

The Ancient Mexican Astronomical Apparatus: An Iconographical Criticism

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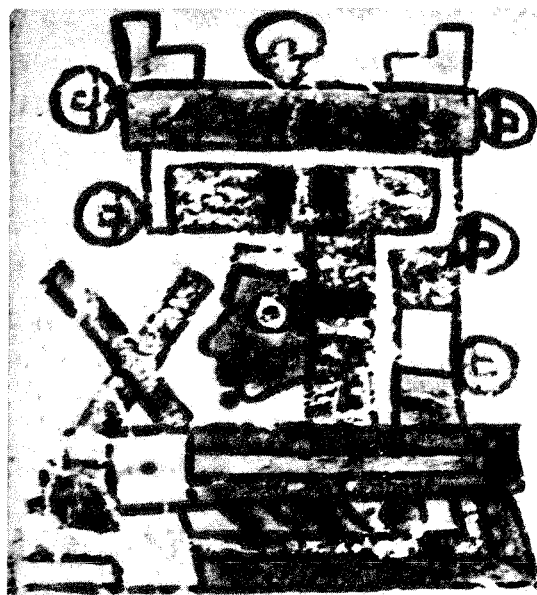
Abstract

It is generally believed that ancient American astronomers made their observations with an instrument consisting of two crossed sticks. This theory is re-examined here and it is shown to be based on an erroneous interpretation of a Mixtec phonetic sign.

Historical Overview

In a pioneering archaeoastronomical study about "The astronomical methods of the ancient Mexicans", Zelia Nuttall (1906) pointed out the similarity between the depiction of an Aztec priest-astronomer in Codex Mendoza (Fig. 1) and the configuration of a human face behind crossed sticks in a temple (Fig. 2), found in Codices Bodley and Selden. In her thorough analysis of the contexts in which this configuration appears, she showed the equivalence of the crossed sticks with a device resembling the drawn-up limbs of a seated human figure (Fig. 3) and the frequent association of both signs with eyes. The fact that in Mesoamerican pictography eyes can also symbolize stars (see again Fig. 1) suggests that both signs may have had an astronomical function. Nuttall concluded that they represented implements used in the observation of the movements of celestial bodies. From the position of the signs in the temples, she inferred that such observations were made from a dark room through the open doorway.

In this line of thought, Zelia Nuttall interpreted a star or heaven sign with a flower and another with footprints as the setting of the "Flower Star". The combination of certain animals with the crossed sticks or knee sign she saw as other celestial constellations. In her study, which remains one of the very few dealing with the precolumbian astronomical instruments (Coe 1975), Zelia Nuttall came remarkably close to the astralistic interpretations



Codex Bodley p. 31/32-IV.

that Eduard Seler and other (especially German) scholars in those days gave to ancient Mexican iconography, and that have their late reflection in the present work of Prof. Thomas Barthel.

Remarkably so, because in other studies, like in the well known introduction to the codex named after her, Zelia Nuttall provided a more realistic, historical interpretation of the group of pictorial documents now known as the Mixtec codices (Bodley, Selden, Vindobonensis, Nuttall, Colombino-Becker, etc.) This historical interpretation was further developed by James Cooper Clark, Richard Long and Herbert Spinden, forming a marked contrast with the astralistic view. It was Alfonso Caso who in his study of the Mapa de Teozacualco (1949) could prove that the above-mentioned codices indeed deal with earthly matters, concretely with the genealogical history of Tilantongo, Teozacualco, and other Mixtec cacicazgos, thereby formulating the modern paradigm for the analysis of these documents. According to this new paradigm, the heaven with flower and the heaven with footprints are part of personal names: the flower turned out to be a butterfly, and the person in question also appears with a gloss in the Codex Nunaha (Smith 1973b, p. 77) calling her *Cuvua dzisi (a)ndevui*, "Butterfly that flutters through the sky"; and the footprint belongs to a name glyph "Eagle that came down from Heaven" (Bodley p. 17-III).

