

PART FOUR

CRUSTAL TURBULENCE

"Crustal turbulence" connotes rock movements, to be sure, but much of this book concerns the same, and we may only plead that there is especially more of these phenomena in this section concerning earthquakes, volcanism, rising or descending and swelling or shrinking earth masses. "The continent of Atlantis" is still mostly a name for geographical and legendary indications of crustal turbulence; it finally sank in one furious climactic day, so said Plato, after exhibiting the above-mentioned four forms of turbulence, plus continental cleavage, floods, pandemonium and extinction. We shall be criss-crossing as usual among the high energy expressions of nature, watching all the while for exoterrestrial interventions.

CHAPTER SIXTEEN

EARTHQUAKES

The ancients may have been more familiar with earthquakes than modern man:

... The earth shook and trembled... the foundations also of the hills moved and were shaken... Then the channels of the waters were seen... and the foundations of the world were discovered... The mountains skipped like rams... [The divine power] removes the mountains... overturns them... shakes the earth out of her place.

In these and many more lines, the Hebrew Psalmists commemorated times of catastrophe. World myth contains thousands of such songs and stories. Some can be located in time; most cannot. But, little by little, the science of myth will move to help the science of the Earth; and geology will move to interpret mythology. Then the ages of quantavolution will assume a clearer shape.

The deep valleys, rifts, and canyons of the globe will soon here be assigned to the greatest of movements. The Earth cleaved; the continents broke up and were rafted into place. At the same time and on later occasions, many places on Earth sank into the depths. These might all be called earthquakes, although they are global events.

A great but conventional earthquake would be described as in the following testimony of a resident about the New Madrid, Mo., earthquakes:

The first shock came at 2. a.m., December 16, 1811, and was so severe that big houses and chimneys were shaken down, and at half-hour intervals light shocks were felt

until 7 a.m., when a rumbling like distant thunder was heard, and in about an instant the earth began to totter and shake so that persons could neither stand nor walk. The earth was observed to roll in waves a few feet high, with visible depressions between. By and by these swells burst, throwing up large volumes of water, sand, and coal. Some was partly coated with what seemed to be sulphur. When the swells burst, fissures were left running in a northern and southern direction, and parallel for miles. Some were 5 miles long, 4 1/2 feet deep, and 10 feet wide. The rumbling appeared to come from the west and travel east. Similar shocks were heard at intervals until January 7, 1812, when another shock came as severe as the first. Then all except two families left, leaving behind them all their property, which proved to be a total loss, as adventurers came and carried off their goods in flat boats to Natchez and New Orleans, as well as their stock which they could not slaughter. On February 17, there occurred another severe shock, having the same effect as the others, and forming fissures and lakes. As the fissures varied in size, the water, coal, and sand were thrown out to different heights of from 5 to 10 feet. Besides long and narrow fissures, there were others of an oval or circular form, making long and deep basins some 100 yards wide, and deep enough to retain water in dry seasons. The damaged and upturn country embraced an area of 150 miles in circumference [1].

Earthquakes are most simply thought of as movements of large bodies of rock, whether of a few tons or of the whole Earth. The rocks flow, flex or fracture. There may be two sets of rocks that split and separated in times past, or which do so now: one moves up and another down; or one slips alongside the other. Or one or both sets move apart or one or both press together. Or one crawls over the other. Earthquakes may combine these movements, so that one, or two, or all may happen at once.

The duration of the movement may be of seconds, or minutes. There may be a single shaking or a series going on for days, and again repeated months later. (The ancients cried to heaven over interminable tremblings, as when the Egyptians suffered them during the days of the Hebrew Exodus.)

Electrical fields gather and play about the scene, beforehand, during, and afterwards. The world may seem to be glowing with fire in the distance. The ground sends up thunder and groans. It screams. It makes rattles like volleys of gunfire. Winds spring up and blow hard. Waters are agitated; tidal waves sweep over the land; wellwaters sink; rivers stop flowing or change their channels.

Animals often sense an earthquake in advance and show distress. Birds fly far, mammals run off, lizards crawl out and away. People are of course terrified by the trembling, they pray, they condemn their sins and those of other, they swear to reform, and curse their government; they help each other or stand stupefied or behave like zombies [2]. When the rocks move, man's world shakes and shatters.

Any force that disturbs the rocks causes the earth to quake. Pumping radioactive wastes deep below ground caused earthquake tremors in Colorado a few years ago. A dynamite explosion or a small meteoroid impact will cause one. Frequently earthquakes are associated with volcanos. A map of the earthquake belts of the Earth is practically a map of the areas of volcanism. The same forces must cause both. The primary force could be an old one, unsettled, that is still working upon the rocks. Or it could be a new force. But perhaps the old and the new force are identical: the new occurs now for the first time; the old is what occurred some time ago. Is not the earth very old? Should it not have settled down? Should not the rocks be stable? If so, then force from nowhere is impossible.

Most of what is known empirically of the globe comes from earthquakes - earthquake shock waves to be more precise. Hence, it is difficult to talk about how the interior of the globe causes earthquakes, if indeed it does. Seismic waves can be made to register their occurrence and intensity on seismographs set up to record and calibrate them. Many thousands of earthquakes, mostly non-damaging, are thus registered around the world each year. They shake the housing of a heavy pendulum which, itself unmoved, marks the shaking on a graph; a reading of the graph indicates the magnitude of intensity on the Richter scale.

The patterns of seismism around the world in recent history are easily described now. One simply follows the Tethyan world belt, the world-girdling fracture (noting a greater intensity where it passes beneath the land), and the island arcs off of East Asia.

Cases such as the New Madrid phenomenon mentioned above are less effected, although a Mississippi Valley "earthquake region" has recently been described. Applying the quantavolutionary ideas, one may point to recent "Ice Age" shifts of the Ohio and Mississippi Rivers, which certainly denote earthquakes, and to the great load of detritus that the lower Mississippi basin must be bearing: "Atlas Shrugs." For, in a brief period, a large part of the North American continent surface rushed toward the Gulf of Mexico in a slurry of ice, water, stone, vegetation, and soil. If enough freshwater entered the gulf to freshen it, as Emiliani found, enough debris would accompany the flood to burden the region and deform and fracture its rocks.

In a second indicative, a severe earthquake struck north of the Adriatic Sea in the Friuli region of Italy. Shocks were felt simultaneously in the Upper Rhine Valley just northwest of the Alps. We conjecture that a branch of the African rift crosses the Mediterranean, runs up the Adriatic Sea, and emerges from beneath the Alps (which have overrun it) as the Rhine River Valley, emptying its waters into the North Sea. All of this is quite recent. The Rhine canyon cuts far out into the bottom of the North Sea, revealing its very late sub-aerial existence. Dutch geologist Doeko Goosen claims that the Netherlands suffered earthquakes more frequently in earlier times [2A]. The Fourteenth Century saw the erasure of many areas and villages. The Alps, of course, make up a heavy load upon the underlying rifted area of the crust.

The greatest known earthquake was registered variously between 8.25 and 8.9, in Chile on May 22, 1960. On the Richter scale, each higher unit stands for a ten-fold increase in wave amplitude, and this represents a .32-fold leap in radiated seismic energy. The numbers move arithmetically from 0 to 8.9 but the magnitude increases exponentially; for example, an earthquake of 8.0 is 10,000 times greater than an earthquake of 4.0 and the energy release much greater.

The 1906 San Francisco earthquake might have reached 8.3 on the Richter seismograph scale, which registers the intensity of vibrations alone. Its equivalent in the more descriptive Mercalli scale would be 11 (out of a possible 12). The present top of the Mercalli scale reads: "Damage total. Waves seen on ground surfaces. Lines of sight and level distorted. Objects thrown upward in the air."

In the Assam earthquakes of 1950 "rivers were dammed; major floods drowned the countryside; mountains and hills split open and square miles of their surface covering were stripped off; rain came down as mud owing to the dust-choked air; and the geography of the region was permanently changed." [3]. It was recorded at 8.6; it is obvious that the measuring scale is a crude indicator of real events.

There may very well have been in recent times earthquakes of great force that do not register beyond the recorded limits of the seismographs, as conjectured by Chinnery and North [4]. Actually what is today meant by earthquakes is an earth movement defined by modern experience and measured by instruments calibrated to this experience. Because of the rareness with which earthquakes of magnitude over 8.0 on the Richter scale have occurred in the brief 75-year record of various measurements, "many investigators have concluded from this result that earthquakes... greater than 8.6 or so do not occur..." However, as it is likely that earthquakes of this intensity occur on the average once a decade, it is also probable that ones of greater intensity (with a seismic moment of 10^{31} dyne-cm or more as compared with the Chile 1960 earthquake of 2.5×10^{30} dyne-cm) can occur and may even be expected over a fifty or hundred-year period. If larger earthquakes occur they might cause destruction far greater than hitherto experienced and "may cause a considerable excitation of the Chandler wobble," a veritable, if slight, shaking of the axis of the Earth.

Most earthquakes have a localized shallow focus and originate within the crust, at or above the Moho discontinuity which may be regarded in quantavolutionary theory as the boundary of the Earth's shell and as the line of catastrophic slippage of the crust on several past occasions; but the Moho boundary itself was born of quantavolution, we maintain. It is both conventional

finding, and quantavolutionary theory, "that some overall global factor, rather than conditions localized in the hypocenters themselves, is responsible for. generating terrestrial seismicity." [5]

The source of an earthquake varies. The seismograph stations of the world draw a fix upon a certain point that appears to be the focus of the earthquake, its epicenter within the Earth. The mantle of the Earth is a hot dense liquid. It does not lend itself to earthquake manufacture by simple mechanical thrusts and fractures. Are there substances in the mantle that are escaping and causing disturbances in the overhanging rock or crust of the continental and oceanic bottoms?

"Yes," says the up-to-date scientist. Chemical elements are decaying in the mantle and crust. They escape upwards and set up convection currents. These currents actually amount to so much force that, like the rising heat of a boiling soup, they can move the surface of the soup off to the side and down. But the forces of convection required to move ocean bottoms and continents is tremendous and many persons, including this author, believe that they cannot be assembled [6]. Earthquakes and earth movements are basically mechanical, and do not result from chemical or nuclear forces, as Cook has shown.

Still, the theory is fetching. For if one examines again the map of the rifts, earthquake zones, and volcanic regions of the world, one can see that there is an order or pattern to them all. They cut up the globe, and the pieces can be called plates. Some of the plates can be measured as moving very slightly; and it can be seen that lands that are now far apart fit together as if they once were of one piece. Since no other force can be imagined by our up-to-date scientist, the convection current force, upwelling and moving out laterally beneath the rocks, must account for rifts, seismism, and volcanos. But this accepted theory, it develops, may be incorrect, and we shall return to the issue of convection currents in a later chapter on continental drift.

An ominous kind of movement has always been the "conjunction," when two or more celestial bodies line up, especially the Sun and planets with the Earth. Earlier we mentioned the Gribbin-Plagemann phrase, the "Jupiter

Effect." [7]. They chose to plot their scenario along the 600 mile-long San Andreas fault, part of the East Pacific Ridge system actually. Hence, the San Francisco Bay Area and many other thickly settled communities found themselves wondering when the "Jupiter Effect" will occur. "1982" or thereabouts, said the writers. At this time, which is passing as this book goes to press, Jupiter and Saturn were to line up with the Sun, Moon, and Earth and exert an electrical gravitational tidal force upon the Earth sufficient to upset the delicate juxtaposition of rock surfaces along the San Andreas fault. The Moon is small, and 239,000 miles away on the average. Yet it affects the waters of the world with its tidal pull, daily and twice a month or every 14.8 days.

The same writers go a certain distance into history, where a few records are to be found, and are able to discover devastation by earthquake close to the time of past conjunctions, specifically in 1800-03. The timing is a bit off, the disaster by no means a catastrophe, but the evidence points to the "Jupiter Effect" as the culprit. In a close encounter with a large celestial body, the earthquakes would be immeasurably worse.

Before Gribbin and Plagemann, Charles Davison examined the same celestial motions to relate them to earthquakes. He found increases in seismism at full moon, 14.8 days, and 19 years and also found a sunspot period every eleven years: when the spots were particularly active, rains and earthquakes increased.

Davison's periodicities may thus be added to the planetary "Jupiter Effect." They show how sensitive are the shell and rock layers of the earth, in their fractured condition, to impulses from the outside. They are clearly tidal, i.e. cyclical.

Davison also discovered that atmospheric pressure could be correlated with earthquakes. Here there were two cycles: a daily one and an annual cycle. Midwinter midnight and midsummer noontime were seismic favorites. Perhaps the atmospheric phenomenon may be connected with the vast diffuse sky lights that occur before earthquakes, arising probably out of a discharge of electricity.

If changes of atmospheric pressure trigger quakes because they

represent a "true dead weight" of the atmosphere above a certain shifting point of focus, then this too is a tidal effect. If it is itself produced by electrical changes, then the direct cause must be assigned to whatever assembles atmospheric potentials.

Sunspots have been increasingly blamed for climate and earthquakes. Recently a 70-year gap in the sunspot record between 1645 and 1715 A.D. was rediscovered and called the "Maunder minimum." [8] It was a time when the Northern Lights hardly appeared; when the Sun's corona was relaxed and clear of disturbances; when C14 was increased because solar particles were not blocking in their usual way the cosmic particles that cause the C14 in the atmosphere; when tree rings became irregular and thin; and when the climate was called a "Little Ice Age." John Eddy, in announcing some of these findings, declared, "We've finally broken a block that held us back - uniformitarianism. It was an assumption we took as fact." And "We've shattered the Principle of Uniformitarianism for the sun." As yet a negative correlation with earthquakes has not been plotted; earthquakes should have declined in number and intensity.

The possibility also arises that some earthquakes are responses to increases in the amount of ice contained in the polar caps. This may be true today and also of any prehistoric ice-caps. Cook and A. Brown develop this line of thought [9]. Cook points to a correspondence between total annual seismic energy and a seeming accumulated energy in the growing ice of the caps. The huge vertical and radial pressures exerted on the earth's rocks by the caps may be taken up by the elasticity of the shell, or, on the other hand, and at least occasionally, the pressures may be alleviated by a shearing or refracturing of rocks even quite far away from the perimeter of the ice. We stated above that seismic origins are in global overall forces rather than in local areas of earthquakes themselves.

However, quantum revolutionary theory leads us to suspect that, not the present ice caps, but rather the effects of the great catastrophic periods are still felt. Earthquakes are seismic memorials to ancient disorders. The rocks of the Earth will not rest in place until their very gradual tailing-off consequences end.

