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A comparison of musical instruments from the prehispanic American Southwest and Paquimé, Chihuahua

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Abstract

Research demonstrates the association between musical instruments and ritual practices and political complexity in the past. Musical instruments have been found at the Late Medio period regional polity of Paquimé in northern Mexico and in sites ancestral to Pueblo peoples of the American Southwest, but they have never been meaningfully compared. Paquimé's occupation corresponds with the first half of the Pueblo IV period in the Southwest, a time when instruments were most numerous and diverse. Intriguingly, some instruments are found in both regions whereas others are not. We summarize the types known for both locations and compare them, considering the social and physical contexts of their use.

Key words: *Pueblo peoples, Paquimé, Casas Grandes, musical instruments, Medio Period, Pueblo IV.*

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Resumen

Una comparación de instrumentos musicales del suroeste prehispánico americano y Paquimé, Chihuahua

La investigación demuestra la asociación entre los instrumentos musicales y las prácticas rituales y la complejidad política en el pasado. Los instrumentos musicales se han encontrado en el gobierno regional de Paquimé en el norte de México y en sitios ancestrales de las gentes Pueblo del suroeste estadounidense, pero nunca se han comparado significativamente. La ocupación de Paquimé se corresponde con la primera mitad del período Pueblo IV en el Suroeste, una época en la que los instrumentos eran más numerosos y diversos. Es intrigante que algunos instrumentos se encuentren en ambas regiones, mientras que otros no. Resumimos los tipos conocidos para ambas ubicaciones y los comparamos, considerando los contextos sociales y físicos de su uso.

Palabras clave: *Gentes Pueblos, Paquimé, Casas Grandes, instrumentos musicales, Medio Periodo, Pueblo IV.*

Résumé

Une comparaison des instruments de musique du sud-ouest préhispanique américain et de Paquimé, Chihuahua

La recherche démontre l'association entre les instruments de musique et les pratiques rituelles et la complexité politique dans le passé. Des instruments de musique ont été trouvés à la fin de la période Médio de Paquimé dans le nord du Mexique et dans des sites ancestraux aux peuples Pueblo du sud-ouest américain, mais ils n'ont jamais été comparés de manière significative. L'occupation de Paquimé correspond à la première moitié de la période Pueblo IV dans le Sud-Ouest, une époque où les instruments étaient les plus nombreux et les plus divers. Curieusement, certains instruments se trouvent dans les deux régions alors que d'autres ne le sont pas. Nous résumons les types connus pour les deux emplacements et les comparons, en tenant compte des contextes sociaux et physiques de leur utilisation.

Mots-clés: *Peuples Pueblo, Paquimé, Casas Grandes, instruments de musique, Période Medio, Pueblo IV.*

Resumo

Uma comparação de instrumentos musicais do sudoeste pré-hispânico americano e Paquimé, Chihuahua

Pesquisas demonstram a associação entre instrumentos musicais e práticas rituais e complexidade política no passado. Instrumentos musicais foram encontrados na política regional do período Medio tardio de Paquimé no norte do México e em locais ancestrais dos povos Pueblo do sudoeste americano, mas nunca foram significativamente comparados. A ocupação de Paquimé corresponde à primeira metade do período Pueblo IV no Sudoeste, época em que os instrumentos eram mais numerosos e diversos. Curiosamente, alguns instrumentos são encontrados em ambas as regiões, enquanto outros não. Resumimos os tipos conhecidos por ambos os locais e os comparamos, considerando os contextos sociais e físicos de seu uso.

Palavras chave: Povos Pueblo, Paquimé, Casas Grandes, instrumentos musicais, Medio Period, Pueblo IV.

The multifaceted roles of musical instrument in the lives of past peoples remains woefully understudied. Whereas some may perceive musical instruments as objects of mundane daily life with the sole role of entertainment, ethnographic studies of indigenous groups in the American Southwest[3] commonly identify their significance within ritual performances. A previous study of archaeological, ethnographic, and depictions of musical instruments in the American Southwest by the senior author (Brown, 2005) demonstrated links between sociopolitical complexity, ritual performances, and types and uses of musical instruments. This study expands upon these conclusions by investigating the musical instruments within the large, late prehispanic sociopolitically complex site of Paquimé located in northwest Chihuahua, Mexico (Figure 1) and compares the results to the those of the germinal study.

[3] Although we recognize that the border between the United States and Mexico did not exist prior to 1848 with indigenous groups moving freely throughout this area, histories of anthropological research often make it easier to discern trends by discussing the prehispanic American Southwest and Mexican Northwest as slightly separate. For this reason, we use the term American Southwest/Mexican Northwest (SW/NW) to refer to the region as a whole and American Southwest and Mexican Northwest separately when useful.

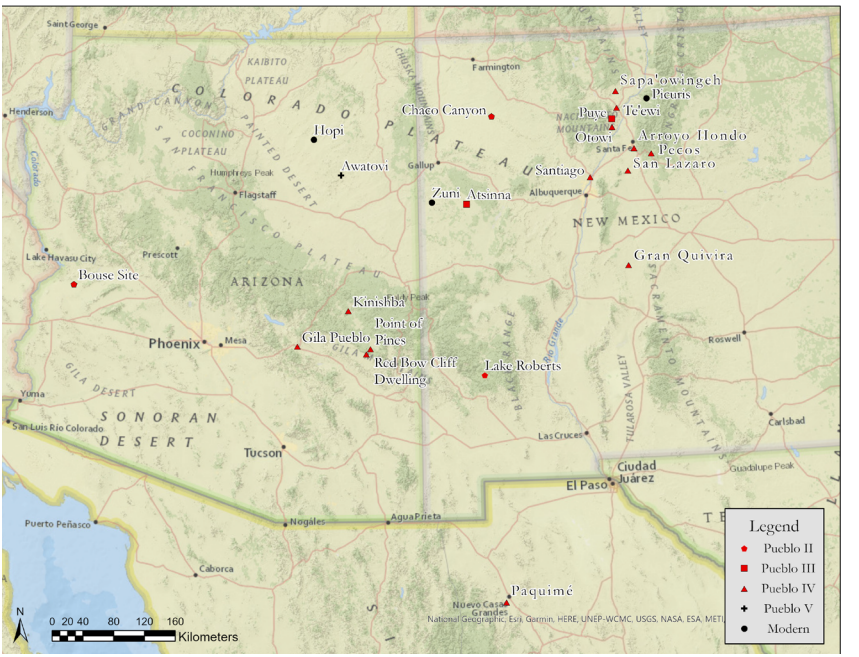

Figure 1. The locations of Paquimé and other sites referred to in this paper. Map by Thatcher A. Seltzer-Rogers.

In their seminal eight-volume publication on excavations at the site of Paquimé, Charles Di Peso (1974) and colleagues (Di Peso *et al.*, 1974) present a substantial amount of data on the musical instruments found at the site, including shell tinklers, ceramic hand drums, shell trumpets, copper bells, ringing stones, and bone rasps. Beyond the descriptions and some initial comparisons with known musical instruments from other contexts in Mexico and the American Southwest in those volumes, these instruments have not been investigated or interpreted as a class of artifacts, although some researchers have considered the copper bells and shell trumpets separately from the rest of the instrument assemblage (e.g., VanPool, 2003; Vargas, 1995). The degree of connection, particularly with respect to population movement, between Paquimé and the region of what is now the American Southwest is highly debated (LeBlanc, 2018; Rogers, 2021a; Whalen and Minnis, 2003; Whalen *et al.*, 2010), but the presence of Mesoamerican trade goods such as ornaments and instruments of shell and copper, macaws, and cacao in the American Southwest are indicative of the exchange of goods, ideas, and likely some people. This coupled with the circumstance that Paquimé reached its florescence during the Late Medio period between ca. 1300 and 1440 C.E.,

contemporaneous with the large, aggregated pueblos of the Pueblo IV period (1300-1600 C.E.) in the American Southwest and the fact that there are several types of instruments found at Paquimé that are also found in the American Southwest makes the latter a logical choice for a context within which to explore the musical instruments of Paquimé.

Comparison of the instruments found at Paquimé with those known for the American Southwest reveals that there are some that they have in common, yet others are found in only one study area or the other. Copper bells, shell trumpets, shell tinklers, ringing stones, and bone rasps are found at Paquimé and in the American Southwest. In contrast, ceramic drums, shell trumpet rasps, stone rasps, and copper tinklers are found at Paquimé but not in the American Southwest, and bone flutes and whistles, foot drums, and clay bells are found in the American Southwest but not at Paquimé. There are differences in the numbers of instruments present and their variability as well, with Paquimé containing far more instruments and more types of instruments than are known for any single site in the American Southwest. There are hints of some similarities in that ancestor worship and an association of feathered or horned serpents, water, and shell are found in both study areas, but the picture is complex with the archaeological data from Paquimé more in line with ethnographic than archaeological data from the Pueblo cultures of the American Southwest. This suggests the two existed on different historical trajectories. Taken as a whole, the data indicate that musical instruments are more numerous, more variable, and more valuable at times and places where the most sociopolitical hierarchy is present.

The paper that follows begins with an overview of the trajectory of the Pueblo cultures of the American Southwest, and then presents a description of the various instruments found there, summarizing their distributions over space and time. Background on the history of Paquimé follows with a description and discussion of the musical instruments found there. Paquimé's instruments are then analyzed in the context of what is known for the American Southwest, including comparisons of the various types of instruments, examination of the contexts in which they were found, and some interpretations on how those at Paquimé were used. The final section addresses how the instrument data from Paquimé fit with that from the American Southwest, concluding that they are more consistent with those from the culture that arose in Chaco Canyon ca. 850-1140 C.E. and with ethnographic data from the current day pueblos than with the archaeological data from the Pueblo IV period pueblos with which it is contemporaneous.

The Ancestral Pueblos

This section presents a very brief summary of the history of the Pueblos of the American Southwest, the northern half of the SW/NW. No musical instruments have been found at sites dating the Paleoindian or Archaic periods when people lived as mobile hunter-gatherers, so this discussion begins with the Basketmaker II and III periods (1200 B.C.E.-750 C.E.). This was a time when people gradually adopted agriculture to a greater degree, becoming more and more sedentary. Small communities of above-ground masonry or jacal pueblos ultimately replaced villages of pit houses during the subsequent Pueblo I period (750-900 C.E.), although some subterranean chambers with features such as vent and tunnel complexes, wing walls, central hearths, and *sipapus* (hole features thought to represent the place from which Pueblo peoples emerged into this world) known as kivas remained and become more distinct from domestic spaces over time. Pueblo I is also the period in which Hohokam peoples of southern Arizona began their construction of extensive irrigation networks. They retained the use of pithouses until ca. 1150 C.E., when pithouses were replaced by above-ground compounds with central courtyards. Trade networks that included goods such as shells from the Gulf of California and parrots from Mexico were established during this period, and the Mesoamerican style (but not Mesoamerican shaped) ball courts were constructed. By 1150 C.E., however, the Hohokam ball court network, which radiated outward along major river drainages and likely acted as a major location for multi-community gatherings and practices, collapsed (Wallace, 2014).

