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Eclipse Imagery in Mexica Sculpture of Central Mexico

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Abstract: Major monuments of the Mexica (Aztec) style are analyzed in terms of possible eclipse imagery. The cycle of monuments linked to the Coyolxauhqui myth are recognized as possible images of historical lunar eclipses. The Bilimek vessel is identified with an historical solar eclipse in 1508. The Calendar Stone is recognized as an image of world cataclysm that may refer to a solar eclipse at the end of the world. In addition, the codices are studied in terms of visual images of eclipses and a pattern linking solar eclipses to the death of a ruler.

1. INTRODUCTION

Eclipse imagery in Mexica (Aztec) art has never been adequately studied, even though the historical chronicles show that solar eclipses were very important events. The Mexica chronicles span the period from 1197, when they began their migration from their homeland of Aztlan, to several decades after the Spanish conquest of the capital city of Tenochtitlan in 1521. Only one or two events are featured as being significant in each year. Such events include major battles, floods, the death of a ruler and solar eclipses. Eclipses continued to be recorded in the codices even 10 years after the conquest, as seen in records of the 1531 eclipse (Codex Telleriano-Remensis 44r).

Even though we have the records of the solar eclipses, their relationship with the images on Mexica sculpture has never been studied. At least one well-known monument shows a solar eclipse that can be dated in relation to the chronicles. Although the historical annals do not show lunar eclipses, a program of sculptures related to Coyolxauhqui may show previously unrecognized imagery of lunar eclipses.

2. LUNAR ECLIPSE IMAGERY

The imagery of lunar eclipses has to be reconstructed largely from myths because there are so few painted images of lunar eclipses in the Central Mexican codices, the known imagery being limited to two representations in Sahagún's accounts. The myth of the dramatic death of Coyolxauhqui seems to conform to imagery of a lunar eclipse. Scholars often identify Coyolxauhqui as the Moon goddess (Seler, 1960–1961, III, p. 328; Matos, 1981, pp. 51–52, 1991; Pasztory, 1983, p. 49; Graulich, 1990, p. 382). What has not been recognized previously is that the legend of her death is a metaphor for lunar eclipse.

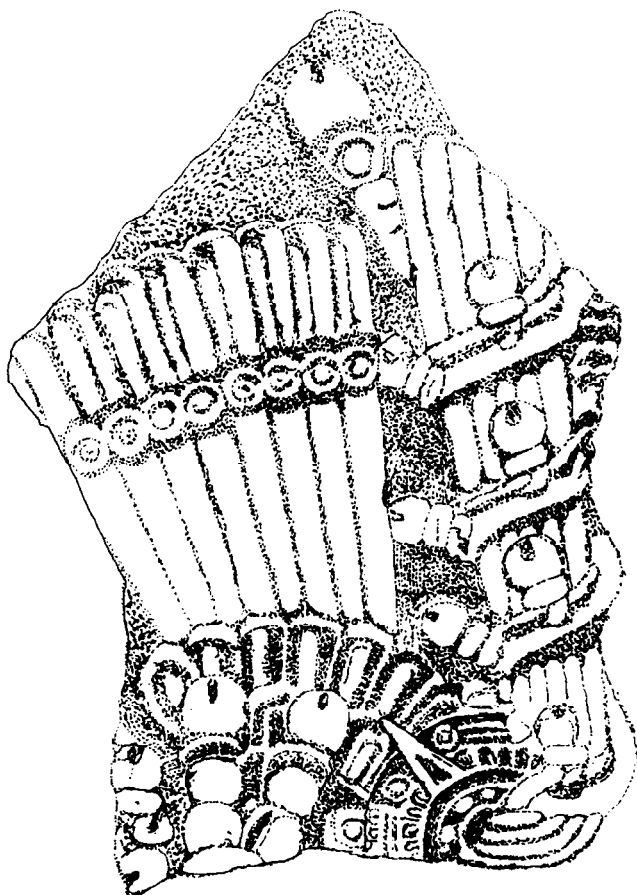


Fig. 1. Coyolxauhqui 5 with a water-filled Moon disk (after Matos, 1991, Plate 6).

The legend of Huitzilopochtli's birth relates how Coyolxauhqui was decapitated by her newborn brother, the solar god Huitzilopochtli (Sahagún 1950–1982, III, pp. 1–5). Coyolxauhqui had planned to kill her mother because she was angry that her mother had conceived another child. Her allies, the star gods, also met a sudden death at the hands of the solar god Huitzilopochtli, who emerged from the womb fully armed to defend his mother. Seler (1960–1961, III, pp. 320–329) interpreted Coyolxauhqui's decapitation as both the daily triumph of the Sun over the stars and the gradual disappearance of the waning Moon losing body parts as it moves closer to the Sun. He argued that the myth refers to the conquest of the stars as a symbol for the daily triumph of the Sun and the decapitation of the Moon goddess as a symbol for the waning Moon. However, the myth shows the two acts to be simultaneous events. In some variants of the myth her death takes place dramatically at midnight, an image that seems inappropriate for the waning Moon, which is visible primarily in the morning sky, finally disappearing in conjunction at dawn. Furthermore, Coyolxauhqui's imagery shows her to be linked with the brilliant aspect of the full Moon, covered with shining bells and represented on or with round-shaped disks (Figs 1, 6). Nor does her imagery as an aggressive warrior fit the waning Moon, because the Moon is often described as an aged old woman during this phase (see below). Some scholars have interpreted Coyolxauhqui as the representative of a political group rivaling the Mexica (Umberger, 1987, pp. 412, 427–428; Klein, 1988). As

Matos (1991) points out, such an interpretation of political metaphor may also be linked to the rivalry between the Sun and the Moon.

The legend indicates that the focus is on the fight between the Sun and the Moon, and some accounts emphasize that the solar god ate Coyolxauhqui or her heart after he decapitated her. This is in keeping with ethnographic accounts that often attribute eclipses to fights between the Sun and the Moon (Baéz-Jorge, 1983, pp. 402, 404; Harvey and Kelly, 1969, pp. 671–672; Thompson, 1971, p. 231). Huitzilopochtli's act of devouring Coyolxauhqui brings to mind a text in the Codex Telleriano–Remensis (42v), which says that during a lunar eclipse the Sun ate the Moon, just as the classical Nahuatl term for a lunar eclipse, *metztli igualoca*, refers to the Moon being eaten (Campbell, 1985, p. 187; León-Portilla, personal communication). Clearly it is the Sun that attacks the Moon and devours it. Although the description of a lunar eclipse in the Florentine Codex says only that the Moon's face grew dark and sooty, an earlier version of Sahagún's chronicle in the *Primeros Memoriales* (282) depicts a lunar eclipse with the Sun confronting the Moon, showering it with dark, arrow-like rays, as though the Sun was attacking the Moon (Sahagún, 1950–1982, VII, p. 8, Plate 21).

Coyolxauhqui's association with the Moon disk is made clear on Coyolxauhqui 5, excavated from the Templo Mayor, the principal religious center of the Mexica capital located off the Zocalo in Mexico City. Here Coyolxauhqui wears a rayed disk with water flowing from its center (Fig. 1; Matos, 1991, Plate 6). Although Matos identifies this as a Sun disk, it resembles the Moon symbol like that on Codex Borgia 18 (Fig. 2). In both representations, water gushes out from the center of a rayed lunar disk. Since there are no known representations of Sun disks showing water in the center, the relief must show an image of the Moon. It is very appropriate for the lunar goddess to carry a lunar disk. The watery Moon in the relief has a conventionalized water band like those in the codices, represented with shell and jade (*chalchihuitl*) symbols attached (Codex Borgia 22; Codex Telleriano–Remensis 42r). The water band is also wrapped with a cord of bells, a symbol of Coyolxauhqui, whose name means 'bells-painted' (Nicholson, 1971, Table 3) or 'she who wears bells' (Klein, 1988, p. 241). Another fragment of the same monument shows the Fire Serpent weapon of Huitzilopochtli penetrating her body, exactly duplicating the myth recorded by Sahagún (Matos, 1991, p. 26, Plate 5).

A relief of a dismembered and decapitated female was found in one of the earliest phases at the Templo Mayor. Designated as Coyolxauhqui 6, this sculpture and the one overlying it (Coyolxauhqui 3) clearly conform to the details of the Huitzilopochtli myth (Fig. 3). In the sculptural program, Huitzilopochtli took the position on the top of the temple and Coyolxauhqui was represented in defeat at the base (Matos, 1981, pp. 51–52). According to Matos, the sacrifices on the temple platform re-enacted the daily triumph of the Sun over the Moon. However, the myth is clearly part of a seasonal cycle.

