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Interpreting the apparent lunar symbolism on a Fremont Indian pendant

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Abstract

The current article examines the apparent lunar iconography engraved on a rhyolite pendant recovered from a 13th century AD, Fremont Indian pithouse village known as "Five Finger Ridge". Symbols etched into the pendant resemble the waxing crescent, full, and waning crescent moon, thirteen circles equating with the thirteen lunations that are commenced during the solar year, and nineteen grooves etched along the outer edge of the disk-shaped pendant. The paper cites archaeological, ethnographic, rock art, and mitochondrial DNA data certifying that the Fremont people were of Ancestral Puebloan ethnicity and are therefore culturally and genetically related to the occupants of the modern pueblos located in the states of New Mexico and Arizona, USA. Ethnographic data from the late 19th and early 20th centuries demonstrates that all Puebloan villages were agriculturally dependent, utilized a solar-lunar calendar, and several conceptualized the year as having thirteen lunar months. The authors utilize the ethnographic data to interpret the two crescents and centrally drilled hole as the *waxing crescent*, *full*, and *waning crescent* moon, and the thirteen etched circles as *full moons* representing the *thirteen-month lunar calendar* reckoned at several historic pueblos. Finally, the paper proffers excavated exotic trade goods (olivella shells, turquoise) to demonstrate that the Fremont people of Five Finger Ridge were involved in long-distance trading relationships with Ancestral Puebloan communities that possessed unequivocal knowledge of the 18.61-year Major Lunar Standstill. From this the authors conclude that the pendant's *nineteen grooves represent the nineteen solar years needed for the completion of a Major Lunar Standstill* cycle, wisdom they learned from long-distance trade relationships with Ancestral Puebloan people that were cognizant of this lunar circuit.

Keywords: archaeoastronomy, Fremont, lunar, standstill, major, calendar, pendant, Ancestral, Puebloan.

Introduction

In the 1980s, expansion of Interstate Highway 70 through Clear Creek Canyon, Utah, USA necessitated the creation of *The Clear Creek Canyon Archaeological Project* (Janetski, Talbot 2000, 1-7; Baker, Billat 1999; Janetski 1998, 3-5). The Project's salvage archaeology mission was to survey, map, excavate, and collect cultural materials from sites that would be destroyed or disturbed by highway construction, and to locate and catalogue the hundreds of rock art panels that dot Clear Creek Canyon. The myriad sites and artifacts discovered by the Clear Creek Canyon Archaeological Project made such a marked contribution to the understanding of prehistoric Native American lifeways that it was designated a cultural resource and renamed Fremont Indian State Park and Museum, with all artifacts from the Project being curated in the latter (Fig. 1).



Figure 1. Location of Fremont Indian State Park and Museum, Sevier, Utah, USA.

During the archaeological survey in 1983-1984, the Project discovered and excavated a large prehistoric Native American pithouse village identified by archaeologists as "Five Finger Ridge". Radiocarbon dates from wood beams excavated from this site placed the occupation between AD 1100-1350 (Talbot, Wilde, Richens, 2000, 125-129; Janetski 1998, 43)¹. Artifact assemblages confirmed that Five Finger Ridge was occupied by the "Fremont" culture of Utah (USA), one of the agriculturally dependent Native American societies affiliated with the prehistoric Ancestral Puebloan peoples of the American Southwest. Among the thousands of artifacts retrieved in excavation, one comprised a circular pendant 3.9 cm in diameter and 0.3 cm thick, which was made from pinkish-lavender rhyolite. The following images are engraved into the pendant: a centrally drilled hole straddled by two crescents; thirteen circular etchings arranged in a semicircle above the hole and crescents; and nineteen etched grooves forming a semicircle along the outer edge of the pendant (Fig. 2).

¹ Five Finger Ridge is labeled 42SV1686 in the Office of Public Archaeology's trinomial system of site classification.



Figure 2. Pinkish-lavender rhyolite pendant 3.9 cm in diameter. Note that the two crescents and centrally drilled hole simulate the *waxing crescent*, *full*, and *waning crescent* moon. Thirteen circles correlate to the thirteen full moons reckoned in the agricultural calendar of several modern Pueblos (see below). The nineteen grooves carved across the top of the pendant correspond to the nineteen solar years needed for one full cycle in the 18.61-year Major Lunar Standstill. (Photograph copyright François Gohier).

At first glance the etchings on the pendant may seem abstract, random, and guided by the ancient artist's aesthetic predilections. Yet, as will be shown below, the Fremont people at Five Finger Ridge were horticulturally reliant on corn, beans, and squash just like their historic Pueblo Indian descendants. Moreover, because the Fremont were of Ancestral Puebloan stock, they presumably utilized the lunar-solar calendar followed by their descendants at the modern pueblos located throughout New Mexico and Arizona. In the late-nineteenth and early twentieth centuries much ethnography was collected at these pueblo villages – including indigenous systems of time-reckoning. These ethnographic records reveal that several of the historic Pueblos adhered to the belief that there were thirteen lunar months in a solar year, a concept they presumably derived from the awareness that approximately one-third of a thirteenth lunation occurs during a 365-day solar year.

Even more intriguing are the nineteen carved notches across the top of the pendant. Although no excavated Fremont features, structures, or rock art motifs recorded by the Clear Creek Canyon Archaeological Project evince an awareness of the 18.61-year Major Lunar Standstill cycle, the Fremont people at Five Finger Ridge were engaged in long-distance trade with Ancestral Puebloan communities *that did possess knowledge* of this lunar cycle – a circuit that recurs every nineteen solar years. The authors proffer artifacts from Five Finger Ridge that betray a connection with Ancestral Puebloan communities that were indeed cognizant of the

Major Lunar Standstill and argue that this lunar knowledge is intimated in the nineteen notches that are carved into the edge of the Fremont pendant.

Object of the Study

The current study attempts to answer the following questions:

1. Do the two crescents and centrally drilled hole represent the moon at *waxing crescent*, *full*, and *waning crescent*?
2. Do the thirteen circles carved above the apparent waxing crescent, full, and waning crescent moon motif represent the 13 lunar months reckoned by several of the historic Puebloan peoples?
3. Do the nineteen grooves etched across the top of the pendant reflect the Fremont people's knowledge of the nineteen solar years necessary to track the 18.61-year Major Lunar Standstill?

Note that the current article is written with international scholars in mind, i.e., researchers who may be unfamiliar with specific aspects of archaeology and archaeoastronomy practiced in the American Southwest, including its prehistoric cultural designations and chronologies, geographic reference points, and prehistoric Fremont peoples' cultural, ethnic, and linguistic relationships to the modern Pueblo Indians that inhabit New Mexico and Arizona, USA.

