

## PROLOGUE

With the study of the Mesoamerican astronomical signs and signifiers, we can recognize several iconic and iconographic aspects that summarize the modes of sky observation, found in codices, sculptures, mural paintings, works of architecture and other elements of the mesoamerican cultural material. We have learned to recognize naturalistic and abstract iconographic aspects that synthesize the old ways of observing natural phenomena, especially the sky. But what is the historical background that allows us to recognize the existence of that Mesoamerican astronomical knowledge?

We know the daily work of observing the sky made by the inhabitants of Mesoamerica; we obtain two examples through detailed descriptions of Fray Bernardino de Sahagún in “Book VII *Las estrellas del Códice Florentino*”, and the text of Fray Agustín de Vetancourt entitled “How did the natives of New Spain measured time” (*Cómo medían el tiempo los naturales de la Nueva España*), just to mention two of the important sources written in colonial times. To answer the question we must first attempt to decipher the symbolic meaning of the texts found in different parts of Mesoamerica. The Aztec Mendoza Codex (Folio 63r) has an excellent figure showing astronomical activity linked to ritual celebrations, it is a telltale sign of stargazing in the night sky (Figure 1) where astronomical activities are clearly part of a social event.



Fig. 1. Folio 63r. Mendoza Codex. Mexican XVI century manuscript preserved in the Library Bodliana at Oxford. Edited by José Ignacio Echegaray. Mexico. San Angel Publishing, 1979, pp. 177.

Two other examples are restricted to the codices, which are undoubtedly related to the account of the days and timing of astronomical events. Thus, in the Mayan Madrid Codex there are two pages showing sky watchers, one that is seated and surrounded by stellar eyes watching the sky in a certain direction, and the other lying on a four-poster-like bed in attitude of looking at the sky (Figure 2). These are mere indications that the celestial lights played an important role for the construction of Mesoamerican cosmogonies.

Other ways to infer such activity are found in the data in the calendrical codices as the Dresden Codex and Borgia Codex. For example in the Dresden tables the synodic cycle of Venus represented in five of its pages have been identified, which expressed the sequence *ad infinitum* of the lower and upper Venus conjunctions.

Many cosmogonies shall remain unknown pending further discoveries in Maya inscriptions, although some mural painting scenes have complemented other cosmogony events that reproduce partially known stories, while others are shown as glitter in the architecture of ancient cities, either because the buildings were oriented to

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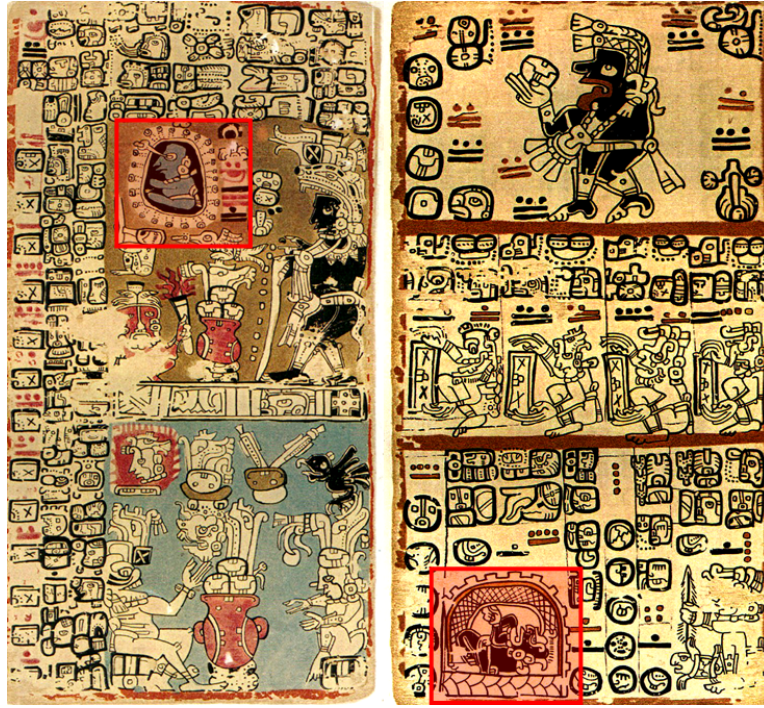


Fig. 2. Madrid Codex, pp. XXIII and XXVII.

the equinox sunset as it is the case of the pyramids of Chichén Itza and also at Chacchoben in Quintana Roo (Figure 3 and 4, from Romero et al. 2002<sup>1</sup>) where a remarkable painting of the butterfly-turtle glyph is shown, representing the conjunction of Venus with the turtle, whose signifier is the Orion constellation in the Maya area, since the orientation of the building points towards the rise of that constellation. This astronomical phenomenon as Orion rise of the Sun and Quetzalcoatl Pyramids at Teotihuacan, also at El Castillo in Chichen Itza (Flores 2014<sup>2</sup>).

Among the vast information about the guidelines of the most important pre-Hispanic building, azimuth values are repeated in locations distant from one another, whose values are between 105° and 107° applied in many of the Mesoamerican cities, such as Monte Alban, Mitla, Teotihuacan, Chichen Itza and Edzná.

We wonder why did the ancient inhabitants of Mesoamerica invested so much time and effort to building constructions whose orientations were certain azimuthal angles, as they allowed them to observe astronomical events which were used to maintain the proper functioning of the calendars?

In modern astronomy, when we want to observe a celestial object, we point the astronomical instrument to its place in the sky; if we need to see another object, the new coordinates are supplied to the control system, and intricate motions necessary are made to locate the new position in the sky.

Clearly, in those ancient times these technologies were not available, first they determined the astronomical phenomenon, then they identified the direction in which it occurs periodically, and finally they constructed the building where the event would be observed for one or two centuries, depending on the accuracy of their observation method. This is due to the progressive changes in the precession of the Earth rotation axis, which induces changes in the star positions; these variation corresponds to one degree per century.

<sup>1</sup>Romero, M., Flores, D. y Mora, J. “*Cuentas y de avatares: un calendario de Venus en Chacchoben, Quintana Roo*”. En *La Pintura Mural Prehispánica en México. Volumen II, Área Maya. Tomo VI, Estudios*, 2002. Universidad Nacional Autónoma de México.

<sup>2</sup>Flores, Daniel <http://www.revista.unam.mx/vol.14/num6/art13/>

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Fig. 3. Mural painting of a ceremonial altar in the Mayan city Chacchoben, Quintana Roo, Mexico. (Photo: M. E. Romero, INAH, Mexico).



Fig. 4. Butterfly-turtle, detail of mural painting in the Mayan city Chacchoben, Quintana Roo, Mexico. (Image: by D. Flores after M. E. Romero).

This is the situation on the astronomical knowledge of civilizations that developed in the Mesoamerican region and has been studied in some aspects, by distinguished scholars of the pre-Hispanic world.

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