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SCRIPTURE IN THE HANDS OF GEOLOGISTS (PART TWO)*

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III. *Concordism*

1. *Neptunism*

WE next trace the history of the concordist tradition. In general, concordists were more empirically minded than literalists and were willing to adopt more flexible interpretations of Scripture in order to harmonize with a developing scientific picture of terrestrial history. The concordist tradition began with neptunism and came into full flower in the nineteenth century.

Although diluvialism diminished by the end of the eighteenth century, other geological theories existed that could also be harmonized with Scripture. During the eighteenth and earliest nineteenth centuries one widely held theory, developed primarily in France and Germany and later transported to the British Isles,[91] was neptunism. For many continental naturalists the neptunist approach was the best way to explain the features in rocks. Where efforts were made to correlate neptunism with biblical data, the writers often showed little conviction regarding the truth of Scripture. Interpretations of biblical texts were generally far less literalistic than those of British diluvialists and were put forward in order to maintain peace with the theologians. When transported into Great Britain, however, neptunism was defended on biblical grounds

* [Part One, which appeared in *WTJ* 49 (1987) 1-34, surveyed the history of literalism in the interpretation of the early chapters of Genesis by Christian geologists. Part Two, focusing on the concordist tradition, concludes Dr. Young's essay.-*Ed.*]

[91] Some British neptunists, for example, Robert Jameson, learned their neptunism at the feet of the German scholar, Abraham Werner.

with the same zeal evident among earlier diluvialists. For British neptunists, neptunism was obviously what the Bible taught.

The major tenet of neptunism was that the original earth had been completely covered by the sea. As time elapsed, the sea diminished and landmasses emerged. Life gained a foothold on the landmasses and in shallow marine areas. The emerged landmasses were eroded, and the erosion products, including the remains of organisms, accumulated as fossiliferous sediment layers on the seabottom and on the flanks on the landmasses. To neptunists the observation that clearly marine stratified rocks rested on older primitive mountains was striking evidence that the world had emerged from a universal ocean. In a refined, late eighteenth to early nineteenth century version of neptunism developed by the great German geologist, Abraham G. Werner,[92] the universal ocean was an aqueous solvent saturated with dissolved chemicals. As the ocean diminished the chemicals precipitated. Thus many layered and crystalline rocks were interpreted as chemical precipitates from the primeval ocean.

We examine here the harmonizations of two neptunists, Benoit de Maillet and Richard Kirwan. Benoit de Maillet was the French ambassador to Egypt, well acquainted with Arab culture.[93] During his wide travels he observed European geology and concluded that rock strata had formed during gradual diminution of the ocean. He also concluded that the diminution had continued for an incredibly long time, perhaps as much as two billion years.[94] He believed that the human race had existed for at least 500,000 years, that men had originated in the sea, and that mermaids were creatures that hadn't quite made the transition to human status.[95] These views were couched within a Cartesian cosmology that favored the eternity of matter. Recognizing that such views would not

[92] Werner was a brilliant teacher and approached geology in a very systematic fashion so that he provided what appeared to be a logical way of ordering the disparate facts then known to geology. Through the brilliance of his teaching, Werner attracted able students to the mining academy of Freiberg who then spread Wernerian neptunism across Europe.

[98] Benoit de Maillet, *Telliamed* (Urbana: University of Illinois, 1968). This edition is an English translation with notes by A. V. Carozzi.

[94] Ibid., 181.

[95] Ibid., 158, 192-200.

be popular with the Roman Catholic Church in France, de Maillet presented his views as conversations between a French missionary and an Indian philosopher, Telliamed (de Maillet spelled backwards), who espoused the diminution of the sea. The work was published anonymously as *Telliamed* in the early eighteenth century.[96]

To gain acceptability, de Maillet, through the mouth of Telliamed, claimed that long-continued diminution of the ocean was compatible with Scripture. Because of his commitment to an extremely old earth and the possibility of the eternity of matter, de Maillet argued

> that the sentence, 'In the beginning God created the Heavens and Earth,' is a very improper translation of the Hebrew, that the words used in that language signify only 'formed the Heavens and the Earth.' Furthermore, the word 'create' is a new term, invented only a few centuries ago to express a new idea; therefore your Bible assumed the preexistence of matter when God formed the heavens and the earth.[97]

Even the diminution of the ocean accorded with the creation account. Said de Maillet, speaking through the French missionary pondering Telliamed's ideas:

> God could indeed have used such means for the creation of the earth and the formation of the mountains through the action of the waters of the sea. The separation of the waters from the earth, as mentioned in Genesis, is even in favor of such an opinion. The void which first occurred on the earth and the uselessness of the latter at the beginning correspond to the same conditions postulated by our author for the initial stage of the globe. It is obvious, if not unquestionable, that the waters of the sea have built the mountains and uncovered through their diminution what they had formed during the first chaos of matter. This emergence led to the growth of grass and plants on the rocks; the vegetation in turn led to the creation of animals for which they represent the food supply; and finally the animals led to the creation of man who depends on them, as the last work of the hands of God.[98]

The sequence of earth history seemed compatible with Scripture, but what of the problem of days if one were to postulate that the earth was approximately two billion years old? Telliamed was ready for this difficulty:

[96] See the editor's introduction (ibid., 1-53) for a discussion of early manuscripts of *Telliamed*.
[97] Ibid., 161.
[98] Ibid., 234.

> The expression ‘six days’ mentioned in your sacred books for the completion of all these works is metaphorical, as you may easily imagine. It cannot even represent the time mentioned by Moses during which the earth rotates on itself six times in its annual orbit around the sun, since according to these same books, the sun was not created until the fourth day. Besides, do they not state that a thousand of your years represent no more than one day for God? Therefore, we must conclude that the six days employed by the Divinity to complete creation indicate a length of time much longer than the measure corresponding to our ordinary days.[99]

Unlike de Maillet, Richard Kirwan, an Irish chemist and mineralogist, was a devout, orthodox Christian. For Kirwan, geology was the handmaiden of true religion, and he repeatedly expressed alarm at systems of geology that struck him as favorable to atheism. In 1797, Kirwan set forth his conception of biblical geology.[100] In typical Wernerian fashion, Kirwan believed that the earth at creation was covered by an "immense quantity" of aqueous fluid heated enough to dissolve enormous quantities of chemicals. As the ocean retreated from earth's surface, crystallization of minerals took place, and a tremendous amount of heat was released, triggering "an enormous and universal evaporation."[101] The intensity of the heat increased until much of the primordial chemical precipitate burst into flames. Volcanic eruptions occurred on the "bosom of the deep.”

The teaching of Gen 1:2 that the original earth was without form and void meant "that the earth was partly in a chaotic state, and partly full of empty cavities, which is exactly the state ... I have shewn to have been necessarily its primordial state."[102] The deep or abyss "properly denotes an immense depth of water, but here it signifies ... the mixed or chaotic mass of earth and water."[103] The spirit of God moving on the face of the waters referred to "an invisible elastic fluid, viz. the great evaporation that took place soon after the creation, as soon as the solids began to crystallize."[104] Kirwan appealed

[99] Ibid., 231.
[100] Richard Kirwan, "On the Primitive State of the Globe and its Subsequent Catastrophe," *Transactions of the Royal Irish Academy* 6 (1797) 233-308.
[101] Ibid., 245.
[102] Ibid., 265.
[103] Ibid.
[104] Ibid., 266.

to Psalm 104 where the standing of the mountains above the waters alluded to the emergence of the primitive mountains above the receding neptunist ocean. The reference in Ps 104:5 to God's "fixing the earth on its basis, from which it shall not be removed for ever" denoted "the deposition of the solids contained in the chaotic waters, on the solid kernel of the globe, from whence they should never be removed nor indeed have they ever since."[105]

After this episode, light was created, and the "production of light ... probably denotes the flames of volcanic eruptions."[106] The firmament of the second day of creation was the atmosphere, formed by the evaporation of the waters of the deep. Lastly, the creation of fish and other organisms occurred only after the great deep had receded, precipitated its chemicals, and cooled. Neptunists maintained that fossil remains occurred almost exclusively in mechanically deposited rocks that were clearly superimposed on top of chemically precipitated rocks.

Kirwan believed that surficial gravels, erratic boulders, and many cave deposits were the result of the flood. The major source of floodwater was from caverns in the earth that had gradually filled during retreat of the primeval ocean. During the flood the waters "were miraculously educed out of those caverns."[107] Since the universal ocean had once covered all the mountains of the earth, there would be sufficient water in the caverns to cover the mountains once more. Kirwan specified that the floodwaters surged out of the south and overflowed the northern continents, for it was on the northern continents that the vast deposits of surficial gravels, erratic boulders, and bone-filled cave deposits were recognized.[108]

2. *Nineteenth Century Concordism- Genesis 1*

By about 1830, both diluvialism and neptunism had been rejected by the practicing geological community. Numerous discoveries pointed toward a long, complex, dynamic earth

[105] Ibid.
[106] Ibid., 267.
[107] Ibid., 279.
[108] Ibid., 280.

history that was totally incompatible with a global flood, and newer studies in the early nineteenth century indicated that rocks formerly interpreted as chemical precipitates from a universal ocean had cooled from intensely hot liquids injected into the overlying fossil-bearing strata.[109] Stratigraphic evidence also made it clear that the ocean had repeatedly advanced on and retreated from the landmasses: it had not simply retreated uniformly. Moreover, successive advances and retreats had been accompanied by significant extinctions of large quadrupeds. Neptunism, like diluvialism, rightly fell by the wayside. Although both diluvialism and neptunism had temporarily provided useful frameworks for integrating theories of earth history with the meager data available at the time and had served as stimuli to further geological research, the time had come for them to be discarded. Diluvialism and neptunism could no longer adequately account for the wealth of geological data that were known by the early nineteenth century.

The recognition of the earth's vast antiquity caused little alarm among leading British and American Christian geologists of the early nineteenth century. Many of the great geologists of that era were devout and enthusiastic Christian believers who were fully committed to the infallibility of Scripture. Thus, even though Scripture played a diminishing role in professional technical geology, many geologists developed popular treatments of ways in which the results of geology could be related to biblical teaching. Many of these geologists sought to demonstrate how Scripture was fully compatible with the latest discoveries of geology. The golden age of concordism had arrived.

Two major schemes of harmonization were developed and refined during the nineteenth century: these were the gap and day-age interpretation of Genesis 1. The modern version of the gap theory was probably first advocated by the great Scottish minister and amateur devotee of science, Thomas Chal-

[109] Of particular importance here was the work of James Hutton as spelled out in his *Theory of the Earth* (Edinburgh: Creech, 1795) as well as the discovery that numerous layers of basalt, a rock that neptunists claimed had been precipitated from the ocean, could be traced to several extinct volcanic cones in central France.

mers.[110] Following his lead, several prominent Christian geologists, including Englishmen William Buckland and Adam Sedgwick and American Edward Hitchcock, espoused the gap theory as the preferred method for correlating Genesis and geology. There was relatively little difference among these geologists in their use of that theory. The major point in common was the interpretation of Gen 1:2. For the first time the "chaos" of that verse was not regarded as a primordial chaos of any kind but as a chaos that developed long after the initial creation of the planet.

