

## CHAPTER FOUR

### MAGNETISM AND AXIAL TILTS

The Earth has two axes of concern here, its axis of rotation between the geographical north and south poles, and the warped axis of its magnetic field lying between the north magnetic pole and the south magnetic pole. It is easier to imagine the axis of rotation; the imaginary equator divides the globe into two equal halves and this equator marks a circle around the spinning globe which, every 24 hours, completes a turn.

The magnetic poles are distant by some hundreds of kilometers from their corresponding geographic poles. They are denoted by the behavior of a compass needle which assumes a vertical position when at or near the magnetic pole; the nearly global distance that lies between the north and south magnetic poles witnesses a continuously changing dip of the compass needle which reverses itself as it passes approximately half the globe and again turns to the vertical (in reverse) as it approaches the opposite pole. The magnetic poles are in perpetual motion, seemingly traversing a kind of oval figure. In the north, the pole is just south of King Christian Island (1980, 77°19 N; 101°49W) and is moving north by 24.4 km per year and west by 5.4 km per year.<sup>1</sup>

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<sup>1</sup> 1. Paul H. Serson, "Tracking the North Magnetic Pole," *Geos* (Winter, 1980)

Apart from a certain usefulness in navigation, its extreme weakness may let one think such magnetism to be quite unimportant. But it indicates the presence of several important processes of the atmosphere, lithosphere, biosphere and cosmosphere. An entertaining book might be written concerning the effects on life of the loss of the magnetic field. How will wild geese navigate? Will there be less heart attacks or more? Cox says that the removal of the dipole magnetic field will reduce the total shielding of the biosphere from cosmic rays by 10 to 12%, no more than is involved in a person's moving from the equator to Alaska. Waddington is of the same opinion "unless it is assumed that these periods are associated with greatly increased particle radiation from some external source."<sup>2</sup> This last point stresses the atmosphere-exosphere relationship, and may serve later on to solve some reversal perplexities.

In 1989, NASA's Magnetic Field Satellite confirmed that the field, already weak, is decreasing in strength. The trend indicates a zero strength in about 1200 years.<sup>3</sup> Relying upon studies begun in 1830 by Gauss, Barnes made the same prediction earlier.<sup>4</sup> Theorists are divided, some saying that the field hits zero, then reverses, and then returns to zero, and so on over great periods of time. A few, the present author among them, say that the field is a once and for all thing: it began at higher intensity, endured for a long time, then began to diminish, meanwhile from time to time reversing its direction.

Assuming a continuously increased strength reading backwards in time, however, implies an enormous intensity eons ago; there is a hint here, to our way of thinking, that the field was created and sustained at a constant level, and then abruptly was

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<sup>2</sup> II *S. I. S. R.* 2(1978), 45.

<sup>3</sup> "Magsat down: Magnetic Field Declining", 117 *Sci. News* (1980), 407

<sup>4</sup> 4. Thomas G. Barnes, 8 *Creation Res. Soc. Q.* 1(1971) 24-9; 9 *C. R. S. Q.* 4 (1973) 322-30; 18 *C. R. S. Q.* (June 1981) 39-41; II. *Soc. for Interdisciplinary Stud.* R. 2 (1978) 42-5, 4(1978), 110-11.

cut off from its source, and began to decline. Barnes declares, too, that "This magnetic decay phenomenon could not have been going on for more than a few thousand years, as the magnetic field would have been implausibly large for a relatively neutral body such as the earth."<sup>5</sup>

The magnetic field constitutes a magnetosphere which is much larger than the Earth itself;<sup>6</sup> it can be imagined as a kind of giant electric globe enclosing the Earth which is perceptible even as one descends into the deepest rocks and which may only end in some kind of an electric current which may be running through the core of the Earth at about the geographical spinning equator, very roughly perpendicular to the geophysical poles.

It is important, too, to appreciate that these two features, the magnetic electric current and the geographical spinning equator may be largely independent of one another. That is, one can conceive of the magnetic and geographical systems operating even at right angles to one another. We have discovered no natural law that says the two equators and sets of poles must be close together.

This implies, however, that the two sets of poles are not stable, that their present positions are a historical accident. But, then, to think so introduces worrisome possibilities: that the axis of spin of the Earth may be changed, too. Both of these possibilities have increasingly occupied the minds and studies of scholars and explorers. Have there indeed been occasion on which the globe has tilted, geographically and magnetically? The answer today is yes, that the axis of spin has shifted and also the magnetic axis has shifted.

But before we consider these two probabilities, it is well to mention yet a third change in the Earth's behavior that would

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<sup>5</sup> Allan Cox, "Geomagnetic Reversals," 163 *Sci.* (17 Jan. 1969) 237-45; C. J. Waddington, *Sci.*, 17 Nov. 1967; Cf. J. Eberhart, "Of Life and Death and Magnetism," *Sci. News* (Mar. 27, 1976), 9.

<sup>6</sup> R. Juergens, "Reconciling Celestial Mechanics and Velikovskian Catastrophism," 2 *Pensée* 3 (Fall, 1972), 6-12.

possibly occur without magnetic or geographic shift. Suppose that the Earth simply tilted in space.

