The Orientation of the Pyramids

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A little consideration reveals that, should the terrestrial axis be turned tomorrow into a new astronomical direction by *any* angle of inclination toward the ecliptic, the Great Pyramid would remain properly oriented to the north and south poles; there would be a new celestial pole and, if so positioned, a new polar star, but the pyramid would remain with two of its sides aligned with the geographical poles. Should the terrestrial axis be turned by anything like 180°, north and south would change places (a hieroglyphic text quoted in *Worlds in Collision,* p. 107: "The south becomes north, and the Earth turns over"), but the pyramid would not be disoriented. Actually, quite a number of authors of classical antiquity refer to earlier changes in the inclination of. the terrestrial axis and to subsequent positions it took *(W. in C.,* Part 1, Ch. 5; Part II, Chs. 7 and 8).

Should the orbit undergo a change, and with it the length of the year and besides, the relative length of the seasons, or should the rotational speed change, and with it the length of the day--the Great Pyramid would remain true to the terrestrial poles.

Only with the additional displacement of the *geographical* position of the axis (location of the poles), would the pyramid be disoriented (unless the poles should travel along the meridian of Gizeh). The present azimuth (orientation) of the sides of the Great Pyramid indicates that any disturbance in the geographical position of the poles since it was built must have been of a temporary character, the Earth's equatorial bulge acting as a stabilizer. In such a case wobbling would result--a residue of such wobbling is still present. For figures, see *Earth in Upheaval,* "Shifting Poles." In that book I also offer reasons why only the first kind of disturbance (shifting of the *celestial* pole) would be of stable nature.

In *Worlds in Collision* I described both kinds of change in the direction of the axis and in the position of the poles; but in *Earth in Upheaval,* on the basis of geophysical facts, I ascribed lasting change only to the first kind of displacement, and changes of temporal character to the second. An application of force (or force field) on the globe creating any such displacement would result in stress in the terrestrial strata and in great earthquakes, and the question could be asked: How is it that the pyramids still stand? Years ago I wrote on the subject (in a debate with Professor J.Q. Stewart, Princeton astronomer, in *Harper's* for June 1951): "Their solid construction (one percent free space inside) prevents the stones from being moved inward, and the angle of inclination of sides to horizon, from moving outward. The pyramid is the most stable of all forms. The king's chamber inside Cheops' pyramid has five ceilings of granite slabs, one above the other. Earthquakes have been extremely severe in wrenching, as all the deep beams of granite over the King's Chamber in the Great Pyramid are snapped through at the south end, or else dragged out ... The whole roof hangs now by merely catching contact' (Petrie, *Egyptian Architecture*)."

In a lecture delivered in April 1966 at Yale University on the subject, "The Pyramids, Their Purpose and Orientation," I stressed that the entirety of Egyptian astronomy, as G.A. Wainwright brought out, was

developed with the celestial position of the terrestrial axis playing the governing role. Chinese astronomy was so oriented, too (J. Needham). See also the Section, "Tao", in *W. in C*. The persisting order of the world and solar motions were watched with the help of the obelisks, for which we have the testimony of Pliny *(W. in C*, p. 320).

The Babylonian and Greek astronomies were oriented primarily toward east and west, or to the rising and setting points of the sun at equinoxes and solstices; therefore the Babylonian stargazers, as a multitude of cuneiform texts witness, carefully watched whether the equinoctial days arrived on time and whether any change occurred in the horizon positions of sunrising points on the winter and summer solstice days. Should the equinox day retard or precede, or should the sun rise too far or not far enough to the north or to the south on the solstices, the order of the world was no more the same. Actually, the very numerous cuneiform tablets found in the ruins of the Nineveh royal library, and if dating from before ca. -700, contain calendric and astronomical data that differ greatly from those of our times; that advanced mathematics was employed in preparing these tablets is readily admitted by specialists in Babylonian astronomy.

According to these tablets, the calendar was repeatedly altered, and at certain periods the vernal equinox was identified on dates far removed from March 21st; the values for the longest and shortest days (daylight hours) of the year repeatedly and drastically changed, too.

Significantly, the very same changes in the calendar and in estimates of the longest and shortest days of the year can be traced in Egyptian texts.

Changes in the world order took place as late as the 8th century before the present era. With the recurrent alterations in the world order, the sunrising point on the summer solstice was inevitably displaced, and such displacement was observed and registered by the sages of all ancient civilizations; it can be traced in altered orientation of the foundations of Greek and Syrian temples--a subject discussed in *Worlds in Collision*, where works of J. N. Lockyer and F. G. Penrose, among others, are cited. Only recently the excavators of the Shechem temple (Jordan) found another such change in orientation: old foundations were not re-used when new foundations, less massive, were laid on the same site, differing in orientation by only five degrees. Professor Bull of Drew University commented that the change must have had to do with observations of the sunrising point (on the summer solstice) by worshipers.