The Pueblo II period (900-1150 C.E.) is when the society at Chaco Canyon, New Mexico rose to its height (Heitman and Plog, 2015; Lekson, 1999). The Chaco region is defined by the distribution of large-scale, stone masonry "great houses" and other monumental constructions. Expanded kivas capable of accommodating large numbers of people attending ceremonies, so-called great kivas —became more standardized. Most scholars agree that there were significant differences in social status (Akins, 1986) and that Chaco Canyon had a ruling theocratic elite (Ware, 2014). Around the same time in southern New Mexico, populations of Mimbres peoples were increasing, shifting from the use of pithouses and small pueblo sites into more substantial masonry pueblos composed of room block compounds. The Hohokam of this time began building capped mounds such as those at Snaketown and the Gatlin site (Wallace, 2014), and there appears to have been a partial elite class. Trade items included copper bells, mosaics, pyrite backed stone mirrors, and macaws.

Chacoan society disintegrated early in the Pueblo III period (1150-1300 C.E.), and there was a marked migration from the Colorado Plateau to other, better

watered locations such as the Rio Grande Valley as part of a sizable diaspora in response to a protracted and severe drought and conflict. Similarly, among the Mimbres peoples of southern New Mexico, widespread villages were vacated as people began to gather in fewer large communities, although another southern group, the Jornada Mogollon, continued to live in smaller rectangular pit houses and isolated adobe surface rooms that by the late thirteenth century formed linear compounds in the Tularosa Basin and increasingly large communities in the Salinas and Sierra Blanca areas. In contrast, by the end of the thirteenth century, large and prestigious structures were being built among the Hohokam, including large adobe platform mounds and buildings, although the spatial extent of Hohokam culture became significantly smaller.

The large-scale migrations of the Pueblo III period culminated in the north in aggregated communities of unprecedented size with enclosed central plazas and multistoried room blocks that characterize the Pueblo IV period (1300-1600 C.E.). Some of these settlements persisted through Spanish colonialism and are the Pueblos present today. Great kivas were no longer used as public gatherings took place in plazas, but smaller kivas persisted, associated with lineages, moieties, and ritual sodalities (Ware, 2014). Populations in southern New Mexico declined sharply, however, with Mimbres people having moved to larger pueblos to the north or returned to a mobile hunting and gathering lifeway. The Hohokam shifted to living in large compounds centered on large adobe structures and platform mounds with clearly elite individuals, resulting in conflict between these compounds and a potential peasant rebellion. Most Hohokam trade shifted from Mexico to Pueblos to the north and east. Changing climate and flooding impacted Hohokam irrigation, however, and whereas the area continued to be occupied, it was by much smaller groups concentrated along rivers. They are the ancestors of contemporary O'odham peoples and contributed as well as to Pueblo groups and to populations in northern Mexico.

Musical Instruments from Archaeological Sites in the American Southwest[4]

Musical instruments found in archaeological sites in the American Southwest include flutes and whistles of wood, bone, and reed; bells of copper and clay; shell trumpets; tinklers of shell, bone, stone, walnuts, and hoofs; rattles of gourd and leather; kiva bells (suspended stones that ring when struck); rasps of wood and bone; and roofed vaults that may have functioned as foot drums. This section briefly describes each type, then presents them in the context of the history outlined above.

[4] Except where otherwise indicated, the information in this section comes from Brown (2005).

Flutes and whistles are both aerophones but are distinguished from one by the fact that flutes can produce a much wider range of pitches. All of the whistles and all of the bone and reed flutes relied on a fipple for sound production in the manner of a penny whistle or recorder, but some of the flutes were end-blown in the fashion of a Japanese shakuhachi or Middle Eastern ney. Speaking very broadly, among Pueblo peoples, flutes are associated with the summer season, flowers and other growing things, and fertility, but also with warfare and scalps. There are many depictions of flutists in rock art of the region, but rather than representing one single flutist, different versions have been interpreted as representing fertility figures, clan symbols, tricksters, traders, a *katsina*, individuals on shamanic or vision quests, and cicada or other insect beings (Slifer and Duffield, 1994). Wooden flutes were generally fairly large, and some were decorated with carving, painting, or feathers (Figure 2). Bone flutes were most often made from the bones of birds, including eagles, and were therefore generally much smaller, being limited by the sizes of the birds (Figure 3). A very few of these were likewise decorated with incised designs.

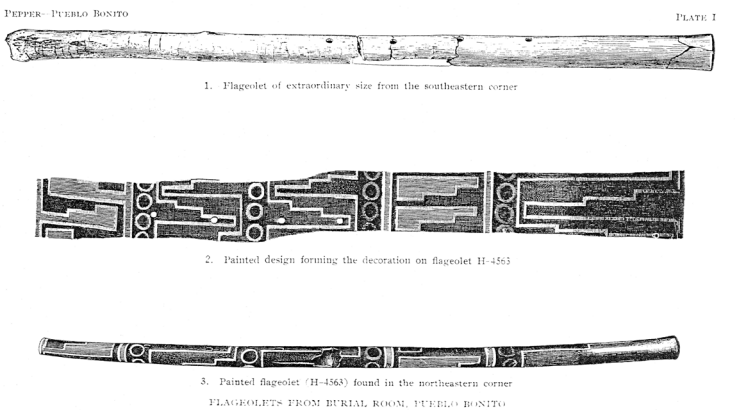

Figure 2. Two wooden flutes from Room 33 of Pueblo Bonito, Chaco Canyon, New Mexico. From Pepper (1909, Plate I).

Whistles are the single most common instrument in the Southwest. There are two types. One is composed of a tube of bone, reed, wood, or clay with a hole midway along its length, under which is a piece of pitch or wax that directs air blown in one end against its edge, thereby creating a sound (Figure 4). The other type, *bitsitsi* whistles, is composed of short lengths of bone that

Figure 3. Bone flutes from San Lazaro Pueblo, New Mexico. Private collection of Forrest Fenn. Photograph by Emily J. Brown.

Figure 4. Bone whistles from San Lazaro Pueblo, New Mexico. Private collection of Forrest Fenn. Photograph by Emily J. Brown.

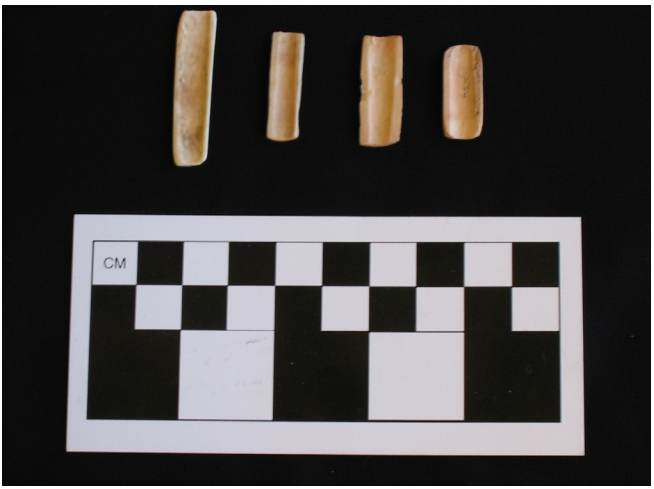

Figure 5. *Bitsitsi* whistles from San Lazaro Pueblo, New Mexico. Private collection of Forrest Fenn. Photograph by Emily J. Brown.

have been cut in half vertically (Figure 5). A membrane was secured between the two halves, and they were cinched back together. Blowing in one end caused the membrane to vibrate and produce a sound, making them technically membranophones. A few others are thought to have had a cord stretched across one end that vibrated when air was blown in the other. A few whistles had incised designs and remnants of pigment. From ethnographic accounts, we know that some were used as bird calls, others to summon clouds and rain, and still others to fight witches. Like flutes, most were made of the bones of birds, including raptors and turkeys.

Virtually all of the bells found in the Southwest are pellet bells or crotals, bells with loose clappers in the fashion of modern sleigh bells. They are of two materials —copper and clay. Copper bells (Figure 6) have received significantly more attention than clay bells in the form of the development of typologies (Pendergast, 1962; Sprague and Signori, 1963; Vargas, 1995) as well as experimental attempts at reproduction (Hosler, 1994; Schulze, 2002). Made in West Mexico, in the American Southwest they represented exotic trade goods. In addition to exotic material and origin from a distance place that would have made them highly valued, many were also decorated with wirework. Clay bells were generally made in the basic forms of copper bells but were much larger and were only very rarely decorated. They appear to have been manufactured locally and may have been made once the trade networks bringing copper bells to the area had collapsed, making copper bells unavailable.

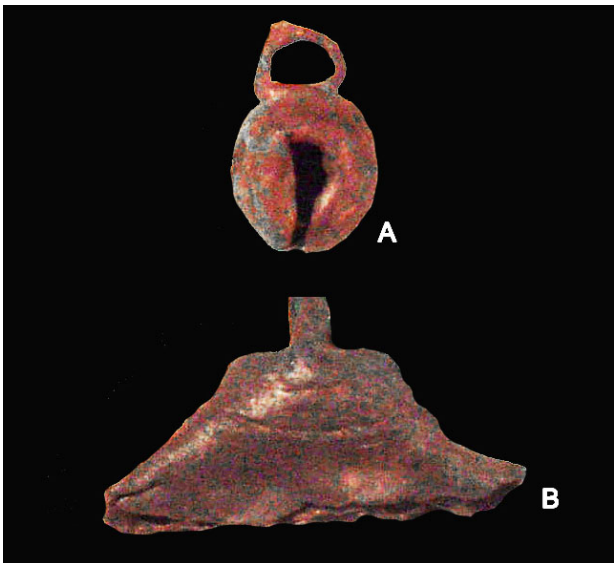

Figure 6. Copper bells, both in the collection of the Western Archeological and Conservation Center. A is from site AZ AA:02:01 in the Casa Grande Community near Phoenix, Arizona, catalog no. CAGR 541. B is possibly from Casa Grande near Phoenix, Arizona, catalog no. CAGR 540. Photograph by Emily J. Brown.