Huitzilopochtli's birth and Coyolxauhqui's decapitation were re-enacted in the month of Panquetzalitzli (Sahagún, 1974, pp. 57–58 and 1950–1982, II, pp. 145–148; González, 1985, pp. 204–205). In the festival of Panquetzalitzli, the sacrificed prisoners take the place of the star gods (Seler, 1960–1961, IV, p. 166; Matos, 1991, p. 21). The ceremony apparently represents the birth of the dry season Sun in November and the seasonal triumph of the Sun of the dry season drying up the waters of the rainy season (Milbrath, 1980). Due to the location of Central Mexico in the northern latitudes of the tropics, the seasons divide equally into a 6 month period of rain and a 6 month period of dry.

The festival also correlates with the solar nadir, when the Sun's position at midnight was coordinated with the zenith of the Pleiades at midnight (Milbrath, 1980, 1988). This astronomical event marked the seasonal transition from rainy to dry weather and the beginning of the epoch of warfare (Milbrath, 1980, 1988, pp. 61–63, 1989, p. 106). It is entirely appropriate that the birth of a solar warrior is correlated with the beginning of the dry season, the season

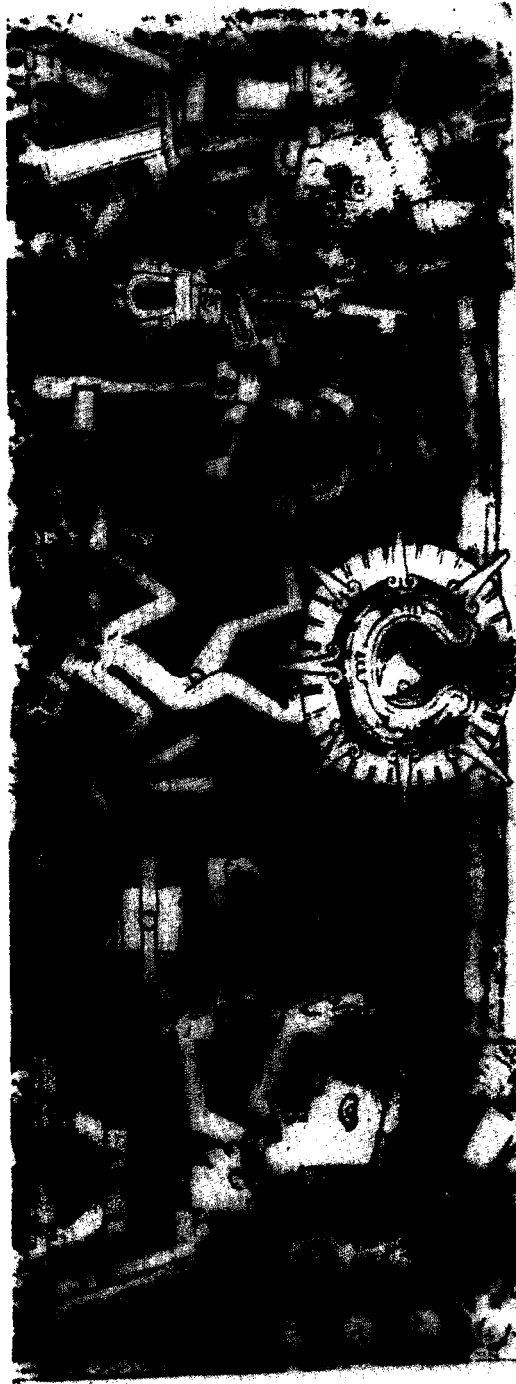


Fig. 2. Codex Borgia 18 with a water-filled Moon disk (Seler, 1963, III).

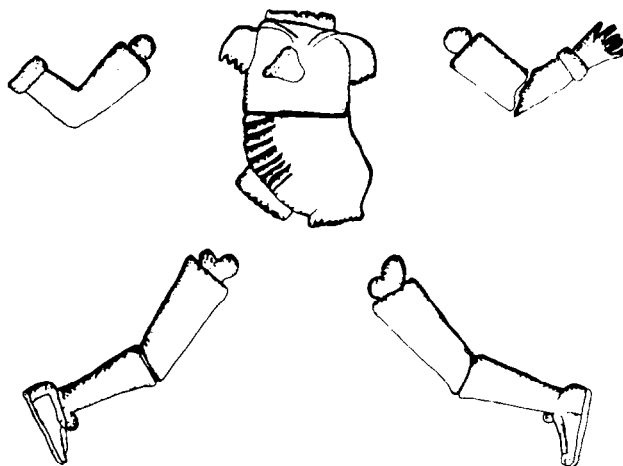


Fig. 3. Coyolxauhqui 6, the earliest known Coyolxauhqui monument (Matos, 1991, Plate 7).

of warfare according to Torquemada (1941, II, p. 299). Panquetzaliztli represented the dry season of warfare replacing (conquering) the wet agricultural season.

The next level of inquiry is to explore whether this seasonal imagery may be related in some way to lunar eclipses. To do so we must study the chronology of the Coyolxauhqui monuments, especially those with secure archaeological contexts. Coyolxauhqui 6 is the earliest known example, dating to Phase IVa (Matos, 1991, pp. 26–27, Plate 7). Matos suggests a date of approximately 1460. The monument might be contemporary with the earliest dated plaque in that phase. Umberger (1987) assigns a date of 1454 to the 1 Rabbit plaque, apparently the earliest in Phase IV.

The year 1454 provides a very interesting pattern because there were two total lunar eclipses in that year; the first on May 12th reached its midpoint at midnight, and lasted around 3.5 hr; and the second on November 5th began just before dawn (at 5 a.m.), and the Moon set before the eclipse reached its midline (Figs 4 and 5). The midnight eclipse suggests a link with some variants of the myth that describe Huitzilopochtli devouring Coyolxauhqui exactly at midnight (Durán, 1964, p. 21). The second lunar eclipse conforms with the seasonal pattern of the newborn Huitzilopochtli conquering Coyolxauhqui at the beginning of the dry season. This dawn eclipse also presents an apt image of the myth because it occurred as the Sun rose, just as Huitzilopochtli rose from the womb of Coatlicue, the Earth mother, to decapitate Coyolxauhqui and send her directly into the underworld. The two eclipses were 6 months apart, one at the beginning of the rainy season in May, the other at the beginning of the dry season in November. The November 5, 1454 eclipse took place very close to the annual festival of Panquetzaliztli (11/21–12/10 O.S.). The second lunar eclipse may have been visualized as a cosmic reaffirmation of the conquest of Coyolxauhqui, reenacted annually in the festival calendar.

In one of Tezozómoc's (1975a, pp. 228–229) versions of the myth, Huitzilopochtli cut off Coyolxauhqui's head and extracted her heart over a hole in the ball court. Then all the water dried up and the animals disappeared. This variant of the myth clearly symbolizes the beginning of the dry season (Baquedano, 1990, p. 107). Coyolxauhqui represents the Moon as a symbol of the wet season, for when she was decapitated, the waters dried up, just as the rains cease at the beginning of the dry season.

The Coyolxauhqui 6 monument, probably dates to the year 1454, when there were two

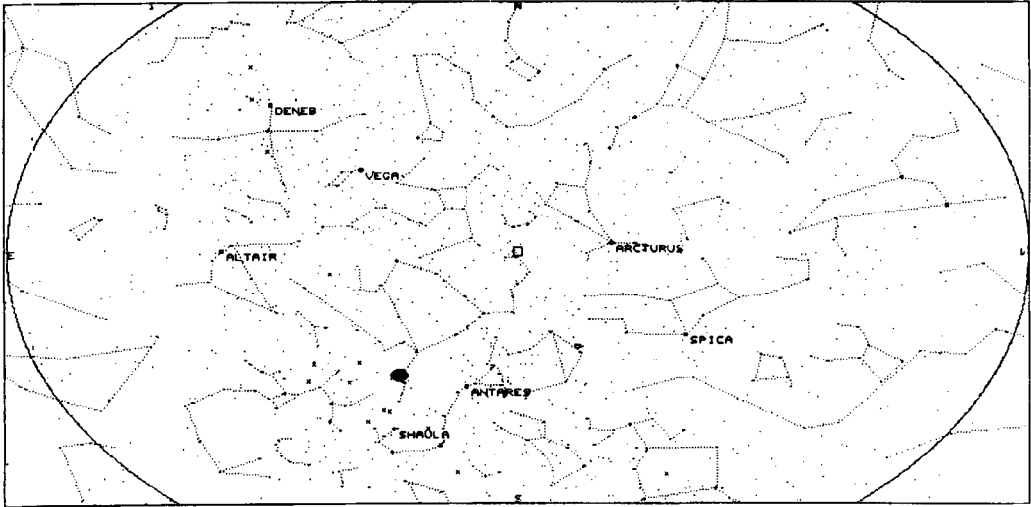


Fig. 4. May 12, 1454 lunar eclipse at the beginning of the rainy season.

