, Las Pinturas del Templo de Pachacamac, Rev. del Mus. Nac., 8:282, 1939.

tain that for their ceramics they used natural ferric oxides. What would have happened to pots whose surface was covered with that brilliant hematite, to obtain a metal appearance, upon submitting them to the action of fire? If enough oxygen reached the objects, they would acquire the brick-red color characteristic of many Peruvian vessels, including the Proto-Chimú ones; if the combustion of the iron was incomplete, the color attained would be the black of many Chimú huacos, both Early and Late. In the black-top pottery of predynastic Egypt (3400 B.C.), bucchero was discovered in that manner; as the vases, faced with red hematite, were baked mouth downward on the ashes, the enclosed air became rarefied, and the interior surfaces of the walls took on the color of the black oxide of iron thus produced.

It is not impossible that the use of mica as a temper was an indirect consequence of the search for clays having a metallic brilliance: even today, the native Peruvian potters utilize, and know under the name *manca-mitu* (earth for pots), a sand rich in biotite.

The preceding observations should cause us to examine carefully the appearance of the black ware found in America in such scattered localities.[20]

Having connected the bucchero with the forms appropriate to metal, we now see why the spouts were placed divergently in the pottery of the Middle period, just as we have already explained the tendency of the spouts to be cone-shaped: This divergence is nothing but the functional result of the use of laminated metal. When only one conical spout is used, soldering it vertically is not a complicated process, but in order to collocate two spouts, parallel above the spherical body of the receptacle, we can only preserve their vertical position by employing a special cut at the base of the cones. This problem—the expansion of one section of a cone as the result of a given curved oblique plane from the axis of the cone—is difficult to solve without the help of descriptive geometry. Since there existed for the Indians no obligation to maintain the parallelism of the cones, they chose an easier and more natural solution: that of placing the spouts as radii-prolongations to the sphere. When the metal objects were copied in ceramics, the potter appropriated this particular feature, which developed into a "mode" once the first impact was made upon the taste of the artisan; so, afterward, even on horizontal surfaces the divergence was maintained.

The *champlevé* designs which we frequently see on black ware, especially in the pedestals[21] of the huacos with conical spouts, are reproductions of pierced work in metal. The reliefs—eyes, nose, etc.—on many Late Chimú vases show a repoussé treatment, illustrated in plate 6, in which *a–c* are metal, whereas *d* and *e* are imitations in black terra cotta (Museo Nacional de Arqueología, Lima). The narrow-mouthed pitcher with a horizontal barrel-shaped body, in the Ica-Chincha style, is also a copy of a metal form. One special shape[22] of the same style, the cylindroid bowl with the concave profile or with walls inclined inward, is, likewise, a borrowing from metal. This last form is particularly interesting and deserves more detailed observation; not only is the treatment of the border revealing, but also that of the angle formed by the intersection of the container's sides with its base where a series of decorative protuberances appear. Two silver objects of the Uhle collection in UCMA, Berkeley (specimens 4–5269 and 4–5216 from Ica), illustrate the underlying reason for the knobs. Baessler[23] pictures one of these bowls, as well as a silver vase with five rows of the same decorative details. Once the concavity was obtained

[20] See map in S. Linné, The Technique of South American Ceramics (Göteborg, 1925).
[21] Muelle and Blas, *op. cit.*, pl. 58.
[22] Muelle and Blas, *op. cit.*, pl. 48, *b*.
[23] A. Baessler, Altperuanische Metallgeräte (Berlin, 1906), pls. 19, 22, figs. 317, 336.

in the sheet of silver by the blows of the silversmith, the desired flattening of the base necessitated the repoussé work in order to shape the angle at the base of the container. This work could not have been done with the chisel, which cuts the metal, hence a blunt punch was used. On the interior the blows of the punch left concave dots which appeared as bas-relief on the exterior. The silversmith took advantage of the regular disposition of the reliefs in order to produce a decorative effect, and the potter copied it.