Figure 7. Shell trumpet with a resin mouthpiece, 13.5 cm long. From the Clines Terrace Site near Roosevelt Lake, Arizona. Collection of the Western Archeological and Conservation Center, catalog no. CAGR 2025. Photograph by Emily J. Brown.

Shell trumpets were made by removing the spires of large shells and making a "buzz" with one's lips while blowing into them in the same fashion as modern brass instruments. Inserting a hand into the interior would have been one way to change the pitch in addition to overblowing and other techniques involving the lips, vocal cords, and diaphragm. *Strombus galeatus* shells were the ones most commonly used, but *Melongena patula*, *Muricanthus negritus*, and *Phyllonotus nitidus* were all made into trumpets as well. In a few rare cases, artificial mouthpieces of pitch or clay were attached (Figure 7). Ethnographic accounts from the Zuni and Hopi reveal that shell trumpets are regarded as the roar of the feathered serpent, a deity associated with springs, caves, and the underworld. (Fewkes 1896, p. 366; Haury, 1945, p. 159) and they were sometimes also used in the context of warfare. Another imported item, trumpets were prestige goods in the same manner as other shell items and objects of copper.

Curiously, although drums made of wood with leather heads dominate the music of the Pueblos today, to date none like them have been found in an archaeological site or depicted in rock art or kiva murals. Ethnographic accounts reference the use of rolled and dried hides, baskets, and pots for drums, but if these have a tradition extending deep into the past, they have so far proven invisible archaeologically. There are vaults of various sizes in the floors of kivas, some stone-lined and others simply earthen, with evidence of wood covers that have been interpreted as foot drums in keeping with ethnographic descriptions of such features among the western Pueblos outside the Rio Grande Valley. Experimental research is needed to ascertain which of the many forms of vaults could have functioned in this way, but the few ethnographic accounts suggest they were used in the course of initiations and as a means of communicating with deceased ancestors residing in the underworld (Lange, 1958; Parsons, 1964 [1936], 1974 [1939]).

Tinklers are idiophones that rely on being shaken against one another to produce a sound. They often take the form of multiple objects such as shells or deer hooves strung together in such a way as to produce a sound when they strike one another. The strings may be sewn to the hems of clothing (in which case they are ornamental as well as musical) or fastened to a handle of some sort and shaken. Because of their nature as composite objects, it is difficult to determine how many such objects were actually present when confronted with an assemblage of their components. In the Southwest, there are examples made from shells, metal cones, stones, hooves, nuts, bones, and pieces of wood. Shell and hoof tinklers are the most common, with the shell versions most often made from *Conus* shells (Figure 8), although *Olivella* and other types have also been used. Like copper bells and trumpets, these would have been

exotic trade items. They are depicted on the sashes of figures of both genders in murals painted in kivas, and some were found along the legs (as if sewn onto leggings) and clustered around the hands (as if attached to handles) of a man in a burial in northern Arizona. The other objects found within him led members of the nearby Hopi Pueblos to indicate he was a person who knew the stick swallowing ceremony, performed to strengthen people and groups, sometimes in the context of warfare (McGregor, 1943, pp. 295-296).

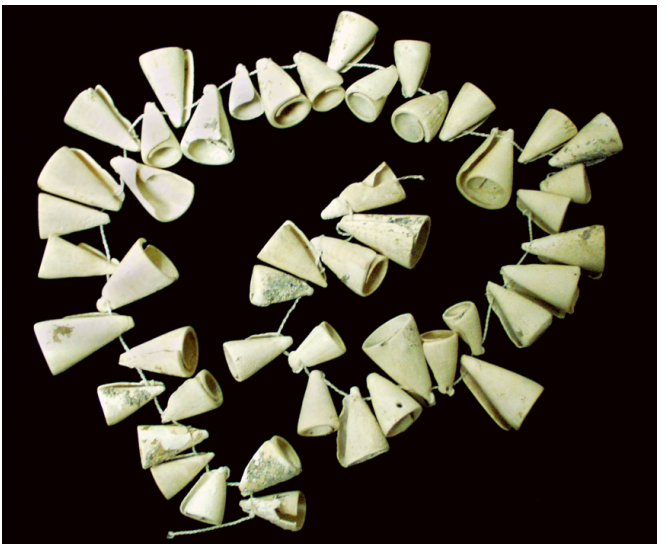

Figure 8. Restrung shell tinklers of unknown provenience. In the collections of the University of Arizona, Arizona State Museum, catalog no. GP 4207.

Tinklers of stone and other materials are much less common. Those of stone are generally of petrified wood or another material high in silica that contributes to its sound quality. Metal tinklers are composed of small cones of metal that could be hung on the ends of fringe or strung together on a string. Only one has been found in the American Southwest at the pueblo of Santiago, although given that it was occupied at the time of initial Spanish colonization, there is always the possibility that this single object was brought to that location during the Spanish *entrada* or subsequently.

Rattles are also idiophones and are commonly vessels containing pellets of another material that create a sound when it is shaken. Those in the American Southwest were made from gourds, turtle shells, leather, clay, and cocoons with seeds or pebbles within. Some turtle shells had deer hoofs attached by thongs

to the exterior that clattered against them rather than containing small objects inside. Many of these materials are highly perishable and it is likely that many more were present than are represented in the archaeological record. They were used extensively in a variety of rituals, but because some of them contain seeds or are made from animal scrotums, they are often associated with rain and fertility (Kurath and Garcia, 1970, pp. 40, 75). Some are depicted in kiva murals, and some gourd examples are decorated by peeling back layers of the rind to expose differently colored flesh beneath (Figure 9).

Figure 9. Decorated gourd rattle 13.5 cm in diameter from Canyon de Chelly National Monument. Collection of the Western Archeological and Conservation Center, catalog no. CACH 811. Photograph by Emily J. Brown.

Kiva bells are lithophones—stones that produce a musical note when struck—and are also considered percussion instruments and idiophones. They are most often small enough to be portable and are occasionally found in sets (Figure 10), although some large boulders and even speleothems in caves have been identified as having been used to produce sound (such as the Lithophone Gallery in Las Ruinas Cave, Oaxaca, Mexico [Hapka and Rouvinez, 1997]). Ethnographic accounts suggest they were used to call people to the kivas (Hewett, 1909, p. 655) or in ceremonies associated with the winter solstice,

sickness, or death (Densmore, 1938, pp. 45-46, 172-173). Other sound-makers of stone in the form of thunderstones —round stones that make a sound evocative of thunder when rolled across a kiva floor— have been described in ethnographic accounts for Zuni Pueblo (Bunzel, 1932; Stevenson, 1884). These are rare in the archaeological record in part because of the failure of archaeologists to recognize and describe them as anything other than manuports (Falvey, 2014), but modified stones interpreted as thunderstones have been found at a Mimbres site near Lake Roberts, New Mexico (Seltzer-Rogers and Hegberg, 2021).

Figure 10. Kiva bells from San Lazaro Pueblo, New Mexico. Private collection of Forrest Fenn. Photography by Emily J. Brown.

Rasps are also percussion instruments and are composed of two parts—a serrated or notched object and an unnotched object that is rubbed across the indentations to produce as sound. In ethnographic accounts they are occasionally described as being used with a gourd or basket resonator to enhance the sound. In the American Southwest, rasps are most commonly made of bone, antler or wood; the raspers and resonators are much harder to identify archaeologically. There are many more known archaeological examples of rasps made from bone than of the much more perishable wood (Figure 11). Most ethnographic data suggest they were used in the course of *katsina* ceremonials.[5]

Bullroarers (slats of wood or other material that make a roar when whirled at high velocity at the end of a cord) are known from a very few ethnographic accounts, but only one possible example has been found in an archaeological

[5] The work *katsina* (also spelled kachina) refers to deities that are the spirits of ancestors that bring rain and is also used for masked dancers in the ceremonies related to them.

Figure 11. Rasp made from the femur of a dog from San Lazaro Pueblo, New Mexico. Private collection of Forrest Fenn. Photograph by Emily J. Brown.

context and they and are not discussed further here. We turn now to what we know of when these various instruments were in use in pre-contact times.

The earliest musical instruments known for the American Southwest are wind instruments —flutes and whistles of bird and mammal bone, reed, and wood found in dry caves in northeastern Arizona. Some of them, a series of eight large wooden flutes dating to between 620 and 670 C.E. (Bakkegard and Morris, 1961, p. 184; Morris, 1959, 1980) are some of the most musically sophisticated objects that have been found in the Southwest, capable of multiple pitches and challenging to learn to play. Whistles may have served as bird calls or had other functions in the hunter-gatherer toolkit, but there is also evidence from rock art imagery linking flutists to birds and animals and one pair of wooden flutes, found tied together with a yucca cord, were decorated with bird feathers. It may be that flutes were part of shamanic ritual, perhaps representing transformational shamanic activities associated with flying (Polly Schaafsma, personal communication to Emily Brown, 2003).

There are very few musical instruments known for Pueblo I (750-900 C.E.) —just eight bone whistles and three bone tinklers— although this may be a function of a paucity of archaeological investigation of such sites rather than a reflection of a lack of instruments in musical traditions of the time. Many more are known for Pueblo II (900-1150 C.E.), when many Southwestern cultures were exhibiting evidence of social hierarchy. Musical instruments were part of the accoutrements of elite individuals, with some of them having value as imported prestige goods as well. At Chaco Canyon, these included shell

trumpets, one with a mouthpiece inlaid with turquoise (Judd, 1954), and copper bells (Vargas, 1995), both of which originated in West Mexico. Chaco is also known for the presence of other imported Mesoamerican goods, including macaws and cacao (Crown and Hurst, 2009).

In addition to the shell trumpets and copper bells, a group of end-blown wooden flutes similar to those found in the Basketmaker caves were found at Pueblo Bonito in Chaco Canyon, one painted with a geometric design of terraces and circles, and a few others decorated with carved animals (Pepper, 1909, 1996 [1920]). In addition to representing apparent continuity of wooden flute manufacture and use, the flutes at Chaco may have helped endow the practices of the people who played them with the weight of tradition. It has also been suggested that some roofed vaults in the floors of great kivas and court kivas from this time represent foot drums (e.g., Windes, 2014). If their identification as instruments is correct, they are much more numerous in this period than during Pueblo I.