On this phenomenon, Peter Warlow reports that both Needham and Dodwell found oscillatory change in the obliquity of the ecliptic, on the basis of ancient astronomical records. Dodwell concluded that three factors were operative in the movement, the linear drift conventionally ascribed, a decaying oscillation with a period of 1200 years, and a logarithmic-sine decay. Dodwell saw in the exponential decay (quantavolutionary exponentialism that I mentioned earlier and in *Chaos and Creation*) a drastic occurrence some 4500 years ago.<sup>7</sup>

Could the Earth have even turned over completely without interrupting (interrupting very little) its spin or its magnetic field? The geographic poles would be reversed, and along with them the magnetic field. The Earth could not perform such a movement without an external assist, whether from an upsetting explosion of gases from the Sun or from the attraction or repulsion of a large passing body.

According to Warlow, who has however been challenged by Slabinski, the transaction could be relatively delicate; it would amount to the drawing of a force along the Earth's path that would cause it to tip over while containing its spin, in the manner of a tippe-top, a toy that is weighed on top and set to spinning on the board; the top turns completely over continuing to spin all the while in the same direction, North becomes South and East becomes West.<sup>8</sup> The motion performed is technically a fast precession.

A moment's reflection will rid us of any notion that the action would be harmless. The atmosphere, hydrosphere, and lithosphere would be agitated and produce effects that by any measures would have to be called quantavolutionary. For instance, it appears most likely that the widespread sudden destruction

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<sup>7</sup> Geoffrey Gammon, "Focus: Catastrophism Old and New," V *SISR* 2 (1980-81), 34.

<sup>8</sup> Peter Warlow, *The Reversing Earth* (London: Dent, 1981).

throughout the northern regions of the mammoths and other large mammals occurred in conjunction with a tilt of the Earth's axis in the presence of the exoterrestrial entity causing the tilt. We can say this because a sudden deep vacuum freeze, asphyxiation, thrusting of masses of gravel and bones, and permanent cold ever thereafter, such that the animals are sometimes found still fleshed-out and diagnosed in certain cases as heart-failures or with blood-clotted lungs, must indicate a holospheric event comprising an atmospheric and aquatic withdrawal, the descent of an extreme coldness, and upon the passing of the body, returning tides of water and wind to accomplish quick burial under muck, ice and tundra.

Yet, according to Warlow's theory, the tilt, which might have been complete to  $180^\circ$  and would change East to West and North to South, would require only thousandths of the energy to be disposed of if, by contrast, the Earth were largely cease or reverse its rotation. If such were to happen, it would be most unlikely that the two bodies, Earth and the intruder, would achieve just the mode of encounter and passage that would avoid direct electrical and material exchanges or that would bring about a full  $180^\circ$  reversal; the Earth, unlike the tippe-top, could cease its tilt at any angle not excluding a full  $360^\circ$  circle with its intruder acting momentarily as its binary, and performing a "loop-the-loop."

Should the intruder collide with the Earth, the Earth might tilt, also, and the damage to it would be much greater. Dacheille estimates that a body 320 km in diameter, impacting tangentially at a velocity of 12 km/sec would produce an axis shift of a mere  $0^\circ 32'$ .<sup>9</sup> Many forms of energy disposal are available, it appears, besides reorientation of the global axis. One is led to suspect that non-colliding encounters involving heavy electrical differentials might more effectively produce axis tilting than would collisions.

Lest the idea be considered quite fanciful, it should be recalled that several ancient sources refer seriously to a reversal of

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<sup>9</sup> 198 *Nature* (13 April 1963), 176.

directions. Herodotus and Plato cite Egyptian sources of occasions when the Sun changed directions and arose in the West instead of the East. A ceiling in the tomb of Senmut of Egypt also pictures a reversed sky tableau such as would occur were the Earth turned upside down. In fifteen spectacular pages, <sup>10</sup>Velikovsky searches out and orders rationally other indications in legends and writing of a reversal of directions that could only come with the Earth turning upside down. The contexts scarcely permit the alternative, a cessation and reversal of the Earth's rotation.

Thomas Gold once remarked that, if the Earth were a perfect sphere, an insect alighting upon it might turn it over. In revising Warlow's calculations, Slabinski assumes that the Earth has to be turned over in a single pass-by at two Earth's radii distance in a parabolic approach trajectory. He emerges with a requirement for a body with the mass of 62 Suns. Even if the crust of the Earth is shoved around independently of the underlying layers, a body of the mass of 68 Jupiters is needed.<sup>11</sup> We expect that such an action will be totally catastrophic." Furthermore, "any appeal to electromagnetic forces that does not give a quantitative analysis of how such forces produce the required torque is equivalent to saying..." a miracle occurs."

Ellenberger, although a stout Velikovsky supporter, agrees: "Since motions occur along the path of least resistance, the possibility that a spin reversal has occurred would appear to be greatly reduced and that interpretation of Senmut's ceiling (and other evidence cited) may be in need of a *raison d'être* other than evidencing a spin reversal. If a spin reversal is a viable alternative, where are there discussions and quantifications of its

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<sup>10</sup> *Worlds in Collision*, 105-20. See also, A. W. Perrins, (tr., 3 *S. I. S Workshop* 1 (July 1980) 27-8, on the reversed burials of Pharaohs, the inscription of Horemheb's tomb that the Sun rises in the West, and Rameses II at Abu Simbel facing East rather than the orthodox western way to where, with his false beard, he should be oriented.