The labiate border, which is apt to be present in such vessels as we have just described and in others, has its origin in the necessity of avoiding a dangerous sharp edge on the metal. Carried over into pottery, the labiate border ceases to be functional. In order that we may detach the decorative motifs from the background, it is interesting to note the relationship of border to the material, as well as important to establish the fact that the thick rim, or lip, often occurring in curious examples of coastal pottery (that known as "from Chavín," and the fragments found in Ancón and Supe), is associated with both the color black and the typical treatment of metal, such as carving, imitation of embossing, crosshatchings, punctations, and scratches. We can even notice the rocking stamp,[24] which is definitely a technique of *pointe-sèche* engraving. In the Larco Hoyle collection at Chiclín, a fragment of silver, the upper part of a bottle, is the prototype of the thick flanged spout of the "Chavín" one-spout vessels.

In close relationship with the thick labiate necks, we find a very special pear-shaped receptacle of the already cited "Chavín" style. This form is precisely the one entirely appropriate for silver. The ability most esteemed by the skillful silversmith is the successful manufacture of an object from a single piece of metal. We are here confronted with an objective: the bottle; and we are also provided with the means of attaining it: the malleability of the metal. In order to form the receptacle we have to begin by striking the sheet of silver with an appropriate mallet until there is produced a concavity which will be the bottom of the utensil. Afterward, we continue crimping the rim in order to construct the walls, and if we raise them vertically, we shall obtain either a cup or vase; while if we keep on contracting the opening, we shall approach the form of the olla. If we have provided sufficient metal, we can lengthen the borders of the opening with the intention of transforming them into the neck of a carafe; this neck could be neither very long nor extremely narrow. The logical form then will be that of a pear, because it is unnecessary to compress the neck to the point of initiating the vertical line of a cylinder. That line of the pear-shaped "flower vase" is, we see, functional in silverwork, much more so than the form of a sphere (a container) penetrated by a cylinder (neck), in which the angle marking the intersection of the sphere and cylinder would require welding or laborious work in beating.

The heavy stirrup spout of the "Chavín" style is another feature of metalcraft. The mouth being so large, a tubular arch was not needed to avoid the conflict of fluids. The original stirrup spout is the narrow one, typical of the Early Chimú pottery, which performs equally well the same function as the two spouts characteristic of the Nazca ware. The stirrup spout was copied by the metalworker and returned to pottery with consequent modifications.[25] Specimens in gold, coming from Huarmey (El Maltino) and preserved in the American Museum of Natural History,[26] can enlighten us about the procedures of the metalworker, and it is sufficient to say here that one of the reasons for enlarging the tube was the labor attend-

[24] Tello, Antiguo Perú (Lima, 1929), fig. 70.
[25] *Ibid.*, figs. 60–67.
[26] Wendell C. Bennett, Peruvian Gold, Natural History, p. 22 (New York, Jan.–Feb., 1932).

ant upon the reliefs with which the ridge of the arch used to be decorated. Silver huacos are very important because they represent the evolutionary step when metal imitated the Proto-Chimú pottery; many are preserved in the John Wise collection in New York.[27]

[27] Catalog of the Exhibits of Ancient Peruvian Art, in the Wadsworth Atheneum, Hartford, Conn., March 3, 1937.

II

Before discussing a Middle Chimú style it is necessary to separate the Middle Chimú period from a Middle Chimú style.

We can designate as "Middle" the period during which the Tiahuanacoid styles developed. Middle Chimú style would be, according to Kroeber,[28] who postulated its existence, "a ware . . . isolable, which in the main combined or averaged traits of Proto-Chimú with traits of Late Chimú." Professor Kroeber, with great reason, felt that in spite of the many points of relationship between the two styles, the link which logically connected them was wanting. Among the solutions offered, neither those which endeavor to enclose the Middle Chimú style within a subperiod, nor those which limit the style to a subarea, are satisfying. On the other hand, we despair of finding pottery which may bridge the gap.

Since this paper is not an exhaustive study of the matter, let us review only some of the predominant characteristics of Late Chimú pottery as related to that of Early Chimú, adhering to the observations of Kroeber:

Late	*Early*
a. Black ware	Bichrome
b. Decoration incised or in relief	Pictorial
c. Surfaces with decorative bosses ("goose-flesh")	No bosses
d. Circular panel of pressed design	Pressed ware but no emphasis on panels
e. Body lenticular or markedly flattened	Spherical
f. Body polyhedric	Spherical
g. Figures conventional	More realistic
h. Modeling coarse, torpid	Very fictile
i. Arms affixed to the body or "hands held across the stomach"	Arms and legs separated from the body.
j. Treatment of the ears stylized	Naturalistic earplug or disk hung from the ear lobe
k. Stirrup ornamented in relief	Simple
l. Stirrup "tends to be heavier and grosser"	Slender
m. Arch "rectangular in cross section"	Circular cross section
n. Arch in coronal collocation	Sagittal
o. Small monkey on the stirrup	No monkey at all