The major source of present-day earthquakes is to be sought along the lines of the global fracture. The fractures will be discussed later on; here they must be mentioned because of their connection with earthquakes. Taking up first the north-south Atlantic rift and following it from the Arctic to the Antarctic, one observes intense seismism throughout its length but largely in the middle of the Atlantic and little on both sides of the Atlantic Basin. The fracture, like an almost healed wound, throbs, festers and drips a little, pushing the continents left and right almost unnoticeably. Perhaps the rocks of the Atlantic Basin are lagging or stretching behind the Pacific rocks, which are being pushed into the basin of the lunar genesis. No theory is yet adequate to explain the difference in intensity and frequency between the Atlantic and Pacific seismism.

Wherever the fracture moves - into the Indian Ocean, across Asia, and laterally across the Southern Pacific and up the East Pacific, it bears with it seismic strains that develop as earthquakes of shallow focus. Quakes of deeper focus take place along a belt that circles the Pacific area of erupted crust, from New Zealand north and east up to Siberia, across the north Pacific and down the west coast of the Americas all the way to Antarctica. It is famous as "the Ring of Fire."

A second belt of shallow and deep focus earthquakes pursues a route along the old Tethyan equatorial region. It begins in mid-Atlantic, pushes through the Mediterranean and the Near and Middle East, shifts to follow the Himalayans where these break upon the Asian heartland, and swings down and across the south Asian seas. Here, where it overlaps the "Ring of Fire," it is intensively active.

But the Tethyan belt does not appear to cross the Pacific basin. It would, of course, have been erased if the Moon had erupted from the region. There thousands of seamounts stretch up from the ocean bottom, and long transverse faults occur. Rather, it resumes off of Central America where, indeed, there is a meeting of all four great earthquake belts - the globe-girdling rift, the Pacific "Ring of Fire," the westwardly moved Americas, and the old Tethyan belt.

Afterwards it proceeds into the Caribbean which may have been

once coupled with the Mediterranean. It ends with the outlying islands some hundreds of miles south of its connecting link, from which I began here to trace its around-the-world movement. Geographers have matched Spain with the West Caribbean region; it is to be expected therefore that the Tethyan fracture of the south would tie into a transverse fracture to the north, thus circumnavigating the globe.

Earthquakes are seismic memorials, it was said. Today there are precipitators, but not important new causes, of seismism. The old causes that regularly occur are themselves significant reminders of a time when the heavenly bodies were much more active. Just as most religious holidays around the world celebrate or re-enact the terror of primeval catastrophe and the relief of survival, the rocks of the world move from time to time in reenactment of their ancient catastrophic motions, prodded by the ancient forces when these are stimulated by recurrent anniversaries.

But some still say that earthquakes go back in time without an increase in frequency or intensity. N.N. Ambraseys, a seismological engineer of the London Imperial College, concluded, after prolonged study of Near East documents, that the 3000 large and small earthquakes of which he found evidence in the period 1 to 1900 A.D. did not in this period show a decline of frequency and intensity [12].

His evidence is piecemeal, localized, undefined in regard to intensity, and barely usable. Only if there were enormously worse earthquakes early or late in the period could a conclusion be drawn.

By the first century A.D. the world was already seven hundred years past the last general catastrophe, as described elsewhere [13], and the skies had been tranquillized. Still, in the several hundred years before Christ, many accounts of severe seismism were handed down. The Spartans, most doughty of warriors, were so deadly afraid of earthquakes that if the land shook in the middle of a war, they would quit and retreat home; this kind of terror suggests a legendary experience recent to their times [14]. Ellen Churchill Semple, writing of ancient Mediterranean geography, admits the profuse claims of risings, sinkings,

chasms, and upheavals both in legends and in the scientific accounts of such illustrious reporters as Aristotle and Strabo. Not to mention Seneca, who declared that "Tyre is as regularly shaken by earthquakes as it is washed by the waves..." But she simply puts them down as exaggerations and furthermore "they erred as to the time element in the problem," for they did not employ the million or so years that she gave to the geological order of the Mediterranean. (We see, though, that *her* Mediterranean is only Quaternary!) Yet who can deny Pliny, the natural historian, when he claims 57 earthquakes to have occurred in a single year at Rome in 217 B.C. [15]?

As we move back in time, the earthquakes increase in severity. Velikovsky points out that in the eighth and seventh centuries earthquakes were so numerous that when they occurred they were mentioned in a bare line of the astrological tablets of Ninevah and Babylon [16]. Nevertheless, "reports concerning earthquakes in Mesopotamia in the eighth and seventh centuries are very numerous, and they are dated. Nothing comparable is known in modern times." He quotes from a tablet of Babylonia, "The earth shook; a collapsing catastrophe was all over the country; Nergal [Mars] strangles the country." Further, "references to breaches in houses, large palaces, and small dwellings are very numerous in the [Hebrew] prophets of the eighth century." Neglecting such sources, a historian could claim that "the earthquake held a place in the religious conception of the Israelites quite out of proportion to its slight and relatively rare occurrence in Palestine." Obviously, some literalness has to be restored to the language of the Bible, as well as to many ancient voices, if a better natural history is to be written.

A destroyed city may leave no records of its destruction; a sunken land leaves only an outsider's report and a myth. A lifetime (1937-1975) of work was dedicated by S. Marinatos before the archaeological and geological world came to realize, perhaps too enthusiastically, what earthquakes and explosions befell the island of Thera in the Aegean Sea some 3100 years ago [17].

Velikovsky's research is especially thorough on the "tenth plague" of the Exodus, which he places at about 1450 B.C. [18] "At midnight, there was not one house where there was not one

dead" in Egypt, says *Exodus*. All the houses were destroyed. It was the unlucky 13th day of the month. "The thirteenth day of the month Thout (is) a very bad day. Thou shalt not do anything on this day," according to an Egyptian myth. Why should a single event be frozen into all behavior unless it was far more frightful than other earthquakes, no matter how severe? "The children of princes are dashed against the walls" and "cast out in the streets," wrote Ipuwer, an Egyptian scribe of those days; "the prison is ruined;" again, "the residence is overturned in a minute."

It would seem that in those days the Earth shuddered and cities collapsed across the world from Mesoamerica through the Mediterranean, the Near East, Middle East, India and China [19]. The greatest modern earthquake becomes insignificant by comparison with the disasters of the Exodus period. Even so, that is not the earliest period of catastrophic earthquake known to archaeology.

Claude Schaeffer systematically combed the files of all excavations in the Near and Middle East that were connected with the period from some 3000 to 5000 years ago. His conclusions are sharp: all known sites suffered multiple destruction; most of the time the destruction was by earthquake, often with fire, sometimes by unknown causes. In the city that he himself excavated in part, Ras Shamra-Ugarit, at least eight heavy disastrous discontinuities were discovered in the period 2400 to 1000 B.C., by his dating.

At five points in time a general destruction of the whole Near East occurred. Small earthquakes, that must have been very common, are of course not considered. They are hardly detectable in excavations. After practically all of these disasters, many years passed before a culture could renew itself or be resettled by survivors from other areas.

Schaeffer plotted the destroyed settlements on a modern seismic map that shows areas where earthquakes of intensities 6, 7, and 9 of the Mercalli scale are typically found. A number of the repeatedly destroyed settlements were located in regions of lower magnitude earthquakes. As noted earlier, this is true of Rome and Palestine, too. They are no longer so prone to

earthquakes as they were then.

The destruction was so total in many of the cases which Schaeffer studied, and had such peculiar features - heavy combustion, for instance, and in the case of Troy II, "the Burnt city," which I too studied, both deep calcination and yet enough time for the population to escape - that the investigator is led to consider even exoterrestrial hypotheses. Invading troops, volcanos known to exist, and hurricanes acting by themselves are inadequate hypotheses. Deep ash falls might apply in some cases; unfortunately archaeologists before World War II paid little attention to levels of destruction; anyhow, where would the ash come from? Once again, the lack of data frustrates theoretical reconstruction; moreover, the less severe modern experience of earthquakes had led to simplistic and negligent judgements even on the part of groups which spent years on site.

Were the quantavolutionary hypothesis to be increasingly applied, the contrast between the past and present would become more marked. Systematic review of the field work of the past two hundred years is needed, as is also a thoroughly objective analysis of ancient legends and records. Too, technical awareness and application of new paleo-chemical techniques are needed in further field investigations.

We can conclude that earthquakes were greater in early history and pre-history than they are today. Further, the seismic experience of the past century is not adequate to assure us that earthquakes a thousand times worse in their effects are no longer possible. They then approach a new level of destruction wherein fire, flood, fall-out, avalanches, diastrophism and other effects assume major roles. Under such conditions the seismism itself tends to become a relatively minor feature and even to lose its name to much greater movements of the land, sea and air. The earthquake is supremely prominent today because the rocks replay more of the history of catastrophe than the atmosphere, the hydrosphere and the biosphere. No people has recalled total cultural destruction by shaking but perhaps all recollect its destruction by fire, winds and water.

There are parts of the world where the rocks, seeming so firm to the naive eye and touch, are criss-crossed by what must have

been an interminable succession of surges and shakes. Cores of the earth under Athens were drilled lately in the planning of a new subway; most of them pulled up cylinders of the so-called "Athens schist," a rock formation that is a mass of small chaotic fractures. It is conceivable that millions of years of erosion caused the cracking; it is perhaps more readily conceivable that the schist was macerated in a period of continual trembling. Plato reports that Athens suffered severe earthquakes in its earlier history; springs on the acropolis were stopped and cliffs were toppled. According to Plato, the Attica of old was practically unrecognizable by his own time, which seismically is our own time, the flattened end of the seismic curve. [20]

Notes (Chapter Sixteen: Earthquakes)

1. The account of one Godfrey Le Sieur, in E.M. Shepperd, 13 *J. Geol.* (Feb. 1905), 46-7.
2. U.S. Government Printing office, *The Great Alaskan Earthquake of 1964* (1970).
- 2A. "A New Model for Level Areas," Vitgeverij Waltman: Delft, 1974.
3. Lane, *op. cit.*, 211.
4. "The frequency of Very Large Earthquakes," 190 *Science* (19 Dec. 1975), 1197-8.
5. Cook, *op. cit.*, citing Benioff (1955).
6. See Chapter 24 below.
7. See Chapter 6, fn. 13.
8. John A. Eddy, "The Maunder Minimum," 192 *Science* (18 June 1976), 1189-1202.
9. Hugh A. Brown, *Cataclysms of the Earth* (NY: Twayne, 1967).
10. P. Jordan, *op. cit.*
11. As is argued by Velikovsky in *Worlds in Collision*, Chapter 8.
12. *Nature* (16 Aug. 1971), 375-9.
13. In *Chaos and Creation* (1981) and *Worlds in Collision* (1950).
14. E.C. Semple, *The Geography of the Mediterranean Region: Its Relation to Ancient History* (NY: Holt, 1931), Chapter 3
15. II *Natural History* 86.

16. *Worlds in Collision*, 274-8.
17. *Chaos and Creation*, 233-4.
18. *Ages in Chaos* (NY: Doubleday, 1952) and *Worlds in Collision*, *op. cit.*
19. Velikovsky, *Worlds in Collision*, and Schaeffer, *op. cit.*
20. ph. Negris, *Plissements et Dislocations de l'Ecorce Terrestre en Grèce, leurs Rapports avec les Phénomènes Glaciaires et les Effondrements dans l'Océan Atlantique* (Athens, 1901).

CHAPTER SEVENTEEN

VOLCANISM

Five hundred volcanos of the Massif Central in France, now defunct, were erupting 12,000 years ago, or less, during the Magdalenian Upper Paleolithic culture. So maintained Escalon de Fonton of Montpellier University. The spheres of the Earth were once so active that humans must have been encouraged to a pan-animism, an omnidirectional feeling which would have dominated all religion and culture if there had not appeared some immense and forceful sky bodies that focused attention upon themselves. Mother Earth, now a picturesque name, was devoutly and literally supplicated by the ancients even in the millennia of the great sky gods between 13,000 and 2700 B.P. She was often married to the greatest of the gods, and it was generally believed that her nuptial ties explained much of the animism of the Earth. "A theory of volcanicity" must not only be "taking into account the whole range of geodynamic processes," as Rittmann says in his classic work on volcanos, but also the whole range of cosmodynamics.

The great movements have gone, but a restlessness remains, erupting locally; volcanos erupt solo, almost never performing duets. The volcanos of the world adhere to the world-girdling fracture system. The system organizes the world's volcanos. The volcanos of the land, active and extinct, follow the great fracture lines that pass underground as for instance in the Tethyan shear sub-system of the Caribbean-Mediterranean-Middle East, or beneath the Pacific coastal states of America. The same is true of the volcanic belts off the East Asian continent. The oceanic volcanos string along with most of the fracture system. Isolated volcanos such as the Hawaiian Islands require special explanations; if the general theory here that seamounts (guyots) are fossil short-lived mantle taffy is correct, the isolated volcanos can have originated at the same time, "the same, but more so." The difference may be explainable by measurements made by Preston in 1893: "The lower half of Mauna Kea is of a very much greater density than the upper. The former gives a value of 3.7 and the latter 2.1, the mean density of the whole

mountain being 2.9,"[1] for the height above sea level. Thus, like a seamount, Mauna Kea stretched in a taffy bubble until finally it burst and began operating as a typical volcano.

More puzzling is the absence of clear connections between volcanism and astroblemes. Why should not a deep shocking crater give rise to a volcano? That a meteoroid often makes a melt of a kind is undisputed, but where is the persisting volcanism? Obviously one must seek for deeper roots of the world's volcanos.

Volcanism takes the form of cones and fissures. It is also beneath swellings and bubblings of surface features. Most of the igneous basaltic surface of the world, including the ocean bottoms, was created by fissure volcanism. As occurs still in Iceland, fissure volcanos produce lava copiously. "During recorded history more lava has poured forth above the sea in Iceland than in all the rest of the earth's volcanic belts combined. Yet... Iceland's volcanic belt comprises less than one-half of one per cent of the total length of the world-encircling rift." [2] Beaumont points out that 40,000 square miles of the British Isles afford plateaus of basalt in sheets; though nowhere are cones or vents to be found, till and clay accompany the basalt [3]. Rampant fissure volcanism is today observable on planet Venus. "Recent first-class Pioneer photographs of Venus show that the planet is rent with fissures, and most remarkably has been described as 'the most volcanic planet' in the solar system." [4] By "most remarkably" the writer implies the theory that Venus is a very young planet and has been losing its heat of eruption from Jupiter only slowly.