William Buckland attempted a synthesis between geology and Genesis in his inaugural lecture at Oxford.[111] He expressed the opinion that "the word *'beginning*,' as applied to Moses in the first verse of the book of Genesis.... [expresses] an undefined period of time, which was antecedent to the last great change that affected the surface of the earth, and to the creation of its present animal and vegetable inhabitants; during which period a long series of operations and revolutions may have been going on."[112] Later in his career, Buckland stated that "it is nowhere affirmed that God created the heaven and the earth in the first day, but in the beginning; this beginning may have been an epoch at an unmeasured distance, followed by periods of undefined duration, during which all the physical operations disclosed by Geology were going on."[113] In support of this notion Buckland appealed to several church fathers who maintained that the work of the six days of creation did not begin until Gen 1:3. He further suggested that "millions of millions of years may have occupied the indefinite interval, between the beginning in which God created the heaven and the earth, and the evening or commencement of the first day of the Mosaic narrative."[114] This long period of time between verses one and two was the supposed gap of

[110] For the original quotation from Thomas Chalmers, see Hugh Miller, *The Testimony of the Rocks* (Boston: Gould and Lincoln, 1857) 141.

[111] William Buckland, *Vindiciae geologicae* (Oxford: University Press, 1820).

[112] William Buckland, *Geology and Mineralogy Considered with Reference to Natural Theology* (London: Wm. Pickering, 1837). Buckland's work is the sixth of the Bridgewater Treatises.

[113] Ibid., 21.

[114] Ibid., 21-22.

the gap theory. Of the second verse of Genesis 1 Buckland commented:

> we have in this second verse, a distinct mention of earth and waters, as already existing, and involved in darkness; their condition also is described as a state of confusion and emptiness, (*tohu bohu*), words which are usually interpreted by the vague and indefinite Greek term, "chaos," and which may be geologically considered as designating the wreck and ruins of a former world. At this intermediate point of time, the preceding undefined geological periods had terminated, a new series of events commenced, and the work of the first morning of this new creation was the calling forth of light from a temporary darkness, which had overspread the ruins of the ancient earth.[115]

This new creation, following upon the great catastrophe, was described in the work of the six days. The new creation brought the earth into its present condition and could therefore properly be described as a re-creation or reconstruction of the earth. Thus the gap theory also became known as the ruin-reconstruction theory. The days of Genesis 1 were assumed to be ordinary 24-hour days, although Buckland was not opposed to thinking of them as longer stretches of time. To avoid having the entire world immersed in total darkness, devoid of vegetation, and devoid of animals at the conclusion of the catastrophe, some proponents of the theory, notably John Pye Smith,[116] suggested that the ruin and reconstruction were localized in the middle eastern area that was the birthplace of modern humanity.

As geology developed during the nineteenth century, Christian geologists became less enthusiastic about the ability of the gap theory to achieve a satisfactory harmony with Scripture. Increasingly they turned to the day-age theory. The idea that the days of creation could be interpreted as periods of time was not new. De Maillet had long since suggested that the days were metaphorical. His suggestion had been adopted by the great French naturalist Buffon and by many early nineteenth century geologists such as James Parkinson, Robert Jameson, and Benjamin Silliman. It was not until mid-nine-

[115] Ibid., 24-26.

[116] John Pye Smith, *The Relation between the Holy Scriptures and some Parts of Geological Science* (5th ed.; London: H. G. Bohn, 1854).

teenth century, however, that day-age concordism became a fine art and achieved a high degree of refinement and subtlety.

The most eloquent of the great day-age concordists was the Scottish ecclesiastical journalist, onetime stonemason, and amateur paleontologist-geologist, Hugh Miller. Miller's mature thought on the relationship of geology to the Bible is spelled out in his great work *The Testimony of the Rocks.* [117] Miller completely rejected the gap theory on the basis of its total incompatibility with geology. Geology had made it plain that there was no "age of general chaos, darkness, and death" separating the modern era from past geological ages.[118] Indeed, "all the evidence runs counter to the supposition that immediately before the appearance of man upon earth, there existed a chaotic period which separated the previous from the present creation."[119]

Miller contended that the drama of creation had probably been revealed to Moses in a series of visions in much the same way that God had revealed the pattern of the tabernacle on the mount. Moses saw "by vision the pattern of those successive pre-Adamic creations, animal and vegetable, through which our world was fitted up as a place of human habitation."[120] This series of visions revealed "successive scenes of a great air-drawn panorama."[121] These visions were then described by Moses optically. In other words, "the inspired writer seized on but those salient points that, like the two great lights of the day and night, would have arrested most powerfully, during these periods, a human eye."[122]

The visions were described and presented in the format of the six days. Unlike others who also held to the vision hypothesis, Miller did not remove the days from the province of chronology by restricting them to the province of prophetic vision. Instead, he maintained,

> we must also hold, however, that in the character of symbolic days they were as truly representative of the lapse of foregone periods of creation

[117] Hugh Miller, Testimony.
[118] Ibid., 155.
[119] Ibid.
[120] Ibid., 190.
[121] Ibid., 196.
[122] Ibid., 171.

> as the scenery itself was representative of the creative work accomplished in these periods. For if the apparent days occurred in only the vision, and were not symbolic of foregone periods, they could not have been transferred with any logical propriety from the vision itself to that which the vision represented, as we find done in what our Shorter Catechism terms 'the reason annexed to the Fourth Commandment.' The days must have been prophetic days, introduced, indeed, into the panorama of creation as mayhap mere openings and droppings of the curtain, but not the less symbolic of the series of successive periods, each characterized by its own productions and events, in which creation itself was comprised.[123]

The six days were small replicas of the vast periods presented in the visions of Genesis 1, and, in answering the common objection to the day-age theory based on the fourth commandment, Miller used the scale-model analogy. "The Divine periods may have been very great,-the human periods very small; just as a vast continent or the huge earth itself is very great, and a map or geographical globe very small. But if in the map or globe the proportions be faithfully maintained, and the scale, though a minute one, be true in all its parts and applications, we pronounce the map or globe, notwithstanding the smallness of its size, a faithful copy."[124]

Miller suggested that Genesis 1 represented a prophecy of the past. This notion provided a key to the interpretation of the text. Just as historical fulfillment is the best interpreter of revealed prophecies which point to events in the prophet's future, so the historical fulfillment of a backward-looking prophecy is the best way to interpret it. That fulfillment is provided by science.

> In what light, or on what principle, shall we most correctly read the prophetic drama of creation? In the light, I reply, of scientific discovery,-on the principle that the clear and certain must be accepted, when attainable, as the proper exponents of the doubtful and obscure. What fully developed history is to the prophecy which of old looked forwards, fully developed science is to the prophecy which of old looked backwards.[125]

In Miller's judgment the geology of his day was sufficiently developed that much light could be shed on the events of several of the days of creation, just as the well-developed astronomy of his day could shed light on the character of day

123 Ibid., 205-6.
124 Ibid., 176.
125 Ibid., 194.

four. He didn't think that geology was sufficiently advanced that the work of days one and two could be specified with confidence. Thus Miller focussed on days three, five, and six as those to which geology could contribute the most, but he also attempted a preliminary explanation of the other three days.

The first and second days of creation were represented by rocks of the "Azoic period, during which the immensely developed gneisses, mica schists, and primary clay slates, were deposited, and the two extended periods represented by the Silurian and Old Red Sandstone systems."[126] During this time the earth's surface and its primitive ocean may have gradually cooled so that the primitive, thick, cloudy atmosphere became less dense. Eventually the rays of the sun struggled through and strengthened "until, at the close of the great primary period, day and night,--the one still dim and gray, the other wrapped in a pall of thickest darkness,--would succeed each other as now, as the earth revolved on its axis, and the unseen luminary rose high over the cloud in the east, or sunk in the west beneath the undefined and murky horizon."[127] On the second day, attention was focussed on atmospheric phenomena. To the prophetic eye absorbed in the vision such phenomena would have attracted far more attention than the appearance of invertebrate life of the Silurian period or the fish of the Old Red Sandstone period. Such events would have been "comparatively inconspicuous" to the prophet.

Of days three, five, and six Miller was more confident. The vision of day three was more "geological in its character" than days one or two. "Extensive tracts of dry land appear, and there springs up over them, at the Divine command, a rank vegetation. And we know that what seems to be the corresponding Carboniferous period, unlike any of the preceding ones, was remarkable for its great tracts of terrestrial surface, and for its extraordinary flora."[128] The Carboniferous period was characterized by "wonderfully gigantic and abundant vegetation."[129] The fourth day, devoted to astronomical features,

[126] Ibid., 196.
[127] Ibid., 198.
[128] Ibid., 200-201.
[129] Ibid., 201.

was identified with the Permian and Triassic periods geologically.

The fifth day was linked with the Oolitic[130] and Cretaceous periods.

> The grand existences of the age,--the existences in which it excelled every other creation, earlier or later, were its huge creeping things,--its enormous monsters of the deep,--and, as shown by the impressions of their footprints stamped upon the rocks, its gigantic birds.... Its wonderful whales, not, however, as now, of the mammalian, but of the reptilian class,-ichthyosaurs, plesiosaurs, and cetiosaurs,--must have tempested the deep.... We are thus prepared to demonstrate, that the second period of the geologist was peculiarly and characteristically a period of whale-like reptiles of the sea, of enormous creeping reptiles of the land, and of numerous birds, some of them of gigantic size; and, in meet accordance with the fact, we find that the second Mosaic period with which the geologist is called on to deal was a period in which God created the fowl that flieth above the earth, with moving [or creeping] creatures, both in the waters and on the land, and what our translation renders great whales, but that I find rendered, in the margin, great sea monsters.[131]

Day six was equated with the Tertiary period. Although "its flora seems to have been no more conspicuous than that of the present time; its reptiles occupy a very subordinate place; but its beasts of the field were by far the most wonderfully developed, both in size and number, that ever appeared upon earth."[132]

Another prominent advocate of the day-age theory was Arnold Guyot, a Swissborn geographer and geologist who spent most of his professional career at Princeton University. Guyot was a committed Christian completely convinced of the antiquity of the earth. He sought to work out a harmonization between Scripture and geology, and a series of early lectures ultimately resulted in the issue of *Creation*.[133] Although Guyot recognized that the main point of the Bible was "to give us light upon the great truths needed for our spiritual life,"[134] nonetheless the "antique document" agreed in its statements with the science of his day. In fact the "history of Creation

[130] The Oolitic was the equivalent of what today is referred to as the Jurassic period (system).
[131] Ibid., 161.
[132] Ibid., 162.
[133] Arnold Guyot, *Creation* (New York: C. Scribner's, 1884).
[134] Ibid., 4.

is given in the form of a grand cosmogonic week, with six creative or working days."[135] The problem for Guyot was to demonstrate the coincidence of the sequence of events outlined by geology with the sequence of events outlined in Genesis 1.