Elsewhere in the American Southwest during the Pueblo II and III (1150-1300 C.E.) periods, copper bells and shell tinklers are present at sites participating in the trade network with western Mexico. Bone whistles were somewhat more abundant, and tinklers from petrified wood, and rattles of Arizona walnut shells and dried artiodactyl hoofs first appear. Some of these postdate the early Pueblo III disintegration of Chacoan society and the migration of people from the Colorado Plateau. Whereas some copper bells and shell trumpets were still present following Chaco's collapse, they are all from a few sites in Arizona and southern New Mexico that are much closer to the original West Mexican sources. No wooden flutes have yet been found in Pueblo III sites, but the possible foot drum vaults were numerous at this time. Some new instrument types make their first appearance in Pueblo III, including *bitsitsi* whistles, the first bone flute since a single isolated Basketmaker example, kiva bells, and rasps. Rattles of turtle shell and leather appear toward the end of Pueblo III.

Many of the instruments that were used during Pueblo III continue during Pueblo IV in greater numbers. Some types such as bone flutes and whistles are found in dramatically higher numbers, and during this period some were made as pairs of bones from the right and left sides of birds. Ceramic bells were made and used for the first time during this period as well, although their distributions were rather uneven with dozens found at Pecos Pueblo in northern New Mexico (Kidder, 1932) and Awatovi, one of the Hopi pueblos (Withers, 1946) and only a few found at other sites. Conversely, the possible foot drum vaults become much less common, and the primary evidence of the large wooden flutes comes from rock art, not from actual examples. Most

instruments seem to be associated with the activities of ritual sodalities and moieties, but some, such as rasps and *bitsitsi* whistles, seem to have been much more associated with *katsina* ceremonials (Brown, 2021). Overall, this period is the one during which musical instruments in the American Southwest were most numerous and most diverse.

Paquimé

One of the largest villages in the prehispanic SW/NW is Paquimé (also commonly termed Casas Grandes), located in northeastern Chihuahua, Mexico. This section summarizes what is known of Paquimé and of the Medio period (1150/1200-1450 C.E.). The patterns that define the Medio period, population growth and aggregation, production of polychrome painted pottery, and the construction of Mesoamerican I-shaped ball courts and large poured adobe room block compounds, have their origins in the earlier Viejo period (700-1150-1200 C.E.), as well as in sociopolitical changes in adjacent areas. The development of several large, multi-compound villages with expansive agricultural fields and irrigation systems located along the fertile Rio Casas Grandes characterize the first century of the Medio period, which some archaeologists (Minnis *et al*., 2006; Whalen and Minnis, 2009) describe as a period of increasing political competition. By 1275 C.E., Paquimé emerged as the supreme regional polity with strong connections across much of the Mexican Northwest. A consequence of Paquimé's establishment as the dominant Casas Grandes center was a seemingly rapid and substantial growth in population size, such that by 1350 C.E. it is likely that Paquimé's population may have reached nearly 5,000 individuals (Wilcox, 2016), or at least 2,500 (Whalen *et al*., 2010), at any given moment. Underpinning the aggregation of thousands of new residents, including some from the Mimbres valley and along the contemporary U.S.-Mexico border as well as eastern Sonora (Offenbecker, 2018), was the elite investiture in the construction of a civic-ceremonial precinct to the west of the residential room blocks, as well as sizable agricultural fields and irrigation systems and a large mountaintop shrine complex with restricted access (Di Peso, 1974; Pitezel, 2011).

Given the significance of provenience and spatial association for this analysis, we synthesize Paquimé's layout and highlight key structures and contexts. Generally speaking, the site is made up of a residential area with multistory buildings, and a civic ceremonial precinct (Figure 12). The latter includes a set of four mounds (one in the shape of a cross, one in the form of a decapitated bird, one that is a serpent, and a fourth that has no specific shape), in combination with two I-shaped ball courts complete with lateral stone rings

and dedicatory deposits. Further distinguishing the civic ceremonial structures is that they are constructed of stone masonry rather than the poured adobe employed in the residential compounds and found at other Medio period Casas Grandes communities (Whalen and Minnis, 2009).

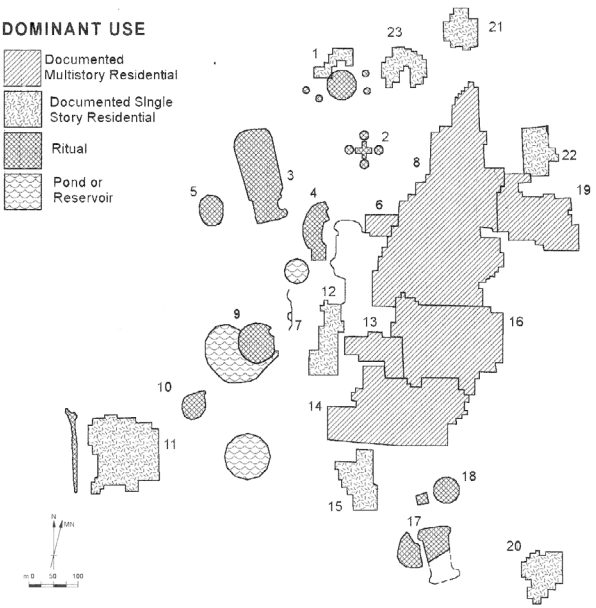

Figure 12. Map of the site of Paquimé. Adapted from Phillips and Bagwell, 2001, Figure 1.

There are four structures specifically that likely acted as central locations for ceremonial practices within Paquimé: the Mound of the Cross (Unit 2), the Mound of the Offerings (Unit 4), Room 38-11, and the Walk-In Well. Aligned with the sun during the equinox, located to the north of the primary residential compounds, and associated with potential preparatory rooms (Di Peso, 1974; Di Peso *et al*., 1974, vol. 4, the Mound of the Cross was likely a central location for rotational ceremonies by individuals. The second location, the Mound of the Offerings, was clearly a focus of elite activity given the elaborate altar rooms in the center and the presence of three large, cremation urns, a mortuary practice not identified elsewhere within Casas Grandes (Ravesloot, 1988). Room 38-11, located in the southwest portion of the site, is a moderately-sized, semi-subterranean structure with hearths, large central posts, and interred macaws

and may be one of the earliest locations for ceremonial practice (Rogers, 2021b). Additionally, these structures are unique to Paquimé within both the Casas Grandes region and the SW/NW as a whole, with potential exceptions being a somewhat similarly shaped, but far less formalized and yet unpublished walk-in well at the Bouse Site in southwestern Arizona. There are also suggestions that Room 38-11 functioned as a Mogollon great kiva.

The final location, the Walk-In Well, is a formalized water shrine (Walker and McGahee, 2006) and is the sole main ceremonial structure not within in the civic-ceremonial core, being located instead in Plaza 3-8 within the residential House of the Well (Unit 8). The Walk-In Well was a subterranean water source above which was a natural air shaft up to the plaza that was enhanced by the residents of Paquimé (Di Peso *et al.*, 1974, vol. 4, pp. 375-381). The well was accessed by a carved and plastered stairway of some 20 steps on which were found significant quantities of offerings from different categories that are spatially distributed (Walker and McGahee, 2006). These offerings included shell tinklers and trumpets, and all of them had been covered with several centimeters of clean, fine sand in an apparent ritual closure of the space. Although the Walk-In Well is found in an open plaza space, its narrow passages and central focus of caching suggest it acted as controlled space, something we discuss further below, and the presence of the spring and the many shell artifacts suggest it had a role as a ritualized space associated with water and was highly significant. Given that the offerings include on the steps of the Walk-In Well included shell tinklers and trumpets, it is likely that they played a role in ceremonial practices.

In addition to these specific structures, there are two more general locations with evidence for a mixture of economic, ritual, and political significance. The first of these is the House of the Dead (Unit 13), a large semi-residential compound of 19 rooms and two plazas located in southern half of Paquimé and just to the east of the House of the Macaws (Unit 12), where local breeding and raising of macaws occurred. The name House of the Dead name comes from the presence of burials in every portion of the compound —at least 117 individuals identified during excavations, the most individual burials found at any of the smaller residential compounds at the site (Di Peso *et al.*, 1974, vol. 5 and 8). The majority of these came from two locations: Plaza 2-13 and Burial 44-13 within Room 3-13. Burial 44-13 is notable as it appears to be an elite burial with sacrificed individuals, formal construction, and preparation that resembles a miniature version of a West Mexican shaft tomb, a tradition which terminated nearly 1,000 years prior. In addition to these, over 175 mostly headless turkey remains were found in the southern portion of the House of the Dead within Plaza 3-13, which contained turkey pens. It is thought by many

that this was the center for a religious cult dedicated to ancestor veneration, and that the manipulation of human remains was likely a focus (Rakita, 2009; Waller *et al*., 2018).

In comparison to the complex mortuary assemblage from the House of the Dead, the second general area with significance included two four-storied rooms, Rooms 15-8 and 18-8, that Di Peso termed warehouses. Both rooms contained shelves constructed of wood and had somewhat unusual shapes, particularly Room 15-8. These two rooms together contained over 3.5 million pieces of shell, at least 49 Gila Polychrome bowls, and the bulk of the raw serpentine ricolite, turquoise, malachite, copper ore, selenite, and salt identified within the site (Di Peso, 1974, vol. 2; Di Peso *et al*., 1974, vol. 4, pp. 6-8). Given the proximity of these rooms, Di Peso interpreted them as having a shared function as warehouses for the storage of crafts. In the absence of manufacturing debris and tools, the combined assemblage has been reinterpreted as a substantial caching of imported goods within a single space, an action attributed to the accumulation of wealth that was integrally intercoupled with ritual practices (see Whalen, 2013).

Since Di Peso's (1974) excavations at Paquimé, sociopolitical complexity and ritual practice remain a significant emphasis within Casas Grandes scholarship. Key developments, many of which were initially hypothesized by Di Peso, include the identification of a proposed social class of priestly elite (termed shamans by some, i.e., VanPool, 2003), the identification of human sacrifice in the SW/NW as a dedicatory practice for elite individuals (Waller *et al*., 2018), and a focus on the significance of water (Walker and McGahee, 2006) and water-associative deposits (e.g., shell; Whalen, 2013). Most archaeologists who specialize in late prehispanic northern Chihuahua agree that there lived at Paquimé an elite class of individuals who lived better lives, had access to restricted spaces, and had obligations to perform ceremonies that underpinned agricultural success in the form or rainfall (see contributions in Minnis and Whalen, 2015). Yet, no investigation exists of the role of musical instruments within these ceremonies or in daily life at Paquimé.

