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Pre-Columbian Maya Valveless Tube Trumpets

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Abstract

There are some 77 representations of non-conch shell pre-Columbian Maya tube trumpets known, but only one extant ceramic version survives. The others are known from paintings, engravings, and sculptures. Of these there appear to be two primary types: trumpets of one or more materials (gourd being one of those) and wrapped trumpets. For this chapter I discuss the evidence for these instruments, their materials and means of manufacture, and their uses. I will also examine the sonic signatures on replications of the ceramic trumpet and a dipper-gourd trumpet.

Keywords

Maya – Trumpet – Gourd – Iconography – Pre-Columbian music – Experimental archaeology

In this paper I discuss the evidence for pre-Columbian Maya non-conch shell, end-blown, valveless trumpets (referred to here as valveless tube trumpets) including their materials and means of manufacture, their sonic signatures, and their uses. The data set contains one ceramic trumpet, two ceramic trumpeters, and seventy-seven artistic depictions on thirty-three different objects and in various media, all attributable to the pre-Columbian Maya.[1] I will concentrate on the valveless tube trumpets on the three ceramic objects, the three wall paintings at Bonampak, and eight painted pottery pieces, as representative examples of the set. All extant trumpets are ceramic and small. They will receive some attention shortly, but I will focus on the larger ones shown in Maya

[1] The seventy-seven trumpets are found among depictions on architecture at Tikal, three Jaina Island figurines, a Campeche column, Rooms 1, 2, and 3 at Bonampak, as decoration around respective doorways at Hormiguero and Chicanná, as graffiti on architecture at Nakum, Dzibanche, Rio Bec, Tikal, La Blanca, and Yaxha (Źrałka 2014), and on the following pieces of pottery: Grolier nos. 31, 33, 36; Kerr nos. 1210, 1453, 3092, 3814, 4120, 4412, 4625, K5534, K5795, K5937, K6294, K6317, a Kerr vase in Schele and Freidel 1990: 268, the Xamac Vase, *Vaso de Ratinlinxul*, Dumbarton Oaks no. 16, and the plate 1989.110 (Metropolitan Museum of Art). In addition, I have seen photographs showing large Maya ceramic collections (public and private) – with depictions painted or carved on the objects in them – which suggests to me that there are probably more representations of the instrument than those listed here.

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Figure 1: Kerr Vase K1210. Reprinted by permission of the Maya Vase Database.

art works, as they are much more prevalent, and offer the best evidence of non-ceramic construction material, morphology, and uses.

Formerly, I have referred to the latter as gradually widening tube trumpets, but further review of the evidence leads me to believe that Maya trumpets of perishable materials – presumably all but the ceramic type – were made of various organics and in various shapes. To redefine my description, all were relatively long, all were narrow at their proximal or mouthpiece ends, and all were wide at their distal or bell ends. But not all were gradually widening. Wood is an obvious choice for the material used in their construction, producing long, sturdy and malleable planks that could be hollowed out. A tree native to southern Mesoamerica and South America, nicknamed "the trumpet tree" (*Cecropia peltata*) is locally prized for its light-weight wood (Standley 1927), and could have been used in the manufacture of the instrument eponymously named. I believe that it or another wood type may have provided the majority of tubes for a particular Maya trumpet that the Franciscan friar Diego de Landa described as "tienen trompetas largas y delgadas, de palos huecos, y al cabo unas largas y tuertas calabazas" (Landa 2021: 31). The Mayanist William Gates translates tuertas as "twisted," and therefore the rest of the sentence should read in English as a long thin trumpet made of a long piece of hollow wood with a long twisted gourd at the end (Landa 1978: 36). In fact, a review of the pictorial data shows trumpets literally in the shape and design that de Landa described (Figure 1).

These two trumpets are no doubt stylized, but the general shape is of a long thin tube attached to a twisted gourd decorated with tassels or flowers. Another vase painting shows trumpets that are analogous in design, but with bells that are only slightly twisted or not twisted at all (Figure 2).