Guyot devoted far more attention to the "cosmological" and "astronomical" parts of Genesis 1 than had Miller. For Guyot Gen 1:2 referred to matter in its primitive condition. The term "earth" (*'eres*) "is an equivalent for matter in general," and was the "primordial cosmic material out of which God's Spirit, brooding upon the waters, was going to organize, at the bidding of His Almighty Word, the universe and the earth."[136] Similarly, the "waters" over which the Spirit brooded referred "to the gaseous atmosphere; it is simply descriptive of the state of cosmic matter comprised in the word earth."[137] These were the same cosmic waters mentioned in Ps 148:4. Once it was recognized that "earth" and "water" referred to primordial matter Gen 1:2 became clear.

> The matter just created was gaseous; it was without form, for the property of gas is to expand indefinitely. It was void, or empty, because apparently homogeneous and, invisible. It was dark, because as yet inactive, light being the result of the action of physical and chemical forces not yet awakened. It was a deep, for its expansion in space, though indefinite, was not infinite, and it had dimensions. And the Spirit of God moved upon the face ... of that vast, inert, gaseous mass, ready to impart to it motion, and to direct all its subsequent activity, according to a plan gradually revealed by the works of the great cosmic days.[138]

As the great gaseous mass began to move, light developed and the waters were separated. But Gen 1:6-7 was not referring to anything as ordinary as the clouds in the sky. Rather the work of the second day referred to the organizing of the heavens. "The vast primitive nebula of the first day breaks up into a multitude of gaseous masses, and these are concentrated into stars."[139] Thus the nebulous masses (galaxies) of outer space were the heavens of heavens, that is, the waters

[135] Ibid., 11.
[136] Ibid., 35-36.
[137] Ibid., 36.
[138] Ibid., 38.
[139] Ibid., 63.

above the heavens. In contrast, our own immediate celestial neighborhood consisting of the sun, moon, and nearby stars were the waters below the heavens. The firmament, by implication, meant the vastness of space between our own nebula and those at a far distance.

By the third day the earth was like a cooling star. Chemical interactions within its atmosphere and ocean produced a luminous glow or "photosphere" like that of the sun. The glow diminished as the earth cooled and became more suitable for life. Only the simplest plant forms could appear under these conditions. Guyot wanted to postpone the development of complex plants until day five, but Genesis said that plants appeared on the third day. To deal with this problem, Guyot said,

> Is this position of the plant in the order of creation confirmed by geology? If we should understand the text as meaning that the whole plant kingdom, from the lowest infusorial form to the highest dicotyledon, was created at this early day, geology would assuredly disprove it. But the author of Genesis, as we have before remarked, mentions every order of facts but once, and he does it at the time of its first introduction. Here, therefore, the whole system of plants is described in full outline, as it has been developed, from the lowest to the most perfect, in the succession of ages; for it will never again be spoken of in the remainder of the narrative.[140]

Thus Guyot introduced the idea that the events of the six days might overlap one another.

The appearance of the heavenly bodies on day four had nothing to do with an *ex nihilo* creation at the time. They "existed before, and now enter into new relations with the earth."[141] Because the earth was self-luminous due to chemical action during its early stages, the light of the sun, moon, and star was "merged in the stronger light of its photosphere, and therefore invisible to it. But after the disappearance of its luminous envelope, our glorious heavens with sun, moon, and stars become visible, and the earth depends upon this outside source for light and heat."[142]

[140] Ibid., 89-90.
[141] Ibid., 92.
[142] Ibid., 93.

Guyot correlated day four with the production of Archean rocks.[143] On day five, Paleozoic and Mesozoic rocks were deposited with their contained fossils, and on the sixth day Tertiary rocks were deposited. The boundary between the Cretaceous and Tertiary periods was thought to occur at the juncture between days five and six. There was an important difference between Miller and Guyot in the correlation of geological events with the days. Miller had assigned day three to the Carboniferous period in the latter part of the Paleozoic era, while Guyot did not even begin the Paleozoic era until day five. Table II compares the two correlation schemes with each other and with that of Dawson. The concordistic scheme of the great nineteenth century North American geologist, James Dwight Dana of Yale University, was nearly identical to that of Guyot.[144]

One of the major concordistic works of the nineteenth century was *The Origin of the World According to Revelation and Science*[145] by J. William Dawson, a great Canadian geologist from McGill University and a devout evangelical Christian. Dawson's work spelled out in great detail both exegetical arguments for his conclusions and scientific interpretations of a variety of correspondences between Scripture and geology.

Dawson argued that the days of Genesis 1 must be long periods of time of indeterminate length. His major argument centered on the nature of the seventh day. He assumed that absence of the formula "the evening and the morning were the seventh day" was an indication that the seventh day had not yet terminated. The notion was further supported by appeal to the continued rest of God in Hebrews 4 and to the nature of God's working on his Sabbath day in John 5. Dawson also maintained that the lack of rain in Gen 2:5 indicated that

[143] The term Archean is typically applied by geologists even today to the oldest known rocks. Such rocks generally underlie other rocks and are typically though not always metamorphic and igneous rocks. Some of the stratified Archean rocks contain fossil remains of primitive one-celled organisms.

[144] See, for example, James Dwight Dana, "Creation, or the Biblical Cosmogony in the Light of Modern Science," *BSac* 42 (1885) 201-24.

[145] J William Dawson, *The Origin of the World according to Revelation and Science* (London: Hodder and Stoughton, 1898).

TABLE II

Correlation Schemes of Major Nineteenth-Century Day-Age Concordists

	Miller	Guyot	Dawson
Day one	Azoic period, clearing of cloudy atmosphere		Atmosphere clears
Day two	Silurian and Old Red periods, development of atmosphere	Primitive nebula breaks up into gaseous masses and stars	Clouds and oceans segregate
Day three	Carboniferous period, lush vegetation emerge	Earth cools, simple plants only	Eozoic period, continents
Day four	Permian and Triassic periods, final clearing of atmosphere	Archean period (equivalent of Miller's Azoic), sun becomes visible as glowing earth loses its luminosity	Sun condensed, continents resubmerged
Day five	Oolitic and Cretaceous periods, ichthyosaurs, plesiosaurs, birds, pterodactyls	Paleozoic and Mesozoic eras (equivalent of Miller's Silurian through Cretaceous), marine animals and complex vegetation	Paleozoic and Mesozoic eras
Day six	Tertiary land mammals	Tertiary land mammals	Tertiary land mammals

the creation days were long periods of time, because it would be absurd that any prominence should be given to a lack of rain if the days were only 24 hours long.

> Why should any prominence be given to a fact so common as a lapse of two ordinary days without rain, more especially if a region of the earth and not the whole is referred to, and in a document prepared for a people residing in climates such as those of Egypt and Palestine. But what could be more instructive and confirmatory of the truth of the narrative than the fact that in the two long periods which preceded the formation and clearing up of the atmosphere or firmament, on which rain depended, and the elevation of the dry land, which so greatly modifies its distribution, there had been no rain such as now occurs.[146]

[146] Ibid., 142.

For Dawson, the initial earth was a ball of hot vapor and liquid that had spun out of a primitive solar nebula. "The words of Moses appear to suggest a heated and cooling globe, its crust as yet unbroken by internal forces, covered by a universal ocean, on which rested a mass of confused vaporous substances."[147] The great deep referred to the atmospheric waters covering the earth, and the darkness of Gen 1:2 was the darkness of outer space "destitute of luminaries." The cooling of the vaporous globe took millions of years and would continue until the "atmosphere could be finally cleared of its superfluous vapors."[148] The light that appeared on day one "must have proceeded from luminous matter diffused through the whole space of the solar system."[149] This luminous matter was gradually concentrated and "at length all gathered within the earth's orbit"[150] so that only one hemisphere at a time would be lighted.

At first there was no distinction between sea and atmosphere: "The earth was covered by the waters, and these were in such a condition that there was no distinction between the seas and the clouds. No atmosphere separated them, or, in other words, dense fogs and mists everywhere rested on the surface of the primeval ocean."[151] Continued cooling led to separation of the waters and the formation of a distinct ocean and atmosphere. The ocean waters segregated into basins as the dry lands appeared as suggested by Prov 8:25, Ps 119:90, Job 9:6, and Job 38:4. Ps 104:5-9 especially referred to the work of the third day.

> In whichever sense we understand this line, the picture presented to us by the Psalmist includes the elevation of the mountains and continents, the subsidence of the waters into their depressed basins, and the firm establishment of the dry land on its rocky foundations, the whole accompanied by a feature not noticed in Genesis--the voice of God's thunder--or, in other words, electrical and volcanic explosions."[152]

[147] Ibid., 110.
[148] Ibid., 113.
[149] Ibid., 117.
[150] Ibid.
[151] Ibid., 157.
[152] Ibid., 176.

Dawson saw geologist Elie de Beaumont's contraction hypothesis as consistent with the biblical account of day three. Geologists, noted Dawson,

> have attributed the elevation of the continents and the upheaval and plication of mountain chains to the secular refrigeration of the earth, causing its outer shell to become too capacious for its contracting interior mass, and thus to break or bend, and to settle toward the centre. This view would well accord with the terms in which the elevation of the land is mentioned throughout the Bible, and especially with the general progress of the work as we have gleaned it from the Mosaic narrative; since from the period of the desolate void and aeriform deep to that now before us secular refrigeration must have been steadily in progress.[153]

Dawson identified the appearance of vegetation on day three with the Eozoic period[154] (see Table II). Dawson was well aware that in the fossil record well-developed invertebrate animals appear earlier than land vegetation. To evade the force of the difficulty he assumed that many older deposits of fossil plants had been metamorphosed and destroyed beyond recognition. He suggested that during metamorphism the organic material was converted into graphite, i.e., crystalline carbon, a very common mineral in older metamorphic rocks.

Dawson identified the Hebrew word *min* (kind) with biological species. In Deut 14:15 and Lev 1:14 the term was said clearly to mean species, and so Dawson believed that the text ruled out any development hypotheses. Long after the publication of Darwin's theory of evolution by natural selection Dawson resisted biological evolution.

> Each species, as observed by us, is permanently reproductive, variable within narrow limits, and incapable of permanent intermixture with other species; and though hypotheses of modification by descent, and of the production of new species by such modification, may be formed, they are not in accordance with experience, and are still among the unproved speculations which haunt the outskirts of true science.[155]

On the fourth day the concentration of luminosity in the center of the solar system, that is, the condensation of the

[153] Ibid., 184-85.

