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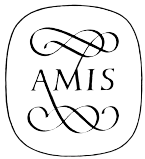

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Indian Flutes of the Southwest

Richard W. Payne

Music played an important role in the culture of the early inhabitants of the Southwest, at least from the time they began to establish themselves in organized communities some thirteen centuries ago.[1] Flutes, in various forms, are prominent in the heritage of most Southwestern Indian tribes. Relatively nonperishable tubular bone objects are common discoveries in archeological surveys of the Southwest, particularly in Anasazi areas. Many of these artifacts are undoubtedly flutes or whistles, though some are game calls, bead stock, "cloud blowers," or ornaments not related to sound production.[2] In tracing the musical heritage of the Southwest, larger flutes made of reed, cane, or other vegetal material are also important, but their preservation is rare in most archeological contexts.

The passage of time has confused tribal memory concerning traditional flutes, even those of the past century, though many fine examples lie mute in museum collections. Moreover, though music remains a pervasive force in surviving cultures, the art of flute making and playing has suffered from acculturation. Yet nostalgia for native instruments generally persists, often producing flutes whose charm is likely to lie more in their ornamentation than their musical integrity.

Flutes in one form or another have been developed by most Southwestern tribes, serving in ceremonial roles, providing individual as well as communal enjoyment, and lending themselves to courtship activities. Flutes may also serve as a clue to the musical heritage and migration of

1. Through careful study of musical instruments it may be possible to determine much about their music; to this purpose a general survey of musical instruments from the prehistoric Southwest has been made by Donald Brown, and a brief survey of prehistoric flutes of the area has been compiled by Elizabeth Morris: Donald N. Brown, "The Distribution of Sound Instruments in the Prehistoric Southwestern United States," *Ethnomusicology* 11 (1967): 71–90; Elizabeth Morris, "Basketmaker Flutes from the Prayer Rock District, Arizona," *American Antiquities* 24 (1958): 406–11.

2. Tubular bone was laboriously worked with stone age tools to form a variety of utilitarian as well as aesthetic and ceremonial objects. Beads and decorative bone tubes were sectioned from hollow bone; bone tubes were used as "cloud blowers" through which smoke from native tobacco was blown in a purifying ritual or (blown toward the heavens) in a ritual to encourage rain. Many small bird-bone tubes were used as turkey calls, the sound being produced by sucking rather than blowing.

tribal ancestors,[3] and because flutes were the only instruments of fixed pitch used by ancient Southwestern Indians, they are of value in providing insight into prehistoric concepts about musical scales.

Charles Wead, who surveyed the large collection of musical instruments from various cultures accumulated in the United States National Museum (now the Smithsonian Institution) before the turn of the century, created the following "generic rule": "The primary principle in the making of musical instruments that yield a scale is the repetition of elements similar to the eye; the size, number, and location of these elements being dependent on the size of the hand and the digital expertness of the performer." It was his final conclusion that the pitch-determining elements of primitive wind instruments are primarily decorative.[4]

Despite Wead's impressions, one might also conclude that native flute makers in the past had some appreciation of the musical potential of their product, though creating the artistic design and making the tone hole fit the fingers were obviously matters of concern to them. In *On the Sensations of Tone* (1885), Hermann Helmholtz suggests that musical scales of most cultures bear some relationship to certain notes of the diatonic scale, at least the octave and fifth, though the rest of the scale may vary considerably.[5] Saying that in the case of music "the human mind has a particular pleasure in simple ratios," he amplified what the ancients had known centuries ago: that the octave, the fifth, and its complementary fourth (in descending order) comprise the simplest of

3. Indian cultures of the Southwestern United States have a long and relatively well-documented heritage. Yet often, apparently well-established tribes have seemed to vanish completely, leaving their worldly goods behind—to reappear enigmatically at a different site; the tracing of the migration of these cultures to their present locations deserves considerable interest. The study of arts and crafts of ancient peoples such as the Anasazi and Hohokam may provide an effective means of tracing the movements of prehistoric man. Alan P. Merriam, *The Anthropology of Music* (Evanston: Northwestern University Press, 1964), 45, touches on this general possibility.

4. Native craftsmen may have a propensity for copying what they see without regard to the functional mechanisms of the object. This is a common habit of the American Indian who may make beautiful copies of a musical instrument with little regard to duplicating its sound-producing requirements, as if they would be expected to follow naturally. Thus there are many beautifully finished flutes that have sound-producing qualities that are sadly deficient; their best fate is to hang upon the wall. Charles K. Wead, "Contributions to the History of Musical Scales," *United States National Museum* (1900), 421–63, unfortunately came to the conclusion that primitive musical instruments were made primarily for haphazard sound rather than serious musical purposes. See note 27 below for an extension of this whimsical point of view.

5. Reprint (New York: Dover, 1954), 15.

FIGURE 1. Archeological sites and cultural areas of the Southwest. Map prepared by John D. Hartley.

ratios and are thus likely to be generally pleasing to the ear in polyphonic singing. The female voice in Indian group singing is usually pitched an octave above that of the male, instinctively providing an agreeable blending of tones.[6] Indeed, in many nonliterate cultures there are flutes classed as "male" and "female" pitched to allow the "natural" harmonic intervals preferred for playing together. Our interest in studying the flutes of the Southwest Indians is heightened by such possibilities.

The considerable cultural exchange between Indian groups, even in the distant past, makes it difficult to assign ethnic priority to any particular flute configuration. The present nomenclature of specific flute types is intended to represent the area in which the particular instrument was first observed or appeared to be in most common use. It seems appropriate to extend the usual boundaries of the Southwestern culture area for purposes of the present survey; the accompanying map (fig. 1) depicts the prominent archeological sites and cultural areas described.

