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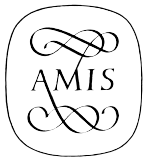


Pre-Columbian Flutes of Mesoamerica

Richard W. Payne and John D. Hartley

Ancient legends of Mexico describe rays of the sun as golden clad flute players joyfully scattering sunlight in all directions. In the Aztec version, Quetzalcoatl, the benevolent provider god, was sent by Tezcatlipoca, the stern implacable god of providence, to bring some of these flutists to earth to promote the joys of life—particularly music. The conditions exacted by the sun for this transfer required that the fairest of the earth be annually returned to him as the designate of Tezcatlipoca.

Thus, each year an exemplary youth was chosen to become the personification of Tezcatlipoca. For the ensuing year he enjoyed the exalted position and unlimited privileges of a god, during which time he was tutored in the flute (the alter voice of the god). At the end of his godly tenure, stripped of masquerade, he ascended the temple steps, smashing his clay flutes on the way to the top—where his still pulsating heart repayed the annual tribute to the sun (fig. 1). To commemorate this event Xochipilli, the Aztec god of music, was represented with a heart impaled on his raised staff (fig. 2).

The development of the pre-Hispanic cultures in Middle America is the story of the cyclic rise and collapse of remarkably advanced civilizations over two millenia. Native written records are scattered and incompletely translated, giving scholars today only a crude outline of these developments. However, archaeologists have recorded a rich legacy of artifacts, architectural remains, and pictorial representations that illuminate the lifeways of these fascinating cultures. In addition, the few surviving codices from the pre-Hispanic and immediate post-Hispanic periods give us much useful information that would otherwise be lost. The prevalent use of enduring ceramics skillfully crafted throughout Mesoamerica has provided a bountiful legacy of their musical instruments.

For purposes of the present discussion Mesoamerica is bounded to the north by the present Mexican states of Sinaloa, eastward through Tamaulipas, and to the south by the Costa Rican cordillera. This section of the Americas includes the Huastecan culture to the north and the Mayan area to the south—both late post-Classic in development (fig. 3).

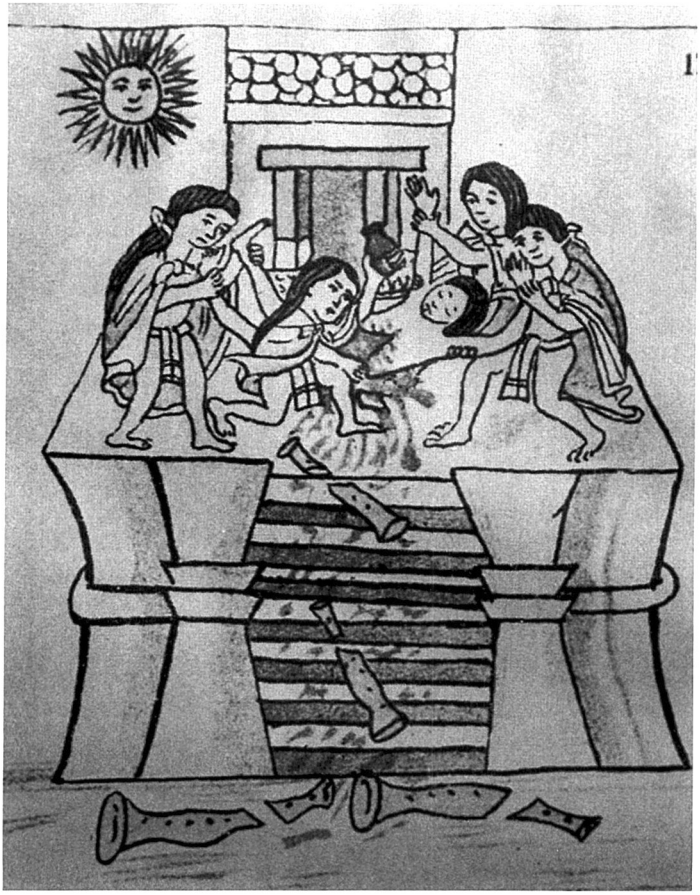


FIGURE 1. Sacrifice of the Tezcatlipoca impersonator. Codex Florentine (Marti, 1968). (Except for those otherwise identified, all instruments shown here in figures are in the authors' collection, all photographs were made by R. W. Payne, and all drawings were made by J. D. Hartley.)

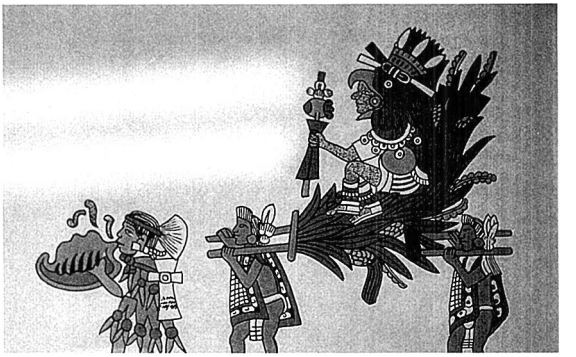


FIGURE 2. Xochipilli, patron god of music, carries the heart of the Tezcatlipoca impersonator impaled on his staff. Codex Magliabecchiano (Caso, 1970).

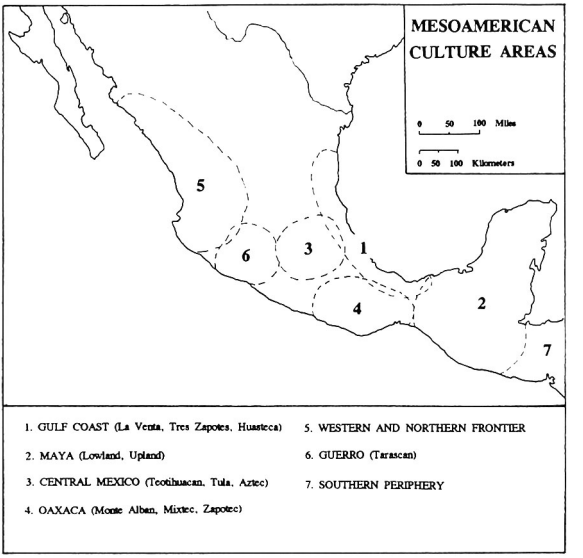


FIGURE 3. Map of prehistoric Mesoamerica, extending north to the present Mexican states of Sinaloa across to Tomaulipas and south to the Costa Rican cordillera. The general areas discussed are outlined.

During the pre-Classic period (ca. 2000 B.C.–ca. A.D. 300), the traits that characterize Mesoamerican cultures—intensive agriculture, monumental architecture, urbanization, highly developed political and religious organization, the advanced calendar, and incipient writing systems—began to develop and spread throughout the region. The Classic period (ca. A.D. 300–A.D. 900) is marked by the crystallization of advanced civilizations in several areas, most notably at Teotihuacan in central Mexico, El Tajin in the central Gulf Coast of Mexico, Monte Alban in Oaxaca, and the Peten region in Guatemala.

For as yet unknown reasons, the Classic period civilizations declined, beginning in central Mexico around A.D. 600, and spreading into the other areas by A.D. 900. During the following post-Classic period (ca. A.D. 900– A.D. 1520), strong and vibrant cultures such as the Toltec and later Aztec rose again in Central Mexico and spread their influence throughout much of Mesoamerica by conquest and trade. In 1520, the Spanish conquest brought the native civilizations to an abrupt halt.

Geographical obstacles to travel are formidable in Mesoamerica. Parched deserts and rugged mountains are serious obstacles even to modern means of transportation, yet the intermingling of cultural elements in pre-Hispanic times was remarkable. Despite no practical use of the wheel, no beasts of burden, and no tradition of seamanship on the high seas, few areas were completely isolated. Commerce along rivers, roads, trails, and coastal routes distributed artifacts far from their point of origin; in some cases, there was substantial translocation of cultures, along with their customs, to other locations. However, more often it was not so much movement of people but of cultural concepts and complexes. The vigor of new societies unencumbered by the encrustations of the establishment is repeatedly evident in the rise and fall of ancient Mesoamerican cultures.

