

# **Metallurgy in the prehistory of South America: a synthetic overview.**

## **Part II**

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**Roberto Lleras**

### 7. Ecuador, regional perspective

**O**n the basis of the developments achieved in the Initial Period new socio-technical dynamics took place in the Ecuadorian coast and Sierra. The period that goes from 500 b.C.E. to 200 C.E. is marked by an extraordinary production; platinum technology was developed and gold, gold alloys and copper were handled proficiently. The Tolita metallurgy radiated its influence northward on the Pacific coast up to Choco, the Western Cordillera and the Cauca Valley in Colombia; in the south the Tolita influence reached the coast of Manabi and the Guayas basin. As a result of this expansive wave, there emerged in Colombia the Calima, San Agustin and Tierradentro metallurgies and in Ecuador the Jama – Coaque and Bahia cultures.

While in the Tolita area this first impulse became gradually exhausted, new trends converged in the Bahia area. Bahia metallurgy seems to have gathered the Tolita inflows with those of the initial focus of Santa Elena; the technological and iconographic reworking that took place there formed the base of the late coastal metallurgical core. During the first centuries of our era the basis of what would be the Milagro-Quevedo and Manteno-Huancavilca metallurgy already existed. The Milagro-Manteño influence reached the north coast where many of the features of the Late Tolita period are derived from it.

In the meanwhile the initial focus of Putushio radiated its influence over the north of Peru and the Ecuadorian central Sierra; in the following centuries many of the elements that make up the technological and formal Central Andean complex can be seen there (tupos, tumis, projectile points, head-breakers, silver-copper alloys, silvered and gilded copper); those were in part derived from the initial focus of

Putushio and in part from the Cupisnique focus of the north Peruvian coast. Be as it may, the truth is that the technological and formal Central Andean complex appears in Cañari and Puruhá in the first centuries of our era.

Cañari and Puruha are two closely related metallurgical traditions. The extraordinary dynamics of these metallurgies in the south and central Sierra determined all the further development of this industry, even in the northern highlands. Canari-Puruha influence must have reached the Quito area rapidly; by the third century C.E. there was a tradition that evolved locally and was then able to radiate its influence northward. First in Imbabura, then in Carchi and Nariño, this tradition set the foundations of the metallurgy of the southern Andes of Colombia.

### 7.1. La Tolita – Tumaco Regional Group

The La Tolita - Tumaco Group developed in the lowlands of the north coast, Esmeraldas and north Manabi provinces, and on the Pacific coast of south Colombia. A large proportion of the objects come from tolas and tombs in what must have been the large ceremonial sites of La Tolita and Tumaco. The initial date of this Group is probably around 500 b.C.E. and the final one around 400 C.E.

The La Tolita - Tumaco technology is possibly the most varied and complex in this territory; the most remarkable feature is the handling of platinum by variations of sintering, allowing the goldsmiths to create solid objects, sheets, as well as coatings and inlayings of this metal. This technological option was, of course, strongly influenced by the presence of platinum in the auriferous sands. The hammering of gold, silver, rich gold tombacs and copper was also practiced. The mastery achieved in hammering and cutting of metal sheets enabled the production of highly complex pieces, such as the famous "Golden Suns". Lost wax casting is less frequent. Other techniques include assemblage by mechanical means such as flanges, sheet folds, hooks, rings and nails and metallurgical means such as welding. Gilding techniques and the setting of precious stones (emeralds) and semi-precious stones were used for finishing. The range of forms of the La Tolita - Tumaco metallurgy is dominated by a variety of small pieces and miniatures, especially facial nails; there is a marked preference for the adornment of the face and head and less emphasis on the trunk and extremities.

After the end of the period of the La Tolita Group the Atacames culture appeared in the same region, around 700 C.E. and it lasted until the conquest in C.E. 1500. These new settlers also produced metal objects, but their technology was different from that of the previous period. In the later period the metallurgy of platinum

disappears, while the use of tombac became **more** frequent, as well as that of copper which is used unalloyed or alloyed with arsenic.

## 7.2. **Jama - Coaque Regional Group**

The Jama - Coaque Group objects are concentrated at sites located on the coast or close to it in the north of the province of Manabi. Their chronology can be estimated between 400 b.C.E. and 1533 C.E. Technologically the Group is characterised by a preponderance of gold hammering; casting seems to have been used only in the manufacture of small components. The combination of the two basic techniques is not common. Embossment and the plating of organic materials with sheets of gold or tombac are usual. Assemblage was done by means of tabs and hooks; there is evidence of welding also. Three-dimensional figures that originally could have wood cores were made through assemblage. Semi-precious stones such as serpentine, jadeite, turquoise and quartz were integrated to gold ornaments. **S**mall nose rings and ear rings account for a very high proportion of the objects. The decoration of the face and head is emphasised; the items to be used in this part of the body represent more than 85% of the total sample. There is also a quantity of hand ornaments. Snail shells were covered with gold foil.

