# Calendric Reform in Yucatán

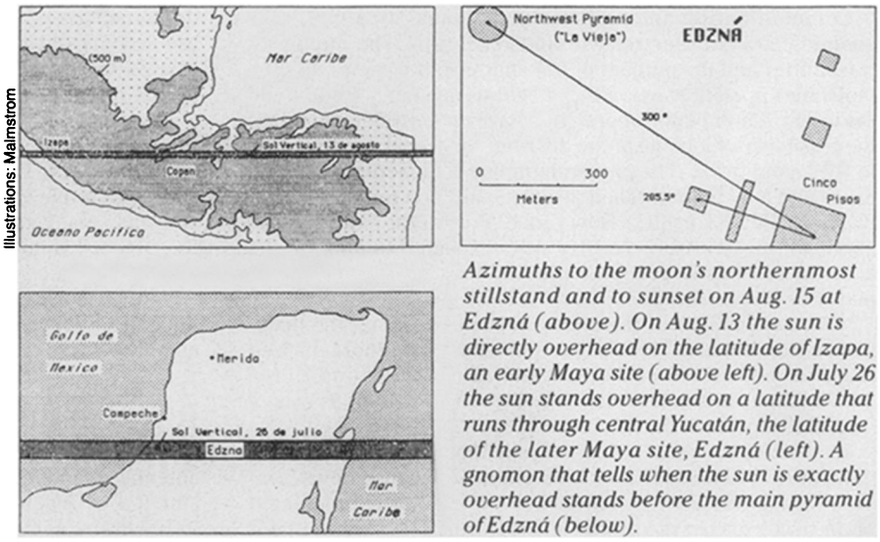
By DIETRICK E. THOMSEN

Calendars are based on cyclic phenomena, so the date on which people start to count is always a little arbitrary. In Europe, new year's day moved from the winter solstice to the spring equinox and back again. According to a computer survey of the Maya calendar by Vincent Malmstrom of Dartmouth College in Hanover, N.H., about the year A.D. 150 the Maya shifted their new year from Aug. 13, the day on which they believed the present cycle of creation started, to July 26. Malmstrom believes the change was due to a northward shift in Maya civilization and the growth of new centers in northern Yucatán. (Evidence for the change is also found in the writings of the first Spanish bishop in the area, who recorded that the Maya in the 16th century used July 26 for the new year.)

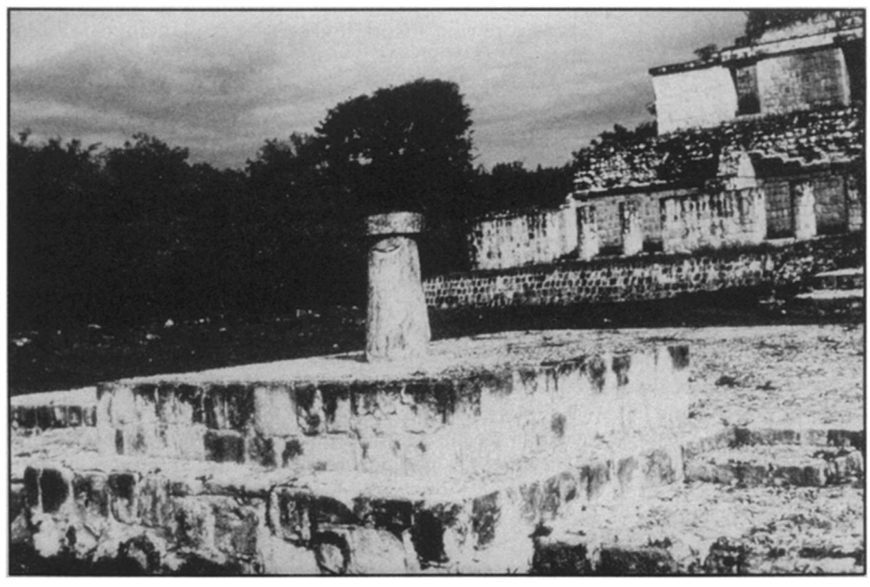
In medieval times pious Christians believed that the year should begin on March 25, which is a feast day commemorating the conception of Jesus. Thomas Hardy tells us in *Tess of the D'Urbervilles* that even in his time farm laborers' contracts in southwest England were still figured from that day, "Lady Day" in the colloquial expression. The Maya, perhaps in keeping with their religion, seem to have set much store by the day the sun stands directly overhead, a criterion not available in Europe.