* * *

Musical instruments of the aerophone class may be subdivided into cup, i.e., trumpet; reed, i.e., oboe; and sound edge, i.e., flute. A great variety of the latter group produced by the prehistoric cultures of Mesoamerica are here considered.

Sound edge aerophones are voiced by a current of air directed across an open space (window) to impinge on a beveled edge (sound edge) (fipple edge) (labium) (sound lip). A particular classification of sound edge aerophones serves the following discussion:

1. Flute (true flute): an open embouchure aerophone in which the sound producing airstream is directed by the lips.
   a. End blown flute: a flute with its embouchure at the proximal end. In the absence of tone holes this configuration would be termed a pipe.
   b. Notched flute: an end blown flute with a groove in the mouthpiece allowing an inset fipple edge.
   c. Transverse flute: location of the embouchure hole in the side of the flute tube.
   d. Vase flute: an open embouchure flute with an expanded resonator chamber.
2. Duct flute (block flute) (flageolet) (recorder): a tubular flute with a formed channel through which an air current can be directed across an open space (window) to accurately impinge on a fipple edge. Often a block (plug) is used to narrow the windway. In the absence of tone holes, instruments of this type may be identified as whistles. Inclusion of a freely movable ball in the tone chamber of a closed end whistle allows classification as an embolus whistle.
3. Ocarina: a duct flute with an expanded resonator chamber.
4. Whistle pot: vessels with a large air chamber vented by a small duct focused on a small resonator chamber. The air chamber is frequently composed of two interconnected vessels.
5. Bitonal whistle: a small resonator chamber within a larger chamber, the latter producing an additional tone ("jump tone") when breath pressure is increased.
6. Chamberduct ocarinas: Instruments incorporating several fipple mechanisms which can be activated by varying breath pressure or by manipulating vent holes (Rawcliffe, 1992).

Attempts to trace the development of Mesoamerican aerophones with reference to time and point of origin pose obvious challenges. The translocation of such musical instruments by far flung trade in ancient times and by more recent surreptitious traffic in these antiquities may seriously cloud precise assignment of provenance. It must be recognized that, particularly in the older cultures, these instruments were often crafted as toys and held in relatively low esteem, perhaps buried only in children's graves or not included in graves at all. Such toys can sometimes be identified by their closely spaced tone holes or by decorations

FIGURE 4. Ocarina from Zaculeu. This tiny ocarina, representing a seated figure playing an ocarina, is pierced with four small and closely grouped tone holes suggesting its design for children. Its tonic note is a‴ with a range of a fourth.

designed for juvenile appeal (fig. 4). A great many aerophones were obviously mass-produced by molding techniques and cursorily finished, seemingly designed for trade purposes; others, designed for musical purposes, are carefully finished and tuned. These often bear the patina of considerable usage; some were designed to serve ceremonial purposes, as in the Tezcatlipoca rites. Little lugs are incorporated in the construction of most ocarinas, serving to anchor a cord by which the instrument might be suspended, as in a necklace.

The skilled and innovative approach to aerophone construction in ancient Mesoamerica has provided a rich variety of instruments of this class which are of considerable interest, even beyond their archaeological context. Abundant examples of multitoned aerophones, as the only clue to scales left by the pre-Cortesian Mesoamericans, provide an excellent opportunity to develop insight into their musical preferences.

Duct flutes compose the greater part of pre-Hispanic Mesoamerican aerophones. In some cases the roof of the air channel is omitted, relegating this function to the upper lip. Open embouchure vases, sounded by blowing across a simple aperture, represent true end-blown flutes,

though end-blown tubular flutes were not in use despite their popularity in North America during comparable periods. Tubular duct flutes were fitted with tone holes or a free pellet (embolus) in the tone chamber to change frequencies; such flageolets were frequently joined to produce multiphonic sounds. Of particular interest is the widespread occurrence of ocarinas (resonator whistles), some of which are also double. Transverse flutes were apparently not known to the prehistoric Mesoamericans. The notched flute (quena), panpipes, and whistle pots which were common in South America at comparable times have been only rarely found in ancient Mesoamerican sites. In contrast to ancient aerophones of North America, relatively few instruments of prehistoric Mesoamerican provenance made of wood or bone have survived to the present.

Flutes of Central Mexican Cultures

The central valley of Mexico has supported a sedentary occupation since at least 2000 years before Christ. The small farming communities eventually developed into ceremonial centers such as Tlatilco, near present-day Mexico City. This site has yielded a large number of ocarinas and block flutes as well as a few whistle pots. These people buried their dead with abundant grave goods, leaving material evidence of their culture. Ceramic flutes and whistles have been commonly found in these graves, particularly those associated with children, dating to the middle pre-Classic period (1000–300 B.C.). It is quite possible that the legends of Quetzalcoatl and Tezcatlipoca as associated with music originated in this era.

The Tlatilco duct flute illustrated (fig. 5) is closely similar to the example in the Mexican Museum of Anthropology. Formed from a fine grey clay, it measures 16 cm. in length. The curved conical-bore tone chamber is pierced by five carefully worked tone holes and the distal end is coned to readily function as an additional tone hole. A rather pleasant fundamental scale of b″, c sharp‴, e‴, f sharp‴, g‴, a‴, and b‴ is possible with this delightful little instrument. (The octave b‴ requires shading of both the upper and the distal tone holes.) However, its upper harmonic tones are not easily controlled. The "ears" on both sides of the window also represent thoughtful aerophone design.

Late pre-Classic and Classic period developments in Central Mexico reached their greatest heights at Teotihuacan, approximately thirty miles north of modern Mexico City. This giant metropolis, with its mag-

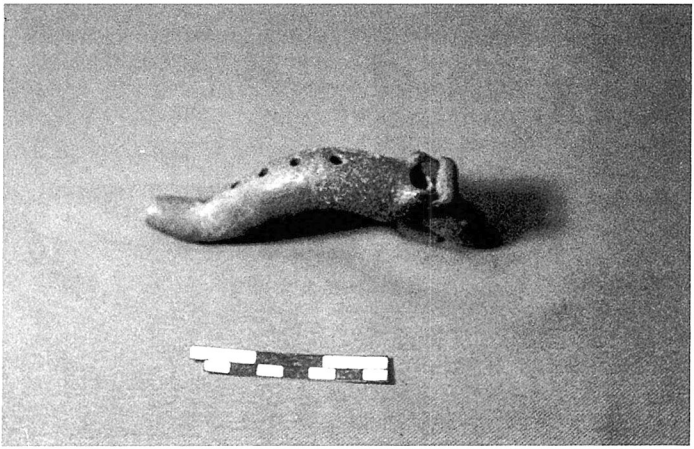


FIGURE 5. Block flute, Tlatilco. A conical-bore block flute with the span of an octave.

nificent temples and widespread residential neighborhoods, was the center of an immense civilization whose influence spread throughout much of Mesoamerica, as far south as the Mayan city of Kaminaljuyu and west to the Pacific coast. Then, during the eighth century, it entered rapid decline and was inexplicably abandoned. Our knowledge of this remarkable culture is dependent upon material evidence of structures, illuminating murals, and artifacts. Because cremation appears to have been the favored means of disposing of the dead at Teotihuacan, we lack the abundant grave offerings that often yield important information about the lifeways of a prehistoric people. One can assume that Teotihuacan musical instruments served not only secular and sacred functions but also were a trade item in the widespread markets of this dominant culture. Many well-crafted whistles and ocarinas in the Teotihuacan style are available for study. The matched pair of small ocarinas shown are carefully made of fine grey clay in bird forms (fig. 6). The instrument on the right measures 6 cm. across wing tips and represents a bird with wings outstretched and head raised in song. The scale of a‴, b‴, c⁗, c sharp⁗, and d⁗ may be produced with the four small tone holes. The ocarina on the left measuring 6.5 cm. across wing tips, similar in design

FIGURE 6. Ocarinas, Teotihuacan. These little ocarinas made of fine grey clay have four small and closely spaced tone holes which would seem designed for the fingers of a child. The whimsical bird form figures portrayed would also seem to identify these artifacts as toys.

except for representation of bird head plumage, produces tones of f sharp‴, g‴, g sharp‴, a‴, and a sharp‴. Neither of these instruments would appear to have any great musical potential, seeming more suitable as ornamental signaling devices or toys.