<sup>11</sup> VII *Kronos* (Winter 1982), 86-94, 92.

mechanism?"<sup>12</sup> Yet Velikovsky, arguing the case for axis displacement, had earlier discussed a calculation by Weizaecker demonstrating that an Earth transaction with a strong magnetic field would affect its axial inclination much more readily than its rotation.<sup>13</sup>

Presently, the evidence for sidereal tilts is considerable, for geographic tilts also some, for upside down tilts little, for stop-and-reverse rotation very little. There is no way in which astronomical assurances can be lent to geologists on this account. Conversely, there is enough doubt on all scores to let geologists be open to the possibility of several catastrophically effective maneuvers of "Spaceship Earth". A moment's consideration of Slabinski's calculation leads to the suspicion that he may be employing a rate in his formulas that soars to wild heights and casts doubts *prima facie* on his procedures: if it would take the gravitational force for 62 Suns to turn the Earth around at a distance of less than 15,000 km, how does a single Sun lock the Earth into fixed orbit at 150 million kilometers? Also, evidence of a geographical shift of the poles is abundant; if this is not to be denied, then we should have to supply the force to do the job; if not 62 Suns, then how many Suns at 15,000 km distance are needed?

The possible occurrence of reversals in proto-historical times may suggest additional reversals in pre-human ages. However, Milton and I have presented in *Solaria Binaria* (Chap. 8) a theory according to which the Earth was in grip of a huge external magnetic field of the solar binary system until perhaps eight thousand years ago; during almost all of geological time, it could not reverse its field. In fact, it is argued that this same magnetic field and its reciprocal electrical current are the present geomagnetic field and current within the Earth, which have been steadily undergoing decay since the grip of the external magnetic

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<sup>12</sup> V. J. Slabinski, "A dynamical objection to the inversion of the Earth on its spin axis," 14 *J. Physics A.* (1981) 2503-7.

<sup>13</sup> "Straka: Science or Anti-Science," I *Pensée* (Fall 1972), 16.

field was released. This theory permits us here to explain the principal geological problems connected with terrestrial magnetism.

We would have to assert that the numerous alleged reversals of the Earth's magnetic field in geological history simply did not occur. Obviously there is no evidence to be obtained one way or another by atmospheric testing of the field; any number of reversals (or none at all) might have occurred without leaving discernible evidence.

The geophysicist, however, can search for evidence of the magnetic field in rocks.<sup>14</sup> Igneous rocks have often been imprinted with magnetism when in a molten state; hence they hold myriads of tiny compasses, pointed towards the magnetic pole. If for one set of rocks the compasses point north and for another adjoining set they point south, it is conceivable that the magnetic field had reversed itself on an occasion between the melting and hardening of the first set of rocks and the melting and hardening of the second set.

Magnetic mapping of rocks is almost entirely of this century but has burgeoned swiftly and, some say, chaotically. Persuaded that they can tell the ages of rocks by radiometry, explorers have used time as a reliable indicator of the change in the magnetic field of the Earth. Since the rocks of the world have exhibited a bewildering variety of magnetic directions, many "dated" strata of differing magnetic direction have been assigned to the different magnetic periods, usually forced into a preconceived mold of "normal" and "reversed" magnetic field.

Depending upon the angle of declination, not only have such fields been noted, but they have been asserted to pertain to shifting magnetic poles. Some students have supported the idea that hundreds of field reversals have taken place in the several billions of years allotted to the Earth's history. One catalogue reports 433 paleomagnetic poles for 3 to 4 billion years of Pre-

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<sup>14</sup> S. Matsushita and W. H. Campbell, eds. *Physics of Geomagnetic Phenomena* (New York: Academic Press, 1967).

Cambrian time, an average of one new pole per 7 to 9 million years.<sup>15</sup> Since the Cretaceous, says Heirtzler, 171 reversals of the magnetic field have been identified.<sup>16</sup> Others have perceived certain intervals of time to elapse between reversals, 700,000 years, fifteen million years, and so on; several studies claim that the farther back in time one goes, the longer the period between reversals.

Some observe much more frequent reversals; they can claim that a reversal occurred 2600 years ago, 3500 years ago, a dozen times during the Pleistocene, and so on. If, they say, we cannot perceive so high a frequency in times more ancient, it is because the reversal is not accompanied by a general melting of rocks and therefore cannot be detected, or it is too faint to be recognized because of disturbances or contamination of the strata. Magnetic reversals may be concealed because sedimentation is too slow to capture its duration, when samples are not closely spaced in time and the reversals are brief, when turbulence and contamination affect samples, when the sediments are dumped or shifted, and when biological activity is high at the level being searched for magnetism.<sup>17</sup> Still indications are strong in favor of heavy magnetic disturbances in the mid-first and mid-second millennia B.C., with ceramic, clay, rock, bio stratigraphic, legendary, and historical contributions.