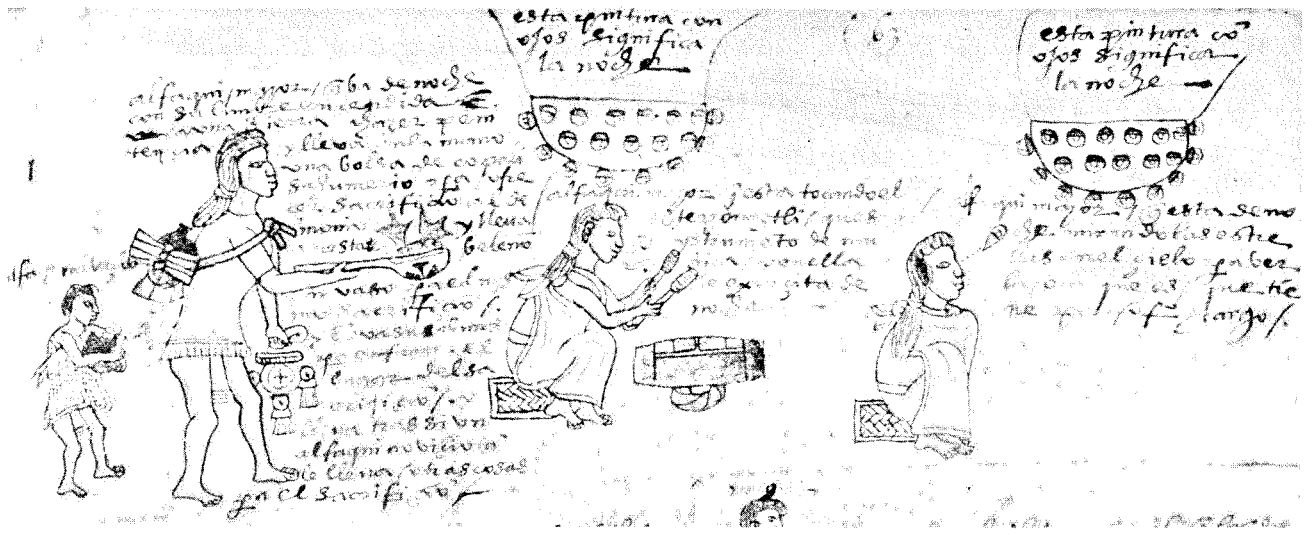


Figure 1: Activities of the Aztec priests, Codex Mendoza p. 63.

Caso showed in his commentaries on Codex Bodley (1960) and Codex Selden (1964) that the crossed sticks and the knee sign formed equally parts of place names (in combination with a temple or a frieze) or personal names (in combination with individuals), but he adhered to Nuttall's analysis in confirming the equivalence of both signs and their identification as astronomical devices. The toponymic glyph in which they appear he called "Observatory", and the personal names he read as "Eagle-Astronomical apparatus", etc.

The place name in question was studied thoroughly by Mary Elizabeth Smith in her fundamental opus "Picture Writing in Ancient Southern Mexico" (1973a, p. 58 ss.), echoing Nuttall's study:

"This sign has been called 'Observatory' because the crossed sticks on the platform of the building in this sign represent the astronomical device used by the Maya and the Mexicans to observe the movement of

stars, the planet Venus and other celestial phenomena. The crossed sticks were fixed in a set place to record the position of a star or planet. Then, when the star or planet returned to this point a second time, the observer could calculate the time of its complete cycle." (op. cit. p. 60).

Smith related this place sign to the Mixtec name of the important cacicazgo of Tlaxiaco in the Mixteca Alta, which is named Ndisi nuu in the orthography of the dictionary of fray Francisco de Alvarado (1593) or Ndiji nuu in the local Mixtec of today. This name, Smith points out, means "Clearly seen" or "Clearly visible", which, taking into account also the importance of the place, is a good base for such an identification.

