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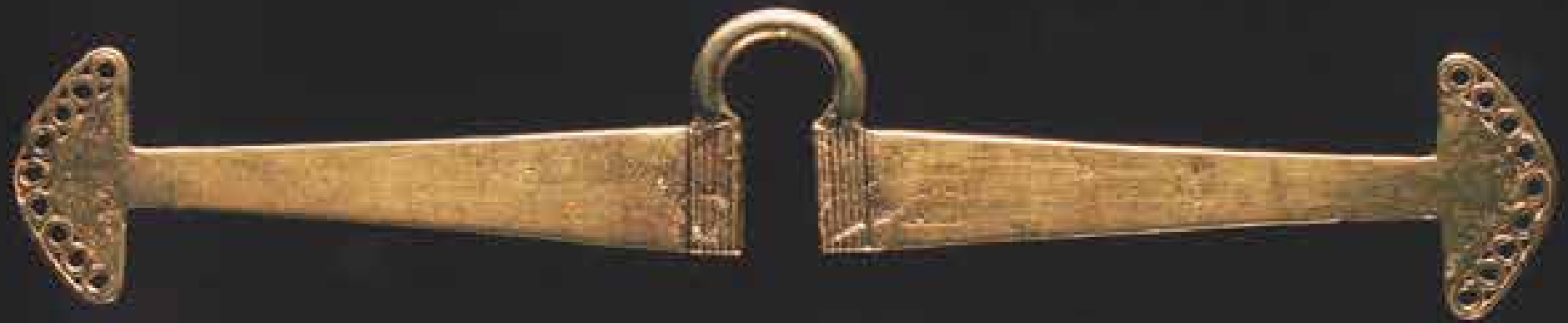
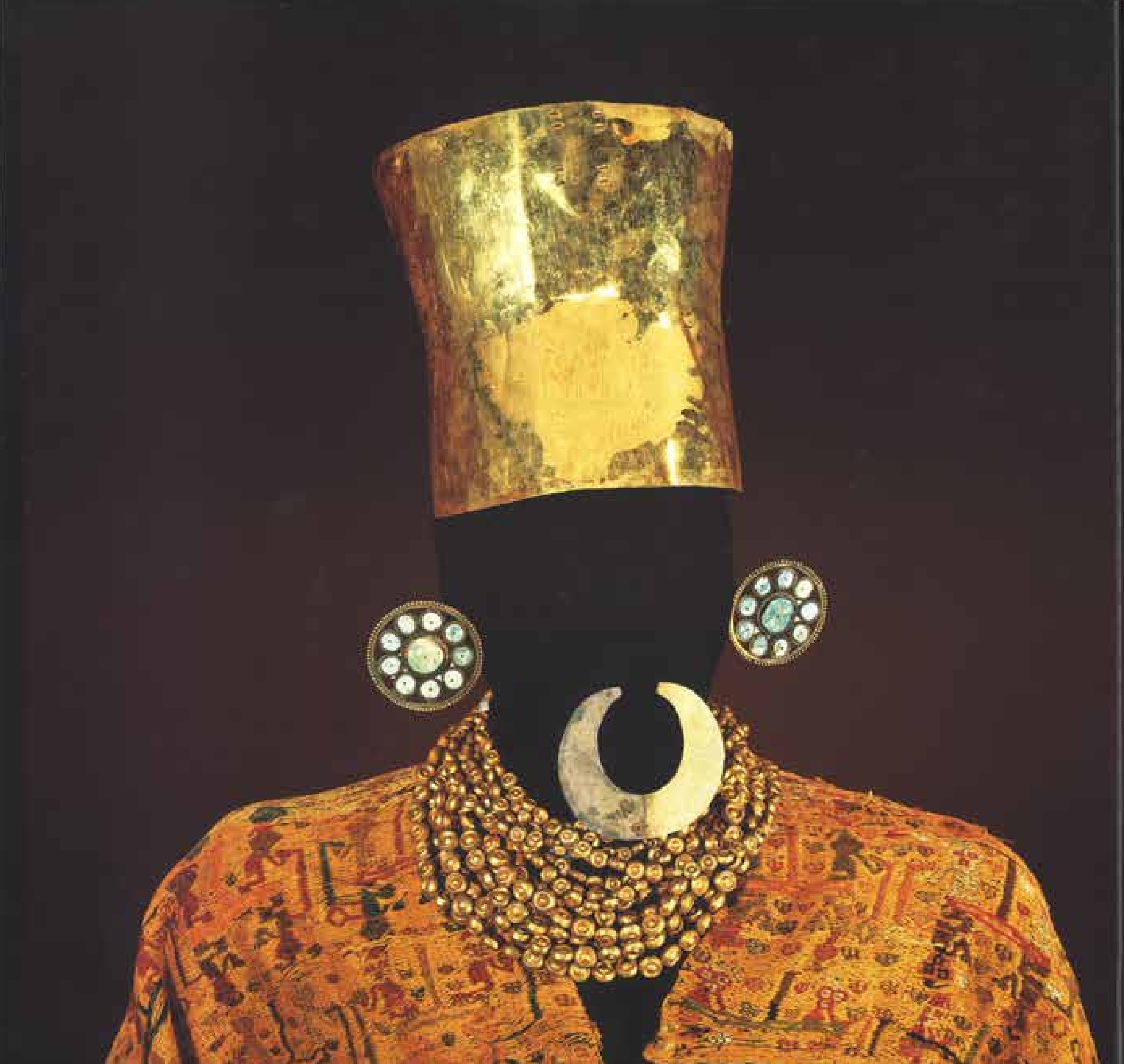
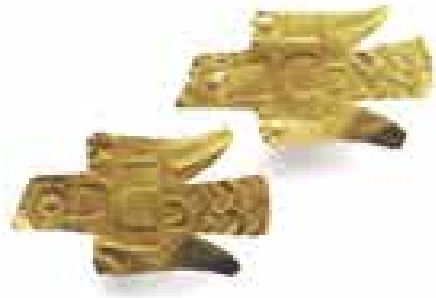




Opposite
Headdress, ear spools, nose ring and necklace
Gold and shell. Classic c.e. 1200 – 1532. Museo del Oro del Perú,
Museo de la Nación del Ministerio Fuerza Aérea Miguel Mujica Gallo, Perú



The early precious metalwork environment

It was not in vain that some of the European conquistadors in the 16th century became convinced that at long last they had found El Dorado in the Andes of South America. Relatively large quantities of gold and silver can be encountered in this mountain range. The abundance of these metals allowed this region to produce the so-called "gold cultures," whose wealth – generally exaggerated by popular legend – motivated the Spaniards to explore the new continent.

In contrast with the perception of the 16th- and 17th-century looters, the indigenous societies viewed their gold and silver production and objects as worthless without people. Moreover, these brilliant noble metals shared with other materials the honor of being privileged means for communicating social values. In the Andean region, copper, *Spondylus* shells, textiles and numerous kinds of rocks and crystals adorned prominent personages, and comprised sacred objects on a par with gold and silver. Even so, Andean precious metalwork is exceptional, and stands out as one of South America's most important artisan traditions. Its emergence, development and expansion were only possible with a certain combination of natural and social preconditions.

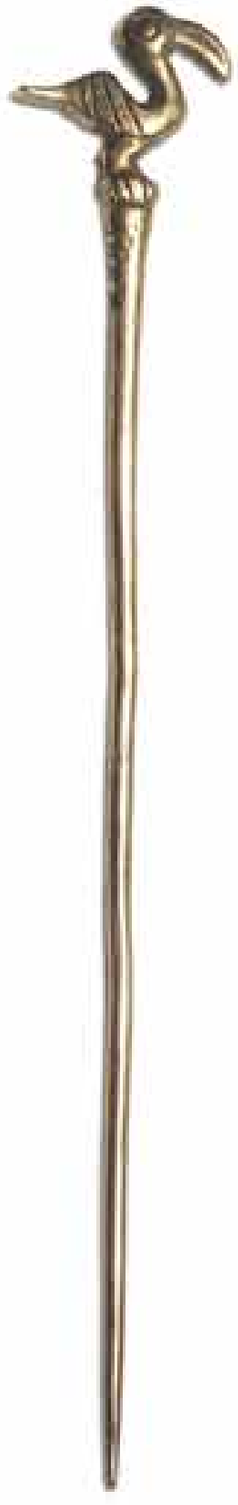
The first prerequisite is, of course, the existence of gold and silver deposits, whether local or in neighboring areas, accessible through some type of exchange system. The possibility of being able to exchange materials outside the local or ethnic territories can also be seen in many cases as an important social requisite for the development of precious metalwork.

But normally it was not enough to have metallic mineral deposits. These deposits had to be exploitable and treatable with a certain level of technology. Some South American areas, such as Amazonia (the Amazon region), contain gold deposits requiring the mining of enormous quantities of material or the use of complex substances and processes to remove the metal. In the Andes, however, placer gold – that is, gold found in river silt and gravel that can be culled by washing – is abundant. In addition, there

Nose metal bells
Gold. Wari. c.e. 500 – 1000. Museo Chileno de
Arte Precolombino – Nº 3167A, 3167B

Precious metals: *Gold and silver from ore deposits*

Opposite:
Headdress, earrings, necklaces, cloak, bracelets, and staff
Gold and cotton fiber. Chimú, c.e. 1200 – 1532. Museo del Oro del Perú, Museo de Sitio Arsenio del Mastro, Fundación Miguel Mujica Gallo, Perú.
Unidentified. Crown and Gauntlet fiber. Chimú, c.e. 1200 – 1532. Museo Chileno de Arte Precolombino – Nº 1149



Opposite: Pin with a pelican head
Gold. Chimú, c.e. 1200 – 1532. Museo Chileno de Arte Precolombino – Nº 3299

are occasionally superficial veins of gold and silver that can be exploited by simple means and tools.

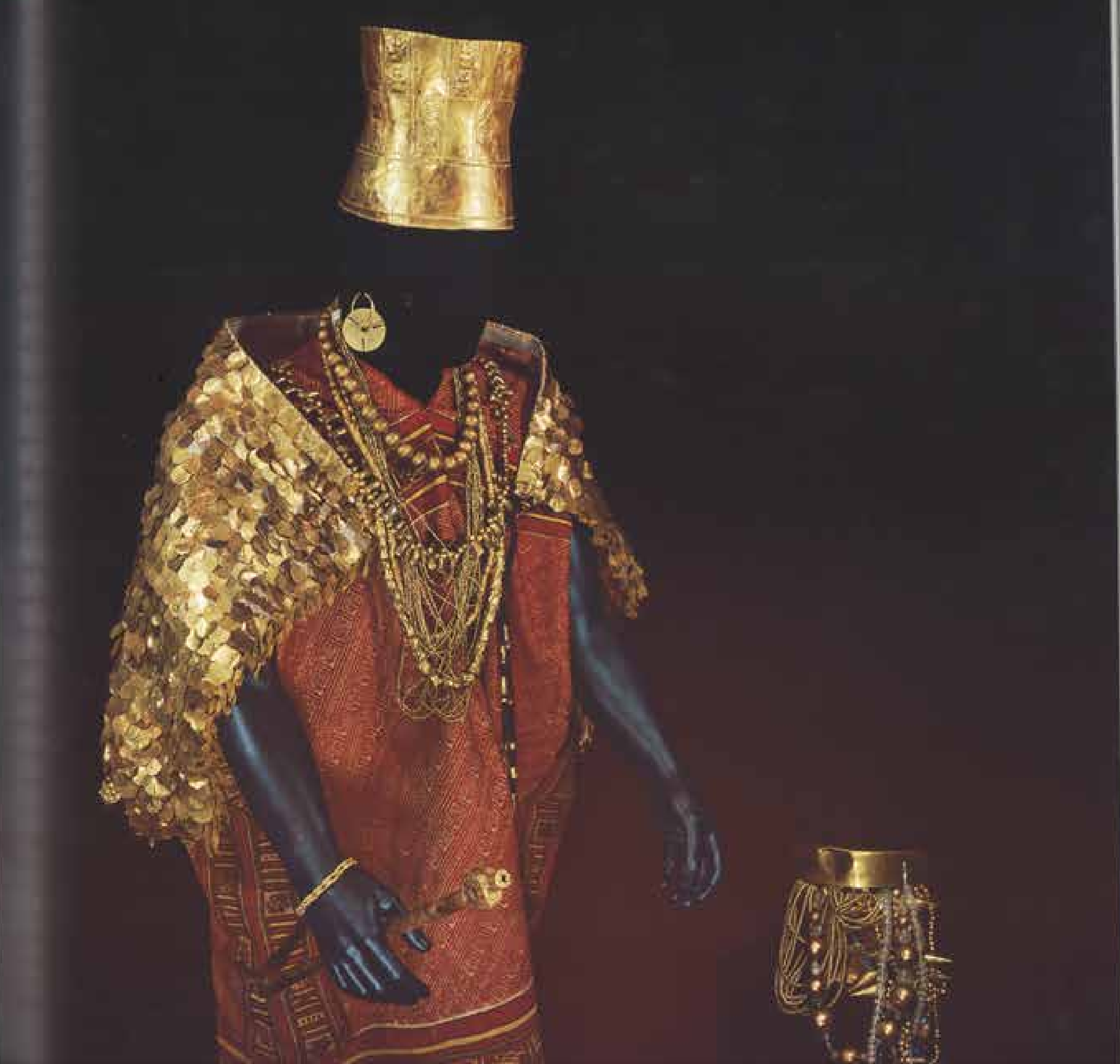
Even in the case where the hammering of native metals was the preferred manufacturing technique, intermediary reheating processes were required, meaning that the controlled use of fire and expertise in achieving and maintaining precise temperatures were essential socio-technological prerequisites.

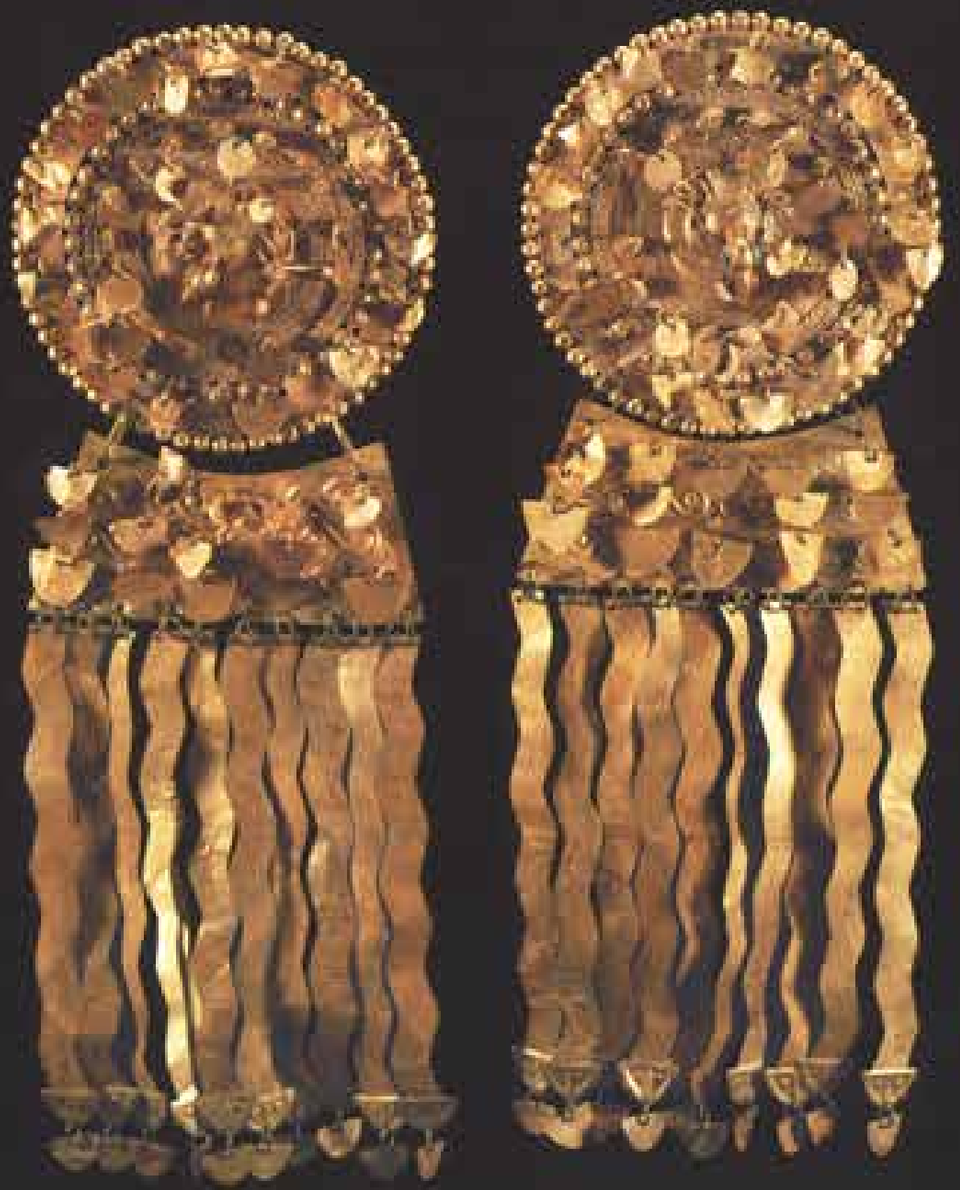
And even when the metal was readily available in nature, as well as where to extract and how to work it, the society needed to be able to sustain the miners and precious metalworkers who, due to their dedication to these activities, normally did not work to produce food for themselves and their families. Therefore, it needed to have a relatively large economy that routinely generated a surplus to be able to sustain a precious metalwork industry of some magnitude.