The Ancestral Puebloan Fremont Culture

The pendant under examination was excavated from a 13th century AD Fremont cultural occupation. The cultural matrix defined by archaeologists as the "Fremont culture", "Fremont people", or "Fremont complex" received its name from the Fremont River in Utah. The Fremont people shared many of the cultural adaptations of their archaeologically better-known Anasazi neighbors to the south—including an agrarian lifestyle reliant upon corn, squash, and beans (Allison 2016²; Cole 2009, 18-24; Simms, Gohier 2010; Janetski 1998, 9-15; 2008, 105-115; Simms 2008, 185-235; Madsen, Simms 1998, 255-277). However, cultural materials recovered in survey and excavation throughout central and northern Utah revealed some noteworthy differences. These distinctions include the Fremont people's wearing of "hock" moccasins as opposed to the Anasazi's use of sandals as footwear, a unique form of "one-rod-and-bundle" basketry, a distinct style of gray-ware pottery, a unique style of rock art, the ideological use of clay figurines, and a heavier reliance on hunting and gathering than the Anasazi (Allison 2016; Simms, Gohier 2010; Janetski 1998, 11; 2008, 105-115; Madsen, Simms 1998, 266). It was this amalgam of differences – encountered by Harvard University archaeologist Noel Morss along the Fremont River in Utah in the 1920s – which inspired him to apply the name "Fremont" to the artifact assemblages north of the Colorado River in Utah which resembled the Anasazi in many ways, yet displayed the aforementioned disparities (Morss 1931, 76-78) (Fig. 3).

² J. Allison "The Fremont, Ancient Farmers of the Far Northern Southwest", A Tea and Archaeology Presentation sponsored by Archaeology Southwest: https://www.youtube.com/watch?v=K_m5aWGNjwo&t=1278s (accessed: 27 February 2022).



Figure 3. Geographical distribution of the prehistoric Fremont and Anasazi cultures of the American Southwest. The Fremont and Anasazi cultures are now identified as *Ancestral Puebloan*, as they are the ancestors of the peoples who eventually migrated to the historic pueblos found throughout New Mexico and Arizona, as shown in Fig. 5 and 6 (photo: J.K. Lundwall).

Moreover, although archaeologists typically referred to the Fremont and Anasazi as distinctly different cultural designations in the latter half of the 20th century (as shown in Fig. 3), recent anthropological classification identifies the Fremont and Anasazi as "Ancestral Puebloan" since they are ancestors to the indigenous occupants of the modern pueblo villages in Arizona and New Mexico (Fig. 4). The cultural continuity of the Fremont people with the modern Pueblo Indians is highlighted by the comment of Hopi Pueblo elder and cultural resource manager Leigh Jenkins: "Because we feel strongly, from the Hopi side, that the Anasazi, as well as other Puebloan-classified cultures—like the Fremont farther north ... are in fact ancestral Hopi people" (Widdison, 1991, 32).



Figure 4. Geographical location of the modern pueblos of New Mexico and Arizona.

This point is underscored by mitochondrial DNA haplogroup analysis, which indicates that the population at modern Jemez Pueblo (New Mexico) and the prehistoric Fremont Indians are derived from the same maternal lineage (Carlyle et al., 2000, 97, Table 5, Figs. 2-3; see Simms 2008, 256-259, Fig. 6. 6) (Fig. 4; Fig. 5).



Figure 5. Jemez Pueblo, New Mexico, as it appeared in 1915. Mitochondrial DNA analysis of prehistoric Native American burials reveals that the prehistoric Fremont people of Utah are derived from the same maternal lineage as the modern occupants of Jemez Pueblo, New Mexico (photo: Jemez Pueblo Wikipedia Commons³).

Moreover, prehistoric contact between Ancestral Puebloans and non-Puebloan hunter-gather societies is retained in the oral tradition of the latter (Patterson, Hadden, 2016).

And here lies one of the great mysteries of Southwestern Archaeology in the United States: around AD 1300 the Ancestral Puebloan people (i.e., the Fremont and Anasazi) abandoned their villages in Utah and Colorado and began migrating southward⁴. Archaeologists have shown that the modern pueblos were the recipients of vast influxes of immigrant populations during the fourteenth and fifteenth centuries AD (Brody 1991, 81-113; Cordell, McBrinn 2012, 247-277; The Anasazi..., 1991, 11, passim). The implication being that immigrating Ancestral Puebloans – which included the Fremont population at Five Finger Ridge that produced the pendant under examination – had deserted their villages in Utah and Colorado and moved southward where they were incorporated into the large, protohistoric (1300-1600 AD) pueblos of Arizona and New Mexico; such as the one at Taos, New Mexico (Fig. 6).

³ <https://digitalnm.unm.edu/digital/collection/acpa/id/4704>

⁴ A brief summary of potential reasons for this abandonment is listed in the "Migration from the homeland" section of the Wikipedia entry entitled: *Ancestral Puebloans*.

https://en.wikipedia.org/wiki/Ancestral_Puebloans#cite_ref-

FOOTNOTEDiamond2005136%E2%88%92156_27-0 (accessed: 28 December 2022)

Thus, we can say with reasonable certainty that the Fremont people at Five Finger Ridge shared some cultural affinities with the Ancestral Puebloan peoples of the Southwest, whose descendants occupy the present-day pueblos of Arizona and New Mexico.



Figure 6. Taos Pueblo, New Mexico, as it appeared in October 2010. It was constructed circa AD 1400 (photo: J. McHugh).

Pertinent to the current paper is that extensive amounts of ethnographic data were collected at the modern pueblos in the late nineteenth and early twentieth centuries (e.g., Cushing 1981; Fewkes 1920; Hill 1982; Lange 1959; Parsons 1925; 1939; Stephen 1936; Stevenson 1904; Titiev 1944). Hence, our assessment of the Fremont pendant for lunar symbolism follows the premise that some degree of cultural continuity exists between the prehistoric Fremont populations and the occupants of the modern pueblos in New Mexico and Arizona. This point is emphasized by University of New Mexico astronomer M. Zeilik:

"The historic Pueblos of the U. S. Southwest preserve a remarkable cultural tradition descended, in part, from prehistoric times. Especially with respect to the religious rituals, the Puebloan people hold the 'ways of our ancestors' in the highest regard, and they view change with suspicion and hostility. The religious ceremonies reported at the beginning of this [20th] century, before the strong intrusion of the Anglo culture by economic forces, probably have the greatest longevity and the strongest connections to prehistory" (1985, S1, brackets inserted).

With this in mind, the authors contend that some of the lunar knowledge collected in the ethnographic record at the modern pueblos was also circulating among the prehistoric Fremont people centuries earlier and can therefore be utilized as a means to interpret the apparent lunar symbolism carved into the Fremont pendant.

Fremont Agriculture at Five Finger Ridge and Use of the Puebloan Solar-Lunar Calendar

Archaeological excavation reveals that the majority of Fremont Indian occupation sites are comprised of pithouse hamlets consisting of four to ten pithouses similar to the reconstructed pithouse at the archaeological site of Mesa Verde, Colorado, USA (Fig. 7); with a sketch of the typical Fremont pithouse at Five Finger Ridge shown in Fig. 8.



Figure 7. A reconstructed pithouse dating to circa AD 600, at the archaeological site of Step House, Mesa Verde, Colorado. Note the hearth ring on the floor. Occupants entered and exited the pithouse through a ladder in the roof. (Photo courtesy of Mesa Verde National Park⁵).