As early as 1907, P.L. Marcanton, using Folgheraiter's method, demonstrated magnetic reversal and intensity changes by studies of the magnetic inclinations imprinted upon Bavarian and Etruscan vases of the period 600-800 B.C., a period that in *Chaos and Creation* I called "Martia."<sup>18</sup> In 1981, K. Games reported upon a similar investigation of Egyptian pottery over a 3000-year period,

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<sup>15</sup> P. L. Lapointe *et al.*, "What happened to the High-Latitude Paleomagnetic Poles," 273 *Nature* (22 June 1978), 655.

<sup>16</sup> 16. J. R. Heirtzler, "Seafloor Spreading," 219 *Sci. Amer.* (1968), 60-70.

<sup>17</sup> Thomas McCreery, "Krupp and Velikovsky," VI *Kronos* 3 (1981), 44-5.

<sup>18</sup> 112 *Archives des Sciences Physiques et Naturelles* (1907), 467-82.

concluding: "Clearly, the geomagnetic field in Egypt has varied rapidly and by large amounts. The greatest rate of change, which occurred around the maximum at about 1400 B.C. was about 140 nanoteslas/year... and lasted about 300 years either side of the maximum.<sup>19</sup>" He did not study directional changes of the field; further, his date of 1400 B.C. is more likely to have fallen in the 8th century, since he was using an unreconstructed chronology which is backwards by 500 years.

One important off-shoot of this enthusiastic age of magnetic pole discovery is the belief that the discovery of a new magnetic pole means that a new geographic pole has been discovered. If so, and if what is being discovered are true magnetic reversals, the Earth would have suffered thousands of devastations. A shift in a true geographic pole (as opposed to a purely celestial or sidereal tilt) must involve a shift in the axis of rotation, the worst kind of disaster. Apparently some geologists are runaway catastrophists as long as they can run on free time long past. Munk's title, "Polar Wandering: A Marathon of Errors,"<sup>20</sup> deserves sober thought.

The significance of this chaos of findings also lies in the association of magnetic reversals with atmospheric, biospheric and lithospheric turbulence. The magnetic field or magnetosphere, even though it is remarkably weak in the farthest stretches of the atmosphere, nevertheless blocks and deflects a host of incoming particles. It acts thus like the ozone layer and atmosphere in general, as a protective shield. If it is removed, or temporarily "shut off" because it is shifting, or overwhelmed or shunted aside by great blasts of gases and charged particles, species extinctions may occur. Kennett and Watkins claim, on the basis of deep-sea drilling, that volcanism was at a peak in

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<sup>19</sup> *New Scientist* (11 June 1981); cf. Brian Moore, note in *V. S. I. S. Rev.* 2 (1980-1), 38, and 4 *S. I. S. Workshop* 2 p. 17.

<sup>20</sup> W. H. Munk, 177 *Nature* 4508 (24 Mar. 1956).

coincidence with changing geomagnetic polarity.<sup>21</sup> Wollin, Ericson and Ryan have noted by faunal and oxygen indicators at various sedimentary levels that cool climates may be associated with high magnetic intensity.<sup>22</sup> These may be short-term indicators, since at least by the *Solaria Binaria* theory, magnetic intensity was stable and high until recently and has since been declining.

A sampling of Siluro-Devonian sedimentary sections from the Arctic Archipelago of Canada reveals a common magnetic reversal. The magnetic inclinations suggest a low equatorial latitude. The rocks were apparently laid down under equatorial conditions, and they magnetized rapidly. Unfortunately, if the globe's axis rotation has since tilted or the continents have shifted or a plenum of clouds then covered the globe, the findings of such studies must be discounted; all three probably occurred. That is, the Devonian has long been thought to have been a warm world; the arctic rocks, whether drifted by conventional modern theory or by quantavolutionary theory, would give false paleomagnetic readings, and the geographical poles may well have shifted as late as the end of the ice ages.

Also, field reversal is an indicator that worse things may be happening. An incoming giant meteoroid may dislocate the magnetic field in the course of destroying life and blasting rock. Whatever it lays down or heats to melting point will be stamped with a deviant magnetic imprint as it cools, provided the field has not sprung back into its original figure.

The complex picture is liable to so many contradictions and misinterpretations that one is tempted to discard it completely. If the magnetic field is due to an original source of electrical current deep in the Earth, can such a current be so fickle,

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<sup>21</sup> J. P. Kennett and M. D. Watkins, "Geomagnetic Polarity Change, Volcanic Maxima and Faunal Extinction in the South Pacific," 227 *Nature* (29 Aug. 1970), 930-4.

<sup>22</sup> G. Wollin, D. B. Ericson and W. B. F. Ryan, "Variations in Magnetic Intensity and Climatic Changes," 232 *Nature* (20 Aug. 1971), 549-50.

breaking down and resetting itself in a new pattern time after time, so as to mark new orientation upon the rocks and atmosphere above? Runcorn has written that microsecond daily changes in Earth's rotation (one report gives 1 second slowdown every 600,000 years) may cause variations in the shape and intensity of the current; he adds that sudden changes in rotation would produce radial changes in the currents.<sup>23</sup> Michelson argues that the energy required to interchange the Earth's magnetic poles is about that of a moderately strong geomagnetic storm resulting from an intense solar eruption.<sup>24</sup>

Meteors have pronounced magnetic effects. Studies to this end by Jenkins, Gilmor, Campbell and Green are summarized by Corliss, and Dachille has also insisted upon the phenomenon.<sup>25</sup> Passing cometary trains exhibit strong electrical disturbances and can cause the same in transacting bodies as in the space plasma. A large meteoroid, whether impacting or passing close by, will disorder the Earth's electromagnetic field. Also, were the Earth to change its orbital position, it would behave like a comet, with a flaring electric tail representing electrical transactions with the unaccustomed medium of passage.