[154] The term Eozoic was applied for a term to the very latest Precambrian rocks, rocks that occurred just beneath the stratified Cambrian rocks and that were thought to contain very primitive invertebrate fossils.

[155] Ibid., 189.

luminous envelope around the sun, was completed. The sun and moon could then become markers for the seasons and years. In earlier periods there were no distinctly marked seasons, and the limits of days and years were inaccurately defined. Dawson suggested that during the fourth day a large portion of the continental landmasses resubmerged because the fifth day was predominantly the day of marine life.

> During the third day the extent of terrestrial surface was increasing, on the fourth day it diminished, and on the fifth it again increased, and probably has on the whole continued to increase up to the present time. One most important geological consequence of this is that the marine animals of the fifth day probably commenced their existence on sea bottoms which were the old soil surfaces of submerged continents previously clothed with vegetation, and which consequently contained much organic matter fitted to form a basis of support for the newly created animals.[156]

All the animals created on the fifth day were attributed to the Paleozoic and Mesozoic eras. The sixth day belonged to the Tertiary period, the age of mammals. On the latter point he was in general agreement with Guyot.

Brief mention may also be made of George Frederick Wright, the last of the great nineteenth-century Christian geologists. Throughout his long career Wright addressed questions relating to the integration of Christianity and geology. In 1882, in *Studies in Science and Religion,*[157] Wright noted that he was not impressed with the efforts of other geologists to achieve concord. "In many of these attempts it is difficult to tell which has been most distorted, the rocks or the sacred record."[158] Calling Genesis 1 a "remarkable ‘proem' " Wright believed that

> it was not modern science with which the sacred writers wished to be reconciled, but polytheism which they wished to cut up root and branch.... When thus we consider it as a protest against polytheism, and an enforcement of the first two commandments, it seems an impertinence to endeavor to find all modern science in the document, however easy it may be for science to find shelter under the drapery of its rhetoric.[159]

[156] Ibid., 205.
[157] George Frederick Wright, *Studies in Science and Religion* (Andover: Warren F. Draper, 1882).
[158] Ibid., 365.
[159] Ibid., 366-67.

Wright showed that in all the details of Genesis 1 it was affirmed that God was Creator. The sun, sky, animals, and so on were all creatures of the one true God and should not be the objects of worship.

Wright later changed his mind and undertook the very effort he earlier condemned. In *Scientific Confirmations of Old Testament History*[160] so Wright confessed that he had dwelt "too exclusively upon the adaptation of the document to the immediate purpose of counteracting the polytheistic tendencies of the Israelites."[161] Upon further reflection he was so impressed by the writings of Dana and Guyot that he saw "in this account a systematic arrangement of creative facts which corresponds so closely with the order of creation as revealed by modern science that we cannot well regard it as accidental."[162] His thumbnail review of the correspondence of Genesis 1 and the order of geology was essentially taken over from the Guyot-Dana position.

3. *Nineteenth-Century Concordism--the Flood*

Because concordists felt the cumulative weight of geological evidence against the notion of a global deluge that deposited the entire stratigraphic column, harmonistic concerns shifted from the flood to the creation account. Nevertheless the flood played an important subsidiary role in their thought. Here, too, concordists adjusted their interpretations of the flood story to the constraints of the geological data. During the early nineteenth century there was still widespread belief in a catastrophic flood of continental or global proportions even among mainstream geologists and naturalists who were convinced of the earth's antiquity. The presumed effects of that flood, however, had been reduced. For example, William Buckland, who was anxious that geology continue its support for the Mosaic record of the flood, identified numerous surficial gravels, erratic boulders, and broad river valleys dis-

[160] George Frederick Wright, *Scientific Confirmations of Old Testament History* (Oberlin, Ohio: Bibliotheca Sacra, 1906).
[161] Ibid., 368.
[162] Ibid., 370.

tributed widely over northern Europe as the effects of a catastrophic deluge.[163]

Buckland's proposals regarding the flood encountered opposition on both scientific and biblical grounds. The Scottish naturalist and Presbyterian minister, John Fleming, said that Buckland's flood "occasioned the destruction of all the individuals of many species of quadrupeds."[164] But that was clearly contrary to the Mosaic account, for Moses expressly stated that some of all kinds of animals were preserved in the ark. This preservation was identified as a preservation of "species ": "we have revelation, declaring that, of all species of quadrupeds a male and female were spared and preserved during the deluge."[165]

Secondly, Fleming maintained that Buckland's deluge was "sudden, transient, universal, simultaneous, rushing with an overwhelming impetuosity, infinitely more powerful than the most violent waterspouts."[166] Fleming took issue with such diluvial attributes.

> In the history of the Noachian deluge by Moses, there is not a term employed which indicates any one of the characters, except universality, attributed to the geological deluge. On the contrary, the flood neither approached nor retired suddenly.... There is no notice taken of the furious movements of the waters, which must have driven the ark violently to and fro.[167]

Fleming also disagreed about the geological capabilities of the flood. Buckland's flood "excavated, in its fury, deep valleys, tearing up portions of the solid rock, and transporting to a distance the wreck which it had produced." 168 But if that had happened,

[163] See William Buckland, *Reliquiae diluvianae* (London: John Murray, 1823). Later in his career, Buckland became convinced of the adequacy of the glacial hypothesis to account for the boulders, gravels, widened valleys, and many of the vertebrate deposits. As a result, he manfully recanted his earlier commitment to a catastrophic deluge theory.

[164] John Fleming, "The Geological Deluge, as interpreted by Baron Cuvier and Professor Buckland, inconsistent with the testimony of Moses and the Phenomena of Nature," *Edinburgh Philosophical Journal* 14 (1826) 211.

[165] Ibid., 212.

[166] Ibid., 213.

[167] Ibid.

[168] Ibid.

> the antediluvian world must have been widely different from the present; lakes, and valleys, and seas, now existing in places formerly occupied by rocks, and the courses of rivers greatly altered. In the Book of Genesis there is no such change hinted at. On the contrary, the countries and rivers which existed before the flood, do not appear, from any thing said in the Scriptures, to have experienced any change in consequence of that event. But if the supposed impetuous torrent excavated valleys, and transported masses of rocks to a distance from their original repositories, then must the soil have been swept from off the earth, to the destruction of the vegetable tribes. Moses does not record such an occurrence. On the contrary, in his history of the dove and the olive-leaf plucked off, he furnishes a proof that the flood was not so violent in its motions as to disturb the soil, nor to overturn the trees which it supported; nor was the ground rendered, by the catastrophe, unfit for the cultivation of the vine.[169]

Convinced of the tranquil nature of the flood and of its general lack of substantial geological activity, Fleming commented that he did not expect to find any marks or memorials to the flood. As a matter of fact, if he had "witnessed every valley and gravel-bed, nay, every fossil bone, attesting the ravages of the dreadful scene, I would have been puzzled to account for the unexpected difficulties; and might have been induced to question the accuracy of Moses as an historian, or the claims of the Book of Genesis to occupy its present place in the sacred record."[170]

Fleming's tranquil flood theory was not widely adopted. Later concordists who accepted the historical reality of the flood believed that the flood had left significant geological relics. However, the flood was considered to be geographically restricted. Hugh Miller eloquently argued against the geographic universality of the flood and spoke of the "palpable monstrosities" associated with universal deluge theories. In the nature of the case, Miller argued, there could have been no eye-witness to the extent of the flood. If Noah and his family were the only survivors there was no way they could have observed that the flood had been universal. God could have revealed such geographic facts, but then "God's revelations have in most instances been made to effect exclusively moral purposes; and we know that those who have perilously held that, along with the moral facts, definite physical facts,

[169] Ibid., 213-14.
[170] Ibid., 214.

geographic, geologic, or astronomical, has also been imparted, have almost invariably found themselves involved in monstrous error."[171] The moral significance of the flood would not be altered by a reduction in its extent. Miller stated that universal language was commonly used in Scripture for more limited events. In many instances it was clear from the text that such a limitation was inherent, "but there is no such explanation given to limit or restrict most of the other passages; the modifying element must be sought for outside the sacred volume."[172] The flood story fell into that latter category.

> Almost all the texts of Scripture in which questions of physical science are involved, the limiting, modifying, explaining facts and circumstances must be sought for in that outside region of secular research, historic and scientific, from which of late years so much valuable biblical illustration has been derived, and with which it is so imperatively the duty of the Church to keep up an acquaintance at least as close and intimate as that maintained with it by her gainsayers and assailants.[173]

For Miller science showed that there had been no universal flood.

One of the compelling arguments against the universality of the flood concerned the problem of getting animals to and from the ark. Supposing for the sake of argument the validity of the idea that the flood involved elevation of the sea bed and sinking of landmasses, Miller poked fun at some of the inherent impossibilities of the universal deluge.

> A continuous tract of land would have stretched,--when all the oceans were continents and all the continents oceans,--between the South American and the Asiatic coasts. And it is just possible that, during the hundred and twenty years in which the ark was in building, a pair of sloths might have crept by inches across this continuous tract, from where the skeletons of the great megatheria[174] are buried, to where the great vessel stood. But after the Flood had subsided, and the change in sea and land had taken place, there would remain for them no longer a roadway; and so, though their journey outwards might, in all save the impulse which led to it, have been altogether a natural one, their voyage homewards could not be other than miraculous. Nor would the exertion of miracle have had to be re-

[171] Miller, *Testimony*, 300-301.
[172] Ibid., 302.
[173] Ibid., 302-3.
[174] Megatherium was a gigantic extinct sloth.

> stricted to the transport of the *remoter* travellers. How, we may well ask, had the Flood been universal, could even such islands as Great Britain and Ireland have ever been replenished with many of their original inhabitants? Even supposing it possible that animals, such as the red deer and the native ox might have swam across the Straits of Dover or the Irish Channel, to graze anew over deposits in which the bones and horns of their remote ancestors had been entombed long ages before, the feat would have been surely far beyond the power of such feeble natives of the soil as the mole, the hedgehog, the shrew, the dormouse, and the field-vole.[175]

Though firmly convinced of a local deluge, Miller admitted being on "weak ground" when discussing the location and mechanism of the flood. He suggested that the very large, depressed area of central Asia around the Caspian, Black, and Aral seas might have been the locus of the flood. He claimed that if a "trench-like strip of country that communicated between the Caspian and the Gulf of Finland" were "depressed beneath the level of the latter sea, it would *so open up the fountains of the great deep* as to lay under water an extensive and populous region."[176] If the area were depressed by 400 feet per day, the basin would subside to a depth of 16,000 feet within forty days and the highest mountains of the district would be drowned. If volcanic outbursts were associated with such a depression of the land, the atmosphere would be so affected that "heavy drenching rains" would have descended the entire time.