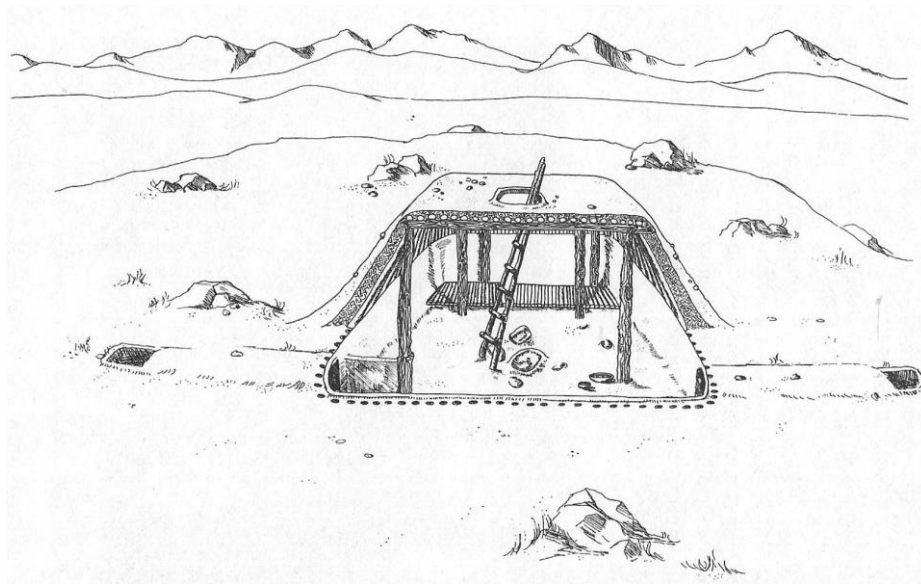


Figure 8. Sketch of the typical Fremont pithouse found at Five Finger Ridge, circa 1100-1350 AD. (Photo courtesy the Museum of People and Cultures, Brigham Young University, Janetski 1998, p. 36).

⁵ https://www.nps.gov/meve/learn/historyculture/step_house.htm

The Fremont pendant under examination was recovered from the fill of Pithouse 57, the largest structure encountered during the excavation at the Five Finger Ridge (Talbot et al., 2000, 119-122) (Fig. 9). The excavators suggest that the pendant was probably hung inside the pithouse along the roof beams which then collapsed and deposited the pendant within the pithouse's fill sometime after the circa AD 1350 abandonment of the Five Finger Ridge.

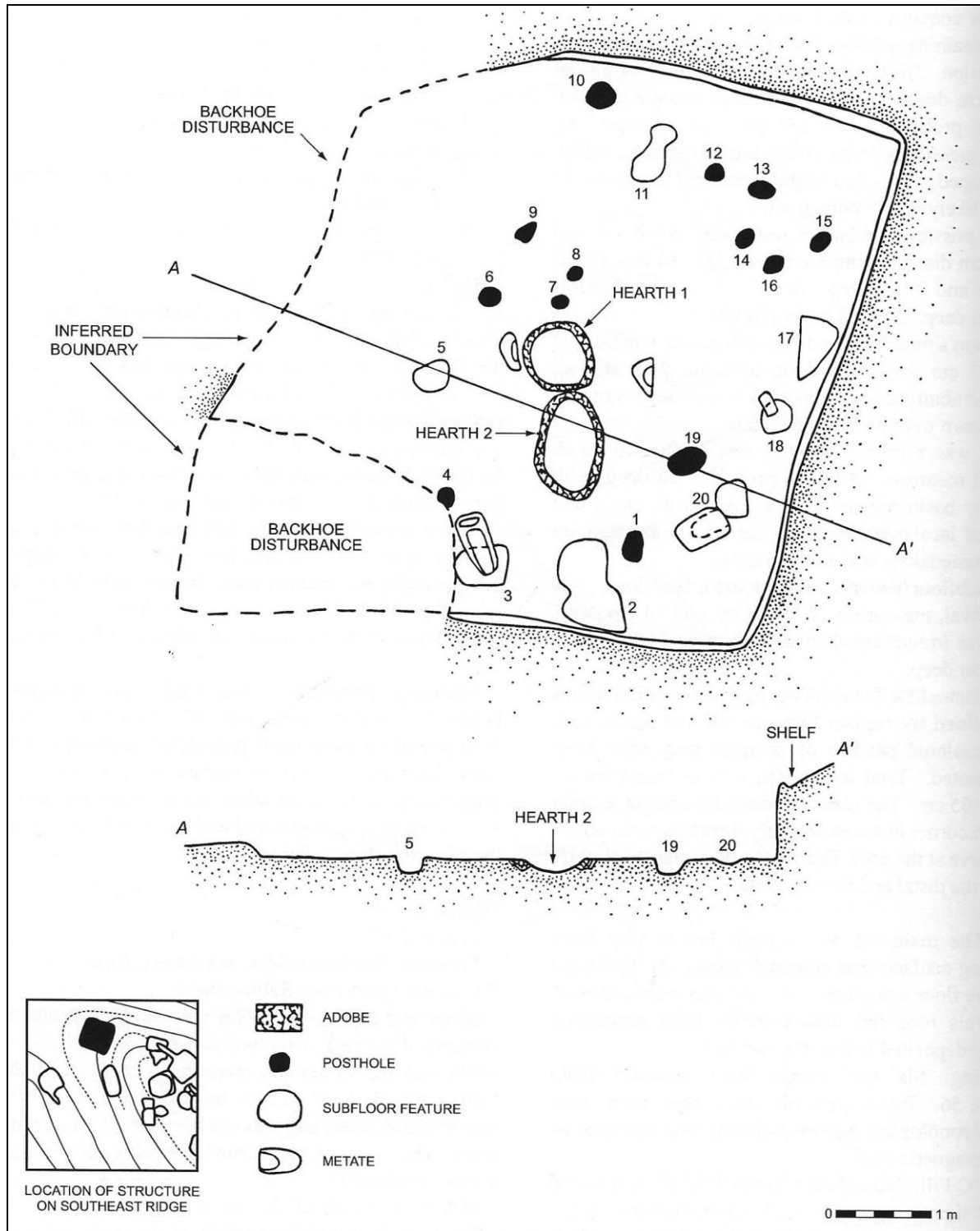


Figure 9. Sketch of Pithouse 57, the structure from which the Fremont "Lunar" pendant was recovered. This pithouse was the largest one at the site, possessing two hearths (Photo courtesy of Clear Creek Canyon Archaeological Project: Talbot et al., 2000, 120, Fig. 2.87).

Radiocarbon 14 analysis from a roof beam yielded the date 1295 AD (Talbot et al., 2000, 121). As mentioned above, the pendant is composed of pinkish-lavender rhyolite, is 3.9 cm in diameter, 0.3 cm thick, centrally drilled, and was found amongst the fill of the pithouse (Ibid. 437, Table 7.5; Ibid. 438, Fig. 7.8, g). The pendant was manufactured during the site's highest population density, which ranged between 60 and 135 individuals (Talbot et al., 2000, 129; Janetski, Talbot 2000, 213; Janetski 1998, 54).

Moreover, J.C. Janetski and D.E. Newman affirm that there is "an abundance of corn in the macrobotanical samples from excavated sites", and "little doubt that the Fremont of Clear Creek Canyon had made a significant commitment to raising corn and probably beans and squash" (Janetski, Newman 2000, 198). The authors aver that the latter statement is crucial to interpreting the symbolism on the Fremont pendant, since agricultural dependence necessitates an accurate calendar. This is especially true at the 2000-meter elevation of Five Finger Ridge, where the approximate number of frost-free days barely exceeds the approximately 100 frost-free days needed for Fremont maize to mature. (Johnson 1996, 3).