The most enthusiastic students of terrestrial magnetic changes are the exponents and developers of continental drift. Prof. Billy Glass once told the author that what convinced him of continental drift was paleomagnetic measurements. These generally are held to correlate positively bands of rock, moving away from the central Atlantic ridge, with time; the older rocks are farther from the ridge. Not only do the magnetic measurements depend upon geochronometry but also upon uniformitarianism, because it is assumed that the lava flood extending from the ridge

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<sup>23</sup> S. K. Runcorn, "The Earth's Magnetism," 193 *Sci. Amer.* (Sept. 1955). 152.

<sup>24</sup> Irving Michelson, "Mechanics Bear Witness," 4 *Pensée* (Spring 1974), 15-21.

<sup>25</sup> A. W. Jenkins, *et al.*, 65 *J. Geophys. Res.* (May 1960), 1617- 19, and in Corliss, compiler, *op. cit.*, GMM-001 to 4 in G2.

has been of the same volume-to-time ratio for many millions of years. More on this last point will be brought forward later.

To conclude these pages on magnetic and geographical tilts, we can state our position: the geographical figure of the rotating Earth can tilt or reverse north and south, with moderate applied exoterrestrial force and with large holospheric damage. It has done so. The magnetic figure of the Earth will tilt or reverse in general accord with a change of geographical figure, but can also tilt or reverse independently depending upon a large electrical exchange between the Earth and a massive agglomeration in space. It has done so repeatedly. The damage is much less. Both types of change -of geographical and magnetic axes -could not have occurred, by the theory of *Solaria Binaria*, until the binary system was collapsing, which has been placed in time by the present author and again by Milton and myself at less than 14,000 years ago.

There remains a more devastating change, whereby the Earth not only tilts but also emplaces its poles upon a new geographical location. The physical force needed to accomplish such a change is many times greater than that required for the tilt alone, because the rotation of the Earth is both interrupted and altered in orientation. It is known that the Sun changes differentially the rotational speed of its several sections and some sharp movements may occur in connection with solar storms.<sup>26</sup>

Too, on Earth, an interrupted rotation is likely to be ramified latitudinally and stratified internally. T. Gold has given attention to such problems; in one place he has demonstrated that the polar positions will change owing to crustal movements and distortions.<sup>27</sup> In another place, too, he insists upon the alteration of the Earth's shape that must accompany a displacement of the

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<sup>26</sup> 26. "Solar Rotation," 202 *Science* (8 Dec. 1978), 1079.

<sup>27</sup> "Irregularities in the Earth's Rotation," in two parts, 17 *Sky and Telescope*, (March 1958) 216-8 and (April 1958), 284-6.

geographical poles.<sup>28</sup> He points to the evidence of paleomagnetism as indicating numerous different polar locations over geological time, evidence that we must largely discount.

But hard geophysical evidence, as presented by Hapgood, Velikovsky and Cook, for instance, supports belief in a recent ice-age finale that shifted the north geographical pole from a position presently denominated by Baffin Island, 20° south of its present location. There is a measurable spring-back occurring all the way from Scandinavia to the Hudson Bay area, a rising area that may be due to a new rotating figure of the Earth, involving a new equator, and possibly to collapse and sudden removal of a burden of ice that had been weighing down the region. (Inasmuch as the great global cleavage passes through the center of this region, one has to introduce the probability of a forcing apart and expansion of the area between the two rising elements of continental rock.)

Surely, if the Moon were to have erupted from the Pacific Basin, the Earth's shape would have been altered, the crust would have been half removed, and the conditions Gold sets for a shift of geographical poles would be satisfied. A great force moving southwestwards would have tilted the globe, removed the crust, cleaved the globe, set the continental fragments into motion, slowed the speed of rotation, and established a new figure of spin, with a new equator and new geographical poles.

This occasion may have been the one and only time that the Earth changed its true axis of spin, as opposed to a number of other occasions in which the geographical and magnetic axes tilted. All the historical and legendary allusions to the world "turning like a potter's wheel," to celestial dizziness, to changing constellations, suns standing still, and so on may relate only to tippe-top behavior of the globe. Moderate changes in time, that is, of orbital and rotational motion, are not excluded, involving deceleration of the Earth's rotation, whether momentary (the

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<sup>28</sup> "Instability of the Earth's Axis of Rotation," 175 *Nature* (26 Mar. 1955), 526-9.

Gibeon phenomenon),<sup>29</sup> or permanent. Claims of heavy deceleration, even so, are suspect; with a tilt, the sun may be visually retarded but the Earth's rotation very little affected.

The full range of possibilities in tilts has not been completed yet. Two additional ideas remain to be presented. The first concerns crustal slippage. The Earth's shell or crust, contributing about 1% to the Earth's radius, lends about one-thirtieth to the moment of inertia of the whole Earth. Apparently, then, if the shell can slip without an identical movement of the mantle and core, the energy required to change celestial and geographical orientations on the shell would be less than that required for a total reversal or retardation of Earth motions.