Dawson, following Miller, suggested that the flood was a local event and that subsidence of an inhabited land area resulted in large scale flooding and entombment of the pre-diluvian races beneath deposits of mud and silt around the Caspian Sea.

> The physical agencies evoked by the divine power to destroy this ungodly race were a subsidence of the region they inhabited, so as to admit the oceanic waters, and extensive atmospherical disturbances connected with that subsidence, and perhaps with the elevation of neighboring regions. In this case it is possible that the Caspian Sea, which is now more than eighty feet below the level of the ocean, and which was probably much more extensive then than at present, received much of the drainage of the flood, and that the mud and sand deposits of this sea and the adjoining

[175] Ibid., 348.
[176] Ibid., 356.

> desert plains, once manifestly a part of its bottom, concealed any remains that exist of the antediluvian population.[177]

Wright, too, believed the flood had been a great local inundation of a huge tract of central Asia. To Wright the biblical account "represents the Flood as caused not so much by the rising of the water, as by the sinking of the land. It says that all the fountains of the great deep were broken up."[178] As a glacial geologist, Wright related the flood to glacial action. The removal of enormous quantities of water from the ocean and their inclusion in massive glacial sheets caused redistribution of weight on the earth's surface. The ice sheets depressed the landmasses while the ocean beds were elevated as the load of water was removed. These readjustments led to pressures that reinforced depression of portions of the landmasses.[179] One of the great depressed areas was that of central Asia in which early mankind was living. At the end of the ice age, enormous amounts of glacial meltwater returned to the oceans and also temporarily drowned the great basin of central Asia. The Caspian, Aral, and Black Seas, and Lake Baikal were said to be remnants of that vast depression.

4. *Recent Concordism*

Since the nineteenth century, Christian geologists became a silent minority. For several decades few harmonizations of Scripture with geological data were attempted.[180] Then in 1977, a sudden flurry of concordist works appeared beginning with my *Creation and the Flood*.[181] My scheme resembled the day-age proposals of Miller, Dana, Guyot, and Dawson. The geological data were updated, and it was proposed that the events of the six days were overlapping. A diagram illustrated how the days of creation might have overlapped. Genesis 1

[177] Dawson, *Origin*, 256.
[178] Wright, *Scientific Confirmations*, 206.
[179] Ibid., 224-29.
[180] An important exception to the dearth of concordist literature during this period is B. Ramm, *The Christian View of Science and Scripture* (Grand Rapids: Wm. B. Eerdmans, 1954). It should, however, be recognized that Ramm spoke as a theologian trained in the sciences rather than as a scientist.
[181] Davis A. Young, *Creation and the Flood* (Grand Rapids: Baker, 1977).

was said to contain summary reports of the major activities of each day so that the creative events of each day were not necessarily restricted to that day. For example, bird formation was envisioned as possibly continuing into day six, and the creation of mammals was viewed as being initiated prior to day six and reaching its climax on that day.[182]

I suggested that the creation of earth on day one referred to a partially organized body not yet fit for life and habitation. The deep was an initial ocean that covered the globe prior to continent formation.[183] The light of day one had reference only to earth; it was "radiant energy falling on the earth's surface for the first time.[184] I denied that this creation of light had anything to do with the so-called Big Bang hypothesis.[185]

The division of waters related to the clouds above and watery oceans beneath; the creation of the firmament involved the development of the atmosphere. The waters accumulated into ocean basins, and continental landmasses appeared on the third day. It was admitted that "some difficulties are readily apparent in correlating Genesis with paleobotany."[186] The problem was that "different categories of plants seem to have arisen over widely-spaced times."[187] Like Guyot and Dawson, I noted that Genesis places plants before animals but that geology reverses the order. I suggested that future paleontological work would disclose more information about the origins of plants and that the biasing of early Paleozoic rocks in favor of marine deposits had led us to overlook the possible importance of terrestrial land plants that might have existed earlier than we had thought. After a century of intense paleontological investigation and of day-age concordism, I did no better with the plant-animal sequence than had Guyot or Dawson. Although more open to evolution than Dawson, I nevertheless thought that the expression "after his kind" sug-

[182] Ibid., 116-17.
[183] Ibid., 119.
[184] Ibid., 120.
[185] Ibid.
[186] Ibid., 128.
[187] Ibid.

gested an "independence of botanical classes that is incompatible with the general plant evolution.[188]

I, too, insisted that the absolute origin of the sun, moon, and stars did not occur on the fourth day. The function of the heavenly bodies with respect to earth was in view. "The point seems to be that at this time the earth comes into its present and final relationship to the sun so that now the sun and moon can serve as time regulators for the earth."[189]

In 1983, John Wiester published a fine summary of current geological and astronomical findings within the constraints of the day-age theory.[190] Wiester said little about Gen 1:2 and linked that verse with the moment of creation or even "before the beginning." He made no effort to identify the great deep. Of this verse he said, "The most we can say scientifically about 'before the beginning' is that we know nothing about it. The scientific quest has reached a barrier it cannot penetrate. Time and space have no meaning or existence. We must turn to the Scripture at this point."[191] Creation therefore began with the pronouncement of God, "Let there be light." This light was identified with the Big Bang of modern cosmology. "Science now fully agrees with the Bible that the Universe began with light. It is time our textbooks reflected the harmony of science with the first creation command in Genesis."[192]

Wiester attributed the formation of the atmosphere to day two. During its early history the earth went through a molten stage, characterized by segregation of materials in the interior as well as outgassing of volatile substances. The outgassed material separated into seas and a cloudy atmosphere. The waters were gathered into ocean basins and continents appeared. Wiester claimed that the creation of the sun on day four related to clearing of the atmosphere. He suggested that "the primordial atmosphere of carbon dioxide and other smog-like gases had to be purified,"[193] and that Gen 1:15 has in view "the transformation of light from the Sun into a ben-

[188] Ibid., 127.
[189] Ibid., 129.
[190] John L. Wiester, *The Genesis Connection* (Nashville: Thomas Nelson, 1983).
[191] Ibid., 36.
[192] Ibid., 45.
[193] Ibid., 115.

eficial energy source" for "we do know that scientific history places the appearance of sunlight beneficial to advanced life in the same sequential order as this fourth creation command in Genesis."[194]

Another recent attempt at concordism is *The Genesis Answer*[195] by William Lee Stokes of the University of Utah. Although Stokes worked out a correspondence of cosmic and geological history with the days of Genesis 1, he asserted that the days did not represent figurative periods of time. The days "were not of equal duration and are not intended to be measures of time. They are not the periods, epochs, and eras invented by geologists. Their meaning is celestial and not terrestrial. They are God's divisions of his own creations."[196] This view he called the Genesis code. Even though the days were not periods of time, each creative day was said to consist of a period dominated by darkness and a period dominated by light.

Stokes maintained that in Gen 1:2 the original, primitive "earth" was "universal unorganized matter, primitive, basic, and elemental--but with endless potential for future development."[197] Since there was no planet yet, neither the deep nor the waters of Gen 1:2 could refer to an ocean. The face of the deep "is to signify that there was a mass, at least a separate entity, with a surface or discontinuity surrounding surrounding the material which God intended to organize."[198] The water of Gen 1:2 was water in outer space. Stokes stated that "water exists in the clouds of space and is known to be abundant in areas where new stars are forming. Reasoning and speculating from these facts it may be assumed for the sake of continuing the story that water may be essential to the formation of solar systems like the one to which the Earth belongs."[199]

[194] Ibid.
[195] William L. Stokes, *The Genesis Answer* (Englewood Cliffs, NJ: Prentice-Hall, 1984).
[196] Ibid., 53.
[197] Ibid., 30.
[198] Ibid., 32.
[199] Ibid., 40.

Stokes admitted difficulty in explaining the origin of light. He said that the creation of light on day one was not to be identified with the Big Bang of modern astronomy but to a later stage of development. Thus the Big Bang fireball could have occurred before the six creative days. As the original brilliance of the fireball gradually diminished, the universe approached a period of universal darkness. This darkness was the evening of the first day. "The appearance and dominance of light in the galaxy we call our own would be the `morning' of the first day.[200]

Stokes' astronomical approach carried over into the discussion of day two. The waters above and below the firmament were waters of space, and the "production of the Firmament is equivalent to events that followed the production of the first light-producing objects of the galaxy."[201] The creation of the firmament was essentially completed when the spiral arms of our galaxy appeared. The waters under the firmament and the waters above the firmament were the two opposite spiral arms of the galaxy! The next step was to explain the evening and morning of the second day. "Certainly a black hole appears to be exactly what is needed for the dark phase of the second day. Here, more dramatically than any other known arrangement, light is separated from darkness. The separation is forceable--light is restrained from escaping."[202]

On day three the waters were gathered together. Stokes proposed that some of the water on one side of the evolving galaxy came together and developed enough material from which to build several solar systems. "The emphasis is on a process that would eventually give rise to the earth."[203] Moreover, "The theme of Gen 1:9 is clearly the emergence of a solid planet from formerly diffuse, unorganized material.[204] The separation of earth from water was identified with segregation of earth from the nebular dust cloud. "The burning process literally 'cleaned up' the solar system by sweeping away the remnants of the nebular cloud. This was the final

[200] Ibid., 63.
[201] Ibid., 78.
[202] Ibid., 82.
[203] Ibid., 85.
[204] Ibid., 87.

event which brought the planet earth into existence as a separate solid body. The earth had at length ‘come up dry'."[205] Still further, "the gathering together ‘in one place' seems to be a very acceptable description of the accumulation of matter in a specific region of space that is an essential step in formation of a solar system and also in the formation of individual planets and satellites."[206] As the process continued "it is not difficult to visualize the planet emerging form enclosing mists or clouds. The references to ‘dry land’ or a dry earth is [sic] scientifically very significant. The use of this wording forces the conclusion that the earth was at one stage without surface bodies of liquid water."[207] The darkness of day three ensued as the matter of the spiral arm of the galaxy passed from the luminous region into the dark inter-arm region.

As the dust and gas that had been diffused throughout the solar system were cleared away by solar light, radiation, and wind, the sun became visible. This passage from the obscurity of dust clouds into the clear light of the sun marked the passage from the darkness of evening into the light of morning of the fourth day.