Figure 2: Kerr Vase K6317. Reprinted by permission of the Maya Vase Database.

Figure 3: Kerr Vase K1453. Reprinted by permission of the Maya Vase Database.

Combining de Landa's historic account with pre-Columbian pictorial evidence mutually enforces the identification of a type of Maya trumpet, and so combining the historical with the pictorial seems a good method for continuing this approach. A second sixteenth century quote, by Domingo de Vico (n.d.), found in the *Vocabulario de la lengua cakchiquel con advertencia de los vocablos de las lenguas quiché y tzutuhil se traslado de la obra compuesta por el limo* addressing a language of highland Guatemala, describes the "tun" as a "calabaza como trompetas que tañen", "gourds like trumpets that they play"[2]. There are not only several Maya depictions of trumpets that seem to be made entirely of gourds, in fact the vast majority seem to be so, and as shown here my reasoning

[2] Author translation.

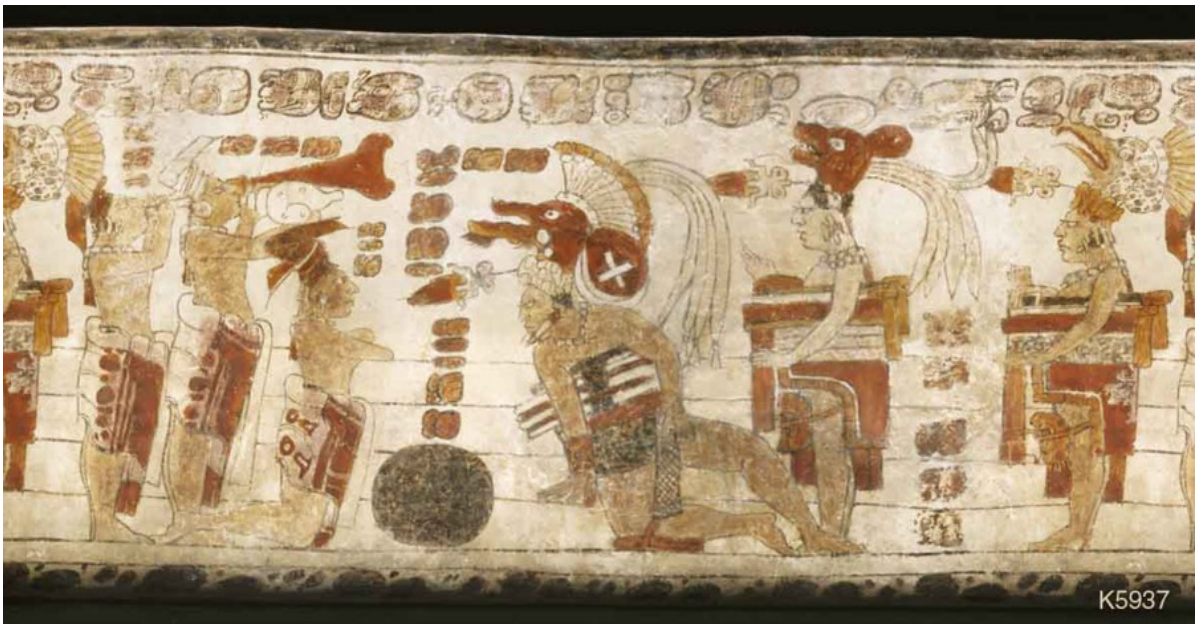

Figure 4: Kerr Vase K5937. Reprinted by permission of the Maya Vase Database.

for believing this is based on the assumption that much art of the Classic era Maya (250–900 CE) favored naturalism: an attempt at an objective rendering of the natural world (Miller 1999: 20).

This means that those things that appear as known objects in art works are likely to be those objects. With that explanation in mind, I propose that what are largely being depicted in the artworks are trumpets made from two distinct species of gourd: the long neck dipper or handle gourd (*Lagenaria siceraria*), and the snake gourd (*Trichosanthes cucumerina*).[3] Both are long tubular gourds that can be manipulated through growing or *post-growing* techniques, and when hollowed out their thinner ends can function as the mouthpiece ends of a valveless trumpet.