Just as important as the preconditions for production were those for consumption. To become an artisan tradition with its own unique style, precious metalwork needed to have a well-defined use to generate demand. Among the pre-Hispanic Andean societies, this context was first and foremost, religious, and secondly, political. It was the presence of personages, such as the *curiquer*, or *curacas* (chiefs), shamans and priests, and the necessity to express and make symbols and ideas visible in ceremonies and rituals that generated a set of public situations in which precious metalwork came to play a leading role.

As the societies grew larger and more complex, their political and religious elites increased as well, and demanded more gold and silver objects for festivals, sacrifices, offerings, burials and other important occasions. But religion and politics not only offered a consumption context; they also determined the general manufacturing standards. Pre-Hispanic metalworking was not an activity left up to the free will and arbitrariness of the artisans. In every period, each of the precious metalwork societies had strict rules dictating the types of metals and alloys that were to be used, how they were to be worked, what forms and functions the objects must have and, above all, what their iconography had to be.[1]

Pre-Hispanic gold and silver metallurgy, such as it evolved in Andean America, was, therefore, the result of a combination of natural and social factors that did not come together in quite the same way in any other region of the continent. These elements shaped this artisan tradition and imposed limits on its development and dissemination throughout a history we will now traverse.





Opposite
Two pectoral discs
Gold. Moche. A.D. 150 – 800. Museo del Oro del Perú, Museo de las Armas del Mundo, Fundación Miguel Mujica Gallo, Perú

The origins and expansion of precious metalwork

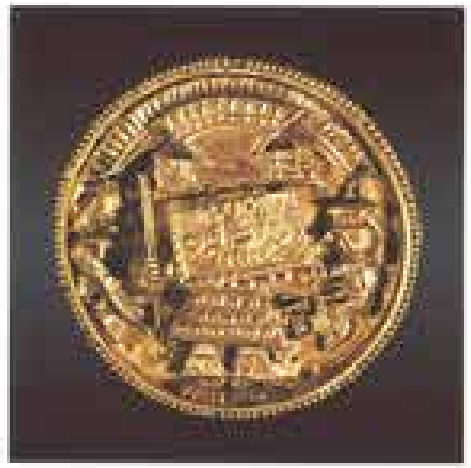
Various archaeological sites in Peru's northern mountains and coast and in southern Ecuador contain evidence of the earliest stages of the understanding of and work with metals in South America. This may indicate that metallurgy emerged as part of the social change and specialization process of the indigenous societies of the Central Andes' Initial Period, and implies multiple contacts between the area's communities.

In Waywaka, a mountain-range site located in the province of Andahuaylas, in central Peru, Grossman[2] found a metalsmith's tool kit, composed of three stone hammers and an anvil, together with pieces of hammered gold sheet. This finding, initially dated around 1500 B.C., is currently thought to be nearer 1000 B.C.[3]

At Mina Perdida, a site located in the Lurín Valley, on Peru's central coast, nine fragments of sheet copper and two of gold were recovered from a ceremonial platform, and date from 1410 to 1090 B.C. A metallographic study determined that they were produced through the hammering of pieces of native copper and gold.[4]

A Cupisnique-style gilded copper pectoral, excavated at the Puémape site, appears to date between 1500 and 1300 B.C.[5] The Putushio deposit in southern Ecuador's Loja province was the source of a large quantity of metal objects, including small cast gold spheres stuck to ceramic mold fragments, dating to 1470 B.C.[6]

Evidence suggests that the first metallurgists initially made their objects from native metal; that is, relatively pure metal occurring naturally in certain geological formations. However, they knew how to produce articles by hammering, casting and even by employing some complex techniques. It is also interesting to note, through physical testimony obtained at Waywaka, that these artisans had portable sets of work tools comprising part of their personal belongings, which seems to indicate a certain individual specialization in precious metalwork.



Top
Ear spool
Gold and turquoise. Moche style. A.D. 200 – 800. Museo del Oro del Perú, Museo de las Armas del Mundo, Fundación Miguel Mujica Gallo, Perú
Bottom
Ear spools. Mythical personage
Gold. Chimú. A.D. 1300 – 1532. Museo del Oro del Perú, Museo de las Armas del Mundo, Fundación Miguel Mujica Gallo, Perú

Opposite
Funerary mask
Gold, copper, tumbaga and emeralds. Sicán / Lambayeque, 900 – 1100. Museo del Oro del Perú, Museo de los Metales Precolombinos, Miguel Mujica Gallo, Perú

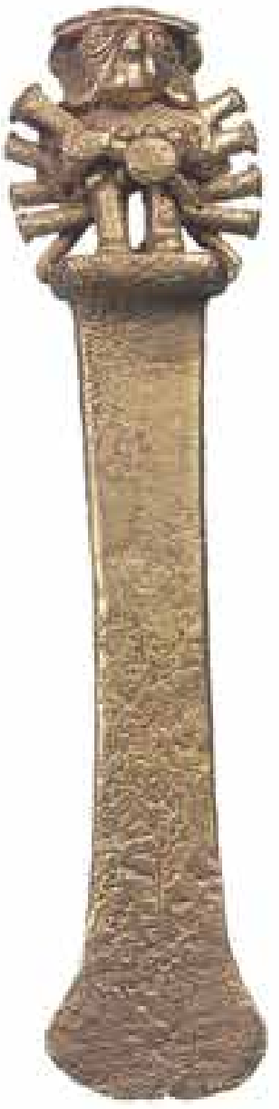
In the Cajamarca region, north of the Peruvian sierra, the thread of South America's precious metalwork tradition leads to the tombs and temples of Chavín. This culture began around 1200 B.C., and while metallurgy was probably not present from the outset, it most likely was during the highest period of development (1000 to 800 B.C.).[7] Chavín expanded metalsmithing throughout Peru's central mountains and coastland until its decline in 400 B.C.

About the time Chavín was deteriorating, precious metalwork began appearing in cultures along the Ecuadorian coast, such as Bahía, Jama-Coaque and Tumaco-La Tolita.[8] Through this latter culture's northern expansion, precious metallurgy entered present-day Colombia, possibly around 500 B.C.[9] During the following five centuries, it spread to various parts of southern, central and northern Colombia. Evidence indicates that by A.D. 300, metalsmiths could be found throughout the Andean and the Pacific and Caribbean coastal regions.[10]

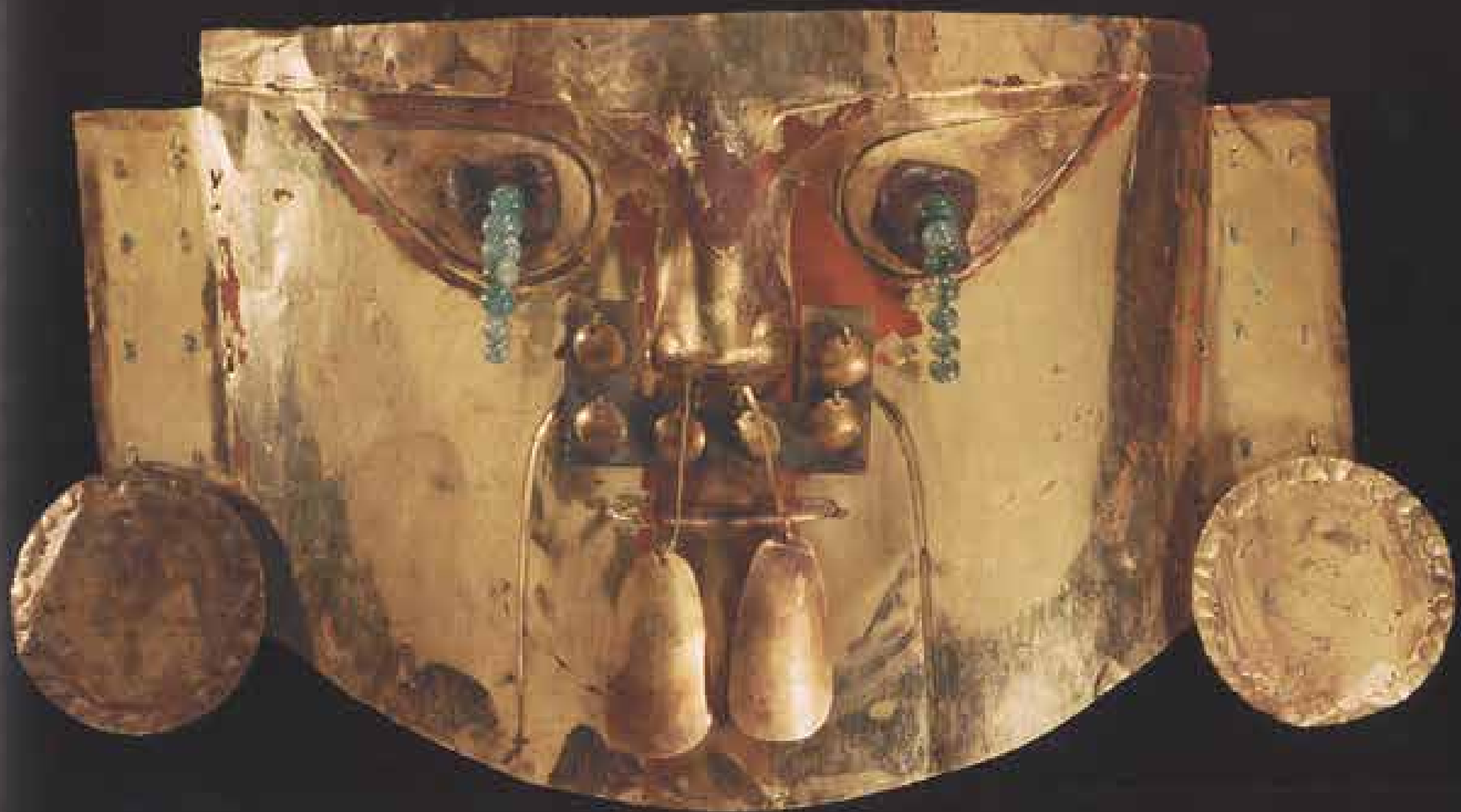
In southern Peru – probably the initial nucleus of Andean metallurgy – dissemination proceeded more quickly. Beginning in 500 B.C., precious metalwork became a part of the Formative cultures of northern Chile and Argentina,[11] and continued on up to the European Conquest. The expansion periods of the Second Horizon (Wari-Tiwanaku), between A.D. 600 and 1000, and of the Third Horizon (Inca), from A.D. 1400 to 1532, represented, nevertheless, the eras of the greatest production and use of precious metalwork in South America.

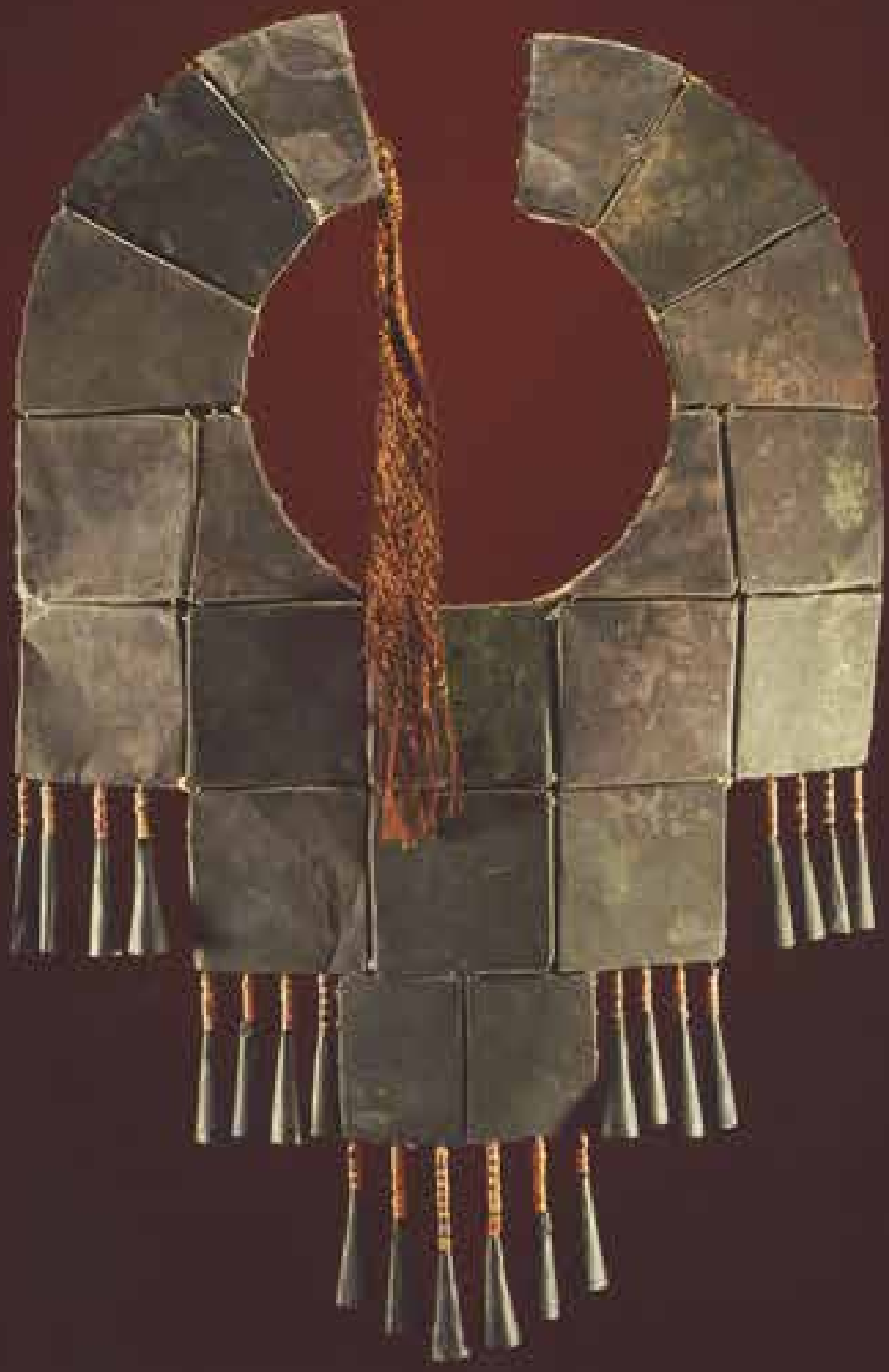
Early Andean metallurgy

To the ancient Andean inhabitants, extracting metals from river silt or the bowels of the earth, alloying them and working them until achieving finished objects were not simply technical activities governed solely by efficiency and productivity considerations. Each precious metalwork phase was imbued with deep social and religious significance linking political ideology and cosmovision with functional manipulation, so that the entire process represented a means of controlling cosmic and social forces.[12] The technical options ended up being essentially cultural options, and their application generated a vast array of styles and objects reflecting a conception of the universe as well as a mastery of a repertoire of work methods.



Tumi knife: Sacrificial knife with owl motifs
Copper and gold. Moche / c. a. 100 – 800. Museo Chileno de Arte Precolombino / Inv. 0362





Opposite
Plaque pectoral
Silver, shell and semi-gem. Chancay, a.c. 1200 – 1532. Museo del Oro del Perú, Museo de la Nación del Estado, Fundación Miguel Mujica Gallo, Perú

The extraction of the gold or silver is the step that unleashed the production chain. Large-scale gold mining in the Andes was possible due to abundant, widespread outcroppings of the geological formations containing the metal. The creeks and rivers removed and carried the native metal that was progressively crushed, ground and mixed with silt in the torrents.

Eventually this placer gold was deposited in riverbeds and ravines or on beaches in areas where the water flow was more tranquil. Many of the rivers descending from the Andes to the Pacific Ocean carry gold that often contains varying quantities of silver and even platinum.