6. Bruno Nettl, *Music in Primitive Culture* (Cambridge: Harvard University Press, 1956), 78.

Most old flutes made of vegetal material have suffered from the passage of time, rendering tone production feeble or impossible. The scale of such impaired instruments can readily be reproduced, however, using thin-walled tubing of a suitable substitute material[7] to simulate the ancient prototype, though the essential charm of the original instrument will of course be lacking.

End-blown Flutes

Flutes of the Basketmaker III Period (A.D. 400–700)

In an archeological survey of the Prayer Rock area of northeastern New Mexico by Earl Morris in 1931, four complete and well-preserved flutes of box elder were found at the somewhat inappropriately named "Broken Flute Cave." These instruments (fig. 2a), now in the Arizona State Museum, are of Basketmaker III age (ca. A.D. 625); they have been described by Elizabeth Morris and B. M. Bakkegard.[8] One is immediately impressed with the fact that their tone hole configuration is similar to that of European renaissance flutes (fig. 3) such as those shown in the second volume of Michael Praetorius' *Syntagma Musicum* (1618), characterized by two sets of three equally spaced tone holes, a system still used in the design of simple flutes and recorders.

While the placement of the tone holes in each set of three is limited by the span of the fingers, the space between the hands can be changed as desired. In a cylindrical flute with approximately equal spacing of tone holes, the intervals generally fall short of a full tone, usually delivering three-quarters of a tone. While this shortcoming can be adjusted to some extent by modifying the size of the tone hole, it is difficult to enlarge the interval to a full tone within the span of the fingers of one hand. No such restriction is present, however, between the two hands, and the interval between the two sets of fingers is easily widened. By increasing the distance between tone holes three and four, one can produce the interval of a fifth from the lowest pitch, an advantageous relationship to natural harmonics that has found favor in widely divergent cultures.

7. Schedule 20 PVC water pipe of a comparable bore, for example.

8. Earl Morris did not publish the particulars of these remarkable instruments, but his daughter, archeologist Elizabeth Morris (see note 1), and ethnomusicologist B. M. Bakkegard, "Music in Arizona before 1912," *Journal of Research in Music Education* 8 (1960): 67–69, did eventually publish excellent descriptions of these flutes.

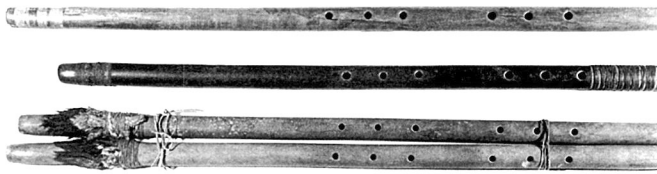

FIGURE 2a. Basketmaker flutes. The flute described is the upper (shortest) one. Arizona State Museum, University of Arizona, catalog numbers (from above) A 14450, A 14451, A 13994–A, A13994–B. Photograph by Christy Turner.

FIGURE 2b. Detail of the embouchures of Basketmaker flutes. Binding the two flutes together is consistent with the strong feeling for duality in the legends of Native American tribes. Arizona State Museum, catalog numbers 13994–A and 13994–B. Photograph by the author.

FIGURE 3. Copy of a renaissance flute made by Friedrich von Huene, in the author's collection. Compare the tone-hole configuration of this flute with that of the Basketmaker flutes, fig. 2a. Photograph by the author.

It is evident that the Basketmaker flutes produce some intervals consistently close to the octave and fifth. The shortest of these similar instruments measures 68.3 cm in length, with 7-mm tone holes placed 31.8, 35.7, 39.5, 49.4, 53.3, and 57.5 cm from the embouchure end. A copy of this flute has been made that produces (roughly) the ascending scale *b♭*, *c′*, *d♭′*, *d′*, *f′*, *g′*, *a′*, *b♭′* (approximately the same as the weaker tones of the original); a clear set of first harmonics; and rather uncertain second harmonics.

The embouchure ends of these flutes are thinly beveled; and the flute described in detail above shows evidence of considerable use, manifested by its oil-impregnated tube and the burnishing around the tone holes. Feathers are fixed to the embouchure end of the two flutes bound together (fig. 2b), evidently to waft with the flutist's breath (though these instruments are plugged with corn cobs and other ceremonial material[9] and show little evidence of having been played). None of these flutes has tooth marks about the embouchure that might indicate the technique by which they were sounded.

The Hopi Flute

Several flutes similar to the Basketmaker type, but probably of later vintage, were found by Morris in Canyon de Chelly.[10] Though some of these flutes show Basketmaker configuration, others display another arrangement of tone holes, the three upper ones much as in the Basketmaker type, but with two widely spaced tone holes substituted for the three distal holes. Such a flute was found in the Verde Valley near the Montezuma Castle site (fig. 4). It seems likely that the spacing of the lower holes allowed a firm purchase on the instrument, using the thumb and middle finger in a manner similar to that of the Japanese shakuhachi, while playing en route. These flutes are most likely of Hopi provenance, as they are typical of the traditional flutes played in the Hopi flute ceremony.

The Hopi flute (fig. 5), seen in abundance in the Field Museum of Natural History,[11] is an end-blown cylindrical tube fashioned from box

9. It is a ritual among many Indian tribes to "feed" their flutes, and perhaps a ritual to bind them together so that they will not be lonely in storage.

10. "Exploring in the Canyon of Death," *National Geographic* 48 (1925): 263–350.

11. These flutes were collected by the Rev. H. R. Voth, a Mennonite missionary among the Hopi at the turn of the century.

FIGURE 4. Flute from Walker Basin ruin, Verde Valley, Arizona. Montezuma Castle National Monument, catalog number 179. Photograph by the author.