Some two centuries after the fall of Teotihuacan, the Toltecs established their capital at Tula, forty miles to the northeast. Although lately Chichimec barbarians, the Toltecs were adept at incorporating traits from various more developed Mexican cultures into an aggressive and militaristic society, which ultimately came to dominate much of Mesoamerica. The cults and legends of Tezcatlipoca and Quetzalcoatl figured prominently in Toltec life, finding some of their most artistic expressions in the Toltec-Mayan city of Chichen Itza.

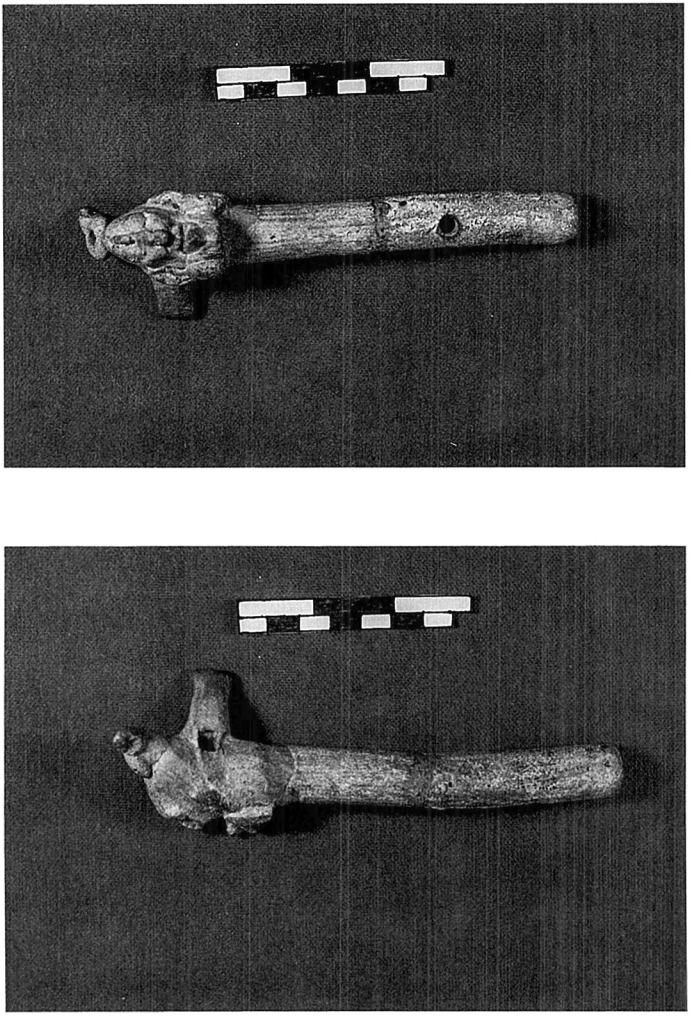
The duct flutes shown as representative of the prehistoric Valley of Mexico have a cylindrical bore and are formed from fine pink-tinted clay. The first instrument measures 25.1 cm. in length, with the sound window on the opposite side of the tube from the tone holes, and a molded god's head (Tezcatlipoca?) replaces the usual location of the sound edge mechanism (fig. 7a). Three upper tone holes are placed

FIGURE 7a. Duct flute, Valley of Mexico, Classic period.

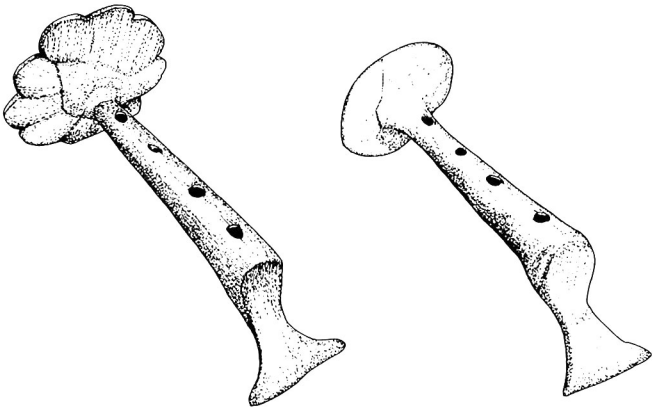
approximately a full tone apart; separation of the two lower tone holes produces the scale d sharp″, f″, g″, a″, b″, d‴, and d sharp‴. Thus intervals of the octave, fifth, fourth, and third are represented. The second instrument, measuring 16.3 cm. in length and fitted with a perpendicular air channel, is decorated with an "old man" effigy and has only one tone hole—delivering the tones b″ and c sharp‴ (figs. 7b and c). Both of these flutes are braced to rest face upright.

Toltec civilization in central Mexico was destroyed by A.D. 1200, probably by a combination of environmental degradation and internal political dissention. Following a short period of confusion and decline, central Mexican culture began its final rise under the Aztecs.

The Aztecs (Mexica) were the last group of Chichimecs to move into the lush valley of Mexico. Initially, they were forced into the swamps of lake Texcoco by their more civilized neighbors. There they settled and rapidly spread out to dominate the area. Tenochtitlan, on the site of present-day Mexico City, was developed into an opulent metropolis and cultural center. Human sacrifice as a means of propitiating the gods, including annual enactment of the Tezcatlipoca ritual, was vigorously practiced. Florescence of the Aztec society at the time of the European



FIGURES 7b and c. Side-blown duct flute, Valley of Mexico.



FIGURES 8a and b. Resonator duct flutes, Aztec. These shrill flutes are presumed to have been used during the ceremonies of the sacrifice to Tezcatlipoca. Collection of the Mexican National Museum of Anthropology, Mexico City, D.F.

invasion permitted accurate eye witness accounts of the life and times of these aggressive and highly organized people.

Music played a large role in the life of the Aztecs and innovations in the flute can be attributed to them. The small flute (flauta aguda), representing the voice of the god (Tezcatlipoca), was associated with the Quetzalcoatl designee but was also used as a martial signaling device (fig. 8a). This short conical-resonator duct flute with closely spaced tone holes and a flower emblem at the distal end has been found at Tizatlin, the sanctuary of Tezcatlipoca near present-day Tlaxcala. Indeed, the flute was elevated from a rather trivial toy to enjoy respect as an object of reverence. The designation of "aguda" as applied to small flutes in Mexico and Central America applies not only to their shrill sound but also has the connotation of bright and keen witted. Examples of flautas agudas from the Mexican National Museum measure 8.0 and 8.5 cm. in length (figs. 8a and b). They are of conical bore with flaring of the distal end to represent a flower. The window is inferior and four tone holes are present on the superior surface. The scale of these instruments

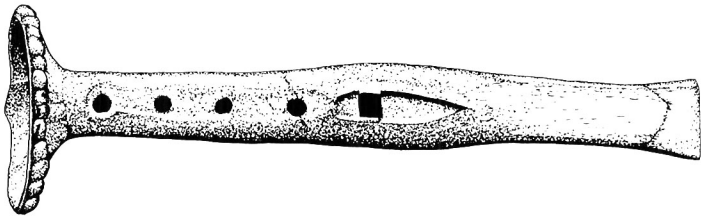


FIGURE 9. Block flute, Aztec. Another characteristic type of Aztec flute possibly used in the Tezcatlipoca ceremony but modified to a somewhat more agreeable scale to the modern ear. Collection of the Mexican National Museum of Anthropology, Mexico City, D.F.

approximates f‴, g‴, a‴, and d⁗. These shrill tones would seem of dubious musical interest but would certainly serve as a far-reaching signaling device.