The last doubt was removed by Wigberto Jiménez Moreno, who demonstrated that the last known ruler of "Observatory", Lord 8 Grass "Rain-Sun" (Iya Nacuañe "Dzavui Ndicandii"),

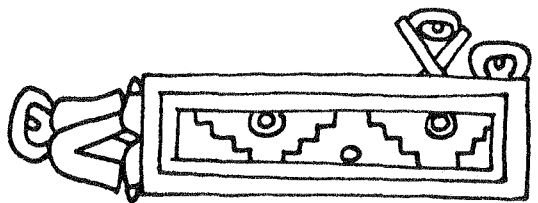
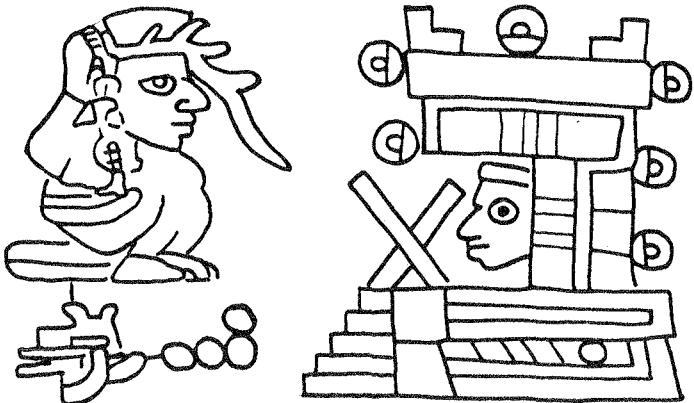


Figure 2: (Left) Lord 4 Wind draws blood from his ear in front of the Temple with eyes, face and crossed sticks sign, Codex Bodley p. 31/32-IV (Hartung 1971).

Figure 3: (Above) Frieze (nuu, "town") with knee sign and crossed sticks, Codex Bodley p. 15-II (Smith 1973a).

mentioned in Bodley pp. 20-II, 21-III, 22-III, and Selden p. 17-II, actually corresponds to Lord Malinaltzin, ruler of Tlaxiaco whose fighting against the Aztecs is described by Torquemada (see Gaxiola and Jansen 1978, p. 12). In the meantime Horst Hartung (1977) published a useful catalogue of nearly all occurrences of the crossed sticks and the knee sign in Codices Bodley and Selden. Arguing that actual astronomical observations might have taken place at Tlaxiaco, those being the reason for its name, Hartung urges archaeologists to look for and excavate that observatory: "Given the written evidence, we have only to dig and excavate at the right place, as did Schliemann at Troy" (op. cit. p. 41).

By now, the crossed sticks sign has been generally accepted as a representation of the ancient Mexican astronomical apparatus and serves as a sort of emblem for archaeo-astronomical studies. Several investigators hold that a similar astronomical instrument was used by other ancient American cultures, like the Maya (Morley 1946, p. 308, Hartung 1971, p. 26) and the Inca (Müller 1972, pp. 25-26).

The Problem

Looking at the general context of pre-columbian studies, we observe that in the beginning of this century iconographical analysis was strongly influenced by astralistic interpretations ("Astraldeutung"). Since then, in several areas, most notably in Maya and Mixtec studies, a dramatic change has taken place towards historical and economical paradigms. Even in religious matters, emphasis is given much more to mantic and ritual scenes (Nowotny 1961). On the other hand a new and more scientific study of archaeoastronomy in ancient America is being developed with a wholly different perspective, starting from precise analysis of orientation patterns in ancient city plans and architecture (see the well known works of Aveni, Hartung, Tichy and others). In this situation it is important to separate clearly the now obsolete astralistic theories from the data of modern archaeoastronomical research and to re-examine carefully the evidence before constructing the new paradigm.

Zelia Nuttall based her interpretation of the crossed sticks on its position in a cluster of elements (eyes, temples, etc.) which she considered to be astronomical in character. By the time Caso defined that cluster as a series of

names of places and persons, most of Nuttall's argument had become doubtful, but the crossed sticks sign as an astronomical instrument had already established a life of its own. True, Nuttall's identification led Smith to the hypothesis of its reading ndisi nuu in Mixtec, a hypothesis which was confirmed. But, ndisi nuu, although referring to the act of seeing, does not necessarily have astronomical implications. We will argue here that this reading is correct, but that the reasoning behind it is wrong. We have to reconsider the crossed sticks from the perspective of what is now known about Mixtec pictography: as the crossed sticks are equivalent to the knee sign, and as both are glyphs, it is clear that both should have the same phonetic value in the Mixtec language.