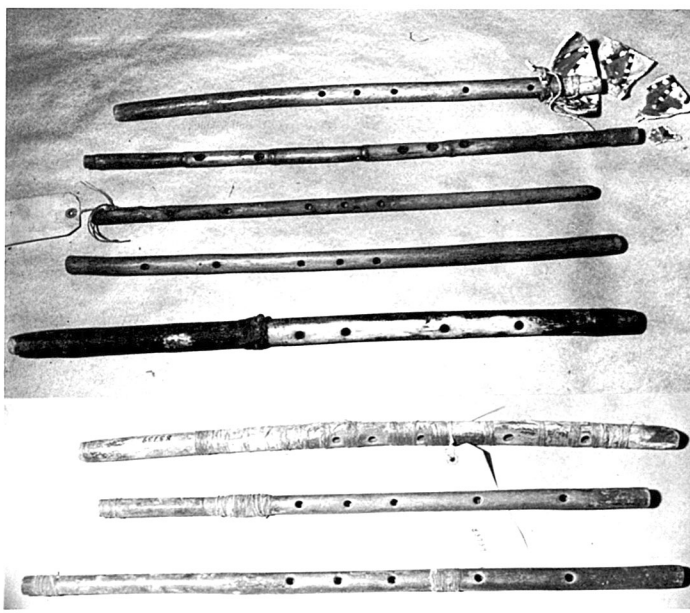

FIGURE 5. Hopi flutes. The flute at the top is described in the text. The gourd "bells" have largely disintegrated. Field Museum of Natural History, catalog numbers (from top) 83738, 83736, 83847, 83649, 71901, 83739, 63848, 44090. Photograph by the author.

elder, ash, cottonwood, reed, or cane. Its length varies from twenty-three to twenty-six inches, and a characteristic grouping of tone holes is evident: the upper tone hole approximates the octave above the lowest pitch; the next two each vent slightly less than a tone, the lower two each

slightly more than a tone from the preceding note. These flutes deliver the overblown octave very well but are erratic in the second harmonics. Some of them were originally adorned with a gourd "bell" affixed to the distal end and painted with a "squash blossom" design. A small prayer feather (*paho*) was dangled from the bell to wave the musical plea for rain heavenward (fig. 6). The trumpet-like end has very little influence on the sound of the instrument except to the extent that it might extend the length of the tube or muffle the distal bore.[12]

Tooth marks on the embouchure end of several well-used flutes show that they were sounded by the unusual technique of inserting the proximal end into the mouth, pressing it against a lower canine tooth, and channeling the air stream between the trough of the tongue, the roof of the mouth, and the upper incisor teeth, venting through relaxed lips. This manner of playing allows the flute to be played vertically, with the sound-generating air stream directed forward, shielded from inadvertent air currents or interruptions caused by the motion of walking (fig. 7). Though this technique is only dimly remembered by the Hopi, it is still practiced by the Cuna Indians of Panama (fig. 8), and by some Zulu and Swazi herd-boys described by Baines; there is also evidence that this method was used in the past by the Santo Domingo Indians, according to Frances Densmore.[13] (For the uninitiated it is much easier to sound these end-blown instruments using the "nay" or "shakuhachi" embouchures[14]). The Hopi flute used as an example of these instruments

12. Hopi legend relates that their ancestors came across the water on reed boats, landing far to the south, then migrating to their present site. The *sodina*, a flute native to the Tanala of Madagascar, has characteristics similar to that of the Hopi flute. Ralph Linton, "The Tanala, a Hill Tribe of Madagascar," *Field Museum of Natural History* 23 (1933): 207.

13. Anthony Baines, *Woodwind Instruments and Their History* (New York: W. W. Norton, 1962), 179; Frances Densmore, "Music of Santo Domingo Pueblo, New Mexico," *Southwest Museum Papers* 12 (1938): 34–40.

14. The "shakuhachi" embouchure: end-blown flutes may be sounded by directing the sound-generating air stream across the upper rim of the circular aperture, as in the common exercise of blowing across the top of a "pop" bottle, the most elementary method of sounding an open tube. By notching the sound-producing edge and directing a fine stream of air directly against this sharp edge while holding the flute vertically, one can produce a superior sound, as in the case of the Japanese shakuhachi and the Peruvian *quena*, when competently played. John Fonville, "On Playing the Boehm Flute Like a Shakuhachi," *The Flutist Quarterly* 12, no. 3 (1987): 28–30.

The "nay" embouchure is another common method of sounding a smooth aperture, by positioning the open tube obliquely and pressing the lips lightly against it; the proximal end of the flute will cover the red area of the lips from the right corner of the mouth toward the middle. A stream of air is then directed across the tube to its lateral edge by semi-relaxed cheek puffing, blowing the air from the diaphragm through the relaxed aperture between the lips. This technique is practiced in sounding open-pipe flutes such as

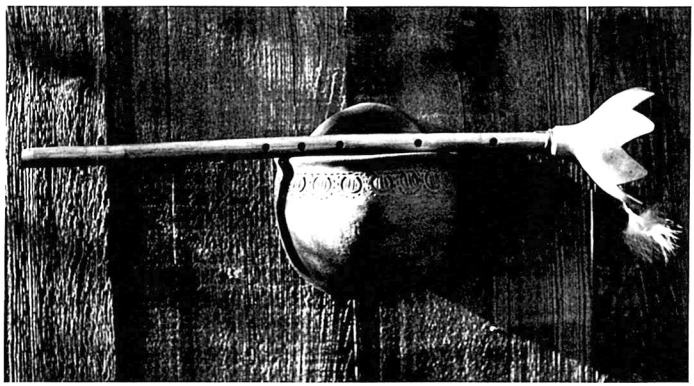

FIGURE 6. Flute of the Hopi type now in the author's collection, made by the author on the pattern of the Mishongnovi flute. Photograph by the author.

FIGURE 7. Hopi flute players in the morning ceremony of the Drab Flute Society at Muyovatni, their sacred spring near Oraibi. Both the "Hopi" embouchure and the shakuhachi method of blowing can be seen here. Collection of Bethel College Library, Newton, Kansas. Photograph by H. R. Voth.

FIGURE 8. Cuna flute player demonstrating the "Hopi" embouchure. Photograph by the author.

