

***Cranial clues to the
mysterious decline of
the Maya civilization:***

The hippocampal hypothesis

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Archeological studies have substantiated the Maya culture as the most highly developed ancient civilization in the Americas. Flourishing between 300 and 800 A.D., it was characterized by achievements in astronomy, mathematics, writing, religion, art, and architecture that marked high intellectual and creative activity.

But within a century, beginning around 800 A.D., the oldest and most developed centers of this civilization underwent a dramatic col-

lapse: the richly decorated temples and palaces (some sited to coincide with viewlines of the solstices and equinoxes) and the calendric monuments systematically sculpted to identify successive rulers, were no longer erected. The priest-ruled cities became depopulated and eventually abandoned to the jungle.

Many probable causes for this strange decline have been the subject of intense scholarly consideration, but none of the possible explanations

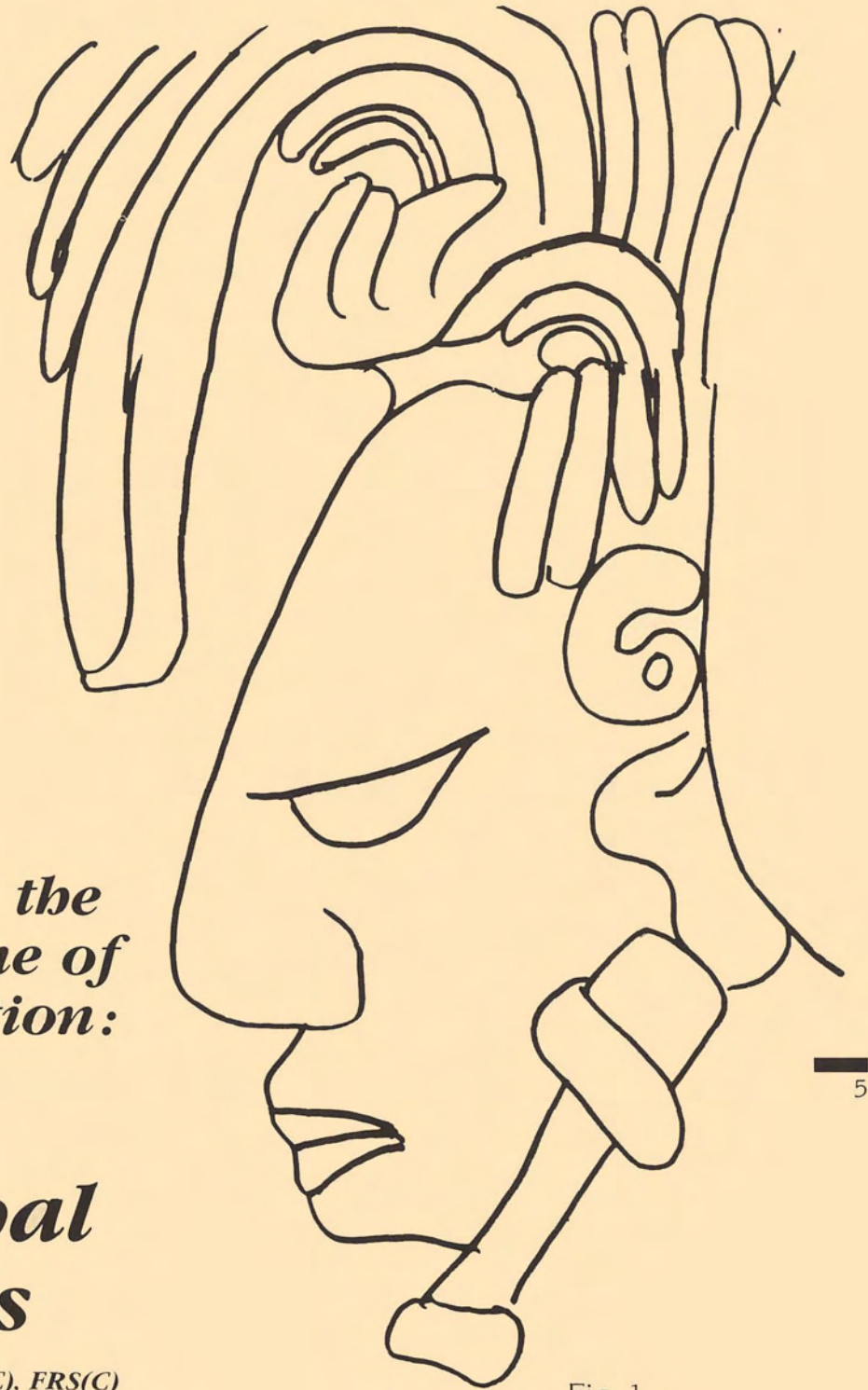


Fig. 1

— climatic disasters such as flood, drought, or earthquake; disease, including malaria and yellow fever; disintegration of the agricultural system; civil or external warfare — has been satisfactorily supported by the evidence so far available⁽¹³⁾.