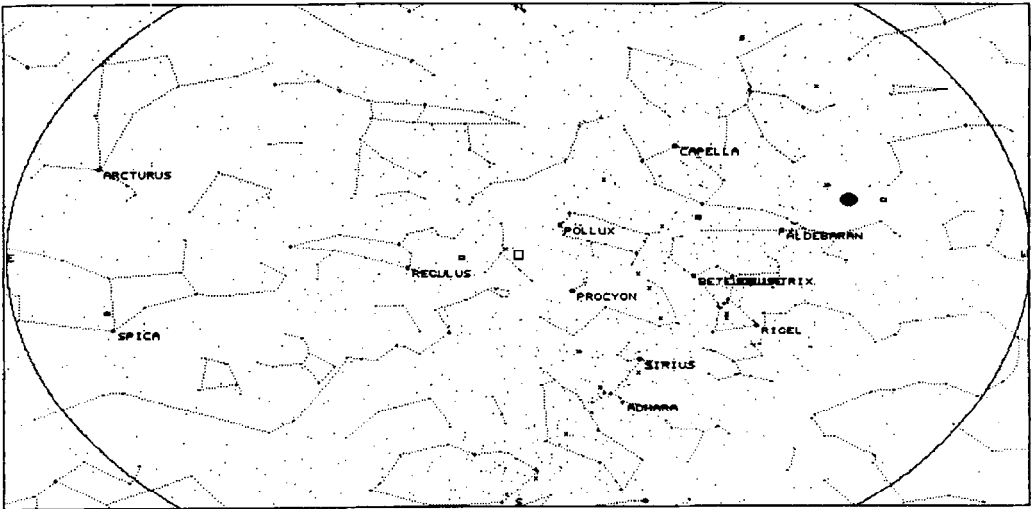


Fig. 5. November 5, 1454 lunar eclipse at the beginning of the dry season.

spectacular lunar eclipses, but Coyolxauhqui 3 positioned above most probably refers to a subsequent lunar eclipse (Fig. 6). Coyolxauhqui 3 is part of a cycle representing the birth of Huitzilopochtli with the Templo Mayor serving as a model for Mount Coatepec, the place where Coyolxauhqui was decapitated in the legend (Matos, 1987). It is noteworthy that this Coyolxauhqui sculpture represents the Moon on a perfectly round sculpture, as if representing an image of the full Moon. This is the only phase when an lunar eclipse can occur. Coyolxauhqui's dismembered limbs, covered with claws bearing demon faces, indicates that she is dead and bathed in blood. Her decapitated head rolls off her neck. Female skulls were found in offerings associated with the large relief (Phase IVb; López Luján, 1993, p. 261, n. 328). This suggest that impersonators of the goddess may have been decapitated at the time the stone was placed at the base of the pyramid.



Fig. 6. Coyolxauhqui 3 as a decapitated figure covered with symbols of the Earth representing the eclipsed Moon (Pasztory, 1983, Plate 103).

This suggests that impersonators of the goddess may have been decapitated at the time the stone was placed at the base of the pyramid.

The Coyolxauhqui 3 relief, found overlying Coyolxauhqui 6, is assigned to Phase IVb in the Templo Mayor chronology (Matos, 1991, p. 24). Phase IVb plaques include ones dated to 8 House (1461) and 3 House, equating with 1469 (Umberger, 1987, pp. 414, 421). Matos (1991, p. 24) believes that Coyolxauhqui 3 dates to 1469. There was a partial lunar eclipse on July 24, 1469 (Julian or O.S.) that lasted from around 10.30 p.m. to 1.30 a.m., and it was probably a dramatic event because the midpoint (midline) of the eclipse took place exactly at midnight. At this time the full Moon was at its highest point in the sky, crossing the meridian, corresponding to accounts in Tezozómoc and Durán that say Coyolxauhqui was devoured exactly at midnight. Durán (1964, p. 21) says that Huitzilopochtli devoured Coyolxauhqui's heart on the ball court precisely at midnight. A similar account is given in the *Crónica Mexicáyotl* (Tezozómoc, 1975b, pp. 34–35). The act of devouring the Moon at midnight evokes to a dramatic lunar eclipse taking place when the full Moon was overhead.

In both versions of the myth, the act took place on a ball court, a location that may be marked by a specific constellation. In this regard, it is noteworthy that Sahagún describes a constellation called the *citlaltlactli*, the star ball court, which seems to correspond to an illustration in *Primeros Memoriales* (Seler, 1904, p. 356, Fig. 92h; Sahagún, 1950–1982, VII, Plate 21, no. 7). Perhaps this constellation represents a stellar location associated with the midnight lunar eclipse described in these two sources.

Coyolxauhqui 1 is a colossal stone head recovered in the 19th century (Fig. 7; Seler, 1960–1961, IV, 163, Plate 133). She has bells on her cheek depicted with symbols for gold, probably representing a literal translation of her name as 'she of the golden bells' (Pasztory, 1983, pp. 152–154, Plates 99–101). The head was found as part of the foundation of a European structure in a convent (Matos, 1991, p. 23). This indicates that it was probably on display at the time of the conquest, since the Spaniards had no need to excavate stones from earlier structures, with an abundance of such material in plain sight. For the reasons presented below, I believe

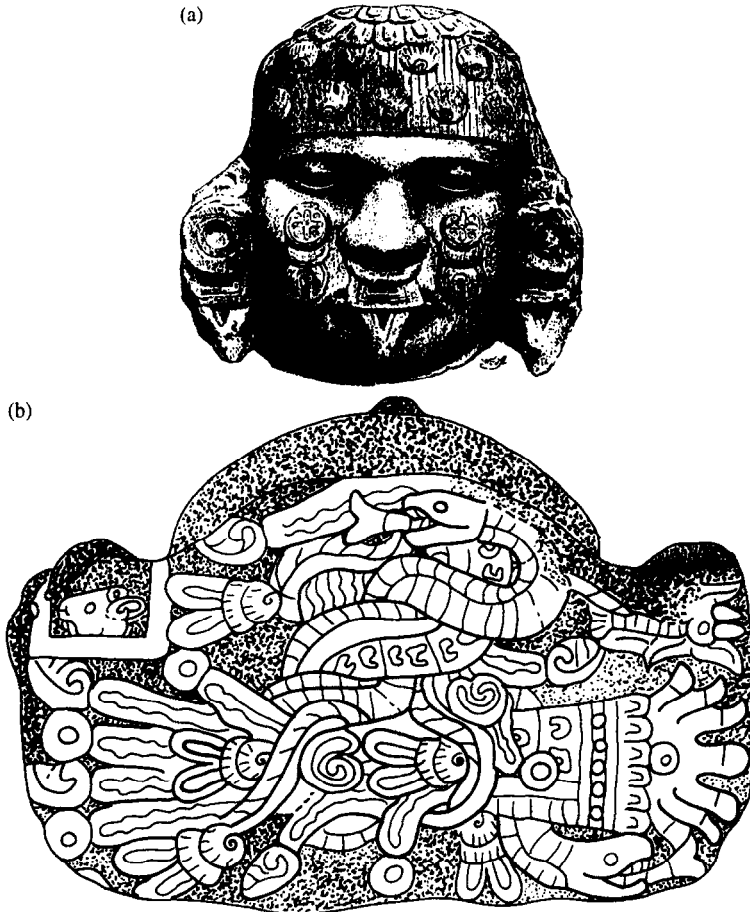


Fig. 7. (a) Coyolxauhqui I found in the foundation of a European structure (Seler, 1960–1961, IV, p. 163, Plate 133). (b) Underside of the decapitated head of Coyolxauhqui showing the Rabbit year date, possibly corresponding to the lunar eclipse of 1506 (Nicholson and Quiñones Keber, 1983, no. 9).

the monument was carved in the last 1 Rabbit year before the conquest (1506), little over a decade before the Spaniards first entered Tenochtitlan in 1519.