Musical Instruments from Paquimé

With the exception of objects that have been interpreted as ceramic hand drums, all of the types of musical instruments found at Paquimé have also been found in the American Southwest, although there are some differences in materials and degree of elaboration. They are: shell trumpets, shell tinklers, rasps, kiva bells, copper bells, a bone whistle, and a possible clay whistle. Some of the objects found with different elaboration or materials found at

Paquimé include shell trumpets modified with serrations to make them usable as rasps as well, possible stone rasps, and bone rasps of human bone. There are also many more examples of decorated instruments such as trumpets with turquoise mosaics and painted shell tinklers. The reader is referred to the appropriate volumes of Di Peso *et al.* (1974) for detailed descriptions of all the instruments, but this section provides brief summaries drawn from that work, highlighting the differences and similarities with those known for the American Southwest.

Di Peso's excavations found 48 shell trumpets of *Strombus galeatus* shell and ten objects he classified as "horns" of the smaller and higher-pitched *Melong enapatula* and *Muricanthus nigritus* shells. Five of the *Strombus* shells had been modified in such a way that they could be played as rasps as well. Some had the lip cut to form a stepped shape, some had the lip notched (Figure 13), and others had the columella notched. Some were decorated with incised designs, and one had cloudlike incised designs and inlay of turquoise, a specular iron crystal, and a circle of pseudo cloisonné. One, labeled an "altar piece," had the outside lip removed and a turquoise mosaic encircling the upper half of the columella (Figure 14). In addition to the complete examples, 107 fragments were also found.

An astounding 21,770 shell tinklers were found at Paquimé, but this number is somewhat misleading. Some 8,566 had been worked into tinkler form but hadn't been perforated and so couldn't have been suspended and may not have been used for sound production. An additional 12,698 were classified as "random jewelry," and it is unclear from the available information

Figure 13. Shell trumpet rasp (after Di Peso *et al.*, 1974, Figure 635-4). Rendering by Emily J. Brown.

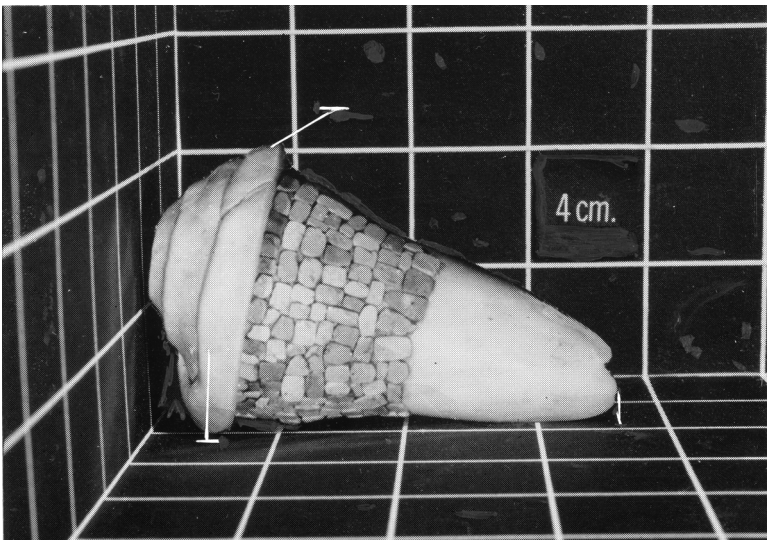

Figure 14. Shell trumpet with turquoise mosaic (described as an "altar piece" by Di Peso et al.). Digital image of camera ready artwork published in Amerind's Casas Grandes, vol. 6, p. 515, Figure 620-6, depicting object CG/8216B). Courtesy of The Amerind Foundation, Inc., Dragoon, Arizona.

whether these were found singly (more in keeping with use only as ornaments) or in groups (necessary for sound production). Di Peso *et al.* (1974, vol. 6, p. 467) observed that 866 bore remnants of blue, green, blue-green, red, or yellow pigment, more than the 506 remaining if one removes the unperforated and "random jewelry" examples. One unique example was incised with a stepped terrace design.

Of the fifteen bone rasps found, six were made from scapulae (four of pronghorn antelope, one of white-tailed deer, and one of mule deer), seven were rib bones (all of *Bovinae* species, two being bison), and two were long bones, one conclusively human and the other likely so. Two stone objects were also identified as rasps (Figure 15). Both were long and thin. One had a human face carved at one end and eight transverse grooves and 12 parallel V-shaped grooves below. The other rasp was fragmentary and had eight transverse lines incised into it.

Lithophones were also present (the name "kiva bells" seems inappropriate for a region with no kivas, so the term "ringing stones" is used here as in Di Peso *et al.* [1974]). Two consistent with those found in the American Southwest, both of basalt, were found (Figure 16); one of which had been modified by grinding and chipping. In addition, a stone much larger than any identified

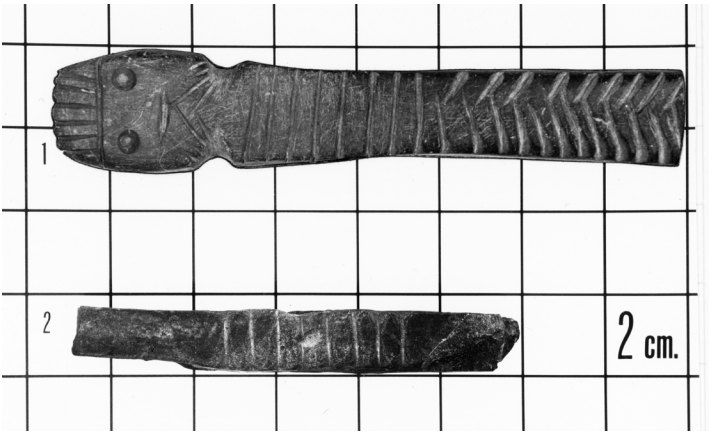

Figure 15. Stone rasps. Digital image of camera ready artwork published in Amerind's Casas Grandes, vol. 7, p. 283, Figure 344-7, depicting objects CG/7825 and CG/8453. Courtesy of The Amerind Foundation, Inc., Dragoon, Arizona.

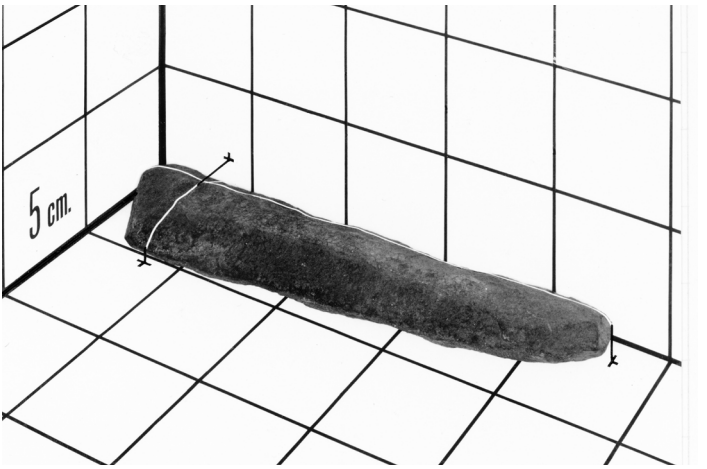

Figure 16. A ringing stone. Digital image of camera ready artwork published in Amerind's Casas Grandes, vol. 7, p. 284, Figure 346-7, depicting object CG/220. Courtesy of The Amerind Foundation, Inc., Dragoon, Arizona.

as a lithophone in the American Southwest was interpreted as lithophone. Of andesite, it was 115.5 cm long, 47 cm wide, and 10 cm thick—three times the size of the other two. Given its unusual size, additional research into its sound production capabilities should be undertaken before it is conclusively identified as a ringing stone.

A total of 115 copper bells were found at Paquimé with 11 types represented, including some plain examples along with those elaborated with wirework (Figure 17), Tláloc faces, other decorations, and a zoomorphic one in the form of a decorated turtle (Figure 18). Fifteen cone-shaped copper tinklers were present, two of which were categorized as ornaments but the rest of which could have functioned musically (although the same issues that apply to shell tinklers are applicable to these as well).

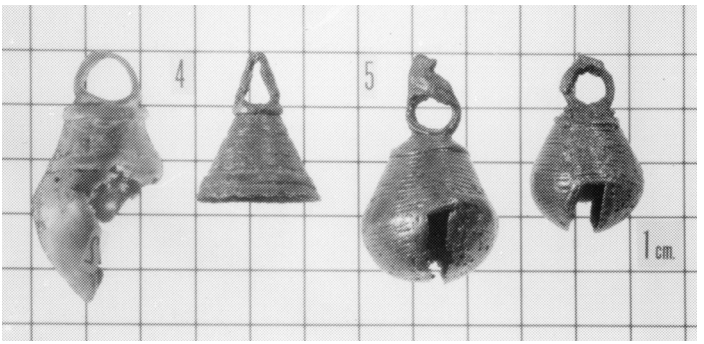

Figure 17. Copper bells. Digital image of camera ready artwork published in Amerind's Casas Grandes, vol. 7, p. 528, Figure 668-7 right, depicting objects CG/8270, CG/1820B, and CG/8126B). Courtesy of The Amerind Foundation, Inc., Dragoon, Arizona.

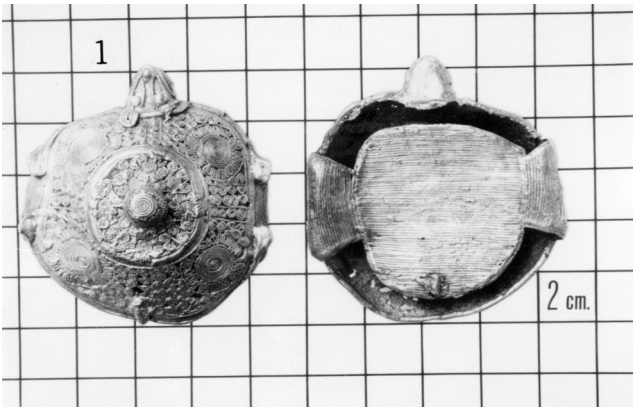

Figure 18. A zoomorphic copper bell in the form of a turtle. Digital image of camera ready artwork published in Amerind's Casas Grandes, vol. 7, p. 529, Fig.ure 669-7 left, depicting object CG/328). Courtesy of The Amerind Foundation, Inc., Dragoon, Arizona.