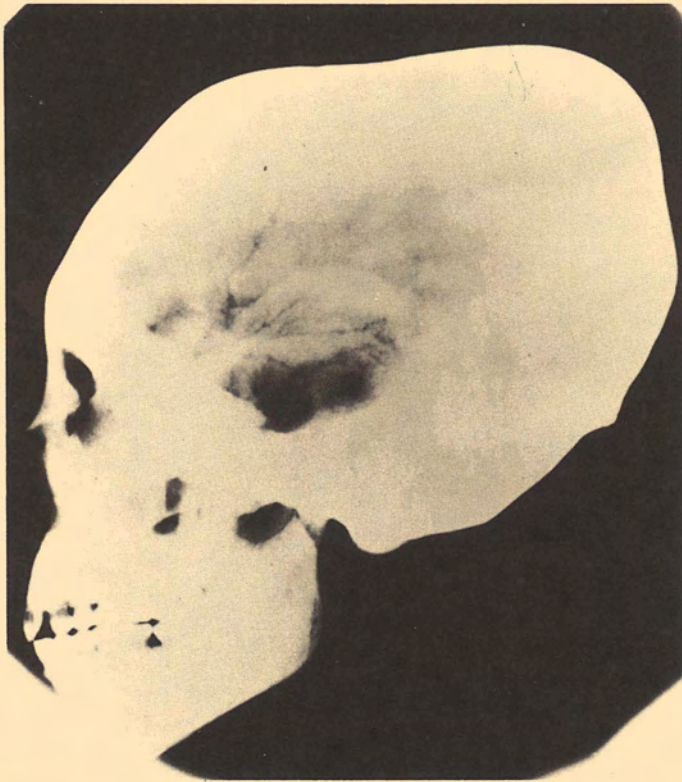


Fig. 3

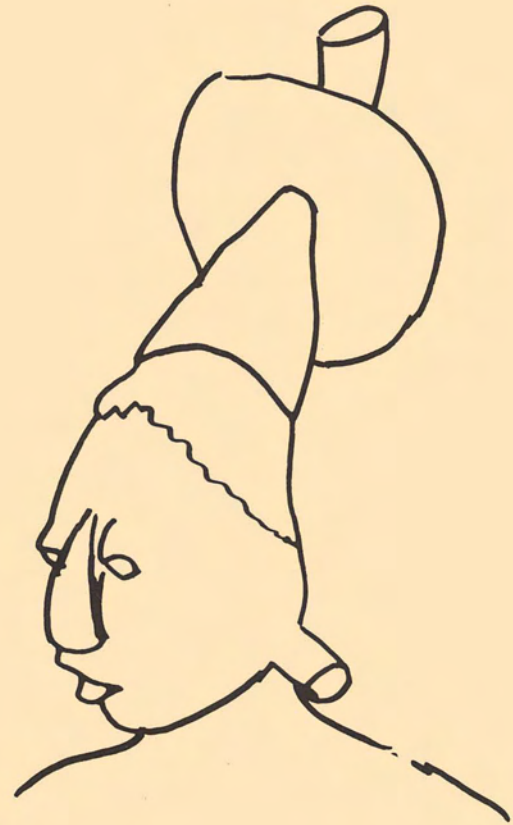
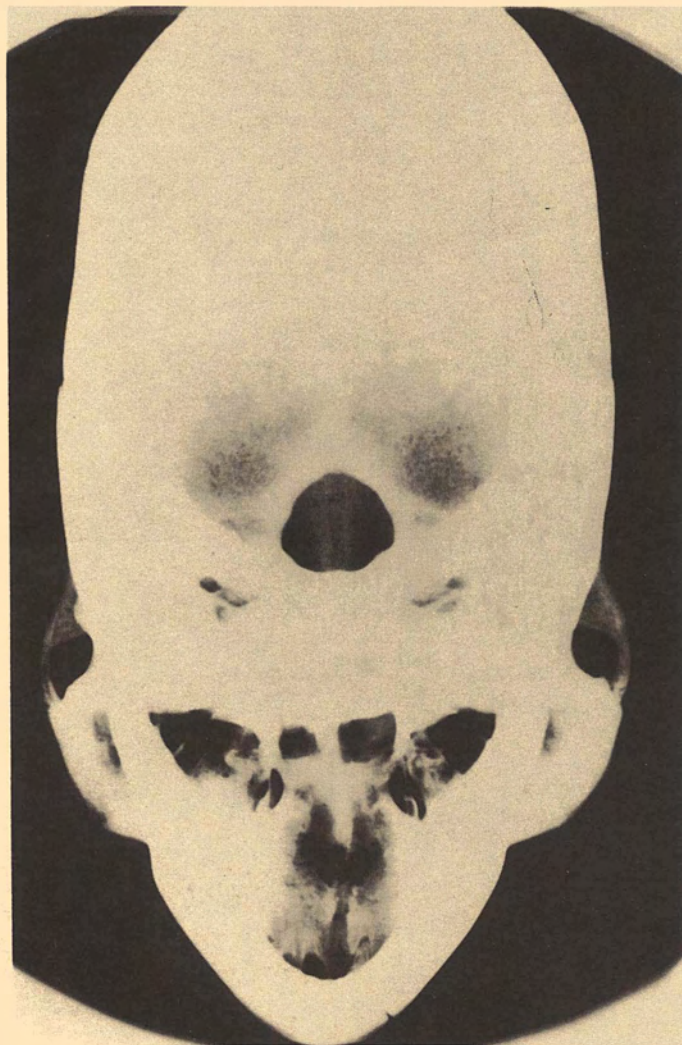


Fig. 2

During a visit in 1978 to Yucatan, I had the opportunity of viewing Chichen Itza and Tulum, two Mayan temple cities that had been examined in great detail by archeologists since their "rediscovery" by John Lloyd Stephens in 1840⁽¹²⁾. One became aware that cities of this size further to the south had undergone this puzzling cultural dénouement for which no scientific explanation was forthcoming. A visit to the National Museum of Anthropology in Mexico City, with my friend Dr. Manuel Valasco Suarez, formerly director of the National Institute of Neurology, confirmed my impression that a neurological factor having a bearing on this Maya enigma had not been noted or examined in the standard scholarly texts on the ancient Maya.^(1,3,5,7)

A particular feature the priest-rulers depicted in their art forms, especially during the later phases of what is referred to as the classical period, was the striking deformity of the head

associated with exuberant head dress as part of the elaborate religious costume. In typical examples, the forehead was slanted acutely backward and the head often pointed or oxycephalic, as evident in the bas-relief stone sculpting (outlined in Figure 1) from Bonampak (circa 790). In other examples, the base of the head dress fitted like an inverted cone over the misshapen cranium as shown in the drawing of the ceramic figurine from Campeche (Figure 2). This practice of moulding the cranium may possibly have been carried on for some centuries after the Maya decline. A skull dated about 1700 A.D. from the National Museum, shows the exaggerated elongation and a concavity in the superior frontal parietal region that may correspond to a constricting head-band (Figure 3). It would be of great value to study examples of earlier skulls to elucidate at what phase of the Maya culture this deformity appeared.

