

*Journal of the
American Musical
Instrument Society*

VOLUME XII • 1986



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The Flutes of El Dorado: An Archaeomusicological Investigation of the Tairona Civilization of Colombia

DALE A. OLSEN

THROUGHOUT THE WESTERN HEMISPHERE many ancient civilizations reached high levels of technology both in development of architecture—temples, agricultural terraces, irrigation canals, and paved roads—and in the perfection of metallurgy and pottery (their achievement in pottery often including the fabrication of various types of musical instruments). The Aztec, Mayan, and Incan cultures are well known because of the expanse of their civilizations, the quantity of their peoples (many of their descendants even today make up a large portion of the populations of Mexico, Guatemala, and Peru), and the level of artistic achievement shown in the artifacts which are still being discovered by archaeologists. But there were other highly developed civilizations that were contemporary with these “big three” that are almost totally unknown outside of scholarly circles or the countries where they flourished. One of the most notable was the Tairona culture from the Santa Marta region of northern Colombia (fig. 1). Unfortunately, the Tairona was one of the first continental native American civilizations to be culturally destroyed by the Spanish conquerors. This conquest began in 1502, when the Spanish, nurtured by the tale of El Dorado, the “Gilded One,” first set foot on the northeastern coast of what is now Colombia in search of gold. The *conquistadores* enslaved many Tairona men, women, and children, killed

This article is a slightly expanded version of a paper presented at the thirteenth annual meeting of the American Musical Instrument Society at Arizona State University in March of 1984. The principal research for this project, in Bogotá, Colombia, was made possible with a Summer Stipend grant from the National Endowment for the Humanities in 1974. Additional funds were provided by a grant for research at the Field Museum of Natural History in Chicago in 1980 from the Committee for Faculty Research at The Florida State University.

I wish to thank the numerous institutions, agencies, and persons in Bogotá, Colombia, who allowed me to photograph and study the many artifacts in their collections; Dr. Michael Moseley, formerly of the Field Museum of Natural History, Chicago, who permitted me to photograph the John Alden Mason collection; and Kenneth Moore, Assistant Curator of Musical Instruments at the Metropolitan Museum of Art, New York, who sent me color photographs of the museum's Tairona musical instrument collection which were invaluable for comparisons.

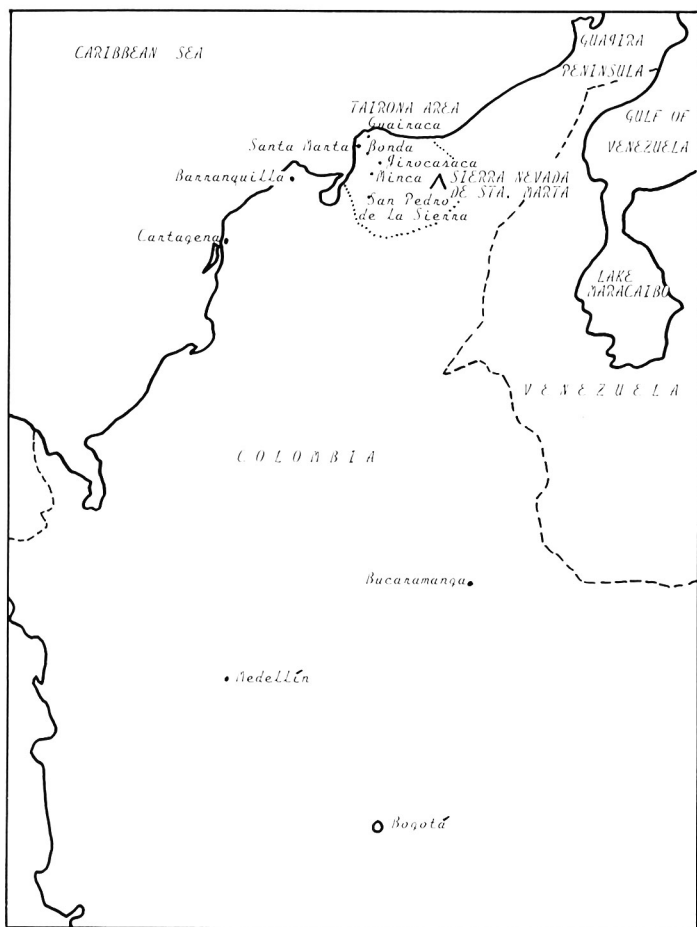


FIGURE 1. Northern Colombia and the Tairona Region.

their chiefs and priests, and caused the remaining people to withdraw into the dense forests and rugged terrain of the Santa Marta mountains. The Colombian Kogi (Cogui, Kogui, Kagaba) native Americans are thought to be the modern descendants of the Tairona.¹

Archaeology and its bastard son, grave robbing, have provided most of what is known today about the Tairona. Thousands of ceramic objects have been found that detail many aspects of Tairona life and beliefs. Hundreds more are musical instruments (flutes and ocarinas) made in the shapes of humans (fig. 2), animals, and highly stylized versions of both. I call these small ceramic tubular and globular edge-blown instruments musical effigy figurines; they were, I believe, regarded as powerful tools for individuals who used them to conjure up supernatural powers or to provide protection from physical or spiritual dangers.² This study will address particular problems involved in archaeomusicology (the study of ancient musical instruments that are known only through archaeology) and will present a method for the organization and musical analysis of aerophonic archaeological specimens of the flute type, based upon the material evidence of the musical culture of the ancient Tairona.

During research in Colombia in 1974 and at the Field Museum of Natural History in Chicago in 1982, I photographed, measured, and recorded (playing them myself) over 300 of these musical instruments from the Tairona civilization. After a cursory investigation, I originally hypothesized that each of the various zoomorphic and anthropomorphic aerophone categories would possess a similar tuning system, and that the instruments would not have been produced haphazardly, but would have been constructed with as much concern for pitch organization as for elaborate exterior detail. Detailed analysis has shown, however, that this hypothesis is, at least etically, incorrect (if an emic analysis were possible, the hypothesis could prove valid).³

Historical and Cultural Background of the Tairona

Not very much can be learned about the Tairona from historical records, for their conquerors wrote very little about them. They were proba-

1. Gerardo Reichel-Dolmatoff, *Colombia, Ancient Peoples and Places Series*, vol. 44 (New York: Praeger Publishers, 1965), 148.

2. See note 20 below.

3. Etic and emic can be explained as forms of analysis borrowed from linguistics and anthropology: *etic* means studied from outside the culture and *emic* means studied from within.