Like all Ancestral Puebloan communities, the Fremont people at Five Finger Ridge were agriculturally reliant upon corn, beans, and squash, and needed to know the most auspicious planting times to exploit the meager rainfall and frost-free days that were needed for these crops to ripen to maturity in the arid Southwestern landscape. Archaeoastronomical analysis has repeatedly demonstrated how Ancestral Puebloan peoples mitigated these environmental challenges: numerous Ancestral Puebloan sites depict petroglyphs and pictographs that were pecked and painted on cliff faces so that sunlight-shadow effects signaled the solstices, equinoxes, and other agriculturally significant calendrical dates (e.g., McHugh, Lundwall, Howells 2021, 1-31; Astronomy ..., 2014; Sofaer, Sinclair, Doggett, 2008; Malville, Putnam 1993; Carlson, 1987). This is indeed true in the immediate vicinity of Five Finger Ridge, where the authors have identified at least nine rock art panels that display sunlight-shadow alignments with the equinoxes and solstices (e.g., McHugh, Lundwall, Larson, 2021, 173-185).

This accords with evidence from the ethnographic record at the modern pueblos. Zeilik (1985) has shown that the historic Puebloan people conceptualized the sun as a deity and possessed a religious officer or Sun-priest whose job was to accurately establish the positions of the solstices and equinoxes for the purpose of anticipating and commencing religious rituals and agricultural activities throughout the year (Fig. 10).

Knowledge of the Sun-deity's precise position on the horizon is underscored by anthropologist A.M. Stephen, who watched a Hopi Indian religious officer utilize sunset observations to identify the precise location of the winter solstice (Fig. 11).

Zeilik explains that the historic Pueblo Indians ascertain the solstices and equinoxes through sunrise or sunset horizon-line observations, but that, "A secondary method relies on the manipulation of light and shadow using windows in buildings" (Zeilik 1985, S10-S12). The latter usage of sunlight and shadow lines cast through observation windows in Pueblo Indian buildings resembles the intentional sunlight-shadow effects found at numerous Ancestral Puebloan rock art sites. We emphasize that sunlight-shadow lines cast on rock art at Ancestral Puebloan sites *implies a knowledge of the sun's solstitial and equinoctial positions on the horizon*.

Yet the solar calendar used to signal the equinoxes and solstices and other religious rituals was inseparably interconnected with the ceremonial events associated with the agricultural cycle. Zeilik emphasizes that, "*Agriculture and religion* are so intertwined in the Pueblos that they reinforce each other" (Ibid. S3, italics inserted), noting that, "Sun watching sets the calendar for

two main purposes: to establish the ritual cycle and to set a planting calendar" (Zeilik 1985, S12; see Williamson 1984, 77-111). The inextricable interrelationship between spiritual and agrarian activities is highlighted by the remark of an old farmer at San Ildefonso Pueblo in the 1930s, "There are two livings, agriculture and religion" (Whitman 1940, 399). The purpose of such Puebloan precepts is obvious: the Pueblo Indians needed to establish an accurate calendar that signals the precise days that field-preparation, planting, and harvesting should commence.

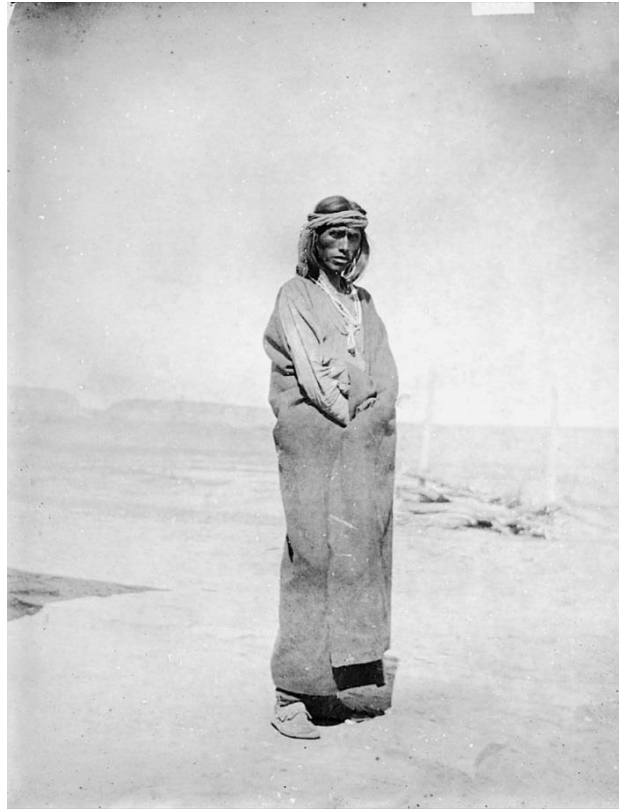


Figure 10. Zuñi Pueblo *pekwin*, or Sun-priest, as he appeared circa 1896. (Stevenson, 1904, pl. XVIII; photo courtesy of the Smithsonian Institution Bureau of American Ethnology).

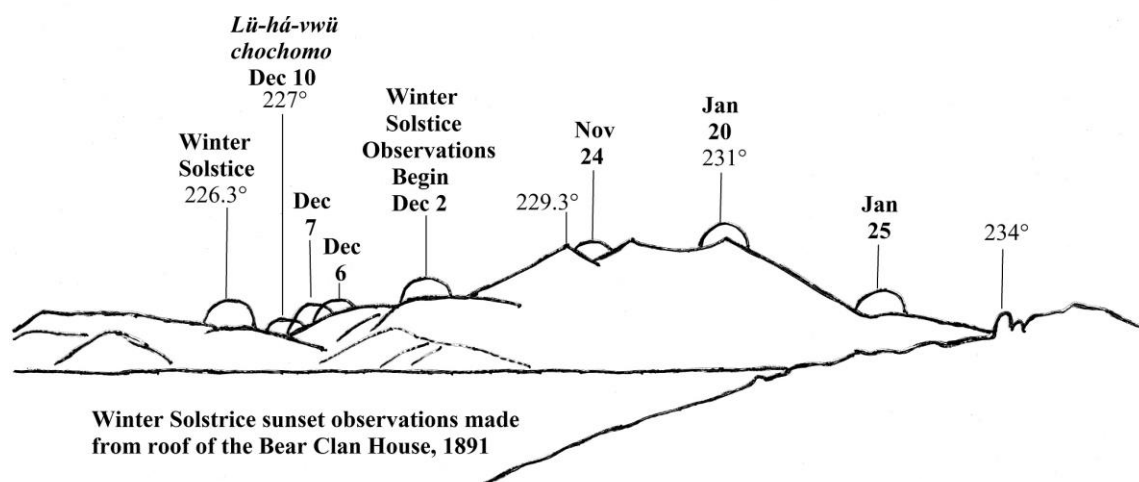


Figure 11. In 1891 anthropologist A.M. Stephen witnessed the Hopi Indian Sun-priest establish the exact date of the winter solstice from sunset observations taken from the rooftop of the Bear Clan's ancestral house (Adapted from Stephen 1936: Map 4. Note that Stephen's azimuth bearings are based on magnetic north).