## 7.3. **Bahia Regional Group**

The Bahia Group is distributed all over the central and northern coast, from Esmeraldas to the north of Guayas. With little available archaeological evidence to support it, its chronology is estimated between 100 b.C.E. and 1500 C.E. Alluvial gold and gold - copper alloys of different composition, as well as silver, were used to manufacture the objects. The predominant technique is hammering, efficiently handled in most cases, even when done on difficult materials such as the silver - copper alloys. **H**ammered plates were used to build complex three-dimensional objects. Mechanical assemblages involved the use of long strips of wire which tied together loose parts. Welding of gold, silver and copper objects is also frequent. To decorate they used embossment, usually on small surfaces and forming intricate designs. Another outstanding feature of decoration is the use of semiprecious stones (jadeite, turquoise and sodalite); these are embedded or suspended with hooks and metal wires.

Objects intended to be used in the head and face such as sub-labial ornaments, skin applications, nose rings and ear pendants are the most frequent. The nose rings and earrings are also the finest and most elaborate objects. An exceptional votive offering figure represents a raft with a main character in the centre, flanked by two oarsmen and a helmsman. This piece, made from a silver-copper alloy, required an initial process of hammering and cutting of sheets that were then rolled and assembled by welding and tying with metal wire. The human figures were fabricated separately, also using foils that were bent and welded; then each figure was welded onto the surface of the raft.

#### 7.4. Milagro - Quevedo Regional Group

While the Milagro- Quevedo metallurgy is thought to be restricted to the Guayas - Daule basin, it is actually distributed over a much larger territory which includes parts of the north and central coast and some isolated places in the Central Sierra. Milagro - Quevedo chronology covers the period from 400 to 1533 C.E. During this period a copper and arsenical-copper metallurgy developed that achieved production volumes that have no parallel at the time; large staffs, giant axes and thousands of money-axes came out of moulds in workshops that also made delicate objects of gold, tombac, silver and silvered and gilded copper. In the Milagro society the domestic production of utilitarian objects in copper was very important; in small workshops located inside dwellings, ornaments for popular use were made. At the same time there was a specialised production for the elites performed by specialists. The equipment of a goldsmith consisting of crucibles, chisels, tweezers, copper nozzles with hollow tubes to be set to blowers and conical "breads" of clay used for polishing was found in a tomb in Guayas.

There are two predominant categories of objects: nose rings and money-axes which represent almost half of the objects of the Milagro metallurgy. In the Milagro - Quevedo Group facial decoration is all important; nose rings, are not only the most abundant type, but also the most diverse, even though the spiral shape is predominant. In contrast ear pendants are very few and simple. Equally few are necklaces, beads and breastplates. Personal ornaments are not as important as tools, instruments and utensils such as needles, hooks, chisels, crucibles, axes, moulds, tongs, bowls and tumis. The money-axes are numerous; a type of object

whose function continues to be enigmatic. There is a pattern of metallurgical production oriented towards needs other than the personal adornment; this explains the massive use of copper over gold, even though locally it was easier to obtain gold than copper.

#### 7.5. **Manteño - Huancavilca Regional Group**

The Manteño – Huancavilca Group is distributed on the central coast, provinces of Manabí, Guayas and Los Rios. This distribution is very consistent with the delimitation traditionally accepted for the territory of the historical Manteño - Huancavilca culture. Foci of concentration are in the **S**anta Elena peninsula and in the surroundings of Portoviejo, but Manteño objects also often appear in the Daule - Guayas basin. The chronology covers the period from 600 to 1533 C.E. Manteno - Huancavilca metallurgy is greatly complex, both with regard to metals and alloys used, as to the technologies employed. However, it shares with the Milagro - Quevedo **G**roup several features, techniques and processes. Gold pieces are, however, relatively rare in this region in comparison with copper and silver findings. Silver, gold and copper, or gilt copper, appear combined in bimetallic objects such as masks (of silver) with crowns (of copper). Hammering **is** the preferred technique, combined with assemblage techniques to achieve large and three-dimensional objects. Small gold objects were assembled or welded. Long strips of hammered wire were shaped to form nose rings and ear rings in spiral patterns. Inlays of turquoise and lapis lazuli were used for decoration.

Money-axes have been found by the thousands, as well as other copper objects; this metallurgical tradition has such magnitude that it appears to have spread its techniques to the west coast of Mexico. Manteño goldsmiths had a long-distance trade and kept work instruments that included "Roman" class scales for weighing metals. In the **M**anteño metallurgy the face and head ornaments are not very important, most of the objects are utensils and tools. On the other hand, breastplates, the most important piece for the upper trunk, are varied and the subject of careful elaboration. Another notorious feature of this Group is the appearance of Central Andean types, as the tupos and tumis.

#### 7.6. **Puruha Regional Group**

The distribution of this Group is very consistent with the territory of the archaeological culture and the historical Puruha ethnic group in the 16th century. The focus of concentration is on the centre of the province of Chimborazo, in places where presumably the power centres of the Puruha chiefdoms were in pre-Inca times. Its chronology is still incipient, but based on the available dates it is calculated between 1200 and 1533 C.E. The objects found demonstrate that gold, silver and copper were widely used, either by their selves or combined. The Puruha smiths made extensive use of these metals mainly by hammering and cutting; techniques in which they achieved great mastery. There are several cast objects, and cast and hammered components were sometimes combined. Casting techniques include the lost wax method for figurines and spear thrower hooks and mould casting for axes. There is a special technique which resulted in bi-metallic objects (gold, silver), a technological feature known only in this area and Cañari.