Another type of flauta aguda common to the Aztecs is illustrated in figure 9. These conical bore instruments vary in length from 15 to 26 cm. and are also formed with an open bell at the distal end. Usually four tone holes are present (occasionally only three). The upper tone hole varies from the octave to the sixth between various instruments, though most commonly the upper tone is the sixth with fairly even division of tones from the tonic.

The Aztecs made other flutes of considerable musical competence. Figure 10 illustrates a well-made conical-bore duct flute measuring 8½ inches in length which is tuned with four tone holes. The scale of this instrument is d‴, g‴, a‴, b‴, and d⁗; second harmonic notes of g⁗ and a⁗ can also be produced. Thus this instrument delivers the octave, the fifth, and the fourth, with comfortable tonal colors. A variety of ocarinas was also produced by the Aztecs (Marti, 1968, and d'Harcourt, 1925).

Flutes of the Mayan Cultures

The florescence of Mayan civilization began in the highland and coastal areas of Guatemala and Belize during the late pre-Classic period, as represented by the sites of Kaminaljuyu and Zaculeu. During the early Classic period the vigor of this culture had shifted to the central

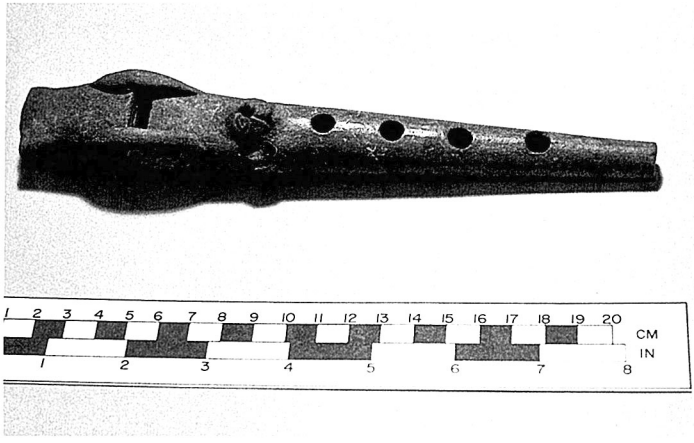


FIGURE 10. Duct flute, Aztec. An excellent example of a conical-bore duct flute delivering the octave, the fifth, and the fourth. The air duct, protected by bilateral ears, precisely impinges the fipple edge. Collection of the Museum of the Red River, Idabel, Oklahoma.

lowlands as exemplified by sites such as Copan in Honduras, Tikal in Guatemala, and Palenque in the Mexican state of Chiapas. Mayan culture enjoyed magnificent growth during the Classic period, becoming a center of cultural development for much of southern Mexico and northern Central America. Around A.D. 900, all of the major Lowland Maya centers of the Peten region were abandoned, and the focus of subsequent Maya developments shifted to the surviving late Classic sites in Yucatan.

The influence of Central Mexican cultures on the Maya (which was apparent, but not dominating during the Classic period) became overwhelming during the post-Classic period in Yucatan. The large Yucatecan site of Chichen Itza came under the political domination of Toltec Mexicans, who recreated much of the city in the image of Tula. During this period, the Toltec cult of Quetzalcoatl (Kukulcan) spread throughout Yucatan. Central Mexican influences are also indicated by increasing secularization and militarism in Maya society during the post-Classic period.

FIGURE 11. Double whistle, Tikal. Formed in the representation of a bird. Each whistle is pitched in a sharp‴, offset from one another by thirty cents. No tone holes are present.

Mayan influence was widespread over southern Mesoamerica. They not only developed an extensive system of roads but also, in late post-Classic times, competence in coastal commerce. By the thirteenth century substantial Mayan settlements had become established in the Chorotega region of Costa Rica.

Relatively little is known of very early pre-Classic period Mayan musical instruments. Most of those found in pre-Classic and Classic sites are hollow figurine ocarinas and whistles; these competently crafted aerophones apparently served as trinkets or toys and were not commonly included among grave goods (figs. 4, 11, 12a, and 12b).

The remarkable collection of grave artifacts from the post-Classic Mayan cemetery island of Jaina, off the coast of Campeche, has provided an excellent appreciation of Mayan musical instruments. Here, block flutes have been found with six tone holes delivering reasonable semblance to a natural diatonic scale. A flute of this type, now in the Mexican National Museum of Anthropology, roughly approximates the scale of C major. Copies of this important instrument, carefully made under the supervision of the museum, are available for study (fig. 13).

FIGURES 12a and b. Vase flute, Tikal. Open embouchure of saddle type representing the figure of a priest. Three tone holes are present, producing the span of a seventh from the tonic tone of a sharp′. Note the tubular tone hole in figure 12b (rear view).

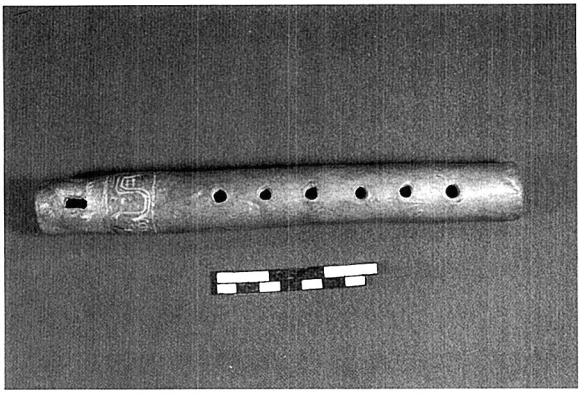


FIGURE 13. Block flute, Jaina. Reproduction by the Mexican National Museum of Anthropology of a flute with six tone holes found on the burial island of Jaina, off the coast of Campeche; producing a natural diatonic scale based on the tonic of d sharp″. The prototype of this instrument is assigned to the late post-Classic period, predating European influence.

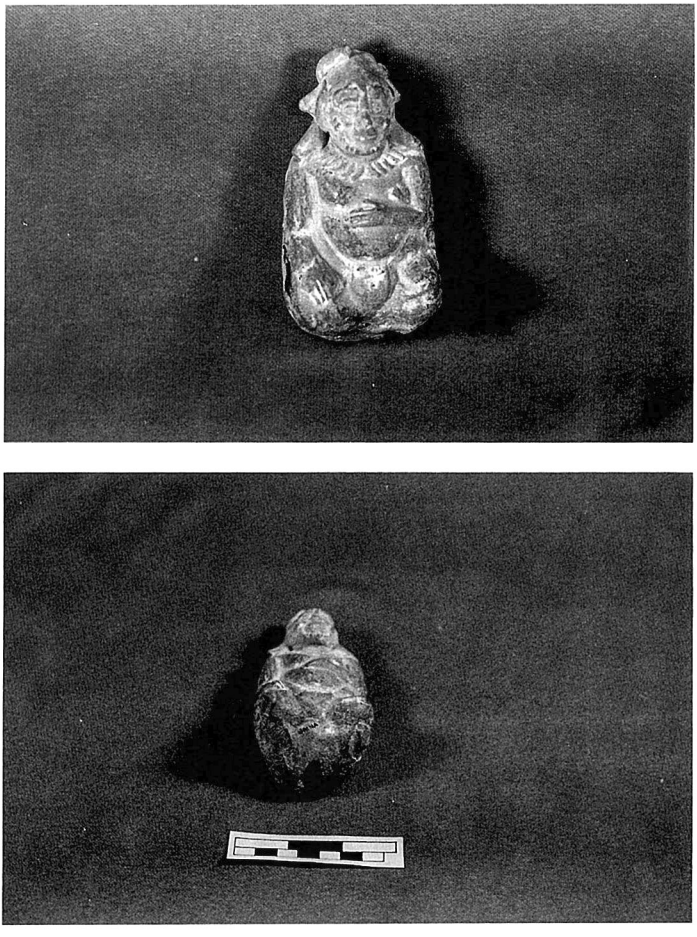
These copies show variable shrinkage from the firing process. The replica shown is 21.9 cm. in length as compared to the 23.5 cm. length of the prototype—approximately seven percent shrinkage assumed for all dimensions during the firing process; however, tuning is comparable to the original. The copy delivers first harmonic frequencies of d sharp″, e″, f″, f sharp″, g sharp″, a″, b″, and d sharp‴; the second harmonic tones of d sharp‴, e‴, f‴, and f sharp‴ can be produced by overblowing the three lower tone holes but cannot be controlled at higher frequencies. The relatively large cylindrical bore (20 mm.) and small tone holes (4 mm.) dull effective harmonic progression and considerably shorten the tone chamber. Compared to a pennywhistle with a bore of 11 mm. which tunes to d″ at a length of 26.5 cm. from the fipple lip, the Mayan flute tunes to the same tone at a length of 19.8 cm. from the fipple lip and loses the greater part of the harmonic agility of the former instrument. Despite the inefficient scale and poor tone color of aerophones of this type, recognition of a rather evenly divided extended scale by the Mayans would seem evident. A flutist using this type of instrument is depicted in the Dresden codex (fig. 14).