This entire complex of calendar keeping, agriculture, and religion is nicely summarized by a chant recorded at the Hopi village of Oraibi at Third Mesa. Preceding the Powamu ceremony or first planting, members of the Powamu fraternity chant a song consisting of "20 identical verses, varying only in the name of a point on the horizon where the Sun rises or sets as the plants are planted and develop. Thus, Powamu not only embodies a ritual preparation for the plantings to come, but also contains a ritual recitation of the points that the Sun will pass as it brings the new crops to fruition" (McCluskey 1977, 176). In this example, the calendar is ritually sung as part of a religious ceremony as the agricultural cycle begins.

Pertinent here is that Pueblo Indian Sun-priests *knew the exact position of the summer and winter solstice sunrise and sunset positions* on the eastern and western horizons; a point that will become crucial to the authors' argument, below. And while the solar calendar established the solstices, equinoxes, and the anticipatory dates signaling the major seasonal shifts related to agriculture, observation of the moon and its lunations served to regulate the specific monthly activities in the agrarian cycle.

Use of the Lunar Calendar for Monthly Ceremonies at the Modern Pueblos

Since the historic Pueblo Indians practice many aspects of calendrics that originated in prehistoric times, we suspect that ethnographic descriptions regarding lunar conceptions and time-reckoning practices at the historic Pueblos will elucidate the perceptions of the moon held by the Ancestral Puebloans at Five Finger Ridge.

In the most extensive analysis of historic Pueblo Indian lunar observation practices, Zeilik notes that the Puebloan people view the moon as deity, often male, but sometimes female (1986, S3-S4). The emphasis on the moon's identity as an anthropomorphized divinity is seen among the Tewa-speaking Pueblo Indians, who refer to the lunar orb as "Moon Old Man" (Harrington 1916, 45-46). Moreover, ethnographers note that some Puebloan people perceive the Moon-deity as a "mother" that travels across the sky behind a numinous shield (Curtis 1926, 104). The perception of the Moon-god traveling across the sky while hiding behind a warrior's shield may elucidate the Hopi Indian perception of the Moon-god as the "Father who guards the people at night" (Curtis 1922, 101). Zeilik emphasizes that "prayers to the moon occur about as often as prayers to the sun", and that, "The moon therefore plays a spiritual role that complements and connects to that of the sun" (1986, S4).

While Sun-watching revealed the seasons and the timing of critical agrarian activities, Moon-watching divided the year into meteorological phenomenon and agricultural events specific to each individual Pueblo. At Taos Pueblo, for instance, March is called "Wind Strong Moon" (Curtis 1926, 252) and at Laguna Pueblo modern January is referred to as "Lizard Cut Moon" – the time of year when the ground was frozen and buried lizards under the ground could have their tails cut off and eaten (Dutton, Marmon 1936, 7). At the Hopi Pueblos in Arizona, every moon corresponds to a ceremonial activity, and "each ceremony is associated with a particular moon" (Parsons 1939, 497; see Ellis 1975, 62-67). This concept is highlighted at the Hopi village of Walpi circa 1883, where ethnographer A.M. Stephen was informed:

Intiwa [the Hopi Indian Powamu festival chief] says – "When my people had learned to build houses and men had grown accustomed to life in the 'Estufa,'⁶ [the underworld god] *Masau* came and taught them many things concerning growth of plants and trees and *instructed them about planting beans when the moon should be at a certain age after the sun had come a certain distance on his way back to the north...*" (Stephen, in McCluskey, 1981, 173, italics inserted).

Relevant to the current paper is the act of lunar observation. At most of the pueblos a new month commenced with the moon's first visible appearance as a waxing crescent in the west, i.e., about two days after our modern astronomical concept of a new moon (Stephen 1936, 159; Harrington 1916, 48). In fact, at Zuñi Pueblo the moons of the year are called "crescents" because they begin with the waxing lunar crescent (Cushing 1920, 154; Parsons 1917b, 301). Moreover, prayer offerings are initiated most often when the moon is at waxing crescent or full (Parsons 1917a, 238-239). To this Zeilik adds, "Otherwise, the moon is waxing or waning, rather than being at specific phases, such as last and first quarter ..." (1986, S1-2). Thus, in Pueblo Indian thought, images of the waxing, full, and waning crescent moon commonly function as a synecdoche for the 29.5-day lunar month.

Importantly, at Zuñi Pueblo solar and lunar observations were integrated. Zuñi ritual tradition was based on a duality that sought a "strong moon (full) with a weak sun (winter) and a weak moon (new) with a strong sun (summer)" (Zeilik 1986, S10). It was believed that "the winter solstice should occur near a full moon, and the summer solstice close to a new (crescent) moon" (Ibid, S10).

According to this tradition the Zuñi were looking for a full moon at the winter solstice and a new moon at the summer solstice. Like the sun, the moon rises and sets north and south across the horizon but does so monthly. The moon's most northerly and southernly risings and settings are called its lunistics (the lunar version of a solstice). It turns out, at winter solstice the full moon will always be at the northern lunistic. At summer solstice the new moon will also always be at the northern lunistic. It appears the Zuñi were tracking the northern lunistic to coordinate rituals with the solstices.

If so, then in one lifetime a sky watcher would notice the moon's changing position on the horizon during its lunistic risings and settings. Specifically, any sky watcher looking for the rising of the full moon at winter solstice, for example, would always be looking northeast to the horizon point where the summer solstice sun rises. He would notice that in some years the full moon rises just south of where the summer solstice sun rises on the horizon; in some years the full moon rises at the same spot, and in still other years the full moon rises north of the summer solstice horizon position. With a little dedication, the entire 18.61-year cycle of the MLS can be worked out using only observational astronomy.

Interpreting the Apparent "Lunar" Icons and the 13 Circles

We find the historic Pueblo Indians' conceptualization of the full, waxing crescent, or waning crescent moon as an emblem for a lunation a crucial datum when interpreting the apparent "lunar" imagery etched into the Fremont pendant. The two crescents correspond to the *waxing* and *waning crescent moon*; while the centrally drilled hole correspond to a *full moon*. Furthermore, these icons are engraved in the order in which they occur in the sky, i.e., the

⁶ "Estufa" is the Spanish term for "kiva", the round, subterranean structures used in Pueblo Indian communal ceremonies and religious rituals. A general description of the kiva's development with photographs can be found at: <https://en.wikipedia.org/wiki/Kiva>.

waxing crescent moon motif is followed by the *full moon*, which in turn is followed by the *waning crescent moon* (Fig. 12). Regarding the direction in which the Fremont pendant should be "read" it is worth noting that some Indigenous American rock art specialists argue that Ancestral Puebloan "motion" in prehistoric rock art flows from right to left, suggesting that the pendant iconography may have also been read from right to left (Patterson, Hadden 2016, 1-28).

Moreover, religious officials at various Pueblo villages have told ethnographers that there were thirteen lunations in a solar year. In the 1890s, Hopi informants told J.W. Fewkes the year contained 13 lunar months (Zeilik 1986, S11; 1991, 98), which was later reiterated by the ethnography of other scholars such as E.S. Curtis, C.D. Forde, and M. Titiev (Zeilik 1991, 100, Table 2a). In his analysis of lunar calendrics at the historic Pueblos, Zeilik writes that, "Whenever a pueblo is reported to have 12 months [rather than 13], it has probably adopted the Gregorian calendar [due to contact with Anglo-Europeans] and discarded its aboriginal one" (1986, S19, brackets inserted).