The more varied and elaborate objects are the ear rings, pendants and tupus. Ear pendants are, sometimes, very large, lavishly decorated and with hanging plates that make them true rattles; pendants reproduce this pattern and, although not very large, are finely and carefully prepared. The largest objects, proportionately, are the tupus; some of them are more than one meter long.

### 7.7. Cañari Regional Group

Canari metallurgy is found in the highland provinces of Azuay, Cañar and south Chimborazo. Unfortunately this rich heritage has been heavily looted since the time of the conquest. Archaeological excavations have yielded some dates which, together with estimates, allow us to locate this Group between 500 and 1533 C.E. It is probable, though, that metallurgical activity was present in the area much earlier. It is also known that metallurgical production was at its peak at the arrival of the Incas and that interbreeding occurred that resulted in a metallurgy with mixed Cañari tradition features and Inca patterns. Canari technology shares many elements with Puruha. The metal most frequently used was copper that, on many occasions was gilded, by fusion or plating. They also used silver, possibly the usual silver - copper and gold alloy. Hammering is the most frequent technique, casting, as manufacturing technique had a very restricted use. Lost-wax casting was used for small items such as spear thrower hooks; open mould casting in bivalve or compounds moulds, was employed for large copper objects, such as axes. To form complex and three-dimensional objects from hammered sheets they used flanges,

sheet bending, welding and rivets. They decorated objects with embossing, engraving and embedding of Spondylus beads.

Canari objects include various ornaments for the face, head and upper torso, as well as instruments, tools and utensils. **S**pear throwers, textiles coated with metal plates, vases, large solid rings, gold ribbons that wrapped skeletons, crowns, pendants, defence shields, flutes, staff heads with figures, diadems, plates, needles, weapons that combine head breaker and axe, zoomorphic figures and gold and silver feathers, were found in the lootings carried out in the area.

#### 7.8. **P**asto (Carchi-Nariño) Regional Group

The objects belonging to this Group are found in the Highlands of Carchi and Nariño, north of the Chota Canyon and South of the **P**atia Valley, in Colombia, Research has allowed us to distinguish three distinct periods of development of the metallurgy covering a time span from 100 to 1700 C.E.; the Early, Intermediate and Late periods. The distribution of Pasto metallurgy is very consistent with the territories of the ethnic groups of the 16th century in north Ecuador and south Colombia. The technology used varies between periods of development, even if certain common traits are preserved. **T**he analysis of the materials used reveals that copper-rich alloys of gold are prevailing and that there are many objects of very pure copper, while the rich gold tombacs are scarce. Silver is present in the vast majority of the samples and there are some objects that are, in reality, silver - copper alloys. Hammering was used mainly.

A surface treatment technique known as **z**oned scraping allowed them obtaining objects with two colours and two textures, an unusual visual game without the help of coatings or encrustations. There are few tools in this Group; most of the objects are body ornaments, especially for the head and face, such as nose pieces with carefully balanced geometric motifs. In the Early and Intermediate periods most of the ornaments seem to be aimed for the use by individuals of elite, while in the Late period simple objects are abundant, probably meant to be used by the common people. **A** very special ritual object type is the rotating disk.

#### 7.9. **I**nca Integration

With the Incas there was in the Ecuadorian Sierra a true metallurgical integration. However, the Inca occupation did not enlarge the territorial scope of production and use of metallurgy. The Inca objects come from the same places where the Cañari, Puruha, etc. objects came from, thus indicating that previous traditions had been replaced by the imperial one. Some Inca objects appear on the coast, but most come from the Sierra, mainly from the south and central parts. The exception is the far north (Carchi). The arrival of the Incas, by about 1450, marks the introduction of a massive and organised work that homogenised material, tools, shapes and decorative motifs. Inca metallurgical technology is a very complex theme. It not only covers an enormous territory in South America, but involves a variety of metals and alloys, complex manufacturing and finishing techniques and, above all, a scale of production and consumption unrivalled in the continent. Lost-wax casting was replaced by casting in bivalve and multi-part moulds and cold hammering alternated with annealing in forges. Copper and bronze are most abundant; the latter (intentional alloy of copper and tin) seems to have been an Inca introduction in Ecuador, where it replaced arsenical copper, widely used in former times.

To manufacture containers, hammered sheets were joined by welding their edges. Welding was also employed to make tupos and other objects of copper, gold and silver. Sheets of gold and silver were used also to plate, sometimes silver and gold, in other cases gold or silver on wood. The moulds in this industry are sophisticated; to overcome the limitations in terms of the geometry of the object casted, they used moulds made of several parts that were assembled together and could also be easily disassembled to take out the cast object without damage.