There are signs that this stratified slippage has occurred in the overwhelming evidence of crustal destruction around the globe as, for example, in the outpourings of lava found everywhere. Even so, the energy required for total shell slippage (following the attraction of a passing body) is formidably high, and where it would be applied is crucial, so that this idea appears, initially at least, to be as totally destructive as any other means of moving the Earth about.

However, if this crustal slippage were to occur at the moment when over half the crust was being blasted into space, then obviously the problems of slipping and venting would be greatly lessened, especially with the assistance of fracturing, rifting, and expansion. These topics cannot well be delved into here, and are reserved for treatment in later chapters.

Archaeology affords support to the proposition that the Earth has changed position relative to the Sun and the planets in recent antiquity. In connection with the human drive to build settlements according to the prevailing cosmological observations

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<sup>29</sup> 29. J. Gribbin and S. Plagemann, "Discontinuous Change in Earth's Spin Rate Following Great Solar Storm of August 1972," 243 *Nature* (4 May, 1973), 26-7; André Danjon, *Comptes Rendus des Séances de l'Académie des Sciences*, series B, 250: 1399 (22 Feb. 1960), 254: 2479-82 (2 Apr. 1962), 254: 3058-61 (25 Apr. 1963).

and beliefs, the compass orientation of the constructions presents highly important issues in regard to changes in the Earth and the sky. That the earliest humans felt compelled to address their dwellings and public places to astronomical occurrences is generally granted. No one has yet found an ancient settlement capable of taking some shape that is not sky-oriented.

The mind of today's scientist turns first to the Sun, then the routines of the current Sun -the rising and setting, the solstices and equinoxes -to answer all problems of ancient civilizations. When the ruins do not confirm to these directions, then Polaris, the current fixed star of the north, is assumed to guide the primeval builders. One perplexed writer suggested that the Mesoamerican Olmecs aligned their structures with the Big Dipper. When neither the north-south axis nor the solar behavior nor a constellation fits the orientation, then it is that the ancients could not tell directions well, or that the matter in any case was not important to the builders.

What is absent from such reasoning? First, there is a failure to appreciate that the desire to orient to the skies was an obsession, a compulsion, an inescapable tradition, a sacred obligation, a proud duty. Second, the ancients, as far back as we can discover their humanity, could calculate readily and exactly the course of heavenly bodies and orient themselves thereto. Many examples of this are presented in G. de Santillana and H. von Dechend's book, *Hamlet's Mill*,<sup>30</sup> indeed this is the book's theme.

Third, not only the Sun, the North Star and the constellations, but also and especially the Moon and the planets were often objects of sacred (which is to say, all-important) architecture. This point has been stressed in numerous works on many cultures. The ancient pyramids of several countries, the design of Greek temples, the Hebrew Tabernacle and the Temple

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<sup>30</sup> Boston: Gambit, 1969.

of Solomon -these and all other ancient masterpieces were like wedding rings uniting Earth and Heaven.

Fourth, when the heavenly bodies deviated from their customary paths or when the Earth shifted its position with respect to them, then the plans of temples, buildings, and settlements were shifted to conform to the new order of the skies. That is, celestial and mundane catastrophes of the past can explain many deviations from present "true" orientations.

Controversy naturally is engendered by any claim that the planets and Earth have shifted their axes in millions of years, if not billions. Still, every oriented edifice or monument built since about 2600 years ago (after the last of the catastrophic shifts, as argued by Velikovsky)<sup>31</sup> seem to have remained fixed in relation to the present skies, while those built before then appear to have moved.

Certain claims of "fixed" structures warrant study. The most famous is the Great Pyramid in Egypt. Recently, the Stonehenge megalithic "astronomical observatory" has also been widely discussed. The age of the Great Pyramid of Ghiza is in question. It has been ascribed to around 3200 B.C. and to other times. But no one suggests that it was built after 687 B.C. or for that matter after 1450 B.C. that is, after the end of the Middle Bronze Age. The West face of the Great Pyramid, which Stecchini believes was drawn first and is the basic face, is oriented 2'30" west of true north.<sup>32</sup>

This slight discrepancy, claims Stecchini, may be attributed to the precession of the equinoxes, which occurred from the time at which the plans were drawn to the commencement of work. He thinks that the Egyptians knew of the precession and deliberately allowed this discrepancy. I doubt this thesis, also, which is based partly upon the work of de

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<sup>31</sup> 31. See Velikovsky, "The Orientation of the Pyramids," 3 *Pensée* 3 (fall), 20-1.

<sup>32</sup> L. C. Stecchini, Appendix to Peter Tompkins: *Secrets of the Great Pyramid* (New York: Harper and Row, 1971), 380.

Santillana and von Dechend, and ascribe the deviation from true north as an increment of continental drift and other seismic movement of the area.