Hence the ethnographic evidence indicates that some of the historic Pueblo Indians reckoned 13 lunar months, and it was during the full moon and waxing crescent that prayer offerings were most frequently deposited (Parsons 1917a, 238-239; Zeilik 1991, 91). From this, we contend that the thirteen etched circles on the Fremont pendant correspond to the thirteen full moons calculated at some of the historic pueblos, which are indicative of the Ancestral Puebloan peoples' *perception* of a lunar year that consisted of thirteen lunations (Fig. 12).

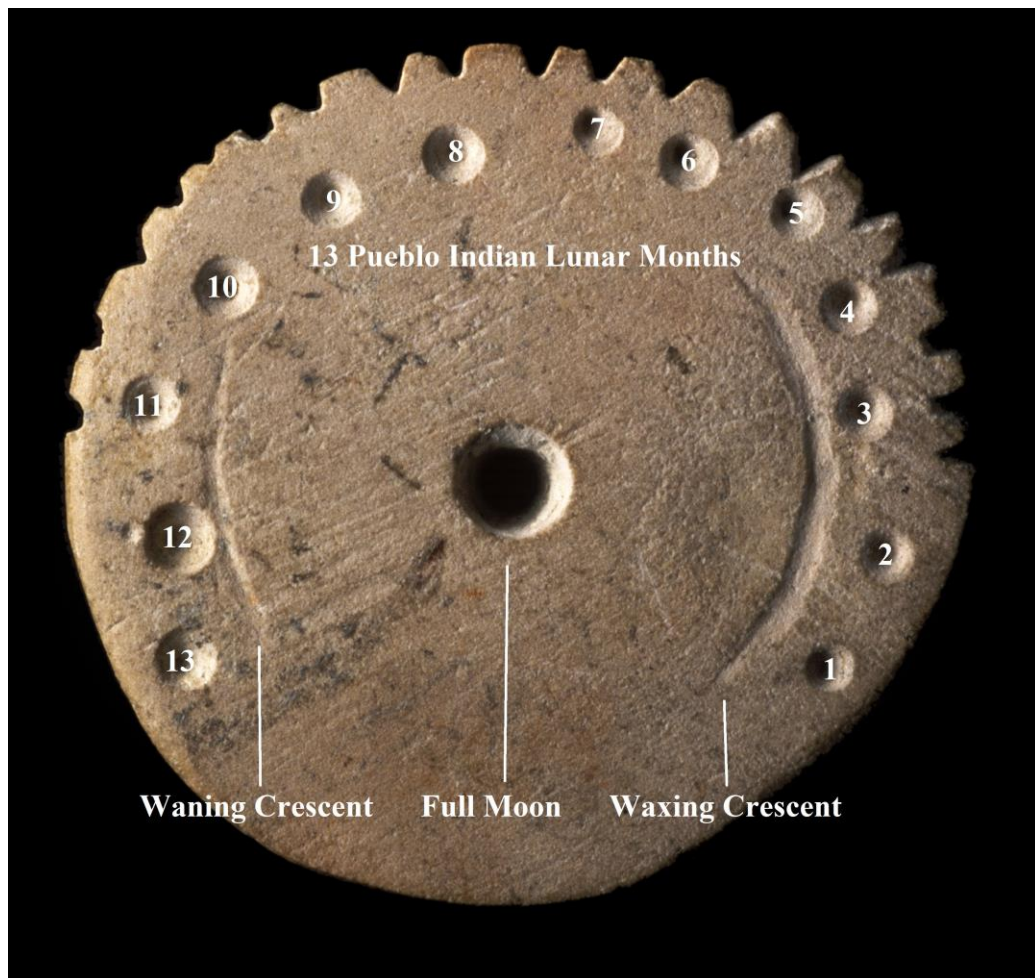


Figure 12. If "read" from right to left, the crescents and center drill hole correspond to the waxing crescent, full, and waning crescent moon. The thirteen etched circles correspond to the 13 lunations reckoned by some historic Pueblo villages (Photograph copyright François Gohier).

Ancestral Puebloan Knowledge of the Major Lunar Standstill (MLS)

No known Fremont feature or structure at Five Finger Ridge displays an intentional alignment with the 18.61-year Major Lunar Standstill (MLS), nor does any pictograph or petroglyph demonstrate a definitive alignment with the lunar shadow cast during this cyclical event (that we have found). Further complicating an MLS interpretation of the lunar pendant is the fact that for most of the 20th century it was believed that Native Americans did not track this cycle or were aware of it. M. Zeilik insists that "The Pueblos usually kept no long counts or tallies greater than a year", and that "no clear indication appears of observations of the 18.6-year lunar standstill cycle relative to a fixed horizon position" (1986, S1, S19).

S. McCluskey is less certain, and reviews published data of the Hopi Powamu festival dates over a 19-year period to theorize that during this time the Hopi were adding lunar months into their calendar roughly every three years (1977, 181-185). It is by observing a fixed solar date at winter solstice with the moving date of full or new moon when Powamu rituals were performed that by "such intricate means relating solar and lunar observations, a consistent system of intercalation can be maintained" (Ibid. 185). However, McCluskey does not make a conclusive decision if the Hopi were actually tracking this 18.6-year cycle, as the published data of the Powamu festivals was incomplete.

For the longest time, western anthropologists noted the strong link between religion and agriculture amongst the Native tribes of the American Southwest and that sun and moon watching held a utilitarian purpose related to agriculture. There is no need to track the MLS for agricultural needs, and therefore it was assumed that the knowledge of this cycle was unknown amongst Native American agriculturalists, and certainly not known amongst hunter-gatherers.

There are two partners in the link between religion and agriculture, however, and while knowledge of the MLS might not be necessary to grow crops, it might be required for other religious reasons. Becoming aware of the shifting horizon positions of the lunistics would import a new divine function to the Moon-deity. The moon is constantly moving, changing its daily appearance in its phases, its daily risings and settings, and its appearance against the stars, and now, rising and setting beyond the solstice points. Now the Moon-god has positioned himself (or herself) outside the solstitial limits demarcated by the Sun-god. What consequences does this understanding have for the cosmogony and related ideas about birth, death, and rebirth? As yet, this question remains open.

Over the past few decades, however, scholarly opinion over the knowledge of the MLS within indigenous Native American cultures has shifted, as rather convincing evidence of this knowledge has been ascertained over a broad spectrum of regions and peoples. Such evidence is found at the Fajada Butte "Sun Dagger" site in Chaco Canyon, New Mexico. Although it is well documented that the sunlight-shadow effects at this 13th century AD petroglyph unequivocally signal the solstices and the equinoxes (Sofaer, Zinser, Sinclair, 1979, 283-291⁷), the site was also aligned with the MLS (Sofaer, Sinclair, Doggett, 1982; 2008). Moreover, A Sofaer and colleagues convincingly argue that (see Fig. 13):

⁷ Video of the summer solstice sunlight-shadow alignment at the "Sun Dagger" petroglyph, Chaco Canyon, New Mexico, excerpted from: Carl Sagan, *Cosmos*, Episode 3, "The Harmony of the Worlds", 1980. <https://www.youtube.com/watch?v=I1qdhU5Lw2A> (accessed: 4 March 2022); For the AD 13th century date of the "Sun Dagger" petroglyph site see: Malville 2014, 38-39.