K1453 (Figure 3) is a vase painting showing two long neck dipper gourd trumpets. It is of more than cursory interest that the indentation or cupped shape of the bells may have been an attempt to depict a hollowed object by an artist unaware of 3D painting techniques (see Figure 5). On the right, the bowl holding liquid being drunk by one of the attendants and the larger pink bowl in the front both have the same cup shape at their tops, perhaps indicating that they too are hollow.

Another vase painting (Figure 4) of a long neck dipper gourd trumpet, does not include additional hollowed objects which we could use for comparison, but its faithfulness in its depictions of other objects characterizing the featured ball game – the ball, the yokes, the stance of the player – may mean that in this scene the trumpet bell happens to be the only hollowed object present.

Figure 5 shows a model of a long neck dipper gourd trumpet, which the author made from a single dried gourd in this general shape, purchased at Pumpkin Hollow, in Pigott, Arkansas. In this

[3] Erickson et al. (2015) propose the bottle gourd, of the *cucurbitaceae* family, or its seeds, traveled from Asia to the New World with early hunter gatherers who migrated there over ten-thousand years ago. The snake gourd is of the same family and may have been dispersed similarly. That said, I have not located confirmation of the early dates of the snake gourd's emergence in the Americas, but to turn the question around, the fact that they appear in pre-Columbian artwork as trumpet bodies suggests that the plant made its way to Mesoamerica at or before the time of Maya civilization.

Figure 5: Author playing a long-neck dipper gourd trumpet. Photo by Stephanie Artz.

exercise in experimental music archaeology, the player's lips are pursed and caused to vibrate at the cut proximal end, without use of a mouthpiece. The trumpet's fundamental sounds the pitch 566 Hz, or approximately C#5 in Western notation. A sampling of its sonic potential proves its propensity to sound partials of the overtone series, with the root and its fifth being the two easiest pitches to produce. An octave and higher pitched glissandos are also relatively easy to sound.

Despite my initial focus on long neck dipper gourd trumpets – with their thin bodies and bulbous ends – the majority of Maya trumpets depicted could correctly be labeled gradually widening tube trumpets; and all or the majority, of these I believe were made from snake gourds, or a hybridized combination of snake and dipper gourds (Figure 6).

This long widening tube trumpet is most famously shown in the murals of the Late-Classic lowland site Bonampak, painted in 791 CE, where eight are depicted in three rooms: The scene in Room 1 concerns the naming and tribute ceremony of a future heir to the throne and shows two gradually widening tube trumpets, with the players blowing into the smaller ends of the conical tubes held aloft at 45%. They are both orange except for black or green ruffle or flower-shaped protuberances around the ends of their bells (Figure 7, bottom right panel).

Figure 6: Three light-colored snake gourds. Photo courtesy of Savvy Gardening.

Two similarly shaped trumpets intrude into the battle scene in Room 2 (second panel from the left), with the