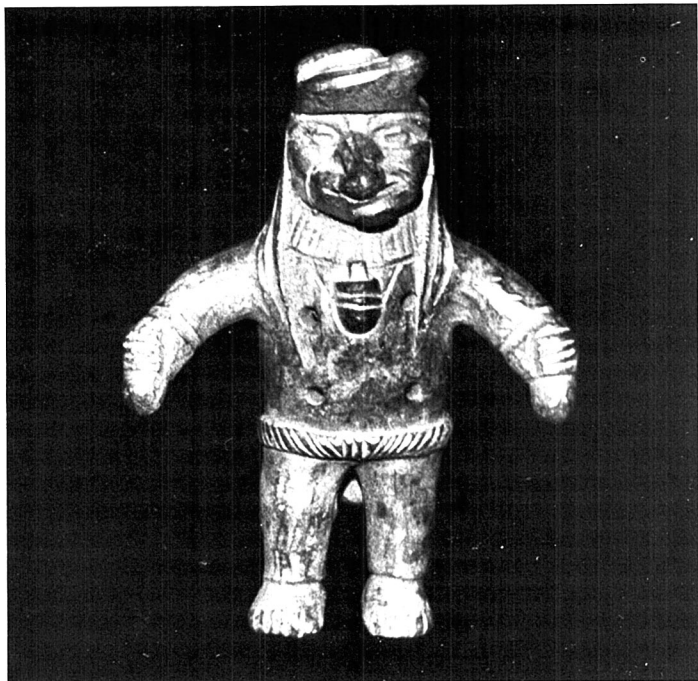


FIGURE 2. A.2.0.e(2).4h. Stylized man ocarina with a human heart necklace, four fingerholes. Height 15 cm; width 10.4 cm; circumference 13.9 cm. Guillermo Cano private collection, Bogotá, Colombia. Photograph by the author.

bly only a small tribal group along with others in the vicinity of the northern and western slopes of the Sierra Nevada de Santa Marta in northern Colombia.⁴ Although the chronicler Juan de Castellanos, writing in 1545–46, referred to this native American culture as the Tairós, the name Tairona has consistently been used in modern scholarship.⁵

4. Gerardo Reichel-Dolmatoff, *Datos históricos-culturales sobre las tribus de la antigua gobernación de Santa Marta*. Bogotá: Instituto Etnológico de Magdalena (Santa Marta: Imprenta de Banco de la República, 1951), 58.

5. *Ibid.*

Archaeological investigation has revealed that the Tairona lived in numerous large village federations consisting of hundreds of circular dwellings placed upon stone ring foundations. These villages had temples, stone burial vaults, stone irrigation systems, stone-walled terraces, and stone-paved roads leading from one village to the other. Gerardo Reichel-Dolmatoff writes:

Life in a Tairona village must have been colorful and busy. Here were a people who loved to manufacture with care and taste the simplest utensils of everyday life, to decorate them and to individualize them. They took pleasure in the smooth and shining surfaces of their black pottery. . . . There must assuredly have been skilled artisans in many different crafts: potters, goldsmiths . . .⁶

In addition, numerous ceremonial centers and ceremonial houses or temples were established by the Tairona throughout their villages and mountain retreats. Although the Spanish chroniclers referred to them as “temples of the devil,” they reported that the Tairona made pilgrimages to these religious centers. Central to Tairona religion, according to the Kogi Indians of today, was a jaguar-god known as Cashinducua.⁷ Jaguar imagery is very commonly displayed in Tairona gold and ceramic iconography, especially among the many ceramic ocarinas (fig. 3).

Although ethnocentrism invites the speculation that these ceramic ocarinas and tubular flutes were recreational sound makers frequently used for diversion (as clay ocarinas are today in parts of Colombia), a search into archaeologists’ notes strongly suggests a ritual use for them. Provenience, however, cannot always be ascertained, for most of the surviving exemplars are not documented. Even some of the ceramic ocarinas in the Field Museum of Natural History, Chicago, which were carried from Colombia by John Alden Mason in the 1920s,⁸ were purchased from grave robbers, as were many of the examples I found in stores and museums throughout Bogotá.

Nevertheless, Mason himself excavated numerous ceramic ocarinas, which his field notes list as coming from either of two areas within certain sites: graves or houses (but not temples). The following items from Mason’s field notes for May 1922 through April 1923 refer to grave sites:

6. Reichel-Dolmatoff, *Colombia*, 155.

7. *Ibid.*, 149.

8. John Alden Mason, *Archaeology of Santa Marta, Colombia, The Tairona Culture*, Marshall Field Archaeological Expedition to Colombia 1922–23, Part I, *Report on Field Work* (Chicago: Field Museum of Natural History, 1931); Part II, Section 2, *Objects of Pottery* (Chicago: Field Museum of Natural History, 1939).



FIGURE 3. A.2.000.f(j-2,4).1h. Jaguar god/man triple ocarina with three chambers (one fingerhole in center chamber) and three mouthpieces. Height 11.7 cm; width 8.8 cm; thickness 3.2 cm. Museo del Oro (Gold Museum), Banco de la República, Bogotá. Photograph by the author.

- [1] . . . an urn of C (possibly A) type, protected by a cover, and containing traces of bones, probably those of a child. . . . In the earth of the urn, in addition to the human bones, were found five black pottery whistles . . . a small stone axe-head, a copper frog, the bones of a small animal . . .
- [2] Five black pottery whistles were found in one C urn, apparently with a burial of a child . . .

- [3] The principal object of interest found in this site is a small, stone-lined grave or boveda. . . . Little was found in this grave. . . . Above this grave was found a broken olla [jar] of polished black ware containing . . . two pottery figurine whistles.
- [4] A small stone-lined grave found. A red stone axe found, another green axe-head, some beads and a small black olla of polished ware with long ornament of green stone and two figurine whistles of black pottery.⁹

Evidence for the presence of clay ocarinas in house sites comes from Reichel-Dolmatoff, who, like Mason, had firsthand experience as an archaeologist in Tairona territory. In the following account, he gives important clues as to the use of certain ocarinas:

The center of the house is clean and free of furniture, but along the curve of the wall there lie the odds and ends which once belonged to each member of the family and which were left lying on the floor. . . . In a corner there will be a few polished stone celts, a fish-hook of stone, net sinkers, a couple of bird-shaped clay whistles, and perhaps some ceremonial object such as a finely polished monolithic axe. That the opposite side of the house was occupied by the women is suggested by the pottery, the children's necklaces, and the scraping and grinding tools of daily food preparation.¹⁰

Mason also writes about objects found within the ring of stones forming the foundation of a house:

Many other buried objects were found on this site. . . . These were found in all parts of the circles, but mostly to the north and least to the south, and apparently without any plan of interment. A vase of dark pottery . . . contained a monolithic axe. . . . Nearby was a pottery whistle in the form of a bat.¹¹

These findings suggest that certain of the clay ocarinas were used by the Tairona men, probably as sacred objects in the form of talismans for averting supernatural danger or for calling up supernatural help. That they were musical instruments for secret magical use rather than instruments for the populace at large is suggested by their absence from the accounts of colonial chroniclers. Gonzalo Fernández de Oviedo y Valdés, for example, writes in 1514 that the Tairona "make large drums from about six or seven palms in length, made from the hollow trunks of large trees."¹² The chroniclers also mention Tairona "cornets" and conch-shell trumpets.¹³ All

9. John Alden Mason, Unpublished Field Notes, May–December 1922, January–April 1923 (Chicago: Archive of the Field Museum of Natural History).

10. Reichel-Dolmatoff, *Colombia*, 148.

11. Mason, *Archaeology*, Part 1, 66.

12. Reichel-Dolmatoff, *Datos históricos-culturales*, 93.

13. *Ibid.*

of these are instruments of loud sounds obviously intended for priest-village ceremonial use. But no mention is made by the Spanish of the Tairona ceramic musical instruments.