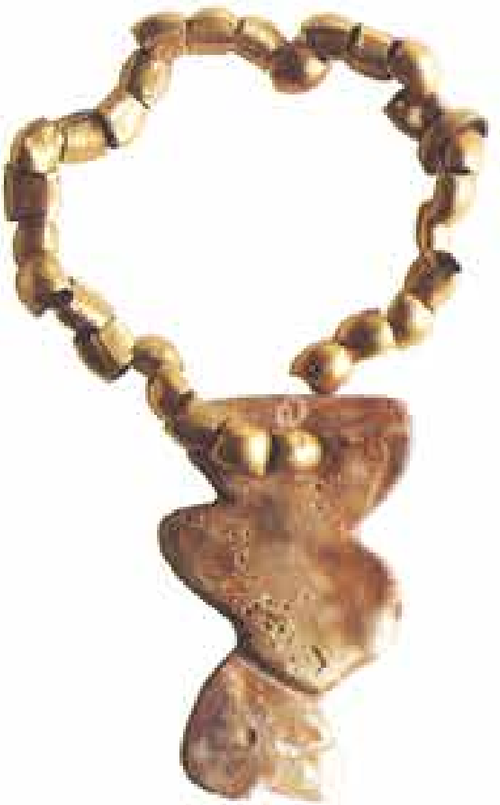
The Andean miners developed methods to increase placer production. In places such as Buriticá, in northwestern Colombia, it is still possible to find works combining dikes, channels and small pools that were used to reroute and manage stream flow, to allow greater quantities of gold to be deposited at predetermined sites.[13]

In addition, gold, and more often silver, were extracted from seams or veins in shallow and medium-depth mines. Most of the information about this kind of mining in the Andes refers to copper extraction but, to a certain degree, the techniques used for gold and silver mining were similar. The miners generally excavated narrow galleries that were only large enough for one man to work. They primarily used stone pickaxes, drills and axes to remove the metal, which was often in a mineral state.

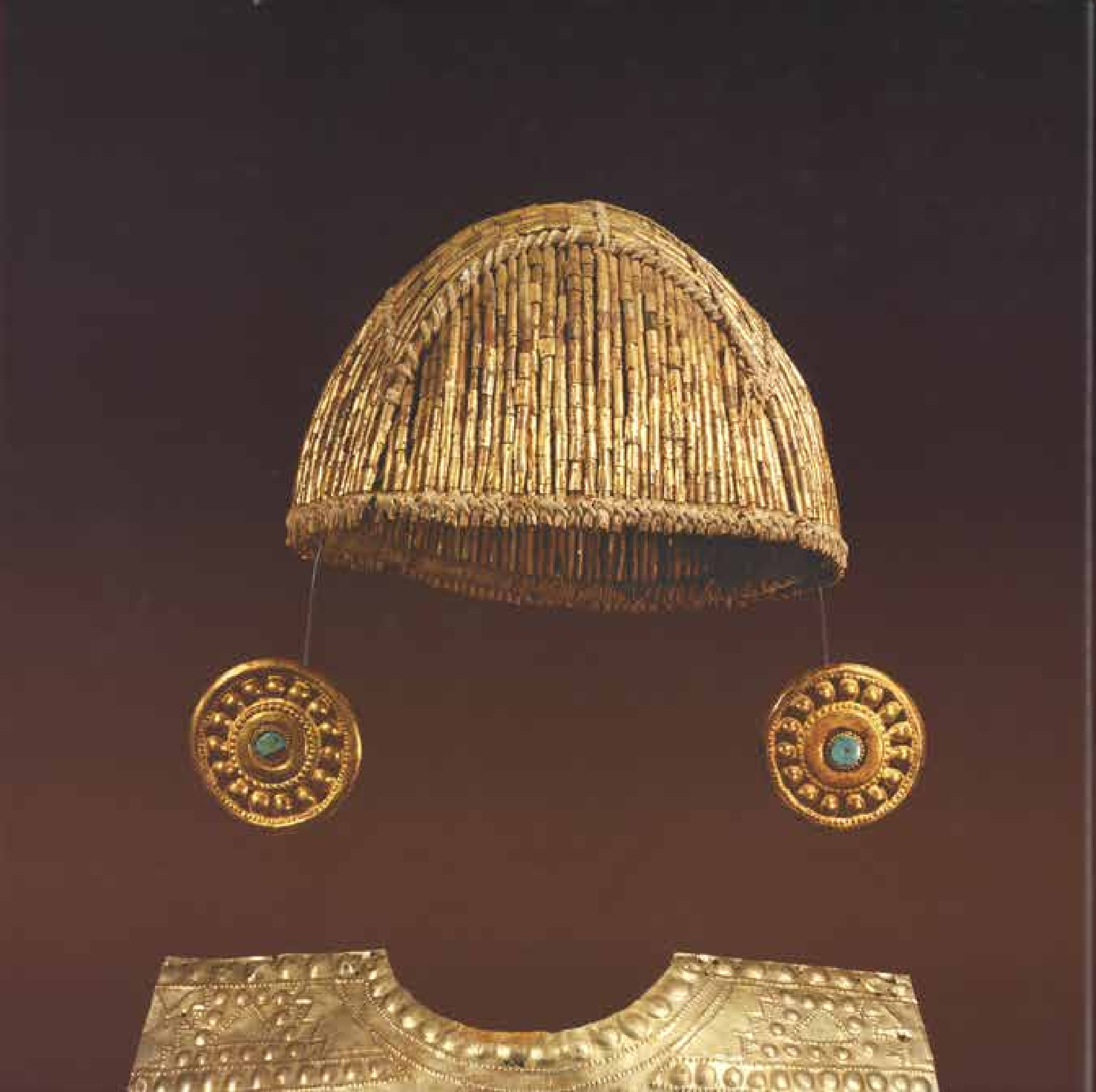
In the case of silver, initial processing often involved crushing, roasting and smelting stages, since the metal is seldom found in a pure form in nature. If the mined product was native silver, that is silver in an unadulterated state, the precious metalworkers had a material that could be readily worked in a number of ways; nevertheless they normally mixed or alloyed it with other metals to achieve colors and properties that were different from that of each unmixed element.[14]

An astounding number of pre-Hispanic Andean precious metalwork pieces are actually binary alloys of silver-copper, silver-lead, gold-silver, and gold-copper, sinters of platinum-gold, and ternary alloys of gold-silver-copper. The finding of numerous ingots of these alloys indicates that the metalsmiths commonly mixed the metals – smelting them in crucibles – prior to the manufacturing process.

Throughout the Andes, there were different preferences in alloys. Generally, in the central and southern zones – from the central part of Ecuador down to northern Chile and Bolivia – silver-copper alloys were extensively used, while in northern Ecuador



Necklace with pendant. Bird
Gold and copper-tumbaga. Guangala, 300 a.c. – a.c. 850, Museo Chileno de Arte Precolombino – Nº 1476



and Colombia, gold-copper alloys, known as *tumbaga*, or *guanín*, predominated. Sinters of gold-platinum were only produced in a limited area on the Pacific coast in southern Colombia and northern Ecuador.

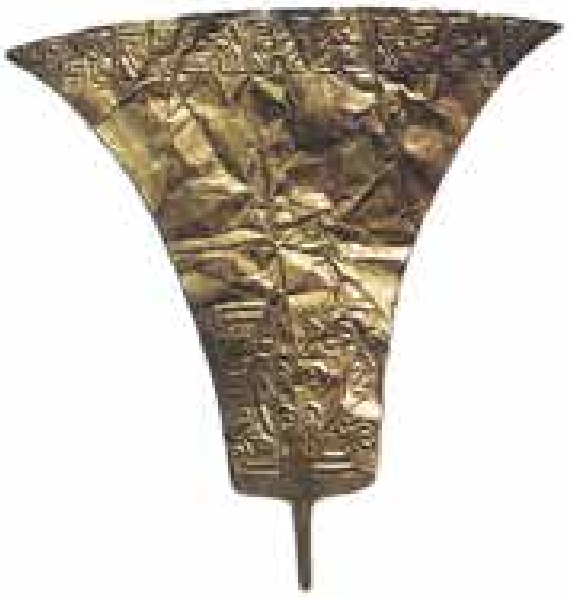
Direct metalworking implied the hammering of grains or ingots with stone or meteoric iron hammers[15] on stone anvils or slabs until sheets were obtained. Even though gold and silver are highly malleable, cold – or mechanical – working changes the nature of their crystalline structure, generating tensions that can end up producing fractures. As a result, after a round of hammering, the metal had to be reheated (annealed) to eliminate the accumulated tensions. This operation was periodically repeated until the sheet reached the desired thickness, whereupon it was cut, bent or joined with others to create a three-dimensional object.

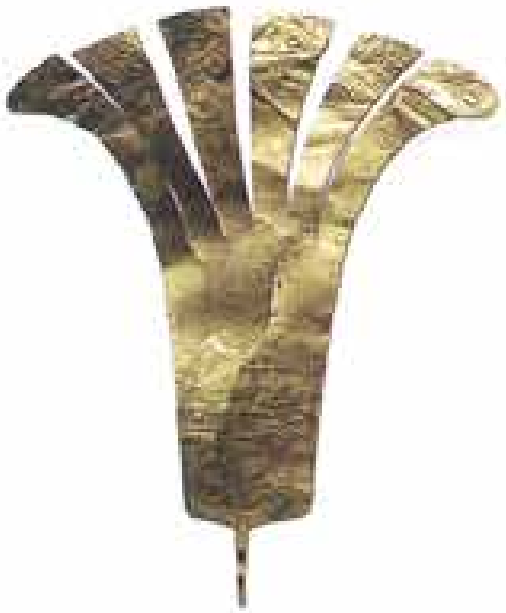
The other basic metalworking technique was pouring, or casting. In the Andes, beeswax was widely used for the molding process known as lost wax casting. The procedure consists of five steps that can be summarized as follows: a wax model is made of the desired piece, and tubes and a funnel are added; the model is encased in a block of clay to form a mold; after drying, the clay mold is heated to melt and remove the wax; the mold is placed in a fire with a charge of solid metal in the funnel (once the necessary temperature has been reached, the liquid metal is forced into the mold); when the mold has cooled, the clay block is broken and the metal piece is removed, the duct and funnel pieces are cut off, and finally, the molded object is burnished.

While commonplace in the Northern Andes, this process was seldom used in the Central Andes, where instead, open and multi-piece molds were employed for casting without wax models.[16]

Especially noteworthy, however, is that on top of this prevailing technological base consisting of hammering and casting techniques, the precious metalworkers developed highly complex refinements. On the Pacific coast of Colombia and northern Ecuador, the metalsmiths of the Tumaco-La Tolita culture devised a method for working platinum, a metal impossible to smelt since the 1,775°C melting point could not be attained by the period's available technology. By hammering hot grains of placer platinum and gold, they achieved a sinter of platinum granules in a gold matrix (sinterization or interpenetration), whose color and appearance is largely that of pure platinum.[17]

Mechanical and metallurgical joins were used to assemble hammered sheets, as well as cast sheets and other pieces. Mechanical means included: crimping, such as in the Calima area during the Yotoco Period;[18] tabs and slots, frequent in Moche metallurgy

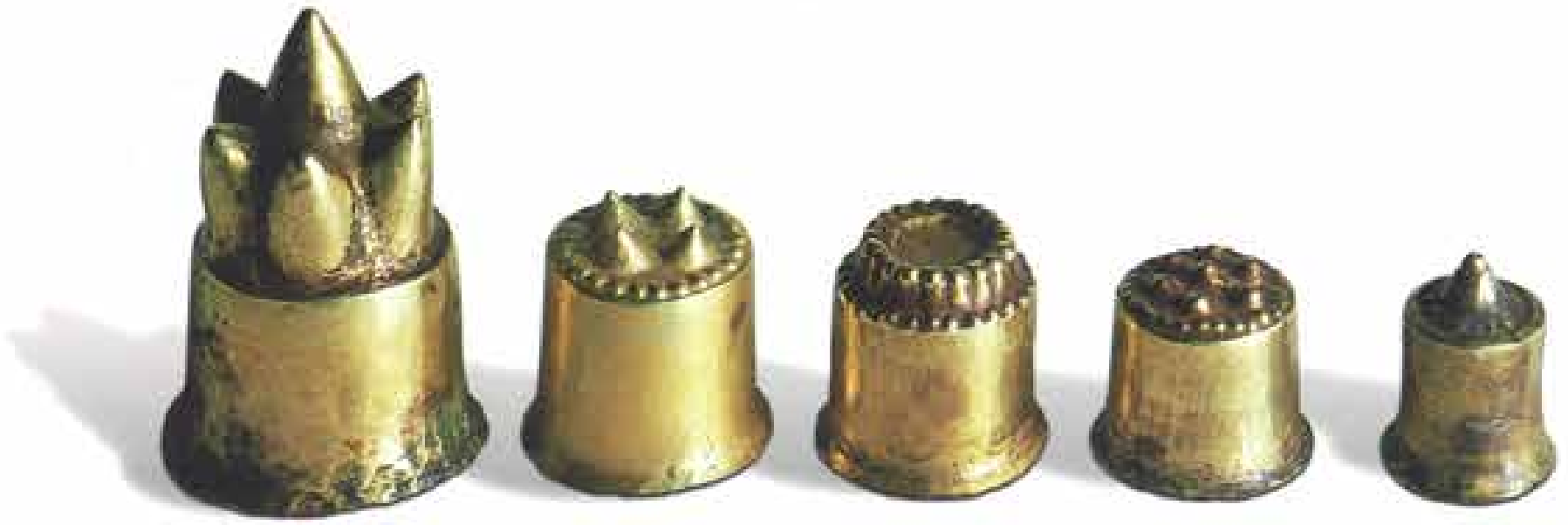




Opposite
Ceremonial knife. Tumi
Gold and turquoise. Incas – Lambayeque. a.c. 750 – 1350. Museo del Oro del Perú, Museo de la Nación del Ministerio Relaciones Exteriores, Perú.

of Peru's northern coast;[19] nails, staples and wires, present in various Colombian and Peruvian styles; and complex combinations of these techniques.

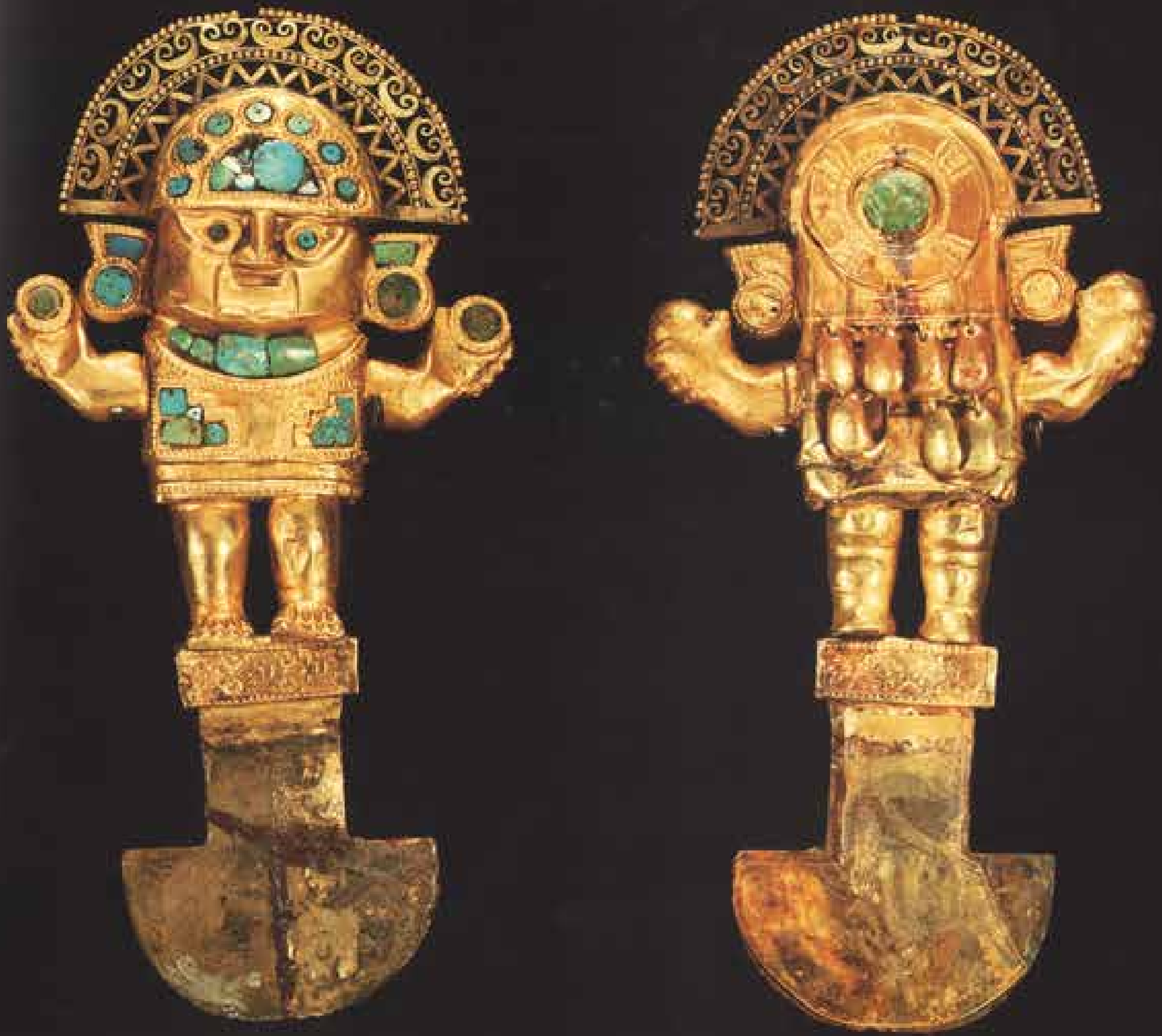
Metallurgical joining techniques comprise various types of soldering and welding processes. For the Central Andes, Lechtman[20] has identified two practices: soldering, the joining of two metal pieces with a filler metal having a different nature from the parts that are joined, performed at temperatures under or over 800°C; and welding, the joining of two metal pieces by partially smelting and fusing their surfaces, without the addition of another metal. In southwestern Colombia and northwestern Ecuador,