The Place Name

Taking our point of departure in the Mixtec language, we first have to ask ourselves: how do the crossed sticks and the knee sign become the representation of the expression ndisi nuu? Nuu means among other things "face" and "eye", which is easy to depict, so it is not surprising to find such an element as part of the glyph under discussion. Ndisi means "visible", an inherent quality related to the eye and the act of seeing. Fray Francisco de Alvarado mentions in his dictionary:

- visible cosa, sa yotuvui ndisi ("that which is ndisi").
- claramente por publicamente, yotuvui ndisi ("it is ndisi").

In modern Mixtec we find the same significance: "clear", "visible", "brilliant" (see Pensinger 1974, Dyk/Stoudt 1973). In Chalcatongo, where ndijin corresponds with the ndisi of Alvarado, we note expressions like:

- a ni-cuu-ndijin, "ya amaneció", "ya se distingue (la persona que viene)".
- ndijin saha ja maa ni-saha, "claro está que él lo hizo".
- nuu ndijin iya vehe, "la casa está en un lugar visible".

The expression ndijin nuu (corresponding with ndisi nuu) turned out to have both a passive and an active significance: "clearly seen" and "clearly seeing":

- ndijin nuu ñuu nuu yucu, "se distingue el pueblo en el monte".

- xraan ndijin nuu bilu, "el gato ve muy bien".
- ¿tuu ndijin nuu-ro?, "¿no ves?"

The quality ndisi is difficult to represent pictorially. In cases like this, the ancient Mexican painter was likely to look for a homonym, a word with the same sound but with another meaning, which would be more easy to render in painting. This is a well known form of phonetic writing (Nowotny 1959). Another example of this procedure is found in the glyph of Teozacualco, called Chiyo cahnu in Mixtec, which means "Large Altar", but is painted as a Broken Frieze. Cahnu, "broken", is easier to paint than its homonym (with difference in the tone) cahnu, "great" (Smith 1973a, p. 57). In the same manner, the Mixtec scribe would have looked for another significance of ndisi. He could have used ndisi, "wing", but, we find, he used ndisi, "cross-beam" or "beams laid cross-wise". Alvarado mentions:

- atravesar algo poniendolo de traves, yo saq ndisi-ndi.
- atravesado estar algo asi, caa ndisi.

In modern Mixtec from Chalcatongo, ndijin is both "travesañu" and "travesado":

- caindijin yunu, "poner atravesadas las bigas".
- caindijin ndava jiin sñin, "poner atravesado el travesañu con el horcón".

Obviously, the crossed sticks in Mixtec pictography represent this cross-beam, as they do in Maya codices. Thompson in his 1972 commentary on the Dresden Codex (p. 48) discusses this element in relation to the Maya glyph T552, which has the very same configuration as the Mixtec ndisi sign, and points out its suggestive position in the depiction of houses (Fig. 4). Glyph T552, in combination with the glyphs for "black" and "red", forms part of the names of two Maya twenty-day periods (Fig. 5). These periods were known in Yucatec as Uo and Zip, but in the Manche Chol language as black and red kat. Therefore, a reading kat for T552 has been suggested (see also De Gruyter 1946, p. 54 and Kelley 1976, p. 152). Thompson's comment is very pertinent and worth quoting in full:

"As the glyphic prefixes match the colors in these names, it follows that kat must correspond to the crossed bands. Indeed,

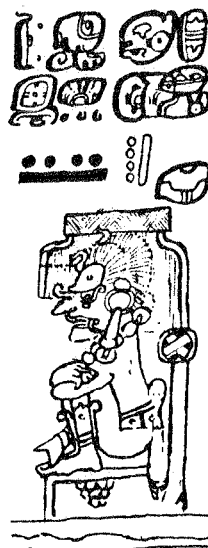


Figure 4: (Left) The Rain God in his house, Codex Dresden p. 38c (Anders 1975).



Figure 5: (Above) The Maya glyphs Uo (2 examples) and Zip.

kat in most Maya lowland languages and in those of Chiapas means transversal or set crosswise, which, of course, is precisely what the glyph shows. According to the Motul dictionary, kat is to wander about crossing a street from side to side; kaatal is to be placed on high or transversal, and a whole series of compounds are built on kat signifying transversal. For instance, katche is to place poles crosswise; in the codices the cross-bands glyph is often set in the back wall of a hut or a temple, clearly marking the A-frame or cross-beam (e.g. D.25b-28b, 38c; M.51b, 63b, 84c-87c)."