Two objects were identified as bone whistles. One, a Canada goose bone, is consistent in form with those from the American Southwest and likely had a musical function. The other, of turkey bone, has three holes along its shaft instead of one. More research would be needed to ascertain if it is capable of sound production (the presence of the pitch or wax directing the air cannot be determined from the photograph), but it does not match any other known whistle from the broader region and its status as a musical instrument is in some doubt. A single clay object was identified as a whistle. It takes the form of a ceramic cylinder with a hole midway along its shaft. There is a human face represented by incised lines for the eyes and mouth and a protruding nose. This object too requires additional research to determine whether it is capable of sound production.

Multiple stone balls were found but is it impossible to know whether any were used as thunderstones and, if they were, which of the variously sized stones were used in this way. These balls were made of various igneous and metamorphic raw material types and shaped by pecking followed by grinding. Ten "large" and 23 "medium" stones that could have served this function were found. Di Peso *et al.* (1974, vol. 7) suggested that only the large sized balls may have been employed as thunderstones; these ranged in size from 11 to 20 cm in diameter. In comparison, the medium sized balls ranged in size between 7 and 11 cm in diameter. An alternative use of these balls was in various games (Di Peso *et al.*, 1974, vol. 7, pp. 284-285).

The type of instrument that has been found at sites in northern Mexico, but which has no correlate identified to date at sites in the American Southwest are ceramic vessels that have been interpreted as hand drums. A total of 109 of them, none of which were found fully intact and two lacking provenience, were identified at Paquimé. Made by the coiling technique commonly used for jars and other vessels and with interiors that were as well-finished as the exteriors, the drums were of the same pottery types that have been defined for other ceramic vessels in the region, including Ramos Polychrome, Ramos Black, Playas Red, Casas Grandes Scored, Casas Grandes Rubbed Scored, Casas Grandes Incised, Casas Grandes Plain ware, Babicora Polychrome, and Madera Black-on-red. Di Peso *et al.* (1974, vol. 6) categorized them into multiple types based on form, but in general, they are all composed of a bowl-shaped body on a flared pedestal (Figure 19). Some had holes in various patterns around the rim (Figure 20) and, more rarely, the body and pedestal, that could have been used to secure the drumhead. One example, a Ramos Black ceramic drum, had a roughened rim. Twenty-five drums had been decorated with red, green, white, or black paint with red and/or green most common. Decorations include vertical bands of alternating color, negative circles (some with dots),

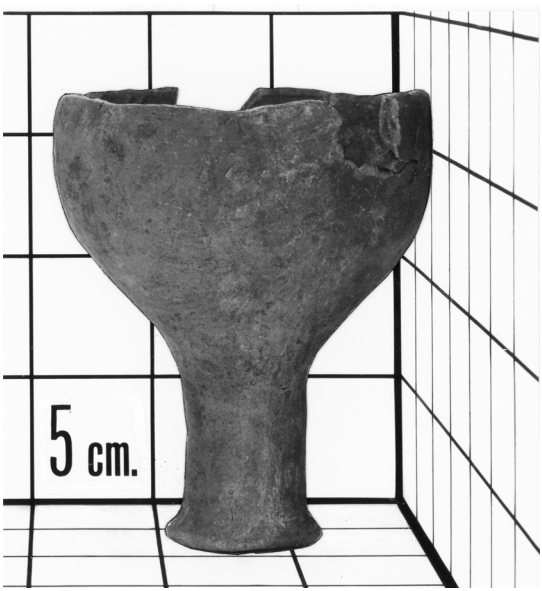

Figure 19. A ceramic drum. Digital image of camera ready artwork published in Amerind's Casas Grandes, vol. 6, p. 359, Figure 435-6 right, depicting object CG/3709. Courtesy of The Amerind Foundation, Inc., Dragoon, Arizona.

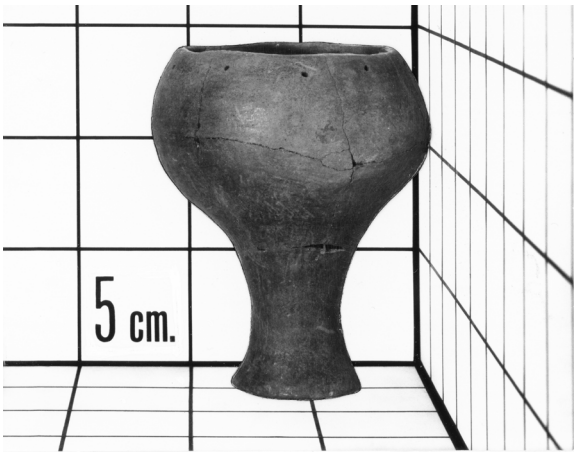

Figure 20. A ceramic drum. Note the holes around the rim that may have functioned to secure the drumhead. Digital image of camera ready artwork published in Amerind's Casas Grandes, vol. 6, p. 360, Figure 436-6 middle, depicting object CG/3889. Courtesy of The Amerind Foundation, Inc., Dragoon, Arizona.

checkboard patterns, pendant squares and triangles, lines of dots, and ticking. One was painted with a possibly zoomorphic figure with the appearance of a centipede that also resembled large, ticked scrolls in its interior.

The highly uneven distribution of the different types of instruments at Paquimé leads us to question how the majority of the site's inhabitants may have experienced the sounds produced by the various types of instruments. Acoustics analysis conducted at a plaza space at the Moche site of Huaca de la Luna in Peru revealed that high frequency sounds such as those produced by whistles were mainly contained within the plaza space, but low frequency sounds such as those produced by many drums carried much farther (Scullin, 2014). This has implications for how the broader community would have experienced the sounds produced in locations that have restricted physical access, with some of the sounds created therein being more likely to be heard beyond them than others. The sounds of the drums and shell trumpets would have carried farther than those of the rasps, shell tinklers, whistles, and copper bells and been audible well beyond their immediate contexts of use, especially if played in ensembles.

In addition, enclosed and subterranean spaces such as the interior of the Walk-In Well have particular acoustic properties. Although acoustic analyses would be needed to identify the particular characteristics of the Well, it is likely that the quality of sound was experienced differently depending on whether the musician or audience was within it, in its entrance, immediately around its opening, or around, behind, or above it. Experiments with the acoustic properties of megalithic tombs in Britain, for example, revealed that listeners within tombs experienced a variety of phenomena including distorted speech with unexpected harmonics and a sensation of sound originating within the listeners' heads (Watson and Keating, 1999). People outside of the chambers of the tombs would have experienced only a diluted or distorted version of the sound events that took place inside, creating a differentiation between people permitted access to those spaces and those without it and adding to a sense of mystery regarding the activities within the chambers.

Other experimental acoustic analyses have been conducted specifically with shell trumpets (Kohlar, 2014). In one instance, it was found that when two trumpets were played together, strong acoustic "beats" resulted as the sound frequencies from the two instruments interacted. The result was that the sound "warbled" or "throbbed" even although the musicians were not intentionally causing it to do so through a performance technique. Musicians playing shell trumpets in resonant enclosed spaces at Chavín de Huantar in Peru found that the architecture affected the pitch and resonance (Kolar, 2014). Specifically, certain sound frequencies vibrated in certain spaces particularly strongly, and

when a second trumpet emitting a different frequency was played at the same time, the air column of the less resonant frequency merged with that of the stronger one to create one unified column in the most resonant frequency. The experience of the musicians is that the trumpet most resonant with the room compelled the compliance of the trumpet less resonant with it, with the player of the one that shifted in pitch experiencing a cessation of the trumpet's sound before the shift happened. The effect became more profound the closer the openings of the shells were to one another.

Although such phenomena can be understood in modern times with our knowledge of the physics of sound production, it is possible that the experiences of the people of Paquimé using the Walk-In Well would have been interpreted very differently. Adapting questions identified by Kohlar (2014), we might ask, what would a trumpet player have thought if the architectural space made one particular frequency most resonant? Would it be attributed to an otherworldly power? If one player or trumpet consistently employed the pull of this resonant frequency such that other players felt their trumpets' sounds shifted toward it, would that lead player and/or instrument be thought to be in command of supernatural forces? Until research is conducted on the acoustics of the Walk-In Well, all of this is purely speculative, but it is possible that the acoustic possibilities created by the enclosed space is one explanation for why so many shell trumpets were found within it in conjunction with any cultural associations of trumpets with water, subterranean water serpent deities, or other factors.

Paquimé's Instruments in the Context of Those from the American Southwest

As the above discussion makes clear, there is significant overlap in the types of instruments known for the American Southwest and Paquimé, but there are some key differences as well, even among instrument types that initially appear to be the same. There are also a few instruments that are found only in one region or the other. One simple but very striking observation is that for all of the Ancestral Pueblo sites in the American Southwest, there are fewer than 1,300 known individual instruments, even counting the elements of composite ones such as tinklers individually. In contrast, more than 22,240 have been found at Paquimé alone. If we remove the shell tinkler assemblage because it is impossible to know how many individual objects it represents, that number drops to around 470, a significantly smaller number but still orders of magnitude larger than any known for an individual site in the American Southwest (Pecos Pueblo currently has the highest number of known individual

instruments for that region at 132). Similarly, there are potentially 12 different kinds of instruments represented at Paquimé if one considers the trumpets and trumpet/rasps separately, but even those are considered as one type, the most identified for any site in the American Southwest is eight (San Lazaro Pueblo), and the vast majority have five or fewer. Although it is possible these patterns are a function of the archaeological investigations of individual sites, they are consistent enough (especially given the number of large pueblos in the American Southwest that have received at least some excavation) that they should be considered meaningful.

Another pattern of note is that even among the instruments that the two locations have in common, examples at Paquimé are often more elaborate. A trumpet mouthpiece with a turquoise mosaic was found at Chaco Canyon, but it is the only trumpet with this kind of elaboration, whereas Paquimé has two highly decorated examples as well as others exhibiting the edge modification. Only four tinklers from the American Southwest have traces of pigment, whereas several from Paquimé do. Copper bells are present in both locations, but Paquimé had more decorated examples and types such as those with a Tláloc face or zoomorphic form almost completely absent in the American Southwest (the one exception is a Tláloc bell with no provenience).