"... the [Ancestral] Pueblo Indians recorded the extreme northern rising positions of the moon and major and minor standstills... *the length of the full [Lunar Standstill] cycle (18.6 years) may be recorded by the count of 19 grooves across the full spiral.* The number of grooves may also record a knowledge of the 19-year Metonic cycle" (Sofaer, Sinclair, Doggett, 2008, 43, italics, brackets inserted).

Not only does the Sun Dagger petroglyph show an alignment with the MLS, but every major building built within Chaco Canyon is aligned either to the sun or moon, including four buildings (Chetro Ketl, Kin Klesto, Pueblo del Arroyo, Pueblo Pintado) and one outlier (Salmon Ruin) whose major axis is aligned with the lunar minor standstill and two buildings (Peñasco Blanco and Una Vida) whose axis are aligned with the MLS (Sofer, et. al. 2008, 91). All these buildings "were in use and most were being extensively worked on in the last and most intensive phase of Chacoan construction, from 1075 to about 1115" (Ibid. 89).



Figure 13. Besides solar alignments at the solstices and equinoxes, the Chaco Canyon "Sun Dagger" petroglyph also displays moonlight-shadow alignment with the Major Lunar Standstill. A. Sofaer, R.M. Sinclair, L.E. Doggett (2008, 39-48) argue that the motif's nineteen grooves intentionally encoded knowledge that the Major Lunar Standstill occurred every nineteen solar years. Sketch of "Sun Dagger" petroglyph by J. McHugh.

The Ancestral Puebloan people of Chaco Canyon, New Mexico were not the only prehistoric Indigenous Americans who were tracking the MLS. Small, intriguing, window-like openings at the circa 1175-1450 AD Ancestral Puebloan site of Casa Grande, Arizona also frames the MLS event (Evans, Hillman 1981, 133-135). And MLS alignments are visible at the Ancestral Puebloan site of Zodiac Ridge, Arizona (Autrey, Autrey 1981, 81-99, Table 9.2, Fig. 9.4). One of the most dramatic examples of Ancestral Puebloan knowledge of the MLS is found at

Chimney Rock, Colorado, where the event was observed around the winter solstice in AD 1056-1058. Dendrochronology analysis confirms that the trees were cut to build an observation pueblo in anticipation of the next two 18.61-year cycles – first in AD 1076, and then in AD 1093, 1094, 1095 (Malville, Putnam 1993, 45-55; Malville, Eddy, Ambruster 1991, 43-50, Table 1⁸). Moreover, the late-13th century AD Ancestral Puebloan site of Sun Temple at Mesa Verde, Colorado, indicates that the MLS cycle was known and observed (Munson 2014, 123-137; Munson, Bates, Nordby 2008, 131-140). And, after an extensive examination of 800 ceramic bowls, University of Texas astronomers R.R. Robins and R.B. Westmoreland report the persistent presence of lunar iconography in the form of a rabbit among the Mimbres branch of the Ancestral Puebloan people that inhabited southwestern New Mexico, circa AD 1100-1130 (Robbins, Westmoreland 1991, 65-88)⁹. The rabbit's connection to the moon is found in modern Puebloan peoples' predilection to envision the "rabbit" in the full moon's pareidolic appearance, rather than the Western culture's "man" in the moon. The most intriguing aspect of their study involved a bowl with apparent lunar iconography and nineteen dots. Robins and Westmoreland comment, "The bowl decoration is depicted ... two rabbits circle each other, each one having 19 dots painted on their visible flank. This numerical reference may be associated either with the 19-year Metonic cycle or with the 18.6-year cycle of lunar precession and standstill" (Ibid., 85) (Fig. 14).



Figure 14. Pueblo Indians conceptualized the pareidolic image in the moon as a "rabbit". This 12th century AD Ancestral Puebloan bowl from southwester New Mexico depicts two circling rabbits with nineteen dots encoded in each. The implication being that the 19 dots on two

⁸ Footage of the moon's Major Northern Standstill at the Ancestral Puebloan site of Chimney Rock, Colorado, 2005-2007: <https://www.youtube.com/watch?v=zzWGj6ynNqg> (accessed: 20 February 2022).

⁹ An overview of Mimbres offshoot of the Mogollon culture is found at: https://en.wikipedia.org/wiki/Mogollon_culture#Mimbres_branch (accessed: 27 March 2022).

different rabbits/moons implies knowledge of the MLS. (photo courtesy of Western New Mexico Museum).

Thus we find six, compelling instances where Ancestral Puebloan peoples appear to be directly observing the MLS.

To this we must add the extraordinary ethnographic finding by E.S. Curtis, who, while living among the Hopi reported:

"It is said that at the [Hopi Indian] villages other than Walpi, the rising of the moon at a certain landmark on the horizon determines the date [of the Flute ceremony]... " (Curtis 1922, 156, n. 1, first brackets inserted).

If Curtis's words can be taken at face value, *we have direct ethnographic evidence of a historic Puebloan community correlating a ceremony according to rising of the moon based on its position on the horizon.* The implication being that, because priests also knew the rising and setting points of the sun at the solstices, they would have surely comprehended that on rare occasions the Moon-god traveled beyond the solstice points delineated by the Sun-god's most northern and southern rising and setting. We contend that Ancestral Puebloan peoples perceived this as a significant, numinous event involving the Lunar-deity's cyclical appearance on the horizon, thus one that needed to be reckoned.

Salient to the current paper is the number 19. We saw above that the Chaco Canyon "Sun Dagger" petroglyph displays 19 grooves and aligns with the MLS (Fig. 13), the 19 grooves presumably corresponding to the nineteen solar years needed for the moon to make a full cycle through its Major Standstill. And the Ancestral Puebloan bowl depicting "Circling Rabbits" portrays nineteen dots depicted on each of its "lunar" (i.e., rabbit) images (Fig. 14). As stated above, these correlations have compelled reputable scholars to attribute knowledge of the MLS to Ancestral Puebloan peoples.



Figure 15. The nineteen grooves etched along the outer edge of the pendant correspond to the 19 solar years that mark one cycle of the MLS, a lunar circuit that was also being reckoned at the

Ancestral Puebloan sites of Chaco Canyon, Casa Grande, Zodiac Ridge, Chimney Rock, Mesa Verde, and among at least some of the Mimbres people of southwestern New Mexico (Photograph copyright François Gohier).

From the aforementioned data, *we argue that the nineteen notches carved on the Fremont pendant disclose awareness of the MLS*; a time when the Moon-god wandered a short distance beyond the Sun-god's sunrise and sunset positions at the solstices (Fig. 15).

The Spread of Religious-Scientific Knowledge through Ancient Trade Fairs

The Fremont pendant was retrieved from "Pithouse 57", the largest pithouse excavated at Five Finger Ridge. If Pithouse 57 embodied a domicile, then its occupants were afforded higher status than the common inhabitants of the village. However, we concur with the interpretation of co-author E. Nagengast-Stevens, who interprets Pithouse 57 as a ceremonial or communal structure that may or may not have simultaneously served as an extended family's dwelling.