(fig. 5, upper flute), collected by H. R. Voth in 1898 from the village of Mishongnovi, measures 60.4 cm in length, with tone holes 26.8, 30.9, 34.4, 42.9, and 50.2 cm from the proximal end, producing approximately the scale *c'*, *d'*, *e'*, *g'*, *a'*, *b'*, *c''*.

The Yuma Flute

In the excavations of Gypsum Cave, a late Basketmaker dwelling on the Colorado River near the present Nevada border, two flutes were

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the *nay* of North Africa, the Balkan *kaval*, and various similar instruments. R. W. Payne, "The Nay Embouchure," *The Flutist Quarterly* 13 (1988): 6.

The particular "Hopi" embouchure mentioned is not so well known; and despite the advantages noted, it is extremely difficult to control or even to sound. The proximal end of the tube is placed in the mouth resting on a canine tooth, and the air stream is directed across the rim edge along the trough of the tongue (Baines, 173).

found.[15] One was a short (10 1/2 in.) end-blown flute of the Basketmaker type with six tone holes that appear to approximate the diatonic scale; the other, 23 1/2" long with four tone holes approximately equally spaced in the middle of the flute, might be considered a prototype of the traditional Yuma flute.

Further south along the Colorado River near its juncture with the Gila River, the Yuma (Quechan) Indians established themselves. Though rainfall is sparse there, free-flowing rivers with fertile flood plains supplied them with the necessities of life. In times past the Yuma were somewhat isolated, developing a culture rather different from that of other tribes of the Southwest; acculturation came relatively late to them because of their inaccessible location, their resistance to the church, and a disinclination to extend their domain. But their enviable situation rapidly deteriorated as the rivers were dammed and irrigation rights were claimed by newcomers brought in by the railroad, which also carried increasing numbers of tourists, usually on their way to California.

Musical tradition, in which the flute played a prominent part, has been a strong aspect of Yuma culture. The Yuma flute is probably of prehistoric origin and may date from the time of the Gypsum Cave instrument found upriver, though flutes of this type more than 100 years old are rare. It is likely that many such prized possessions were consumed in the cremation fires of their owners, for the Yuma of the past were careful to remove all traces of the deceased.[16] Many of the elaborately decorated Yuma flutes dating from the first decade of the twentieth century in the Arizona State Museum (fig. 9), collected by an early director of the Museum who also served as warden of the Yuma Territorial Prison,[17] show little evidence of heavy use, and were apparently made for sale to tourists.

In her detailed study of Yuma music, Densmore briefly describes the Yuma flute, though her measurements cannot be correlated with the instruments photographed or with specimens in the Smithsonian Institution. She describes the tonal range of the flute as the interval of a third, which is clearly not the case. When her measurement of the upper

15. Mark R. Harrington, "Gypsum Cave, Nevada," *Southwest Museum Papers* 8 (1933): 140–51.

16. In the Yuma tradition of the past, after a short period of mourning during which the body and all possessions were consigned to the fire, it became an offense even to mention the name of the deceased.

17. Wilma Kaemlin, "Yuma Dolls and Yuma Flutes in the Arizona State Museum," *Kiva* 20 (1954): 1–10.

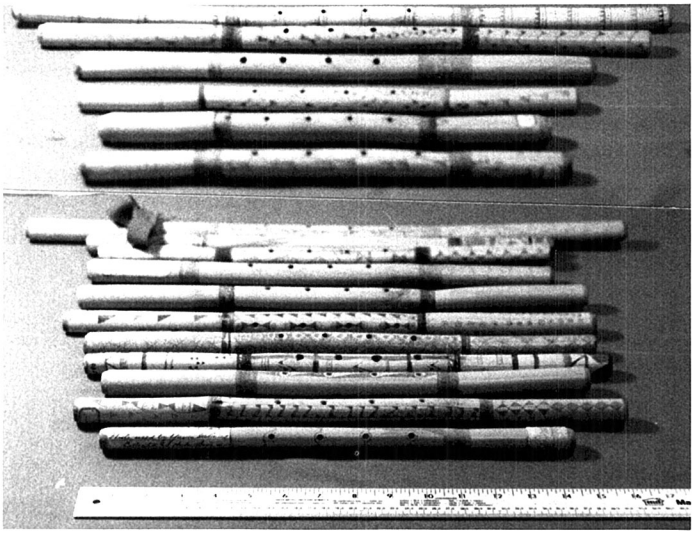

FIGURE 9. Yuma flutes. Arizona State Museum, catalog series 580. Photograph by the author.

tone hole is corrected, a symmetrical arrangement of holes results that yields approximately the scale *a, d′, f′, g′, a′*. Densmore did not sound-record the music of this flute; and she states that the informant played it with great difficulty, an additional disadvantage. (By the time of her report flutes of the Pima type described below appear to have supplanted the traditional Yuma flute in common use.) Her account of the now defunct cremation ceremony, in which the Yuma flute played an important part, is of particular interest.[18]

George Herzog, in a comprehensive study of Yuma music, speaks briefly of the flute, saying it was used for "lovemaking by the boys" (apparently a trivial role) at the time of his report.[19]

18. "Yuman and Yaqui Music," *Bureau of American Ethnology Bulletin* 110 (1932): 1–51.
19. "The Yuman Musical Style," *Journal of American Folklore* 41 (1928): 183–231.

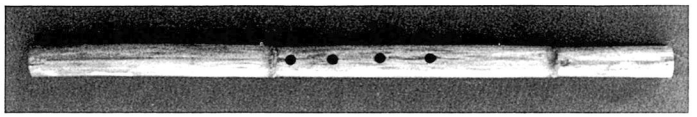

FIGURE 10. Yuma flute in the author's collection. Photograph by the author.