Some instruments found at Paquimé have not been found in the American Southwest, including the ceramic drums, stone rasps, and trumpet-rasps.[6] In addition, no bone rasp in the American Southwest has yet been identified as having been made of human bone. The copper bells are more diverse at Paquimé, and no zoomorphic examples have been found in the American Southwest. In contrast, there are some instruments known for American Southwest that have not been found at Paquimé, such as bone and wood flutes, bitsitsi whistles, ceramic bells, tinklers of all materials except shell, and foot drums. It should be noted that ceramic bells have been found elsewhere in Mexico (e.g., the site of Arroyo Piedras Azules dating from both the Early and Late Postclassic [Joseph Mountjoy, personal communication to E. Brown, 2021],) and at Tepeticpac, Tlaxcallan, primarily a Late Postclassic site (Kosyk, 2021) as well as at sites farther south in Mesoamerica.

In addition to instruments that are found only in one place or the other, there are some instruments which, although shared, occur in comparatively uneven amounts. Whistles, shell tinklers, and shell trumpets are the most striking examples. There is one bone whistle (perhaps two) at Paquimé, whereas excavations at Puye Pueblo, the pueblo at which the most have been found

[6] There is a fragment of *Strombus* shell found by Pepper at Pueblo Bonito in Chaco Canyon that had "a design in hachure effect on the edge" (Pepper, 1909, p. 69) that may be a piece of a trumpet rasp, but it would need to be examined to confirm that its function could have been musical rather than decorative.

contained 25. The site in the American Southwest with the most shell tinklers, Pecos Pueblo, had 36, whereas 506 were found at Paquimé (13,204 if one includes those classified as "random jewelry", and 21,770 if one includes the unperforated examples). Twelve shell trumpets were found at Pueblo Bonito in Chaco Canyon, whereas 58 complete ones and 107 fragments representing an unknown additional number were found at Paquimé.

But such comparisons are misleading if the period of occupation isn't taken into account. As an example, Chacoan society and the associated trade networks had collapsed well before the rise of Paquimé, so in considering trumpets, it is important to note that fewer than twenty have been found at sites contemporaneous with Paquimé in all of the American Southwest with the site containing the most, Gila Pueblo, having only six. Table 1 compares the instruments found at Paquimé only with those known for the Pueblo IV period in the American Southwest, presenting numbers for the sites with the most examples of any given type.

Table 1. Comparisons of the highest numbers of individual instruments types between Paquimé and Pueblo IV Sites in the American Southwest

Instrument	*Number at Paquimé*	*Number at PIV Site with the Most in the American Southwest*	*American Southwest Site with the Most*
Ceramic drum	107	0	
Copper crotal	114	17	Gila Pueblo
Copper tinkler	15	1	Pueblo Santiago
Clay crotal	0	71	Awatovi
Ringing stone	3	38	Atsinna
Shell trumpet	58+[7]	6	Gila Pueblo
Shell trumpet/rasp	5	0	
Stone rasp	2	0	
Animal bone rasp	13	9	Kinishba
Human bone rasp	2	0	
Wooden rasp	0	1	Red Bow Cliff Dwelling
Thunderstone	33	0	
Bone whistle	1	25	Puye
Ceramic whistle	1	2	Pecos Pueblo

[7] Amount at Paquimé also ...includes an additional 107 fragments.

Instrument	*Number at Paquimé*	*Number at PIV Site with the Most in the American Southwest*	*American Southwest Site with the Most*
Bitsitsi whistle	0	4	Arroyo Hondo and San Lazaro
Wooden whistle	0	0	
Reed whistle	0	0	
Bone flute	0	23	Pecos Pueblo
Wooden flute	0	2	Otowi
Shell tinkler	506[8]	35	Pecos Pueblo
Stone tinkler	0	7	Gran Quivira
Nut tinkler	0	0	
Hoof tinkler	0	0	
Foot drum	0	2	Te'ewi and Picuris

Review of the table data indicates that the wide variety of tinkler materials used in earlier periods were no longer used later in time with the preference being for shell, and highly perishable wind instruments are no longer present in any significant numbers either. This may be a function of preservation or depositional practices, however, as the larger sites that characterize the Pueblo IV period are necessarily exposed to the elements, whereas the earlier sites at which such perishable instruments were most commonly found were sheltered in alcoves (the notable exception being the wooden flutes from Chaco Canyon).

Beyond this, however, a profound musicological difference becomes evident, which is that the majority of the instruments from Paquimé are percussive, and the aerophones, whether shell trumpets or the isolated examples of whistles, being capable of only a limited number of pitches. In contrast, the bone and wood flutes found in the American Southwest are capable of a great deal of melodic variation. It would appear that vocal music, not recoverable archaeologically, was most responsible for the expression of melodies at Paquimé. It is also the case that even although the number of instruments overall is greater at Paquimé, and it contains a higher number of types than are known for any one site in the American Southwest, overall, the number of types of instruments in the American Southwest is higher, and the choices as far as timbre (the quality of the sound that makes each kind of instrument sound different from another) were greater.

[8] 21,770 found at Paquimé, but 8566 were not perforated and 12,698 were classified as "random jewelry."

In addition to differences in wind instrumentation, another profound difference between musical instruments identified in contexts in the American Southwest and Paquimé is that at the latter, 64% of the instruments were imported and only 36% were potentially made on site. In contrast, in the American Southwest, the number of instruments that represent imported objects at any given site is quite small and is often limited to items such as such as shell trumpets, shell tinklers, and copper bells. As an example, 132 instruments are known for Pecos Pueblo. Of these, 27% are imported (all shell tinklers), with 73% likely of local origin. Another example, the pueblo at Gran Quivira, has 27 known instruments of which only two shell tinklers, 7% of the total assemblage, were imported with the remaining 93% of local origin. The majority of sites have no imported instruments at all.

The imported instruments were particularly important to the population at Paquimé, therefore, whether it was because they were more challenging to procure and therefore more costly and indicative of a particular social status, whether there was some significance attributed to the place of origin (the ocean or West Mexico), or whether some significance was attributed to the material (shell or copper), or whether the associated sounds were particularly sought out, or all of the above. The idea that some musical objects were valuable and exotic trade goods is in keeping with the fact that many of the types of instruments found at Paquimé have a visual component. Some of the trumpets were decorated with turquoise, some of the tinklers were painted, some of the drums were painted, one of the stone rasps was given a human face, and many of the copper bells were elaborated with wirework and other decorative elements. These instruments were meant to be seen as well as heard, and it is possible that same may have been treated as animate. This is further supported by the interment of elaborate copper bells as sacrificed, dedicatory offerings at Paquimé.

In contrast, whereas the Pueblos of the Pueblo IV had the opportunity and means to decorate their instruments more extensively, there are few examples of visual elaboration of basic forms. It appears that the esoteric meanings attributed to the sound, material, color, and/or place of origin, were more important than whether or not an instrument was also a prestige item. Even among the Hohokam where imported instruments continued to be used during Pueblo IV, they were used in the context of platform mounds within compounds with restricted access, although the entire community would be able to hear a shell trumpet being played. In this instance, instruments were meant to be heard more than seen.

At both Paquimé and in the American Southwest, some instruments appear to have been owned by individuals and some by corporate groups such as kiva

societies or lineages. In the Southwest, this is manifested by a few instruments found in the graves of individuals versus those found within kivas, sometimes in the context of caches that include crystals, projectile points, concretions, bone tubes, and other items (Brown, 2021). At Paquimé, it appears in a pattern of different types of instruments being most common in specific locations (i.e., drums in the House of the Dead and trumpets associated with the Walk-In Well) that were controlled by specific cultural groups. In addition, there are instruments at Paquimé that have been found in dedicatory contexts associated with the ball courts, and no such dedicatory practice is known for the American Southwest.

One last difference is the practice of the use of human bones for instrument manufacture at Paquimé that is absent in the American Southwest. Although some readers might find the idea of the use of human bones as musical instruments macabre, it may have been a way to include ancestors as active participants in musical performance. In one of the few surviving prehispanic Mayan theatrical plays, the *Rabinal Achi*, the leader of one of two feuding cities, K'iche' Achí, explains his wishes for his body after death, wanting his arm bone to become a rattle handle, and his leg bone to become a drumstick (Stöckli, 2014). In this context, he intends for his physical essence and influence to continue beyond his death. A similar world view may explain the presence of the human femur converted into a rasp and other ornaments of human remains found at Paquimé. Notably, the human bone rasp was located within the Mound of the Offerings altar burial vault and suggests that the musical use of this object was likely associated with ancestor veneration (see Rakita, 2009) and has echoes in the use of the rasps during the *katsina* ceremonials of the American Southwest which also include strong elements of ancestor worship.

Distribution of Instrument Types within Paquimé and Sites in the American Southwest

Much can be learned from the contexts in which instruments are found, but sound interpretation is dependent on the quality of the accompanying excavation data. Much of what is known about instruments from sites in the American Southwest comes from excavations that took place in the first half of the 20th century, as many were found in the course of large-scale excavations at large Pueblo IV-period sites performed by staff from museums in the East sent to obtain quality objects for display (Snead, 2001). As documentation standards were not as developed as they are today, few instruments have provenience information sufficient for analysis and interpretation based on their context of deposition. With that said, there are some general observations

that can be made with the usual caveats on validity that necessarily accompany all interpretations based on small sample sizes.

Instruments have been found in pit houses, rock shelters and caves, pueblo rooms, kivas, plazas, burials, platform mounds, middens, and caches and storage cists, depending on the time period and location. In general, instruments have been found in every type of architectural space as each appears in time with the glaring exception of great kivas. Aside from possible foot drums which are necessarily located within the kiva spaces because they are a feature of the architecture, only a single rasp from the Mogollon site of Point of Pines and a single shell trumpet from Pueblo Bonito in Chaco Canyon (Judd, 1954, pp. 305-306) have been documented as coming from a great kiva. This is not to say that other instruments weren't used in great kiva spaces at all —almost certainly they were used there but stored and ultimately deposited elsewhere. In the periods following 1200-1600 C.E., several instruments were deposited in kivas, but aside from a few examples in Utah, and one from near Petrified Forest in Arizona, all those of which the writers are currently aware are from the pueblos of the Northern Rio Grande Valley, located just northward of Albuquerque. Again, this observation should be viewed as preliminary and requires more data for confirmation.

Particular types of instruments are not correlated with specific depositional contexts in the American Southwest to a degree that is statistically significant; most instruments are found in multiple contexts given the size of the region and the breadth of the timeframe. In certain locations at certain moments in time that pattern did vary, however. Analysis of flutes and whistles from the pueblo of Sapa'owingeh, a Pueblo IV period site in northern New Mexico found that they were statistically more likely to occur in ceremonial caches than in non-cache contexts (Burger, 2021, pp. 220-221), for example. Careful analysis of the contexts of other instruments in subregions during specific periods would likely reveal additional patterns like this one so long as the provenience data are specific enough to permit it.