At locations between the Tropic of Cancer and the Tropic of Capricorn the sun stands directly overhead twice a year, once on its passage south and once on its passage north. (The sun is overhead on the Tropic of Cancer at the June solstice and on the Tropic of Capricorn at the December solstice.) Aug. 13 is the date the

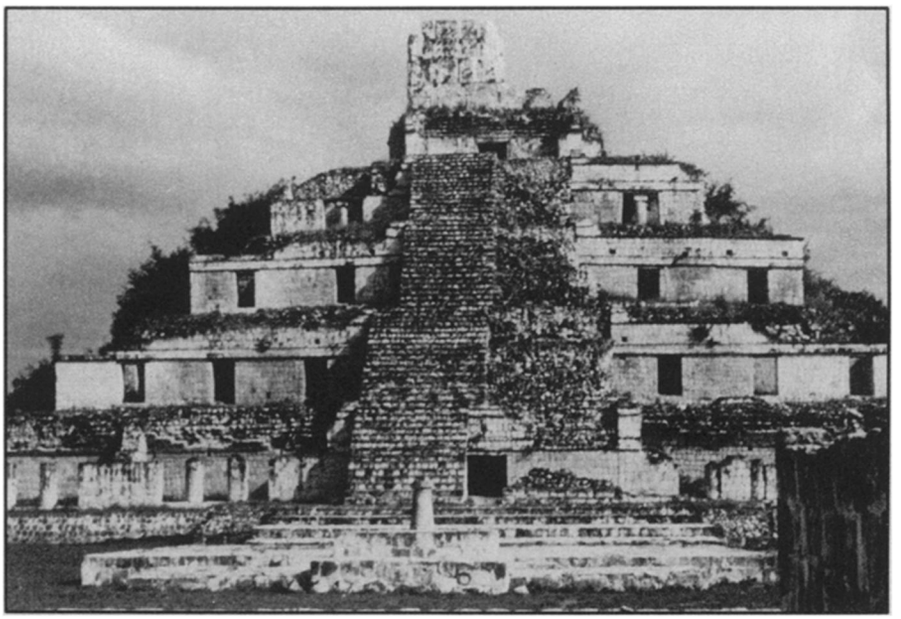
Illustrations: Malmstrom




*Azimuths to the moon's northernmost stillstand and to sunset on Aug. 15 at Edzná (above). On Aug. 13 the sun is directly overhead on the latitude of Izapa, an early Maya site (above left). On July 26 the sun stands overhead on a latitude that runs through central Yucatán, the latitude of the later Maya site, Edzná (left). A gnomon that tells when the sun is exactly overhead stands before the main pyramid of Edzná (below).*



*A northward move seems to have induced the ancient Maya to change their calendar. Edzná may be the observatory where they figured out the reform.*



*Cinco Pisos ("five stories") is the main pyramid at Edzná, which used to be considered a late and minor Maya site. Recent investigations show it to have been a town of significant size and 500 years older than archaeologists believed it to be.*

sun, on its southward passage, stands overhead at the latitude of Izapa, an early Maya center in what is now the Mexican state of Chiapas. On July 26 the sun stands overhead at a more northerly latitude. On that parallel lies a Maya site called Edzná, near the modern city of Campeche.

Intrigued by the correspondence, Malmstrom and some of his students investigated the Edzná site in 1978. They found there evidence that the place was used to determine when the sun stood overhead. Standing before the main pyramid of Edzná, which is known simply as Cinco Pisos ("five stories"), is a gnomon, a tapering stone pillar with a disk on its top. The circumference of the disk equals that of the base of the pillar. Therefore, on the days the sun stands overhead at noon, and only then, the entire pillar will be in shadow. On other occasions there will be a stripe of sunlight on the pillar.

At the same time, Malmstrom's group found evidence for other astronomical features in the alignments of buildings on the site. One of the principal axes runs through the central doorway on the west side of Cinco Pisos, through an opening in an elongated platform across the main plaza, and terminates in a large pyramidal mound that has the remains of a circular building on its top. This axis defines an azimuth of 285.5° (15.5° north of west), which is the direction of sunset on Aug. 13, the Maya's creation day, still an important day to them. From the top of Cinco Pisos another pyramid is visible to the northwest. The line connecting the two pyramids has an azimuth of 300° (30° north of west). Malmstrom calculates that this azimuth marks the northernmost turning point of the moon in its 18.6-year cycle that determines the eclipses.

This lunar lineup leads Malmstrom to suggest that Edzná is the oldest known lunar observatory in the Western Hemisphere. The Maya were afraid of eclipses, he says. The way to lessen the fear was to figure out the lunar cycle and so be able to predict eclipses. Malmstrom suggests that this is what the Maya did.

There was only one hitch to all this reasoning: Archaeologists held that Edzná was a minor and late Maya site, dating it only to the seventh century of our era. If so, it could not have been the center of a calendric reform in the year A.D. 150. Being a geographer, Malmstrom did not feel he could dispute the archaeologists, and so he put the idea aside for a couple of years. However, on a later trip to Yucatán he happened to meet Ray Matheny, an archaeologist from Brigham Young University in Provo, Utah. From this meeting Malmstrom learned that Matheny had investigated Edzná and found it to be a major urban site with complex waterworks that could have supported a population upwards of 20,000. Matheny had also dated the site (by radiocarbon) to about 150 B.C. (A 1968 expedition under George F. Andrews of the University of Oregon at Eugene had also found evidence that Edzná was an urban center and determined some of the axes used by Malmstrom.)

With this information, Edzná became a plausible site for the figuring of a calendric reform. After some further work, Malmstrom decided to publish his ideas about the reform, which he did at the recent conference on Archaeoastronomy and Ethnoastronomy in Mesoamerica, held at the National University of Mexico in Mexico City. □