The Yuma flutes studied vary from 20 to 24 in. in length with bores 1/2 to 3/4 in. in diameter; tone holes are from 1/8 to 3/8 in. in diameter. All are characterized by rather evenly spaced tone holes in the middle section, positioned slightly toward one end. The distance from the longer (embouchure) end to the first tone hole is from thirty-five to forty percent of the overall length of the instrument. The flutes were made of box elder, elderberry, Phragmytes or Arundo reed (carrizo), Arundinaria, or imported bamboo.[20]

These flutes were end-blown using the nay embouchure and were usually beveled on both ends as if to be played from either end; but it is evident that the preferred position is the one with the longer end up. Blown from the longer end, the upper tone hole vented an approximation of the octave above the lowest pitch, and the lowest tone hole delivered the fourth (or in some cases the fifth) below its neighbor. Intermediate tone holes were then roughly equally spaced to produce intervals of seconds or diminished thirds, for the use of both hands allowed adequate spacing. When the embouchure end of some flutes is reversed, the lowest tone hole often produces the fifth below its neighbor that is complementary to the fourth in the reverse set.

Figure 10 shows an old Yuma flute made of Phragmytes communis, a reed that served many purposes in Yuma culture. It is 48.5 cm in length,

20. Many years ago Phragmytes communis was the predominant large reed growing along the lower Colorado River basin. More recently it has been replaced in large part by Arundo donax, a similar but faster growing and softer-walled reed; Phragmytes, however, is more suitable for flute construction and generally used when available. Natives of the areas are familiar with the location of surviving stands of Phragmytes suitable for flute construction and are willing to go to great effort to obtain it. Both of these reeds are commonly called "carrizo." Arundinaria (cane) does not grow in the Southwest, but is easily obtained from the more humid southeastern areas of the United States and the rugged canyons of the Tarahumara in Mexico. Bamboo, not native to the United States or Mexico, is rarely seen in flutes from the Southwest. Richard Felger and Mary Beck Mosar, "People of the Desert and Sea," *Ethnobotany of the Seri Indians* (Tucson: University of Arizona Press, 1985), 170–71, 314.

with tone holes 7 mm in diameter placed 18.2, 21.9, 25.5, and 30.5 cm from the embouchure, giving approximately the scale *e'*, *a'*, *c''*, *d''*, *e''*.

A Yuma flute player photographed in 1885 (fig. 11) using the nay embouchure wears body painting for the cremation ceremony. The enigmatic playing cards in the photograph probably belonged to the deceased and were destined for cremation with him, to provide him with diversion in the other world.

The Pomo Flute

Small prehistoric flutes with centrally grouped tone holes similar to those of Yuma flutes have been found in various areas of coastal California. Examples of these miniature end-blown flutes made of bird bone with four tone holes, found in graves on Santa Cruz and San Miguel islands (now in the Smithsonian Institution), have been described by Thomas Wilson.[21] The small Pomo flute of historic times appears to be descended from this type. Usually made from an elderberry stalk, it is pierced by very small tone holes grouped in the central area. To guide the fingers to these tiny holes, they are recessed in flattened areas of the flute wall. Sometimes called "medicine flutes," these instruments were also used in courtship, reports William J. Wallace.[22] These flutes, common among many Californian cultures, produce bright tones with an uncertain development of upper partials due to poor venting by the small tone holes. The Pomo flute shown in figure 12, made of an elderberry branch, measures 26.7 cm in length, with 3-mm tone holes 10, 12.7, 15.2, and 17.7 cm from the longer end, delivering a scale approximating *d'''*, *e''*, *a''*, *c'''*, *d'''*.

The Mohave Flute

Several flutes of Pueblo II provenance were found by Pepper and Judd in excavations at Chaco Canyon in eastern New Mexico.[23] Most of these instruments, found in Pueblo Bonito, were associated with skeletal remains assumed to be those of priests. These end-blown flutes, now in

21. "Prehistoric Art: On the Origin of Art as Manifested in the Works of Prehistoric Man," *Report of the U.S. National Museum* (1896), 512–72.

22. "Music and Musical Instruments," *Handbook of North American Indians* 8 (Washington, D.C.: Smithsonian Institution, 1978): 615.

23. George H. Pepper, "Pueblo Bonito," *Anthropological Papers of the American Museum of Natural History* 27 (1920): 164–279.; Neil M. Judd, "The Material Culture of Pueblo Bonito," *Smithsonian Miscellaneous Collections* 124 (1954): 304–5.

FIGURE 11. Yuma flute player demonstrating the "nay" embouchure. Arizona State Museum photograph.

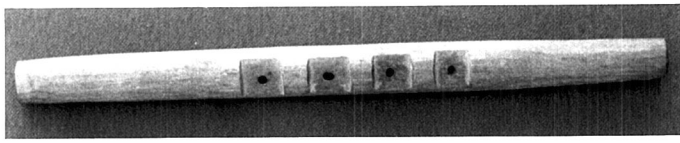

FIGURE 12. Pomo flute made of an elderberry branch, in the author's collection. Photograph by the author.

the collection of the American Museum of Natural History in New York, though varying considerably in size and state of preservation, have this tonal configuration: four distally placed tone holes, approximately evenly spaced or with a slightly greater separation between the second and third tone holes. Such flutes have a fundamental scale with a range of approximately a fifth; but a full octave can be achieved by overblowing, as is the case with tabor pipes.[24] (Distally placed tone holes producing fundamental pitches spanning less than an octave are found in duct flutes of many cultures; among the examples are the Morris pipe, the txistu and many bone flutes of the ancient Southwest. End-blown flutes of this type are uncommon, however.)

FIGURE 13. Mohave flute. Collection of the Museum of Man, San Diego, California, catalog number 10635. Photograph by the author.

A Mohave flute from the collection of the Museum of Man, San Diego (fig. 13), measures 64.8 cm in length, with tone holes 39.4, 42.3, 49.5, and 52.6 cm from the embouchure end, producing approximately the scale *b*, *c'*, *d'*, *e'*, *f'*.