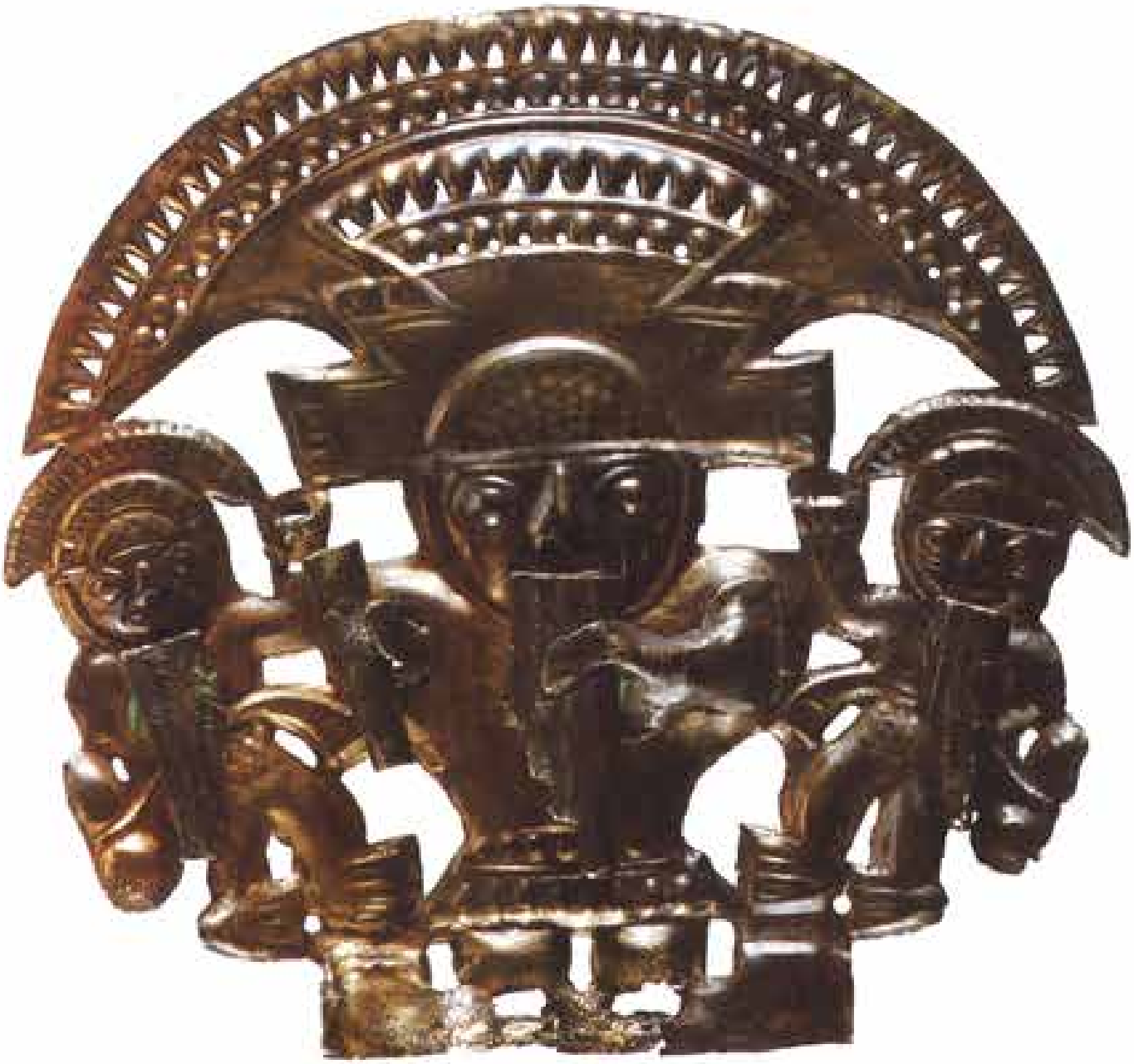
soldering was used on small gold spheres to create decorations. This soldering technique, known as "granulation," involves the use of fluxes (fusing materials) extracted from plant substances to reduce the alloy's melting point.[21]

Opposite: Sobrehúmeros
Gold. Vicús. 400 b.c. – a.c. 100. Museo Chileno de Arte Precolombino – Nº 3000 to 3004

Casting techniques also underwent important refinements. An outstanding achievement of Early Quimbaya metallurgy in the middle valley of the Cauca River, in Colombia, was lost wax casting with an inner core and supports. This process allowed the production of large, hollow pieces – mainly recipients for lime.[22] Another variation of lost wax casting was the utilization of stone matrices for the serial elaboration of common motifs. This technique was used to create and decorate adornments and to manufacture some votive figures in the Eastern Andes.[23] In northern Peru, metallurgists often employed two-piece molds, and experimented with a type of casting that required semi-liquid metal.[24]



Opposite
Spanda. Personaje
Gold. Chimú. A.D.1200 - 1400. Museo Chileno de Arte Precolombino - N° 0067



Throughout the Andes, precious metalsmiths ardently sought to expand their array of surface colors and textures. The zone's most wide spread technique was gilding and silver-plating by oxidation. The process required the use of pieces containing alloys with varying amounts of "noble" metals – such as gold or silver – and other metals, generally copper. To obtain a surface qualitatively different from the core of the metal object, the smiths made use of the alloy components' dissimilar resistance to corrosion. By air-heating the piece's exterior and applying corrosive products, such as acids extracted from plants, they depleted part of the copper. As a result, the surface of the alloy ended up with a greater proportion of gold or silver.

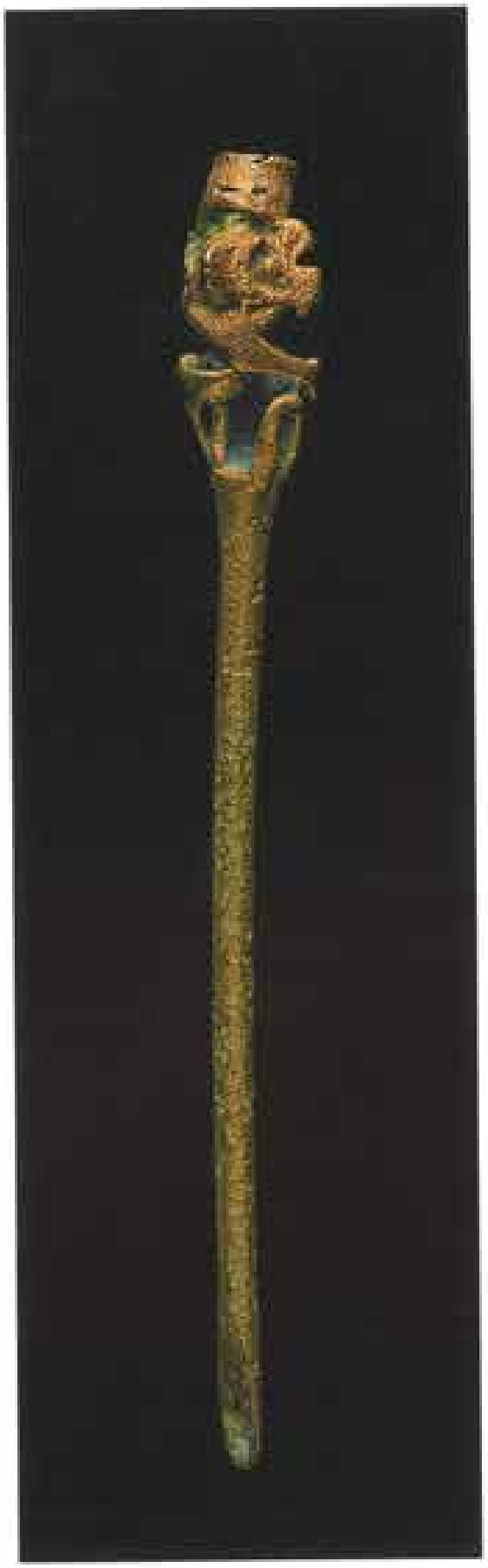
Metal work: Mexico
Silver to silver-gilded copper. Classic A.D. 1200 - 1521. Museo Chileno de Arte Precolombino - N° 0095

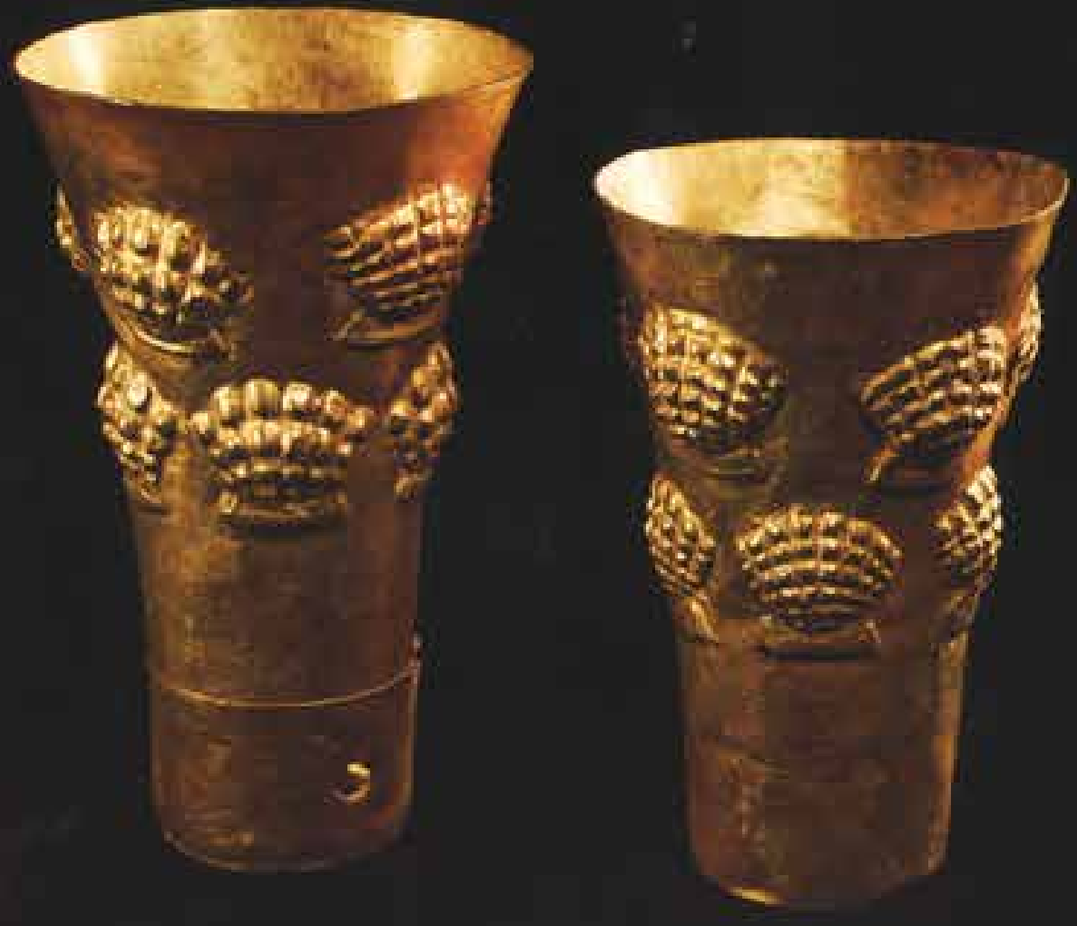
In addition to gilding by oxidation, the Central Andean metalsmiths employed electrochemical replacement plating, fusion gilding, and foil plating. The first involved the dissolving of gold or silver powder in an electrolytic solution of corrosive minerals, such as sodium chloride, potassium nitrate or potassium aluminum sulfate (all readily available in the environment), and the immersion of the metal object for gilding or silver-plating in this bath. In time, due to the difference in the electrical potential between the metals, a thin, uniform layer of gold or silver became deposited on the object's surface. Afterward, the adherence of the plating could be improved through the application of heat.[25]

In fusion gilding or silvering, thin sheets of gold or silver were placed on the surface of the object, and through the application of heat and pressure (hammering), a lasting bond was achieved. As an alternative, the piece to be gilded or silver-plated could be covered with a fine layer of gold or silver dust that was heated until it melted and adhered.[26] Sometimes the precious metalworkers opted for mechanical instead of metallurgical solutions, to change the color of the alloy pieces. Such is the case of gold foil plating, fastened with plant glues or by means of crimping.

In the Nariño-Carchi Altiplano, in southern Colombia and northern Ecuador, the gilding by oxidation technique was refined to achieve various colors and textures in revolving discs and body adornments. By selectively descaling parts of previously gilded *tumbaga* objects, metalworkers re-exposed the alloy's pink color, and thus obtained bi-color pieces. They also administered acids to certain areas of the gilded and polished surfaces to create design patterns with different textures.

But the search for color did not stop with the manipulation of alloys, and metal plating. Incrustations and paints constituted another achievement by the Andean precious metalworkers. In the Moche and Sicán cultures, smiths applied paints made with mercurial minerals (cinnabar) to produce an attractive red color.[27] In addition, they experimented with the insetting of precious and semi-precious stones, such as emeralds, turquoise, and lapis lazuli; *Spondylus* spicules; petrified resins including amber; shells; and pieces of other metals.[28]





Opposite:
Zoomorphic Spondylus shell
Gold. Sicán / Lambayeque. A.D. 750 – 1350. Museo del Oro del Perú
Museo de las Armas del Mundo, Fundación Miguel Mujica Gallo, Perú

Cultures, styles and horizons

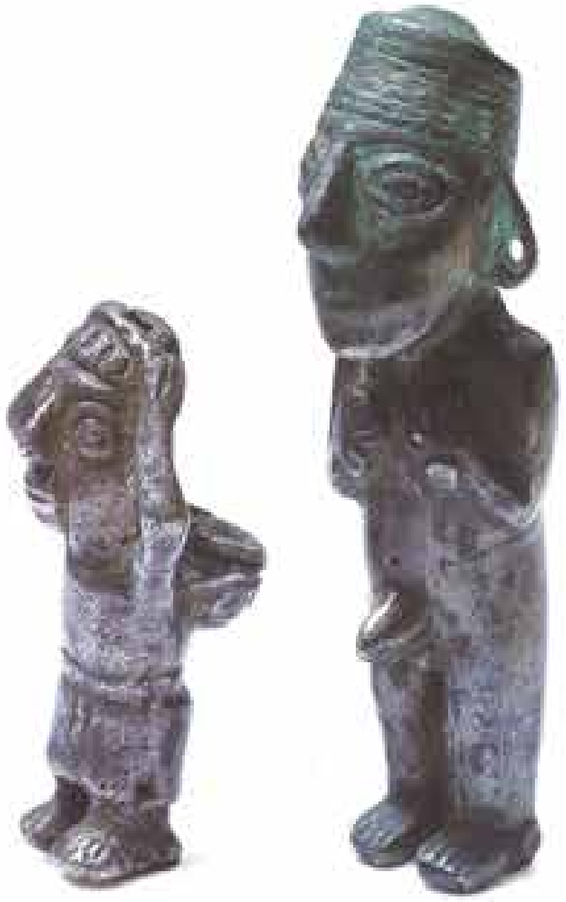
Even today, many Amerindian societies continue to manufacture gold and silver objects; there are even societies that first developed their precious metalwork traditions in the Colonial Period. Such is the case of southern Chile's Mapuche, who began producing their renowned silver jewelry around 1600.[29] Consequently, Andean precious metalwork is a cultural phenomenon that has lasted 3500 years, and as would be expected in such an extensive era and region, a large quantity of cultures, styles and horizons evolved. As a result, we will concentrate on the greater traditions, proceeding from the central zone to the north and finishing in the south.