The transformation of some of the characteristics *can* be explained through the technology of metal:

a, b. We have examined the links showing the relationship between the Peruvian bucchero and the products of the silversmiths. The painted pots and, for reasons already expressed, the pictorial tendency of the decoration, are more suitable to the technique of ceramics. Incised decoration is functional in metal. Perhaps, however, it can be argued that not having a medium for decorating the black ware with pigments the artists were forced to resort to incised decoration: in reality, this is the very reason why the ornamentation of metal is either in relief, pierced, or engraved design.

c. The nubby backgrounds have been obtained in the Chimú vessels by means of a mold, and, of course, it is easy to make small holes in the negative, but it is not less certain that it is equally easy to obtain them by denting a metal sheet in the manner of repoussé work.

d. e. These are related points. We have said that to make a hollow sphere of silver or other malleable metal in one single piece is highly difficult, unless an opening is left sufficiently large to permit the introduction of the tools needed in pounding,

[28] Kroeber, Moche, p. 215.

distending, or constricting the walls of the object: hence it was necessary to have recourse to two half spheres. When, through the suggestion of metalwork, the idea of a two-piece mold for pottery was conceived—possibly, even the repoussé metal was used as a mold—the difficulty of obtaining two perfectly geometrical hemispheres increased in making the negatives. If one of the results was the flattening of the sphere, the other was the impossibility of dividing a single decorative motif between the two halves of the mold. The duplication and confinement of the design to the panels—one for each part of the mold—were, then, imperative. The taste for "enclosed composition" had in this its principal stimulus.

f. The polyhedrical form is one result of rigid materials: principally wood, or metal; but never clay.

g, h, i. Clay is an excellent plastic material, permitting soft and very realistic modeling; to dominate metal and impose upon it an analogous "quality" is to work under conditions different in many respects. The difference of material did not constitute the only cause of the coarse treatment in the sculptures, but it is certainly the principal one, because evidently the same results cannot be exacted from both clay and metal. Separating the extremities of man and animals from the body conduced to the same result: this was easy in clay, but the metalworker had to content himself with suggesting the arms and legs on the trunk and to maintain the "mass" in order to avoid multiple pieces and weldings.

j. As for the treatment of the ears, which frequently have the outline of the digit 3, it is important to compare the stones from Chavín, the gold objects of Chongoyape,[29] and certain black huacos of the North Coast. The stone objects, like the black ceramic pieces, show a typical pattern, the consequence of repeated efforts to obtain in bas-relief on metal a human ear with the disk which adorned it. The naturalistic treatment of the bichrome sculptured vessels could not be transferred to metal without undergoing simplification and conventionalization: the external ear became a spiral line, and the circle which represented the earring was assimilated by "reflection" or symmetry. In the black huacos, one can note how the ears had been welded on the metal.

k, l, m, n. Why the arc of the stirrup became clumsy has been explained through the "necessity" of decorating its back, but we shall add here the reason for the failure of the practice being widespread. In the beginning the stirrup spout was a utilitarian form, a handle which had to be tolerated but which had no part in the "composition." It was placed, therefore, in the least conspicuous position, in the posterior part of the huaco, especially if this was a total effigy or partial effigy jar. The habit of seeing the arch in foreshortening determined what ought to be the front even in non-effigy receptacles.[30] But when it was necessary to represent a head in metal, the face had to be formed in one of the calottes as if it were a mask, so that the welding would remain concealed behind the ears, and would not be visible along the nose, let us say. To place the arch sagittally, that is, from front to back, would require two holes—one in each hemisphere—but to place the arch coronally, as a diadem, it sufficed to trim away a little of the borders of the calottes before welding them: for economy of effort this last method came to be preferred. Then interest slipped from the convex top to the sides of the stirrup,[31] where decoration in relief was easier, and the exaggerated enlargement of the stirrup was avoided, while, at the same time, the cross section became rectangular when the arched tube was worked in repoussé with two longitudinal halves exactly alike.