When the Earth had to erupt magma on a large scale, from far down, because of a loss of crust and an expansion of crust, fissure volcanism had to be the means. The deep ocean ridges of today still supply lava for paving the abyssal surface; the process has assumed a certain orderliness. On the other hand, viewing the Pacific Basin one must conjecture that a very large surface was once removed and a deep wound was left exposed that repaired itself *in situ*. The concept of cone and fissure volcanism fails, then and there, and one must speak of sheet volcanism, creating its own hard skin.

Fissure volcanism stands for extensive catastrophic venting; if there is so little of it today, the reason occurs in the general global settling. Cone or tube volcanos represent a moderate 'need to erupt.' Volcanic fields denote an interconnected set of tubes with a number of outlets. Volcanic outlets are spaced apart in relation to the thickness of the lithosphere; thinner rock invites closer spacing [5].

When dormant or extinct, all of these suggest either that a local rock crisis has been settled or that the global volcanic system has been shutting down its ramifications and further extensions. Many hills and uplifts, whence gases and lava have never escaped, are in the same fossil status. A major exoterrestrial encounter, the only event that can excite general volcanism, would reinvigorate the pattern of prehistoric and present volcanism insofar as the force vectors of the encounter prescribe, and would excite new volcanism wherever new stresses were imposed. Ultimately, geophysics should be able to locate as a set of overlays the total historical series of exoterrestrial encounters in fossil and live volcanism and go so far as to discover or substantiate the detection of their avenues of approach, their duration, and their energy.

Neat surveys of past volcanism are not to be had. Rampino, Self and Fairbridge collected "known volcanic eruptions of large magnitude within the last 100,000 years." [6] Their interest lay in associations between volcanism and climate, and a shaky correlation was established, with climatic change apparently preceding eruptions, suggesting to this author exoterrestrial issues. Presently germane, however, is the possibility that the statistics will confirm or deny a greater incidence of volcanism in the past. No help is forthcoming, because of the inadequacy of the data: the dating methods are perforce questionable; the bias toward known historical instances is heavy (12 of 28 cases occur in the past 5000 years, one twentieth of the period studied); and there is no uniformity of occurrence over time (implying, if anything) that heavy volcanism is aroused by global events. Because fossil volcanism is generally assigned even older dates, most scholars do see very heavy volcanism in periods beyond 100,000 years; australopithecus, for example, is often tramping in volcanic ash, but 'three million years ago and more.'

Some 13 ash layers have been already discovered in the Central East Pacific Ocean, none blanketing the entire region. There is a great discrepancy in dating between the argon radiometric and biostratigraphic methods, about half a million years within the single million years of total assigned time. The argon technique is faulted for atmospheric contamination and incomplete outgassing of lava containing radiogenic argon. (But is this not an inevitable occurrence, then, in all catastrophism, where atmospheric "pollution" is inevitable?) Even so, both methods are faulted when it appears that preclassical Mayan artifacts are found under the 500,000 y argon-dated (or 50,000 y biostratigraphic-dated) so-called "D" (or Worzel) layer of ash in the region.

The explosion of the island of Thera about 3000 years ago sent about 40 km³ material into the atmosphere. The seas were covered with pumice, some of which was driven ashore. Marinus and Melidonis plotted the story of one such incident at the small island of Anafi to the east of Thera. Two pumice deposits were noted. The one at Vounia is notable.

On the base of a natural profile of soil, we observe the following sequence: lowermost schists of the basement (bed rock), on this a bed of earth and pieces of schists of alluvium and slope debris. On this the mentioned bed of pumice and on the pumice a younger bed of soil and small stones of the surrounding rock with the usual cementing of lime carbonate. The general dip of these strata is gentle (about 10°) to the bottom of the valley. The lower part of the pumice bed consists of broken pumice, though the upper one consists of almost powdered pumice mixed with small pieces of pumice, irregularly rounded, of some millimeters to a few centimeters. We cannot give any other explanation about the formation of the above pumice bed except the transportation and deposition of this material by the tidal tsunami wave following some terrible phase of the catastrophe on Santorin (Thera). [7]

The height of the foaming wave increased after rushing into the funnel opening of the narrow deep valley. It ascended, achieving 250 meters, and then retreated, leaving the pumice.

The authors do not comment on the heavy, late diastrophism evidenced: the absence of low-lying pumice beds, the abrupt cut-off of the bed, as drawn by them and the layering of *ca* 2 meters of alluvion talus atop the pumice bed. I have observed the same deep bedding of semi-consolidated rock over pumice in Thera-Santorini itself. Possibly there occurred subsequent explosions of rock and soil, or violent quakes that shook down hill-tops. The investigation of cases such as Vounia and Thera where the dating is relatively secure may enable us to reconstruct a larger and/or later sudden deposition of non-volcanic material. Without the historical dating here, one would be inclined to assign very old ages (as was the case here before Marinatos discovered Late Bronze Age artifacts in the ruins of Akrotiri) in order to account for the superposition of heavy 'erosional' deposits and then a slow landscaping.

Today, volcanism of all kinds may be remanent. Fascinating and destructive as it may be, it is as nothing compared with the volcanism of times past. The Soviet geologist, A.P. Pavlov, declared in 1936: "At the present time, only a residual, negligible manifestation of volcanic activity is observed on the earth; formerly, this activity was perhaps the most typical and almost universal phenomenon in the life of the planet." [8] Probably the phenomenon is correct, but the volcanism, like astroblemes, may have happened during only several immense exoterrestrial encounters.

The greatest eruption of modern times, some say (incorrectly) of all history, was the 1883 eruption of Krakatoa. The total volume of erupted material has been estimated at 18 to 21 km³. "When compared with prehistoric ignimbrite-forming events ranging in volume up to 10³ km³ the volume of the Krakatoa eruption was very modest." [9] So declare S. Self and Rampino.

Thera's volcano (Aegean Sea) blew away most of a large, high island and its culture three thousand years ago [10]. Ilopango (El Salvador) destroyed a cultured Mayan area of thousands of square miles in an explosion of 1800 years ago [11]. The volcano of Tamboro on Sumbawa Island in the East Indies emerged from the waters in 1812. Within three years it grew the awesome height of 12000 feet, some three miles tall. Then it exploded. Approximately 100 cubic kilometers of material shot

into the atmosphere. About 100,000 people were killed, many more than died in the Anglo-American War of 1812 being fought at the same time across the world.

Hawaii arises eleven miles from the bottom of the sea. It is the world's tallest mountain. It appears to be stable. Yet it ends a long fracture out of Mexico and begins an arc of seamounts that strikes Siberia. The scene of volcanism today is the pallid termination of the scenario of quantavolution. There is nothing objectionable in present theory; it is just not historical.

Volcanic activity serves as a mechanism to release thermal energy from the Earth's interior. Thus, we can view the Earth as a boiler and the inactive volcano or vent as a sealed valve. Conversion of tidal energy to thermal energy by friction is concentrated at plate boundaries, where almost all active volcanos are found. Thus tidal energy helps heat up the boilers and increase the pressure, while tidal stresses weaken and break the seals. Both of these triggering effects increase during periods of increasing peak tidal stress... Once a volcano has erupted, its susceptibility to triggering remains low for a longer period of time and then increases rapidly following a hyperbolic or exponential stress [12].

Now we turn to Rittmann for additional theory:

Volcanic activity is caused by the loss of gases from magmas, a process which takes place wherever magmas can ascend from the depths and come into regions of lower pressure. This ascent of magma is, however, only possible if the earth's crust is stretched and fractured through tectonic forces. The existence of volcanos is thus closely connected genetically with orogenesis and epeirogenesis. We then attempted to explain these genetic connexions on the principle of the causal chain of disturbed equilibria, and so to place volcanicity in its correct position in the overall picture of geodynamic processes. The interpretation of a wide variety of observed facts led us to the conclusion that magmas could originate in two ways, and that we could distinguish between primary magmas having their origin in a subcrustal zone encircling the earth, and secondary

magmas formed by the anatexis of sialic rocks within the earth's crust [13].

One notes here, besides the requirement of a stretching and tearing of the crust, the origination of volcanic magma from the "subcrustal zone encircling the earth" and anatexis, or regurgitation of surficial rock. This region occurs some 15 to 30 miles below the land surface and about 5 miles below the oceanic bottoms. This layer corresponds not only to the Moho discontinuity, as I have mentioned in connection with the base of seismism, but also with the volume of "missing sial" from the ocean basins, which roughly approximates the volume of the Moon. Volcanism, then, like seismism, reflects the level at which, all over the globe, the still landed crust moved in reaction to the eruption of the Moon. Whether or not the mantle on which this lunar boundary level rides jostling is solid or liquid, in the years of its fast movement it would have heated, liquefied, and expanded. The volcanos are probably still draining the liquid.

Studies of volcanic eruptions arrive at correlations between the moment of major eruption and the tidal forces exerted upon the Earth by the Sun and the Moon. Similar correlations have been detected between tides and seismism. In this regard, volcanism and earthquakes reveal themselves as close relatives.

G. Beccaria (1716-81) with Stokeley, Franklin and others, set the stage early for a systematic approach to electricity in connection with earthquakes, cyclones, and volcanos, but the promised scientific drama has never been enacted [14]. As early as June 21, 1902, Elmer G. Still published his observations of the volcano-solar-lunar relationship [15]:

The writer has for several years been observing this relation between the positions of the heavenly bodies and seismic, volcanic, and electrical disturbances, and is forced to the conclusion that the latter are caused in part by the conjunctions, oppositions, perihelions (or perigees) and equinoxes of the moon, earth, and seven other planets, especially when several of these occur at once.

He warned that such disturbances do not always occur at these times and that the relative position of the heavenly bodies have

to be combined with local causes to produce volcanism and seismism. After all, he commented, if solar storms (sun spots) are excited by perihelion with Jupiter, why would not earthquakes and sun spots be transactive?

A second article in the same year stressed that "the influence of the Moon and planets in causing and intensifying seismic and volcanic disturbances is not altogether tidal action - gravitational; it is partly, or mostly, electrical, and seismic and volcanic action is an electrical disturbance." [16]

Once more in 1902, the same author, E. Still, continued his prescient argument, now declaring that gravitational tides of the Moon were quite inadequate as explanations of many terrestrial disturbances. "We know [Still was seventy years ahead of the field] that magnetic earth currents (which interfere with telegraphing), brilliant auroras, severe thunderstorms, violent storms of many kinds, and also earthquakes and volcanic activity accompany sun spots. All these are electrical disturbances, and the eruption of Mount Vesuvius and numerous seismic shocks which occurred at the time of the last large sunspots -about September 15, 1898 - were no doubt electrically caused by them." [17]

We are not surprised at these statements, in view of Chapters 4 and 5 earlier on in this book, where electricity was allowed a broad scope among geological effects. The electrical volcanism of Io, satellite of Jupiter, will be recalled, where ejecta speed at 2000 miles per hour from 60 to 160 miles above the surface. A number of factors operate holistically in terrestrial volcanism; electricity may sometimes take up center-stage; mechanical heat and pressure are probably the chief actors in late historical times. Yet the electric and the mechanical are always working together: no rock can be squeezed without emitting electricity; no electric charge can pass without heating rock.

Recently, Johnston and Mauk examined the unusually complete records of Mount Stromboli (Italy) over a 72-year period and related 33 major eruptions to the amplitude of tidal forces operating upon the Earth [18]. A distinct pattern emerged. Some ten days after the tidal peak is the significantly likely moment for the eruption. The eruptions concentrate in the days between full

moons.

Roosen used oxygen isotope ratios in cores of the Greenland ice cap as an indication of mean temperatures between 1200 and 1976 A.D.

Variations in tidal stresses on the Earth caused by the Sun and Moon cause changes in the stratospheric dust produced by volcanic activity; this in turn changes the thickness of the stratospheric dust veil and hence the atmospheric radiation balance. At least some significant fraction of the dust occurs at peaks of tidal stress. The tides measured vary over long periods. There is a peak of stress at approximately 179.3 years period. This period actually shows up in a (significant) correlation of 0.37 between the stress periods and the temperature curve [19].

The relevance of such studies here is that tidal stresses and volcanism correlate; hence, great tidal stresses of the past must have excited great volcanism; conversely, evidence of heavy past volcanism denotes heavy past tidal stresses.

In the present placid astronomical order of the world, there is scarcely a place to look for such tidal forces. A mere 500 active volcanos occupy the world landscape, compared with the 500 of the Massif Central of few thousand years ago. Flying high over southern Italy, one may luckily see Vesuvius, Stromboli, and Etna all smoking at the same moment. Arriving in sight of the famous seven hills of Rome, there is a grandeur of culture, not nature. Yet Breislak in 1801 was arguing that the seven hills were debris amidst a large volcanic caldera, and Cuvier for one approved the idea. When the oldest hominids, human in some ways, walked the Earth at Afar (E. Africa), some ten nearby volcanos were active.

A great many dormant volcanos exist and an enormous number of extinct volcanos. If the belts of inactive fissures and the unnumbered thousands of seamounts are added, the Earth has undergone periods of the most intense exoterrestrial stress. Or else, one will have to parcel out these millions of volcanos and 'volcano equivalents' over exceedingly long stretches of time.

But if volcanism even in the stable "solarian" period of the past 2000 years exhibits a 'grouping' tendency in response to exoterrestrial tides, then pre-historic volcanism must have exhibited grouping, too. Once more, we force the question: quantavolution, yes, but could it not happen at widely spaced intervals over time?

Even with fossil and radiochronometric data that give, I think, ages too "old," the ocean volcanos and ridges are geologically young, under 80 million years. Is there some reason to believe that land volcanos should not be also as "young"? Probably not, inasmuch as most of the land volcanos are tied into the ocean ridges, into great faults, and into the ring of fire that bounds the Pacific Basin.

If there exist extinct volcanos and fissures that belie this statement by extruding from the surface far from the zones of present activity, these, it will turn out, are aligned with expired branches or special fractures of the Earth's crust. That is, it is plausible to assign all volcanos to the same geological time, and a young age; "where are the volcanos of yesteryear?"

If the continental and oceanic plates break up and drift apart, as the prevailing theory will have it, touring the globe every 200 million years, forming new combinations, where are the extinct volcanos that should dot the world like pine trees? That is, so far as volcanos are concerned, history ends recently. Presumably, before then, lands broke up and plates travelled without their fiery boundary-markers; this is implausible.