Let us review dates proposed for the monument by other scholars. Pasztory (1983, p. 153) suggests that the monument dates to 1487, based on historical references to a sculpture of Coyolxauhqui carved during the reign of Ahuitzotl. She reconstructs the date on the base of the head as 1 Rabbit, suggesting that it refers to the mythical date of the creation of the Earth, rather than the date the sculpture was carved. Emily Umberger (1981b, pp. 82–83) dates the monument to 1480, just prior to the last major phase of the Templo Mayor begun in Tizoc's reign in 1483. Nicholson and Quiñones Keber (1983, p. 50) suggest the monument dates to Phase IV (pre-1487). They note that the rabbit year may be 1 Rabbit because the Codex Azcatitlan seems to indicate that 1 Rabbit was the year Coyolxauhqui was killed, a date equated with 1194 in the Spanish gloss. This provides further support for identifying the date on the base of the sculpture as 1 Rabbit.

Due to the cyclical nature of the Mexica calendar, the same year date could repeat every 52 years. The date may refer to both the year the piece was carved and the mythological time in

the past when Coyolxauhqui was killed in the 12th century. Given the sophisticated style of the piece, it certainly was carved relatively late in the Mexica chronology.

Lunar eclipses in the year 1 Rabbit took place in 1454 and 1506. Stylistically Coyolxauhqui 1 certainly seems to be later than Coyolxauhqui 6, the monument located in Phase IVa contexts that contained a plaque dated 1454. The 1506 lunar eclipse might have been the inspiration for carving a new image of the conquered Moon goddess in the year 1 Rabbit. This lunar eclipse was visible at 8 p.m. on February 7th. This was only a partial eclipse, lasting about 45 min, but it took place around the beginning of the Mexica year, which may have made it noteworthy.

It is intriguing that there are eight major renovation phases of the temple and there are at least seven Coyolxauhqui monuments. Six are preserved as sculptures (Matos, 1991). The seventh is known only from the map of Cortés, which shows a headless figure associated with the Templo Mayor (Umberger, 1987, p. 414). It seems to represent a different form than the known sculptures. Perhaps there was one Coyolxauhqui sculpture for each of the major phases of renovation. The map certainly represents the last phase, indicating that this image of Coyolxauhqui dates to Phase VII of the Templo Mayor. A 1487 renovation mentioned in the chronicles may overlap with Phase VI (Umberger, 1987, p. 421). This renovation involved making a new sculpture of Coyolxauhqui, according to the chronicles.

Umberger's (1987) study of the Templo Mayor's chronology indicates construction of different superimposed phases continued over more than 200 years. Phase I of the Templo Mayor remains unexplored. Phase II dates prior to 1428, possibly associated with a 2 Rabbit plaque recording a date of 1390. Phase III is associated with a 4 Reed plaque that probably correlates with 1431. Phase IVa has a 1 Rabbit plaque linked with the year 1454. Phase IVb has an 8 House plaque related to the year 1461 and a 3 House plaque linked with 1469. For Phase V no plaques are known, and in Phase VI there is a plaque that may be linked with 8 Reed, referring to the year 1487. For Phase VII there are no date plaques that survived.

Only half of the date plaques appear to correlate with years in which there were lunar eclipses visible in Central Mexico. Significantly, the year 1487 (8 Reed) when a new sculpture of Coyolxauhqui was commissioned was also the year of a double lunar eclipse. The first was a total lunar eclipse on February 7, between 7 and 10 p.m., falling in the first month of the Mexica year (Caso, 1971, Table 4). The second was a partial eclipse between 5 a.m. and 8.30 a.m., just as the Moon was setting. Thus the full Moon turned blood red as the Sun rose, an image that reinforced the myth describing the newborn Sun covering the Moon goddess in blood as he cut up her body.

Let us review the dates associated with the Coyolxauhqui sculptures to see if we can find a candidate for the 1487 date and the double lunar eclipse in that year. A relatively early date is assigned here to Coyolxauhqui 6 (1454) and Coyolxauhqui 3 (1469); and late dates are assigned to Coyolxauhqui 1 (1506) and the map image of Coyolxauhqui (Phase VII, post-1506). There were ten lunar eclipses between 1507 and 1519 that could have inspired this last representation of Coyolxauhqui, and lunar eclipses occur on all other dates proposed for the monumental sculptures. A small jade head of Coyolxauhqui is designated as Coyolxauhqui 2 (Matos, 1991, p. 24). Since it is not a major monument, it probably was not part of the cycle of reconstructions at the Templo Mayor.

Coyolxauhqui 4 was found at the turn of the century in deposits that are dated to Phase IVb, but it is completely broken apart (Matos, 1991, p. 25, Plate 3). The archaeological context suggests that it is too early to be assigned to the 1487 renovation. Coyolxauhqui 5, found near the surface in a much destroyed condition, dates to one of the latest phases according to Matos. Thus Coyolxauhqui 5 may be linked with the 1487 eclipse and Phase VI, the second to the last phase in the Templo Mayor.

Lunar eclipses may have inspired the Mexica to create new sculptures of the conquered



Fig. 8. Cihuacoatl with her weaving batten in the Tititl festival (Codex Magliabechiano 45r).

Coyolxauhqui, but they appear not to have been the primary aspect in the dates inscribed in the plaques in the Templo Mayor. Certainly lunar eclipses cannot be taken as the motivation for these reconstructions, but carving of the Coyolxauhqui monuments may have been done in the year of a lunar eclipse, because such a time was an auspicious moment to celebrate the triumph of the Sun over the Moon. Those that would appear especially auspicious are lunar eclipses falling during November at the beginning of the dry season. Between 1301 and 1519 there were 17 lunar eclipses during November visible in the Valley of Mexico, and the majority were total eclipses (1305, 1341, 1370, 1388, 1389, 1407, 1435, 1453, 1454, 1490; John Oliver, personal communication). These may have been especially important in establishing the relationship between lunar eclipses and the seasonal triumph of the Sun over the Moon.

3. CIHUACOATL AND TONAN

Another lunar goddess decapitated in a seasonal ceremony is the Earth–Moon goddess called Cihuacoatl, Tonan, Ilamatecuhtli, or Quilaztli (Fig. 8), who are all interchangeable in the Aztec festival calendar as the principal goddess of Tititl; they are variants of the same Earth-mother goddess with lunar connections (Nicholson, 1971, pp. 420–421; Table 4). Tonan is equated with the Moon within the Earth, today known as Tonantsi, our sacred mother among people speaking Nahuatl, the language used by the Mexicas (Sandstrom and Sandstrom, 1986, pp. 129, 292). Although Tonantsi originated in the sky, she has become part of the Earth realm. This seems to be an image of the Moon in conjunction during a 2 or 3 day period. The Mexica goddess Tonan and her affiliates are linked to both the Earth and Moon. She is the Earth–Moon goddess representing the Moon invisible in conjunction, when the Mexicas visualized the Moon as being merged with the Earth. This goddess of the dark of the Moon is quite different from Coyolxauhqui, the goddess of the full Moon arrayed with golden bells. In the festival of Tititl, the Mexicas decapitated a woman representing the Earth–Moon goddess in the temple of the Sun (Sahagún, 1950–1982, II, pp. 31, 155–156). In some accounts, she is an aged woman, as would be appropriate to the waning Moon, described in a number of

Mesoamerican ethnographic accounts as an old woman, aging as the Moon's light gets weaker (Baéz-Jorge, 1988, p. 247). Her decapitation represents the final moments of the waning Moon, when the Moon disappears in conjunction. Sahagún (1950–1982, VII, p. 3) notes that the final moment, when the Moon disappears completely is the time the Moon dies. Therefore, the decapitation ceremony may symbolize lunar conjunction in the context of the Tititl festival.

Cihuacoatl represents the Moon as a warrior armed with a shield and a weaving batten (Fig. 8). Cihuacoatl is the aged Moon goddess who loses her head as she disappears in conjunction with the Sun. On the other hand, Coyolxauhqui loses her head in a cataclysmic fashion in a battle with the solar god, signaling a role as the full Moon eclipsed by the Sun. In some contexts, Cihuacoatl is a lunar being who acts as an enemy of the Sun (Seler, 1963, II, pp. 70–71). This role recalls that of Coyolxauhqui, but they take different aspects as adversaries of the Sun. Whereas Coyolxauhqui is the Moon threatened by the Sun, Cihuacoatl is linked with the eclipse monsters who can threaten the Sun.