A more important question concerns whether the almost perfect north-south orientation means that no tilt or change of poles has occurred since the Great Pyramid was constructed. The following possibilities ensue:

1. The Pyramid was imperfectly oriented to true north.
2. The Pyramid was perfectly oriented to true north but the continuing drift of the African land mass or at least northeastern Africa has amounted to minute disorientation since the Pyramid was built.<sup>33</sup>
3. The Pyramid was oriented to a pre-existing true north, marked by another star. The axis of the earth shifted celestially. But an abundance of stars can be used to mark true north; Polaris is the most recent star and naturally the Pyramid points to it.
4. The Pyramid was oriented to a pre-existing true north, which coincided with the present true north. The Earth's axis tilted on one or more occasions and then tilted back to its former position when it was built.
5. The Pyramid was oriented to the north-south. Subsequently, the rotation of the Earth changed direction, meaning that a new *geographical* (not celestial) true north was set up, but the rotation was either changed by 180° and therefore south became north, or alternatively, accompanying or subsequent land mass thrusts

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<sup>33</sup> 33. Cf. G. S. Pawley and N. Abrahamson, 179 *Science* (2 Mar. 1973), 892.

coincidentally brought the area around Cairo to rest pointing at the true and original north-south axis.

Of these five possibilities, the third appears most acceptable within the framework of this book. It would permit a number of axial tilts but only a minimum land-mass movement affecting Egypt since the Pyramid was constructed. This seems to be in accord with the theories advanced in *Chaos and Creation* that catastrophes subsequent to the great Pyramids construction did not cause major crustal slippage or a changed axis of rotation even though they caused heavy electrical, flooding, hurricane, and volcanic events. Earlier catastrophes involved the major changes in the geographical existence and location of the Earth's land masses.

At least so far as the Egyptian area is concerned, Velikovsky's descriptions in the Venusian case (ca 1450 B.C.) especially may be exaggerated; any implication that the geographical masses moved, or the Earth's axis of rotation changed, would have to be discounted. His evidence that the Pyramid shows signs of great seismic stress should be recalled, however. The most resistant material ever sculpted and fitted by mankind was affected visibly by earth shocks that must have been beyond the present limits of the Richter seismic scale.

The huge stones placed in circles and lines at Stonehenge, England, can be proven to be only generally oriented to observe solar solstices of the present age. Otherwise they display actual rearrangements of stones, done with immense labor, which can best be accounted for by an axial tilt, that is, by catastrophe.

Here, as at other magnetic settings, the earth scientist needs to take into account human motives, asking oneself: is it likely that the stupendous collective labor required to build these great structures, admittedly astronomical, would have been mobilized if the Earth (and hence the skies) were not exhibiting strange and terrifying changes of motion? Was the human urge to control the sources of his terror implicated?

Attempts have been made at dating Stonehenge by C14 on organic objects found in association with it. MacKie is of the opinion that the dates of Stonehenge and other megalithic astronomical sighting locations would not permit one to claim reorientations of the Sun after 1500 B.C.<sup>34</sup> Hence, in Joshua's time or on later occasions, reports of the Sun altering its route would have to be considered false.

Still, Stonehenge, like the Pyramid, is a catastrophized artifact in the first place, and bears also the marks of catastrophic changes in its settings. The C14 dates are not abundant and consistent, nor generally reliable within the span of centuries.

The Mesoamerican sites magnify the uncertainty. There are many of them. All are thought to have been set up after 1500 B.C. Macgowan, (1945), and now we quote Anthony Aveni extensively,<sup>35</sup>

... seems to have been the first person to suggest that the plans of a large number of Mesoamerican cities exhibited an east of north axiality. Among those sites which evidenced some orderly arrangement, he observed that the orientations fell into three groups: true north, about 7° east of north, and about 17° east of north; he noted that few sites were oriented west of north. In the 17° group were Teotihuacan, Cholula, Tenayuca, Mexican period buildings at Chichen Itza, Tula, and the pyramid adjacent to the Zocalo in Mexico City. A number of sites of the Peten District seemed to belong to the 7° group. Macgowan suggested that a historical pattern might emerge in the sense that early structures such as Cuiculco possessed a nearly true north axiality while the 17° east of north orientation showed up in the later buildings.

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<sup>34</sup> Euan W. Mackie, "Megalithic Astronomy and Catastrophism," 4 *Pensée* 5 (Winter), 5-20; "Megalithic Astronomy: Neolithic Stone Circles," *I S. I. S. R.* 4 (Spring 1976), 2-4.

<sup>35</sup> Anthony Aveni, ed., *Archaeoastronomy in Pre-Columbian America* (Austin, Texas: U. of Texas Press, 1975).

Aveni found by transit that fifty of the fifty-six sites surveyed align east of north; the 17° orientations seem to be prevalent in the valley of Mexico.

Yet Carlson, working on centers carbon-dated between 1000- 1400 B.C. says that "Olmec culture is well-characterized by ceremonial centers, which are generally 7° to 12° west of north...".<sup>36</sup> This would suggest that tilts of different ages are represented in the two regions, or that the Olmecs, who invented the magnetic compass, may have oriented their buildings to a magnetic north. Almost all of them deviate from true north orientation.

According to sacred scripture, the four gods who were born of the creator gods govern the four cardinal points of the Earth's compass, and struggle with each other. It would appear from the chart that, while north-south was the way human construction should be engineered, by present direction lines, frequent changes have occurred.

A few years ago, Mesoamerican civilization was considered recent and crude. Today the view has changed and the same respect is given the early Mesoamerican as is accorded to other world civilizations.