In comparison, instruments from Paquimé occurred in varied contexts from dedicatory caches within ball courts or termination or dedicatory caches in the Walk-In Well to funerary objects associated with elite burials (e.g., Burial 44-13). There also seem to be differences in the types of instruments located in various parts of the site. The Mound of the Offering's altar rooms contained only shell tinklers, shell trumpet fragments, and one bone rasp. In contrast, the House of the Dead's rooms contained numerous ceramic hand drums distributed across many of its 19 rooms, and shell tinklers were mostly concentrated within the elite Burial 44-13 within Room 3-13. Ceramic hand drums were notably absent from all extramural plaza spaces and were almost entirely absent from

enclosed plaza spaces within compounds. Overall, hand drums were located only within 10 rooms of Unit 14, 8 rooms of Unit 13, two rooms of Unit 8, two rooms of Unit 16, and a single room of Unit 19. The majority of ceramic hand drums with provenience data (around 84%) came from within the House of the Dead. Consequently, we hypothesize drums were an integral component of the ancestor veneration rituals that occurred there.

Copper bells were overwhelmingly most common from within Unit 8's various rooms, but curiously, were found in neither of the two "warehouses" containing many sumptuary goods. In contrast, 40 shell trumpets (nearly 85%) came from one of these warehouses, Room 15-8, suggesting they may have been stored there for use elsewhere within Unit 8, potentially near the Walk-In Well although Room 15-8 and Plaza 3-8 are not located directly near one another. Sixty-seven percent of shell tinklers recovered from Paquimé came from Rooms 15-8 and 18-8, further indication that these locations were associated with water-associative instrumentation. The Walk-In Well contained 277 shell tinklers, further evidence of the strong connection between shell and water rituals. The Mound of the Cross contained few instruments and only a single shell tinkler, demonstrating that it contained no place to adequate store instruments even though dancers wearing tinklers and individuals playing shell trumpets or utilizing other instruments may have used the space (see Di Peso *et al*., 1974, vol. 4). The final ceremonial space of note, Room 38-11, contained only three shell tinklers and the entirety of Unit 11 had only a small ringing stone, 13 shell tinklers, and a medium stone ball. The absence of any copper tinklers, copper bells, shell trumpets, or bone rasps is notable and hints at a diachronic shift in which instruments were crucial to ceremonial practices and daily playing, given that Unit 11 is thought to be slightly earlier than many other ceremonial spaces within Paquimé.

The other types of instruments, such as thunderstones, ringing stones, and rasps, did not occur in specific concentrations within Paquimé and were found in many contexts. For the former, this suggests that they may not all have been employed as thunderstones or as ball game implements and that those that were used as thunderstones may not have been restricted to specific contexts or individuals. The two small and one potential large ringing stones were also oddly dispersed across the site, with small ringing stones in Mound of the Pit Ovens (Unit 1) and the House of the Dead and the proposed large ringing stone in the House of the Macaw (Unit 12). The Mound of the Pit Ovens is located far to the north and the presence of a ringing stone therein leaves us to ask if it may have been associated with feasting activities. No instruments were present within the Mogollon kiva-like structure, Room 38-11, although it is

entirely possible that they were used there but stored or ultimately deposited elsewhere.

Conclusions

The analysis of the musical instruments found at Paquimé in the context of those known for the American Southwest revealed some similarities and some profound differences. Although there were many instrument types that the two regions have in common such as shell trumpets and tinklers, copper bells, ringing stones, and bone rasps, there are others that are not shared in the form of flutes, whistles, foot drums, *bitsitsi* whistles, and clay bells found among the Pueblos and ceramic drums, stone rasps, trumpet rasps, and copper tinklers discovered at Paquimé. Beyond these, distributional observations, however, there are additional similarities and differences that characterize the two study areas.

The strongest similarities exist in the worldview surrounding water and water sources, as feathered or horned serpents, subterranean caves and springs, and shell trumpets are associated with them in both regions. Ethnographic accounts from the Hopi and Zuni pueblos indicates that both regarded the sound of shell trumpets as the roar of a plumed serpent (Fewkes, 1896, p. 366; Haury, 1945, p. 159). This serpent, who also manifests as a horned serpent, is associated with water and springs but also with landslides, earthquakes and volcanoes. The plumed serpent motif appears in the rock art of the Mogollon at the same time, or even slightly earlier, as the appearance of Toltec-style art in the Casas Grandes region, suggesting a network of exchange and communication between the two (Schaafsma, 1980, pp. 198-199). The presence of the Mound of the Serpent, serpent imagery on pottery, and serpents depicted on wall murals at Paquimé (Schaafsma, 2001) suggests serpents were significant at Paquimé as well, and the close association between the shell trumpets and subterranean and watery spaces is entirely consistent with the ethnographic data. There are no archaeological examples of trumpets in direct association with water shrines in the American Southwest analogous to the Walk-In Well, however, and to be clear, there are possibly multiple serpent deities and this observation of the mutual importance of serpents should not be taken as an assertion that the serpent deities or the associated ritual practices in the two regions were the same.

Another finding that highlights a similarity between the Paquimé and the American Southwest relates to a concern with worship or veneration of ancestors (also noted by Ravesloot, 1994). It takes very different forms in the two locations places, with Pueblo groups worshiping ancestors that become

rain-bringing *katsina* deities that are represented by masked dancers in contrast to some Paquimé inhabitants participating in ancestor worship and maintaining and establishing elite authority through exclusive rituals such as the ballgame and those involving manipulation of human remains (Rakita, 2009). The use of rasps seems to be a common element, but this is another case where the archaeological data from Paquimé is more consistent with the ethnographic rather than archaeological data from the American Southwest, and there are certainly other models of Medio period socioreligious organization and practices at Paquimé. Drums are a second instrument that appears to have been very much connected with worship of the ancestors, and although there is no correlate in the form of portable wooden or ceramic drums from prehispanic archaeological sites yet known for the prehispanic American Southwest, there are some ethnographic accounts from Zuni and Hopi that suggest foot drums were viewed as a way to communicate with the spirits of dead ancestors residing inside the earth (Dutton, 1963, p. 95; Parsons, 1974 [1939], pp. 182, 382-383).

Perhaps the most significant finding of this analysis of the musical instruments at Paquimé in the context of those from the American Southwest is that the results verify a pattern noted for the American Southwest wherein the archaeological sites that were the largest and presumably most sociopolitically complex contained the highest numbers and greatest varieties of types of instruments (Brown, 2005). This is a pattern that has been observed elsewhere in the Americas in locations such as Peru as well (Daniela la Chioma, personal communication to E. Brown, June, 2021). There are additional aspects to the instruments at Paquimé that add to our understanding of this general pattern, however, and that is that as well as containing higher numbers and more types of instruments than any other single site in the American Southwest by several orders of magnitude, the musical instruments at Paquimé exhibited greater visual elaboration than those in the Southwest and were much more likely to be imported, whereas nearly of the contemporaneous instruments in the Southwest were made locally.

These facts have several implications. First, it would appear that like community leaders among the Pueblos, the sociopolitical elite at Paquimé used musical and ritual performances as important elements of the practices that helped establish, legitimate, and perpetuate their authority. Instruments found in the House of the Dead and the Walk-In Well are especially strong evidence that musical performance was an element of ceremonials associated with ancestor worship and water. Second, the fact that many instruments were imported adds an additional layer of significance to them in that they would potentially have required wealth and/or trade connections to procure and may

have held additional meaning because of their origin, material, association with the ocean, decoration, or other characteristics. Beyond their status as exotic trade goods, however, the decorated examples would have conveyed a visual message or meaning in addition to the aural communication inherent in their musical capabilities and would likely have been even more valuable than their plainer counterparts. Third, the shell tinklers in particular were accumulated and cached in vast numbers that suggests that they functioned as luxury or prestige items quite apart from their musical capabilities. That these caches were found in only a few locations is one more indicator of the strong differences in wealth and power among the site's inhabitants and although these caches occur in a context that appears generally secular, they are one more line of evidence that imported musical instruments were a luxury available primarily to the site's elite.

Whereas there is evidence that certain groups such as kiva fraternities controlled individual instruments in the American Southwest, Pueblo societies of the contemporaneous Pueblo IV period were much less overtly hierarchical than was Paquimé and there were many social mechanisms that limited social stratification. For this reason, although comparing Paquimé to the contemporaneous Pueblo IV communities is productive because it can consider historical events such as the rise of the katsina religion, in many ways Paquimé is much more equivalent to the society in Chaco Canyon at its height, although Chaco's apogee between 850 and 1140 C.E. precedes the beginning of Paquimé's by 160 years. Whereas Paquimé was arguable more socially stratified than Chaco at its height, the contexts and physical characteristics of the instruments are in many ways much more similar than are those of Paquimé and the Pueblo IV pueblos. Some musical instruments at Chaco were found in the context of the richest mortuary offerings found in the American Southwest and include shell trumpets and copper bells that would have been costly and exotic trade goods owned by members of the elite. Some were decorated, such as a trumpet with a turquoise inlayed mouthpiece and carved and painted wooden flutes, and there was clearly a visual element to them that is usually lacking in later Pueblo IV instruments. An additional element of similarity is that a few shell trumpets at Chaco were found in contexts that suggest they were offerings in the context of ritual closure of rooms, kivas, or perhaps even entire pueblos (Brown, 2015), analogous to those found in Paquimé's Walk-In Well.

In sum, a review of the musical instruments found at Paquimé in the context of those found at archaeological sites in the American Southwest reveals many similarities and some differences in the kinds of instruments, but also exposes many differences between Paquimé and contemporaneous large-scale Pueblo

IV pueblos. The instruments at Paquimé are distributed in ways that suggest they were most available to the site's elites and were most often played in the course of ritual practices, among them ceremonies associated with ancestor veneration and a water shrine. Others were accumulated in ways that suggest they were a form of wealth in their own right. Instruments at Paquimé were by far more numerous and more varied than Pueblo instruments, exhibit more visual elaboration, and were more likely to be imported rather than locally made. Musically speaking, none were capable of a particularly wide variety of pitches, suggesting that music with melodies that varied in pitch to any great degree would have been vocal rather than instrumental. Overall, the instrument assemblage at Paquimé and the contexts in which the objects were used is more similar to the clearly hierarchical society in Chaco Canyon than with the Pueblo IV period Pueblos with which it was contemporaneous.

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