One final work that merits attention is *Genesis One and the Origin of the Earth*[208] by Robert C. Newman and Herman Eckelmann. Although the primary interest of Newman and Eckelmann was in astrophysics rather than geology, their approach bears on geology. Our authors suggested that "each day opens a new creative period, and therefore each day is mentioned in Genesis 1 after the activities of the previous creative period have been described, but before those of the next period are given."[209] Moreover, the days were "sequential but not consecutive" and "the creative activity largely occurs between days rather than on them."[210] Each day of Genesis 1 was a 24-hour day that introduced a particular creative activity of God. The activity was not confined to that

[205] Ibid., 92.
[206] Ibid., 97.
[207] Ibid.
[208] Robert C. Newman and Herman J. Eckelmann, Jr., *Genesis One and the Origin of the Earth* (Downers Grove, IL: InterVarsity Press, 1977).
[209] Ibid., 64-65.
[210] Ibid., 74.

day, for each day was followed by a long period of time in which the activity continued. Thus, although the beginning of the creation of vegetation preceded the beginning of the creation of land animals, the appearance of vegetation may have continued after the animals began to appear. "It is not necessary to suppose that the fruit trees ... were created before any kind of animal life, which would contradict the fossil record understood as a chronological sequence. Instead, we assume that the creative period involving land vegetation began before the creative periods involving sea, air and land animals of sorts big enough to be noticed by an average human observer."[211] Newman and Eckelmann named their view the intermittent-day view. The 24-hour days of creation were separated by long time gaps of indeterminate length, and most of the creative activity occurred during those unmentioned stretches of time.[212]

Newman and Eckelmann suggested that in Gen 1:2 "the earth at this point in the narrative is not yet a solid body, but is shapeless and empty, perhaps even invisible. This is an excellent, though nontechnical description of the gas cloud that would eventually form the earth."[213] The darkness on the earth was a subsequent darkness that developed as the "shapeless, empty cloud, becomes dark as contraction raises the density enough to block out starlight."[214] Similarly the "deep" was equated with "the gas cloud, now a dark, cloudy and unfathomable region of space."[215] A large body of ice or of water, a mass of ice crystals, ice droplets, a cloud of water vapor, or even some other fluid would be within the range of usage of the word *mayim* (waters, Gen 1:2) in Scripture. "All of these would have a surface over which the Spirit of God might 'move' or 'hover'. In agreement with the scientific

[211] Ibid., 79.

[212] An early exegetical defense of a view very similar to the intermittent-day view can be found in F. Hugh Capron, *The Conflict of Truth* (Cincinnati: Jennings and Pye, 1903) 162-99. A similar view has also been proposed in Alan Hayward, *Creation and Evolution* (London: Triangle, 1985).

[213] Newman and Eckelmann, *Genesis One*, 70.

[214] Ibid., 71.

[215] Ibid.

model proposed, a dark nebula would be expected to contain some water vapor."[216]

As the gas cloud contracted it would heat and begin to glow. An hypothetical observer would first see darkness everywhere and then light,

> then some of both after they are separated. From the viewpoint of an observer riding along with the material of the earth as it is being formed, this is just what our scientific model would predict. When the gas cloud first begins to contract, the observer can see stars outside.... Later the contraction becomes sufficient to absorb light from outside the cloud, and the observer within is in the dark ('darkness was over the surface of the deep'). After further contraction and heating, however, the whole cloud lights up and the observer, immersed in light, can see no darkness anywhere ('and there was light'). Then, when the observer follows the equatorial band of gas and dust out from inside the cloud, both darkness and light are simultaneously visible.[217]

The firmament (atmosphere) formed by degassing of the earth's interior. The sun and other astronomical bodies appeared on day four as the cloudy atmosphere cleared.

In these recent efforts, the flood received scant attention; the focus has been on the interpretation of Genesis 1. My *Creation and the Flood* was the only one of these works to deal with the flood. Only the final chapter was devoted to the flood, and the intent of that chapter was to criticize the global diluvialism of scientific creationism rather than to make positive proposals. The only widely publicized contemporary flood theories available to evangelicals are those of scientific creationism. Small wonder that on the issue of the flood evangelicals are so attracted to that voice; it is virtually the only one speaking among us![218]

Selected interpretations of nineteenth and twentieth century concordists are summarized in Table III. Concordists

[216] Ibid., 72.

[217] Ibid., 73.

[218] A variety of local and large regional flood hypotheses have been proposed by such writers as E. K. Victor Pearce, R. E. D. Clark, and F. A. Molony in *Faith and Thought* and *Journal of the Transactions of the Victoria Institute* but none of these is well known to the general evangelical public. Perhaps the mot extensive evangelical treatment of the flood from a nonscientific creationist viewpoint is Frederick A. Filby, *The Flood Reconsidered* (Grand Rapids: Zondervan, 1970).

TABLE III

Summary of Concordist Interpretations of Key Texts in Genesis

	Gen 1:2	Gen 1:6-8	Gen. 7:11
Kirwan	Global ocean that precipitates chemicals, heating ocean which then vaporizes to thick darkness; Spirit-evaporation	Atmosphere formed by evap- during chemical precipitation	Caverns and ocean
Buckland	Devastated state of world after catastrophe prior to re-creation		Oceanic tides accounting only for surficial gravels
Fleming			Tranquil flood
Miller	Primitive ocean	Development of atmosphere; deposit of Silurian and Old Red rocks	Depression of central Asia and subsequent flooding
Guyot	Matter in primitive condition; gaseous atmosphere	Primitive nebula breaks up into gaseous masses and stars	
Dawson	Atmospheric water covering earth	Clouds and ocean segregate	Flooding around Caspian Sea
Wright			Depression of earth by glacial ice and flooding of depressions by melting glacial ice
Newman and Eckelmann	Gas cloud that blocks out starlight		
Stokes	Universal unorganized matter and water in space	Opposed spiral arms of galaxy; darkness of sec- day due to black hole	

have been as inventive as the literalists. Gen 1:2 has been interpreted as a global ocean precipitating chemicals and producing a great evaporation, atmospheric water, a simple primitive ocean, primitive matter, a gas cloud, or as the devastated condition of the world after a great catastrophe long after creation. Events of the second day of creation have included formation of the atmosphere by evaporation of the ocean or by outgassing of earth's interior, the segregation of a primitive nebula into stars, and the formation of spiral arms of a galaxy together with black holes. The flood was of continental scale and formed surficial features, it was completely tranquil and left no effects, and it inundated central Asia by flooding of the sea or the melting of glacial ice. The range of suggestions for the interpretation of these and other portions of the biblical text indicates that concordism has not given us reliable answers about relating the text to scientific questions. The Christian concordist still does not know from God's Word what happened on the second day of creation or how the flood occurred. Despite many attempts, concordism has not successfully explained the making of the sun, moon, and stars on the fourth day. Nor has concordism accounted for the creation of vegetation on day three prior to the appearance of sea creatures in relation to the prior appearance of sea life as disclosed by paleontology. As more and more concordist suggestions have been advanced in light of the latest developments in science, one becomes increasingly suspicious that the biblical text has been pressed into the service of a task for which it was not intended. I sense that the Bible does not, even incidentally, provide answers to detailed technical questions about the structure and history of the cosmos. Scripture contains no anticipations about the physical development of the cosmos that awaited the scientific discoveries of the nineteenth and twentieth (or future!) centuries to be brought into the open.

Concordism is not only the pet of Christian scientists. Concordism has also been warmly embraced by theologians and exegetes. In the nineteenth century Charles Hodge, A. A. Hodge, and B. B. Warfield, as well as such Scottish Presbyterian stalwarts as James McCosh, James Orr, and Alexander

Maclaren were kindly disposed toward the day-age theory.[219] James Murphy and Herbert Morris defended the gap theory in their writings.[220] More recently J. 0. Buswell, Jr., and Harold Stigers adopted the view that the days of Genesis 1 were periods of time longer than 24 hours .[221] I suggest that we will be well served if commentators recognize that concordism has not solved our problem of relating Genesis and geology any more than literalism. Commentators should not try to show correlations between Genesis 1 and geology and should perhaps develop exegeses that are consistent with the historical-cultural-theological setting of ancient Israel in which Genesis was written.

IV. *Conclusions and Suggestions for the Future*

No doubt not all will choose to follow this trail out of the swamp. Those who have done so will need to survey cooperatively the terrain carefully before setting out a new path. In taking stock, I propose that several matters need to be stressed and faced if evangelicals are to follow a path that will lead to satisfactory integration of biblical interpretation and scientific study.[222]

1. *Literalism and concordism are failed enterprises that evangelicals should abandon*.

A review of 300 years of literalistic and concordistic harmonizations between the biblical text and the results of em-

[219] For a more comprehensive listing of many prominent theologians and exegetes who adopted the day-age theory see my *Christianity and the Age of the Earth*, 55-67.

[220] Herbert W. Morris, *Science and the Bible* (Philadelphia: Ziegler and McCurdy, 1871), and James G. Murphy, *A Commentary on the Book of Genesis* (Andover: Draper, 1887).

[221] J. Oliver Buswell, Jr., *A Systemic Theology of the Christian Religion* (Grand Rapids: Zondervan, 1962), and Harold G. Stigers, *A Commentary on Genesis* (Grand Rapids: Zondervan, 1976).

[222] It is not the purpose of this paper to work out the areas of integration. That is the future task of Christian exegetes and scientists working in concert. Nevertheless I suggest that, if a proper integration should focus less on the precise correlation of presumably historical details, it should also focus more on broad biblical principles such as God's providence, the orderliness of creation, and man's role as steward of God's creation that are fundamental to the scientific task.

pirical geological study shows that there has been absolutely no consensus among evangelical Christians about interpretation of the details of the biblical accounts of creation and the flood or about texts such as Psalm 104, Proverbs 8, or other wisdom literature that bear on the creation, the flood, or the physical character of the earth. There has not been a Christian consensus about the identity of the great deep, about the firmament, about the waters above and below the firmament, about what happened on the fourth day of creation, about the sequencing of events and their matching with the geological evidence, or about the nature of the fountains of the great deep. Given this history of extreme variation of understanding of these various elements of the biblical text, it is unwise to insist that the teaching of the biblical text on any of these matters is "clear and plain" or that one's own interpretation is obviously what the biblical text has in mind.

As science developed and new theoretical frameworks were constructed in light of new discoveries, interpretations of biblical data were repeatedly adjusted to match the new understanding of those data. Both details and overall approaches to Genesis 1 or the flood were adjusted again and again. Such adjustments will continue with advances in the physical sciences so long as evangelicals assume that the biblical portrayal of creation gives us a skeletal outline of a scientific history of the planet or cosmos. The result would be still more variations of interpretation of texts from which to choose. We would be farther than ever from approaching an evangelical consensus. Perhaps the time has come to make the adjustment, in light of the extrabiblical evidence, away from the idea that the biblical text gives us a scientifically verifiable history of the planet.

The inability of literalism to provide a satisfactory agreement between the biblical text and geological knowledge can be seen on two counts. In the first place, modern literalistic interpretations of the creation and flood texts yield results that are wildly at variance with geological knowledge. In the second place the wide variation of interpretation demonstrates that we have not yet discovered the proper understanding of "scientifically relevant" biblical texts. Literalism, after 300

years, has failed and no longer provides a fruitful approach for achieving the appropriate biblical view of geology.