The most abundant ornaments are the simple tupos, as those that were authorised for common women, pendants and rattles. Other adornments, presumably for the exclusive use of certain people (bracelets, nose rings, ear-rings, pectorals) are much scarcer. Very important are tools and weapons; pins, bolas, head breakers, axes, chisels, projectile points, drills, tumis and spear thrower hooks. The other abundant type of objects whose use must also have been much extended in accordance with the precepts of the State religion, are the votive offering figurines.

#### 7.10. A summary of iconography

Among the most frequent geometric shapes we find the circle and the two-dimensional and three-dimensional forms related to it. The circle is also present as a decorative element and comes as part of the configuration of pieces that have other general forms. Altogether this preponderance is quite overwhelming. Another very frequent form in the Ecuadorian metallurgy is the spiral, a derivation of the circle, as well as its projection in three dimensions, the spring. The human motif is present in all Groups; it may appear as a whole body but sometimes just the head or other parts of the body such as arms, legs, ears or noses are represented. The anthropomorphic representation is frontal, hieratic and devoid of movement.

Animals represented include birds first of all and, in descending order of frequency, monkeys, snails, felines, owls, insects, reptiles and crustaceans. In certain Groups birds are very characteristic and play key iconographic roles. In Carchi, it is likely that birds appearing in pendants and breastplates are condors. In Manteño - Huancavilca plates and pectorals have the shape of what appears to be an eagle with outspread wings. The other important animal is the monkey; it appears in Carchi and Manteno - Huancavilca tinculpas and Puruha spear thrower hooks. Felines, possibly jaguars, are important in La Tolita where their representation focuses in mouths with large fangs and in Cañari where its figure is stylised.

Dualism, or the conception of society and nature as an ordered set and balance of opposite principles, is a salient feature of Andean thought. The expression of the dual in the pre-Hispanic metalwork is expressed, for example, as the game of the concave and the convex, filled and empty, bi-colour and bi-texture, bi-metallic and the two-headed tinculpas. Dual iconography has a different specific expression in each Group. The use of platinum and gold in La Tolita allowed creating two coloured objects and figures. In Bahia silver configures dual expressions based on the opposite colours of this metal and gold; identical parts, some gold and some silver seem to have formed part of single sets of grave goods. In Milagro - Quevedo double coils are unusually frequent. In Manteno - Huancavilca is where dual iconography is more explicit; breastplates, pendants, plaques and axes have pairs of human figures and, less frequently, monkeys or protrusions (in pairs or quartets). This pair of identical "twins" appears at times holding hands or supported in a bar that divides the space in four quarters. Dualism is present as a game of colours in the surface of Cañari and Puruha objects; in this case identical objects in silver and gold were deposited in pairs in the tombs of the elite. They also sought to integrate the two colours into a single object; rectangular dangles in gold with

silver corners, semilunar nose pieces of gold with silver centres, spear thrower covers in gold tied with silver ribbons.

## 8. Colombia, regional perspective

We have stated previously that the Central Andes region is characterised by a geographical setting in which there are three main axes running in a broad north-south direction: Costa, Sierra and Selva. This is true as well of Ecuador and the extreme south of Colombia. However, north of the massif known as the Macizo Colombiano this setting changes abruptly. The landscape of the country is dominated by two huge inter-Andean valleys running south-north onto the plains of the Caribbean coast. This imposes radical changes to the ways in which population movements and cultural interchanges operated. On the other hand, to the north of parallel 3° the tropical jungle is replaced by relatively dry savannahs while tropical jungles are now located in the Pacific coast, something that is also completely different from the Central Andes. The particular geographical transition that happens in the Colombian territory and which also links the lands of Central America in an ecological sense has a definite bearing on the diffusion and development of metallurgy and metallurgical traditions.

### 8.1. Chronology and Periods

Given the present state of our knowledge it is only possible to affirm the following general and particular facts:

8.1.1. In the territory of what is now Colombia metallurgy appeared around the 5th century b.C.E. in the south Pacific coast and spread in various regions of the south, centre and north in the following five centuries, i.e. until the beginning of the Common Era, approximately.

8.1.2. In other areas, not necessarily further from the likely focus of introduction, metallurgy appears later; between the first and third century of our Era. By 300 C.E. there are evidences of metal working in all areas of the Andean region and the Pacific and Caribbean lowlands.