In the Central Andes, the establishment of traditions with well-defined technological and iconographic components occurred during the Early Horizon Period (1200 to 400 B.C.). In Chavín de Huántar's urban and ceremonial center, a strong religious cult emerged, extending its sphere of influence throughout Peru's central mountain and coastal regions. The advent of the Chavín influence ushered in a period of rapid technological development and a considerable increase in the use of metals by the elite and in worship. Many Chavín objects come from tombs of the upper class located in the valleys of Jequetepeque, Zaña and Trujillo, Chongoyape, Chavín and Kuntur Wasi in Cajamarca.[30]

In general, such articles constitute adornment pieces fashioned through hammering, joining and *repoussé*. There are crowns, diadems, nose rings, ear spools, pins, spoons, necklaces and tweezers. Chavín iconography is laden with a complex mythical and symbolic content that from this point on, became a traditional part of Central Andean precious metalwork. The decoration features felines, serpents, saurians and fantastic beings. Joins and red and black paint were now present.

For still unknown reasons, Chavín de Huántar declined, and its influence over the Central Andean peoples gradually disappeared. This event marked the beginning of the Early Intermediate Period (400 B.C. to A.D. 600). The vacuum left by Chavín was

Bottom figures: Yellow with human face
Gold. Mochica. A.D. 600 – 1000. Museo del Oro del Banco de la República, Bogotá – 39° O1111



filled by cultures such as Nasca, Vicús and Mochica – each with a regional development. During this period, pre-Hispanic metallurgy's full range of alloys, techniques and motifs came into being and solidified.

Most findings of the Nasca culture, which developed on Peru's southern coast, were part of funerary bundles or mummies encountered by the hundreds in the desert. These include large adornments, headdress decorations, diadems, mouth masks with serpents or hummingbirds, bracelets and ear spools. There are also some miniature pieces, such as trophy head representations. Hammer work predominates, and only in the later stages do a few cast spearthrower hooks appear.[31]

In the Loma Negra cemetery, in the Piura Valley, on Peru's northernmost coast, tombs were found that contained more than 100 metallic adornment objects of the Vicús culture. The most common metal is copper, frequently plated with gold or silver. Pieces include enormous discs, nose rings, staff heads, pendants and waxing-moon-shaped plaques. Vicús iconography is deeply rooted in Moche culture, whose characteristic gods and monsters were popular Vicús themes. The Pampa Juárez and Loma Valverde metal production workshops have clarified the relationship between the foundry sites, the mines and the residences.[32]

The findings in the Sipán pyramids, in the Lambayeque Valley, on Peru's northern coast, brought to light one of pre-Columbian America's most complex and advanced metalworking traditions. Studies made by Donnan[33] reveal how Moche precious metalsmiths created pieces whose form, color and composition would, even today, be difficult to reproduce.

The Moche inhabited an extensive territory covering the central and northern coast of Peru. At the culture's zenith, there were lords whose political rule had a strong religious tinge. Their tombs were located in giant adobe pyramids and contained hundreds of metallic funerary furnishings. Moche metallurgy consumed large amounts of copper to produce objects made entirely of this metal, or alloyed with gold, silver or arsenic;

Left
Figurines. Man and woman.
Nasca. Peru. 4 a.C.1000 – 1532. Textiles Museum Collection. Museum Collection & Art Foundation – Ref. 1961, 2161
Right
Disc pendants
Gold. San Pedro – Tiwanaku. 1 a.C.400 – 700. Museo Arqueológico R. P. Gustavo Le Paige, Chile

it was left visible on the surface, or covered with gold or silver through oxidation, foil, or an electrochemical plating process, and adorned with emerald, turquoise and shell insets or inlays.

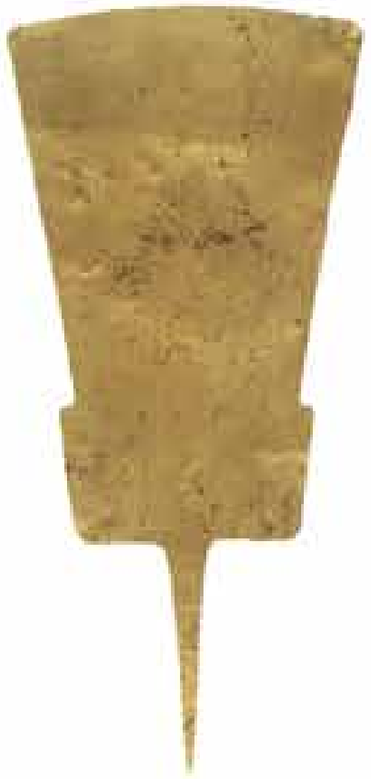
The deceased authorities could have incredibly rich and varied ceremonial finery. For example, such an individual might wear a large half-moon adornment on his head; a nose ring; heavy ear spools with turquoise-encrusted discs; various string bead necklaces; a mantle reaching to his elbows and to his knees, literally covered with gold plaques; semicircular adornments about his waist; hip protectors; and lastly, hold a great scepter in his hand.

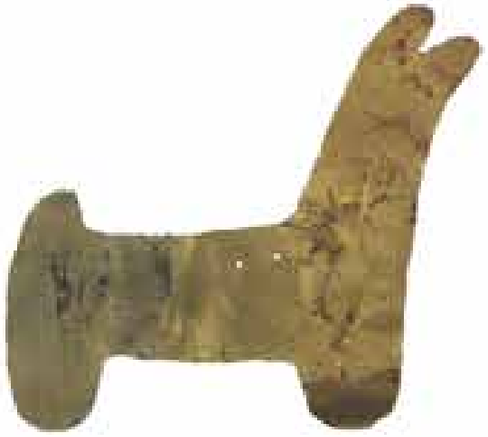
Moche precious metalwork also stands out for the use of the colors of the metals to express the sun-moon duality. Some pieces are half gold and half silver; others are paired – one gilt, the other silver-plated. Inevitably, the silver-plated part or object – the color of the moon – is on the left, while the gilded side or object – the color of the sun – is on the right. The Moche maintained contact with their neighbors; as a result, the cultures that followed were able to acquire their technological knowledge and stylistic refinements.

The Middle Horizon (A.D. 600 to 1000) is marked by the domination of two great urban centers: Wari, located in the Ayacucho region, in Peru's Southern Andes; and Tiwanaku, situated on the Lake Titicaca altiplano. During this horizon, most of the regional cultures were absorbed or they adapted to new patterns.[18] In the field of metallurgy, a relatively smaller amount of precious metalwork objects and refinements were produced.

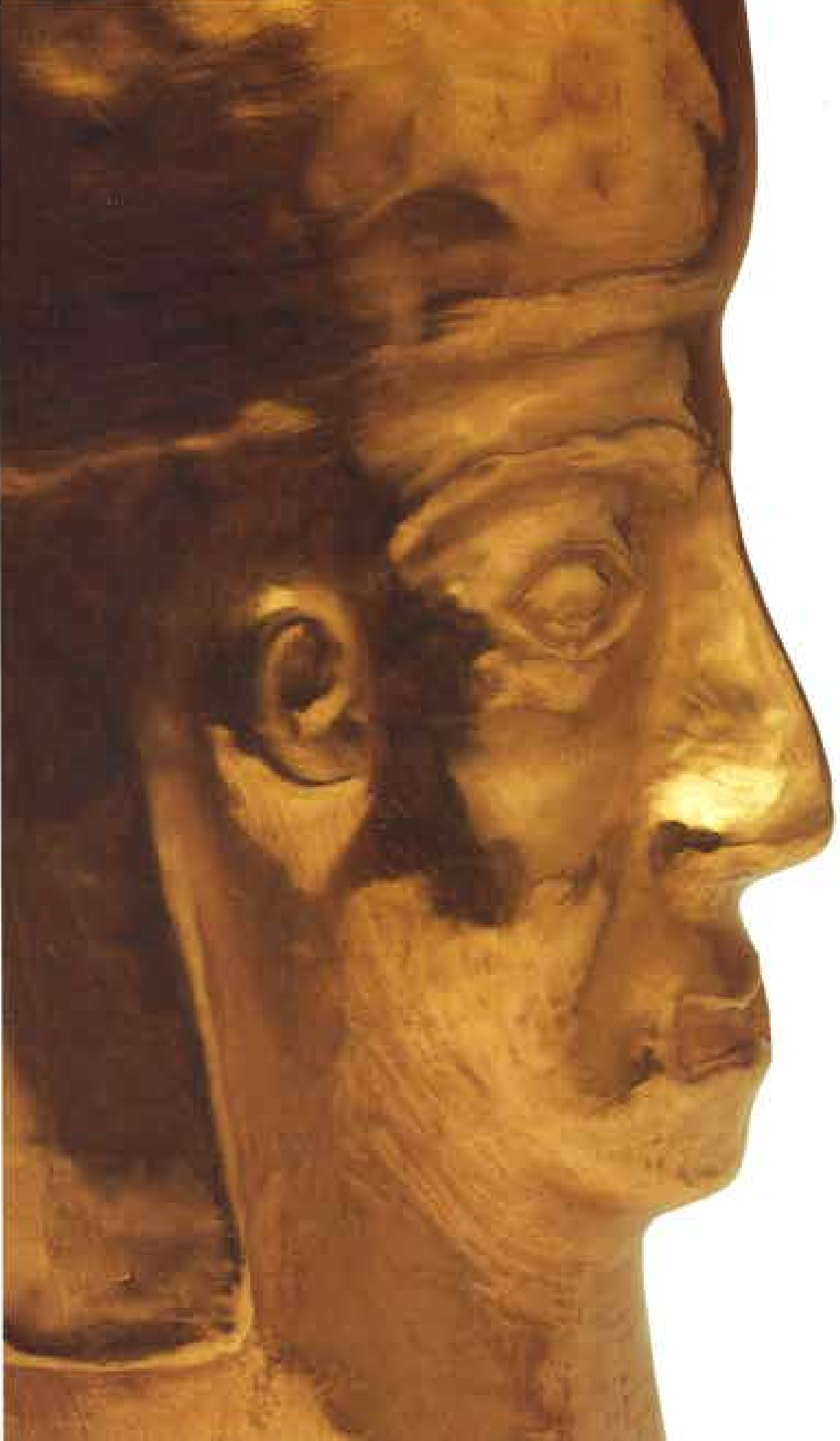
The gold, silver and *tumbaga* objects are not as spectacular or as sophisticated as those manufactured by Moche metallurgy. Most of the pieces are of copper, gilded copper or *tumbaga*, and are rather simple in shape. This group includes *tupus* (decorated pins used to fasten robes), pins and tools. A few luxury items made of gold and of silver tended to be decorated with the figure of a deity having a rectangular face that radiated rays ending in circles – an unmistakable Wari icon. These rather scarce artifacts are from only a few sites: Pomacanchi, near Cuzco; the Ica Valley, in the south; Pachacamac, in the Lurin Valley; and Ancón, on the central coast. The inventory of these sites lists such articles as bracelets, silver-plated copper or gilded silver sheets with incised figures, bells, headdress ornaments and funerary masks.

The beginning of the Late Intermediate Period (A.D. 1000 to 1300) is marked by the decline of Wari and Tiwanaku, and the flourishing of new regional cultures, such





Feather and Bones
Gold. San Pedro, Tiwanaku. A.D. 600 – 700. Museo Regionalgiaco R. E Gustavo Le Paige, Chile



as Sicán and Chimú in Peru's central and northern coastal areas. Today, thanks to excavations made in the tombs of the lords of the pre-Hispanic Batán Grande pyramids – the site of Huaca Loro – we have learned much about the Sicán-Lambayeque metallurgical tradition.[35]

With this precious metalwork, the emphasis is once again on hammering and the construction of three-dimensional figures through the joining of multiple components. Objects include figures of animals, *tumis*, *tupus*, funerary masks, headdress adornments and ear spools. Tall beakers, or *keros*, were made by hammering a flat metal sheet until attaining a 20-to-25cm-deep, roughly cylindrical cavity. Generally, they are decorated with anthropomorphic figures. One particular anthropomorphic icon with a rectangular face, rounded jaw, eyes like sideways commas, and wearing a semi-circular headdress – the "Lord Sicán" – appears repeatedly in a wide variety of pieces.

The metallurgists often employed red paint, created largely from cinnabar. They also made use of precious and semi-precious stone, shell and *Spondylus* applications. A careful technical examination of the metallic pieces has revealed a close collaborative relationship between a broad range of specialized artisans to produce complex objects. Among the artifacts found are gold-foil-plated vessels, metallic-plated wood items, and large pieces of fabric completely covered with gilded copper plaques that served as dividers or false walls in temples. In addition, the mainly metallic objects include fabric, feathers, precious stones, shell and wood.[36]

Undoubtedly, it was the Chimú Kingdom that achieved the greatest expansion and power during this period. The Chimú conquered all of Peru's central and northern coast, and put an end to Sicán-Lambayeque's independent developments. This conquest was accompanied by the imposition of the Chimú Kingdom's characteristic style. A new icon, the "Lord Chimú," an anthropomorphic figure with almond-shaped eyes, flanked by assistants with litters,

Opposite
Rim-beaker. Effigy
Gold. Sun Poker – Tiwanaku. c.e. 400 – 700. Museo Arqueológico
R. P. Gustavo Le Paige, Chile

became a popular adornment of the period's gold objects. The Chimú lords were buried with large gold crowns that had feather-like appendices, ear spools with animal figure assemblies or lapis lazuli incrustations, full-torso breastplates of gold, necklaces with spherical ornaments, gilded copper vessels, headdress adornments, plates with intricate incised designs, *tumis* and *rupus*.

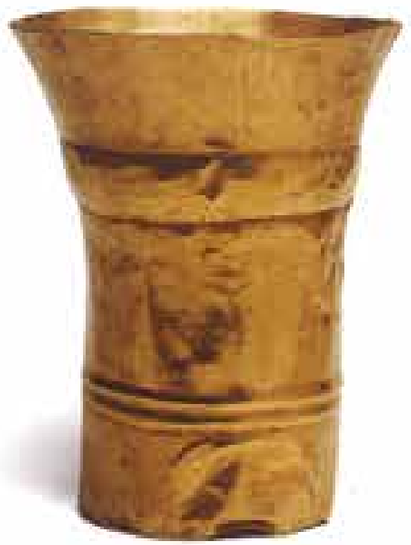
In a period rather difficult to pinpoint, around A.D. 1300, the Quechua, a small mountain society, conquered the Cuzco Valley. The Quechua went on to dominate a vast territory and build one of the largest and best-organized empires in history: *Tawantinsuyu*. This period, known as the Late Horizon (A.D. 1300 to 1532), or the Inca Period, is characterized by a homogenization of the technological and stylistic patterns of precious metalwork.

The Inca took control of the mines and metal extraction areas, and determined what types of alloys should be used for tools, arms, and ornamental and offering objects. Regarding the social distribution of the metals, now more than ever, the governing elite and state religion dominated the use of gold and silver; the intermediate strata were allowed to use gilded and silver-plated copper; and the commoners, only copper.

The adornments of the noblemen and of the Inca himself consisted of enormous headdresses, crowns, ear spools, pectorals, textiles covered with gold and silver plaques, necklaces and bracelets. For drinking and eating they used gold and silver cups, large bowls, and plates. The pieces continued to be hammered, joined and decorated with metal insets or inlays. Molds were employed to cast innumerable miniature gold and silver figurines of men, women and llamas, which served as offerings. Many of these objects have been found in mountain sanctuaries located over 4,500 meters above sea level, where ritualistically sacrificed individuals were interred.[37]

The Temple of the Sun, or Qoricancha, in Cuzco, constitutes an unrivaled example of the use of gold and silver in religious buildings. It exhibited a meter-wide frieze made from gold sheet, on all of the interior and exterior walls. The main altar had a disc of gold measuring over 2 meters in diameter, representing the sun, and a similar one of silver, representing the moon. The smaller altars had comparable discs. Mummies of some of the Inca rulers rested on litters lined with gold. An enclosed area featured a gilded fountain, 25 life-size llama figures with their herders, also of gold, and an artificial garden of corn – with silver stalks and gold ears.