Intriguingly, seven Olivella shell (sea snails from the Pacific Coast and Gulf of California) beads were retrieved from this structure (Talbot et al., 2000, 449, Table 7.8). Moreover, since the Fremont villages at Five Finger Ridge were landlocked and approximately 860 km. from the Pacific Ocean, these shells could only be acquired through long-distance trade (Janetski 2002, 349-351). Equally noteworthy was the presence of fifty-three turquoise specimens, a luxury good that was also only available through long-distance trade (Ibid. 351)¹⁰. Three of these were worked turquoise pendants retrieved from Pithouse 57 (Talbot et al., 2000, 442, Table 7.6). Here we find the comment of one of the Five Finger Ridge excavators, J.C. Janetski, to be instructive: "... most turquoise artifact from the site were coming from the same sources that were supplying both Chacoan and Hohokam peoples" (2002, 352; see Talbot et al., 2000, 619-621). Thus, the Fremont people of Five Finger Ridge had acquired their turquoise from the same trading sources that supplied Chaco Canyon and the Ancestral Puebloan Hohokam culture occupying the Phoenix Basin¹¹. Above, we showed that the Ancestral Puebloan occupants of Chaco Canyon utilized the "Sun Dagger" to track the MLS, which may explain why this spiral petroglyph is incised with nineteen grooves; and the Ancestral Puebloan Hohokam people of Arizona displayed unequivocal knowledge of the MLS at the sites such as Casa Grande (Evans, Hillman 1981, 133-135) and Zodiac Ridge (Autrey, Autrey 1981, 81-99, Table 9.2, Fig. 9.4).

Therefore, the Fremont "Lunar" pendant was excavated from a pithouse that also contained three turquoise beads acquired from long-distance trading routes that supplied Ancestral Puebloan communities that possessed an indisputable knowledge of the MLS. The authors propose that during one of these long-distance trading runs a foreign trader cognizant of the MLS had imparted this wisdom to his Fremont counterpart and, in this way, knowledge of the MLS was disseminated to Five Finger Ridge; lunar knowledge that was later carved into the "Lunar" pendant under examination.

Additionally, deposited within Pithouse 57 was a bone pendant and three enigmatic bones, two of which could confidently be construed as "gaming pieces" that were used for gambling (Talbot et al., 2000, 446, Table 7.7, Ibid. 450, Fig. 7.11*n*; Janetski 1998, 15); objects that are commonly found in archaeological contexts at Fremont culture sites (Janetski 2002, 361). Such

¹⁰ Note that turquoise is not native to Utah, USA (Janetski 2002, 351).

¹¹ For an overview of the Ancestral Puebloan culture that archaeologists classify as the "Hohokam culture" see: <https://en.wikipedia.org/wiki/Hohokam>.

gaming pieces testify to the widespread practice of "trade fairs" or "trade festivals" in historic Southwestern Native American society in which communities of different tribes, languages, and lifestyles would commune for multiple days during established trading festivals. Janetski writes:

"Formally scheduled festivals were important occasions for intercommunity trade and trade fairs along with expeditions facilitated movement of goods over long distances... Haggling ... could be ameliorated by establishing quasi-kin or trade partner relations with individuals in distant villages... it is clear that exchange was important and well-developed in the ethnographic Southwest" (2002, 347).

He adds that, "Trading parties, a 'quasi-market' held within Hopi villages, seems peculiar to a few Puebloan communities" (Ibid.).

In light of the bone gaming pieces deposited in Pithouse 57, W.R. Wood comments that "Gambling at trading fairs was rampant" (1980, 106). Hence, the gaming pieces at Five Finger Ridge testify to gambling – an endemic practice at Ancestral Puebloan trading festivals. Thus, the circumstantial evidence suggests that Fremont long-distance traders from Five Finger Ridge engaged in mercantile ventures by which they obtained turquoise from Ancestral Puebloan communities that possessed knowledge of the MLS (i.e., Chaco Canyon, Casa Grande, Zodiac Ridge). During trading festivals this lunar knowledge was disseminated to the occupants of Pithouse 57, who in turn etched it into the rhyolite "Lunar" pendant shown in Fig. 15.

Finally, it is possible that the Fremont at Five Finger Ridge had discovered the lunar standstill cycle on their own accord. Unlike their neighbors to the south, whose architectural remnants can be measured to show solar and lunar alignments, the Fremont at Five Finger Ridge built only small pithouses whose architectural remains are essentially small divots in the ground. However, Five Finger Ridge does possess a commanding view of the entire horizon line, and the pithouses had openings in the roof where their occupants entered and exited the dwelling. Technically, these openings could have been utilized to observe celestial phenomena, as witnessed by F. Waters among the Hopi in the 1940s and 1950s (1986, 144-145). Sadly, no such survey to determine celestial site lines at Fremont pithouse sites had been undertaken before road construction of Interstate 70 obliterated most of the archaeological structures at Five Finger Ridge.

Discussion of Results

The Fremont pendant's motifs bear unmistakable correlates with lunar precepts held by historic Puebloan people. The two engraved crescents and central drill hole correspond with the Pueblo Indians penchant to use the image of a *lunar crescent* or a *full moon* to represent an entire lunation (Fig. 12). The thirteen etched circles correlate with the Puebloan conviction that there were thirteen lunations in a solar year (Fig. 12). And the nineteen etched grooves along the outer edge of the disk imply knowledge of the 19 solar years tallied during one circuit of the 18.61-year MLS (Fig. 15). Thus the proffered archaeological, astronomical, and ethnographic data strongly validates the authors' lunar interpretations of the symbolism on this pendant.

In an effort to falsify our explanations we came across one, historic instance where stone disks were cut along the outer edge in a manner similar to the Fremont "Lunar" pendant. Circa 1910, anthropologist M.C. Stevenson remarked that the Tewa-speaking inhabitants of San Ildefonso pueblo pay special attention to the full moon. Pertinent to the Fremont "lunar" pendant being analyzed, she notes that:

"... the Sun and Ice rain priests keep a tally of their [lunar] observation by cutting a stone disk with stone knives. The disk of *the moon has a moon-face painted on it in yellow. A new disk is made each year and the old one deposited in the room with the tsekan*" [i.e., harvest fructification fetish]. (Zeilik 1986, S17, brackets, italics inserted).

The Fremont "Lunar" pendant under analysis displays some tangible differences from the stone disks described by Stevenson. First, the face of the Moon-god is *not* engraved or painted on it. Second, the Fremont "Lunar" pendant is a unique artifact unlike the etched, stone, lunar disks that tabulated the number of collaborative lunar observations made by the Sun and Ice priests at San Ildefonso Pueblo, which were deposited yearly. If the Fremont "Lunar" pendant were part of ritualized lunar tabulation that concluded with annual deposition, one would expect to find multiple examples of this relic in excavation. Yet, at present, the Fremont "Lunar" pendant is the only one of its kind. For these reasons we find it unlikely that the Fremont pendant served as a ceremonial lunar observation tally between religious officers akin to the stone disks at San Ildefonso Pueblo.

Conclusions

The authors contend that the Fremont pendant under examination is indeed a "Lunar" relic encoded with Puebloan moon lore. When "read" from right to left the two crescents and central drill hole correspond to a *waxing crescent, full, and waning crescent* moon—any one of which could serve to represent a full lunation. The thirteen carved circles represent *full moons* that correspond directly to the *13 lunar months* reckoned at several, historic Pueblo villages. Finally, the nineteen etched grooves across the upper edge of the pendant intimate knowledge of the *19 solar years necessary to complete one cycle of the Major Lunar Standstill*; knowledge that was gained during long-distance trading encounters with Ancestral Puebloan peoples that were aware of this prolonged lunar circuit.

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