The innumerable seamounts are a standing reproach to opponents of quantavolution. I have mentioned their origins as pulled mantle taffy in cosmic encounters. They are an impossibility for tectonic plate theory for there the continents move on plates, not through them, and seamounts appear abundantly around the Moon Basin of the Pacific, with a solitary but impressive chain of hundreds off the New England Coast [20]. If the Moon were erupted from the now Pacific region, the seamounts could be visualized as pulled taffy drop-backs that could not follow the Moon into space. But the Atlantic Ocean off New England would only then have opened its abyss and "New England" would have been retreating westwards. To

explain this particular "taffy-full" we must conjecture a prolonged explosiveness or subsequent passes of an attractive exoterrestrial body in order to assist their generation.

Morphological comparison of Atlantic and Pacific seamounts may be of use in deciding the sequence of events. One study of the former finds shallow water fossils, including coral and the algae *Melobesia*, at 3000 meters, and suggests that somehow the seamounts subsided that much. More in order is our hypothesis that the sea did not fill the basin until recently; similar phenomena are discoverable in the Pacific seamount areas.

I would be loath to leave the subject of volcanism before tightening its awesome connection with the birth of the Moon in the parturition of Earth. In 1907, William Pickering was continuing George Darwin's effort, begun in 1879, to establish that the Moon fissioned from the Earth's present Pacific Basin. He called it "The Volcanic Problem."^[21] He alluded to spectroscopic binaries as examples of fission in the Universe.

He argued that when the Moon fissioned, "the Earth was in much the same condition that we find it at present, except that it was hotter." It was supposed to be rotating in only several hours (so as to provide the centrifugal force for whipping out the Moon). He matched the continents at the Atlantic to show the breaking away occasioned by the need to fill the emptied basin; he mentions "North America during its transit across the fiery ocean, in obedience to the pull of the Moon." (Thus he preceded Wegener with the idea of continental drift.)

Geologists generally abandoned the search for proof of Moon fission, even though they could choose their own time and state of the Earth to accomplish the feat. Thus they might afford a gaseous fission, or a thin crust, or a hot and molten body and they had no care for the biosphere or atmosphere or even stratified rocks. It is surprising that under such easy conditions for speculation, they could reject the theory. A reader of this book will surmise that an ideological block against any immense catastrophic event would account for the rejection of fission. Rather should the Moon come sailing in nicely and moor itself above the Earth. The catastrophic implications of capture were not generally pursued, except by Hoerbiger and the maverick

mythologist Bellamy. Nevertheless many establishment scholars looked benignly upon the fission theory, allowing that the event was to have occurred eons ago. Also, of course, exoterrestrial inducements to fission were taboo.

D.U. Wise, more rationalistically, attributes non-acceptance of the fission theory to calculation problems. "The traditional and seemingly insurmountable obstacle to all fission hypotheses has been the discrepancy of approximately 400% between the present angular momentum of the earth-moon system and the values calculated as being necessary for the last stable configuration before fission." [22] That is, an incredibly flattened obloid would have to drop its end like ash off a cigar. After disposing of several types of calculations, he is satisfied that "the basic problem of excessive angular momentum in fission hypotheses may have a solution in volatilization and escape of a silicate atmosphere generated by dissipation of lunar tidal energy in a high-temperature early earth." [23]

The eruption of the Moon certainly extends beyond the conventional concept of volcanism, although Vsekhsvyatskii claims that planets and comets originated in volcanic episodes, especially involving escapes from Jupiter. Explosion is of course a fission; rocks are transformed; gases and electricity are part of the process, and so on. Also, exoterrestrial influences are connected with volcanism, both as to origins and to triggering activity. These influences are provable in our own time by correlations of volcanism with tides, electricity and seismism. They are provable for ancient times by the patterned system of volcanism in the world and the obvious function of volcanism in relieving stresses according to a pattern highly suggestive of transactions in outer space. Withal there is a uniqueness to the lunar event; the dimensions of the event soar almost beyond comparison with ordinary disaster and even all other catastrophes. But the theory of the fission is greatly simplified if it is conceived to occur through the passing intervention of a large body in space.

Furthermore, it is well to mention, as a postscript, that should the Moon have erupted from the Earth and all ocean bodies are young, then the eruption must have occurred recently. The basins are dated at under 100 million years. Thus the Moon

episode, so incredibly destructive, would have occurred with the full realization of life on Earth, including many thousands of existing species and with most Earth rocks still present. If those species could survive, so even could homo sapiens.

Therefore, one must accept the possibility of the Moon originating by eruption. The evidence is that such occurred. The evidence is that it occurred recently relative to geological convention. The evidence is that it occurred without total destruction of the Earth's surface or its occupants. If, finally, one is to argue whether the Moon erupted 12,000 years ago as opposed to 120 million years ago, the issue may seem idiotic, but it is imperative to dispose of it.

Notes (Chapter Seventeen: Volcanism)

1. CXLV *Am. J. Sci.* (1893), 256.
2. Heezen and Hollister, *op. cit.*, 557.
3. Comyns Beaumont, *The Mysterious Comet*, (London: Rider, 1945), 197.
4. R.D. Mac Kinnon, 3 *S.I.S. Workshop* 1 (July 1980), 7.
5. P.J. Smith, 265 *Nature* (1977), 206; Vogt, 21 *Earth Planet. Sci. Let.* (1974), 235.
6. 206 *Science* (16 Nov. 1979), 826.
7. G. Marinos and N. Melidonis, "On the Strength of Seaquakes (Tsunamis) During the Prehistoric Eruptions of Santorin," reprint from *Acta* (see fn. 10), 280.
8. Quoted in S.K. Vsekhsviaskii, "Indications of the Eruptive Evolution of Planetary Bodies," (Kiev: unpubl. paper, ca 1973), 7.
9. "The 1883 Eruption of Krakatoa," 294 *Nature* (24 Dec. 1981), 699-704.
10. *Acta*, First Int'l Cong on Volcano of Thera, 1969 (Athens, 1971) J. Keller, D.L. Page, and C. and D. Vitaliano, eds.
11. *N Y Times*, 101 Jan. 1977, quoting Payson Sheets.
12. R.G. Roosen, "Earth Tides, Volcanos and Climatic Change," 261 *Nature* (24 June 1976), 680.
13. Rittmann, *op. cit.*, 267.
14. *Artificial and Natural Electricity*. See Heilbron.
15. 86 *Sci. Amer* (21 June 1902), 433.
16. 87 *Sci. Amer.* (26 July 1902), 54.

17. 87 *Sci. Amer.* (27 Sep. 1902), 203.
18. M.J.S. Johnston and F.J. Mauk, 239 *Nature* (29 Sept. 1972), 266-7.
19. *Op. cit.* 682.
20. J.R. Heirtsler *et al.*, 65 *Amer. Sci.*(1977), 466-72.
21. "Place of Origin of the Moon: The Volcanic Problem," 15 *J. Geol.* (1907), 23-38.
22. "Origin of the Moon from the Earth: Some New Mechanisms and Comparisons," 74 *J. Geophys Res.* (15 Nov. 1969), 6038.
23. *Ibid.*, 6044.

CHAPTER EIGHTEEN

SINKING AND RISING LANDS

Vita-Finzi remarks that we cannot tell whether, over the past century or even now, the shorelines are sinking or rising [1]. Furthermore, there is much greater complexity and much less data when making such determinations for the longer past. The Earth has demonstrated a capability for moving up and down here and there leaving scarcely a clue as to the causes. The wisest path may be to pursue a general theory, such as the Ice Ages or, I think, a great lunar eruption, and build hypotheses and information upon it.

The legendary voices are worth an audience. Alexander Kondratov, a Soviet linguist and compiler of legendary and geological evidence of the sinking of lands, writes [2]:

China's oldest myths tell of a war between the god of fire and the god of water 'at the beginning of the world.' The mountains erupted fire, the earth quaked and the sea attacked the land. When the fire god was defeated he decided to commit suicide and struck his head against the highest mountain in the west. The frightful blow drove the land into the sea in the east like the prow of a boat, while in the west it flew into the air like a boat's stern. Since then all the rivers in China have flowed eastwards.

Kondratov inquired of geologist Yuri Reshetov concerning this myth and received the following in reply:

Geological, geophysical, paleontological, archaeological and anthropological studies have shown that up until at least the middle of the last Ice Age the Japanese Islands and Indonesia were Asian peninsulas. During the second half of the Ice Age (from 40,000 to 20,000 years ago), vast areas of land subsided into the sea and were replaced

by what are the Sea of Japan and the south China Sea. The sinking was accompanied by powerful volcanism and by earthquakes. At about the same time, that is, towards the end of the Ice Age, the ranges of Indo-China and the mountains of Central Asia rose another 2,000 meters. Many generations of Chinese must have witnessed the gigantic geological changes in south-east Asia. It is these events that the myths about the struggle between the gods of fire and water evidently reflect.

This is macro-geography, indeed. It speaks of a quarter of the world. Part of the world rose and part of it sank. The events described are probably much more recent, the 20,000 year figure reading 10,000 years in other sources.

Many Europeans still speak, as they have from the dawn of history, of a civilized continent of Atlantis that sank in a day.

The legend of the Lost Continent of Atlantis is a hardy tale; billions of words have been written about the few words of the legend. It is quite incorrect of F.M. Cornford, for example, to write that "serious scholars now agree that Atlantis probably owed its existence entirely to Plato's imagination." If Plato lied in his tale of Atlantis, there would be little truth in him generally; for Plato repeatedly insisted that his story be considered seriously and literally: the Atlantean culture did exist across a water barrier to the west; it had relations with the ancestors of the Athenians and Greeks; it did sink abruptly in an earthquake. Plato's date would place the event at about 11,500 years ago. I attribute this date to a confusion with the lunar catastrophe and assign it instead to the time of the Noachian Deluge, that is, about 6000 B.P. as described in *Chaos and Creation*.

An ancient document, the Oera Linda manuscript, which was written in Frisian with runic characters and whose age and authenticity is much disputed, claims a general Atlantis-type sinking of a prosperous civilization of the Fryas between the North Sea and the Baltic, where frost was rare and fruit trees blossomed. There came a summer of darkness, great earthquakes, a spitting of fire from newly bursting mountains, a general holocaust, an obliteration of rivers, and huge floods that advanced to cover most of the land. Whole islands were newly

formed by the bones of dead cows and sand (one is reminded of the Siberian islands formed of mammoth bones). The survivors were subjected by invading Finnish bands (just as the Hyksos invaded Egypt after the Exodus) [3].

The Caribbean peoples talk of an "Antilla," now sunk beneath the ocean. The Pacific Ocean and American peoples of the Southern Hemisphere say that once a continent existed where now stand a few islands amidst a great deep sea. The perplexing books of Churchwarden concern this continent of "Mu." Legends of the Greeks speak of a drowned Aegean Sea, and the ancients believed the Mediterranean Sea was recently arisen.

In the Pacific Ocean of the North, there is supposed to have been a Beringia where now stands the Arctic Ocean on one side and on the other side the northern half of the "arc of fire" bordering the great Ocean.

The East Indian peoples and Indian Ocean people offer legends of the sunken continent of "Lemuria," whence came world civilization. T. Huxley and F. Engels were famous supporters of the theory over a century ago. And the islands of the South Seas, where Indonesia stretches out, are reputed to have been of a single piece before the waters rose or the land sank. The Dutch geologist Bartstva claims that a landbridge connected the Celebes and Philippines until Holocene times. In August 1982, Alan Thorne announced the discovery of Chinese human remains in North Australia with an estimated age of at least 10,000 years [4]. A map in *Chaos and Creation* outlines in the most general way all of these mythical lands that are said to have existed in human times.

If one is to believe legend, every large expanse of ocean once had its land mass. A form of quantavolutionary reasoning could proceed as follows: the ocean basins are new, created in the time of man; before the time of man, there was Pangea, a globe covered by continental crust that carried shallow freshwater seas, especially in the then equatorial area, which area, now greatly tortured, is still recognizable in the fabled Tethyan Sea remnants of the Mediterranean area and the "belt of fire" that girdles the world longitudinally.

The awesome depths to which the land has sunk or from which the crust has been removed should not halt the argument. If the Andes, the Alps, and the Himalayas can rise miles high, Lemuria and Atlantis can slump miles deep. If the sial debris of sunken lands cannot be scooped up by dredges or pierced by the few meters of core drills, that too is not surprising; the ocean basins were opened up and repaved recently with basalt; where the land was not exploded away, it was covered over by lava working furiously and fast under the catalysis of falling and flooding waters.

Where the continental fragments do not remain to be fitted obviously together, then the intervening land was blasted away or sunk. Continental sial has been extracted on occasion from the deep bottoms in the Atlantic and Pacific Ocean; this is surprising given the major discovery of recent oceanography that the ocean bottoms are covered everywhere with lava. Metamorphic rocks typical of the nearby islands and Italy were found 3000 meters below sea level in the central Tyrrhenian Sea, as reported by Heezen [5]. Fragments of black carbonaceous sandstone were found on the Rocksall Plateau and Orphan Knoll, between Greenland and North America [6].

Some legends have been confirmed by geology; many might be confirmed; most are not, because they are vague or misleading. It would be well to examine closely the myths that have proved quite accurate to see in what mythical form they found expression and then to proceed systematically to the translation of similar myths around the world.

The aboriginal Australians who live around MacDonnell Bay say that an angry witch once stirred up the waters and flooded the beautiful land to make the Bay. Geologists confirm that the land was high in the ice ages and recently sank to form the Bay. The image of the witch should not be discounted; Velikovsky has described how European and Chinese alike have an image of a witch riding a broomstick, which he traces to cometary images of 3500 years ago. Indians of the area of Crater Lake recalled in their oral history what geologists later confirmed - that a great volcanic explosion fashioned the beautiful basin in the mountains that has since collected rainwaters.

These were not the only risings and sinkings, but they were by far the major ones. Kondratov, for example, mentions that Bulgarian researchers have compiled a detailed map of underwater archaeological finds, dating from the eighth to the fifth centuries B.C., discovered along a large section of their country's Black Sea. Irish Celts were in America in this period, according to several recent studies of history, archaeology and linguistics; they were perhaps driven to explore and immigrate by a further sinking of their homeland coasts.

The age of the comet-god Athena-Venus preceded these episodes of the age of the god Mars by under a thousand years. The Gulf of Mexico may have been sunk at this time, for the peoples of the Mexican Gulf Coast were not long afterwards lamenting the destruction of their previous civilization by the jaguar-god (a Venus symbol) and storm-god Hurracan, and telling of how they were taught their arts by a few people who came from the east. Kelly and Dachille wrote that the Gulf of Mexico has the superficial appearance of a meteoritic impact crater. In Cook's reconstruction of the area prior to continental movements, the Spanish peninsula is fit like a socket into the Gulf but a gap, possibly a crater gap, remains.