On the Ecuadorian coast, three cultures – Tumaco-La Tolita, Jama-Coaque and Bahía – were part of the Regional Developments Period, spanning from approximately 500



Rim-beaker
Gold. Sun Poker – Tiwanaku. c.e. 400 – 700. Museo Arqueológico R. P. Gustavo Le Paige, Chile

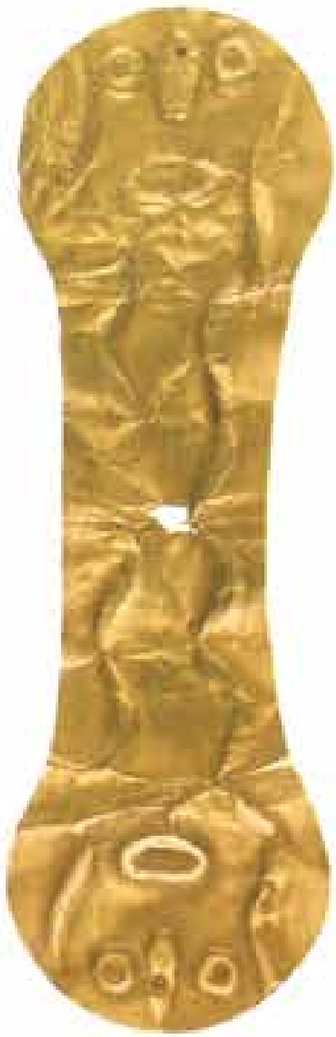
Opposite
Detail of the back of a portable ceremonial platform
Wood, gold, shell, turquoise and cinnabar. Chancay. A.D. 1,000 – 1,532
Museo del Oro del Perú, Museo de la Armas del Mundo, Fundación
Miguel Mujica Gallo, Perú

B.C. to A.D. 500). Tumaco-La Tolita is considered to be the oldest of these cultures. Most of its findings come from the island of La Tolita, in northern Ecuador, the site of a ceremonial center and cemetery for the elite. At its zenith, the Tumaco-La Tolita culture covered a large part of Colombia's southern Pacific coast. In their precious metalwork – mainly hammered – the metallurgists used platinum components that were assembled, soldered or welded with others of gold to form bi-colored pieces, which included masks, ear pendants, nose rings, and breastplates. They are noted, too, for producing numerous miniatures, such as small masks, skin applications and even delicate gold thread.[38]

Jama-Coaque and Bahía precious metalwork stands out due to its highly ornate iconography, laden with feline and male human images. The Jama-Coaque lords seem to have worn complicated attire, consisting of a helmet, pectoral, nose ring, ear spools, necklaces, bracelets and anklets, made of hammered and *repoussé*-treated sheets, that must have made them appear quite imposing. Notable Bahía metalwork includes recipients for hallucinogenic substances, depilatory tweezers, and clothing; some pieces exhibit precious and semi-precious stone adornments. In the sanctuary on Isla de la Plata, abundant Jama-Coaque offerings have been found.[39]

During the Ecuadorian Integration Period (approximately A.D. 500 to 1500), precious metalworking expanded toward the mountains, while new coastal developments were emerging. Around this time, the Milagro-Quevedo culture began to flourish in the lower part of the Guayas River basin, making extensive use of gold and silver to produce an assortment of small hammered pieces, some with stone incrustations. In Manteño-Huancavilca precious metalwork, the use of silver-copper alloys and complex joining techniques denotes a powerful influence by the Central Andes tradition. Findings include a wide variety of hammered and twisted wire body adornments, recipients for coca consumption, and head and body part representations. In both cultures, enormous quantities of metal were buried with the more prominent deceased, which might have constituted a way of accumulating riches.[40]

In Ecuador's Southern Andes range, the precious metalworking traditions of the Cañar and Puruhá cultures are especially noteworthy. In the tombs of the Cañar elite, archaeologists have found large amounts of gold and silver discs, adornments, cast spearthrower hooks, and recipients, produced mainly by hammering and commonly decorated through *repoussé*. Methods such as soldering, welding, joining, inlaying and foil-plating pieces of wood were used to fashion attractive but heavy attire that the Cañar lords took to their sepulchers. In the inter-Andean valley between Tungurahua and Chimborazo, the Puruhá ethnic group created metalwork that includes some gold and silver objects, manufactured through hammering, *repoussé* and joining techniques, in accordance with the Central-

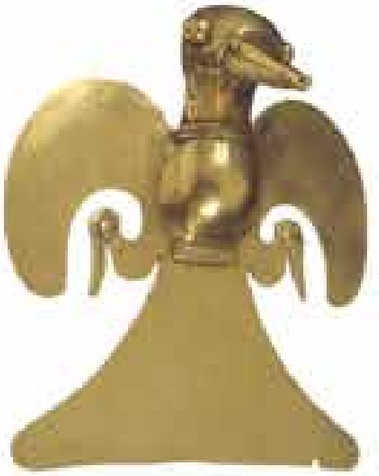


Sheet metal pendant. Paste
Gold. San Pedro – Tenazillo. A.D. 800 – 700. Museo
Arqueológico R. P. Gustavo Le Paige, Chile

Opposite
Pectoral: Bat-man with bird headdress
Gold. Late Tairona. A.D. 900 – 1600. Museo del Oro del Banco de la República, Bogotá, Colombia · 30° C34384

Andean tradition, which strongly influenced southern and central Ecuador's precious metalworking practices. Toward A.D. 1450, the Inca invasion brought about an integration of the local styles through the imposition of the state's rigid patterns, although some of the ancient precious metalworking traditions subsisted as part of mixed systems until the European Conquest, as is the case of the Late Inca-Cañar style.

In the Nariño-Carchi region of northern Ecuador and southern Colombia, the precious metalwork is highly varied, alluding to the manifold influences and courses that converged in the area between A.D. 100 and 1600.[41] To express the iconography, metalworkers frequently employed the technique of gilding and selective removal to produce bi-colored pieces, especially revolving discs, that clearly communicate the idea of complementary opposites. Alternatively, they fabricated articles that were similar in form but not in color (gilded, silver-plated and copper-colored), which are found in pairs or trios. In addition, openwork decoration was used to create objects exhibiting a visual interplay of filled and open spaces.[42]



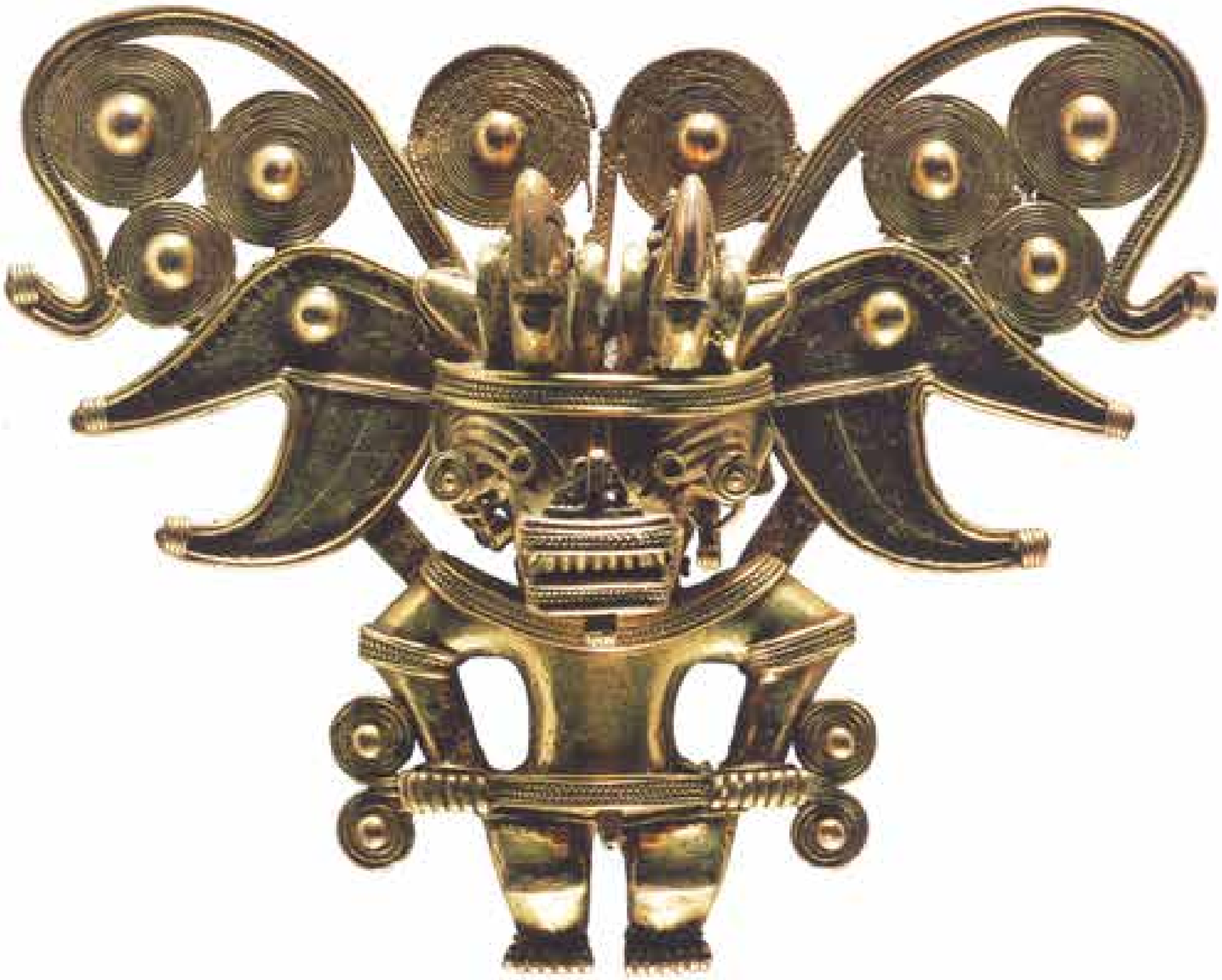
Bird pectoral
Gold. Early Zenú. 100 B.C. – A.D. 800. Museo del Oro del Banco de la República, Bogotá, Colombia · 30° C33752

In the Northern Andes region and Colombia's Caribbean plains, an initial group of precious metalwork styles and periods developed between approximately 100 B.C. and A.D. 1000. This includes the Yotoco-Malagana Period of the Calima area, the early periods of San Agustín, Tierradentro, Tolima, Quimbaya, Uraba and Zenú, and the Nahuange Period of the Sierra Nevada de Santa Marta. What is most striking in this first phase is the extraordinary variety of technology as well as iconography. Nevertheless, a number of the styles and periods express the idea of transformation, which is clearly shamanic in origin. This theme was sometimes manifested in a single piece, and at other times, by means of a series of objects representing stages in the transformation process.[43]

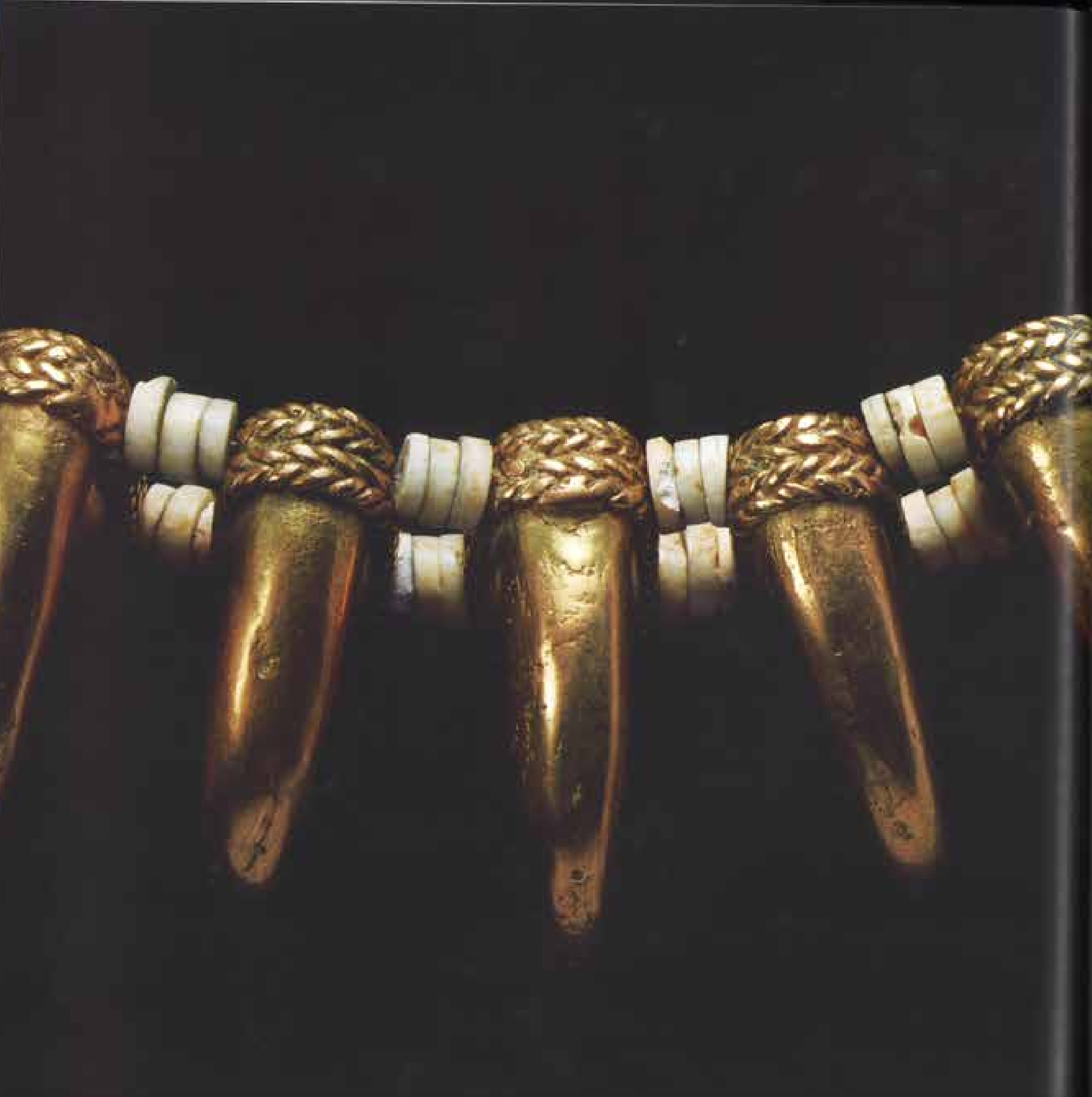
From the Yotoco-Malagana Period, exceptional pieces include lengthy, foil-plated attire, as well as bi-colored articles and granulation-soldered necklaces. In this area, certain icons appear that were widely disseminated throughout most of the territory, such as heart-shaped breastplates and Darien pendants.[44] The precious metalwork styles of San Agustín and Tierradentro, located in the upper Magdalena valley, are represented by a rather limited number of objects exhibiting a unique iconography that includes winged fish, human and feline masks, and bracelets, ear pendants and other plated and joined artifacts. The expression of movement and transformation is particularly striking in Tolima-style pectorals and pendants, which are composed of large, heavy, symmetrical pieces produced through casting and hammering.

Pendant: Human figure in visual alloy
Gold. Early Quimbaya. A.D. 0 – 900. Museo del Oro del Banco de la República, Bogotá, Colombia · 30° C34111

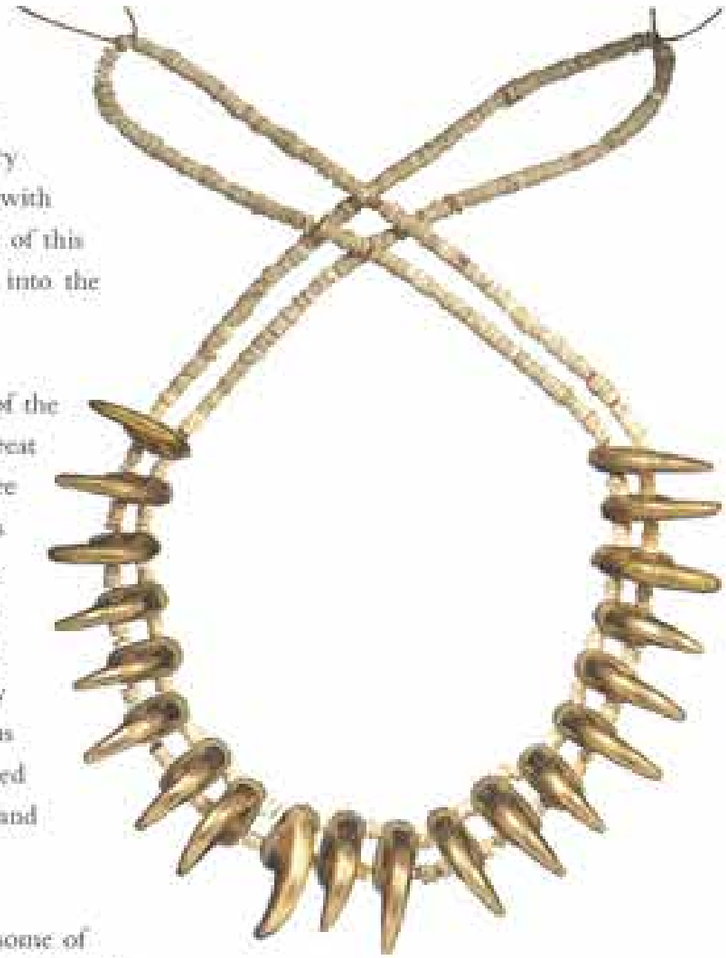
In the Early Quimbaya of the middle valley of the Cauca River, there are a series of pendants with representations of an insect's different metamorphic stages: eggs, larvae,



Precious metals *Gold and silver from pre-Hispanic*



pupae and adults. Uribe[45] found in the great anthropomorphic figures of this period's metallurgy a symbolism centered on the idea of fertility and life's cyclical nature, which includes the imagery of gourds and *tommas* (*Cercomia cujete*), and is also associated with the consumption of coca – the plant of knowledge. A large part of this iconography and the symbolism that accompanied it expanded into the region of Uraba, on the Panama border.