Cihuacoatl is closely related to Tzitzimitl (Klein, 1988, pp. 248–294). Tzitzimitl is one of the *tzitzimime*, demonic beings linked specifically to solar eclipses. On Codex Magliabechiano 76r (Fig. 9), Tzitzimitl has a skeletal face, like Cihuacoatl, and he wears a kilt with a shell border like the skirt worn by Cihuacoatl (Codex Borbonicus 23, 26). The splayed posture and fright wig crowned with banners recall relief representations of Cihuacoatl (Klein, 1988, Fig. 6b). The skeletal jaw is also like Cihuacoatl. And like Cihuacoatl (serpent woman), Tzitzimitl has a snake affiliation seen in the rattlesnake dangling between the figure's legs. On the other hand, Tzitzimitl lacks weaving implements, and is a male in some contexts (Codex Vaticanus A 2v). In some legends, Tzitzimitl is identified as the demonic grandmother of Mayahuel, the pulque goddess, indicating a feminine aspect that seems to be linked with Cihuacoatl; for in her aspect as Quilaztli, Cihuacoatl is called the female Tzitzimitl (Taube, 1993, p. 6). During a solar eclipse the Mexicas feared that the *tzitzimime* would descend to devour people (Sahagún, 1950–1982, VII, p. 2; VIII, p. 2). The Codex Aubin describes a solar eclipse in 13 Reed when the Sun was eaten and all the stars appeared (Dibble, 1963, p. 47). The Classical Nahuatl term for solar eclipse is *igualoca intonatiuh*, which is related to *qualoni*, 'an edible thing' (Campbell, 1985, p. 371; Molina, 1970, p. 84). Since the *tzitzimime* were seen during a solar eclipse and are described by Tezózmoc (1975a, p. 486) as signs (constellations) and planets, they may represent all the astral bodies that suddenly became visible during a total solar eclipse. They must also be linked with the new Moon, which becomes visible as a black disk covering the Sun during a solar eclipse. This is the monstrous aspect of the Moon that threatens the Sun.

4. THE BILIMEK VESSEL

The *tzitzimime* represented on the Bilimek vessel include representations of the Venus gods Tlahuizcalpantecuhtli and Ehecatl-Quetzalcoatl, and the fire serpent (Xiuhcoatl) constellation (Seler, 1960–1961, II, abbl. 33–34; Taube, 1993, Fig. 12). The lunar aspect of the *tzitzimime* may be represented by a goddess with her decapitated head dangling on her chest (Fig. 10). Although previously identified as Cihuacoatl (Klein, 1980, p. 162), she seems to be a skeletal aspect of Mayahuel, the personified maguey plant whose head must be cut off to make the aguamiel flow, just as the liquid flows from her breasts into the pulque jar in the vessel relief. The emphasis on her breast milk is because Mayahuel is the woman of 400 breasts whose milk produces pulque. As further support of this identification, I note that Mayahuel's esoteric name (8 Knife) appears on the vessel rim (Caso, 1967, p. 198).

A head on the front of the Bilimek vessel with its tousled grass hair and skeletal jaw compares with images of Cihuacoatl and Tzitzimitl (Fig. 11). Although a number of scholars



Fig. 9. Tzitzimil as a demonic male deity (Codex Magliabechiano 76r).

have identified the head as a personification of the *malinalli* ('grass') day sign (Klein, 1980, pp. 159–162; Pasztory, 1983, p. 260; Umberger, 1981b, p. 120; Taube, 1993, p. 13), it lacks a numeral coefficient, as would be expected if it were a day sign. Also, the head is placed in the jaws of the Earth Monster, a position typical of dying gods, but never used for day signs. I suspect that the head is that of the decapitated goddess of *malinalli*. Her pairing with the goddess *Mayahuel* on the vessel recalls the Codex Borgia 31 that depicts the skeletal goddess of maguey paired with the skeletal goddess of *malinalli* and a similar deity with her head thrown back in a manner that suggests decapitation. The square ear plugs link the *Bilimek* deity with the pulque gods in the Codex Magliabechiano, but the imagery also evokes a connection with the decapitated *Cihuacoatl*, who also has a skeletal jaw and grass hair. Just above the head, the *Bilimek* vessel represents a solar eclipse showing a Sun disk partially covered by a wedge of stars (Taube, 1993, p. 1, Fig. 3a). This suggests that the decapitated head plays the role of a *tzitzimime* attacking the Sun during an eclipse. It is another image of the Earth–Moon transformed into an eclipse monster at the time that the new Moon covers the Sun. The head represents the dark of the Moon made visible during a solar eclipse, which appears like a dark disk surrounded by yellow rays, just as the head is surrounded by a corona of grass hair. In fact, the head replaces the Moon sign seen in solar eclipse imagery of the Colonial period, showing the Moon symbol partially covering the eclipsed Sun (Codex Telleriano–Remensis 40v).

It may be possible to date the eclipse event on the *Bilimek* vessel. The Codex Telleriano–

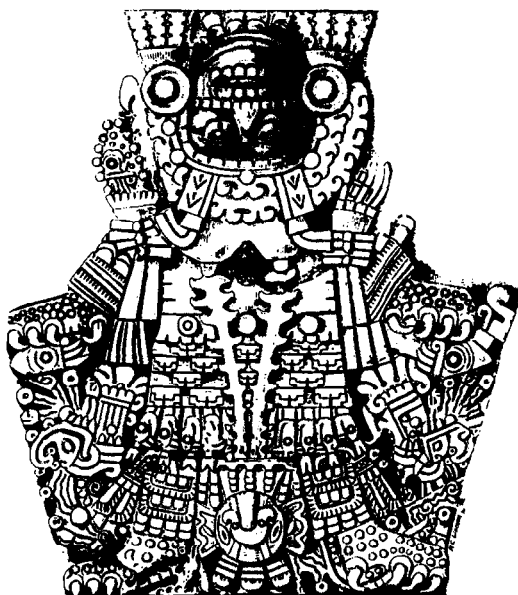


Fig. 10. Rear of Bilimek vessel showing the decapitated skeletal goddess of maguëy with her breasts pouring *aguamiel* into the pulque vessel (Seler, 1960–1961, IV, p. 951, plate 53).

Remensis (37r, 40v, 42r, 42v) records solar eclipses in the years 1476, 1496, 1507, and 1510, corresponding to the native years: 10 Knife, 4 Knife, 2 Reed, and 5 Rabbit. The eclipse events are repeated in the same years in the Codex Vaticanus A. Taube (1993) recognizes the eclipse imagery on the vessel, and he suggests that the Bilimek vessel was made in the year 2 Reed, the year of the last New Fire Ceremony, but he does not explore the relationship with actual eclipses in that year. A strong argument in favor of the 2 Reed eclipse date is the fact that the underside of the Bilimek vessel records an earthquake (Fig. 12). The Codex Telleriano–Remensis (42r) and Codex Vaticanus A (85r) both indicate that in 2 Reed a solar eclipse took place in the same year as an earthquake, a pair of catastrophes not repeated together in any other year recorded in the pictorial annals. The Bilimek Earth Monster with the earthquake sign on its belly is associated with the date 1 Rabbit. This date lacks the square cartouche typical of a year sign, and most likely refers to a date in the 260 day calendar (*tonalpohualli*). This may be the day the earthquake took place in the year 2 Reed. Because the Mexica calendar began in February, the year 2 Reed ended in January. This provides a correlation with a solar eclipse that took place in January of 1508. This must be the 2 Reed eclipse of the chronicles because there was no eclipse visible in 1507. At 8.30 a.m. on January 2, 1508, there was a solar eclipse when the Moon covered 31% of the solar disk (Aguilera and Galindo, 1991, p. 65). On the vessel, the Sun is positioned just above the horizon represented by the gaping mouth of the Earth Monster, an appropriate image for a dawn solar eclipse. Furthermore, the timing of the eclipse helps to identify the decapitated head as an image of Cihuacoatl, for the January eclipse coincided with the Tititl festival when Cihuacoatl was decapitated. This is also the month that the reed year bundles were buried on the day 2 Reed, the last day in the year of the New Fire Ceremony (Caso, 1967, pp. 134–138; Taube, 1993, p. 13). Tititl was an especially important month because the name of the year was taken from the last day of this month, which occurred in January at the time of the conquest (Caso, 1971, Table 4).

The Bilimek vessel may have been carved in the month of Tititl to celebrate the end of the year, the burial of the year bundle, and the passage through the dangerous time of the

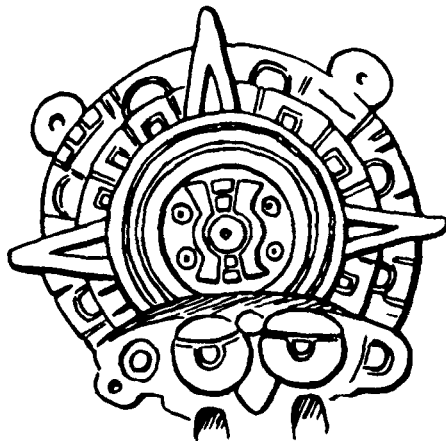


Fig. 11. Front of Bilimek vessel showing the decapitated lunar goddess as the Earth-Moon partially covering the Sun during a solar eclipse (Pasztor, 1983, Plate 280).