The small ceramic tubular flutes, globular flutes, and whistles,¹⁴ that is, the musical effigy figurines, are described by Reichel-Dolmatoff:

Elaborate clay ocarinas constitute a special category of objects, ranging from simple bird shapes to very complex figurines of warriors or priests, with high feathered head-dresses, nose ornaments, clubs, and other paraphernalia. Some of these effigies show people wearing animal masks or sometimes a human face peers through the open jaws of a jaguar or reptilian monster.¹⁵

The archaeologist/explorer Gregory Mason (not related to John Alden Mason) cites the Tairona effigy figurines of clay, stone, metal, shell, and bone as evidence of totemism among the Tairona.¹⁶ Indeed, the number of animals represented in Tairona sculpture is large, and includes birds such as owls, parrots, eagles, hawks, and doves; mammals such as bats (fig. 4), dogs, foxes or opossums (fig. 5), jaguars, pigs, and monkeys; and reptiles and amphibians such as crocodiles, frogs, turtles (fig. 6), lizards, and snakes (fig. 7). About these and their symbolism Mason writes:

I am convinced that these representations are not the haphazard result of the free play of Indian whim. Indians never give free play to their imaginations. Every stroke in an Indian drawing, every geometric line incised on Indian pottery, means something. The meaning, for the South American Indians, is more often concerned with magic than with anything else. Totemism is founded deeply in magic. . . . That is why I suggest that (1) the animal figures found in Tairona art are the eponymous symbols of matrilineal exogamic clans . . . and that (2) the curious pig-like creature, the . . . "visor-god," is nothing more than . . . a pig, a wild pig, a peccary, and a totem of a clan. . . .¹⁷

It is unlikely that we will ever be able to do more than speculate about the use and function of the hundreds of musical effigy figurines of the Tairona. As for Mason's statement that "Indians never give free play to

14. I include the term *whistle* only because it is found in secondary sources about Tairona culture. The term *globular flute*, which among the Tairona is also a duct or fipple instrument, subsumes the so-called whistle type. *Whistle* usually refers to a globular (or vessel) flute without fingerholes: see the Diagram Group, *Musical Instruments of the World* (New York: Paddington Press, Ltd., The Two Continents Publishing Group, 1976), 20. To be consistent and eliminate any ethnocentric bias concerning its simplicity of construction, I prefer to call such an instrument a globular flute without fingerholes. No fingerholes versus several, for example, is not a criterion for complexity in the case of Tairona musical effigy figurines.

15. Reichel-Dolmatoff, *Colombia*, 150–51.

16. Gregory Mason, *South of Yesterday* (New York: Henry Holt and Co., 1940), 308.

17. *Ibid.*, 309.

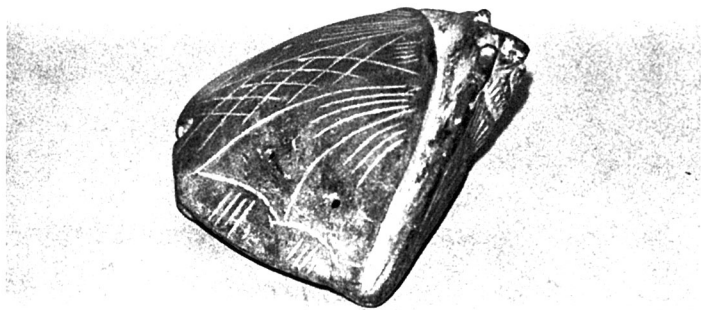


FIGURE 4. A.2.0.c(bt-1,5).4h. Flying bat ocarina with four fingerholes. Length from head to tail 11.5 cm; width from tips of wings 17.2 cm; height from bottom to top of head 4.7 cm; circumference around wings 34.2 cm. Estampillas y Monedas Arqueología, Bogotá. Photograph by the author.

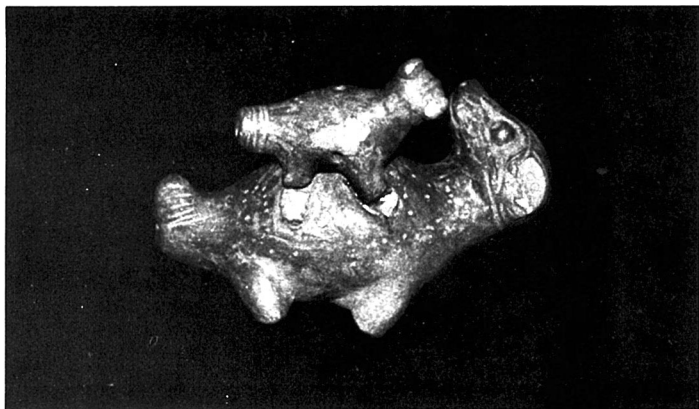


FIGURE 5. A.2.00.c(o-1,4).3h + 2h. A double ocarina: a mother opossum (fox, dog) with baby on her back. The mother has three fingerholes, the baby two. Mother's dimensions: length 12 cm; width 5 cm; height 8.5 cm. Guillermo Cano private collection, Bogotá. Photograph by the author.

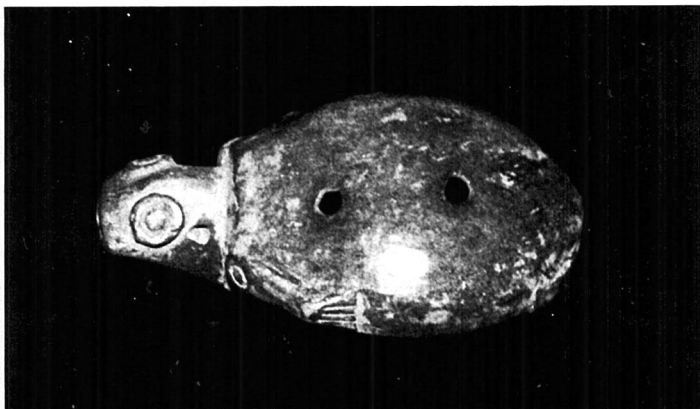


FIGURE 6. A.2.0.c(t-1,4).4h. Turtle ocarina with four fingerholes. Length 10.8 cm; width 7.9 cm; circumference 18.5 cm; thickness 4 cm. Guillermo Cano private collection, Bogotá. Photograph by the author.

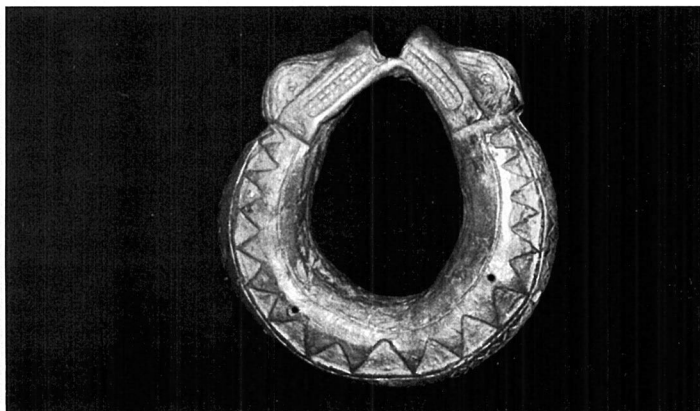


FIGURE 7. A.2.00.c(sk-2).1h+1h. Two-headed snake double ocarina with two chambers (one fingerhole per chamber) and two mouthpieces. Diameter across 10.8 cm; diameter from top to bottom 9.9 cm; circumference of body 9 cm. Guillermo Cano private collection, Bogotá. Photograph by the author.

their imaginations” and his inference that they did everything for a purpose, I must take exception to it and offer my evidence for the haphazard use (from a Western point of view, i.e., etic analysis) of musical pitches among the more than 300 musical instruments of the Tairona that I studied.