Sáenz[46] has proposed that beginning with the Early Zenú style of the Atlantic Plains region, the conceptualization of the cosmos as a great tapestry grew widespread: society and its economic activities were viewed as networks, and ridges or elevated fields, drainage channels and ditches, as a weaving over the landscape. The metallurgy, with its abundance of false filigree pieces (metal weavings), also participated in this symbolism. In the Sierra Nevada de Santa Marta, along the Caribbean, during the Nahuange Period, the cultural continuity pattern started to coalesce that thrives to this day. Nahuange precious metalwork brought to the Caribbean area the tradition of hammered *tumbaga*, gilding by oxidation, the iconography of the serpent, and pectorals resembling spread-winged birds.[47]

During a second phase, related to the arrival of new settlers in some of the previously mentioned zones, more styles emerged. In some cases, they constituted a continuation – to a greater or lesser degree – of the former, and in others, a rupture. This phase, which partially overlaps its predecessor, extends from approximately A.D. 400 to 1600, and encompasses the Sonso (of the Calima area), Popayán, and Late Quimbaya periods; the intermediate and late styles of the Caribbean plains; the Tairona style of the Sierra Nevada de Santa Marta; and the Cordillera Oriental (Eastern Andes) styles.

The Sonso, Late Quimbaya and Popayán precious metalwork styles are somewhat related, and perpetuate few elements of the earlier traditions of the same regions. Generally, small, simple pieces were manufactured, although there are marked exceptions, such as the circular breastplates with the lizard-man motif, the great saurians of the Late Quimbaya, and the Popayán bird-man pectorals – undoubtedly, the most representative icons portraying the idea of the shaman's ecstatic flight.

In the Caribbean plains, the Early Zenú style became infused with other styles that represent local variations of a major regional tradition. Mammary-shaped breastplates,

Alone and Opposite
Necklace of "fallen stars"
Gold. Early Zenú. 150 B.C. – A.D. 800. Museo del Oro del Banco de la República, Bogotá, Colombia
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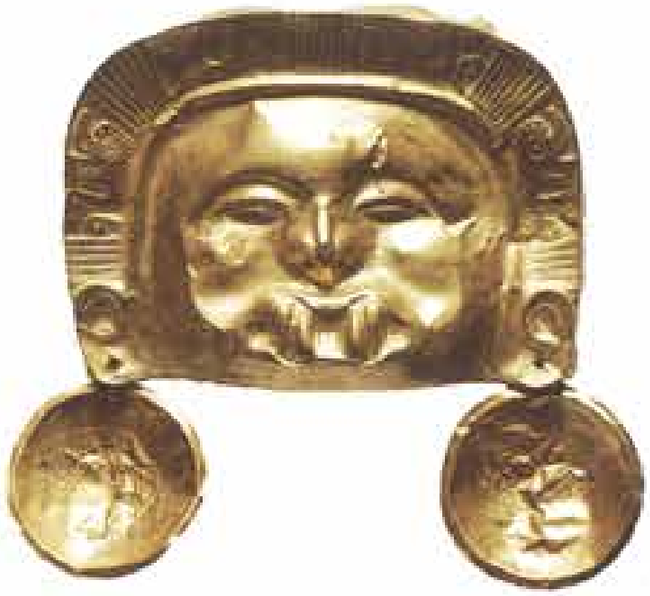
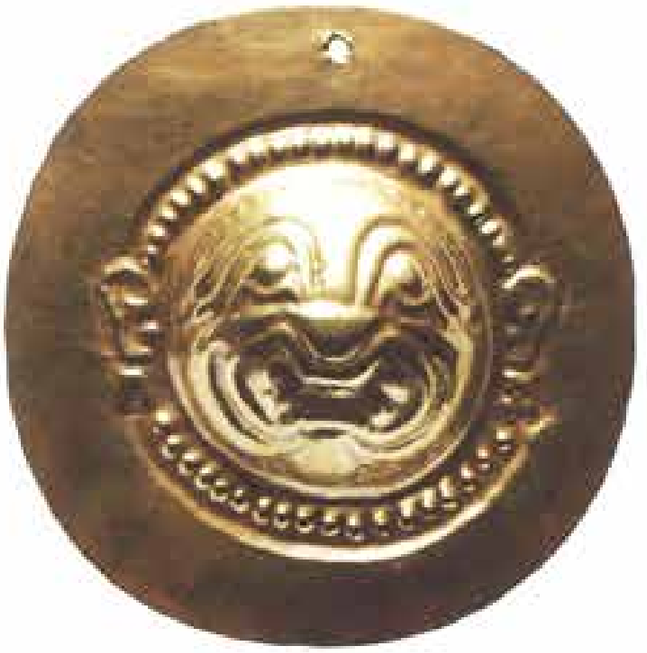
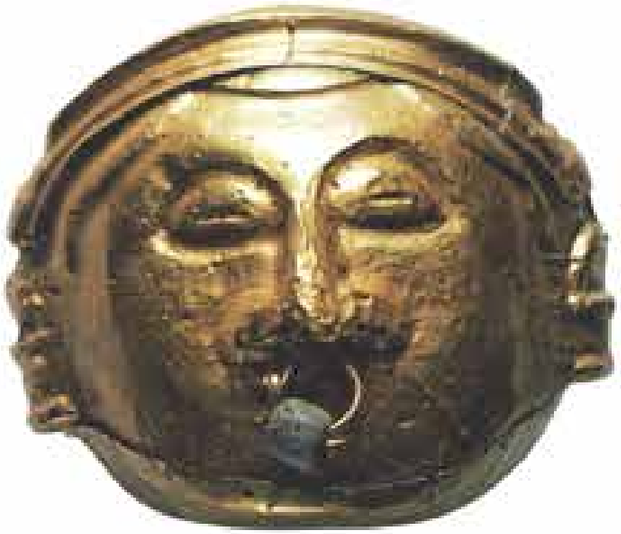


Jaguar-nose face adornment
Gold. Calima Yotoco – Malagana. 350 a.c. – a.c. 800. Museo del Oro del Banco de la República, Bogotá, Colombia – Nº 033232



Ear pendant: Jaguar-nose face
Gold. Diquís. a.c. 800 – 1500. Museo del Oro del Banco de la República, Bogotá, Colombia – Nº [illegible]

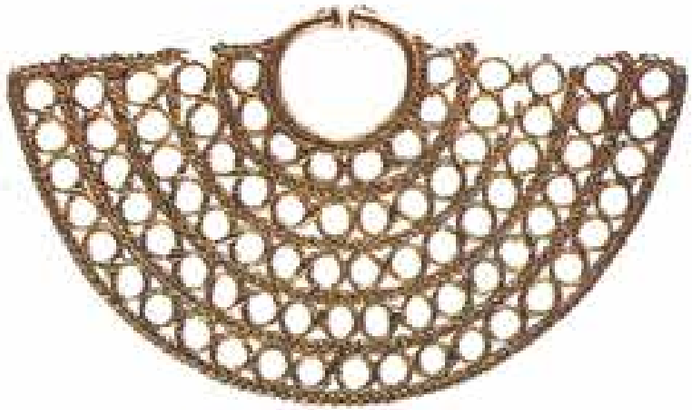


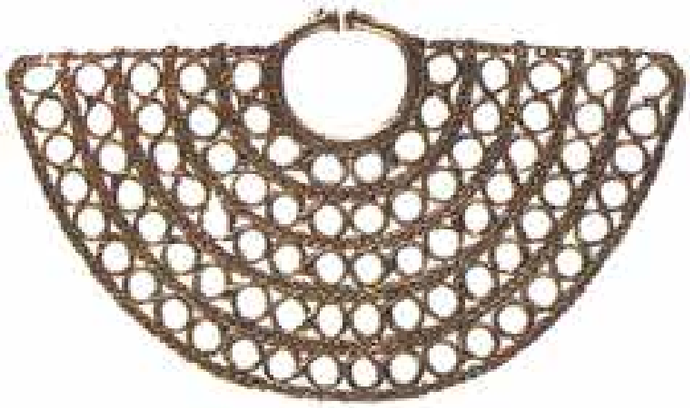
Lime receptacle: Human face with nose ring
Gold. Calima Yotoco – Malagana. 350 a.c. – a.c. 800. Museo del Oro del Banco de la República, Bogotá, Colombia – Nº 033850

Mask: Human face
Gold. Calima Ilama. 800 – 350 a.c. . Museo del Oro del Banco de la República, Bogotá, Colombia – Nº 033883

false filigree ear pendants and an enormous variety of staff heads adorned with motifs of the local fauna have been found in funerary mounds, some of which stand out in the swampy landscape due to their size. During the last centuries before the Conquest, a final group, San Jacinto, replaced the others, preserving much of their iconography, but implementing the extensive use of gilded *tumbaga* and of copper.

During the Late Tairona Period of the Sierra Nevada de Santa Marta, the metalworkers produced numerous gilded *tumbaga* pectorals, pendants, diadems, necklaces and revolving discs with motifs of serpents, birds with outspread wings and bat-men that evidence intensive use. The style was excessively elaborate, and full advantage was taken of the ductility of wax to cast the plaits, spirals and eights that adorn the carefully polished pieces.

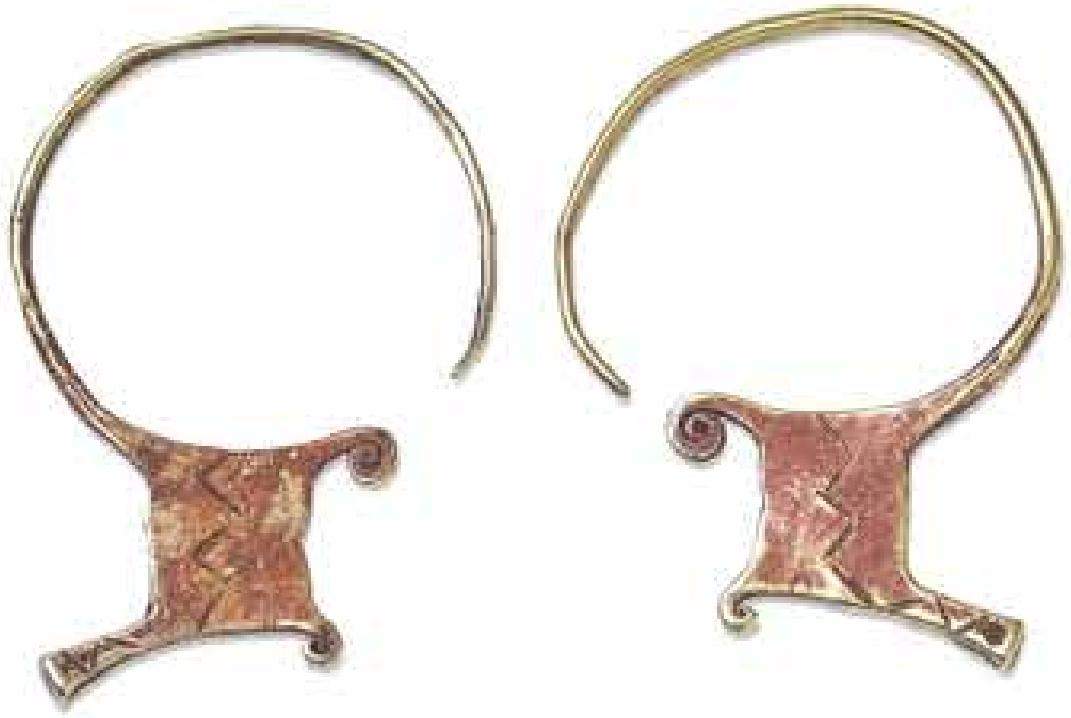




Above and Opposite
Filigree ear spools
Quimbaya, Early Zenú, 150 B.C. – A.D. 800. Museo del Oro del Banco de la República, Bogotá, Colombia – Nº 33052, 33053

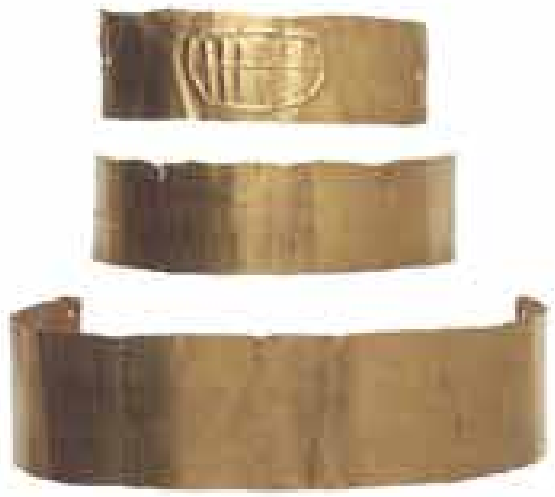
In Colombia's Cordillera Oriental, three contemporary styles, relating to different sub-areas and population groups, produced attire of different complexity. Even more interesting, however, is a collection of votive pieces comprising seven categories of gold, *tumbaga* and copper miniatures (men, women, asexual anthropomorphs, scenes, animals, personal-use items, and home-use articles) made through lost wax casting technology. A number of the objects were deposited together in ceramic offering recipients in lagoons, caves and other sacred places. Such offerings continued to be made even after the Spanish Conquest, as evidenced by their association with mummies dating as late as A.D. 1800.[39]

The territory occupied by present-day Colombia represents the northeastern limit of the pre-Hispanic Andean precious metalwork expansion. In Venezuela and in Guyana, Suriname and French Guiana, archaeologists have only made a few scattered findings of small pieces, some of which appear to have been brought from Colombia.[40]



Now let's turn our attention to the lower part of South America. In northern Chile (Tarapacá, Antofagasta, Atacama and Coquimbo) and in Argentina (Jujuy, Salta, Catamarca, Tucumán, Santiago del Estero, San Juan and La Rioja) are found some metallurgical traditions from the Formative Period (500 B.C. to A.D. 450) that concentrated on the manufacturing of copper and bronze objects,[30] although a few precious metalwork pieces in gold and silver can also be encountered. In archaeological contexts of the Condorhuasi, Cienaga and Tafí traditions, bracelets, curved and oval plaques, breastplates shaped like a bird with outspread wings, and *repoussé* pectorals have been recovered.[31]

During the Regional Integration Period (A.D. 400 to 900), metallurgical production experienced strong expansion. The Yavi and Isla societies imported gold and silver articles of Tiwanaku influence. In a lavish tomb near the locality of El Morro, archaeologists found 109 metallic objects, and in the Doncellas River (Jujuy) area, another intriguing collection of furnishings that includes gold-silver cups.[32] On the other side of the Andes, a similar custom was underway in this same period. In San Pedro de Atacama's "Casa Parroquial" ("Parochial House") cemetery, Téllez and Murphy[33] excavated 22 burials with rich furnishings, such as gold, silver, copper and bronze objects exhibiting a Tiwanaku influence. In other sites of the Atacama altiplano, a few similar pieces have been encountered. The Aguada culture generated most of the period's metallurgical production, which primarily used copper and bronzes; to date, only a few gold head adornments have been registered.[34] In the



Above
Earrings
Gold. Diaguita culture. Circa A.D. 1000 to 1536. Museo Regional de Atacama, Chile. Nº 10-1/34, 10-1/28

Below
Diadem and bracelets
Gold. San Pedro de Atacama culture. A.D. 400 to 700. Museo Arqueológico R. P. Gustavo Le Paige, Chile.