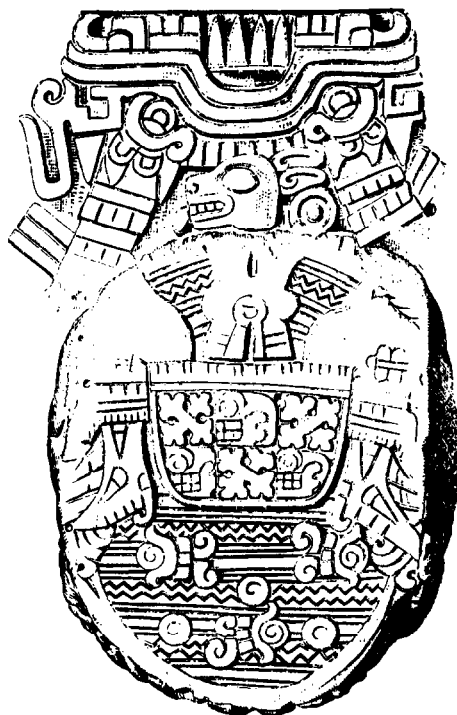


Fig. 12. Base of Bilimek vessel with the Earth Monster bearing an earthquake sign (Pasztory, 1983, Plate 282).

New Fire Ceremony in November of 1507 (2 Reed). The pulque vessel also commemorated a perilous year when there was an earthquake and a solar eclipse, and the *tzitzimime* descended, threatening the Sun. The destruction of the Sun and descent of the *tzitzimime* were feared at the time of the New Fire Ceremony (Sahagún, 1950–1982, VII, p. 27). This indicates that the Mexica feared a solar eclipse at the time of the New Fire Ceremony would bring an end to the world. My research indicates that at the time of this ceremony, when the Pleiades reached zenith at midnight in November, the Sun was in the deepest reaches of the underworld at astronomical nadir (Milbrath, 1980). Subsequent research has confirmed the relationship of this ceremony to both the solar nadir and the midnight zenith of the Pleiades (Broda, 1982; Krupp, 1982, 1993).

The Mexica feared that the Sun would be permanently eclipsed and the world would fall into darkness at the end of the current world age, known as the fifth Sun. Earthquakes and external solar eclipse would be accompanied by the descent of the *tzitzimime* at the end of the world (Caso, 1958, p. 95; Sahagún, 1950–1982, VII, p. 2). It certainly is a remarkable coincidence that both these events occurred in the year of the last New Fire Ceremony, and the Mexicas never again celebrated this world renewal ceremony.

5. SOLAR ECLIPSE IMAGERY IN THE CODICES

Pre-columbian codices of the Mixteca-Puebla tradition show eclipse imagery in a variety of ways. Scenes of a wounded rabbit grasped by an eagle may be animal metaphors for eclipses (Codex Borgia 52, Codex Vaticanus B 27). The title page of Codex Laud depicts a solar eclipse

with an image of the Sun disk partially covered with darkness, showing the Sun god pushing back the darkness with his finger (Brotherston, 1992, p. 25).

More problematical images that might refer to eclipses are the Sun disks half darkened with stars which occur in the Codex Borbonicus, the Codex Borgia, and other codices of the Borgia Group (Taube, 1993, Figs 3c–e). The Codex Aubin (72) suggests eclipse associations for these images because the eclipsed Sun in this codex appears as a Sun disk colored half light and half black. Because the half darkened Sun disks in the pre-columbian codices appear associated with pulque gods, they have been interpreted as the sign for dawn, the time that pulque banquets took place (Seler, 1960–1961, II, p. 921). The iconography of the Bilimek vessel indicates that pulque is associated with true eclipse imagery. Perhaps pulque was consumed after a solar eclipse to celebrate the Sun's survival.

In the colonial period historical codices, solar eclipses are often represented by the Sun like a pie with a piece removed or partially covered by the Moon disk (Sahagún, 1950–1982, VII, Fig. 21). This indicates that the Moon was seen as the agent of solar eclipse. Sometimes stars also surround the Sun disk to show that the day has become night (Codex Telleriano–Remensis 40v).

6. SOLAR ECLIPSES AND THE DEATH OF A RULER

Texts written during the early colonial period indicate that solar eclipses were conceptually tied to the death of a ruler, for the Mexica rulers were considered to be the embodiment of the Sun. Terrifying events, such as war or the death of a ruler, are compared to earthquakes and the Sun being eaten (Umberger, 1987, p. 425). These metaphorical descriptions suggest that the Sun is devoured during a solar eclipse.

The death of the Mexica ruler Chimalpopoca is compared to a solar eclipse in a Mexica poem (Durán, 1964, p. 202; Umberger, 1981b, p. 202). The date of Chimalpopoca's death is 13 Reed or 1427, according to most sources (Boone, 1992, p. 152). Although this is not an eclipse date, there was an eclipse visible in Central Mexico on October 30th, 1426. It took place at 11.52 a.m., and was .78 in magnitude (Weitzel, 1951, p. 8). It may be that this eclipse was seen to forecast the death of Chimalpopoca.

Despite the general association between the death of rulers and solar eclipses noted in the poem about Chimalpopoca, very few deaths actually coincide with solar eclipses or fall within a few years of an eclipse. According to the chronicles, from the founding of the Mexica capital around 1325 to the conquest of Tenochtitlan by the Spaniards in 1521, there were nine historical rulers (Boone, 1992, pp. 152–153). In this period there are a total of three solar eclipses that might be correlated with the death of a Mexica ruler, including the one of 1426 that was linked to the death of Chimalpopoca.

The earliest eclipse record after the founding of the Mexica capital is the solar eclipse recorded in the Codex Huichapan, linking an eclipse to the year 2 Reed (Aguilera and Galindo, 1991, p. 62). Although this source does not relate the eclipse to the death of a ruler, there was a solar eclipse in 1404 that might relate to the death of the first emperor, Acanapictli. Twenty different sources give a variety of dates for his death, but three give 3 Flint (1404), and another source dates his death to 2 Reed, equating with 1403 (Boone, 1992, p. 152). There was a total solar eclipse on January 12, 1404 (Aguilera and Galindo, 1991, p. 62). The calendar year began some time after this date (somewhere between late January and March, depending on the source), so this eclipse is accurately correlated with the year 2 Reed in the Codex Huichapan.

In Codex Telleriano–Remensis 42v depicts a solar eclipse in 1510 which is linked with the death of an important individual, a man whose name glyph resembles the symbol for rubber

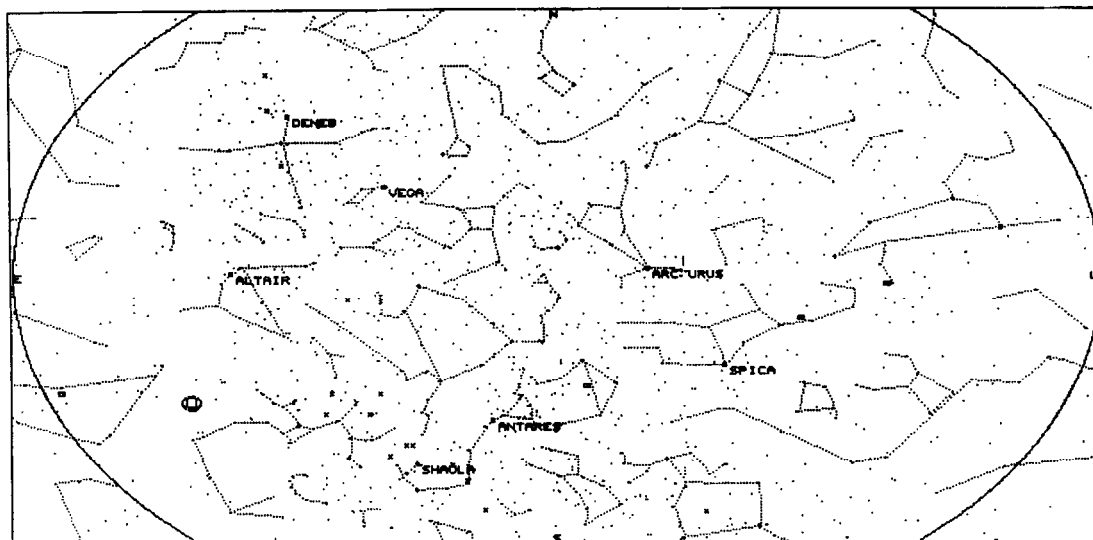


Fig. 13. January 2, 1508 solar eclipse that inspired the Bilimek vessel imagery.

represented on the Codex Mendoza 46r. His name has been previously interpreted as Tezcatl, but it actually more closely resembles the glyph for rubber. He was not one of the Mexica emperors, but perhaps a ruler from a rubber-producing area. The only eclipse that corresponds to this year took place on November 1, 1510, but it was not very spectacular because it covered only 24.9% of the solar disk (Aguilera and Galindo, 1991, p. 66). Furthermore, this eclipse cannot be said to be linked to a Mexica ruler.