These several speculations treat of events of 11,500 years ago, or at the latest 7000 years ago, not of 3500 years ago - unless, of course, everyone is right: that is, the breakup of the area occurred and "western Europe" rifted outwards; the flood of Saturn deluged the shallow gulf areas; a fragment of the Venus tail spilled petroleum in the area and impacted.

The Caribbean area generally is rife with myths of disaster and immigration. The timetable is chaotic. Archaeologist Cyrus Gordon has described convincingly Mediterranean materials that originated between Phoenecian and Roman times and that were uncovered in spots so far apart as the Brazilian Coast and Tennessee (U.S.A.) [7]. Sanders and Price in 1968 set up a convincing case for direct Asiatic influences upon the New World. East Indian contacts with the Americas can be traced as well.

At maximum age, none of the materials would go back to before 1500 B.C. That leaves a great prior gap of culture, untitled save

by indistinct legend. Brasseur de Bourbourg was one of many early European scholars who felt that, in these myths of white-skinned, technically competent people coming from the East, there were visitors from or survivors of a great continent of Atlantis.

Interest in East-West contacts has increased recently among scholars. That ancient "Japanese" had cultural contacts with at least "Ecuador" is a distinct possibility. That unusual blood types appear among villagers in settlements of the Andes is demonstrable. Also, the ancient Meso-Americans, as judged by sculptures and drawings, seem to be a population in which African-Negroid and Tethyan-Caucasoid (Semitic) types were mingled with Mongolian-Sinyan-Amerindian populations.

John L. Sorenson, citing Kroeber and others, examines 200 basic, defined cultural features of the "Old World Oikoumene." [8] What would be called the "common heritage" of the peoples of the Near East. Of these features one in eight is found in Meso-America definitely. He believes that another tenth would be added to the New World list when checked out through the whole body of information; thus about 18 percent of the Old World basic culture traits are shared with the New World. The statistical probability that this percentage of correspondence would occur by accident is low. It suggests land bridges of past ages.

Perhaps it was around 1500 B.C. as well when Thule vanished into the Faroe Rise. Thule is famous in Northern European myth and is referred to in many books and accounts with tantalizing brevity. Russian geographer N. Zhironov argues this theory, citing evidence that Thule was near Iceland, that many islands were mentioned thereabouts, that it was in a warm oceanic current, and its people grew grain and other crops, (We are reminded of the Oera Linda manuscript.)

Indeed the birth of the North Sea may have come so late as 1500 B.C. The famous amber of the North and Baltic Seas is conventionally dated at seventy million years; it comes from submerged pine forests that are assigned that date. Recently geologists have begun to stress the youngness of the area, prodded by archaeologists. Drowned settlements have been

found at the bottom of the Baltic Sea, the North Sea, and off the British Isles. These are not to be confused with the sunken settlements of later time - Slavic Vineta in the Baltic by a tidal wave of 1100 A.D., many places off the mouth of the Rhine in 864 A.D. and so on. We are writing of the whole of these seas. "Europe was inhabited when the North Sea did not exist, when England and Ireland were not islands and Jutland and Scandinavia were not peninsulas but were all parts of a single land mass." Thus writes Roy MacKinnon, who gives us a fix on these great submergences [9].

Aristotle wrote in his book *Of the Earth*, "Inroads and withdrawals of the sea have often converted dry land into sea and sea into dry land." And Strabo, the most reliable geographer of the classical age, declared that "extensive submergence of the land, as well as minor submergence, has been known."

Reviewing these and other ancient writers, Professor Ellen Churchill Semple wrote in 1931 that they "attributed the straits and sounds of the Mediterranean and the formation of many islands to convulsions of nature. They found evidences of previous land connections in the similarity of relief and rock structure on both sides of the intervening channels, as do modern geographers, but they erred as to the time element in the problem" That is, she would accept what they said of sinkings and risings, the Mediterranean Sea, the Black Sea, the Red Sea connection, the Sicilian-Italian-Tunisian bridge, and so forth, but simply dismissed any short-time reckoning for the events. She is not alone in thinking that the ancient sense of time was palpably and *prima facie* stunted.

The same authority speaks airily of the Mediterranean Sea being of Quaternary origin or less (perhaps a million years); whereas now the *Scientific American* publishes maps of the Mediterranean as it was supposed to be half a billion years ago, a discrepancy of some 50,000 percent. Not to be outdone, Heezen and Ewing, two of the best contemporary oceanographers, found continental land far beneath the Tyrrhenian waves, even while the "oldest" parts of the seven seas are credited with a mere 200 million years. (Many say less.) That is, 200 million years ago would represent the time a continent was lofted by its convection cell currents over the

oldest spot of the oceanic abyss, erasing its sediments and boiling it.

If so, the Mediterranean could hardly resist for such vast lengths of time the passage of land masses over it, while land rocks betook themselves into its depths. One is attracted once more to the ancient idea of the Tethyan Sea, a shallow home for innumerable species until the new oceans were created to house them.

Geographers have long known of this mythical Sea of Tethys of which the ancients spoke. They appropriated the term for a Tethys Geosyncline or trough which they traced around the Old Worlds - from Gibraltar to Indo-China. The Mediterranean Sea is regarded as descended from it. I use the term for an equatorial belt and shallow seas circumscribing the original Pangean globe. With the new theory of continental drift and splitting of the Old World from the New by the Atlantic Ocean, Carey changed the concept of the Tethyan geosyncline. "The Mediterranean shear system links up *en echelon* with the Caribbean system to form part of a global sinistral shear system which I have called the Tethyan Shear System." [10]

The lands (and shallow seas) were wrenched apart between North America/South America and Europe/Africa. and Asia/South Asia. Then Africa rotated sinistrally and Asia dextrally. The Asian continent encountered land masses moving sinistrally from the South, Arabia and India primarily.

So incomplete is the understanding of great movements of land that, where one encyclopedia, the *Britannica*, is merely out of date, another, the *Americana*, assigns to the Mediterranean a Tethys origin that runs far to the north - taking the Black Sea route to the Caspian Sea, the Sea of Aral, and into Mongolia. In myth this is incorrect. Actually this is a third and temporary great ocean of Tethys that may be called the Gobi Sea. It replaced the Tethys geosyncline and the remnant of old Mediterranean which are more plausible successors to the ancient mythical Sea of Tethys. It gathered waters in the great basin that is now the Gobi desert or "the Sea of Sand," as the Chinese call it. Like the extinct Sahara Sea, the Gobi Sea lasted long enough to attract many human settlements to its shores. Then it was emptied in a

great flood and its cultures disappeared, as described earlier.

Thus there were perhaps three Seas of Tethys, the latest being the Mediterranean Sea of recorded history. The first would be the Pangean shallow sea that carried the vast majority of marine species and supported a thriving population of plants and terrestrial animals, including australopithecines. This area, like the rest of the world, was severely buffeted in Uranian times but became known to the first modern humans. They were called pro-Selenians because the Moon was absent from the sky, and were the prototypical Tethyans of generalized Mediterranean race.

A second sea would be produced from the Lunarian catastrophes and be deepened by transverse cleavages of the world-girdling fracture system; it is discoverable today as the Balearic, Ionian and Eastern Mediterranean basins. It may have been a major locale of recovery for humans and their cultures. But the recovery was far from peaceful. Africa slammed into Europe at several points, raising the Alpine ridges and the mountains of Anatolia, then withdrew after a short interval.

The third Sea of Tethys was formed by the flood waters of the evacuated Gobi Sea basin, four thousand miles away. It was at first huge in expanse, then in a short while diminished to the earliest Mediterranean Sea known to history. The Sea of Azov and the Black Sea basins would have been filled and connected with the Caspian Sea. The Tyrrhenian area was flooded beyond its present level and survivors occupied the high islands of the Western Mediterranean.

Ancient history saw many more risings and sinkings of land and towns than have occurred over the past two thousand years. Extensive research would probably be able to distinguish the sinkings of what we have been calling sometimes the Solarian, Martian, Venusian, and Saturnian ages. They are all part of legend, of some remaining historical fragments and, unfortunately, of an age that knew writing and had a complex culture, but whose achievements are inadequately identified because of the great destruction and the unwillingness of scholars to entertain even a hypothesis of the events.

The names of the places supposedly sunk or serving as havens for survivors read like a roster of geography and mythology. Attica; many places of the Aegean Sea; numerous places around the Sea of Azov, a ring of towns around the Black Sea; the whole Adriatic basin (this was probably the location of the predecessor of the Po River, the mythical deep river of Eridanus, that used as its channel an arm of the global cleavage that forked from the Red Sea clear up through the Rhine), the Gulf of Taranto. The Straits of Messina and the Sicilian-African straits, the lands around Corsica and Sardinia, the coast of ancient Etruria, the Cyrenaican coast of Libya, Jerba in Tunisia, towns of Crete, the Gulf of St. Gervais off of Marseilles, the straits of Gibraltar, the Isthmus of Suez. One can only guess that the Sahara Sea (Sea of Triton of myth and ancient reports) was created during the Saturnian deluges. If so, it probably was emptied into the Atlantic Ocean and its cultures destroyed during the cometary intrusion of about 3500 years ago.

Scholars of every science have pondered the many tantalizing indications of shared history in the southern regions of the globe. Kondratov exclaims at one point:

The most surprising part of it is that a study of the world's earliest civilizations reveals a whole series of riddles that can be solved only by using the hypothesis of Lemuria, a large land mass in the Indian Ocean that was inhabited not just by lemurs and not even by Pithecanthropi, but by human beings who had reached a high level of civilization. (p. 131)

And later he says:

Lemuria... is connected with sciences that range from marine geology to the deciphering of ancient scripts, and geographically, from the Indian Ocean to the Himalayan mountains and the Buryat steppes. It may be that Australia and Australian studies are also linked up with Lemuria.

One can conceive of the original extent of Austroafrica or Lemuria by noting that Africa, South America, Australia, India, and Antarctica were once intimately connected. Moreover, in the South Pacific a huge amount of shelf area exists beneath the

waters and a great amount of continental crust is missing.

The Americas were heavily reconstituted by natural disaster. It is reasonable to presume that humans occupied these continents prior to the great catastrophes. Conventional anthropology and archaeology would do well to drop the theory that all Americans are descended from some few who made the passage across Bering Strait a few thousand years ago - some say 20,000, some only 12,000. They assume that the continents were in their present positions; only a bridge of land sank and rose. Even among believers in the possibility of contact from the Pacific islands by sea, a recent occupation is credited. A few think it more likely that the people of Tierra del Fuego and other southern stretches came from "down under," that is, Tasmania or other islands of the South Pacific. I think that it will not be long before some human remains of Uranian or pre-catastrophic times are discovered or rediscovered.

The same will be true of Antarctica. This huge continent, nearly twice the size of Australia, gives many indications of recent tropical climate, and produces many types of fossil animals and plants including those associated farther north with human occupations. Kondratov writes that "we do not know when the antarctic region became covered with ice. Some glaciologists think that it cannot have been more than nine or ten thousand years ago."

Two maps have appeared in recent years after four centuries of gathering dust. One is the Piri Reis map that depicts the true un-iced coasts of Antarctica with considerable accuracy, another, the Orontius Fineus map, that carries interior topography with considerable accuracy. By conventional theory, mapping of a land mass of Antarctica could not have occurred until the middle of our present Twentieth Century because of the ice cover as well as the great difficulties in moving about without planes and snow vehicles.

It seems likely, then, in accord with the general theory of this book as well as such evidence, that African peoples occupied Antarctica during Pangea and Urania, and were decimated by the Lunarian disasters, especially by electrical and atmospheric ravaging; that they recovered somewhat during the Saturnian

period, and then died out in the icy climate that descended in the age of Jupiter. Somewhere in the interior their remains will be found

Moving north from the frozen continent to the micro-continent of New- Zealand, largely buried under water, and to Australia, the situation is not too different. There few people were living before the European immigration. These few are supposed according to conventional wisdom to have come from the northern and western islands of the Indian Ocean some 20,000 years ago. Another theory says that this was impossible because there was open water that could not be crossed and that there would have to be land bridges. Presently, the geologists of the area have gotten together with the anthropologists, to the extent of saying that the land bridges existed for the movements of people. (Admittedly, the people of New Zealand, standing across a deep sea, would be difficult to account for by a shallow sea land bridge.)

So the theory goes back and forth in a way to satisfy now theorists of the bridges and then again theorists of the clever navigators. The theory which we employ is that the land masses of New Zealand and Australia were sliced away from Antarctica by the now quite evident earth cleavage and sent rafting along with other lands towards the excavated crustal areas, north and east. On the rafts were Austroafrican survivors.

Australia rafted mostly to the east; India moved mostly northwards and to the east; the Asian continent moved east and south nosing under the waters in places, and ultimately (after the Saturnian deluge) with a large section of its underside underwater as ocean shelf and slope. It is probable that the Indian Ocean was an excavated basin forming part of the great Pacific basin and then was closed in upon by Asia veering southwards and Australia going north.

India itself, it is agreed, became detached from Africa and Madagascar and rafted north to lodge itself into Asia. Half the crust of the earth was gone and the earth was expanding somewhat so that there was plenty of room for maneuver and titanic forces to propel the rafts.

Now to examine the human record in the southern regions. It is becoming ever more plain that the oldest surviving large-scale culture in the world is African, exemplified in the Tamil culture of India. For thousands of years we have heard claims that this south Indian culture was a survival of a great sunken culture. Ancient writers even asserted that India had been connected with Africa. Probably the first modern man to consider the evidence of the common roots of the Dravidians of Tamil Culture of Southern India with the natives of Australia, and then to connect this idea with the notion of continental drift, and hence continental drift in recent times, was the Soviet ethnographer, A. Zolotaryov. He was deeply influenced by Wegener's book and presented his synthesis in 1931.

Before Zolotaryov, the Tamil (Dravidian) legends and the many ancient commentators had impressed others. Thomas Huxley, the apostle of Darwinism, wrote that mankind had originated on the now sunken continent, Lemuria. Frederick Engels, the intimate cohort of Karl Marx, and a believer in Darwin's theory of evolution, wrote that a "particularly highly developed race of anthropoid apes lived somewhere in the tropical zone - probably on a great continent that has now sunk to the bottom of the Indian Ocean." Ernst Haeckel, German biologist, named the proto-human "pithecanthropus," and assigned its origins to Lemuria; he said it migrated from there to India, Africa and South-East Asia; indeed, in all three places pithecanthropus was shortly found.

The Dravidians, who are among the darkest in skin of the Indians and who had generalized features which could be called Negroid but by the same token primordial human features, are located principally in Southern India today. Their culture is called the Tamil and is now reputed among scholars to be the oldest in India, predating by far the Indo-European culture of the Aryan immigrants of the mid-second millennium B.C., not to mention the medieval culture brought in by Muslim invaders.