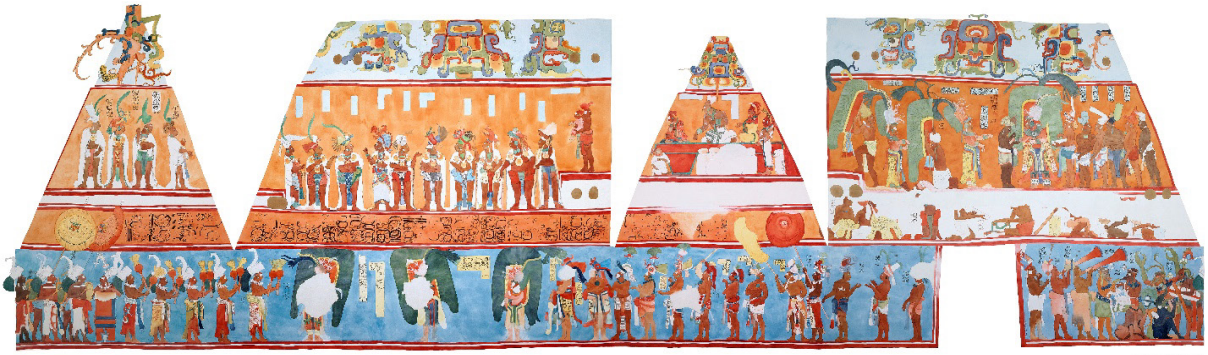

Figure 7: Room 1, Bonampak, Mexico, Maya, AD 791. Reconstruction, Yale University Art Gallery, Gift of Bonampak Documentation Project, illustrated by Heather Hurst and Leonard Ashby.

Figure 8: Room 2, Bonampak, Mexico, Maya, AD 791. Reconstruction, Yale University Art Gallery, Gift of Bonampak Documentation Project, illustrated by Heather Hurst and Leonard Ashby.

Figure 9: Room 3, Bonampak, Mexico, Maya, AD 791. Reconstruction, Yale University Art Gallery, Gift of Bonampak Documentation Project, illustrated by Heather Hurst and Leonard Ashby.

one held aloft differing slightly by having crossed bones painted along its upper length. The other trumpet faces down and is without designs (Figure 8).

Room 3 featuring a court dance, includes four trumpets (bottom right panel), with two of those being blown while the other two are held in the right hands of their players (Figure 9). Additional representations of almost identically shaped trumpets include figurines from the Mexican gulf coast necropolis on Jaina Island, which in the example below is a duct-activated whistle, making a small sculpture of one instrument sound like another (Figure 10).

In Kerr Vase K3814 three gradually widening tube trumpets play for a ball game, with the ball and players wearing yokes, as was noted in the earlier vase with a ball game and dipper gourd

trumpets (Figure 11). It is worth pointing out that this vase includes glyphs of the Primary Standard Sequence (PSS), a formulaic glyphic sequence that indicates specific details about the vessel, which can include the individuals or scene depicted, the type of material it contains, or a dedicatory ownership. Ownership information is indicated by a possessive glyph known as the God N Head variant and/or the *ik* (T-shaped) sign for wind – which coincidentally is tied to music in origin and metaphysics.

Figure 10: Jaina Island ceramic whistle depicting a trumpeter. Photo courtesy of Sainsbury Centre for the Visual Arts.

The scene on Kerr Vase K4120 (Figure 12) features a dancer performing before a ruler, and includes rattles accompanying the gradually widening tube trumpets. In addition, an apparent God N Head variant and the *ik* symbol in its literal form as breath emanating out of the mouth of the god can be seen at the top. The fact that two vase paintings of the ball game feature trumpets that are of different designs – one in the shape of a dipper gourd and the other in the shape of a snake gourd – suggests that perhaps the activities musicians played for were not conditional on the use of specific shaped trumpets. It is also possible that for Maya music the quality of sound, the timbre, was of equal or greater importance, and a change in

Figure 11: Kerr Vase K3814. Reprinted by permission of the Maya Vase Database.

Figure 12: Kerr Vase K4120. Reprinted by permission of the Maya Vase Database.

tone quality might signify a different type of ritual, or a portion of a ritual. We also cannot assign different trumpet types to different time periods, as the majority of known depictions are from the Late-Classic period (600–900 CE). However, there may be some reason to believe that trumpet shape is conditional on geographical areas of use, as gourd trumpets are so far only known from the Maya lowlands and wrapped trumpets, discussed next, are most often depicted on pottery found in the highlands.

The distinctive weave pattern encasing the body of a type of Maya trumpet that I call the wrapped trumpet may have been used for decorative purposes, or to provide a solution to the restriction on length that might have been imposed by local materials. If, for example, the desired non-conch trumpet was narrower at its mouthpiece end and wider at its bell the possible lack of local material of a suitable length might have necessitated that shorter sections of available substances be attached together to achieve the desired length and shape. In art works wrapped trumpets are represented as gradually widening tubes with some type of thin-stripped material probably of cane or cloth wrapped around their proximal ends.[4]

The ethnomusicologist O'Brien-Rothe (O'Brien 1983) has proposed trumpet wrapping as constituting the instrument itself or being utilized to cover the joints connecting separate pieces of wood tubing, held together by pins or dowels. She mentions an indigenous precedent for this design in South America, where there are native trumpets with bells of material woven in the manner of baskets (*ibid.*: 22; Izikowitz 1934: 233; 235 Figure 113).