The death of the ruler Axayacatl is linked with a solar eclipse in the Codex Aubin (72). The eclipsed Sun as half dark, which might suggest a partial eclipse, but we have no evidence total and partial eclipses were distinguished in pictorial images. The gloss notes that the Sun was eaten and all the stars appeared when the ruler Axayacatl died. This suggests that his death and the eclipse were simultaneous. As we shall see, this is not an accurate record, but an attempt to rewrite history to relate events on Earth to those in the heavens.

The Codex Aubin shows Axayacatl's death as occurring in the year 13 Reed, coinciding with the calendar name of the Sun. This year has great cosmic significance as the birth of the Sun at Teotihuacan (Umberger, 1981a). Normally the death of Axayacatl is recorded in the year 2 House, corresponding to 1481, although some sources give 4 Reed (1483; Boone, 1992, p. 153). One source gives the date as 1 Flint, a year corresponding to 1480. If we take the single source (Aubin-Goupil, 40) that attributes the death of the ruler to 1480, we can find a correspondence to a solar eclipse in 1480, but to do so is to ignore a great number of other records.

The European inscription in the Codex Aubin notes that 13 Reed (the eclipse year) is 1479, in accord with the generally accepted correlation (Caso, 1971, Table 5). Codex Mexicanus also depicts a solar eclipse in 13 Reed. Even if we take into account that the year began in February or March, the 13 Reed date cannot be linked directly with an eclipse. The closest solar eclipse is the one on November 1 of 1480, which covered around 41% of the solar disk (Weitzel, 1951, p. 8; Aguilera and Galindo, 1991, p. 64). At present the evidence suggests that the author of the Codex Aubin deliberately distorted the record to link Axayacatl's death to an eclipse. This repeats a link between the year 13 Reed, a solar eclipse, and the death of Chimalpopoca. But as we have seen, both of the accounts juggle the dates, shifting either the death date or the eclipse event, or both events. Clearly, the chroniclers modified the record to

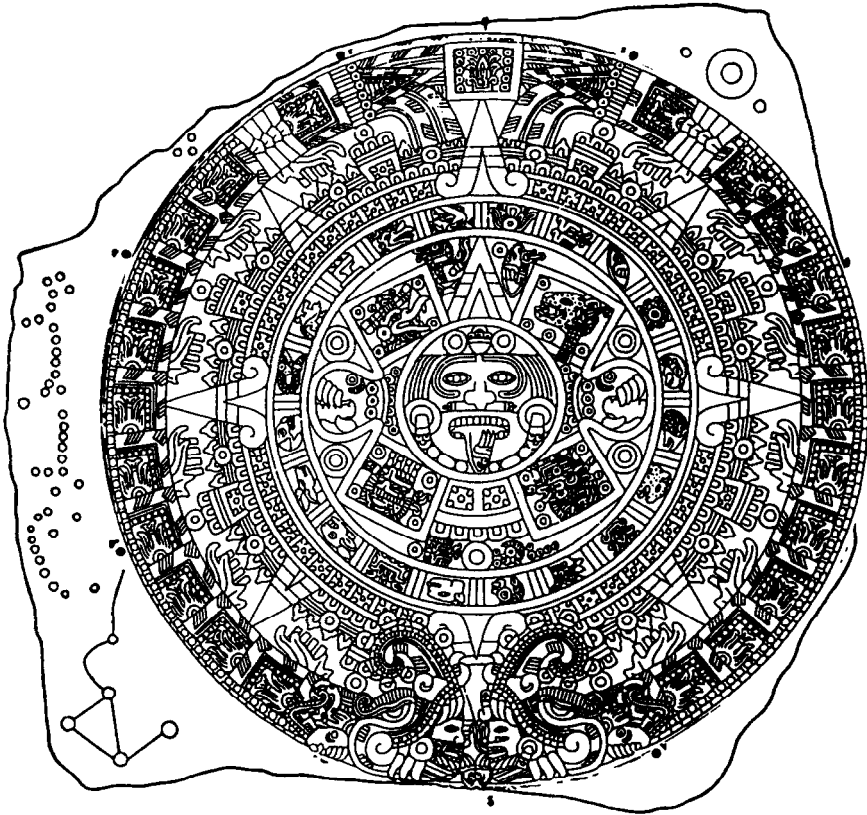


Fig. 14. The Mexica Calendar Stone (modified from Nicholson, 1993).

make the eclipse and the death a simultaneous event. This seems in keeping with general trends in Mexica history, for Umberger (1981a) notes that the Mexican rewrote history to serve their own purposes, adjusting the calendar dates of certain events to serve cosmological principles.

7. THE MEXICA CALENDAR STONE AND SOLAR ECLIPSES

A 13 Reed year is prominently displayed on the Mexica Calendar Stone, its role as a year date clearly signaled by a square frame. Usually the 13 Reed date is presumed to be a mythological reference to the birth of the Sun in the current world age (Townsend, 1979; Pasztor, 1983). Certainly this could be one important meaning of the date, but dates sometimes had multiple levels of meaning, referring to both myth and history (Umberger, 1981a,b). Eclipse imagery may be suggested by the stellar imagery and the death aspect of the solar god, who sticks out his tongue in the manner of an underworld deity (Fig. 14).

First let us study the mythological references on the monument. Glyphs marked around the central face give the calendar name of four previous world ages or Suns positioned around the glyph for the world age of the Mexica, the fifth Sun. This is an X-shaped design designating the day *ollin*, variously translated as 'earthquake' or 'movement'. The world age glyphs all have four as the numeral coefficient, indicating they are days in the 260 day calendar. The *ollin* glyph is essentially the same used to represent earthquakes, but instead of being placed on

an Earth band or on the Earth Monster (Fig. 12), it is set within a solar disk. The fifth Sun would be destroyed by earthquakes, the movement of the heavens would cease, and the Sun would be destroyed when the *tzitzimime* descended (Nicholson, 1971, pp. 398–400; Sahagún, 1950–1982, IV, p. 143; VII, p. 27). Descriptions of solar eclipses also record the threat of world destruction by the final darkening of the Sun in an eternal eclipse when the star gods (*tzitzimime*) descend to Earth (Sahagún, 1950–1982, VII, pp. 2, 38). It seems that the eclipses and the cataclysm are directly related.

The Codex Vaticanus A (4v–7r) shows that the name given to the Sun or world age describes both the cataclysm and the day name associated with the destruction of that world. Each of the previous world ages bore a name that indicated both the day of destruction and the type of destructive force that would end the world (León-Portilla, 1963, pp. 38–39). In the Sun or world age of 4 Jaguar or Tiger (*ocelotl*), the world ended when jaguars or tigers descended to devour the people on the day 4 Jaguar in the year 1 Reed. When the Sun of 4 Wind came to an end, the people perished when they were carried off by a great wind on the day 4 Wind. At the end of the Sun called 4 Rain, it rained fire at the time of destruction on the day 4 Rain in the year 1 Flint. At the end of the age called 4 Water, there was a great flood that destroyed the people, transforming them into fish, on the day 4 Water in the year 1 House. The year of destruction is a yearbearer date with a coefficient of one in three cases; the fourth is not specified, but most probably is 1 Rabbit, the only other yearbearer that is missing.

The date 4 *ollin* is the day the Sun first began to move in the year of its birth, 13 Reed. Some sources say that the current Sun was called 4 *ollin* because it moves and follows its path (León-Portilla, 1963, p. 39). Since all the days chosen for previous world ages indicate the mode of destruction, 4 *ollin* is both the day of the Sun's first movement and the symbol of the end of its motion, completing the cosmic cycle. The mode of destruction is earthquakes, according to some sources, but others say that the movement of the heavens will cease. Thus the word 4 *ollin* means both an end of the celestial motion and the cataclysmic motion of the Earth that will destroy the Mexica.