24. The harmonic series may have served as an early pitch pipe for tuning the octave and the fifth, particularly in narrow-bore instruments.

Duct Flutes

The instruments previously described, sounded by an oral embouchure, are considered "true" flutes; the following instruments, provided with ducts that direct the air stream along a flue, on the other hand, are classified as "duct" or "whistle" flutes. The term "flute" is used in the present discussion to refer to both types.

The Papago Flute

Fragments of a prehistoric flute made of Phragmytes communis were found in Ventana Cave, located on the present Papago Indian reservation in south central Arizona.[25] This tubular specimen is pierced by three small tone holes 3 mm in diameter, spaced 19 cm apart. The proximity of the present Papago reservation, the character of the tone holes, and the material used suggest that this scanty artifact is a forerunner of the Papago flute. The traditional Papago flute, generally made of cane or indigenous reed, is ducted by perforating the cane wall on either side of a cane node, then forming a channel over the nodal obstruction. Using the index finger to close the hole above the cane node, air is directed from the upper air chamber over the obstructing block and across the hole below to its sound-generating far edge (lip). Some degree of regulation of the air stream issuing from the long air chamber is provided by adjusting the finger. Small tone holes are bored distally as far as the arms can comfortably reach. Usually there is a distal septum, perforated only partially to increase the response of the closely spaced tone holes. Despite the limitations of a narrow scale and a mute upper register, these elegant flutes, though slow to respond because of their long air column, produce beautiful tone colors particularly suited to the ambience of the quiet desert evening.

A Papago flute of circa 1880 fashioned from Arundinaria cane (fig. 14) is 75 cm long, the tone holes measuring 4 mm in diameter, the bore 1.9 cm at the proximal end and 1.8 cm at the distal end. The lip or edge is 37.4 cm, the tone holes 60, 62.7, and 65.7 cm from the mouthpiece, producing approximately f', $g\sharp'$, $a\sharp'$, b'—the range of an augmented fourth. Figure 15 illustrates the method by which the Papago flute is played.

25. Emil W. Haury, *Stratigraphy and Archeology of Ventana Cave* (Tucson: University of Arizona Press, 1950). 1ff.

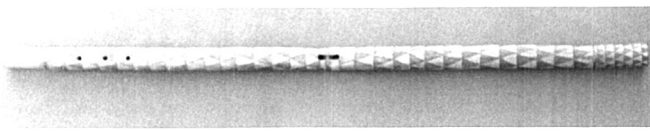

FIGURE 14. Papago flute in the author's collection. Photograph by the author.

The Pima Flute

A modification of the Papago flute credited to the neighboring Pima culture is the covering of the windway of the Papago flute with a "bandage" of cloth, paper, or leather to allow it to be played using only one hand. This windway innovation also steadies the flow of air over the lip; it can be adjusted in various ways to produce the desired tone color and control of harmonics. The Pima flute, particularly the Apache version, is usually shorter than the Papago prototype. This flute with a "bandage," by virtue of the ease with which it can be played, and its more predictable dynamic control, has become popular with other Southwestern tribes in recent years.[26]

The Pima flute may be 14 to 25 in. long and is usually made of local carrizo. As a rule there are three tone holes, approximately equally spaced, though their location between lip and distal end varies from one instrument to another. If the tone holes are placed toward the distal end of a flute of narrow bore, an effective series of harmonics, aided by shading the distal end with the fifth finger in the tabor-pipe tradition, is made possible. A Pima flute from the Smithsonian Institution measuring 64.7 cm in length and producing approximately the scale *b'*, *e''*, *g''*, *b''* is shown in figure 16.

A present-day flute carefully made for his personal use by Emmitt White (fig. 17a), a highly respected medicine man of the Pima tribe, is shown in figure 17b. This unadorned flute made of Phragmytes measures 40 cm in length and has a bore 1.9 cm in diameter. The tone holes are 6 mm in diameter, the lip 22 cm and the tone holes 31.2, 34.3, and 37 cm from the mouthpiece. The placement of the tone holes near the

26. Perhaps the horse-riding Apache had the same practical need as did the bugle-equipped cavalry for an instrument that could be played one-handed.

FIGURE 15. Papago flute player. Smithsonian Institution photograph.

FIGURE 16. Pima flute. Smithsonian Institution, catalog number 27844. Photograph by the author.

FIGURE 17a. Emmitt White of Bapchule, Arizona, playing a flute he made. Photograph by the author.

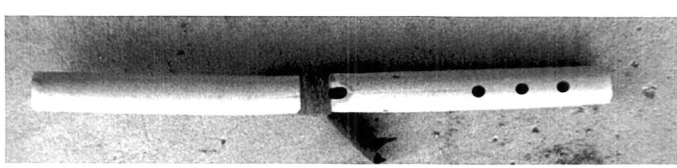

FIGURE 17b. Pima flute made by Emmitt White. Photograph by the author.

distal end allows the fifth finger to shade the lower end of the bore to produce the five-tone scale *d″, e″, f″, g″, a″*. The elaborately decorated Pima flutes made by Frances Vavages (fig. 18a), another respected Pima elder, largely for the tourist trade (fig. 18b), vary in scale, as no great effort is made to tune them. The flute shown produces the scale *e″, g♯″, a♯″, c♯‴*.

The Maricopa Indians, located between the Pima and Mohave areas, produce a flute of the Pima type that occasionally has four tone holes, reminiscent of Mohave preferences. Figure 19 illustrates a Maricopa flute 54.5 cm long, producing a scale approximating *c″, f♯″, g♯″, b″, and e‴*.

