

CHAPTER THIRTEEN

DELUGES

We resort again to the skies for cataclysms. A dense canopy of primordial clouds, lately dropping, has long been a tempting theory. Jordan, who wrote a book generally upon earth expansion, assembled data and authorities in support of the idea that in the Devonian and Carboniferous age there was "a world-wide uniformity of climatic conditions from the furthest south to the furthest north."¹ A cloud cover of a thickness of perhaps ten kilometers was deemed possible, leading to the warmth and precipitation that grew rapidly the huge forests of the carboniferous period where, he pointed out, the trees carried no seasonal rings. R Potonie is cited on the evidence for low light intensity in those times.

Jordan favored Dirac's hypothesis of a declining gravitational constant. This would permit a larger solar constant in earlier times, which would have brought on the vapor cloud canopy. At some point the gravitational grip relaxed and the rings and clouds descended. Jordan was not concerned with the speed of drop or the basins required to collect the waters or with the recency of the translation from sky to Earth. However, the sky-drops may not have been so long ago. Rich and specific traditions of great celestial waters and deluging of the whole earth convey a strong presumption of truth. Prehistoric floods are believed in by many peoples who have suffered in historical times floods of only trivial consequences. Not even psychoanalytic theory, which is the most penetrating critic of delusions, can locate a psychic source of the flood complex; the waters of the sac in which we all swam in embryo are believed to have been a soothing, not devastating, medium.

Scholars have repeatedly analysed much of the surface of deposits of the Earth and reported them to be the result of universal deluges; just as often they have been rebutted by scientists who see in their studies the hand of religious authority. The greater the controversy, the less immediate the conviction that my few paragraphs here can convey. Nevertheless, I will state that an unbiased scientist must today admit that the action of heavy, large-scale floods produced by vertical and lateral rushes of water can, in a holistic context, account for numerous deposits and land forms around the world. A presumptive and perhaps invalid stretching of time can only stagger the events so as to deny them simultaneity and hence grand scope. Or, in keeping with legends, the events can be concentrated, but the intervals of quiescence then may be stretched out greatly. Or, finally, both the events and the interims may be condensed in time, a view preferred here.

The sources of huge flood waters are limited. They may occur from the sudden collapse of an ice cap such as that of the Pleistocene, which covered, it is said, 30% of the Earth's surface. They can be exoterrestrial -from a comet or exploding body of the planetary system. They can descend from a onetime far-flung vaporous canopy. They can be mobilized as tides from an interruption of the Earth's motion, a tilt of the Earth's axis, or a drag induced by a giant passing body. They can, also as tides, be generated from a heavy meteoroid impact on the ocean, directly and also indirectly as in all cases above, from the winds, rock shifts and seismism accompanying them.

¹ Pascual Jordan, *The Expanding Earth* (1971) (orig. German ed. 1966).

Deluges and tides both cause flooding. Some distinctions are necessary, though, for the next chapter continues this one with the story of great tides that swept the Earth. "Deluges fell." We should preserve the strict meaning of deluge, as a cataclysm, a "down fall." That is, a deluge is defined as an immense rain or fall of matter from the sky. A flood tide is a body of water in motion. A flood is a raising of water levels from rain or tide or both. In this chapter, only the vertical flood, the true cataclysmic deluge, is considered; in the following chapters, lateral floods and tides are treated.

Diderot's *Encyclopedie* (1751-1765) carried an article on "The Deluge" written by a young French engineer and soldier, Nicholas-Antoine Boulanger. Going beyond Newton's disciple, Whiston, who had explained the Deluge by a comet, he then wrote the first scientific work uniting the four factors; comet, flood, terror, and the origin of religion. G. R. Carli followed in a few years with additional world-wide legends and geological evidence of catastrophe. The ancient reports of universal catastrophe, both men reasoned, bore the stamp of truth.

In the century that followed, the natural and psychological sciences separated themselves from history and legend. The Biblical Deluge, for example, was steadily diminished and even dismissed as a fairy tale. It became a local flood along the Euphrates River, an account which the Hebrews picked up and patched into their holy scriptures. The influential geologist Seuss opined that "the traditions of other peoples do not in the least justify the assertion that the flood extended beyond the lower course of the Euphrates. More recently, the great floods that moved over the Indus River centers of India in the second millennium B. C. have been explained by Raikes as the effects of the bursting of natural mud dams. Such floods, goes the conventional belief, typified in the work of D. Vitaliano, occurred elsewhere from time to time and were exaggerated out of local pride.