Methodology

One might easily reason that the logical person to do a study of pre-Columbian musical instruments of the flute type would be a flutist; but since the culture no longer survives, and there are no pre-Columbian flute teachers, this is only partially logical. It is reasonable, nevertheless, because a flutist will have a stable embouchure and coordinated fingers. Any fingering skills other than coordination, however, will *not* be of use to such a study. The athletic approach or fast-fingering technique of the Western flutist, for example, is nonsensical in this context. It is also ethnocentric to consider only the standard Western fingering pattern of lifting one finger after the other from the distal to the proximal end of the instrument.

A careful look at the flute fingering techniques of several present native South American cultures will reveal systems other than the one-finger-at-a-time, bottom-to-top routine. The Warao of the Orinoco delta region (Delta Amacuro) of Venezuela, for example, finger their three-holed deer-bone flute (the *muhusemoi*¹⁸) one finger at a time off, and only one. Thus, their typical sequence would be: all fingers on, bottom off, all on, middle off, all on, top off, and so forth. Similarly, the Q'eros of southern Peru, high in the Andes mountains, play their four-holed flutes in groups of two fingers off at a time, never one.¹⁹ Thus, to assume a Western flute-fingering technique on these flutes would be as incorrect within the context of those cultures as it would be to assume that the people spoke English.

The fingering methodology I have used for the Tairona tubular flutes is

18. Dale A. Olsen, “Musical Instruments of the Native Peoples of the Orinoco Delta, the Caribbean and Beyond,” *Revista/Review Interamericana* 7 (Winter 1978–79): 588–94.

19. John Cohen, *Mountain Music of Peru*, Ethnic Folkways Library, FE 4539 (New York: Folkways Records & Service Corp., 1966), 7.

Peter Crossley-Holland, *Musical Artifacts of Pre-Hispanic West Mexico: Towards an Interdisciplinary Approach* (Los Angeles: Program in Ethnomusicology, Department of Music, University of California, 1980), 34–35, refers to these as “closed fingering” and “paired fingering.” I prefer to use “Warao method” and “Q'ero method,” for the other terms are confusing. Although “paired fingering” is clear, the former term is not, since all fingerings use closing and opening of fingerholes; nor does it correspond to the latter term.

as follows: for each flute I performed the five sustained-note scales shown in table 1. I believe that this methodology is nonethnocentric and systematic, and that it includes all possibilities for producing pitches and analyzing their intervallic relationships. It is based on the assumption that each of the world's cultures, whether pre-Columbian, historic, or present, has a systematic method of playing its musical instruments that is dictated by that culture. Since the researcher will never know precisely how ancient peoples fingered their flutes, played their trumpets, or beat their drums, all known methods, based on evidence from iconographic artifacts, historical accounts, and surviving traditions, must be considered.²⁰

TABLE 1
Fingerings for Tairona Tubular Flutes

Numbers in parentheses show all the fingers that will be off simultaneously; 1 = bottom or distal-end finger.

- a. (1) (12) (123) (1234)—Western method
- b. (4) (43) (432) (4321)—Reverse Western method
- c. (all on) (1) (all on) (2) (all on) (3) (all on) (4)—Warao method
- d. (all off) (4) (all off) (3) (all off) (2) (all off) (1)—Reverse Warao method
- e. (all on) (12) (all on) (34)—Q'ero method

My methodology for the globular flutes or ocarinas is equally systematic and, I hope, nonethnocentric, although I found no surviving traditions to provide insights into fingering possibilities. Since ocarinas do not usually have their fingerholes aligned in a straight line, but rather in a left-hand and right-hand grouping, I have chosen to use the odd numbers for the left hand and the even numbers for the right hand. The ciphers for the fingers are arranged from the distal to the proximal end, as shown in fig. 8. Table 2 lists the fingerings used for a four-holed globular flute. The same

20. Four methods or processes of musical inquiry (the archaeomusicological process, the musical iconographic process, the historiographic process, and the ethnologic-analogy process) are discussed in detail in Dale A. Olsen, "The Pipers of Etruria: A Model for Research in World Music Iconology," presented at the 1986 International Council for Traditional Music, Studygroup for the Iconography of Traditional Music, in The Hague, The Netherlands, June 1986. The present paper explores in depth the archaeomusicological process applied to the Tairona culture, while the other three processes are used in another study entitled "The Flutes of El Dorado: Musical Effigy Figurines of the Tairona," forthcoming in *Imago Musicae* 3.

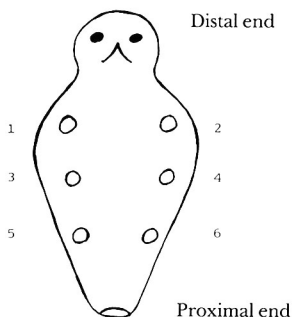


FIGURE 8. Drawing of six-holed ocarina showing fingerhole numbering sequence used in this study.

TABLE 2
Fingerings for Tairona Globular Flutes

- a. (1) (12) (123) (1234)
- b. (4) (43) (432) (4321)
- c. (all on) (1) (all on) (2) (all on) (3) (all on) (4)
- d. (all off) (4) (all off) (3) (all off) (2) (all off) (1)
- e. (all on) (12) (all on) (34) (all on) (13) (all on) (24)

methodology is used for all ocarinas, from two-holed to six-holed examples. As can be seen, both table 1 and table 2 list similar methodologies.

As I recorded myself playing the more than 300 Tairona examples, I also measured and photographed four sides of each instrument. All details pertinent to provenience were gathered for each artifact as well, though, as I have explained, there is often very little information available.

A control that has not been scientifically feasible while collecting the materials, because of the lack of laboratory equipment, is that of constant air pressure. My study, unlike a study of ancient Peruvian whistle pots conducted at UCLA in 1976 in which pressurized air was used to sound instruments placed in an anechoic chamber,²¹ relied on my own breath pressure.

21. Steven Garrett and Daniel K. Stat, "Peruvian Whistling Bottles," *The Journal of the Acoustical Society of America* 62 (August 1977): 449–53.

Understanding that variation can occur from day to day, and even from minute to minute, I was aware of the problem and tried to blow at consistent levels.

In the laboratory at The Florida State University I transcribed all of the musical scales into Western notation, and then notated the cents deviation from $A = 440$ with a stroboscope (*Stroboconn*).