[29] S. K. Lothrop, Gold Ornaments of Chavin Style from Chongoyape, Peru, American Antiquity, vol. 6, no. 3, 1941.

[30] *Ibid.*, pl. 19, *c.*

[31] Kroeber, Arch. Explor. . . . , 1926, pl. 7, fig. 6.

o. The monkey appears modeled in the round on the Proto-Chimú pottery, not as a functional and constant element but only as a decorative theme (UCMA specimens 4–2717, 4–2716). Cast in metal, the monkey was used as a brace appropriate for reinforcing the junction of the spout with the arched tubular handle. The predominance of the use of only one monkey on the stirrup indicates that this element originated when the sagittal arch was more in use, because the law of symmetry would oblige the use of two over a coronal arch.

As final proof that forms in the Late Chimú bucchero are copies of metal objects, two specimens in the Museo Nacional de Arqueología, Lima (2–4656, a piece of black pottery, and 13–1975, a rare silver utensil whose exact provenience is not known although it is evidently from the North), are illustrated in plate 7, *a, b*. The metal object here cannot be a copy of one in clay. Not only the polyhedric form of the container but also the form of the shrimp [crayfish?] represented on it is very natural in welded sheets of metal: the crest of the cephalothorax and the feet reveal important details. In clay the feet could have been modeled more naturalistically, one by one, each separate and distinct, as is usual in similar Proto-Chimú huacos.[32] If they were placed in three groups at each side of the animal, it was simply because the artisan was imitating metal; to make the feet one by one would have required excessive work, whereas, in metal, they were as effectively suggested by groups of five on tiny pieces of sheet metal welded on at the sides of the crustacean.

[32] Muelle and Blas, *op. cit.*, pl. 23, *b*.

CONCLUSION

1. Metal techniques thus provide the key which was lacking to explain the transition from the Early Chimú forms to those of Late Chimú, and it is among metal objects that the Middle Chimú style is exemplified.

2. From the time of the ransom of Atahualpa until the reduction of the antiquities to ingots—a practice which today furtive excavators employ to avoid the restrictions of the law—the disappearance of the ancient objects of gold is explicable. With regard to the silver objects, their copper content together with the humidity and salinity of the archaeological deposits in the North has been bringing about their destruction. Because of these factors, science has lost the principal data of an original technomorphic style.

3. The sporadic appearance of some motives of this style carried over into other materials—clay, stone, etc.—has caused archaeologists to assume an archaic and mysterious extinct culture. But if we succeed in assembling some other objects of beaten gold, such as those made known by Tello and Lothrop, coming from Chongoyape, we shall have the genealogy of the horned demon "of Chavín," found so repeatedly in the Late and Early Chimú ceramics,[38] and one cardinal connection, in consequence, for the cultures of the Sierra and the Coast.

4. The "Chavín" style does not *necessarily* imply an Andean influence, although it may have it; it is much better to consider the "Chavín" style as influenced by the Proto-Nazca and Proto-Chimú, though a new technique spread from the north.

5. There exists, then, one link between the Middle Chimú style and the "Chavín" style; this link *can* signify a relative contemporaneity, although it does not yet provide dates to *fix* the chronological interrelation. It goes without saying that if we had as many specimens of metalwork as of pottery, it would be possible to classify them into various groups since the metal arts certainly had a long development.

[38] Among the black Chimú pottery we find total effigy vessels representing the horned demon, with the same features as that of the one embossed in the gold sheets from Chongoyape. See Lothrop's (*op. cit.*) and Tello's (Antiguo Perú) figures.

Museo Nacional de Arqueología, and
The School of Arts and Crafts,
Lima, Peru

PLATES

Late Chimú vases. *a–c*, metal, showing a repoussé treatment. *d*, *e*, imitations in black terra cotta. (Specimens from the Museo Nacional de Arqueología, Lima.)