A jade carving from the American Museum of Natural History (undated) shows what appear to be two children with headbands made of individual plates. These may represent the means by which the head moulding in infancy or childhood determined the unusual adult shape (Figure 4). Many depictions of headshapes going back to the earlier centuries of the Maya culture show normal cranial outlines. Indeed, the first historical document of Maya hieroglyphic writing, known as the Leyden plate (circa 320),

shows a head with only a slight obliquity of the forehead common to the normal Maya profile but topped by one of the florid head costumes (Figure 5).

Some of these splendidly costumed priests with magnificent plumed head-dresses showed more advanced oxycephaly than the soldier guards or peasants. In wall drawings documenting the conquest of the Toltecs over the Maya in Chichen Itza, the Maya, but not the external victors, are pictured with moulded heads. These head shapes were thus most prominent among the elitist ruling class during the later classic period, after which the Maya culture relentlessly declined.

Such advanced forms of cranial distortion could produce secondary effects on brain growth and development. As we know, from studies carried out here earlier at the Institute, compression of the head during difficult birth and delivery can selectively damage the mesial portions of the temporal lobes, especially the amygdala and hippocampus on both sides. This can result in seizures and disturbance of memory function^(2,4,6,8). If this cranial compression by headbands were continued from childhood onward, one would even expect some of the secondary effects noted in severe cranial stenosis such as proptosis (see Figure 2) and the well recognized associated intellectual deterioration⁽⁹⁾. This cranial deformity seems to have



Fig. 4

been prevalent mainly among the ruling priests whose complex religious organization was of critical importance to the continuing operation of the main cities of the Maya. It is conceivable that impairment of intellectual function and especially of memory from this extreme cranial moulding could have been one of the factors that led inevitably to a break-down of many of the sophisticated aspects of the Maya civilization. The origin of this practice of cranial deformity seems unknown in the present scholarly literature on the Maya (5,7,13).



Fig. 5

Artificial deformation of the head in infancy and children was practiced by a variety of techniques in many ancient cultures of the west coasts, and especially the central region of the Americas⁽¹⁰⁾. The effect on mental function would clearly depend upon the degree and duration of the compressive moulding, as recognized with craniostenosis.

Recent studies of carbon-14 dating from organic materials relating to time periods of the Mayan culture from the first to the fifteenth centuries, demonstrated that activities of the priest-ruler class peaked at the 8th century, then declined to become negligible after the 10th century, the cycle corresponding to that of the incidence of dated monuments (Stelae) over the same period. But from similar dating compilation, the commoner population did not undergo any prominent rise and decline⁽¹¹⁾. Thus, whatever influences were associated with the decline appear to have been operative among the elitist class. The occurrence of head deformi-

ty in the latter stages of Maya culture and prominently among the elitist class adds to the plausibility of the hippocampal hypothesis.

This hippocampal hypothesis merits further study and examination. It postulates that hippocampal damage, associated with the practice of cranial moulding displayed in the Maya art forms and dominant among the ruling priest class, produced memory and other intellectual impairment. These deleterious effects may have played a role in the eventual decline of the highly structured Maya society. (Less likely is the possibility of a genetically determined incidence of cranial stenosis that effected this particular class, and resulted in a similar loss of mental function.) It seems probable that the ritual distortion of the head brought about something like a self-imposed Alzheimer's syndrome. The hippocampal hypothesis opens up another avenue for examining the mystery of this strange dissolution of one of the great world cultures.

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