FIGURE 14. Mayan flute player. Codex Dresden (Marti, 1968).

Multiple block flutes, anthropomorphic whistles, side-blown vessel flutes, ocarinas, and double-lipped resonator whistles of Mayan provenance have also been found on the island. The latter whistles contain a second fipple edge enclosed within a bulbous chamber, delivering several tones according to breath pressure ("jump-tone"); some, known as "chamber duct whistles," are of complicated design including more than two enclosed fipple edges (Marti, 1968; Rawcliffe, 1992). Many of these instruments were formed completely or in part in molds, with the addition of decorations and painting (figs. 15a, b, and c).

No large ceremonial complexes have been found in Central America below Southern Honduras. However, many artifacts from burial sites have been found in this area—including whistles and ocarinas. Mayan influences can be readily seen in the variety of expertly formed instruments from Costa Rica (figs. 16a, b, and c); of particular musical interest is a pentatonic duct flute from the Nicoya region tuned by extended tone holes (fig. 16d). The majority of these instruments, many finished in polychrome (similar to Veracruz instruments), date from late post-Classic to early Historic times as this area was initially bypassed by the early Conquistadors.

FIGURE 15a. Resonator whistle, Jaina. Aerophone figurine from the Island of Jaina. This rather elaborate, largely molded relief of three figures made of fine plumbate clay showing punctate pupils and a prominent Mayan nose is similar to figurines of the middle phase Tres Zapotes artifacts. Height 5 13/16 inches. Collection of the Dallas Museum of Art, Dallas, Texas (1973.31). Photograph by Bill J. Strehorn.



FIGURES 15b and c. Resonator vase flute, Jaina. Molded kneeling figurine with triangular shaped (notched) embouchure effectively delivering a single tone of a sharp'. Traces of blue decoration characteristic of Jaina ceramics are present.

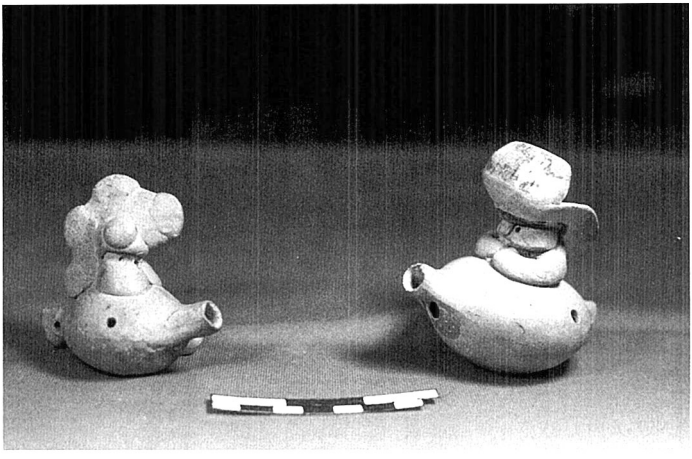


FIGURE 16a. Ocarinas, Costa Rica (Huetar). The ornament atop the ocarina on the left bears some resemblance to the head of a horse. The four tone holes develop a pentatonic scale with g sharp′ as the tonic and d sharp″ as the upper note. The instrument on the right is decorated with a human figure wearing a tricorne hat on backward, which might suggest European influence (as does the horse figure); its four tone holes span an octave with a scale of a sharp′, d sharp″, f sharp″, g sharp″, and a sharp″.

FIGURE 16b. Ocarina, Costa Rica. Polychrome barrel-shaped ocarina surmounted by the figure of a jaguar. Two tone holes are present delivering the scale of c sharp″ to e″.

FIGURE 16c. Ocarina, Costa Rica. Polychrome representation of two headed jaguar. Two tone holes with scale of e″ to b″.

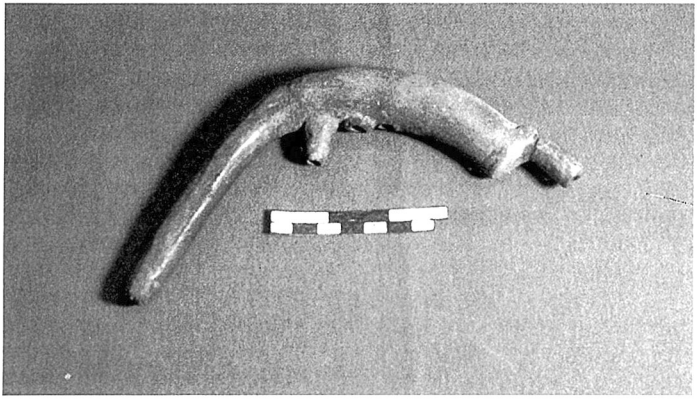


FIGURE 16d. Duct flute, Costa Rica. A conical-bore pentatonic duct flute with extended tone holes producing a scale of c″, d″, f ″, a″, and c‴. Cross fingering will complete the C-major diatonic scale. Overall length is 26 cm.; tone holes, including the distal aperture, are 5 mm. in diameter.

Flutes of the Gulf Coast Cultures

The enigmatic Olmec culture occupied the mid-east coast of Mexico as early as 1500 B.C. Their plastic arts are characterized by huge stone carvings and small figurines in jade. Though their glyphs alluded to flutes (Leon-Portilla, 1969), most of their crafted objects were probably made of perishable wood accounting for the lack of musical instruments of this provenience (Bernal, 1968).

The earliest aerophones in the Gulf coast area date to successors of the Olmec as represented by the Lower Tres Zapotes artifacts (early Classic period). This site provided many solid clay figurines, some, from very early stratum (perhaps dating from the time of Christ), formed with the typical Olmec facies; though only fragments of hollow figurines which might have represented whistles have been found (Drucker, 1943; Weiant, 1943).

Succeeding Gulf Coast cultures left an abundance of figurines formed into whistles and ocarinas as well as block flutes and ocarinas, clearly representing Teotihuacan influence. Block flutes fixed together in multiples were also in evidence as were block flutes with a rolling ball (embolus) in the tone chamber, which provided a sliding scale of frequencies. Birdform ocarinas made of coarse red clay and other native clays are similar to those found further south in Costa Rica, Guatemala, and Honduras. Small clay balls were inserted in the sound generator chamber of some of the whistles to provide warbling similar to the modern police whistle.