The Tamil scholars look back not only to a sunken Lemuria, but to a sunken larger continent called Gondwana. And it is this "Gondwanaland" that has given geologists the name for their conception of a united land mass of the southern hemisphere that split apart in the breaking up of the continents an alleged

hundred million years or so ago, long before the age assigned to the primates. (I may note here the interchangeability in the context of this discussion of the words "sinking" and "drifting apart." One must be prepared mentally to think of sinking whenever rifting occurs, both because a cleavage is seen by terrified observers to be a sinking of the opposite lands and because flooding and sinking actually occurs in most areas of rifting.)

However, the number of species whose remains have been found in separate areas where there was once Gondwanaland (that is, around the world in the southern and tropical regions), increases from year to year. Some are alive. Earthworms of the same species are found in Australia, India and Ceylon. Pouched mammals or marsupials are found in the Americas and Australia and nowhere else. (In 1982 fossil marsupials were uncovered in Antarctica.) Old world and new world monkeys exist. So also, identical as well as related fossil species, of horse, elephant, tiger, camel and rhinoceros. So, too, both living and fossil plants.

From Kondratov's summaries, it appears that Soviet scientists have been most active in tracing the ethnic movements of pre-history from the Lemurian homeland. Surprising developments have occurred one after another, building up the case espoused by the old Tamil scholars. In the first place, and using "Dravidian" as the term for the basic generalized Negroid (Australoid) race, the Dravidian language has been compared with and found to be related at some remote period to the language of Madagascar, thus supporting floral and faunal resemblances and geophysical similarities previously uncovered by other scientists from several nations.

Further, the Dravidian roots have been traced up through the Indian sub-continent to the proto-Indian high civilizations of the Indus valley and indeed up and across the whole north of India. Computer analysis of proto-Indian and a number of other writings indicated the Dravidian affinity.

Moreover, Soviet scholars contend that the proto-Indian, hence Dravidian influences, move up the Persian Gulf and into the very foundations of what were to become the Sumerian and other Mesopotamian civilizations. These have long been thought to be

the rock-bottom, independently developed civilizations of the old world. This earliest pre-Sumerian culture has been termed the Ubaid. Kondratov makes clear that it is not alone a matter of trade and other intercultural relations; for the pre-Sumerians or Ubaidians were part of the proto-Indian, hence, Dravidian complex. Place-names, language roots, religious images, god-names, and forms of building construction are similar if not the same.

Far to the East now is the present Khuzistan, Iran, once called Elam. The Soviet linguist I. Dyakonov has said that "the only hypothesis supported by a few indicative facts," in a comparison of Elamite with other writings, "is that of an Elamo-Dravidian relationship." Further, "tribes related by language to the Elamites and the Dravidians were scattered throughout Iran, or at any rate, throughout southern Iran, in the fourth and third millennia B.C. and perhaps later as well." Traces of the Dravidian race have been noted since then in various places in southern Iran.

Far to the north, recent Soviet archaeology has been uncovering a South Turkmenian civilization of the third and second millennia B.C. Again, statuettes, symbols and skeletal and cranial analysis point to close relationships to the Elamites, then the Ubaidians, then the proto-Indian, that is, the Dravidian, and ultimately to the sunken or rafted continent of Lemuria-Gondwanaland.

Kondratov does not leave his discussion of the Lemurian cradleland without elaborating two further items of significance. The origins of Egyptian high culture, following the neolithic, have puzzled many scientists. Suddenly, upon the neolithic, a high culture seems to have been imposed. I believe that it came from the Tethyan movement eastwards from the Atlantis-Mediterranean centers. Kondratov suggests that a Dravidian north-west thrust may have brought it in.

The earliest Egyptian writings are estimated at five thousand years of age. They are not primitive; they are classical, that is, developed and complex. Perhaps Dravidian India was the source. Indian archaeologist S.R. Rao has analyzed rock drawings of early Egypt found along the Red Sea coast and sees in their high-prowed, high-sterned boats portrayed there the vessels of Dravidian India. I find no contradiction, but actually

two early post-diluvian civilizations encountering each other in Egypt.

The Dravidians, or perhaps more properly, the Austroafricans or the fundamental negroid race, did not cease their travels to the East until they reached the farthest islands. African blacks, Dravidians, and the Melanesians that reach across the southern islands of the Pacific to New Zealand relate to a basic African race that was not greatly different from the Tethyan and Sinyan groups during the Uranian age. (Racial differences develop rapidly in isolation and under conditions of inbreeding.) Now it appears that the languages of the Dravidian and Australian peoples - both of which, incidentally, throw the boomerang - are cognate. The Australian scholars J.C. Pritchard and William Bleek argued the case a century ago. In 1963 Swedish linguist, N.M. Holmer, systematized the grammatical and phonetic coincidences of the two languages. Kondratov continues:

In the last century philologists discovered a remarkable similarity among the languages spoken over the vast area that extends from Madagascar, near the shores of Africa, to Easter Island in the eastern part of the Pacific. It has now been demonstrated that the similarity is not accidental. The languages spoken on Madagascar and on Easter Island which, along with those of the Hawaiians, Maoris and other inhabitants of Polynesia, belong to the Polynesian group, the languages of the Micronesians, living on islands in the North-West Pacific, those of the Melanesians, inhabiting islands in the South-West Pacific, the languages of the Indonesian Archipelago, and those of the indigenous population of Taiwan all come from a single root and constitute the Austraonesian ("southern islands") family of languages.

In view of all of the foregoing, which has relied heavily upon Kondratov, it might be reasoned that the whole southern hemisphere of the world and perhaps a very large belt moving north above India belonged once to a great African grouping and was catastrophized and separated during the lunar fission. Any Antarctic survivors were removed by the new ice age. It may be that the same is true of South America, but with flood, not ice, as the destroyer.

The scientific roots of catastrophism are more extensive than ordinarily believed. Alfred Wallace, co-inventor of evolutionary theory with Charles Darwin, believed that a single oceanic race had inhabited a great island in the Pacific Ocean which had then been sunk. So did Darwin's disciple, Thomas Huxley, and Darwin probably agreed with him. No injustice is done to Darwin by regarding his work as a great model of natural history, or "simply a theory" as some critics like to say. He had many doubts and made many "anomalous" observations about vast sudden catastrophes of species, of mountain building, and, when he experienced a now-forgotten earthquake off the coast of Peru, he was appalled by the high energy displayed, noting in his *Journals* that the surface of the stricken island was changed more in a day than in a century of uniformitarian processes.

Lesser known scientists developed more elaborate theories of the sinking of Pacific lands: a century ago, Dumont d'Urville, naval officer and explorer, Moerenhout, folklorist, both French; then earlier in this century, J.M. Brown, ethnographer, and M. Menzbir, Russian zoo-geographer. Others might be also named. All brought forward evidence of a great continent joining the Americas to Asia and of human cultures flourishing upon it.

What kinds of evidence of this theory might be advanced? Again, as with the Indian Ocean, the material is geographic, ethnographic, zoological, and mythological. Again the chronological problems are perplexing. Kondratov, whose work was passed by a high-level interdisciplinary committee of Soviet scientists, can therefore only hint at the possible resolutions:

It used to be thought that the earth sciences possessed indisputable data. However, oceanography and geology are both developing so rapidly today that many seemingly settled questions are being revised. Substantial changes may soon take place in one of the cardinal questions of geology and oceanography - the dating of events that have changed the face of our planet.

Relating to the geographic is our general conception of the Pacific area as an exploded basin, filled promptly with water. The famous "ring of fire" is an effect like a fractured earth that is cauterizing the wounded edges of the continents. Repeated

catastrophes irritated and reopened the wounds. The famous arcs of islands and their associated trenches were left in an advanced position when the Asian continent was forced back by the Indian collision and an elastic withdrawal after the continent had been pushed to its maximum.

Japan is rising out of the water. Eastern Siberia is also, as evidenced in a progression of shell mounds of shellfish-eaters marching inland from the coast where the food was taken and eaten. Is Eastern Asia still pulling back from its farthest advance? But southeastern Asia is still subsiding. Is the continent still moving southwards? Experts may be found to date these events anytime from the Tertiary Age to the end of the last Ice Age. As with the ice caps and climate, the rising and sinking of continents is difficult to measure, much more difficult to interpret in terms of localized theory, and always hard to time.

If only people had kept off of the hundreds of Pacific Islands, geologists of long-term persuasion might rest easily. But some surprising human developments have been going on throughout the vast region. Related to the great Sinyan race of the Asian continent are the Malaysians to the southwest and the Polynesians to the south and east. Farther south and mingled with these groupings in some places are the Negroid or Australoid types to which reference has been made earlier. Nor should one neglect the Negritos and pygmies who are found in the middle of Negroid regions but are reputed to have dwelt practically everywhere. "The little people" are a universal subject of folklore. Wherever found they are designated as a very old, perhaps aboriginal, type of mankind; they are said usually to be more clever and have a richer mythology than the peoples around them, despite their smaller braincases.

Not only are there peoples on the Pacific Islands, but also the peoples have cultural complexities and have exercised technologies beyond their recent capacities. Picture writing is found on a number of islands, the *kohau rongo-rongo* tablets of Easter Island and the Woleai Island script, for instance. Monumental sculpture, comparable to "Old Bronze Age" achievements of the Middle East, existed on Easter Island, Ponape, and the islands of the Caroline Archipelago. Brown found Easter Island sculptural forms in many islands: Hawaii;

Pitcairn; the Marquesas; Christmas; Malden; Tinian; and Ponape. There are no two sculptures alike; hence the contacts were not recent and even originally the peoples must have been of diverse sub-cultures.

And everywhere, including the tiniest atolls, the peoples have myths of large populations, greater lands, of sinking lands, and of past ages of glory.

An Easter Island legend is typical. It is translated by Kondratov from Easter Island writings brought back by Thor Heyerdahl, the Norwegian archaeologist-explorer:

The Youth Teea Waka said: 'Our country was once a big land, a very big land.'

Kuukuu asked him: 'Why did the country grow small?'

Teea Waka answered: 'Uwoke lowered his staff on it. He lowered his staff at Ohiro. The waves rose, and the land became small.

People began to call it Te Pito o te Henua. [Navel of the Universe]

Uwoke's staff broke against Mount Puku Puhipuhi." A later arrival on the island, Chief Hotu Matua is told the story. It is added that "When Uwoke's staff was big, the land fell into an abyss. The chief corrects the report:

"That was not the staff of Uwoke, my friend," said chief Hotu Matua. "That was the lightning of the god Makemake."

The parallels here to the Phaeton and Typhon myths of Greece and the Near East seem to be beyond mythical fantasy. The comet (staff) of the god (cf. Uwoke, Yahweh, Ea, Yahou, Hermes), the marine tidal upheaval, the near approach of the huge comet, the sinking of the land into the abyss, the stroke of cosmic lightning that broke off the comet's tail, and the resulting "navel of the world," a sacred place like Delos Island in the Aegean Sea, which was called by the same term.

But now we are given pause. The Phaeton incident was of 3500 years ago, not 11,500 years. How explain the discrepancy in time between the Lunarian fragmentation of continents and the

Venusian cometary catastrophe?

The question is actually an opportunity to advance the theory. Perhaps the most perplexing of the problems enmeshed in the multifarious evidence of grandiose Pacific happenings is this: the debris of the Pangean continental breakup is scattered around the Pacific as its fundamental morphology; yet reports of more recent disasters occur. Many a geologist has dismissed offhand all evidence of recent happenings because he knows how removed in time were the major events; meanwhile the ethnologists are fixated upon the evidence of a human history unfolding in the midst of disaster. If the Pacific continents sank once, how could they be there to sink again even in the past three thousand years, even, indeed, in the nineteenth century, when reputable navigators swore to the presence of islands near Easter Island and elsewhere that are no longer there.

Some indications fit different periods. One may conjecture that, in the Lunarian episode, small pieces of land survived the chaos, or disengaged from the nearest continent and floated into the vortex. But, as for Europe, Africa, and Asia, so for Oceania. There was no end to catastrophe. Considerable populations and cultures could still be built up, only to be drastically reduced by subsequent lesser catastrophes. The Earth has not yet achieved equilibrium, particularly in the regions that were most heavily damaged. Igneous islands, such as the Hawaiian chain, must be considered as the tallest of seamounts. Coral islands and atolls may be considered as debris of Pangean sea bottoms and as new growth, accelerated by heat and by being adaptable to a quick rate of bottom sinking.

Rare igneous bits of rock, such as rhyolite, are of continental origin and found on Easter Island. The Soviet geologist, V. Belousov, maintains that a large zone off of Western south America had once been continental sial. Moreover, the seabottom of this southeastern sector of the Pacific rests upon a crust 20 to 30 kilometers thick; this is characteristic of continental crust, not of oceanic crust, which is only three to five kilometers thick.

It is possible that the area is continental sial, and even was once populated land, but that the stripping of crust by the moon

eruption brought on lateral avalanching to the north and west and a sinking generally in this sector. Then as the world cleaved, the rift here overran the land that was to sink. The setting contrasts with western North America where the rift was overthrust by the continent. One may expect to find oceanic basalt or sima beneath Easter Island, which extruded from the rift to pave over the land. Just as in the northwestern United States, the rift extruded lava on top of the land in wave upon wave.

Regrettably, judgment cannot yet be passed on the origins of Tiahuanaco, in the Bolivian highlands, or upon its related areas of culture in Peru, Colombia, and Ecuador. It may well be connected with Polynesian settlements in mid-ocean. The Galapagos Islands, once thought to be an isolated laboratory of plant and animal evolution, now gives up 2000 pieces of pottery and implements of human manufacture, as well as continental species of flora and fauna.

If Tiahuanaco last rose high when the Sierra Nevadas of California did, and when the area around Easter Island sank, then this event and a new phase of existence maybe placed in the second millennium B.C., rejecting its present dating of around 400 A.D. and moving backwards part of the way to Bellamy's 11,500 dating.

Soviet opinion on the American Indians, like that of most Europeans, assigns earlier dates to their arrival in the Americas. Kondratov works on the baseline of 30,000 to 40,000 years ago, and of 25,000 years for the Indians of the U.S.A. In Kamchatka Peninsula, sites are dated at 14,000 to 15,000 years. Red ochre, arrowheads, and beads and pendants like American Indian *wampum* were unearthed there. (Perhaps the question should be not "How so early?" but rather "Why so early?") Some 14,000 years of dealing in the same monetary exchange appears extraordinary in view of the fleeting career of historical monies. There are drawings in the American southwest of man and dinosaur; also footprints of man and dinosaur are linked; it is hopeless to calm the heated objections to these finds here; they are not impossible; then either the dinosaur survived until very late, or Americans are extremely old. Evidence is difficult to come by, but quantavolutionary theory may find profit in considering a humankind in America who was primordial with

humans everywhere, who was almost annihilated in the subsequent catastrophe, who was Tethyan (Mediterranean-Atlantean), Melanesian (African) and Sinyan (Mongolian) - all three - and who was later reinforced by way of the Aleutians and the Bering Strait region; there is no gainsaying the supposition.