The next step was to develop all the photographs of the artifacts, and to place the instruments in categories according to the taxonomy that I devised. My classification is shown in table 3. It begins with method of sound production (duct or ductless mouthpieces) followed by basic shape (tubular or globular). Next is specific information about the chamber(s): the tubular flutes are cylindrical, sausage, or double cone shaped; and globular flutes have one, two, or three chambers or are crescent shaped. Another criterion includes features of design such as plain, zoomorphic, anthropomorphic, or anthro-zoomorphic, with the taxonomy becoming more specific as it continues. An animal and position code (table 4) which includes sixteen an-

TABLE 3
Identification Code Key

A. Duct mouthpiece

1. Tubular flute

0 = cylinder shape

00 = sausage shape

000 = double-cone shape

a. plain or incised

1. horizontal lines

2. vertical lines

3. circles

4. geometric

5. dots

b. imposed zoomorphic (enter animal type from animal code)

c. zoomorphic (enter animal type from animal code)

d. imposed anthropomorphic

1. complete human

2. head only

3. body parts only

e. anthropomorphic (enter position code number)

f. anthro-zoomorphic (enter position code number and animal type from animal code)

2. Globular flute (*Ocarina*)

0 = 1 chamber (does not include crescent shape)

00 = 2 chambers (each chamber has one fipple)

000 = 3 chambers (each chamber has one fipple)

0000 = crescent shape (one chamber only)

- a. plain
 1. round
 2. oval
 3. irregular
 4. jar
- b. imposed zoomorphic (enter animal type from animal code)
- c. zoomorphic (enter animal type from animal code)
- d. imposed anthropomorphic
 1. complete human
 2. head only
 3. body parts only
- e. anthropomorphic (enter position code number)
- f. anthro-zoomorphic (enter position code number and animal type from animal code)

B. Ductless mouthpiece

1. Tubular flute

0 = vertical

00 = crescent

w = with attached whistle

- a. plain
- b. imposed zoomorphic (enter animal type from animal code)
- c. zoomorphic (enter animal type from animal code)
- d. imposed anthropomorphic
 1. complete human
 2. head only
 3. body parts only
- e. anthropomorphic (enter position code number)
- f. anthro-zoomorphic (enter position code number and animal type from animal code)

2. Globular flute (*Ocarina*)

0 = round

00 = oval

000 = irregular

0000 = jar with feet

- a. plain
- b. imposed zoomorphic (enter animal type from animal code)
- c. zoomorphic (enter animal type from animal code)
- d. imposed anthropomorphic
 1. complete human
 2. head only
 3. body parts only
- e. anthropomorphic (enter position code number)
- f. anthro-zoomorphic (enter position code number and animal type from animal code)

TABLE 4
Animal Type and Position Code

<i>Animal Code</i>	<i>Position Detail</i>
(bd) bird	(1) realistic
(br) bear? (anteater)	(2) stylized
(bt) bat (regular and leaf-nosed)	(3) seated
(c) caiman	(4) standing (also legless with wings folded in)
(fi) fish	(5) flying (wings extended)
(fr) frog	(6) swimming
(j) jaguar	(7) reclining
(l) lizard	(8) tongue extended
(m) mouse	(9) jaguar mask
(my) monkey	
(o) opossum (fox, dog)	
(p) pig	
(sc) sea creature	
(sk) snake	
(sl) snail	
(t) turtle	

imal types and specific characteristics such as realistic, stylized, sitting, standing, flying, and swimming, provides further details. I feel that this identification code key is important not only because it offers a systematic method of classification for Tairona ceramic aerophones, but also because it can be computerized for purposes of sorting and selection. Using the identification code, I classified the Tairona ceramic aerophones into fifty-two categories.

The final portion of my laboratory analysis included the transposition of the musical scales of selected categories (those with the largest number of examples of musical instruments) into a scale in which the principal tone (i.e., lowest pitch, or basic pitch) is always A on the treble staff. By giving the A zero cents deviation (i.e., A = 440) and adding or subtracting the original cents deviation from the cents of the remaining pitches, I arrived at a standard for all the musical examples, and could, from these transposed scales, measure in cents the precise intervals of each scale. For my comparisons I chose two relationships: the "foundation interval" from the principal tone or lowest pitch to the next highest pitch and the "overall interval," the span from the lowest to the highest pitch of the gamut.

My conclusions are based upon the study of 147 musical instruments from twenty-six categories chosen because they constitute the largest numbers of instruments from individual groupings. The remaining categories include too few instruments in each grouping to allow random sampling.

Analysis

The first category chosen for analysis (see table 5) is A.I.O.e(2,4). 4h., which, when translated according to table 3, means "duct mouthpiece, tubular cylindrical flute, anthropomorphic design." The additional information in parentheses is from table 4 (stylized, standing), and the number of fingerholes (four) is shown at the end. Five instruments are included in this category (figs. 9 and 10). Since these instruments are definitely vertical flutes, the several fingering possibilities yield interesting results. For the most part, the flutes in this group support my original hypothesis that the



FIGURE 9. A.I.O.e(2,4).4h. Three flutes with four fingerholes each. Lengths (from left to right) 20.4 cm, 18.1 cm, 16.7 cm; circumferences 12 cm, 11.5 cm, 11.5 cm. Guillermo Cano private collection, Bogotá. Photograph by the author.

TABLE 5
Data on Instruments in Selected Categories

<i>Identification Code</i>	<i>Overall Interval</i>	<i>Number of Examples</i>	<i>Fingering Type (see Table 1) and Foundation Intervals</i>	<i>Number of Examples</i>
A.1.0.e(2,4).4h.	m 6	4	a. m 2	1
	M 6	1	M 2	4
			b. m 3	1
			N 3	3
			M 3	1
			c. same as a.	
		e. P 4	5	

(Although all fingering possibilities listed in table 1 were recorded, the following data are based on fingering type a. only.)

A.1.0.c(bt-2,4).2h[3].	(using distal hole as fingerhole—only thirteen studied)			
	M 3	1	m 2	1
	P 4	3	M 2	3
	+ 4	1	m 3	5
	P 5	8	N 3	2
			P 4	2
	(not using distal hole as fingerhole—fifteen studied)			
	M 2	2	m 2	4
	m 3	2	M 2	9
	N 3	5	m 3	2
	M 3	6		
A.1.00.a(1,2,5).4h.	P 4	1	M 2	6
	+ 4	1		
	P 5	4		
A.1.000.c(bt-1).2h.	m 3	1	M 2	4
	N 3	1	m 3	1
	M 3	2	M 3	1
	P 4	1		
	+ 4	1		
A.2.0.c(bd-1,5).4h.	P 4	1	M 2	9
	+ 4	5	m 3	14
	P 5	5	N 3	3
	m 6	13	M 3	8
	M 6	4	P 4	1
	m 7	6		
	M 7	1		