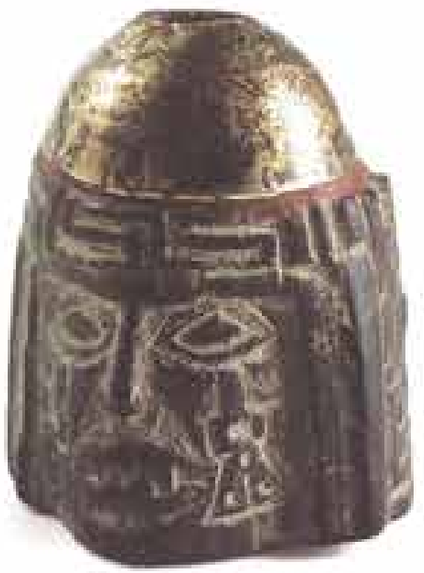
Regional Developments Period (A.D. 900 to 1400), precious metalwork continued to be limited. Scattered findings have been made of discoid adornments, ear pendants, bracelets and anthropomorphic and zoomorphic figurines.[55]

Beginning in A.D. 1400, northern Chile and northwestern Argentina became politically integrated with *Tawantinsuyu*, which had a profound quantitative and qualitative impact on their precious metalwork. Major production centers (Quillay, Calchaqui and Rincón Chico) were established, and the Inca iconography was introduced and disseminated. The region produced copious amounts of gold that was cast in ingots for transport to Cuzco. Few precious metals were worked locally. The findings of this period include votive gold and silver pieces accompanying sacrifices on snow-covered peaks (Reinhard 1992) and some ceremonial ornaments denoting mixed styles (Inca-Northwestern Argentina), as occurred in many of the Empire's outlying zones.

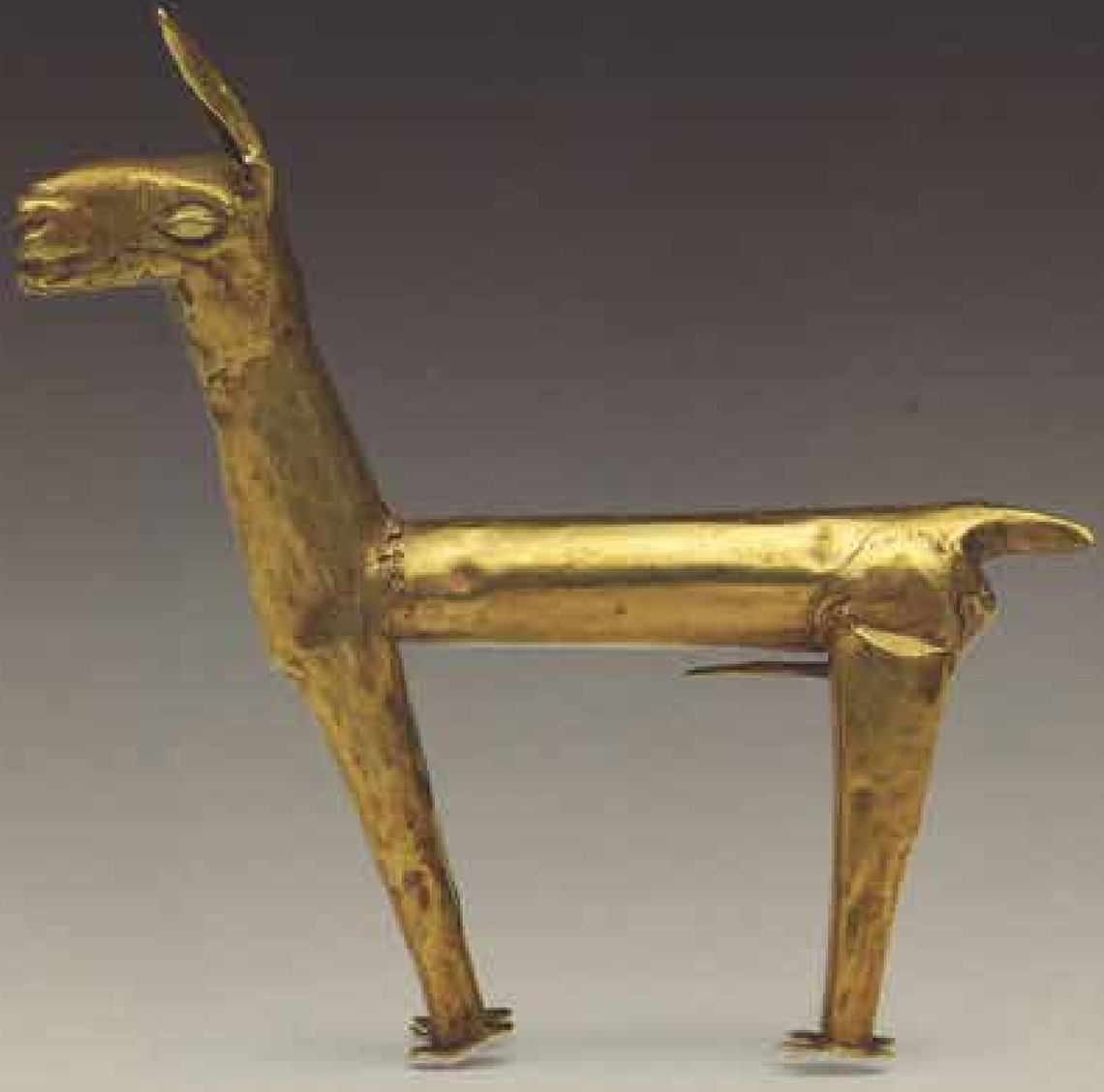
The fate of the gold and silver

With so much having been written about the Spanish Conquest, we too are obliged to touch on this subject. Suffice it to say that for Andean precious metalwork, as for so many other aspects of indigenous life, the event's impact was devastating. The pillaging by the Europeans was such that little raw material was left for the native industry. The conquistadors first appropriated the gold and silver that the Indians carried on themselves, then assaulted their temples and sanctuaries, and soon afterward broke into their tombs to rob the funerary furnishings. Once these sources had been exhausted, they turned their attention to finding out where the precious metals had been extracted, and thus became miners.

Gold and silver flowed in quantities never seen before to the metropolis. In the years following the fall of the Inca Empire, the *Tawantinsuyu* mines produced around 190 metric tons of gold and 635 of silver annually. Through the plundering of Cuzco and the ransom received for the release of the Inca Ruler, Atahualpa, the Spaniards obtained 61 metric tons of silver and 8 of gold that were collected from every corner of the Empire. It took the Spaniards four months working with nine furnaces to melt down all of the objects.



Human head
Gold and copper sheeted. Rio [illegible] - 1000.
Museo Colonial de Arte Precolombino - [illegible]

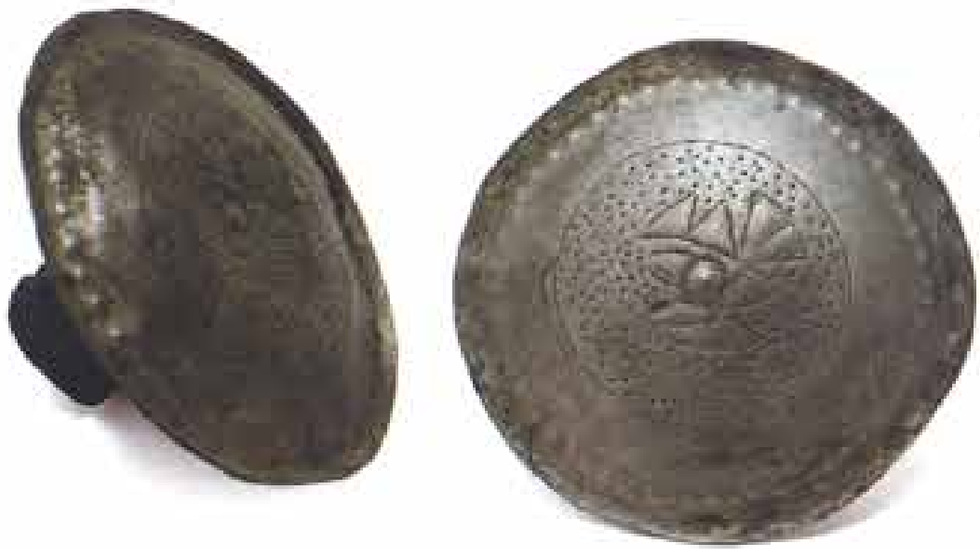


Opposite
Llama
Gold. Inca. a.c. 1400 – 1532. Museo Chileno de Arte Precolombino – Nº 3339

Meanwhile, the American precious metalworkers were not only unable to continue making their pieces due to the lack of raw material, but were absolutely forbidden to produce them. Their precious metalwork objects were always of a religious nature, and their religions, accused of being pagan and diabolical, now could no longer be practiced – at least not publicly. Despite persecution, torture and executions, they continued with their offerings, ceremonies and burials in secret.[20]

In time and with the arrival of European and African metalsmiths, precious metalworking took new directions, and mixed styles developed. American knowledge of alloying and surface finishing was complemented with African skill in smelting as well as European technology, which allowed higher temperatures to be reached through the advent of forced-air furnaces powered by means of water or animal traction. The limited Colonial economic space during the 16th to the 18th century did not permit, however, this industry to meet more than local needs, where production was restricted and slow to advance.

There are some exceptions. Perhaps the most striking is the 16th- to 20th-century Mapuche silverwork. Today, this singular jewelry, endowed with this native culture's powerful iconography, is no longer produced. Other indigenous Andean societies, such as the Aymara, Quechua and Cuna, still use gold and silver jewelry. Among the remaining groups, precious metalworking is extremely rare. The implacable logic of the market pushes the Indians into poverty – there, where it is difficult to obtain precious metals. But this wealth endures in their cosmogony; there, gold and silver continue being forged.



Ear spools
Silver. Chimú. a.c. 1200 – 1532. Museo Chileno de Arte Precolombino – Nº 3796

Notes

Precious metals: *Gold and silver from our ancestors*

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[1] R. Lleras, 2002a. El Chamán orfebre: una exploración en torno de los artesanos y la religión. Manuscript. *Chamanismo, tiempo y lugares sagrados* Symposium, Universidad de Salamanca.

[2] Grossman, W. L., 1972. An ancient gold worker's tool kit. *Archaeology*, 25 (4), New York.

[3] W. Bray, 1998. Gold from the New World. Manuscript, Museo del Oro, Bogotá.

[4] R. Burger & R. Gordon, 1998. Early Central Andean metalworking from Mina Perdida, Peru. *Science*, vol. 282.

[5] W. Bray, op. cit.

[6] M. Tellenius, 1994. Pre-Columbian gold processing in Putushio, South Ecuador: The archaeometallurgical evidence. In *Archaeometry of pre-Columbian sites and artifacts*, David Scott, P. Meyers, Edit., Getty Conservation Institute, Los Angeles.

[7] N. Davies, 1998. *Los antiguos reinos del Perú*. Editorial Crítica, Barcelona.

[8] F. Vallejo, 1989. Le symbolisme du naturel et du social. In *Equateur. La terre et l'or*, Maison de l'Amerique Latine, Paris.

[9] D. Patiño, 1997. Arqueología y metalurgia en la costa pacífica de Colombia y Ecuador. *Boletín Museo del Oro*, No. 43, Banco de la República, Bogotá.

[10] R. Lleras, 2003. La metalurgia prehispánica en el norte de Suramérica: una visión de conjunto. Manuscript. *Metalurgia en América antigua Symposium*, 51º Congreso Internacional de Americanistas, Santiago.

[11] L. R. González, 2004. Bronces sin nombre. La metalurgia prehispánica en el Noroeste Argentino. Ediciones Fundación Ceppa, Buenos Aires.

[12] M. Eliade, 1974. *Herreros y alquimistas*. Alianza Editorial – Taurus Ediciones, Madrid. J. Van Kessel, 1989. Ritual de producción y discurso tecnológico. *Chungará*, No. 23, Universidad de Tarapacá, Arica.

[13] N. Castillo, 1998. *Los antiguos pobladores del Valle Medio del río Porce. Aproximación inicial desde el estudio arqueológico del proyecto Porce II*. Empresas Públicas de Medellín, Universidad de Antioquia.

[14] H. Lechtman, 1988. Traditions and styles in Central Andean metallurgy. In *The beginning of the use of metals and alloys*. Robert Maddin, Ed. Papers from the Second International Conference on the beginning of the use of metals and alloys, The MIT Press, Cambridge, Mass. London, England.

[15] C. Plazas & A. M. Falchetti, 1978. Orfebrería prehispánica de Colombia. *Boletín Museo del Oro*, Nos. 3. Banco de la República, Bogotá.

[16] H. Lechtman, op. cit.

[17] D. Scott & J. F. Bouchard, 1998. Orfebrería prehispánica de las llanuras del Pacífico de Ecuador y Colombia. *Boletín Museo del Oro*, No. 22, Banco de la República, Bogotá.

[18] C. Plazas & A. M. Falchetti, 1978. Orfebrería prehispánica de Colombia. *Boletín Museo del Oro*, No. 3. Banco de la República, Bogotá.

[19] H. Lechtman, op. cit.

[20] H. Lechtman, op. cit.

[21] C. Plazas & A. M. Falchetti, op. cit.

[22] M. A. Uribe, 2003. Orfebrería, ideología y poder en el Cauca Medio: una mirada diacrónica en las sociedades prehispánicas. 51º Congreso Internacional de Americanistas, Santiago. Manuscript, Museo del Oro.

[23] R. Lleras, 2003, op. cit.

[24] H. Lechtman, op. cit.

[25] H. Lechtman, op. cit.

[26] L. Gallon, A. Bernal & C. Hernández, 2003. Nariño: algunos desarrollos tecnológicos en su orfebrería. 51º Congreso Internacional de Americanistas, Santiago, Manuscript, Banco de la República.

[27] I. Shimada, 1996. Sicán metallurgy and its cross-craft relationships. *Boletín Museo del Oro*, No. 41, Banco de la República, Bogotá.

[29] W. Bray, op. cit.

[30] C. Mirando Vasconcellos, 1999. Platería Mapuche. In *Arte Mapuche Chile*, Museo de Arte Popular Americano Tomás Lago, Universidad de Chile, Santiago.

[31] L. G. Lumbreras, 2005. Chavín. Metalurgia. www.perucultural.org/chavin/metalurgia.

[32] W. Bray, op. cit.

[33] Arqueomuseus, 1987. Vicús. *Colección arqueológica*. Museo Banco Central de Reserva del Perú, Lima.

[34] C. Dorsman, 1998. Un ceramio Moche y la fundición prehispánica de metales. *Boletín del Museo Chileno de Arte Precolombino*, No. 7, Santiago.

[35] N. Davies, 1998. *Los antiguos reinos del Perú*. Editorial Crítica, Barcelona.

[36] L. Shimada, op. cit.

[37] I. Shimada, op. cit.

[38] J. Reinhard, 1992. Sacred peaks of the Andes. *National Geographic Magazine*, Vol. 181, No. 3. National Geographic Society, Washington, D.C.

[39] J. F. Boggiani, 1979. Hilos de oro martillado hallados en la costa pacífica del sur de Colombia. *Boletín Museo del Oro*, No. 2, Banco de la República, Bogotá.

[40] A. Feirou, 1995. *Sala del Oro*. Museo Nacional del Banco Central del Ecuador, Quito.

[41] W. Bray, op. cit.

[42] R. Lleras, L. A. Gómez & J. Gutiérrez, 2002. El tiempo en Nariño y Carchi: un análisis de la cronología a la luz de nuevos datos. Manuscript, Museo del Oro, Bogotá.

[43] L. A. Gómez & R. Lleras, 2000. La problemática del Capuli, Piartal, Tuza: una nueva clasificación orfebre. Manuscript, Museo del Oro, Bogotá.

[44] R. Lleras, 2003, op. cit.

[45] C. Plazas & A. M. Falchetti, op. cit.

[46] M. A. Uribe, op. cit.

[47] J. Sáenz, 2002. La gente y el oro en las llanuras del Caribe. Manuscript, Museo del Oro, Bogotá.

[48] J. Sáenz, 2001. Las águilas doradas: más allá de las fronteras y el tiempo. El motivo de las aves con alas desplegadas en la orfebrería Tairona. *Boletín Museo del Oro*, No. 48, Banco de la República, Bogotá. www.banrep.gov.co/museo, Bogotá.

[49] R. Lleras, 2002b. La Gente y el oro en la Cordillera Oriental. Manuscript, Museo del Oro, Bogotá.

[50] J. Sáenz, 2001, op. cit.

[51] L. R. González, 2004. *Bronce sin nombre. La metalurgia prehispánica en el Noroeste Argentino*. Ediciones Fundación Ceppa, Buenos Aires.

[52] L. R. González, op.cit.

[53] L. R. González, op.cit.

[54] L. R. González, op.cit.

[55] F. Téllez & M. Mörner, 2003. El cementerio "Casa Parroquial": un rescate afortunado. San Pedro de Atacama, Chile. Manuscript, report presented at the 51st Congreso Internacional de Americanistas, Santiago.

[56] L. R. González, op.cit.

[57] L. R. González, op.cit.

[58] E. Londoño, 2001. El proceso de Ubaque de 1563: la última ceremonia religiosa pública de los Muiscas. *Boletín Museo del Oro*, No. 49, www.banrep.gov.co/museo, Bogotá.