Anyone who has experienced heavy rain and flood is keenly aware of the damage and the fright that come with the prolonged precipitation combined with the rising and swirling waters. Individuals and towns do not forget them easily. But no culture makes of any such weather event a centerpiece of their history as human beings. No matter how disastrous (as for example, was the Yangtse flood that killed an estimated million people in 1887), unless a flood practically obliterates a culture, or is accompanied by compelling foreign "divine" phenomena, it does not mark indelibly the social memory.

Donald Patten lists sixty-eight deluge traditions on six continents. He might have named many more. For instance, twenty-five of them come from the Americas; but Marie and Richard Andress, folklorist and geographer respectively, found forty-six in the New World, almost twice as many accounts. But Bellamy estimated 500 deluge myths coming from 250 peoples or tribes. The probability is high that every culture can recite the story of a universal flood which practically nobody survived.² The deluge is frequently pictured, too, in ancient and modern art. A. Durer and Leonardo da Vinci painted their images of it, both making it a kind of typhoon. And indeed, in the ancient Chaldean story of the flood of Xisuthros the node of the Deluge is spoken of as a waterspout that "swelled up to heaven "and struck fear into the gods; the god Ea pleaded that any and all disaster be visited upon men, but nothing so terrible as "the waterspout of the Deluge."³

² *The Biblical Flood and the Ice Epoch*, op. cit., 164-6, 52. Bellamy: *Moon, Myths and Man*, op. cit., 120.

³ Kelley and Dachille, *Target Earth*, 241.

In every ancient legend of great waters descending from the sky, a few survivors live to tell the tale. At any rate, so it seemed to the survivors. But given any tiny sum of survivors in various parts of the world, one has the basis for survival of the human race. Even a single couple procreating successfully can set off a population explosion within a few generations. The mathematics of reproduction are such that some eight billions might theoretically come forth in a thousand years. That is over twice the present population of our crowded world of today.

While catastrophic forces work on exponential curves, so do populations of all living forms. Indeed, unwilling as they may be to accept such a defence, one of the best arguments for Darwinian adaptation is the capacity of all living things to increase from a pair to billions in a numbers of years. There would be no need for exponential population growth under uniformitarian conditions. But population explosions themselves are an indirect proof of catastrophes.

Since the time of Boulanger, quantavolutionary thought has arrived at a number of additional conclusions about the "Deluge." These are at odds with conventional science, yet have been using more and more the findings of conventional science.

Boulanger and others have talked of "the" Deluge as if there were only one, whether unique in occurrence or unique in size. Most of the ancients spoke of periodic flood catastrophes. The Greeks spoke of three great floods, Deucalion, Ogyges, and Dardanus. The first two have been tied to great floods of Exodus times, the mid-second millennium B. C.⁴ According to Philochorus (3rd c. B. C.), "deluge-swept Attica remained without a king for 189 [or 190] years " in the wake of the Ogygian Flood.⁵ Sextus Julius Africanus said that "all the former population of Attica was killed in the Ogygian deluge and the country remained uninhabited for 270 years."⁶

The Flood of Dardanus was probably of the 8th century B. C. The story of Atlantis may be contemporary with the Saturnian flood. We note that the Atlantic Ocean was called the Sea of Kronos. Atlantis would then have sunk in the flooding of the continental shelves by the Noachian Deluge. In a prescient line, Bellamy thinks: "Genesis I is a dragon myth without a dragon, a deluge myth without a deluge."⁷ This would be the initial deluges of the first, Uranian period of Chaos. The Greek myths of Ouranos and Okeanos were concerned with universal deluges of the earliest catastrophes, involving the breakup of the Super-Uranus partner of the Sun.

Diluvians are of several minds. My view is that the deluges were numerous, with two great peaks. This view has at least the advantage of including all known and suspected deluges in human memory. As pointed out earlier, various high energy expressions such as typhoons and volcanic explosions invariably pick up and drop huge amounts of water and are at least localized deluges.

The first peak, the Uranian, consisted of a series of drops of sky-held waters, occurring from the beginning of the holocene period when set at 14,000 B. C. and continued for several thousand years through the lunar fission. Deluges of stone and dust (or mud) occurred

⁴ By Velikovskiy in *Worlds in Collision*, 148-52.