A.2.0.c(bd-2,5).4h.	+ 4	2	M 2	4
	P 5	3	m 3	3
	m 6	2	N 3	1
	m 7	1		
A.2.0.c(o-1,4).2h.	(data not used		m 2	3
(o-1,4).3h.	because number		M 2	8
(bt-1,4).4h.	of fingerholes		m 3	4
(j-2,4).3h.	varies)		N 3	2
(m).2h.			M 3	2
(fi-1,6).2h.				
(sc-1,6).1h.				
(t-1,4).4h.				
(fr-1,3).2h.				
(fr-1,4).2h.				
(sk-1,3).1h.				
A.2.0000.e(2,3).4h.	+ 4	2	M 2	5
(2,3,8).4h.	P 5	5	m 3	15
(2,3,9).4h.	m 6	11	N 3	2
	M 6	4	M 3	2
	m 7	1		
	P 8	1		
B.1.00.e(1,3).2h.	(distal end closed)		(distal end closed)	
(2,3).2h.	M 2	1	m 2	1
(1,5).2h.	m 3	2	M 2	6
(j-2,3).2h.	N 3	3	m 3	11
(m-1,4).2h.	M 3	3	N 3	2
(mk-1,3).2h.	P 4	7	M 3	5
	+ 4	6	P 4	3
	P 5	5	+ 4	1
	m 6	2		
	(distal end open)		(distal end open)	
	m 2	3	+ 1	2
	M 2	6	m 2	8
	m 3	11	M 2	17
	M 3	6	m 3	1
	P 4	3		

instruments were not produced haphazardly. Analysis clearly indicates, for example, that these five tubular flutes share similar characteristics.

As table 5 shows, the foundation intervals produced by fingering a. are similar in four of the five instruments, and fingering e. produces foundation intervals of a perfect fourth in all five instruments (with a difference of as much as 67 cents between two of the flutes, however). The other

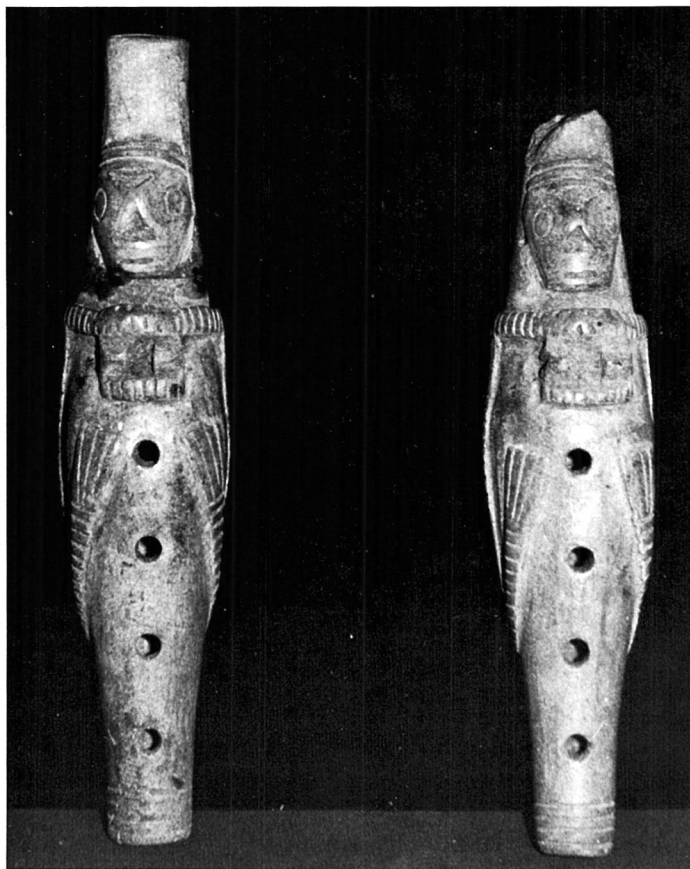


FIGURE 10. A.1.0.e(2,4).4h. Two flutes with four fingerholes each. Lengths left to right 19.1 cm and 17.6 cm; circumference 12.9 cm and 12.7 cm. Guillermo Cano private collection, Bogotá. Photograph by the author.

fingering styles show no consistency of foundation interval. Although these flutes share physical similarities as well, it is my feeling that the sampling in this category is too small to determine whether or not the musical and structural similarities were intentional.

The fifteen small effigy tubular flutes representing stylized bats that make up category A. 1.0.c(bt-2,4). 2h[3]. (fig. 11) have an interesting distal hole that can easily function as a bottom fingerhole (hence the 2h[3] in the code). Consideration of the distal hole for a foundation interval, however, reveals little consistency except for the minor and neutral thirds taken together as one type of interval (54%). The overall span, however, was approximately a perfect fifth in sixty percent of the cases. If we consider the neutral and major thirds as emically the same interval, the scales without the distal hole are very similar, seventy-three percent being a type of major trichord (i.e., the first three notes of a major scale). A careful comparison of the similar flutes with the dissimilar ones, however, reveals no substantial differences in ornamentation and design.



FIGURE 11. A.1.0.c(bt-2,4).2h[3]. Stylized bat tubular flute with two fingerholes and a small distal hole. Height 8.5 cm; width 4.5 cm. Field Museum of Natural History, Chicago. Photograph by the author.

There are only six examples in category A. 1.00. a., a rather small number of sausage flutes. Three of them, from the Cano collection in Bogotá, have very similar scales (fig. 12). Although each instrument's principal tone differs from the others by about a half step, their intervallic relationships and exterior details are nearly identical, tempting one to suggest that they were made by the same potter.

The flutes in category A. 1.000. c., constructed in a double-cone fashion, are also few in number, and all have batlike heads (fig. 13).

The group A. 2. 0. c(bd)., bird ocarinas, includes two basic types: realistic and stylized with jaguar characteristics (figs. 14 and 15). Because of the importance of birds and jaguars in many South American native cultures (both animals are associated with shamanism),²² these musical instruments strongly suggest supernatural use. In spite of the obvious physical differences between the two bird types, there are no outstanding musical differences. A physical difference observed among the stylized bird/jaguar artifacts (two types of heads, one a horizontal head with eyes on the side and bulbous sacred mushrooms on top, and one a vertical head with eyes on the side) also did not indicate any musical differences.

Since the remainder of category A. 2. 0. c., animal ocarinas, includes ten animal types that were grouped together on the basis of animal motif rather than numbers of fingerholes, the data for this group are based only on foundation intervals. The foundation-interval analysis indicates that there is no connection between animal type and intervals employed, except in the case of the frog motif. That three of the four frog ocarinas use a minor third as their foundation interval is, I believe, only a coincidence. One of the most interesting instruments in this group is a double ocarina representing an opossum or some other animal with her baby on her back (fig. 5). The mother is an ocarina with two fingerholes and the baby a single-pitched ocarina without fingerholes (a whistle).

The globular flutes that make up category A.2.0000.e., which I refer to as stylized and seated anthropomorphic, crescent-shaped, duct flutes, are among the most elaborate and beautiful pieces of pre-Columbian pottery (fig. 16). They are subclassified into three groups: stylized seated, stylized seated with extended tongue, and stylized seated with jaguar mask. All of the figures are seated upon a crescent that is perhaps a throne, and often the crescent terminates in jaguar heads. The ornate feather headdresses incised into the pottery seem to indicate a high-ranking class, perhaps a

22. Dale A. Olsen, "Symbol and Function in South American Indian Music," in Elizabeth May, ed., *Musics of Many Cultures* (Berkeley: University of California Press, 1980), 368.