This type of trumpet is sometimes painted on a highland vase type, known as Chamá, which was manufactured during the Late-Classic period (600–900) in the Chixoy River valley in the northern mountains of Guatemala. Figure 13 shows a famous Chamá vase known as the *Vaso de Ratinlinxul*.

[4] The wrapped trumpet types covered here use one of two techniques for instrument wrapping: plait weave, which is an interlacing of two or more strands of flexible material in a pattern like a braid (see Figure 13); and layering, which is the placing of a flexible material around an object in a spiraling motion, from top to bottom or bottom to top (see Figure 15).

Figure 13: *Vaso de Ratinlinxul* (Kerr Vase K594). Reprinted by permission of the Maya Vase Database.

Figure 14: Xamac Vase rollout. Photo courtesy of Linda O'Brien-Rothe.

This one, like other Chama vases with music scenes doesn not have PSS glyphs, so interpretation is dependent on an analysis of the scenes depicted. The scene on the *Vaso de Ratinlinxul* features a wealthy man being carried in a litter, a small black and white-spotted dog growling underneath his sedan, and an entourage that includes two porters and three figures holding gradually widening tube trumpets, encased in plaited wrappings on their lower portions. The three yellow and white trumpets appear to have separate mouthpieces, which resemble modern Western ones.

Another Maya vase with wrapped-tube trumpets is attributed to Xamac, a site located in the Ixil highlands near the modern town of Chajul, Guatemala. O'Brien-Rothe (O'Brien 1983) included this vase painting in an essay on Maya bone instruments, where her reproduction is barely clear enough to show three elaborately dressed individuals performing on trumpets, each differing slightly in design. At least one of the horns, the one in the rear, has a wrapping on the lower part of its body. Glyphs (likely dates) are included above the trumpeters and under one is a dog (an animal sometimes depicted in association with wrapped-tube trumpets) (Figure 14).

Figure 15: Kerr Vase K5534. Reprinted by permission of the Maya Vase Database.

O'Brien-Rothe (O'Brien 1983) has researched numerous small clay and bone tubes found at Maya archaeological sites and has determined that some of these may constitute pre-Columbian trumpet mouthpieces. A few bone tubes are even inscribed with plait-patterns, suggesting an association with other objects sharing that design. One such weave simulates a mat, and a class of high-ranking official went by the title of "keeper of the mat" or "he of the mat" (Miller and Taube 1997: 110–11; Tedlock 1996: 345). In addition, archaeologists Mary Miller and Karl Taube (1997: 110–11) define the Yukatek phrase *popol nu* as "mat house", and propose it as a community house for young people where, among other activities, dance performances were held.

The archaeologist Michael Coe (1973) claims that Chamá vases were funerary offerings and that the scenes painted on them were probably of a mythological nature (Miller 1989: 137). The dog may be included because of the animal's mythological connection to the underworld, where it often served as a guide. On the *Vaso de Ratinlinxul*, two figures carry articles that strongly suggest the man on the litter is a merchant, and the vase itself may have been a funerary object meant to celebrate, or at least describe, his life. It is known that among the Aztec deceased merchants were often placed on sedans and carried to a mountaintop to be cremated (*ibid.*: 112).

Vase Kerr file number K5534 (as well as K6317, Figure 2 above), includes the same four elements as are in the merchant scene: a wealthy man in a litter, a dog underneath it, and an entourage that includes porters and trumpeters with wrapped trumpets (Figure 15).