In 1976, a lodestone compass was claimed for the Olmec civilization at 1000 B.C. or earlier, before the earliest demonstrable Chinese compass. In this case, it cannot be argued that the Mesoamerican were incapable of planning their settlements and public buildings with accurate reference to north or any other cardinal point. In a letter describing a study trip to Central America, Patrick Julig writes:<sup>37</sup>

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<sup>36</sup> John B. Carlson, "Lodestone Compass: Chinese or Olmec Primacy?" 189 *Science* (5 Sept. 1975), 753-60.

<sup>37</sup> To William Mullen, 1974 n. d. Julig studied the famous Nazca earth lines of Peru and concluded that they might represent lines of meteoritic falls from which the (sacred) burnt stones were removed.

... I observed changes in the orientation of the foundations of Mayan buildings between the Archaic and Classical periods. Sometimes there were changes within the same building by as much as  $10^\circ$  in later additions to the structure such as in the Palace at Palanque. This could possibly be a way to date the structures, or at least the foundations, as being pre-687 B.C.

One must tentatively conclude that at least Middle America suffered serious crustal slippages. Or, axial tilts occurred frequently and the Mesoamericans were employing a method of determining true north (the Earth's axis of rotation) by a means not dependent upon a star. And, if this technique existed, the alternative presents itself that the object defining true north itself moved on occasion.

A second study by Aveni leads us also to believe that astronomical settings have altered in proto-historical times. He and his associates traced and surveyed the orientations of "The Peaked Cross Symbol in Ancient Mesoamerica" in many places.<sup>38</sup> These peaked crosses are not monuments of the highest level, but remind us in some ways of the frequent crude religious sculptures that are to be found at crossways in many places on Earth, dating up even to the present day. The cross represents the application of the Sacred Year to the four quarters of the world, the cardinal directions, the highly significant merging of time and space that the ancient Mesoamericans achieved.

Teotihuacan was probably the religious center of ancient Mesoamerica, like Rome of medieval Europe. The fundamental Teotihuacan grid as excavated is oriented  $15.5^\circ$  east of north. Of the some 30 symbols that the Aveni group have assembled from elsewhere in Mexico, the orientations of 19 are given. Of the 19, nine are oriented within  $2^\circ$  of the Teotihuacan grid. Of the nine, all except one (carved on an outcrop) are on a floor. Of the remaining ten with known orientations, all range between  $35^\circ 42'$  and  $80^\circ 24'$ ; all are incised upon outcrops except one that is on a

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<sup>38</sup> A. Aveni, H. Hartung and B. Buckingham, 202 *Science* (20 Oct. 1978), 286-79.

broken flat stone whose "axis points toward Teotihuacan"(TEP3), and another (TUI) that is "pecked on horizontal floor of lava field." Most of these are considered as pointing towards the summer solstice sunrise, which is rather insulting to the intelligence of the humblest pecker. Are we to believe that they could not find the point of farthest advance of the Sun? And why should outcrops be carved east and floors to the north?

It would appear that either (a) the carvers were inexact amateurs with biases towards the east, or (b) the larger part of Mexico shifted its axis by  $15.5^\circ$  to the west of north in response to seismism and/or a tilt of the Earth's axis in reference to the solar and sidereal system, or a geographical transfer of poles implying a changed axis of rotation, or (c) the axis of Teotihuacan shifted at an early time eastwards from true north and its new position was assigned sacred and ritual meaning, a Holy North to be imitated, just as the 260-day Sacred Year was tenaciously preserved, without a celestial referent, until modern times, alongside the 360 and 365-day calendars. In the case of (b) and (c), the extreme eastern orientations of the peckings might have been memorial, without special orientation, to Teotihuacan's gods upon the occasion of faulting, fracture and exposure of new rocks. The geology and the relative dating of the peckings are important in considering these alternatives. Especially, the hypothesis can be entertained of a deliberate attempt to follow a fault line (especially if an electrical current were running) in the outcroppings. (If the Etruscan priests took possession of and catalogued all aspects of a spot struck by lightning, similar obsessions may be expected among the equally obsessional Mesoamericans.)

So long as north-oriented axes were to Holy North, they would be consistent. But east-oriented axes, if there is no "Holy East", would wander with tilt of the Earth's pole, that is perhaps from  $30^\circ$  to  $80^\circ$ , whether in the wake of the Teotihuacan shift or upon some later occasion. The association of the peaked cross symbols with outcroppings must have some significance. If a desperate speculation may be permitted, new outcroppings might have become thereby "holy" too, just as fallen meteoroids have

become holy, and perhaps the outcrop orientations might be attempts at affixing the eastern risings of that vagabond planet, Venus.

A research of deviating Egyptian, Mesoamerican, Mycenaean, Greek and other structural orientations may suggest dates for the construction of earliest Teotihuacan-a subject of some controversy -as well as point to causes of the phenomena of the peaked crosses.

Finally, one may observe that the Teotihuacan orientation  $15.5^\circ$  to the east of north could have indicated a transfer of the geographical north pole of the Earth by that amount at some point of time. This shift is not far from the degree of shift in the north pole from a location at Baffin Island to its present location northwest. A number of students believe such shift to have occurred at the "End of the Ice Ages."