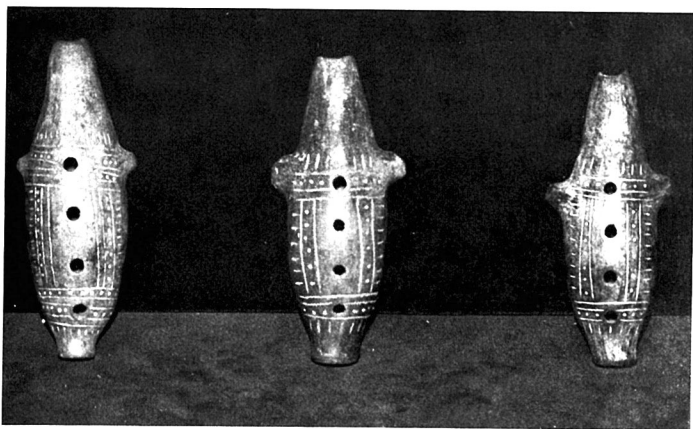


FIGURE 12. A.1.00.a(1,2,5),4h. Three sausage-shaped tubular flutes with four fingerholes each. The ornamentation consists of horizontal and vertical lines and dots. Lengths left to right 12.5 cm, 11.8 cm, and 11.4 cm; width 5 cm, 5.5 cm, and 5.2 cm; circumferences 11.8 cm, 12.7 cm, and 12.5 cm. Guillermo Cano private collection, Bogotá. Photograph by the author.

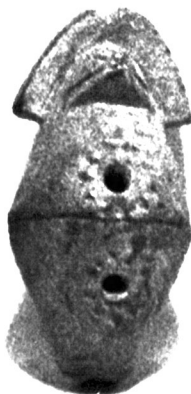


FIGURE 13. A.1.000.c(bt-2).2h. Double-coned tubular flute with the head of a stylized bat; two fingerholes and a small distal hole. Length 6 cm; width 3 cm. Galería Cano, Bogotá. Photograph by the author.

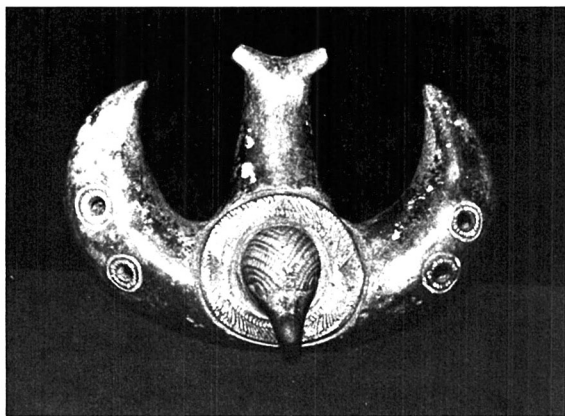


FIGURE 14. A.2.0.c(bd-1,5).4h. Realistic flying bird globular flute with four fingerholes. Length 9.1 cm; width 12.1 cm; thickness 2.8 cm; height to top of head 5.1 cm. Guillermo Cano private collection, Bogotá. Photograph by the author.

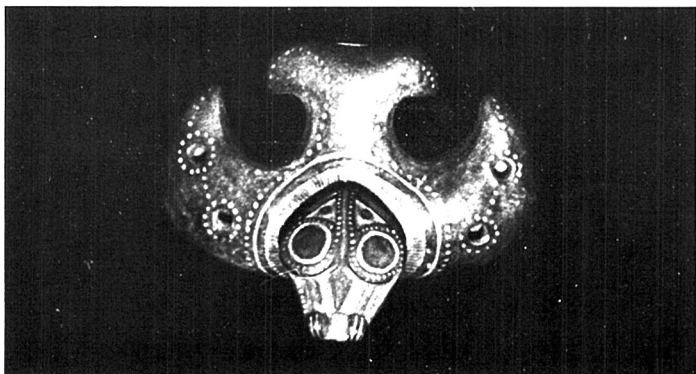


FIGURE 15. A.2.0.c(bd-2,5).4h. Stylized flying jaguar/bird globular flute with four fingerholes. Length 5.9 cm; width 9.3 cm; thickness 2.4 cm; height to top of head 4.9 cm. Guillermo Cano private collection, Bogotá. Photograph by the author.

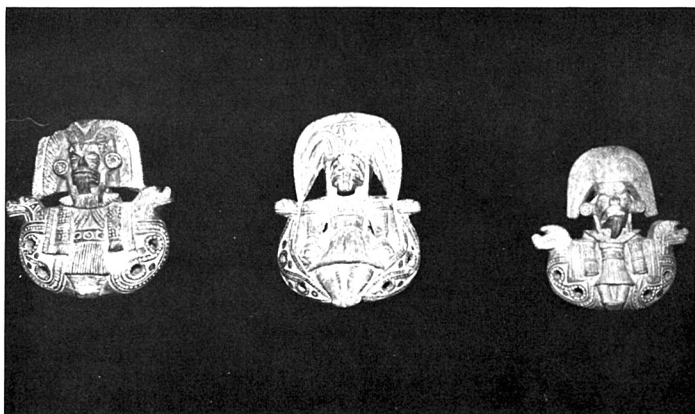


FIGURE 16. A.2.0000.e(2,3,8).4h. Three crescent-shaped globular flutes with stylized priest/shaman motif and four fingerholes each. From left to right, lengths 9.1 cm, 10.1 cm, and 8.7 cm; widths 8.4 cm, 7.6 cm, and 8.7 cm; thicknesses 3.7 cm, 4.1 cm, and 4 cm. Guillermo Cano private collection, Bogotá. Photograph by the author.

priest/shaman. The elaborate renderings of extended tongue and jaguar mask on many of the specimens, as well as the stylized elements of the others, indicate that these flutes served a supernatural function. As with all the ocarinas studied so far, there is no particular musical characteristic unique to each group. There is, however, a preponderance of the minor third used for the foundation interval (a total of 62.5%). In fact, when the minor third, the neutral third, and the major third (which may emically have been considered the same interval by the Tairona) are taken together, they constitute seventy-nine percent of the sampling.

The final category to be discussed in this paper, B.1.00.e. and c., ductless, crescent-shaped tubular flutes with anthropomorphic or zoomorphic design, is unique among pottery musical instruments found anywhere in the world (fig. 17). Each flute has two fingerholes and is capable of two basic scales. One scale is produced with the distal end open, the other with it closed. Analyses of the foundation and overall intervals of both sets of scales indicate no standard arrangement and no relationship between choice of interval and exterior motif. The evidence simply shows that with the distal end open the primary foundation intervals are the major second



FIGURE 17. B.1.00 series. Three crescent-shaped ductless tubular flutes with anthropomorphic or zoomorphic figures seated upon a throne or craft and two fingerholes in the crescent. Both ends of the crescent are open. From left to right, lengths 5.5 cm, 6.1 cm, and 6.1 cm; widths 6 cm, 5.6 cm, and 5 cm; thicknesses 2.4 cm, 2.5 cm, and 2.2 cm. Guillermo Cano private collection, Bogotá. Photograph by the author.