⁵ H. S. Bellamy, *The Atlantis Myth* (London: Faber and Faber, 1948), 145.

⁶ *Ibid.*

⁷ *Moon, Myths and Man*, op. cit., 178.

simultaneously. The second peak may be placed at the end of the age of Saturn and can be identified as the flood of Noah (sometimes calculated at 4000 B. C.). Dense material fall-outs of catastrophic extent occurred at the time of the heavy-body encounters with Venus and Mars, in the second and first millennia B. C. These were exoterrestrial. In these cases, described in *Chaos and Creation*, as well as on a number of other occasions, universal and local conflagrations and explosions caused damaging fall-outs of material that was raised from the Earth. The gravest such occurrences would have been the fall-back of some of the material that was erupting to form the Moon, around 11,500 B. C. Huge falls of insects, fish, frogs, etc. would have certainly constituted terrifying spectacles over less extensive areas, and were sometimes the cause of plagues.

Issac Vail, an American naturalist, in 1874 proposed that the Deluge of Noah occurred "as a philosophical necessity, arising from a world-condition that no longer obtains A vast cloud-canopy of primitive earth-vapors, such as now envelop the planets Jupiter and Saturn, lingered as a revolving deluge-source, in the skies of antediluvian man --a source of primeval rains, snow and hail, competent to produce all the floods, and all the Glacial Epochs the earth ever saw, and that this last fall of those primordial waters deepened the oceans many fathoms."⁸ Vail was a polymath whose analyses of myth were superb. Unfortunately, a fire consumed his principal manuscripts and he was compelled to rewrite them from memory, and then only in part, omitting many citations of sources.

Vail calculated the fatal flaw of the conventional theory of the ice ages; the incapacity of the Earth internally to generate enough heat to lift the waters and convey them to where they would form ice. And, had a mechanism to lift such masses been employed by exoterrestrial sources (although no one considered this possibility), then the poles as well as the Equator would be consumed by heat. The only alternative, Vail thought, was a pre-existing high set of Saturnian rings which descended into Jovian cloud bands and then fell upon the Earth as snow and ice in the polar regions, to which they were deflected by the Earth's magnetosphere.

Vail thought that the vast changes recorded in ocean and terrestrial life proved that a canopy had existed and had from time to time dropped part of its contents upon the earth. He pointed to pre-existing tropical conditions uncovered throughout the globe as proof of a "greenhouse" climate in which the clouds diffused the sun's heat and maintained even temperatures everywhere.

Vail did not introduce heavy-body encounters into his model of heaven and earth. Yet there is yet another possible source of a deluge, terrible beyond all others. If a passing body were attractive enough to disrupt, dislodge, and explosively pull into the sky portions of the earth's surface, it would also extract water and ice directly from the earth. The portion of the water that did not follow the intruding body into far space beyond the earth's grasp would fall back upon the world as a deluge or circle the earth with the moon and ultimately, if disturbed, fall.

Vail was not specific as to why the canopies would ever fall. He appealed to a "natural" and "divine" order or process happening over long ages, without external intervention. If the rings had moved with the Earth like the Moon does, they would hold their orbits similarly. Their fall would be at best exceedingly slow and the climatic ages that they would produce on earth exceedingly long, too long for any catastrophic theory. However, a collapse would be rapid

⁸ "The Misread Record," p. 1. Most of the specific allusions in these next paragraphs are from Vail's *Selected Works*.

under certain conditions. The globe or canopy might change its motions and/ or electrical charges. Both would occur with large-body encounters and dense-material fall-outs and radionic storms. A great meteoritic explosion, a phaetonic atmospheric pass-through, and a bombardment of particles would singly or in combination, and in proportion to their volume, precipitate deluges upon Earth.

Now we see a complex of possible events: that "heavenly waters" (canopies) might have existed, that they might have fallen, and that explosions might have produced them and/ or brought them down along with exploded waters. The mechanisms are described more precisely in *Solaria Binaria*.