Though the distance between the tone holes is rather uniform in most flutes of the Pima type, comfortably fitting the fingers of one hand, the location of the upper tone hole between the lip and the distal end of the tone chamber may vary as much as twenty to fifty percent of the total length of the tone chamber, resulting in a scale the span of which varies from a fifth to an octave. In any event the Pima flute represents an ingenious method of providing a windway in native materials and an easily played musical instrument that can readily be tuned to the desired scale.[27] Windways of the Pima type are used in flutes and whistles of many American Indian tribes; a Choctaw and a Creek "medicine flute" are shown in figure 20. These flutes, known as "canes," made of the narrow-bore Arundinaria that is common to eastern Oklahoma, may have no tone holes or as many as two, but produce an agile series of partials upon which simple melodies may be produced by competent players. They are used to blow medicine songs into the medicine bowl and to lend excitement to the stickball games. The Plains Indians use whistles of this type (fig. 21) in their dances, particularly the Grass Dance.[28] The Seri Indians, south of the Yuma in Mexico, also have a flute of this type made of reed and called a "shaman's flute" (see note 20).

27. H. W. Schwartz, *The Story of Musical Instruments* (New York: Garden City Publishing Co., 1943), 57–85, has an entertaining and highly personal view of the development of flutes: he equates the eight notes in the octave with the availability of eight (!) fingers and attributes the semitones in the diatonic scale to the size of the little fingers, speculating that if man had a different number of fingers, or if they were thicker and longer, our scale would be different.

28. The Plains Indian flute, particularly as modified to the diatonic scale, has had a notable revival as an instrument for public performance, and has become increasingly popular among Native Americans, often replacing the traditional flutes of the Southwest. R. W. Payne, "The Plains Flute," *The Flutist Quarterly* 13 no. 4 (1988): 11–14.

FIGURE 18a. Frances Vavages of Sacaton, Arizona, playing a flute he made. Photograph by the author.

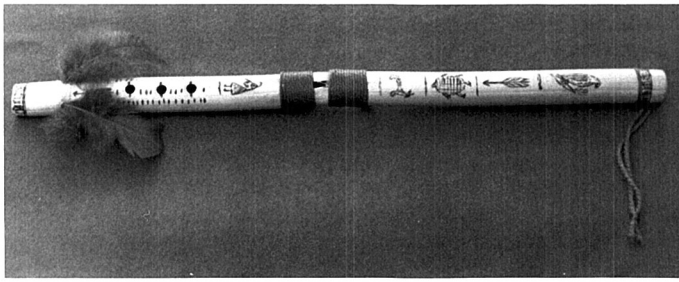

FIGURE 18b. Pima flute made by Frances Vavages. Photograph by the author.

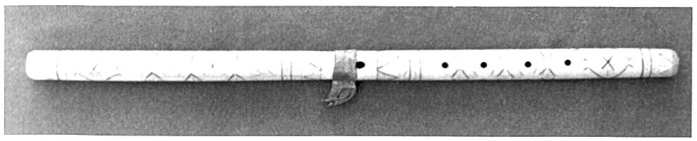

FIGURE 19. Maricopa flute in the author's collection. Gift of the Rev.Thomas Mails. Photograph by the author.

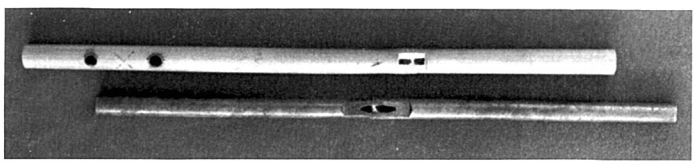

FIGURE 20. The flute above is a Choctaw flute, the one below a Creek flute; both are in the author's collection. Photograph by the author.

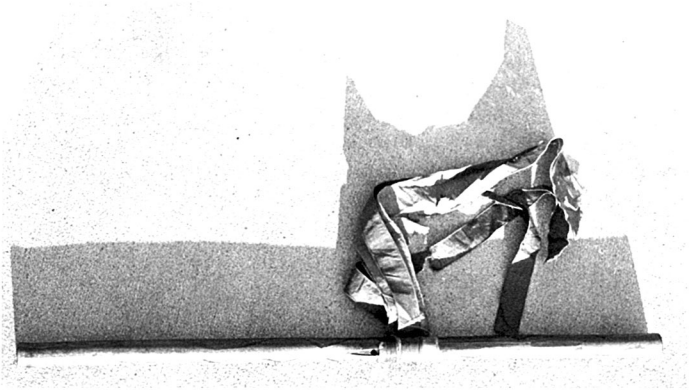

FIGURE 21. Otoe Grass Dance whistle. Collection of the Cherokee Strip Museum, Oklahoma Historical Society, catalog number 75.178.95. Photograph by the author.

The Zuni Flute

Excavations at Tularosa Cave unearthed portions of reed flutes with widely spaced tone holes that may represent a prototype of the present Zuni flute.[29] This flute is a rather short (12" to 18") section of bored cane with three or four tone holes widely spaced. The beak of the flute is blunt and a small "bell" of gourd or pottery, reminiscent of the Hopi flute, is attached to the distal end. These flutes produce a series of intervals approximating thirds; the weak response from the upper tone hole is due to its high pitch, which is suppressed by the relatively large bore. In general, this flute does not match the excellent musical accomplishments of the Zuni, though it continues to have limited ceremonial use.[30] Judd reports that "few except tribesmen would recognize music in the squeal of a Zuni flute."[31] The Zuni flute pictured (fig. 22) measures 13.5 in. in length, with the lip 1 in. and the tone holes 4, 6, 8, and 10 in. from the proximal end, yielding approximately the scale b', $d\sharp''$, $f\sharp''$, $a\sharp''$, e'''.

Two Jemez flutes in the New Mexico Museum at Santa Fe are similar to those of the Zuni. One of these ceremonial objects is end blown, the other has a whistle mouthpiece; neither appears to have any musical potential.