(61%) and minor second (29%), and with the distal end closed, the minor third (38%), major second (21%), and major third (17%). Furthermore, with the distal end open the most frequent overall intervals are the minor third (38%), major second (21%), and major third (21%), while with the distal end closed they are the perfect fourth (24%), augmented fourth (21%) and perfect fifth (17%). The iconographic symbolism of these musical instruments is a mystery. On the one hand the crescent-shaped chamber upon which the person or animal is sitting or lying resembles a throne, but on the other hand it also resembles a boat (von Daniken might say a spacecraft). In most cases the creature sits with knees up high on one side of his seat; but in others he sits astride it, and some figurines depict the creature on his back (figs. 18 and 19). Some of the human figures are playing vertical flutes; some are chewing coca. Others have their tongues extended, and some seem to be wearing masks or representing transformation into an animal. The most frequent animal shape seems to be that of a jaguar or some other fanged beast. The designs on the seats or vessels themselves often include geometric motifs such as steps and spirals, and some suggest faces, using the fingerholes as eyes. In several, the animal or man is itself a whistle. In one example, the coca-chewing person who sits astride his seat is actually a two-holed duct ocarina with its window in the middle of the long hair that extends down his back to his waist (figs. 20 and 21). The seat itself must represent a boat (perhaps one similar to the totora-

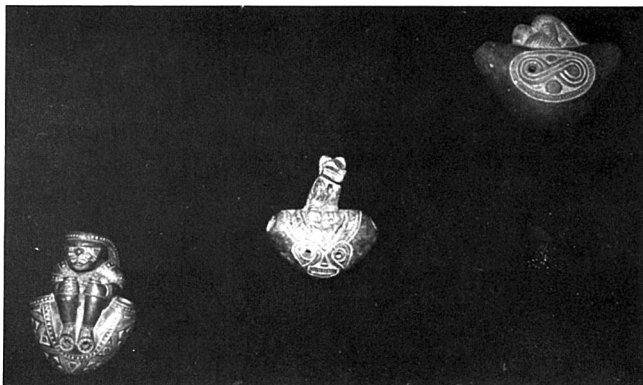


FIGURE 18. B.1.00 series. Three crescent-shaped ductless tubular flutes showing various motifs. The figure on the left is a crouching humanoid, the one in the middle a jaguar or lizard with a long tail, and the one on the right a humanoid lying on its back with knees up. All the crescents have two fingerholes; the figures on the left and middle instruments are themselves ocarinas without fingerholes (whistles). The front views show various geometric designs; eyes and mouth are depicted around the fingerholes of the middle flute. Guillermo Cano private collection, Bogotá. Photograph by the author.

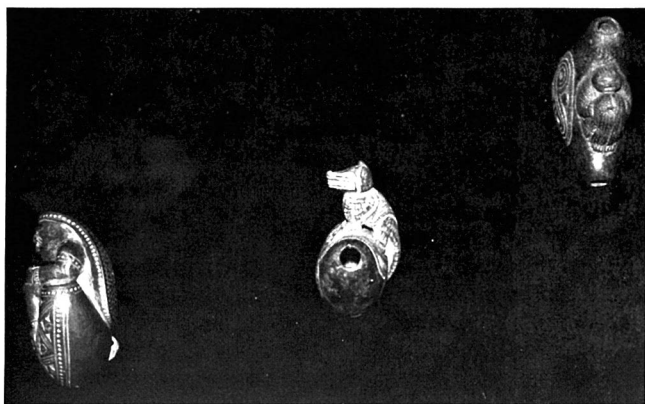


FIGURE 19. Side views of the instruments in figure 18. From left to right, lengths 8.7 cm, 7.7 cm, and 7.3 cm; widths 6.6 cm, 6.7 cm, and 8.8 cm; thicknesses 3.8 cm, 3.7 cm, and 4 cm. Guillermo Cano private collection, Bogotá. Photograph by the author.



FIGURE 20. B.1.00.e(1,3).2h. + A.2.1.e(1,3).2h. Front view of a crescent-shaped ductless tubular flute with a humanoid figure straddling his craft. There are two fingerholes in the crescent. The human figure is itself a duct ocarina with two fingerholes, one in the left bicep and the other in the right breast. The window for the duct mouthpiece is in the middle of the man's long hair. Museo Arqueológico, Banco Popular, Bogotá. Photograph by the author.



FIGURE 21. Another view of the instrument in figure 20, showing the bulging right cheek of the figure, who is chewing coca. The instrument, which has not been measured, is slightly larger than most; its height is noticeably greater because the figure is larger and is sitting more erectly than is usually the case. Museo Arqueológico, Banco Popular, Bogotá. Photograph by the author.

reed boats of the Moche [Mochica] people on Peru's north coast),²³ for the person appears to hold a paddle at his left side (fig. 22).

Conclusions

Archaeomusicology inevitably raises more questions than it answers. When an ancient civilization can be studied only by means of the artifacts it leaves behind, and when the provenience of those artifacts is questionable, no cultural conclusions can be reached with total certainty. The study of the musical instruments of an ancient and prehistoric culture, like the music itself, deals with symbols. There is no question that the exterior motifs and designs of ancient native American effigy figurines are symbolic. Whether or not the tuning systems are in any way symbolic, and whether or not the arbitrary scales used for analysis are representative of the ancient tuning systems used in practice, are, however, questions that remain unanswered.

My analyses have revealed that the ceramic tubular and globular flutes of the Tairona civilization were probably *not* made in a manner that systematically related exterior motif with scale structure. This is true at least in so far as Western ethnomusicological methods of analysis are concerned. When one considers musical sound as symbol, however, no ethnomusicological analysis of an ancient culture can ever be anything more than an etic suggestion (i.e., one made by an outsider) of what that music meant. It may be true, for example, that emically (i.e., according to the Tairona musicians themselves) the ceramic musical effigy figurines *did* relate exterior motif to scale structure. Unfortunately, such a folk evaluation can never take place.

Nevertheless, what the ceramic musical instruments of the ancient Tairona can tell us is that the Tairona had a great concern for the exterior details of their musical effigy figurines, and that choice of pitch was also a concern because the means for it was provided. This study has shown that the representation of human and animal figures (and combinations of these) was important to them, and that there was apparently a connection between the figure represented and the music making, even though the present musical analyses cannot determine the precise relationship between them. It is perhaps not the details of the musical sounds themselves (the product) that, in fact, form the bond between the visual and the aural,

23. Victor W. Von Hagen, *The Desert Kingdoms of Peru* (New York: The New American Library, a Mentor Book, 1964). Pages 133–134 contain pictures of Mochica totora-reed boats.



FIGURE 22. Rear view of the instrument in figures 20 and 21, showing an apparatus that could be a paddle. This, and the fact that the figure is straddling the crescent, suggest that it is a boat. Museo Arqueológico, Banco Popular, Bogotá. Photograph by the author.

but rather the act of making the sounds (the process). An emic evaluation could possibly have told us that the proper union between the visual and the aural is in the mind of the performer, and that the process of playing functions as individualized communication between mortal and immortal. Music used for such supernatural purposes probably had (for among the survivors of El Dorado it still has) a complexity that cannot be comprehended in terms of modern Euro/American ways of thought.

The Florida State University