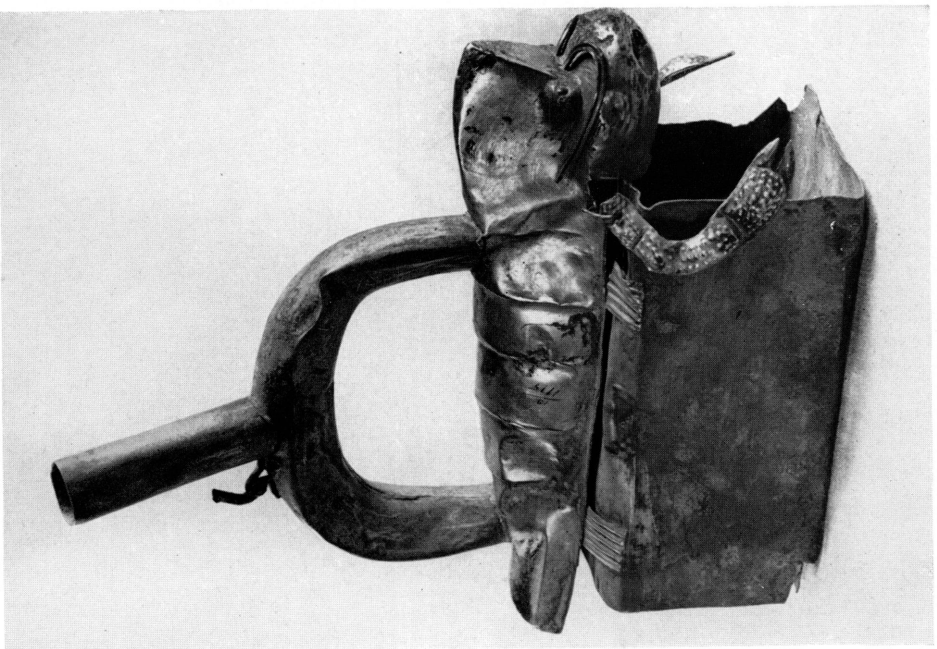
LATE CHIMÚ VASES: METAL AND BLACK TERRA COTTA

UNIV. CALIF. PUBL. AM. ARCH. AND ETHN. VOL. 39

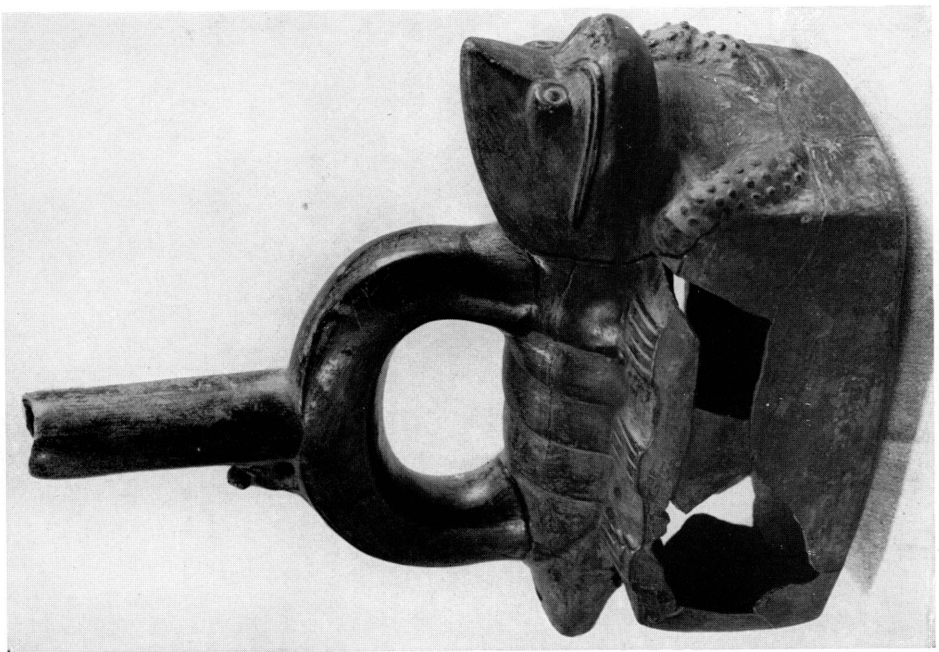
[MUELLE] PLATE 6

PLATE 7

a. Late Chimú bucchero object. *b*. Rare silver utensil, evidently from northern Peru. (Both specimens from the Museo Nacional de Arqueología, Lima; *a*, 2–4656; *b*, 13–1975.)



b



a

LATE CHIMÚ BUCCHERO OBJECT AND SIMILAR OBJECT OF SILVER