A variety of whistles and ocarinas, including emboli types, have been found in archaeological surveys of the Gulf Coast districts from late Classic to post-Classic times. Single or double emboli flutes were incorporated into a disc construction considered to represent the sun (fig. 17). Though it would not seem practical to manage a consistent scale with this arrangement, particularly with dual flutes, dramatic sliding frequencies, however musically inept, could be easily produced. Triple and quadruple duct flutes exhibit a rather extravagant method for portioning an approximately normal scale among various tone chambers. The triple flute of Tenenexepan (fig. 18a) covers the span of an octave (c sharp″–c sharp‴) utilizing the three tubes—though a scale of only seven tones. The quadruple flute of Tabasco (fig. 18b) delivers a rough natural diatonic scale (g′–g″) with slightly offset melody tubes to provide an auditory beat as seen in the double flutes of the West Coast cultures (fig. 23).

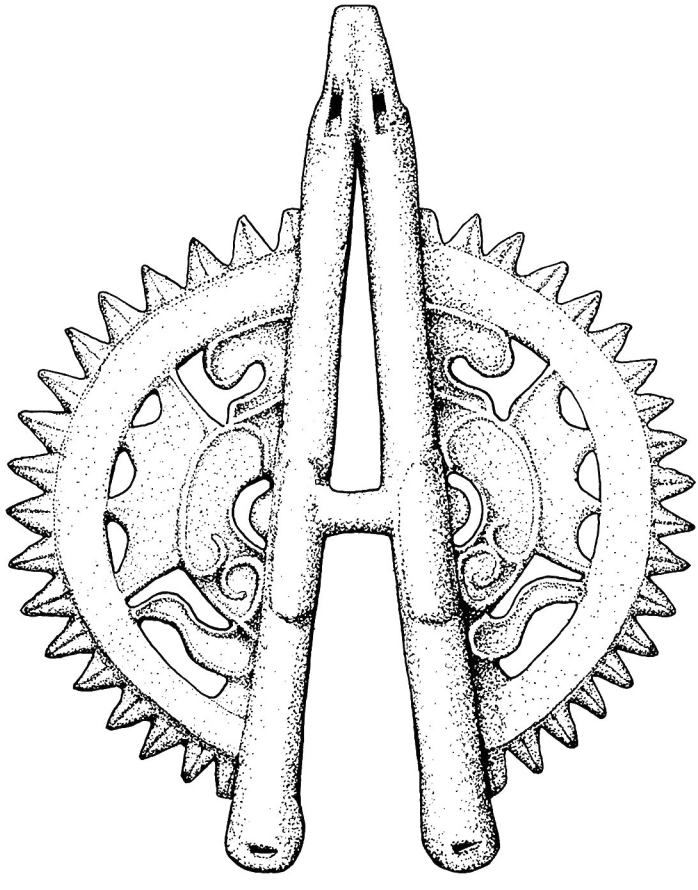
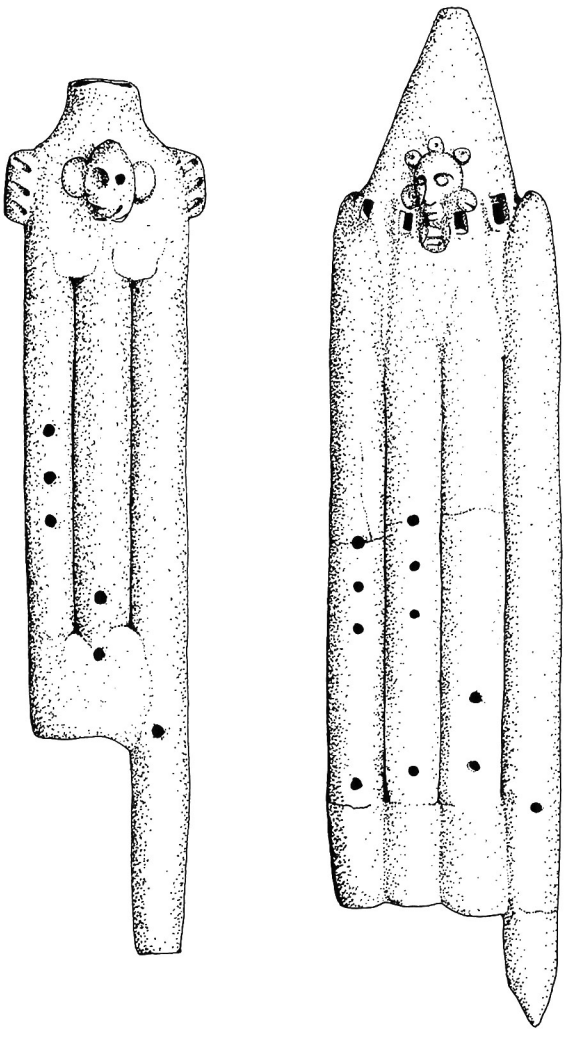


FIGURE 17. "Sunburst" flute construction of Gulf Coast region. Two ducted embolus flutes are incorporated in the construction. The Mexican National Museum of Anthropology, Mexico, D.F.



FIGURES 18a and b. Triple duct flute from Tenenexpan, Veracruz. Museum of Anthropology, Jalapa, Mexico; quadruple duct flute from Tabasco. Heye Foundation, New York.

Fragments of multiple flutes have been found in many areas of prehistoric Gulf Coast cultures as well as Teotihuacan from which they probably originated. Such instruments were capable of producing chords, which indicates an appreciation of harmonic relationships. However, the physical problems of generating enough air to voice these instruments as well as the dexterity to manage all the tone holes would seem formidable. In any event, post-Classic Gulf Coast cultures such as Totonacan, Huastecan, and Vera Cruzian carried on the Gulf Coast tradition of multiple-voiced whistle flutes and ocarinas as well as valve flutes. Rarely, fragments of panpipes have appeared in Gulf Coast sites. Anthropomorphic whistles, frequently multitoned, were produced by the Huastecans (figs. 19a and b) and the application of polychrome to these instruments became very common in the area, particularly in Veracruz sites (fig. 20), during the Upper Tres Zapotes phase (early post-Classic period).

The Western Cultures

The ancient inhabitants of Western Mexico produced some of Mesoamerica's finest pre-Hispanic flutes in spite of their marginal role in developments elsewhere in the region. In particular, the pre-Classic cultures of Colima, Jalisco, Nayarit, and Chupicuaro produced many excellently crafted flutes, whistles, ocarinas, and whistle pots. Fortunately, large numbers of these instruments have been well preserved in graves.

Block flutes of tabor pipe configuration are commonly found in the Western areas, particularly Colima (fig. 21). The distally placed tone holes frequently provide a fundamental scale of a fourth divided by three or four equally spaced tone holes. The lower tone hole is frequently too close to the distal end for semitone venting, possibly serving to tune the lowest notes or to serve as an aid to the upper harmonic scales. Using the three upper tone holes these flutes effectively serve as tabor pipes, developing an extended scale by harmonic steps, leaving one hand free to accompany on a drum, as seen in the figurine ocarina illustrated (fig. 22). The instrument second from the top in figure 21 measures 28.5 cm. in length with a cylindrical bore measuring 1 cm. in diameter. The air duct is inclined 45 degrees aimed obliquely at the inferior surface of the fipple lip. The fundamental scale is d″, c sharp‴, e‴, f‴, and f sharp‴ and harmonics to the fourth overblown series can be produced. Thus this instrument, though a half tone short of the optimal

FIGURES 19a and b. Huastecan ocarina. A small whistle pot enclosed in a larger resonator cavity. Gentle air pressure voices the large resonator ocarina in a″; more vigorous air pressure voices the enclosed aerophone in f‴ producing a "turtle dove" sound. No tone holes are present. Multienclosed whistles of this type, known as "jump-tone," were common among the Gulf Coast cultures. The bituminous covered eyes and down curved mouth probably suggest use of this artifact as a funeral piece.

FIGURE 20. Polychrome resonator whistle, Veracruz. Height 12.5 cm. Collection of Gilcrease Museum, Tulsa, Oklahoma (5445.4007).

FIGURE 21. Duct flutes, Colima. These aerophones of tabor pipe configuration produce two octaves of the diatonic scale using overtone progression.

FIGURE 22. Tabor pipe player. This ocarina from Costa Rica depicts a man playing a flute (tabor pipe) and drum (tabor).