Yaqui and Mayo Flutes

The culture of the Yaqui Indians of southern Arizona and northwest Mexico evinces a strong Mexican influence. The traditional Yaqui flute is sounded by a unique ducted windway of the recorder type, its channel dimensions manipulated by a peg that allows precise adjustment of the air stream over the lip to produce the desired register. This flute seems strongly influenced by the txistu, a tabor pipe of conical bore native to the Basques of northern Spain, who arrived early in the Spanish conquest of Mexico (the conical bore of the txistu is ingeniously improvised

29. J. B. Rinaldo, "Tularosa Cave," *Fieldiana* 40 (1952): 34–357. A well-preserved side-blown flute made of reed, also found in Tularosa Cave, indicates that the principle of the transverse flute was known to the ancient people of the area. Walter Hough, "Culture of the Ancient Pueblos of the Upper Gila River Region, New Mexico and Arizona," *U.S. National Museum Bulletin* 87 no. 4 (1914): 107–16.

30. Matilda Coxe Stevenson, "The Zuni Indians: Their Mythology, Esoteric Fraternities and Ceremonies," *Annual Report of the Bureau of American Ethnology* 23 (1901–1902): 173–569.

31. Neil M. Judd, "Everyday Life in Pueblo Bonito," *National Geographic* 48 (1925): 227ff.

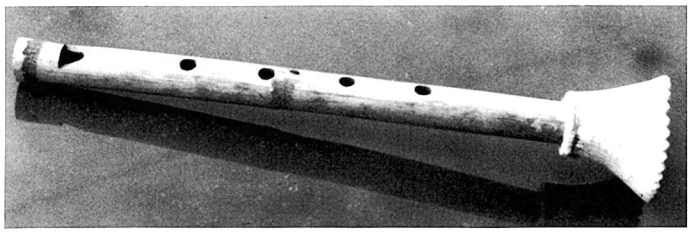

FIGURE 22. Zuni flute used by the order of Payatamu (Little Fire Fraternity). Photographed on the Zuni reservation by the author.

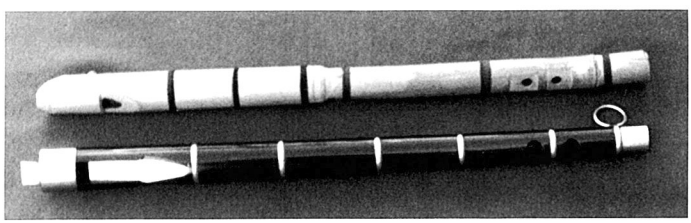

FIGURE 23. Yaqui flute (above) and Basque txistu from the author's collection. Photograph by the author.

in the Yaqui flute by joining a cane segment of smaller diameter to the head joint). The Yaqui flutist accompanies himself with a drum (tabor). He performs at fiestas to accompany the Pascola Dancer, who is joined at Easter time by the Deer Dancer.

The similarities between the txistu and the Yaqui flute can be seen in figure 23. The Yaqui example produces the fundamentals $g\sharp'$, b', c'', d''; the txistu $g\sharp'$, $a\sharp'$, b', $c\sharp''$. These flutes play harmonics that effectively produce a two-octave scale. Since the Yaqui and the similar Mayo flutes (fig. 24) vary in length and therefore in tuning, finding a flute that matches the tenor txistu so closely is probably a matter of chance.

The Tarahumara Flute

The Tarahumara, in the vast Barranca del Cobre east of the Yaqui, play a small beaked tabor pipe made of the cane (Arundinaria) that grows in the valleys of their vast canyon country (fig. 25). These flutes,

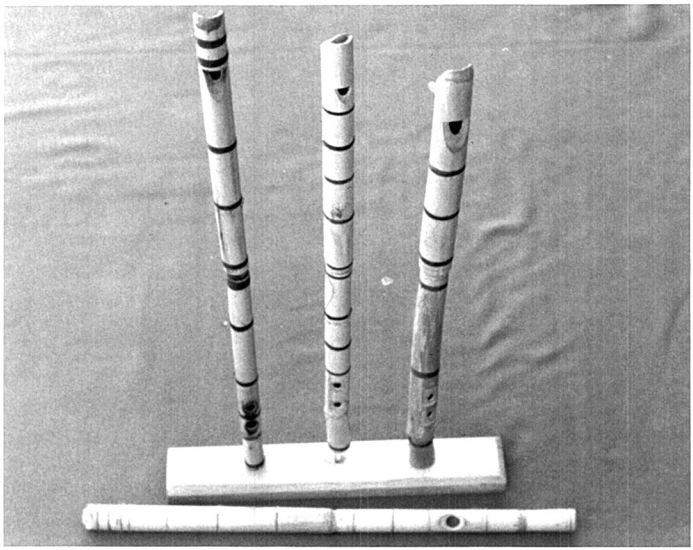

FIGURE 24. Yaqui flutes (upright) and Mayo flute (horizontal) from the author's collection. Photograph by the author.

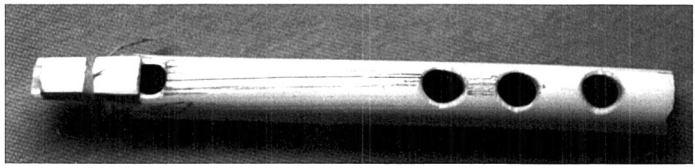

FIGURE 25. Tarahumara flute in the author's collection. Photograph by the author.

usually played as tabor pipes accompanied by a large tambour (a manner attributed to Spanish influence), resemble in some respects the clay flutes of the prehistoric Mayan and Aztec civilizations. Similar flutes are currently widespread among the native cultures of Mexico.[32]

32. Samuel Marti, *Instrumentos musicales precortesianos* (Mexico, D.F.: Instituto Nacional de Antropologia y Historia, 1968), 135–75.

* * *

The flute, the only fixed-scale instrument of the prehistoric Indians of the Southwest, provides an important link in the understanding of the musical practices of those peoples. In the evolution of these traditional instruments, the influences between cultures are of particular interest, and the development of various types of flutes, as we have seen, may be traced from early archetypes to current instruments that are characteristic of individual indigenous Southwestern peoples.

Oklahoma City, Oklahoma