Concordism has been unable to provide a satisfactory agreement between the biblical text and geological knowledge. Concordistic efforts have never been able to do justice to the fourth day of creation and to the relative positioning of the third and fifth days of creation in relationship to geological knowledge.[223] On the other hand the variation of suggestions further demonstrates that concordism has not helped us to understand "scientifically relevant" biblical texts any more than has literalism. Concordism, after 250 years, has also failed and no longer may be assumed to provide a fruitful approach for achieving an appropriate biblical view of geology.

It is doubtful that, after centuries of failure, either strategy is going to be effective in the future. I suggest that evangelicals give up the attempt to identify the role of the great deep in terrestrial history, to work out a geophysics of the flood, to settle disputes between theistic evolutionists and progressive creationists about the origin and development of life from studies of the word "kind" or from the arrangement of differing life-forms on days three, five, and six, or to work out the sequence of geological events from biblical data. If evangelicals are to achieve an appropriate understanding of the relationship between biblical texts and scientific activity, then literalism and concordism should be abandoned and new approaches developed.

[223] Genesis 1 does, of course, convey the impression of sequential chronology. But even if we do not press the chronology too hard and simply take refuge in a vaguely sequential interpretation of Genesis 1 and a general similarity between Genesis 1 and the events of geology, we still cannot avoid the fact that day four cannot be explained easily in such a way as to allow formation of the heavens long before earth, and thus achieve concord with one of the more thoroughly established scientific conclusions. Moreover, geological evidence makes it clear that marine life preceded land vegetation, contrary to the view of Genesis 1 that assumes sequence of creative events. These severe difficulties suggest that we should at least give serious attention to the possibility that the chronology does not belong to the temporal sequence of events on earth but in some way accommodates human understanding to divine actions that transcend time.

2. *The failure of literalism and concordism suggests that the Bible may not be expected to provide precise "information" or "data" about the physical structure and history of the planet or cosmos.*

Given the wide diversity of available interpretations, it is unlikely that the Bible provides "high quality data" about details of the history or internal structure of the planet any more than Revelation yields "high quality data" about events of the future as in *The Late Great Planet Earth*. If the Bible does provide such data, we have been totally unable to determine exactly what it is! For example, it is unwise to claim precision for biblical data about the mechanism of the flood in view of proposals about subterranean abysses, vapor canopies, caves, comets, melting glaciers, oceanic tides, colliding asteroids, and so on. We know nothing from the Bible about how the flood started except that water was involved!

The fundamental--and understandable--assumption (one that I made previously) behind the search for "data" or "information" by both literalists and concordists through the centuries is that Moses wrote strictly as a "sacred historian." Thus the creation and flood stories (as well as related wisdom literature texts) have been read as if they were reports providing detailed information with quasi-photographic, journalistic accuracy and precision. And it has been assumed that these events can potentially be recognized, identified, and reconstructed from the effects they left behind by using the tools of geological, cosmological, biological, and anthropological investigations. Such historical reconstruction has been thought to be essentially no different from efforts to reconstruct the historical events of the Roman Empire or Hitler's Third Reich from extant documents and monuments. The failure of literalism and concordism suggests that we may have been mistaken in such attempts.

3. *Although the so-called "geologically relevant" biblical passages do not provide data for historical geology in that they are not straightforward reportorial chronicles, they nonetheless bear witness to genuine history.*

Even though the creation and flood stories probably should not be read as journalistic reports or chronicles, they nonetheless treat of events. We must reject the idea that the biblical account of creation does not speak of origination and can be

reduced solely to the notion of dependence of the material world on God. Genesis 1 teaches not only the dependence of the world on God but also its divine origination. God did bring the world into being (Heb 11:3). Even though Genesis 1 may not yield a sequence of datable events, we must insist that God did bring plants, animals, heavenly bodies, seas, earth, and man into existence. Any thought of the eternity of matter must be rejected. A bringing into being came about because of God's creative action. What should be addressed by evangelicals is the manner in which Genesis 1 and other creation texts portray God's bringing the world into being.

The flood story of Genesis 6-9 also witnesses to genuine history. The flood story tells us about God's action in this world and cannot be reduced to mere fable. Even though we may be unable to reconstruct a "historical geology" of the flood, behind the flood story of the Bible was an occurrence in the physical world in which God clearly acted in judgment and in grace. The task that lies ahead for evangelicals is to discover in what way the flood event is presented to us in Scripture.

4. *In future wrestling with "geologically relevant" texts such as Genesis 1-11, evangelical scholars will have to face the implications of the mass of geological data indicating that the earth is extremely old, indicating that death has been on earth long before man, and indicating that there has not been a global flood.*

Evangelicals can no longer afford the luxury of ignoring the implications for biblical exegesis of the enormous mass of extrabiblical data provided by geology, cosmology, and anthropology. It is unwise to proclaim belief in creation and ownership of the world by the sovereign Creator and then ignore the discoveries in God's world. Such an attitude is like receiving a beautiful Christmas package, profusely thanking the giver, and then failing to open the gift--ever. We insult our Creator if we fail to appreciate and appropriate what he has given us in the world.

Nor can evangelicals expect to provide an effective witness to unbelieving scholars in geology, cosmology, biology, and anthropology if we ignore or distort what is known about the world. We place unnecessary stumbling-blocks in the way of an unbelieving geologist if we persist in the claim that the

literalistic approach to the flood is the only legitimate approach. Any geologist knows that a literalistic view of the flood flies in the face of the accumulated knowledge of the past several centuries. Will such a person be led to Christianity?[224]

Future wrestling with Genesis 1 and the flood story must come to grips with the mountainous mass of data that indicates that our planet is billions of years old and has undergone a complex, dynamic history. No longer can competent, aware Christian theologians naively insist on a recent creation by taking refuge in the so-called evidences for recent creation emanating from the scientific creationist camp. Those who do so do the Christian community a disservice. No longer can Christian theologians claim that the Genesis story talks about a geographically universal deluge that has left observable, physical remains all over the earth's surface. No longer may we tell our children about the flood in which pairs of penguins from Antarctica, kangaroos from Australia, sloths from South America, bison from North America, pangolins from southeast Asia, and lions and elephants from Africa all marched two by two into the waiting ark. The biogeographical data rule out such migrations of animals. Though it is difficult to make such assertions and very painful for evangelicals to accept them, the evangelical world must face up to the implications of the geological data that exist if we wish to do justice to the biblical text.

The very tempting response that many evangelicals might wish to make is that the geological, biogeographical, and anthropological data have no real force because the present reconstructions of terrestrial history have been made largely by unbelievers who were controlled by world-views that are hostile to Christianity. What is needed, it may be claimed, is for Christians to reevaluate the data and to reinterpret it in the light of biblical principles. Such an assertion may compel those who have little knowledge of the practice of geology, but we delude ourselves by falling back on such an illusory hope. The historical reality is that geology as a science was

[224] I fully sympathize with the deep desire of literalists to achieve a biblical view of geology and to bring unbelieving scientists to Christ. Nevertheless I am persuaded that their basic approach fails to achieve a proper view and also has had a detrimental effect within the scientific community.

developed largely by those who were active evangelical Christians or shaped to some degree by Christian principles. The force of the accumulating data led to the understanding that the world is ancient and that there was no global flood. *Christian* geologists who loved Scripture and the Lord were repeatedly confronted with new discoveries that could not be squared with the traditional interpretations of the Bible. *Christian* geologists were compelled by the observations they made of God's world to conclude that there had been no global flood and that their world was extremely old.[225]

5. *The idea of apparent age is an unacceptable way of facing the issue.*

There is only one way to avoid the force of geological data regarding the history of earth, but one must be willing to face the consequences. That way is to take refuge in a literalism that insists on a series of purely miraculous, *ex nihilo*, nearly instantaneous, fiat creations in six ordinary days and that insists on a flood in which the water was miraculously created and annihilated, physical effects were miraculously removed, and animals were miraculously transported to and from the ark.

The result of this view is that any evidence for the elaborate history and antiquity of the earth is purely illusory. On this view rocks are not old; they must be interpreted as indicating appearance of age and history only.[226] Such a conclusion must be applied to all rocks that were formed prior to the beginning of human history. Only of rocks formed since human history began, that is, rocks not miraculously created, may it be said that they contain a historical record that can be reconstructed from internal evidence. All other rocks were miraculously created to look as they do; they did not go through any process. Not only basement rocks composed of igneous and metamorphic rocks, but virtually the entire column of sedi-

[225] For aspects of the history of geology see, for example, Charles C. Gillispie, *Genesis and Geology* (New York: Harper, 1951), Roy Porter, *The Making of Geology* (Cambridge Press, 1977), Claude C. Albritton, *The Abyss of Time* (San Francisco: Freeman, Cooper, 1980).

[226] The apparent-age theory of creation was adopted in John C. Whitcomb and Henry M. Morris, *The Genesis Flood* (Philadelphia: Presbyterian and Reformed, 1962).

mentary rocks with their enclosed fossil remains must be created in place. Despite scientific creationism's contention that stratified rocks were formed during human history by the flood, the evidence accumulated during the past two centuries overwhelmingly indicates that stratified rocks, as in the Grand Canyon, were deposited long before the appearance of humans. Such rocks, if prehuman, would have been formed during the six days of creation and were therefore created in place. Proponents of this literalism must then be willing to accept the consequence that fossil elephant bones, fossil dinosaurs, and fossil trees are illusions created in place, and that such "fossils" tell us absolutely nothing whatsoever about formerly existing elephants, dinosaurs, or trees.[227]

If we wish to avoid the force of the geological data in dealing with the flood story we must also take the flood as a purely miraculous event. Physical mechanisms for the source and draining of floodwaters and migrations of animals land us squarely in contradictions and absurdities. Thus we must ultimately conclude that the floodwater was miraculously created and annihilated and that the animals migrated and emigrated from the ark in a purely miraculous way. We must accept, too, the notion that all physical remains of the flood were miraculously eliminated from the earth, because there is no recognizable physical evidence for a global flood.[228]

[227] If we choose to explain most of the geological record in terms of miraculous creation of apparent age, then let us be consistent and give up all efforts to appeal to scientific evidence that supposedly indicates that the earth is young. If we want to appeal to scientific evidence, then let us be consistent and willingly accept that the evidence in total overwhelmingly points to long historical development. We cannot have it both ways by appealing to science when we think it supports a young earth and then appealing to apparent age when the evidence suggests antiquity.

[228] The issue is not whether there have been miracles in history or whether God can perform miracles. It is unquestioned that God can perform miracles and that he has performed miracles, e.g., the resurrection. The issue here is only whether the flood or the whole of the act of creation was purely miraculous. For example, if we postulate that God miraculously brought the animals to the ark and miraculously returned them to their native lands, we could ask why God bothered to put animals on the ark at all. If he wanted to preserve the animals why did he not just miraculously recreate them after the flood?