- 8.1.3. Within each area we can detect diverse trends with relation to the styles or periods of metallurgy. In the south Pacific coast, there is only evidence for the Early period (Inguapi) but there are no dates for the styles which survived until the Colony and fused with African contributions to create the modern Barbacoas jewellery. In the southern highlands of Nariño the Early Period is represented by the Yacuanquer and La Cruz styles, the Middle Period by the Piartal and Capuli components and the Late Period by the North-Center Late style.
- 8.1.4. Both in the upper and in the Middle Cauca Valley we can distinguish between early and **late** periods (Early from 300 b.C.E. to 500 C.E. and Late from 800 to 1500 C.E.).
- 8.1.5. In the Uraba Gulf metallurgy is quite early (400 to 700 C.E.). Later styles endured and gave rise to the Cuna and Embera present day metal work. In the Caribbean lowlands the Early Zenu Group is dated between the 1<sup>st</sup> century b.C.E. and 12<sup>th</sup> century C.E. The San Jacinto Group is definitely late (15<sup>th</sup> and 16<sup>th</sup> centuries) and seems to correspond to the metallurgy found by the Spaniards in this region that, fused with African and European elements, gave rise to the current Mompox jewellery.
- 8.1.6. In the Sierra Nevada of Santa Marta, it is possible to distinguish clearly an early period, Nahuange (2<sup>nd</sup> to 11<sup>th</sup> centuries) and a late period (10<sup>th</sup> to 16<sup>th</sup> centuries).
- 8.1.7. The panorama of the Eastern Cordillera is more complex. The three styles that make up the metallurgy of this region (Western Complex, Nuclear Muisca and **Simple Hammered**) seem to be contemporary. So far we have been unable to define early or late periods in the metallurgy of this region.
- 8.1.8. The above seems to indicate that, once the metallurgy was introduced, it had in each of the different regions a relatively independent development; only in a very general way we might consider major stages of development common to several areas. **Not** only was different in each area the time of introduction of this industry, but the diversification of styles and groups and the transitions between periods operated at different times and with different durations.
- 8.1.9. Indian metallurgy does not disappear with the conquest and colonisation of the territory. There is indisputable evidence of its survival during the

last five centuries and its fusion with metallurgical traditions from other continents. This means that, broadly speaking, it is a living cultural phenomenon that has duration of 25 centuries. It also means that we must revalue the classificatory concept of "pre-Hispanic" which we use to distinguish this tradition from historical metallurgy; between these two there are undeniable ties.

## 8.2. Geographical Distribution

When dealing with the theme of chronology it has become clear that in this region of northern South America, at least in the last fifteen centuries before the Spanish conquest, only in some areas proper metallurgical industries actually came into existence. This cultural manifestation is confined to part of the regions of the Caribbean lowlands, including the Sierra Nevada de Santa Marta, the plains of the Pacific and the Andean zone with its inter-Andean valleys. Within this area the finds are concentrated in certain regions. The most relevant general aspects related to the distribution of metallurgy can be synthesised as follows:

- 8.2.1. The distribution of metallurgy is a dynamic aspect that should be seen in a temporal perspective. There were variations in the extent of the territories and internal patterns of focuses of concentration in all geographic regions.
- 8.2.2. The distribution of styles and metallurgical groups keeps some relation to the distribution of types and complexes of pottery, but there is not a full correlation. Even when the association of the two types of materials has been tested, we should not expect that where one appears the other should necessarily be there.
- 8.2.3. An important aspect refers to the relationship between areas of concentration of finds of metallurgy and the areas with deposits of metals. Even though the logic of economy of effort might as well set it, the truth is that there is not a complete correlation between the areas with an abundance of raw materials for the industry of metals and the sites where these materials were produced and used. In some areas with an abundance of deposits of gold, silver and copper few objects were actually made and used, while in areas with no resources of this

type they manufactured and used many metal objects. This is evidence of the fact that other social factors were more influential in the process.

- 8.2.4. Within each general area patterns of distribution tend to be complex and do not seem to correspond to simple ecological or geographical logics, as could be the case with patterns of cultivated lands, to cite just one example. Obviously there were powerful factors that we do not understand very well; they must have determined where metal objects were used and deposited.
- 8.2.5. While there has been too much emphasis on the exchange and trading of metal objects, especially in regions like southwest Colombia, this is not an aspect that is clearly supported by the available evidence. What the maps of distribution show is that the objects of each style, group, or period tend to be confined to restricted regions and that extraterritorial finds are exceptional.
- 8.2.6. There seems to be no point in trying to establish general patterns of change in the spatial distribution of metallurgy in Colombia. Different areas show different trends; between one period and the other either contractions or expansions of the territory can occur. Similarly processes of concentration or de-concentration of findings can happen. We must recognize that each region had its own dynamics, relatively independent from its neighbours. This configures a very complex process, influenced by a multitude of factors and hardly reducible to simple formulas of cultural change.

### 8.3. Metallurgical technology

Most geographical areas, to which we have been referring, were characterised by the, more or less similar, use of well-known and relatively simple, manufacturing and finishing techniques which were sometimes combined between them, on gold or gold-copper alloys. This configures a relatively homogeneous basis on which there are some interesting innovations:

- 8.3.1. On the Pacific coast, both in the south and in the north, platinum was used to produce colour plated or bi-coloured parts. This metal is handled

through the process known as sintering or compenetration, involving the direct handling of a mixture (not an alloy) of granules of platinum in an matrix of gold.