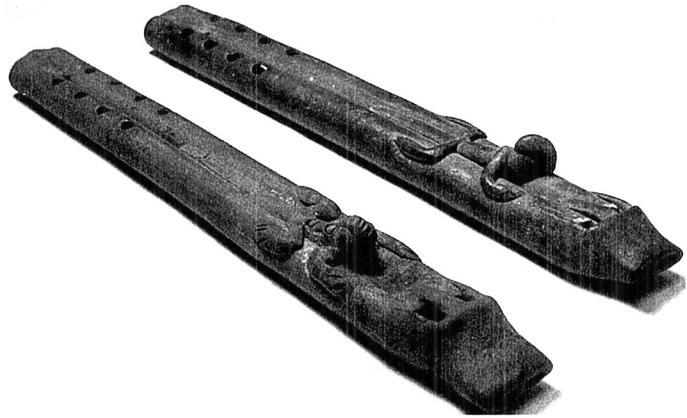


FIGURE 23. Double duct flute, Colima. The tuning of individual pipes is similar to the single pipes of figure 22. Corresponding tone holes are slightly offset to produce a beat. The figures appear to be iguanas. Collection of the Gilcrease Museum, Tulsa, Oklahoma (upper 5455.4118; lower 5445.4117). The ability of these instruments to produce harmonic chords is noteworthy.

fourth, is capable of functioning as a scalar harmonic flute with a diatonic span of two octaves. Double flutes were also common in this culture (fig. 23). These instruments were made by joining two single flutes together with slightly offset tone-hole placement—enough off pitch to produce a pleasant beat. The multiphonic effect of the combination of sounds is most interesting even if one side is used only as a drone. Less sophisticated double flutes were also made in Colima with less musical merit (figs. 24a and b). It is of interest that the double flutes of Gulf Coast cultures are multitoned in the upper range of the scale while those of West Coast cultures are set to the lower range.

Beautiful ocarinas were made by the ancient West Coast cultures. Large prehistoric Western Mexican ocarinas are exemplified by the illustrated turtle ocarina with two tone holes delivering the haunting tones of c′, d sharp′, and f sharp′ (fig. 25), and the ocarina from Jalisco in the form of a dog with four tone holes producing the scale from d sharp′ to b′ (fig. 26). Small ocarinas from the area usually had four tone holes placed to produce a harmonious pentatonic scale (figs. 27a and b). Double ocarinas were also in common use (fig. 28). As with ocarinas from other areas, holes were provided by which these instruments could be suspended. A free pellet was occasionally enclosed in the resonator chamber to produce a burbling sound.

Whistle pots were also made by prehistoric West Coast Mesoamerican peoples. The joined vase-jug aerophones differ from Peruvian whistle pots by an open outboard vase and by different resonator mechanics, using the entire effigy head as the sound chamber (figs. 29a and b). The Colima whistle pots appear to be entirely formed by hand, in contrast to the use of molding processes by the Peruvians.

Other Mesoamerican Aerophones

Most surviving Mesoamerican flutes are from the four principal culture areas described above. Somewhat surprisingly, with the exception of a few Zapotec ocarinas (d'Harcourt, 1925: plates 31 and 32), only scarce aerophones have been recovered from Oaxaca, which is one of the core areas of Mesoamerican civilization.

The Tarascan area has also yielded comparatively few such instruments, in spite of these peoples' outstanding skill in ceramics. The few known prehistoric Tarascan flutes are more impressive for their sculptural quality than their musical potential. Figure 30 illustrates a Tarascan duct flute in the form of an iguana. This instrument, with its tonic

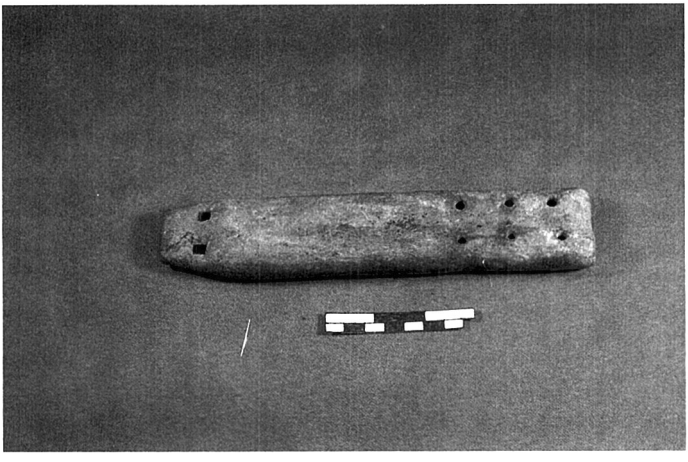


FIGURE 24a. Double duct flute, Colima. The three tone holes of each tube spanning a third are staggered slightly.

FIGURE 24b. Double duct flute, Nayarit. A common type found at prehistoric Western Mexico sites, often fashioned rather crudely with small tone holes. This instrument measuring 18.2 cm. in length has three tone holes dividing the span of a second. Collection of the Gilcrease Museum, Tulsa, Oklahoma (5444.2085).

FIGURE 25. Ocarina, Colima. A turtle figure with two tone holes producing the resonant tones of b, e′, and f sharp′.

FIGURE 26. Ocarina, Jalisco. Representative of a dog with the right front foot lifted. There are four tone holes producing a scale from d sharp′ to b′.

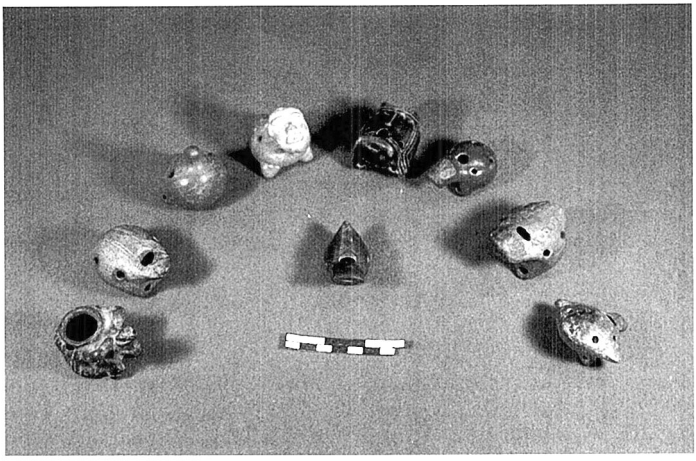


FIGURE 27a. Small ocarinas, Colima. A variety of small ocarinas from pre-Columbian Western Mexico. The instrument on the left is a vase ocarina.

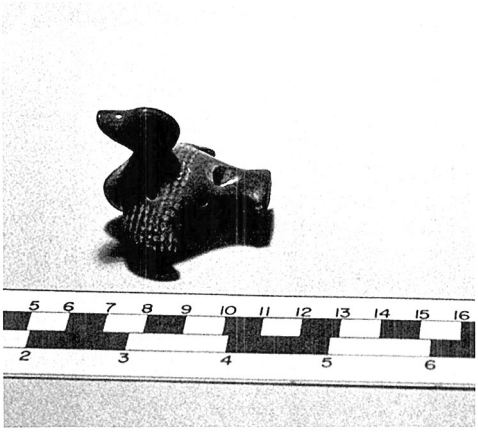


FIGURE 27b. Ocarina, Chupicuaro. A carefully crafted ocarina in the shape of a bird. Museum of the Red River, Idabel, Oklahoma.