Apart from paintings on pottery, the wrapped trumpet is also found on at least one Maya sculpture, a limestone column discovered in the modern State of Campeche, Mexico, and on display in the capital of the state at the Maya Sculpture Museum. Carved on its surface are two performers playing plait-wrapped trumpets in accompaniment to a ceremonial gift exchange. A distance of 600 km separates its place of origin from that of the *Vaso de Ratinlinxul* but both are

attributed to the Late-Classic period, indicating the extent of distribution for that instrument type during that era. Unlike gourd trumpets which so far are restricted to the lowlands, wrapped trumpets do occur in both the lowlands and highlands, even if more are known for the latter.

Maya tube trumpets of perishable materials such as gourd and wood, like those described by de Landa and de Vico have not survived. But there is at least one Prehispanic Maya trumpet, of fired clay, that has. It is on display in the Museo Regional at Villahermosa, and was made using the coil technique. [5] It is approximately 3 cm wide at the mouthpiece, 5 cm at the bell, and in keeping with known extant Mesoamerican clay trumpets, is short – only 17 cm long (Figure 16). This clay trumpet could be a toy, a model or a functioning instrument and if the latter, based on its length, it yields a slightly sharp E5 (676 Hz) as a fundamental tone (at –13 dB).

Figure 16: Model of Villahermosa trumpet, constructed by Valerie Hanks-Goetz. Photo by author.

The Villahermosa trumpet is of one piece, but molded to resemble an object in two sections, the mouthpiece end and the flaring bell (Figure 16), its mouthpiece being a in a cup shape with its outer edges widened sharply like the instrument's bell. In addition to the functional sound-making components, the bell end is decorated with three slightly raised ovals in clay molded to form a broken line of ovals proceeding up the widening tube. Some light on the significance of this design may be shed by a small clay sculpture deposited as a funeral offering at Jaina Island. That object represents a musician who stands proudly holding the middle of a long trumpet in the crook of his left elbow (Guzmán Bravo et al. 1984: 124). The flaring bell of the instrument extends above the figure's head, and based on its shape would seem to represent the single-material long-tube type. An embossed design on the body of the trumpet vaguely recalls the oval elements on the short Villahermosa trumpet. The Mayanist Linda Schele (1997: 146) proposed that that embossed design

[5] The Maya used coil and slab techniques. The coil method most likely involved the formation of clay into long coiled pieces that were wound into a vessel. The coils were then smoothed together to create walls. The slab method used square slabs of clay to create boxes or types of additions like feet or lids for vessels. Once the pot was formed into the shape, then it would have been set to dry until it was leather hard. The pot was next painted, inscribed, or slipped. The last step was the firing of the vessel. Kilns were used to fire the vessels, and they were normally found outside in the open air. Unlike many modern kilns, they were fired by wood, charcoal, or even grass.

Figure 17: Jaina Island ceramic whistle depicting a trumpeter playing a trumpet with a slide or brace. 38.B Whistle 1.2.75.204. Museo VICAL. Photo courtesy Jared Katz.

represented a functional though stylized device, a brace perhaps, used to help fasten the bell section to the body of the instrument, which the clay model copies.

Another ceramic trumpeter from Jaina Island clearly shows a brace, which the archaeologist Karl Taube has proposed to be a slide, a device that could move the bell along the body and thus change the length and pitch of the instrument (Figure 17: Katz 2018: 135 and 147). If true, this instrument is the first known representation of a pre-Columbian trombone. Coincidentally, one of the long neck dipper gourd trumpets, shown in Figure 3, had a similar brace or slide device.

Sixteenth-century accounts by Westerners do not make mention of Maya trumpet playing as sounding significantly different than trumpet playing in the West, nor do they make mention of any strange or unusual technique(s) used by these trumpeters. Therefore, one may conclude, that like modern Western trumpeters, pre-Columbian Maya musicians must have produced sounds on their trumpets by forcing air through pursed lips vibrating against the receiver end of a tube made from one or more resonating materials. This technique is distinct from the open-lipped blowing technique used to produce a sound on the gradually widening *dijeridoo*. Using varying degrees of lip tension and air pressure, a specific pitch is produced, derived from partials of the overtone series relative to the fundamental pitch of the horn.[6]

[6] Specifically, the bell (distal end) of the trumpet utilizes the wave produced by lip buzzing, and serves as the end point of the wave. The total length of the vibrating air column causes a drop in resistance, forming the wave, which then travels back to the lips, changing their shape so that they match the pitch of the trumpet.