Perhaps by this time the reader has already noticed the magical phrase which conventional science uses to deal with recent catastrophes of all kinds: "the end of the ice ages." It is a useful way of saying what is uncertain, without admitting that it is uncertain, or that scientists are even in agreement on when the ice ages ended. It could be anywhere between 5000 and 25,000 years ago, with most scientists centering upon the date that I have assigned to the Earth cleavage and Moon eruption, about 11,500 B.P. Thus, Vladimir Obruchev places "the sinking of the land in the region of Easter Island at the time of the glacial epoch" when the ice melted and waters rose. Or "Bering Land began to sink at the end of the last glacial period, between 10,000 and 12,000 years ago." Probably in any sample of books and articles on quaternary geology, paleontology, evolutionary biology, and archaeology, most authors will be found to use the "end of the ice age" as a general synonym for catastrophe. From pole to pole and all around the world "the Pleistocene ended in disaster." The reader might examine the two contrasting hypothetical calendars that follow after the text of this book.

To claim a known sinking for a known time invites error. The help that one can get from geologists and prehistorians is mainly inadvertent. The calendar of events and dates could be readily improved were a quota of careful scientific attention granted to quantarevolutionary hypotheses. Even conventional geologists of the holocene period have complained that their colleagues turn their backs on any phenomena that are recent.

Geology has traditionally opposed or ignored the interjection of legendary history and anthropology into its concerns, especially insofar as revisions of time scales are stated or implied. How then has geology coped with the rise and fall of land masses? After shaking off the idea that Noah's flood had covered the world (and the Deluge became a bogeyman to them, obliterating ancient human voices and behavior), geologists were possessed by the need to explain why marine fossils are found in lofty and

protected enclaves of the continents. It seemed natural to resort to risings; then just as naturally, the land beneath the sea had taken part in sinkings. Blessed with the gift of time, they could assign to every parcel of land its turn above and below the sea. The mechanism for the many freight elevators was unfortunately almost as mysterious as the "Hand of the Almighty," and is to this day. Furthermore, the mystery has in the past generation been enhanced by the discovery that most land beneath the wave is a stranger to the subaerial land. 'Sial is sial, and sima is sima, and never the twain shall meet.'

J. Tuzo Wilson pioneered the theory of the destruction and remaking of present ocean floors every couple of hundred million years: so much for sunken lands; they are stuffed down and run over by drifting tectonic plates. The rises are another matter.

The uplift of the continents is by the rise of flat domes of a variety of sizes, which have been called shields, cratons, batholiths and smaller domes... There have been intermittent uplifts involving the rise of land areas of the size of shields, or even of whole continents. Uplifts are followed by erosion and flooding of continents by the sea, each cycle requiring something like a hundred million years... Next smaller in size are *cratonic* uplifts of which Southern Rhodesia affords a fine example... Much of the shield of Southern Africa is underlain by a series of about a dozen cratons, each roughly circular and a few hundred miles across. These cratons are uplifted more actively than the shield as a whole... Smaller again are *batholithic intrusives*... Each craton was formed of a hundred or more batholithic uplifts... Those formed during a period of a few million years in Jurassic-Cretaceous time in the western Cordillera exceed in area by a factor of 1,000 all those formed during the rest of the half billion years since the close of the Precambrian eras. Once considered to have been intruded while molten, batholiths are now widely considered to have more likely resulted from plastic deformation with recrystallization and partial melting of piles of pre-existing sediments. They are often approximately circular and those showing the strongest evidence of recrystallization and igneous activity grade

into uplifts of similar size that were clearly intruded while cold and in a solid state." [11] Even smaller uplifts are very many in number.

Wilson's statements are descriptive: the mechanism is here presumed. Too, the language itself is non-operational and Aristotelian in undue proportion. Noteworthy in our view is the assignment of uplift to practically all land above the sea. It is thus that the marine sediments occur in all regions. The uplifts are circular, but not meteoritic; they seem like aborted volcanos, whether great or small.

The total impression is of immense uplifts from pre-existing sea beds, accompanied by smaller uplifts, then smaller, and finally quite small rises, a bloated skin with many thousands of protruberant patches. There appears also to be a heavy concentration of these rises in an age that concluded with worldwide biosphere extinctions, the Cretaceous. Further, the subterranean force involved a heat whose temperatures might begin by melting rocks and end in slight metamorphic deformation of rocks whose top levels were in fact pushed up in a cold state.

Might this whole worldwide process have occurred mostly in a single quantavolution? Some regions, even large parts of continents, would have been lifted hundreds or thousands of meters higher than others. Shallow marine sediments would be raised. Many sediments would be reworked in the heat, pressure, and churning of the uneven general uplifts. Erosion would be heavy in such an event, from mechanical disruption, uneven heating, electrical and gaseous outbursts, precipitated vapors, and winds. A great many inter-lift depressions and fractures, laying the groundwork for gullies, streams, and valleys, would develop.

The superpositioning of fossilized sediments according to age would be preserved, even as these were raised. High in the plateaus of Africa, Tibet, and Bolivia, fossils from shallow seas and swamps would be stretched out in their original beds. The Earth would have a largely new surface, uneven, less neat, and confusing to the eye of the beholder. Too, with all this swelling, could not one speak of a general expansion of the Earth? Again,

we go in search of a mechanism.

Let us turn to another admirable geologist, whose work unwittingly has helped us to generate the theory of quantavolution. Shelton explains the modern theory of crustal movements of the Earth - diastrophism, in a word [12].

Most geologists look inside the earth for the ultimate driving force of diastrophism; no known exterior forces are sufficiently versatile to account for the variety of deformation we see... Plastic creep, perhaps in the upper part of the mantle, is the active element, and the brittle crust on which we live is passively tiding on this very slow flow. Of course, discernible forces arise from the rotation of the earth, from the tides, and from gravity acting differentially on irregularities in the crust and its surface topography, but these influences probably can do no more than modify and locally complicate what is probably the essential mechanism of crustal deformation - very slow plastic movements at about the level of the upper mantle.

One notices an absolute indifference to exoterrestrial forces and to their high energy expressions of an electrical, atmospheric, aquatic, and lithic kind. Shelton proceeds:

This concept is attractive for many reasons. By postulating different directions of flow in the upper mantle, it is possible to imagine many different kinds of stress being imparted to the lower side of the comparatively passive crust. If the flow involves circulation in three dimensions it must include rising currents in some areas and sinking currents in neighboring ones hundreds or thousands of miles away, as well as horizontal transfer from the first type to the second.

One notes the speculative terms: "attractive," "postulating," "imagine," "must include." There can be no objection to speculation, especially in so excellent a volume as Shelton's, but neither should geology claim to be a "hard science," fighting off speculators.

Shelton, perhaps embarrassed by the weakness of conduction currents, suggests that the rising heat of the deep mantle is so great as "to require the actual rise of masses of rock from hotter regions deeper in the earth." And he concludes that "some kind of very slow thermal convection - the rise of relatively warm columns and sinking of relatively cool ones - is a favored hypothesis for the ultimate cause of diastrophism." Then in two final paragraphs he reverts to basic questions, asking, too, for the essential information needed to answer the questions. He doubts finally that the information at hand is more than enough to tell one rock from another, and certainly not adequate enough that "a hypothesis of thermal convection currents in the upper mantle can even be formulated, let alone tested..."

Sometimes, when asked why he does not sufficiently quote "creation scientists" - George McCready Price, Donald Patten, Byron C. Nelson, Alfred Rehwinkel, to name a few - the present author answers that he has only a limited perspective, an individuated paradigm, which cannot move too far if it is to remain intact. Moreover, he cannot assimilate theoretically the instrumentation of some secular catastrophists such as Hoerbiger and Beaumont, whereas he feels comfortable in the modes of thought of such as Boulanger, Donnelly, Bellamy, Kelly, Dacheille, Velikovsky, and a number of very recent historians and catastrophists. But finally he must confess that he feels more inspired by the contradictions displayed within the evolutionary and geological literature as it marches in fine array through the catalogues and journals of science. It profits science and pleases him more to tell the latter writers that he agrees with what they are saying but that they do not realize the full meaning of what they are saying.

Notes (Chapter Eighteen: Sinking and Rising Lands)

1. *Op. cit.* 55, 59.
2. *The Riddles of Three Oceans* (Moscow: Progress Publ., 1974) 101.
3. Unpubl. miss. communicated to author by René Roussel of Ablon, France, Apr. 19, 1974; *cf.* discussion by J. Bimson, *S.I.S. Workshop*, Feb, 1979, P.M. Hughes, *ibid.*, Sep. 1981, and 35-6 editor).
4. *Melbourne Sun*, Aug 14, 1982.
5. 229 *Nature* (Jan. 29, 1971), 327-9.
6. By the "Glomar Challenger," *cf.* 227 *Nature* (Aug. 22, 1970), 767-8.
7. Before *Columbus* (NY: Crown, 1971); *Riddles in History* (NY: Crown, 1974).
8. In J.C. Riley *et al.* *Man Across the Sea: Problems of Pre-Columbian Contacts* (Austin, Texas: U. of T., 1971).
9. "Cenomanian Sync., "I *S.I.S. Rev.* 2 (Spring, 1976).
10. S. Warren Carey, *The Tectonic Approach to Continental Drift* (U. of Tasmania, 1958); *The Expanding Earth* (Amsterdam: Elsevier, 1976).
11. In Beals, et at., *Theories of the Origins of Hudson Bay*, *op. cit.*, 37-40.
12. The material to follow is contained in Shelton's *Geology Illustrated*, 423-4.

CHAPTER NINETEEN

EXPANSION AND CONTRACTION

Mankind has been impressed by many lands sinking like Atlantis and Lemuria, and by others, such as the Atlas, the Cascades and the Chilean Cordillera rising. The movements, all legends insist, were sudden. And, of course, since it is the human who speaks, the movements were recent.

L.C. Stecchini, historian of ancient measures, maintained[1] that the Babylonians, calculating the diameter of the Earth subsequent to Egyptian measurements, arrived at a larger figure. Some of man's early obsession with geometrical measurements of Earth and sky were motivated by perceptions of terrific effects and of changes still then occurring or feared.

Geologists prefer to think of lands sinking in one place while rising in another. I doubt that ancient man would argue the point. The geologist may call the total process isostasy, by which is meant the belief-not necessarily a fact that the mantle around the world so acts as to stabilize the crustal surface. The mechanism of isostasy is questionable, but, since it is only a question-begging term, it is less questionable than the mechanisms for pushing up and pulling down the crust, which may be a non-existent practical fiction.

What would provide an intelligible mechanism? One such possibility is the expansion of the Earth as a whole.

When the remarkable past changes of the globe first assembled themselves in my mind, I imagined them to have occurred solely as a result of the expansion of the Earth under the influence of exoterrestrial forces. Then the theory of lunar eruption appeared more convincing than a very large expansion, and finally I settled upon a combination of loss of mass and expansion of volume.

Whatever can explode can expand. Worlds explode. Radio

astronomy and even visual observation on rare occasions, confirm this. The asteroid belt between Mars and Jupiter was probably a planet until recently. There are some small indications that it may have been identified with the Greek god Phoebus Apollo, hence be so close in time.

The Earth can explode. Therefore it can expand. It is more difficult to construct a model of expansion than a model of explosion. Both layman and expert can readily conjure up an image of "more than enough" energy to explode any body. In so imagining, they may skip over the crucial problem of how much it takes exactly to explode the body. An explosion can be defined as a rapidly accelerating expansion that has achieved a specified rate where a set of effects occurs that is called "explosion."

The conservation of angular momentum of a rotating body depends upon its retaining the sum of its mass, its velocity and its radius. The radius is the distance from the center of rotation to the direction of its motion along the axis of rotation. Expansion signifies a change in radius.

The concept of radius describes a relationship of objects. It is not itself a force or an entity. Therefore, the expression "increase in radius" must signify a changed spatial relation between things that determine the radius. Once more, the salient question points at electro-mechanics, determinants of mass that might act to increase the radius.

Expansion of a rotating body then must be associated with a change in velocity or mass. In the case of the Earth during a lunar eruption, the loss of mass consists of half the crust and most of a dense atmosphere, altogether no more than 2% of the mass of the Earth. An interruption of rotation imposes an abrupt decline of spin velocity upon the Earth. This then requires an increase in radius and expansion in order to maintain angular momentum.

At the same time, the conservation of angular momentum does not occur in an isolated system. In the present case, energy representing the angular momentum is transferable to other external systems: the space plasma, the proto-Moon, the Sun and

planets, and cometary bodies.

A body such as Earth will expand when it is freed from an external pressure. Possession of a dense atmosphere of the type of Venus would have limited the Earth's figure; if removed, the Earth would have expanded. Its outer surface will even spring back, that is, exhibit an acceleration and a counterpressure that causes it to "take off" from its base. Irregularities found in a number of places around the globe may be fossil expansions, if not fossils of impact explosions and massive eruptions.

There are reasons to believe such events can occur and have occurred. In anticipation of stating them, we may suggest why land has sunk; for the two behaviors of expansion and sinking are not independent, although they may occur at different places and lithospheric levels. Lands have sunk by collapse into new basins, by flooding, and by their contents disappearing in explosive clouds of debris. If the force that explodes the land expands the Earth, then we have sinking and rising in a new formula, one which contains its mechanism, and furthermore may be true.

The Earth was not pre-ordained to its present volume or density. No two planets have the same size or density. Earth's mass density differs considerably from that of the inner planets and much from that of the outer planets. So does its volume. It could once have been denser and smaller. That its mass and volume have been constant through long ages is 1) an ideological dogma and *idée fixe* 2) a mistaken simplism regarding the "hardness of rock" and the innateness of volume 3) a mistaken reading of natural history 4) a psychological denial of an undesired state 5) a practical fiction, or 6) a fact. The first five possibilities might be demonstrated without much difficulty, but will be left to such evidence as the reader may cull from this and related studies. If they are so, then the sixth may be in doubt and the contrary may be considered, namely that the Earth's volume has fluctuated or at least been subject to expansion. Such a consideration is the purpose of this chapter.