- 8.3.2. The use of silver, so common in the Central Andes, was very limited. Despite this, there are pieces of silver in the Nariño - Carchi plateau. In other areas metallurgical analyses have revealed silver proportions exceeding 30%, which cannot be explained by the use of a natural gold alloy; it is likely that in these cases silver would have been added to obtain certain tones on the surface of objects.
- 8.3.3. In the southern Pacific coast and in the upper and middle Cauca Valley the welding of small spheres of gold was employed to form relief decorations; this technique is known as granulation and involved the use of fluxes extracted from vegetable substances to reduce the melting point of the gold - copper alloy.
- 8.3.4. In the Nariño - Carchi plateau depletion gilding was greatly improved thus constituting the zoned scraping surface technique that allowed them to achieve different colours and textures in rotating discs and body ornaments.
- 8.3.5. Also in the Nariño - Carchi plateau there was an interesting, though restricted, experimentation with other alloys. Some tools were elaborated in tin and arsenical bronzes, reflecting, no doubt, the influence of the metalworking traditions of the Central Andes.
- 8.3.6. The extensive use of copper occurred in highland Nariño - Carchi, in the Late Quimbaya of the Middle Cauca Valley, the San Jacinto Group of the Caribbean and in the Muisca Nuclear style of the Eastern Cordillera.
- 8.3.7. Hollow lost wax casting with nucleus is one of the salient features of the Early Quimbaya in the Middle Cauca Valley metallurgy. Among the many technical requirements of this process, perhaps the most critical is the control of the casting temperature.
- 8.3.8. Another variant of the lost-wax casting is the use of stone matrices for the serial production of common motifs. The technique was used for production and decoration of ornaments and the manufacture of some votive figures in the Muisca Nuclear style of the Eastern Cordillera.

- 8.3.9. Complex assemblages have been reported in the Middle Cauca Valley, specifically in the Yotoco - Malagana period, as well as in the upper Magdalena and the Sierra Nevada de Santa Marta.
- 8.3.10. A very interesting aspect of technology that has been neglected in previous analyses is the repairing and patching of objects. Sometimes repairs were made on objects worn by use and, in others, applied to objects that came defective from the manufacturing process. Repairs were made by sheets fastened with hooks or wires and, less frequently, pressed-in studs or welding. **N**ot all defective objects were repaired and some that could have been used without repair (votive figures, for example) were, however, patched.
- 8.3.11. No broad and widespread process of technology dissemination is evident in the general panorama of metallurgy. It is likely that the basic techniques of hammering and casting and the finishing technique of depletion gilding were well-known by the American goldsmiths by the moment when metallurgy appeared in this territory. As it is clear, the processes of innovation were almost all of local order. No such thing as widespread communities of technological knowledge seems to have existed. The degree of isolation must have been quite acute.

#### 8.4. **S**hape and function

First of all, it is useful to establish the difference between simple and complex objects. Regardless of its function, it is clear that a large proportion of metal objects are formal and technologically simple; this category includes the nose and ear pieces of annular, semilunar and circular shapes, circular pendants and breastplates, bracelets and other kinds of small pieces, produced thanks to quick and easy manufacturing processes and with little or no decoration. The simple pieces are the most abundant in the archaeological record; found in contexts such as not very elaborate tombs and with scarce grave goods, suggesting that they were used by ordinary people.

Complex objects are, on the contrary, much more varied in terms of their function. They do not only include the entire range of personal ornaments, but also other

categories of function. Often they involve complex manufacturing techniques and profuse decoration. Even though there are small and even miniature complex objects, their average size is much greater than the simple objects. They are scarce in the archaeological record and in collections; in spite of that they have been featured and published profusely. Its "diagnostic" character has served as the basis for classifications. Available data indicate that they appear in complex archaeological contexts; tombs with rich grave goods, deposits of offerings, etc. This suggests that their use was restricted to persons who held special political, religious or social positions.

Secondly, metal objects may be classified according to their general function. The popular idea that objects of gold are jewellery gave rise to the belief that all pre-Columbian metal objects were used to decorate the body. The universe of functions is actually quite broad and includes the following basic categories:

- a. Personal ornaments
- b. Tools and utensils
- c. Votive figures
- d. Objects related with the consumption of coca and hallucinogens
- e. Musical instruments
- f. Emblems of power and rank
- g. Ornaments for constructions and statues

Objects may be classified according to their geometric shape. Even though the universe of forms of indigenous metal objects is very well known, no statistical survey has been done which allows us to understand which the proportion of each type is in the population of each Group. Most of what we have stated for Ecuador would also apply to Colombia, so we will only point out a few characteristic traits:

- a. The human figure is preferred. **P**atterns of representation are rigid: no movement; the presentation is frontal; the faces are expressionless or have expressions of low intensity; in the representations of the whole body the head occupies one third of the height. There is a restricted range of body positions, standing, sitting (sometimes on benches) or kneeling with four or five variations in the position of the arms. A distinctive feature is the

tendency to create icons, standardised and repetitive representations of human figures.

- b. Among the many species of animals that populated the territory only a few came to have importance in metallurgy. The most frequently represented animal was the bird. Birds appear in all the functional categories in varying degrees of outlining and stylization; there are detailed and realistic representations and others that involve only two or three simplified traits of the animal. Another important type are felines; jaguars, pumas and ocelots. Snakes acquire high degrees of stylisation, to the point of being represented simply by a forked tongue. Bats are usually represented in a very schematic way. Frogs and toads are profusely represented in necklace beads.
- c. Mixed representations, anthropo-zoomorphic and zoo-zoomorphic, are also frequent. Among these, the most common are those of the man - bat, man - feline, man - bird, man - snake and snake - feline. In the Eastern Cordillera there are votive figures that mix deer, snake, feline and man.
- d. The representations of the vegetable world are scarce; these include gourds in the Middle Cauca Valley and a few flowers here and there.