The fundamental pitch of the particular instrument depends predominantly on the length of its tube (Tarr 1980: 211; 213). If the instrument functioned acoustically in a way similar to a metal one, an eight-foot-long (244 cm) valveless gourd trumpet should sound the following pitches: C1, C2, G2, C3, E3, G3, Bb3, C4, D4, E4, F#4, G4, A4, A#4, B4, C5 (Piston 1955: 209). That said, the overall size and register of the instruments can be estimated, but not the precise length and fundamental tone. The width of the bore primarily determines the instrument's timbre.

Figure 18: Two of the three Rab'inal Achi musicians, Rabinal, Guatemala: Photo by author.

According to the archaeologist Norman Hammond (1972:225), the lengths of the trumpets painted on the three walls at Bonampak, estimated in proportion to the presumed height of their performers are: Room One, 108 cm; Room Two, 106–50 cm; and Room Three, 160 cm. It is possible, using ratios, to establish a relationship of trumpet length and interval for comparative purposes. Accordingly, Room 1 and Room 2 exhibit trumpets of similar length, so their relationship is one of unison; Room 3 to Room 1 and Room 2 are approximately 3:2, giving a difference of about a fifth. This means that the trumpets from Room 1 and Room 2 are a fifth higher than the trumpet from Room 3, which is ⅓ longer than they are. All of this is speculative and does not answer any questions conclusively about Maya concepts of keys or scales, but it constitutes data that might inform future researchers with better evidence of pre-Columbian Maya music practice.

The best indication for a continuation of pre-Columbian Maya music practice and the resulting sounds are a handful of dance-plays, called *bailes*, some of which continue to be performed in highland Guatemala. The most famous of these is the Rab'inal Achí, a drama about love, betrayal, and atonement in the centuries before Spanish conquest. It is accompanied by a band of two valveless trumpet players, playing brass trumpets, and a slit drummer (Figure 18).

The two trumpeters have two specific music roles. The one called alto plays high glissando lines and the one called bajo supports the slit drum rhythm by playing short and long notes on the root and fifth. In this way, the two trumpeters play sounds that are the most easily produced on a long-necked-dipper-gourd trumpet. This, however, is not meant to suggest proof of the continuation of a past Maya music practice.

To make a trumpet from a long neck dipper gourd is relatively easy. According to personnel at Pumpkin Hollow, where I purchased my gourds (personal communication 2021), the hardest part is growing and shaping the gourds. This entails hanging the plant after harvest so that the bulbous end straightens out from the stem due to gravity. Then the gourd is cut and boiled for further manipulation, and is turned into its final shape after curing (some are fabricated into

shapes with circular or bent stems). After purchasing several straight stemmed gourds I chose three to fabricate into trumpets by making two cuts with a knife, one near the proximal end of the stem to form a mouthpiece, and one at the other, the bulbous part, to make a bell. A dowel was then inserted in the stem to clean out the interior membrane (alternately, a strong piece of stripped cane could be used).

In conclusion, an important point not discussed is the possibility that some, but probably not all, of what the Maya have painted and sculpted that resemble trumpets were not those instruments (or any kind of instrument). I mention this, not to cast doubt on the evidence presented, but to remind us of the nature of that evidence. Pictorial and sculptural images are subject to artistic license and subjective interpretation. Archaeological bias engendered by the particular artworks excavated may also confound the record. That said, a combination of the accumulated visual and historical evidence suggests that large gourds of one or more species were the core materials used to make pre-Columbian Maya trumpets, and as such, that they could have functioned similarly to the brass ones used in Mexico and Central America today.

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