From all this we conclude that the crossed sticks sign indeed represents two crossed beams, and is to be read as ndisi, "cross-beam" in Mixtec.

But ndisi is not only used for beams. Not in the dictionaries, but in the living Mixtec language (Chalcatongo) we find expressions like:

- chihi ndijin sñin, "poner cruzadas las piernas",

which demonstrate that ndisi (Chalcatongo: ndijin) also refers to the crossing of the legs. This, of course, explains nicely the fact that the crossed sticks sign can be replaced by the knee sign. The Mixtec expressions cited above make it quite clear that both crossed sticks and crossed legs are to be read as ndisi. This ndisi then can be used to express in pictography other notions which are also called ndisi, but which have another meaning. Tempting though the image of a face looking through crossed sticks in a temple might appear, the configuration is

nothing but a quite common phonetic writing without any reference to something astronomical.

One could still claim that maybe the image is not only a phonetic writing but also an iconic representation of some observation instrument, used both to indicate the name "clearly seen", one in a phonetic and the other in a purely pictorial manner. But in order to bring forward such an ad hoc hypothesis, it would be necessary to produce evidence that is completely independent from the material discussed here. The Mixtec word for "observatory" is not known to us, but it is unlikely that it would have contained the word ndisi, considering related terms that are given by Alvarado:

- astrologo, tai sini tnuni teñoo andevui ("a man that looks at/knows the signs of the stars in the heaven") or

tai yonacaha casi sa yondaa andevui ("a man that observes clearly what is in heaven").

- mirar al cielo, yondoyo contondi ("I wake and see")

yondoyo nai nuundi ("I wake with a constant face")

yochidzo nduvua nuundi ("I throw the arrow of my eye")

yondoyo chihi nuundi ("I wake and direct my eye").

The Personal Name

Tlaxiaco is an important place in Codex Bodley, and to a lesser extent in Codex Selden. Some other place glyphs also contain the ndisi element (Bodley p. 6-II, p. 35-II; Vindobonensis p. 6-II), but these are very rare and as yet unidentified. Apart from the place glyphs, ndisi occurs in personal names, in combination with the elements: maize, jewel, fan, eagle, jaguar or ball-court. These do not match the few known names of Mixtec constellations (e.g., astillejo constelacion: ydzu, "deer", according to Alvarado), but, instead are quite normal constituents of Mixtec personal names.

We should make a parenthesis here and note that, although some fine studies of Mixtec naming practices have been made (e.g., Smith 1973b, Aróstegui 1978, König 1979, see also Troike 1978, p. 561), Mixtec name glyphs are still rendered in literature as descriptive paraphrases, without trying a real translation: a consequence not only of scientific caution, but also of the divorce between iconographic analy-

sis and the study of the language involved. Another example of this unfortunate division of labor is the ridiculous habit of designating the sex difference between the protagonists of the codices with O or "Male" and O or "Female". This in spite of the fact that the Mixtec designations are well documented, equally handy in usage and certainly much more elegant: iya, "Lord" (señor) and iya dzehe, "Lady" (señora).

A name like "Eagle-Astronomical Apparatus", though acceptable as a descriptive paraphrase, does not really make any sense as a name. The original Mixtec name is easily reconstructed as Yaha ndisi nuu, which can be translated as:

1. "Eagle that is clearly seen", "Visible Eagle",
2. "Eagle that sees well", "Sharp-eyed Eagle",
3. "Eagle from Tlaxiaco".

The same translations are possible for "Jaguar-Astronomical Apparatus" (Cuñe ndisi nuu).

Just as "Eagle" and "Jaguar" were favorite names for the Mixtec Lords, names with a "Jewel" or a "Fan" in it were loved by the Mixtec Ladies. In combination with the ndisi nuu sign, these names translate as:

1. "Clearly seen (or brilliant) Jewel", "Clearly seen (or brilliant) Fan",
2. "Jewel from Tlaxiaco", "Fan from Tlaxiaco".