In general it can be said that the formal and functional universe is extraordinarily rich and varied; this does not imply that it reflects a great deal of individual creative freedom. On the contrary, the huge range of shapes and functions seems to respond to rigid, pre-established patterns of design and manufacture.

#### 8.5. Iconogr aphy and symbolism; some general ideas

- a. Although the shamanic theme and, more precisely, the shamanic flight are dominant in the iconography of the metallurgy of Colombia, it should not be assumed that all metal objects have a shamanic iconography. There are important groups of objects that do not participate in this symbolism.
- b. The votive figures of the Eastern Cordillera form a set with a particular symbolism. A typology of more than seventy kinds of figures which, in turn, are grouped into seven major categories has been established in this area.

Each type of figurine embodied a specific principle within a dual conception of the cosmos; in this way the offering constituted a way of balancing the opposing principles of the cosmos.

- c. The idea of the transformation, which has an obvious shamanic source, is present in various styles and periods. This topic was sometimes managed within a single piece and also through a series of objects that represent stages in the transformative process. The most common transformation depicted is, as before stated, that of man - animal in its different variants and, likewise, the animal – animal transformation.
- d. It has been proposed that in the Caribbean lowlands the conception of the cosmos as a large textile became predominant. Society and its economic activities were seen as networks, while the ridges and channels of the drainage systems were as knitting over the landscape.
- e. The large anthropomorphic figures of the Early Quimbaya metallurgy in the Middle Cauca Valley portray a symbolism centred on the idea of fertility and the cyclical nature of life, which is related also with the symbolism of pumpkins and gourds and, in turn, with the consumption of coca.

## 9. Central America and the Antilles

During the first centuries C.E. the south west Circum-Caribbean littoral and the major Antilles were part of an area where cultural interchange seems to have been especially active. The area was populated by Chibcha and Arawak speaking groups that involved metals in their sacred symbolism. This favoured the expansion of metal working traditions from South America, leading eventually to the formation of local styles. In Panama, Costa Rica and southern Nicaragua this process fully evolved, both in terms of technology and iconography. In the territory of northern Nicaragua this cultural influx met the influence of the powerful Mayas and of the subsequent Meso-American cultures; this marked the north limit of the expansion of metallurgy via the isthmus. In the Antilles gold and guanine (tombac) were used by the time of the Spanish conquest. The finds are, however, very scarce and there is no museum collection or archaeological find that may allow establishing iconographic and technological trends; little is known also about geographical distribution and chronology.

### 9.1. The gold of Panama

A large part of the metallurgy of Panama comes from the Conte site, a large settlement with rich graves occupied from about 450 to 900 C.E. More than 80 graves, some of them containing multiple skeletons, were dug and many objects of gold were unearthed. The grave offerings include embossed plaques, nose ornaments, gold-sheathed ear pieces, pendants, bells, and necklace beads. Decorative motifs are mainly anthropomorphic and zoomorphic; human, bats, deer, sharks, snakes, birds, turtles, crabs, insects, frogs, stingrays, armadillos, monkeys and alligators. Most motives appear also in the Cocolé style pottery, well represented in the Conte graves. The gold style is thus termed as Cocolé. Due to the careless methods of excavation much information was lost. The objects are now at the University of Pennsylvania, USA.

Recently some other rich graves were excavated at El Caño, another large site with many graves and an arrangement of stone columns, probably marking astronomical observations. The tombs are dated between 700 and 1000 C.E. A few isolated finds from several different places were collected by the Museo del Hombre Panameño; some of them were stolen. The objects from this part of Central America are manufactured in gold or gold-rich alloys. Most are made by lost wax casting and constitute body ornaments used by people of the elite. By the time of the European conquest there was in Panama an important gold working tradition that involved the work of artisans of high rank; priests and chiefs, who mastered the skills of craftsmanship.

### 9.2. Costa Rica gold styles

Apparently the most appreciated material in the territory of Costa Rica by the beginning of the Common Era was jade, brought initially from the areas of the Olmec and Maya cultures. By around 900 C.E. the fall of the Maya culture disrupted the interchange circuits and metal soon replaced jade as the foremost material for elite use. There are, however, evidences of the use of metal objects dating back to 300 C.E. The earliest tradition is located in the central Atlantic region (300 – 800 C.E.); most objects are made of copper-rich tombacs gilded by depletion and portraying human figures. Lost-wax casting was preferred and objects were made in such a way as to maximise their size keeping down their

weight. This technological innovation remained present in the subsequent styles of the central Atlantic region, from 700 C.E. onwards.

The major gold working areas are located in the south east of the country, Diquis region, where there are also abundant alluvial gold deposits. In spite of what we just stated, most metal objects from Costa Rica tend to be rather small body ornaments; pendants, breastplates, necklace beads, ear and nose pendants. There is a rich iconography within this small-scale universe; frogs, bats, felines, alligators, shamans, musicians, alligator-man, bat-man, jaguar-man and scenes of alligators and alligator-men devouring people. Gold objects of pre-Columbian origin were used by native chiefs in Costa Rica throughout Colonial and Republican times, up to the 20<sup>th</sup> century.