We continue Vail's account: the most ancient of East Indian gods was Varuna, whose name means the "surrounder" or "concealer." He is the regent for the Sun. The root syllable "var" means water, hence "he who covers the heavens with his water canopy." Ouranos is the Greek equivalent: this Heaven-god, ancient Hesiod's *Theogony* tells us, came from far away to embrace "Mother Earth," Gaea, and "lay close about her on all sides around." The most archaic deity of the Latins was Coelus, ruler of heaven (Coelum), who like all the other heaven-gods, was ultimately banished. The Kojiki, holy scriptures of Japan, maintains that the gods, in the earliest days, brought the heavens and earth very close together. Two light-gods then ruled the world from their "floating bridge of heaven." Later, heaven "began to retire and eventually passed utterly away."

In the Hebrew Genesis, the Elohim (the Most High) created the Heavens and the Earth. The Heavens were a "firmament" placed "in the midst of the waters." The "there-waters" (Shimayim or Heaven) existed with lights but not with the sun and moon, for they are not mentioned in the opening passage of Genesis. The Assyrians said also that the sun, moon and stars came into view only when the monster foes of order were dislodged. When the Scandinavian heaven, Asgard, died with the gods, during Ragnarok, "the Sun and his legions came riding through the gap in shining array."

The name "Yahweh" came later when the skies were opened, just as names of the leading gods changed in all cultures, with the coming of a new age. In Greek terms, Kronos (Saturn) sbecame Zeus (Jupiter). When Kronos was removed by Zeus, Zeus removed also his own younger brother Poseidon from Heaven and sent him to rule the terrestrial waters. But note that Okeanos (the *Ocean*) had, as a rebellious Titan, already been expelled from Heaven before Poseidon left it.

So the Great Deep of the earliest religions was a watery sky. The final waters of the Great Deep were broken up at the time of the Noachian (or Poseidon) Flood. But there was "a long, long time when floods were the order of the day."

If I may refashion the theory of Vail, in the light of what I have written elsewhere, I should suggest that (a) self-conscious myth-making mankind was born beneath a high canopy of rings and clouds, without a visible Sun; (b) deluges began and a visible Uranian Sun and the present Sun appeared; (c) the Uranian Sun went nova, the Earth bore forth the Moon and cleaved, while undergoing further deluges that partially filled the newly formed ocean basins; (d) the heavenly clouds remained to some extent thereafter (during the Golden Age of Saturn when the world lived tropically); and then (e) the second great Deluge came, which was the Noachian deluge.

Jewish legends of the earliest period of man go beyond the Bible in defining a cosmic catastrophe prior to Noah's Deluge. It may be called the Enosh Catastrophe, for it happened during the time of Adam's grandson, Enosh. Since I have designated the full self-awareness of modern man (in *Homo Schizo I and II*) as part of the early catastrophic scenario of a binary nova of Super-Uranus, and suggested that this was accompanied by great flooding, and that the Moon eruption and Earth cleavage (*Chaos and Creation*) also brought down to Earth great deluges to fill the ocean basins, perhaps Enosh belonged to one of these eras. The second is preferred if only because in legend and scripture Adam (mankind) was self-aware and active, and had been evicted into a hard world from the Garden of Eden, which represents a catastrophe of a universal globe-tilting kind.

The legends say that mankind's attention was riveted upon celestial events; idolatry (implying deviant sky-body worship) and gods (the same, but lawful) were active and importuned. The terrestrial effects were said to be threefold: the sea transgressed its bounds and a third of the Earth was flooded; "There arose mountains, valleys, and rocky ground, whereas prior to that everything had been smooth and even...; man's stature was shortened."⁹ Ignoring the last, which is for another book, we are left to conjecture original or successive (Uranian) deluges possibly in conjunction with the eruption of the Moon and the cleavages of the globe, at which time great orogeny occurred and much of the land was thrust and folded. O'Gheoghan points out that two deluges were attributed by Phoenician sources to the planet El (Saturn, possibly our lunar Super-Uranian and Super-Saturn novas).¹⁰

The Greeks had a god who was a son of Ouranos. His name was Okeanos and his behavior was consonant with our theory. Okeanos, write Giorgio Santillana and Hertha von Dechand, dwelt originally in heaven.¹¹ He was the rivers of heaven who flowed down from the sky to earth. He was the "beloved end of the earth, ruler of the pale" and his name, too, is derived etymologically from "heaven." Jane Harrison also found that "Okeanos is much more than Ocean and of other birth."¹² He was the "daimon of the upper air," of the stratosphere, of the binary system's atmospheric plenum in our interpretation. According to Homer, the universe took the form of an egg that was girded about by Okeanos, the Generator. And Socrates in *Theaetetus* says, "When Homer sings of the wonder of 'Ocean whence sprang the Gods and Mother Tethys' does not mean that all things are the offspring of flux and motion."¹³ "Mother Tethys" is the ancient sea that in my opinion preceded the earthly oceans, and was the central body of water of Pangea, as the wholly land-covered Earth may be called. A whole subsequent paragraph of Santillana and von Dechand bears quotation:

The authority of Berger can reconstruct the image. The attributes of Okeanos in the literature are "deep-flowing," "flowing-back-on-itself," "untiring," "placidly flowing," "without billows." These images, remarks Berger, suggest silence, regularity, depth, stillness, rotation--what belongs really to the starry heaven. Later the name was transferred to another more earthbound concept: the actual sea which was supposed to surround the land on all sides. But the explicit distinction, often repeated, from the "main" shows that this was never the original idea. If Okeanos is a "silver-swirling" river with many branches which obviously never were on sea or land, then the main is

⁹ Ginzberg, *Legends of the Jews* (Philadelphia: 1909), V. 152, note 55. Quoted by B. O'Gheoghan, "Notes on a Possible Pre-Deluge Catastrophe," III S. I. S. Rev. 2(Aut. 1978), 36.

¹⁰ Ibid. (and see H. Tresman and B. O'Gheoghan, "The primordial Light?" / S. I. S. Rev. (1977), 35ff.)

¹¹ Ibid., 190-1.

¹² Ibid., 189.

¹³ Ibid.

not the sea either, *pontos* or *thalassa*, it has to be the Waters Above. The Okeanos of myth preserves these imposing characters of remoteness and silence. He was the one who could remain by himself when Zeus commanded attendance in Olympus by all the gods. It was he who sent his daughters to lament over the chained outcast Prometheus, and offered his powerful mediation on his behalf. He is the Father of Rivers; he dimly appears in tradition, indeed, as the original god of heaven in the past. He stands in an Orphic hymn as "beloved end of the earth, ruler of the pole," and in that famous ancient lexicon, the *Etymologicum magnum*, his name is seen to derive from "heaven."

Boreal means "northern." It also means "bore," a "hole". Both of these prehistoric meanings refer to the first human sense of direction. As the clouds that surrounded man's early cultures began to break up and descend as deluges, the first openings of the sky were in the north (to those living above the Equator). Uranus, in the late Roman Empire, was still pictured as a god cloaked in clouds.

The Hyperboreans were people who lived farthest north. Their legends said that the great light (commonly, but mistakenly translated as Helios) arose and also set but once a year. So time-cycles were possible in the brilliant peak of illumination.

Most legendary clues seem compatible with the model being tested here--of an early cloud-covered greenhouse world, now broken through and deluged by water, fire, and rocks; of clouds lowering upon a smothering Mother Earth; of the beginnings of reliable changing lights and planetary figures in the Boreal hole; of a rapid development of thought and culture; of the retreat of Ouranos (Uranus) and the appearance of Kronos (Saturn).

But then also the land of Pangea was being flooded and the ice was piling up in the polar regions. Life forms retreated steadily southwards. Then came a Lunarjan catastrophe, the worst, followed by the full mild, misty "golden age" of Saturn (Kronos). Again, disaster, with the Noachian Deluge and the coming of electrical Yahweh (Zeus-Jupiter) to the force.¹⁴

Afterwards, sunshine, dryness, lightning, thunder and the present rain-making cycle governed the atmosphere. Vail put it one way: "All through the Ouranian and Kronian ages, the thunderer [Jove] was silent." I would say that these former ages were fully catastrophic in their beginnings and end, and cosmic lightning and pandemonium were present, but that a fairly clear and dry world was the scene for the working out of Jupiter's divine character.

The first fall-out of sky-waters must have been limited--one sixth of today's total, we guess--because, as we argue later on, they descended upon a world largely without basins to receive them. The world would have drowned without the basins. Nor did the second fall come at one time but over a period of centuries prior to and after the forming of the basins. Even then, if the waters had not fallen partly as ice upon the caps, where it did not melt, then too the world would have been swamped.