According to this interpretation, these names make perfect sense in Mixtec. As was to be expected, the personal names discussed above were quite popular within the Tlaxiaco ruling family, because of their double or triple meaning. As far as we can see, all personages with these ndisi nuu names belonged to or had some relationship with the Tlaxiaco dynasty. In one case the ambivalence is solved by adding a

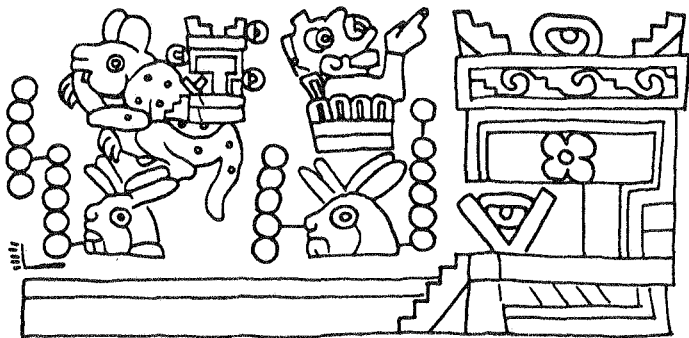


Figure 6: Names of rulers of Tlaxiaco, Codex Bodley p. 15-V (Hartung 1971).

semantic determinative: Lord 10 Rabbit (Bodley p. 15-V, Fig. 6), ruler of Tlaxiaco, has a personal name "Jaguar-Temple with eyes and crossed sticks". The temple indicates that ndisi nuu is here to be understood as a toponym. So, the name should be translated as "Jaguar from Tlaxiaco".

Geographical references of this type are quite common in Mixtec names (Jansen 1983, p. 227). A nice example is to be found in the names of two sisters in Codex Bodley pp. 13-V, 13-IV and 14-III: The first is named Lady 13 Rain "Jewel-Town-Cattail", which can be interpreted as "Jewel from Tula" or "Toltec Jewel". Possibly the original Mixtec was Dzeque Nuucohyo, which nowadays of course would be understood as "Jewel from Mexico City". Her sister is Lady 1 Flower, who has two personal names: "Quetzal" (Tedzandodzo) and one that consists of a combination of glyphic elements "Town-Cattail-Flower device - (Shining?) Jewel, which we read tentatively as "Flower from the Jewel-City of Tules" or "Flower from precious Tula". Both are appropriate names for daughters of a couple that married in Tula (Bodley p. 12-V, see Caso 1960, p. 41), of whom the second one married a ruler of Tula-Temazcal.

A different pattern of distribution has the name glyph "Ball-court-ndisi nuu" (Selden p. 5-III and p. 5-IV). We could translate this as "Visible Ball-court", "Visible in the Ball-court", or perhaps "Sharp-eyed Ball-player (?)". It is also possible, however, that the ball-court is again a phonetic writing for something else. Finally, we find a name "Maize-Crossed legs" (Bodley p. 38-II), which could have been Ndisi nuni in Mixtec, "Maize that becomes visible", a term which indicates that the first green sprouts of the maize can be seen above the ground (Fig. 7).

Summarizing, we see that the correct argument for identifying the toponym formed by the combination of crossed sticks or crossed legs with eye or face as Tlaxiaco is the fact that the crossed sticks and crossed legs are read ndisi in Mixtec, which is here used to express its homonym ndisi, "visible", while eye and face are nuu. Together they are read Ndisi nuu, which means "clearly seen", "sharp-eyed" and is the Mixtec name of Tlaxiaco. In this context there is no reason to interpret the crossed sticks as an astronomical instrument. The reading ndisi nuu also applies to personal names where it produces satisfactory readings and translations.

This discussion shows the caution necessary in archaeoastronomical interpretations; the image cannot be taken at face value, without studying the language and culture behind it. In fact, we are convinced that the study of native American cultural heritage needs the active participation of those who share that cultural tradition and are its direct inheritors, the native Americans themselves. Modern research practice is still essentially analyzing people for "Culture History", "Nomothetic Science", or "Career Building". As long as the people involved, confronted already with crisis, poverty and discrimination, are only the object of such study, the knowledge which others gather about them, among them and without them, will remain an occidental monologue, suffering from misunderstandings, falsification and sterility.

Acknowledgements

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Figure 7: Lord 7 Movement "Maize-Crossed Legs" and his wife, Codex Bodley p. 38-II.

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