The day 4 *ollin* surrounding the solar face on the Calendar Stone is the day of destruction, but what was the year predicted for the Sun's destruction? As noted above, the end of the world was especially feared at the time of the New Fire Ceremony in the year 2 Reed. However, another cosmic cycle of completion is indicated by the year 13 Reed, the only year date on the monument. This date indicates a connection with the beginning of the epoch of the current world age and the year of the Sun's birth, but it may also be the year of the Sun's destruction. Since the 4 *ollin* date was both the beginning and end of the Sun's motion, 13 Reed might also be the Sun's birth year and the year of its destruction. The central face is traditionally interpreted as the Sun God framed by solar rays, but scholars have recognized that there is something strange in the image. Whereas the Sun god is usually shown in profile, this face is frontal and flanked by monster claws, and it has a protruding knife tongue most often seen with Earth deities. Klein's (1975, 1976) extensive study of the Calendar Stone led her to conclude that it represents the Sun in the underworld, associated with death imagery because of its position beneath the horizon. She believes that imagery refers to the night Sun joined with Venus in inferior conjunction and to the concept of cyclic completion. Graulich (1992) proposes that the Calendar Stone represents the noonday Sun, linking the upperworld with the underworld. Nicholson (1993) reviews these and other revisionist theories, including the notion that the central face is the Earth Monster, a position taken by Heyden, Navarette, and Townsend. He rejects the link with nocturnal imagery or Earth iconography, and reasserts the position held by an earlier generation of scholars identifying the face as Tonatiuh, the diurnal Sun. As we shall see, the contradictions in the interpretations of the imagery can be resolved if we see the image as the diurnal Sun during a solar eclipse. This would explain an apparent anomaly

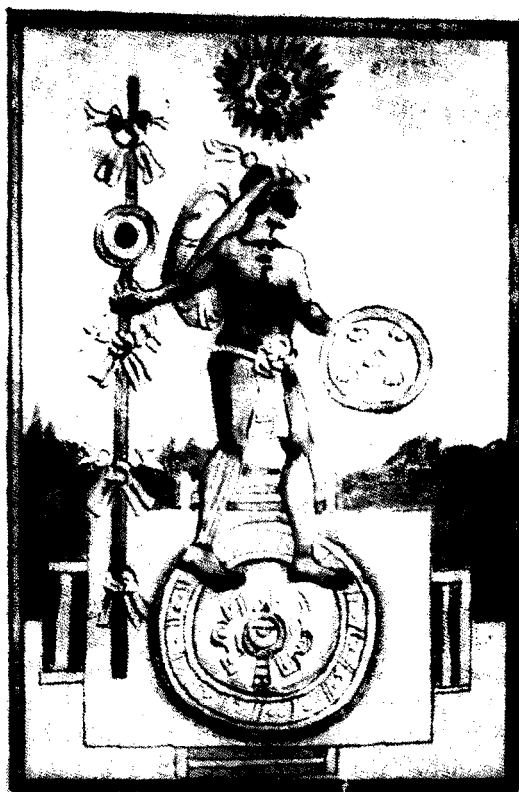


Fig. 15. The noonday Sun marked by the stellar *ollin* glyph (Durán, 1971, pp. 186–188, Plate 16).

avoided in Nicholson's discussion. If the Sun is the day Sun, why is it shown surrounded by stars? The only prototype for this type of imagery is the imagery of solar eclipse.

Stellar imagery is clearly represented on the Calendar Stone, much like images of eclipses that show stars surrounding the Sun disk (Codex Telleriano–Remensis; Codex Vaticanus A). Schematic representations of constellations surround the ledge that projects around the Sun disk. Framing the rays of the Sun, there are two star-snouted fire serpents. Despite its designation as the *Xiuhcoatl* ('fire serpent'), the creature is not actually a snake, for study of its curving form, segmented body, pointed tail and prominent forelegs indicate a connection with images of the scorpion (Codex Nuttall 22, 76). My research suggests that the fire serpent represents the scorpion constellation (Seler, 1904, Fig. 92k; Milbrath, 1980). The Mexicas had a scorpion constellation pictured in Sahagún's *Primeros Memoriales* that may well correspond to Scorpius (Milbrath, 1980, Fig. 7). Perhaps the 1480 eclipse attributed by some sources to 13 Reed served as a prototype for the eclipse imagery on the Calendar Stone, because the Sun was eclipsed just as it passed beyond the tail of Scorpius on December 1, 1480, serving as the model for the image of solar eclipse in the scorpion constellation.

In addition to the stars on the fire serpent and the constellations on the ledge, the central face itself may be compared with a stellar imagery. Durán (1971, pp. 186–188, Plate 16) discusses sacrificial offerings made to the Sun at noon on the day 4 *ollin*, noting that the *ollin* sign is the form of a butterfly (Fig. 15). The noon Sun is shown by a European-style Sun disk covered with an *ollin* glyph with a central star represented as a stylized, heavy-lidded eye. The messenger stands on a similar star-*ollin* glyph, here carved on a Mexica Sun stone like the

Calendar Stone. The day sign *ollin* in Mexica art often has a star in its center. The face in the *ollin* glyph on the Calendar Stone clearly takes the place of a star, giving it a nocturnal quality as an image of the *ollin* Sun. Thus the fifth Sun literally bears the signs of its destruction: the earthquake sign for the earthquakes that will end the world and the stars showing the Sun in darkness, a darkness caused by eternal eclipse. Although the Calendar Stone is not a conventional representation of an eclipse, it does show the solar being surrounded by stars, like eclipse images in the codices.

Now let us return to the 13 Reed year featured so prominently on the monument. Umberger (1981b, 1988) has presented convincing evidence that the Calendar Stone was carved during the reign of Moctezuma II, noting that his name glyph appears on the monument. Previously this glyph had been interpreted as the soul of a dead warrior, but Umberger shows this argument is without merit. She points out that because the 13 Reed year date does not coincide with the reign of Moctezuma, the date must then refer to past events, most probably the birth of the Sun. In addition to referring to the birth of the Sun, the monument seems also to refer to the concept of cyclical completion, referring to both the birth and the death of the Sun of current world age, the age of the Mexica. As we have seen, earthquakes were expected to be accompanied by an eternal eclipse in the cosmic catastrophe. In the year 2 Reed (February 1507–January 1508), these conditions were fulfilled at the time of the last New Fire Ceremony. Yet the Mexica world survived, and Moctezuma II may have looked forward to another fateful date in the future. Certainly the day 4 *ollin* was feared because, just as previous world ages were named for the day of their destruction, so this world would end on its namesake day. Perhaps the 13 Reed year also spelled the year of destruction in terms of the cyclical nature of history, just as 1 Reed was both the year Quetzalcoatl died and the year he was expected to return.

In a strange coincidence, there was a total eclipse in the first 13 Reed year after the conquest. The eclipse took place in the early afternoon on March 18, 1531 (O.S.), less than a week after the spring equinox (Aguilera and Galindo, 1991, p. 67). The path of totality was somewhat north of the Valley of Mexico, so that the coverage from that location was 45.1%. Perhaps in some way this eclipse fulfilled the ominous cycle of the birth and death of the fifth Sun, 4 *ollin*. By 1531, only 10 years after the conquest, plagues of small pox, influenza, and other European diseases had cut the population of the Valley of Mexico almost in half, effectively bringing the Mexica world to an end.

8. CONCLUDING REMARKS

We cannot know whether the Mexica astronomers could accurately predict eclipses, but they probably were able to tell that an eclipse was possible in a given year, just as Maya astronomers had tables showing eclipse windows (Aveni, 1980, pp. 173–183). Mexica astronomers had every reason to fear the eclipse events, for as the empire drew to a close, there were more and more solar eclipses visible in Central Mexico. In the 128 years from their initial migration in the 12th century and the foundation of the Mexica capital in 1325, there were only two solar eclipses recorded, and in the next 100 years there was only one more. But in the final 100 years of the Mexica empire, between 1425 and 1525, there were a total of eight solar eclipses recorded in the chronicles, according to Aguilera and Galindo (1991).

The astronomers, who were also astrologers, may well have become concerned about the fate of the Mexica nation. Its history was closely tied to that of the Sun, and its demise was to be accompanied by a solar eclipse. Each solar eclipse was a threatening event. Whereas the birth of the Sun is linked with the conquest of Coyolxauhqui as an image of lunar eclipse; the imagery of the Sun's conquest by eclipse is linked with imagery of the *tzitzimime*, representing

the stars and monstrous lunar deities. A threat to the Sun is perceived in the imagery of the Bilimek vessel in relation to the New Fire Ceremony of 1507. The threat to the Sun on the Calendar Stone shifts the focus to the notion of cyclical time, with 4 *ollin* referring to both the beginning of the Sun's motion and the end of its motion when the eclipse monsters would descend and earthquakes would destroy the world.

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- [18] *Codex Mendoza*, see Corona Núñez.
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