A number of theories have given the Earth different sizes in the past. A number of means of expansion are available. A number of reasons lead one to a probable opinion that the Earth was

once smaller and has recently expanded in volume.

Pickering long ago realized the necessity of Earth expansion. "A rising region... must evidently be increasing its volume. This increase may occur either with or without an increase of mass. In the latter case, the increase must be due to a rise in temperature. It has been shown that, if a part of the Earth's crust fifty miles in thickness were to have its temperature raised 200° F, its surface would be raised to the extent of 1,000 to 1,500 feet. The Bolivian plateau has an elevation of two and a half miles. That of the Himalayas is about a mile higher. It is improbable that these elevations are due to this cause." [2] He finds that an increase in mass is impossible. He then turns for an explanation from a simple temperature rise to the possible pressure of water and steam, and since he was unaware of the lack of water over the rock of ocean beds, and since he presumed the Moon eruption and the catastrophic period to be very ancient, he called upon a still watery mantle to produce the necessary thermodynamics for expansion. Even were the age to be granted, the mechanism would be hopeless for the task. No exploding steam engine could blow the material of the Moon basin into space.

Carey and Jordan have devoted books to the subject of Earth expansion, and were cited earlier. Both see the process as very gradual. Carey estimates a 20% radial expansion and uses the projected expansion as a mechanism to account for continental drift. M. Cook, in criticism, finds Carey's theory short in energy supply, and argues that the required release of chemical bonding of molecules would melt the Earth. Jordan, following Dirac, claims a relaxation of the gravitational constant over time. As gravitational attraction declines, matter expands. The application of Dirac's theory to Earth expansion would logically follow, but Jordan is unable to provide convincing geological evidence, even when presented with a long Earth history.

R.H. Dicke and C.H. Brans also predicted a slow drop in the force of gravity, and Dicke estimated that Earth gained from this source 15% in volume over 3.25 billion years. When the Atlantic basin was shown to be young, Dicke ceased to credit its widening as support for his theory, because it apparently had grown 300 times faster than his theoretical rate would allow [3].

Egyed's theory of Earth expansion, based upon paleogeographical data showing a modest inverse correlation between the quantity of ocean waters and the passage of time seems vulnerable both because a uniform quantity of water is assumed and because the time periods, though conventional, can be challenged. Egyed cites Cox and Doell, further, in claiming an increase in the Earth's radius of between 0.5 and 1.0 millimeters per annum [4]. This would amount to 10^6 meters in a billion years, about one-seventh of the Earth's radius.

In comparison, my estimate of the radial expansion which accompanied the fission of the Moon is about 9%, less than one-tenth of the total radius; the estimate is the result merely of topographical scrutiny. The expansion in volume represented is about 20%, much less than Carey's estimate. Carey's expansion took place over many millions of years; the process here discussed would have occurred in perhaps three thousand years. Again, we rely upon a uniquely great exoterrestrial encounter to compress time, accomplishing in centuries what the aforesaid scientists have allocated as the task of very many millions of years. Any evidence at present of an expanding Earth, we would accredit to the extended uniformitarian tail of the exponential curve of quantavolution.

Of the several attempts at demonstrating expansion, Meservy's appears most clear and valid. He shows that "the separation and movements of the continents in the last 150 million years cannot be explained by continental drift on the surface of the present-sized earth." [5] This he does topographically. Following the Bullard and Hurley reconstruction of the supposed original supercontinent before its continental elements drifted apart, he retrojects the present continental map as it must have drifted and shows that the present arrangement could not have emerged from the reconstruction.

In order for the supercontinent of one time to fit the map of the continents of today, the continents of today would have to come from a smaller globe. "It seems highly improbable that the area enclosed by the perimeter [of the Pacific] was ever as large as half the earth's present area in the last 150 million years." Furthermore, he claims that his "argument is not very sensitive to the exact time scale or to variations in the rate of ocean-floor

spreading, as long as these were reasonably monotonic in the period in question." That is, the solution of a smaller Earth would emerge even if time were foreshortened and ocean-floor growth were rapid. "The most direct interpretation of the evidence... seems to be that a large expansion of the earth's interior has taken place in the last 150 million years. The nature of the physical process that could have led to such an expansion is highly conjectured, but such a process cannot be excluded on the basis of present physical knowledge."

By what means could the Earth have expanded at the time of or subsequent to the breakup of the original super-continent? Six means can be suggested, none of them excluding all others and in fact all six could be simultaneously operative to produce a concurrent breakup of the continental mass and an expansion of the globe. Meservy does not consider a sudden loss of over half the Earth's crust, as by Moon fission, but significantly the occurrence of such a loss, concentrated within the Pacific perimeter, only serves to strengthen his topographical demonstration.

An abruptly slowed rotation of the Earth over days of time, never to be restored, would reduce the centripetal force of the globe and tend to expand its volume. This would be especially prominent if the body causing the slowdown were electro-gravitationally attractive. The Lorentz-Fitzgerald (1893) equations assert that all matter contracts in the direction of its motion and the amount of the contraction increases with the rate of motion. The Earth rotates with a kinetic energy of 2.6×10^{36} ergs. If an interruption by an external body depresses its rotation by 35% and shortly thereafter the rotation assumes the level of a 20% reduction, an energy of some 10^{36} ergs is available, along with a large electrical, gravitational, and axial torque energy, to push the continents and expand the volume of the Earth. This heat of rotational slowdown is sufficient in theory to unleash 50 billion Krakatoa's. That volcanic eruption, one of the worst in history, released about 2×10^{25} ergs.

The conditions for expansion of the Earth were probably present, but they approached the conditions for a complete melting of the crust of the Earth. They approached, beyond that, the conditions for the explosion of the Earth. Nevertheless, in the end, the

sphericity of the globe was maintained, half of Pangea was preserved, and small numbers of most flora and fauna, including *homo sapiens*, survived. The fall of cold water on the continents helped to preserve their structures against heat from below while the same waters moving into the oceans and the falling waters there catalyzed the expansion process.

The sudden acquisition of a huge heat presented problems of storage and prompt use, if the Earth were not to explode. The Intruder's pass-by and the forces it exercised upon the globe would begin some days before the moment of maximum impact and continue for several days thereafter. Thus the heat would not be applied all at once; by the time the critical moment arrived, the Earth was committed to partial explosion and expansion. The loosening of the Moon-making crust and the cleaving of the globe would take place quickly; then immediately the heat would be drawn upon for the reconstruction of the Earth.

Also, a great proportion of the heated matter would be exploded into space. The global fracture system would help to handle the venting of enough heat and material to cool, pave and expand the Earth's surface. Moreover, it would develop the capacity to do so within the required time. And the density of the Earth's interior would be originally sufficiently high to provide the material.

A decline in atmospheric pressure by the temporary and permanent removal of atmosphere, especially a heavily vaporized one, would also contribute to an expansion of the Earth. So too, of course, would the actual removal of crustal material of low temperature. It is not necessary that the rising magma be less dense than the escaping crust but only that temporarily it be in a molten state, mixing with gases and water as well, and hence capable of freezing into a solid at a higher level or over a larger expanse of surface. H.J. Binje said once that "the driving force of rising magma lies in change of the nuclear structure of the magma itself." [6]

Water added to a silicate solution reduces its melting point. The lower crust and mantle boundary might melt at as low a temperature as 500° C under water saturation. The water itself would be provided by old surface waters and incoming deluges

of rain, snow, and ice.

The upper crust on which the biosphere and sediments rested would be shielded from the abyssal heat by thousands of volcanic vents penetrating its surface and by the cyclonic venting of heat into space over the immense flayed crater of the Moon. Still the thermal pressures throughout the globe would be heavy and accompanied by rises in temperature that would increase the expansion.

The globe would fracture throughout. Pictured as scraped of its biosphere and surficial sediments, the globe today presents a thoroughly fractured appearance. Nowhere on Earth is one very far from a great fissure that would have been involved in expanding the globe. Perhaps one of the reasons for the discontinuity and absence of expected sediments in so many places is the underlying expansion by igneous intrusions that once occurred. Furthermore, the very 'success' of the globe-girdling fractures in producing ocean beds of lava and pushing away the continents is that they were engaged in expanding the volume of the Earth.

The sial continents that remained obviously were not destroyed in the process of partial explosion and expansion. However they were penetrated at many points by expanding lava. The sial could be lifted by less force than would be required to dissolve it. Given over half the surface as a direct outlet, and a huge fracture network for disgorging heat and magma, there would be less occasion to obliterate the many large areas of sial overhang.

Willis once wrote that "it is established by observations on rocks that the chemical compounds of which they consist can adjust themselves to changes of pressure or of temperature or of both by changes of volume as well as by alterations of form. Larger volume would result if a mass of rock were heated and at the same time relieved of some of the load resting upon it." [7] He even went so far as to say that erosion can cause underlying rocks to expand their volume. Rock crystals respond to new conditions, not even highly thermal, by reorganization of their structure. "Crystals are almost human in that they always seek the easiest way out... Where crystals grow vertically, continents rise." A sudden and massive change in crystallization may have

occurred in many rocks. Now we might claim that the lunar explosion may have been the chief factor in expanding the Earth and producing the granites of the continents whose origins we had been wondering about in an earlier chapter.

A definition of stability and even of structure is that the defined complex resists electro-gravitational dissolution. If a complex, say of rock, is stretched in a lowered gravitational field, that is, attracted by another field, and obtains a revised structure, then, after release from the second field, it will tend to retain the form temporarily assumed. This may be a factor to be considered in relation to an expanded Earth. An analogy suggests itself: rock under conditions of the assumed encounter would behave like oil shale when it is processed. The rock that is mined expands its volume by 20% or more [8].

Seismic signals experimentally transmitted through the Earth produce more or less sudden changes in velocity, indicating "boundaries" at six radial distances before reaching the center: the Moho discontinuity, and at 400+, 950+, 2900+, 4800+, and 5100+ kilometers of depth. There seems to be little explanation for these seismic transitions unless they represent levels of response to an historical torque. The interruption of a rotational motion of a mass must be perceived by the whole body. At some ratios of density to torque, indications of a phase shift should occur. These indicators would be erased by a huge expansion, but by the same token, will remain vivid under conditions of moderate expansion.

In another work, I asserted briefly, and probably in error, that the Earth would lose electrical charge in a grave encounter such as would remove the lunar material: "loss of electrical charge may also have decreased the density of the Earth." [9] This was based on the assumption that piezoelectricity from rock turbulence and electrostatic charges would be lost into space to the larger intruding body; then matter hitherto bonded electrically would be unbonded and take up more volume. However, after discussions with E.R. Milton, I became persuaded that the intruder would have carried a heavier charge, since it was transporting charge from the outer solar system toward the Sun; it was also much larger than the Earth; therefore it would have deposited charge upon Earth. The charge would

then be incorporated by the Earth's molecules and cause the stretching of their internal atomic bonding. Hence expansion. But where the charges would accumulate is critical, whether on the continental surfaces, or diffused in the mantle, etc.

"It is not generally known that the volume of a Leyden jar is increased by charging the jar and diminished by discharging it, wholly or partially. The crust of the earth resembles a Leyden jar, of which the coatings are represented by the liquid core and the enveloping atmosphere." So wrote Abbe Moreaux in 1909 [10]. He envisioned a daily expansion and contraction of the crust. Possibly the same charging phenomenon would effect a larger and more enduring expansion of the Earth.

The almost non-existent evidence, and the complexities of the electrical phenomena accompanying such an encounter, make all reasoning highly speculative. It is possible that both processes occurred, a gain and loss of charges, with the gain predominating.

Yet another set of phenomena may be connected with Earth expansion, rather than simply the adjustment, unexplained, of coastal margins to which it is otherwise attributed. That is the tendency of continental margins to stretch out over the ocean basins. For instance, "as late as the beginning of the Quaternary period the land of Siberia reached much farther north and at the end of the last glacial epoch was broken up, large areas sinking into the sea." [11]

Elsewhere we read, "while exploring the seismic structure of the continental margin off France, Lucien Montadert, of the Institut Francais du Petrole, noticed that the upper part of the continental crust of margins has been fractured into a remarkable pattern of narrow sedimentary basins bounded by listric faults, that is, faults that 'curve,' being steep at the surface, becoming more horizontal with depth. He suggested that the continental crust at the margin was extended at the time of rifting by up to 20 per cent." [12] The listric faults are not found where internal basins, such as Lake Michigan, have been examined.

We are inclined to view this oceanic marginal fault system as a possible stretching to accommodate expansion. If the rift did not

cleave cleanly, however, the stretching might be expected. As the Earth expanded, and radial pressures pushed upwards, blocks of rock would be broken off serially from the continental mass. The stretching might also, still in accord with our general theory, be a result of a differential speed of rafting, with 'France' here heading eastwards faster than the bottom of the basin could be paved with fresh lava.

When the Earth's surface is viewed from a detached intellectual perspective, it begins to appear as a thoroughly disorganized assemblage. Instead of its presenting logical conformities on a grand scale, its every feature becomes an anomaly. All of its real rules seem to have come from violating the rules of the earth sciences. When such a condition is manifest in human organizations, such as the factory, or the hospital, or the government, that is, when what is regularly done contrasts with the way things are supposed to be done, the usual recommendation is to change those rules that are inapplicable to reality. Unfortunately in the present case, as in many cases of social organizations, new rules are not easy to write and, meanwhile, the old stable mixture of reality and pretense that has been managing the enterprise dissolves into fantasy and disorder.

Notes (Chapter Nineteen: Expansion and Contraction)

1. In conversation with author. His yet unpublished manuscripts may cast light upon the matter.
2. 15 *J. Geol.* (1907), 34.
3. W. Sullivan, *Continents in Motion*, 50-6.
4. "The expanding Earth," 197 *Nature* (16 Mar. 1963), 1059-60; see also P.S. Wesson, "Does Gravity Change with Time?" 33 *Physics Today* (July 1980), 32-7.
5. "Topological Inconsistency of Continental Drift on the Present Size Earth," 166 *Science* (31 Oct. 1969), 609-11.
6. Quoted by Jordan, *op. cit.*, 121.
7. B. Willis, *East African Plateaus and Rift Valleys* (Wash. D.C., Carnegie Inst., 1936), no. 470; 306, 309.
8. *Encyclo. Britannica yearbook*, 1976, 289.
9. *Chaos and Creation*, 154.
10. 68 *Sci. Amer. Suppl.* (24 July 1977), 3.
11. II *Catas. Geol.* 2 (Dec. 1977), 3.
12. Tony Watts, "Plate Tectonics," *New Sci.* (6 Nov. 1980), 362.

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