The deluges would not amount to much rain if they were spread out over thousands of years. This, of course, was not the case, but is worth calculating. We assume that the original Tethyan Sea, shallow but globe-girdling, held one-sixth of the 1,347 million cubic kilometers of water contained in the present oceans. Further, we assumed that two-sixths of the present

¹⁴ The author's *God's Fire: Moses and the Management of Exodus* examines the electrical associations of Yahweh.

oceans came down in subsequent deluges of Noah and thereafter. Ice caps (now 1/200 of the total waters) are ignored, so, too, possible expansion of the Earth during the period, and also the rain cycle that would be occurring all the while. We allow ourselves 6000 years to bring down new waters equal to half the oceans today, that is, 673.5 million km³. The annual average quota becomes 112,250 km³/y, which turns out to be only 22 cm³/cm²/y, when it is averaged over the Earth's surface. This is much less than the average rainfall around the world today, which can rise well above 200 cm³ in a number of localities such as the State of Washington or Hong Kong. Evaporation and precipitation would add to the figure. Further, most important, most of the deluging might occur in years, not millennia, and then we should have to resort to a dynamism unlike ordinary rain, and resembling more ropes, hoses, and cyclones of water at many locations.

The ancient Scandinavians called snow the "pus of the gods." Something is to be said about snow and ice deluges soon. In many places, however, the waters of the deluges and floods or tides were heated. Rains came down in gobs the size of a man's head and were at times boiling hot, according to the Zend-Avesta of Persia. Josippon bin-Gorion repeats a Jewish myth: "The fountains of the deep broke up first. Then came the flood from above. Then fire fell also, and rain, boiling hot."¹⁵ Bellamy writes that "quite a number of peoples report not only a Great Flood, but specifically a flood of *hot* water." American Indians of the West claimed that the waters of the Great Flood were warm. The Voguls of Finland said a great fire raged over the world first and was followed by a deluge of hot water. Then the hot waters raged across the land. Fire mixed with the water-- even their rafts caught fire, they said. Amerindians of Brazil said that the Sun was a cauldron of boiling waters that tipped over.

Saturn was the chief sun in ancient legend, it should be borne in mind; several recent studies have established this identification (see *Chaos and Creation*). Saturn, successor to Uranus, was both an early sun, a bright binary partner of the Sun, and flared magnificently when it went nova just before its deluge waters struck the Earth. Moreover, while lightning would unquestionably have played about the deluge scene, the fires and heat connected with the deluge and flood waters would be associated with the debris of the nova and the heavy volcanism which, as one Jewish commentator wrote, sprang up on all sides.¹⁶

The Feast of Lights (Hannukah) and the Christmas Light festivals, as well as the Hindu, Roman and other Saturnalia derive from the brilliant seven-day display of Saturn in nova, before the deluge struck. Frazer give us a Jewish folktale to conclude our instances of sky-associations for the Flood of Noah:

Now the Deluge was caused by the male waters from the sky meeting the female waters which issued forth from the ground. The holes in the sky by which the upper waters escaped were made by God when he removed stars out of the constellation of the Pleiades; and in order to stop this torrent of rain, God had afterwards to bung up the two holes with a couple of stars borrowed from the constellation of the Bear. That is why the Bear runs after the Pleiades to this day; she wants her children back, but she will never get them till after the Last Day.¹⁷

In *Solaria Binaria*, which is the heavily astronomical work of the Quantavolution series. Milton and I formulate the dynamics of the deluges. I mentioned earlier that the form which

¹⁵ Bellamy, *Moon, Myths and Man*, op cit., 124-5.

¹⁶ Velikovsky in *V Kronos* 1 (1979), 9.

¹⁷ *Folklore in the Old Testament* (1981), I, 143-4.

the deluges of Uranian and Saturnian times took was probably cyclonic, with the waters jetting down, as fountains or as liquid meteoritic falls. This would be a necessary assumption for biosphere survival and for disposing of the huge quantities of water involved. At the same time, we must speculate upon the lithospheric effects of the thousands of jets or spouts. Where are the visible effects today?

Perhaps the myriad rings faintly visible on satellite photographs of the Earth's surface (as reported in earlier pages) represent cyclonic craters formed by the jets and soon filled by aquatic tides and earth flows. When I first began to study the incidence of meteoroid impacts, I was pleased at each new discovery. But as the number of indicated craters grew larger and larger, I began to wonder how the Earth could have been so completely bombarded yet its biosphere could have survived. Cosmic lightning bolts and plasmoid lightning balls supply part of the answer. A liquid bombardment might also be an answer. We shall have to await a more extensive survey of the surface halos of the Earth.