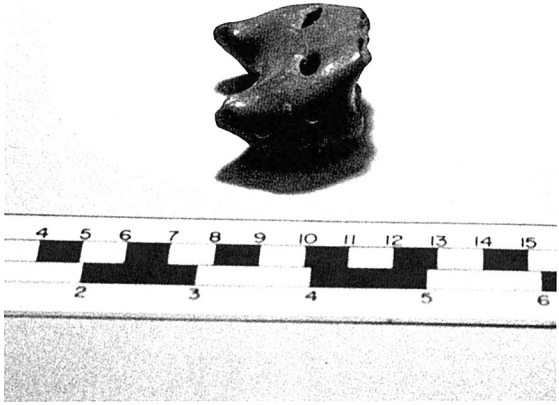
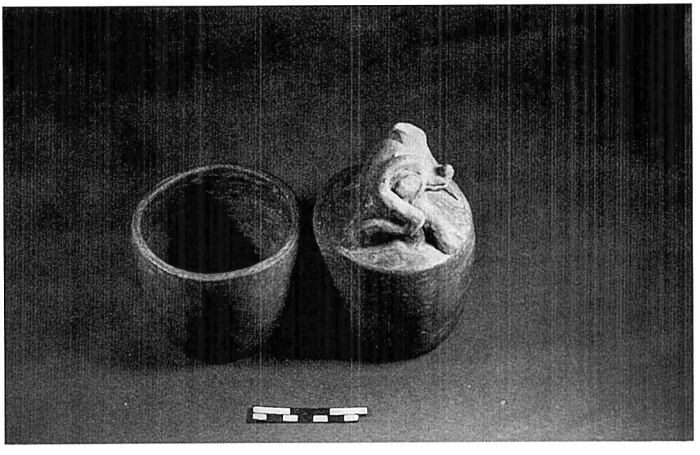


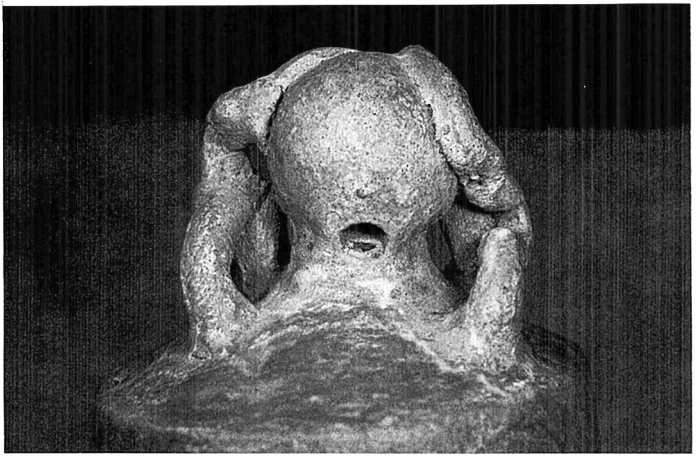
FIGURE 28. Double ocarina, Colima. Collection of the Museum of the Red River, Idabel, Oklahoma.

tuning hole 16 cm. below the fipple edge, produces a scale of c sharp″, f sharp″, a″, and b″. A Tarascan transverse flute is also shown (fig. 31). This instrument with six tone holes tuned to an approximate E-major scale almost certainly postdates the Spanish Conquest, as knowledge of transverse flutes was lacking in prehistoric Mesoamerica.

Ceramic Flutes of Present-Day Mesoamerica

Over the past few decades a resurgence of ceramic flute crafting has occurred in Mesoamerican areas, particularly in Mexico. Reproductions of ancient instruments may be difficult to distinguish from their progenitors by the uninitiated. Fortunately, carefully made copies are usually clearly labeled as such. Curio versions of ceramic flutes are produced in large quantities and serve as an economical memento of a visit to these charming areas (figs. 32a and b). Some of these flutes and ocarinas are





FIGURES 29a and b. Whistle pot, Colima. Tilting of the water filled container activates a whistle located in the base of the dog figure's skull; detail of bulb whistle, which shows similarities to the "bosun's pipe" (Payne, 1991).

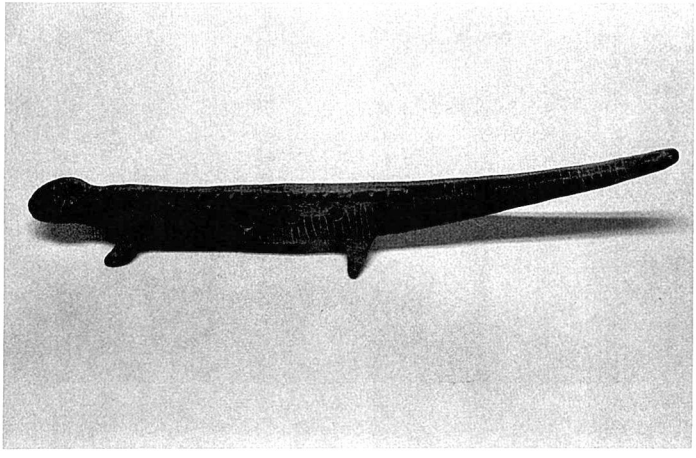


FIGURE 30. Ocarina, Tarascan. A late post-Classic ocarina, made of polished brown-black clay, representing an iguana; three tone holes are present.

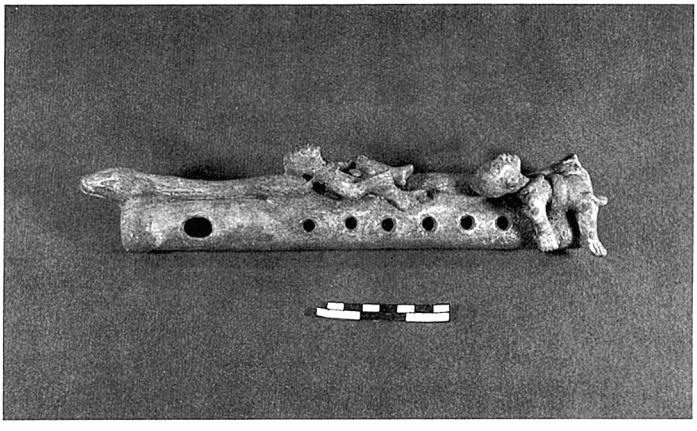
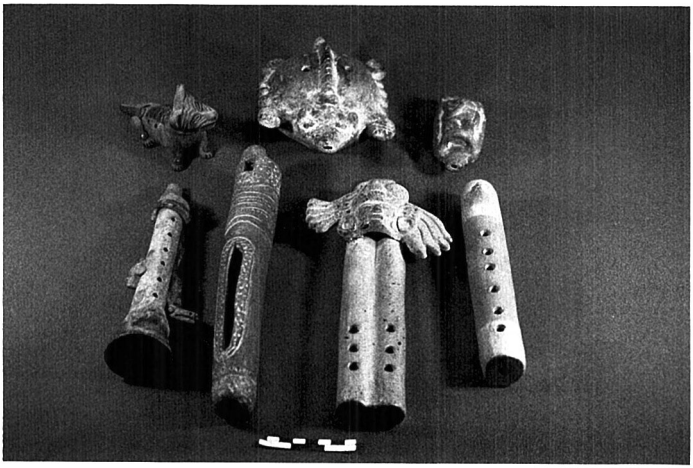


FIGURE 31. Transverse flute, Michoacan. This instrument probably dates from early European influence as there is no other evidence of the transverse flute in Mesoamerica prior to that time. The tone holes are evenly spaced in the scale of D major.



FIGURES 32a and b. Modern Mesoamerican aerophones.

worthy of collection on their own merit according to their artistic and musical interest and may be signed by their makers, such as Rosa of Coyotapec, Jorge Daher Guerra, or the Mexican National Museum (INAH), but most are anonymous.

Summary

The prehistoric cultures of Mesoamerica developed a variety of sound edge aerophones competently crafted in large quantities by ceramic techniques. A great many of these instruments have survived, providing an abundant study source with which to characterize musical instruments of the region from the pre-Columbian era. Effective mechanisms for sound generation were incorporated into aerophones characterized as duct flutes, ocarinas, vase flutes, and whistle pots. The tuning of these aerophones provides valuable clues to the musical preferences of these societies indicating their familiarity with pentatonic and diatonic scales as well as their appreciation of simple harmonic relationships, particularly intervals of the octave and the fifth.

Oklahoma City, Oklahoma

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