#### 10. Pre-Columbian epilogue

Given the level of development of Mexican cultures it is quite surprising that metallurgy had among them such little importance. There are very few Maya objects of hammered gold sheet apparently intended as textile applications. The most important find of gold objects is, undoubtedly, a set of pendants and other ornaments from the site of Monte Alban, Mixtec culture, now kept at the museum in Oaxaca. Aztec metallurgy evolved very late; just prior to the Spanish conquest a silver, gold and bronze metallurgy which combined the effort of artisans from other specialities seemed to be very active. Most of Aztec metallurgy went into the furnaces of the Conquistadors so very little is known about it. The other important metallurgical tradition in Mexico comes from the western Pacific coast; in the states of Jalisco, Colima, Guerrero and Nayarit flourished around 900 C.E. an important copper metallurgy. It has been established, doubtlessly, that this local phenomenon was the product of a long-distance trading connection with the Ecuadorian cultures. Mexican objects resemble closely the Manteño-Huancavilca objects from Ecuador, both in shape and manufacturing patterns.

Further north of the 23<sup>o</sup> parallel there is no proper metallurgy in pre-Columbian America. There are, however, important finds of metal objects. In the region of the Great Lakes and the upper Mississippi River native copper was mined and hammered to produce different items as early as 4000 b.C.E. No ore processes were involved and no casting techniques were used; this is the reason why this is

not considered as a true metallurgical tradition. In technical terms native copper was treated as a stone, not as metallurgists would treat metals. On the other hand it is possible that annealing techniques were employed (alternation of reheating and hammering), so some doubt about whether this is or is not a metallurgical industry still remains.

#### 11. The metals of the Indians after the conquest

For reasons that are not strictly scientific, American archaeo-metallurgy makes a sharp cut on the time scale of its object of study. The studies come up to the time of the conquest and avoid exploring processes and evidences of the Colony and the Republic. Afterwards, studies of metallurgy reappear to account for the industrial era in the 19<sup>th</sup> and 20<sup>th</sup> centuries. It is as if the social dynamics had frozen and then were miraculously reactivated in a different time and space. This, of course, is not more than an aberration of the scientists, not a reality. There is an interesting transition that starts at the time of the conquest and extends to the present day. There are five trends and processes that mark this particular transition between the pre-Hispanic metalwork and modern metallurgy. These processes had different expressions and rhythms in the various provinces of Spanish America:

- a. The disappearance of the native gold objects and gold work - The hoarding of gold by the conquerors acted in two ways, equally devastating with respect to the production cycle. Firstly, it affected the moment of production; without enough raw material goldsmiths were paralysed. In the second place it attacked the moment of consumption since, even if they continued producing ornaments, it was increasingly difficult to use them, taking into account the prohibitions and the threat of a repetition of the looting.
- b. The attempts to continue producing and using 'traditional' objects in metals other than gold and its alloys - This alternative was most natural and naive. It was obvious that the sudden availability of metals, materialised in pots, pans, tools, etc. represented an attractive source of raw material. Spaniards had them and were willing to sell them and, in principle, there was no prohibition for their possession. The problem arose when European iron, tin, copper, brass and pewter went in to shape crowns, nose rings and ear rings for the Indians; such outrage would not be tolerated.

- c. The persistence in the use and manufacture of metal objects, sometimes under the protection of geographic isolation and sometimes in conditions of secrecy – There are evidences, both represented in C14 dates obtained from metal objects (13 dates for northern South America) and documents that prove that, in spite of all the difficulties, traditional objects were being produced by native communities in isolated regions until the early 19<sup>th</sup> century. On the other hand, gold remained present, though not materially, in the symbolism, mythology and oral tradition of many Indian societies.
  
- d. The emergence of new colonial indigenous metallurgical industries in areas where, before the conquest, there were no traditions or they were incipient – Surprisingly, in areas like northern Choco in the Pacific coast of Colombia and south-central Chile where metallurgy was unimportant or altogether absent in pre-Columbian times, emerged new traditions. On the basis of new available material, i.e. silver coins, new jewellery industries emerged. No European influence is involved; the whole process is Colonial Indian.
  
- e. The formation of mixed industries, combining American technologies and aesthetic patterns with others of European and, sometimes, African origin – When the Europeans started to settle in cities all along America they had to deal with the problem of providing articles for the daily life consumption to which they were used. European jewels and metal objects were expensive, it was difficult also to import all the qualified craftsmen needed for the workshops. This led to the incorporation of native smiths and, later on, slaves brought from gold working provinces of the west coast of Africa. In time flourishing “mestizo” jewellery traditions emerged in several places like Mompox in the Caribbean lowlands of Colombia, Barbacoas in the south Pacific coast and Santa Elena in the central coast of Ecuador.

These traditions have been crawling marginally over a long period of agony that for some of them ends with their death and for others with a transformation that perverts all its content in order to adapt it to the needs of the capitalist market and the new tastes of the commercial handicrafts.