The idea of creation of the total rock column with an appearance of age is so fraught with problems that it ought to be rejected. Just as no theologian wants to work with a Bible that was suddenly created out of nothing and in which the many evidences of history in its composition were purely illusory, and as no individual wants to regard his life before last night as pure illusion, so no geologist wants to study rocks whose evidences for historical development are purely illusory.

In addition, the idea of creation of apparent age was not a component of Christian thinking until the mid-nineteenth century. The idea, proposed by Gosse[229] and currently espoused by scientific creationism, was suggested only as a means of evading the force of geological data while retaining a traditional reading of Genesis 1. So far as I am aware, neither the church fathers nor the Reformers ever held to the notion of creation of apparent age.

The literalistic, apparent-age view of Genesis 1 and the purely miraculous view of the flood story are unduly rigid, for Scripture uses the terms "creation" and "create" in a variety of ways. Although *bara'* always has God as its subject, the word does not necessarily imply creation *ex nihilo*. The context must determine whether creation *ex nihilo* is in view. Although *bara'* might imply instantaneousness of effectuation in some contexts, the word does not everywhere demand such instantaneousness. Although in some contexts *bara'* might not entail secondary causes, process, and providence, the word by no means necessarily rules out secondary causes, process, or God's providential activity in every context. There are many instances in Scripture, for example, in the creating of Israel (Isa 43:1), the creating of the wind (Amos 4:13), the creating of animals (Ps 104:30), and the creating of future generations of people (Ps 102:18), where creation does not involve pure miracle and instantaneousness and does involve providence, ordinary processes, and means. These are not *ex nihilo* creations. It is therefore unwise, given the flexibility of the biblical usage of "create," to insist that creation in Genesis 1 involves only immediate, purely miraculous, instantaneous production

[229] Philip H. Gosse, *Omphalos* (London: J. Van Voorst, 1857).

of every item out of nothing. Capable theologians have maintained otherwise for centuries.

An instantaneously created, mature creation that shows only an illusory history is also inconsistent with the nature of God and of man as God's imagebearer. In the absence of an incontrovertible word from the Lord that he has created an illusion, we must conclude that God would be deceiving us by placing us within a complex world which bears myriad indications of a complicated history that did not actually happen.[230] Mature creation is also incompatible with the character of man as one created in the image of God and given dominion over the earth. God has given us the mental tools with which to make sense of the world and placed us in a world that makes sense. In every sphere of intellectual endeavor we assume the genuine character of the world. Why should the world's past be any different? Why should our intellectual tools be mismatched against an illusory past in an effort which God blessed when he told us to "subdue the earth"?

Creation of apparent age also forces us to conclude that it is impossible to carry out any scientific reconstruction of terrestrial history prior to the advent of humankind. We can study the world scientifically only in terms of known or knowable processes. The past can be reconstructed scientifically only by analogy with what is known of the present. The only history that could legitimately be investigated scientifically would be that history which begins immediately upon conclusion of the miraculous six-day creation. "Prior" to that would be off limits to scientific research. We could only state of anything produced before genuine history began, that it was created and that it bears only an illusion of history. Even terrestrial history that coincides with human history would be

[230] Appeal in favor of the idea of apparent age or mature creation is often made to Jesus' conversion of water into wine in John 2. However, in John 2, the conversion is designated as a "sign" performed in full view of the servants with the result that Jesus "revealed his glory, and his disciples put their faith in him." The same cannot be said of creation or the flood. There were no eye-witnesses to the creation, and the flood story is not presented as a "sign" and the details of the story imply predictable effects of a lot of water!

questionable if a purely miraculous global flood had occurred of which all traces were miraculously annihilated.

If we adopt this approach we are confronted with the problem of deciding exactly, and on compelling grounds, how long real history is. When did creation cease and history begin? Biblical literalists and scientific creationists believe that real history is between 6,000 and 15,000 years long. Thus far, I have seen no compelling argument in favor of any specific date of creation.

Suppose that history began exactly 10,000 years ago. If so, any rock formed within the last 10,000 years could be studied scientifically. We could legitimately talk about the processes involved in the formation of that rock. We could talk about its being an igneous or sedimentary rock. We could legitimately try to decide just when it was formed and whether it was older or younger than some other rock nearby. But suppose we found some rocks that appeared to be older than 10,000 years. Then those rocks must have been created miraculously during the six days. It would be inconsistent with our Christian belief to study them scientifically, that is, to attempt to discover the processes by which they were formed. Even though the rocks might look like lava flows or sandstones, we could not identify these rocks as igneous rocks or sedimentary rocks, for those terms imply processes. We could not even say anything about the relative age of those rocks compared with some other created rocks. We could not, for example, claim that the rocks were 20,000,000 years old while some rocks beneath them were 30,000,000 years old because the world was created 10,000 years ago. Therefore, created rocks are scientifically off limits.

But how do we decide that a rock was created? How do we determine that a rock has an apparent age greater than 10,000 years? How do we decide that a rock may not legitimately be studied by the methods of geological science? The only way that we can possibly demonstrate that a given rock is "older" than 10,000 years, short of a direct biblical revelation which we do not have, is to presuppose the validity of the scientific enterprise and to carry out a scientific investigation of that rock. It is only through scientific argumentation that we can claim that rocks might be 100,000 years old or 16,000 years

old or 2,000,000,000 years old. In order to claim that a rock is "old" and therefore created and that it may not be legitimately studied scientifically, we must study it scientifically. We must presuppose that which we are attempting to rule out! Such an approach is clearly destructive of the entire scientific enterprise. Any approach to creation which entails creation of illusory history ultimately undermines all scientific effort and should be rejected by the evangelical community.

6. *In view of the complexity of the issues, Christian scholars must work in community in an effort to arrive at a satisfactory understanding of the relationship between Scripture and the various sciences.*

Too often evangelical scholars have worked in isolated groups. The theologians have often worked without much insight into developments within geology or other sciences, and geologists have often worked independently of theologians. For example, some of the harmonization schemes that we have reviewed, particularly the more recent ones, were developed by scientists working in relative isolation from biblical scholars. It seems to me that evangelicals can no longer afford to tackle the issue of origins without a lot of cooperative, interdisciplinary discussion. Evangelicalism will be successful in developing a fruitful understanding of the relationship between Scripture and terrestrial history only if biblical scholars work closely with geologists, archeologists, anthropologists, astronomers, paleontologists, and historians and philosophers of science.

We can ill afford to remain in isolated academic enclaves shouting at one another. Geologists ought to be more cautious about proposing interpretations of the biblical text on their own than we have been. In turn, biblical scholars ought to be more cautious in insisting that geologists reinterpret their data to conform to some traditional rendering of the text when they have little idea of the compelling force of those data. We will have to work together in the future.

7. *Approaches to Genesis 1 that stress the contemporary cultural, historical, and theological setting of ancient Israel are potentially fruitful and ought to be worked out more fully.*

Biblical scholars are, of course, the ones who are qualified to indicate the direction in which biblical interpretation ought to go in the future and to work out the details of that program.

Thus I make no original proposals of my own at this point. Some evangelical scholars have already begun to work in the direction that I am suggesting.[231]

I suggest that we will be on the right track if we stop treating Genesis 1 and the flood story as scientific and historical reports. We can forever avoid falling into the perpetual conflicts between Genesis and geology if we follow those evangelical scholars who stress that Genesis is divinely inspired ancient near eastern literature written within a specific historical context that entailed well-defined thought patterns, literary forms, symbols, and images. It makes sense that Genesis presents a theology of creation that is fully aware of and challenges the numerous polytheistic cosmogonic myths of Mesopotamia, Egypt, and the other cultures surrounding Israel by exposing their idolatrous worship of the heavenly bodies, of the animals, and of the rivers by claiming that all of those things are creatures of the living God. The stars are not deities. God brought the stars into being. The rivers are not deities. God brought the waters into existence. The animals are not deities to be worshipped and feared, for God created the animals and controls them. Even the "chaos" is under the supreme hand of the living God. Thus Genesis 1 calmly asserts the bankruptcy of the pagan polytheism from which Israel was drawn and that constantly existed as a threat to Israel's continuing faithfulness to the true God of heaven and earth.

As a sample of the kind of approach that is potentially fruitful, we might consider Genesis 1 as a preamble to the historical prologue of the Sinaitic covenant as suggested by Kline.[232] If so, then Genesis 1 introduces the great divine King who enters into covenant with his people Israel at Sinai. In the first chapter of the Bible we are made privy to the King's council chamber. We see the great King of the universe issuing

[231] See, for example, Meredith G. Kline, "Because It Had Not Rained," *WTJ* 20 (1958) 146-157; Henri Blocher, *In the Beginning* (Downers Grove, IL: InterVarsity, 1984); Conrad Hyers, *The Meaning of Creation* (Atlanta: John Knox, 1984) 1-114; Gerhard F. Hasel, "The Polemic Nature of the Genesis Cosmology," *EvQ* 46 (1974) 81-102; Bruce K. Waltke, "The Creation Account in Genesis 1:1-3," *BSac* 132 (1975) 327-342.

[232] Meredith G. Kline, *The Structure of Biblical Authority* (Grand Rapids: Wm. Eerdmans, 1972) 53.

a series of royal decrees, bringing the ordered world into permanent being by his all-powerful, effective word. In Genesis 1 the King stakes out and establishes his realm, the sphere of his dominion. The King issues the royal decrees, "Let there be," and the King's will is carried out.

The decrees of the divine King are recorded as a set of "minutes" or "transactions" by analogy with the decrees of earthly kings. Thus we may view the days not as the first seven earthly days or periods of time, but as "days" of royal divine action in the heavenly realm. If we receive an impression of chronology from the chapter, it is a divine "chronology, " not an earthly one. Perhaps God's creative work is portrayed in the form of a group of seven days to signify completeness and perfection, thus establishing the weekly pattern of six days of work and one day of rest for Israel as a copy of the divine "week."

God's final royal action is to set up his image in his territory, the created universe. Thus man is set in the earth as God's image and given derived authority and dominion over the King's property.[233]

Clearly the previous paragraphs present only the barest outline of how Genesis 1 might be viewed. There are many unanswered questions and many details to work out. Moreover, the development of a new approach to the flood will also require the turning over of much new ground. But we cannot let fear of what lies ahead allow us to fall back into the old comfortable approaches and deter us from the task. May God give the entire evangelical community the grace and courage to work together in developing new and deeper insight into the character of his amazing creation and his infallible Word.

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[233] I am indebted to Professor John Stek for his thoughts about Genesis 1 and its extensive usage of royal-political metaphor.