

Creation Research Society Quarterly

Haec credimus:

For in six days the Lord made heaven and earth, the sea, and
all that in them is, and rested on the seventh. — Exodus 20:11

VOLUME 32

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WOOD RAT NESTS BENEFIT PALEOBOTANY



RENEW NOW FOR 1996/97: PAGE 188

CREATION RESEARCH SOCIETY

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Front Cover Photograph

While crossing a freeway, this particular dusky footed wood rat (*Neotoma fucipes*) was photographed by Dennis Thornhill of *The Newhall Signal*.

The very similar desert wood rats (*Neotoma lepida*) have unwittingly helped botanists reconstruct the vegetational history of the North American Deserts — see pp. 221-224.

Back Cover Photograph

Can you find the horned toad lizard here? Camouflage like this and mimicry both are tributes to the Creator's providence and versatility. Consult a fascinating creationist analysis of mimicry by Walter Lammerts in C.R.S.Q. 20:42-44, June 1983. See p. 187 to order this one or other back issues of C.R.S.Q.

Instructions to authors can be found in June Quarterly.

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CREATION RESEARCH SOCIETY

History The Creation Research Society was organized in 1963, with Dr. Walter E. Lammerts as first president and editor of a quarterly publication. Initially started as an informal committee of 10 scientists, it has grown rapidly, evidently filling a real need for an association devoted to research and publication in the field of scientific creation, with a current membership of over 600 voting members (with graduate degrees in science) and over 1100 non-voting members. The *Creation Research Society Quarterly* has been gradually enlarged and improved and now is recognized as the outstanding publication in the field.

Activities The society is solely a research and publication society. It does not hold meetings or engage in other promotional activities, and has no affiliation with any other scientific or religious organizations. Its members conduct research on problems related to its purposes, and a research fund is maintained to assist in such projects. Contributions to the research fund for these purposes are tax deductible. The Society operates The Van Andel Research Center in Chino Valley, Arizona.

Membership Voting membership is limited to scientists having at least an earned graduate degree in a natural or applied science. Dues are \$22.00 (\$27.00 foreign) per year and may be sent to Glen W. Wolfrom, Membership Secretary, P.O. Box 8263, St. Joseph, MO 64508-8263. Sustaining membership for those who do not meet the criteria for voting membership, and yet who subscribe to the statement of belief, is available at \$22.00 (\$27.00 foreign) per year and includes a subscription to the Quarterlies. All others interested in receiving copies of all these publications may do so at the rate of the subscription price for all issues for one year: \$25.00 (\$30.00 foreign).

Statement of Belief Members of the Creation Research Society, which include research scientists representing various fields of successful scientific accomplishment, are committed to full belief in the Biblical record of creation and early history, and thus to a concept of dynamic special creation (as opposed to evolution), both of the universe and the earth with its complexity of living forms. We propose to re-evaluate science from this viewpoint, and since 1964 have published a quarterly of research articles in this field. All members of the Society subscribe to the following statement of belief:

1. The Bible is the written Word of God, and because it is inspired throughout, all its assertions are historically and scientifically true in all the original autographs. To the student of nature this means that the account of origins in Genesis is a factual presentation of simple historical truths.

2. All basic types of living things, including humans, were made by direct creative acts of God during the Creation Week described in Genesis. Whatever biological changes have occurred since Creation Week have accomplished only changes within the original created kinds.

3. The Great Flood described in Genesis, commonly referred to as the Noachian Flood, was a historical event worldwide in its extent and effect.

4. We are an organization of Christian men and women of science who accept Jesus Christ as our Lord and Saviour. The account of the special creation of Adam and Eve as one man and woman and their subsequent fall into sin is the basis for our belief in the necessity of a Savior for all people. Therefore, salvation can come only through accepting Jesus Christ as our Savior.

**MEMBERSHIP/SUBSCRIPTION APPLICATION AND RENEWAL FORM
CREATION RESEARCH SOCIETY**

See current *CRSQ* for membership information

DEDICATION TO JOHN KLOTZ

DON B. DEYOUNG*



This issue of the Quarterly honors a charter member of the Creation Research Society, biologist Dr. John W. Klotz. John's life has been filled with faithful church service, college ministry, strong family ties, and creationist leadership.

Born in Pittsburgh, John Klotz received his science training at Concordia College (Bronxville, NY), University of Pittsburgh (Ph.D. in biology), and Washington University. He also earned an M.Div. at Concordia Seminary. One summer was spent at the Marine Biological Laboratory in Woods Hole, MA. John thus developed symbiotic interests in theology, genetics, and ecology.

John served as a biology professor for 33 years at Lutheran colleges in Bronxville, NY, Mankato, MN, River Forest, IL, and Fort Wayne, IN. For eight additional years he administered at Concordia Seminary of St. Louis, including the presidency. Now retired, John and his wife, Florence, live in St. Louis. They have eight children, one deceased.

During his rich academic career John authored six books and numerous technical articles. Book titles include *Genes, Genesis, and Evolution* (1955, 1970) and *Studies in Creation* (1985). I personally find his *Ecological Crisis* (1971) an especially helpful approach to current concerns. While living in Indiana, John wrote a popular long-running column "Of Bogs and Logs" in the *Fort Wayne Journal Gazette*.

Dr. John Klotz was a member of the Team of Ten who originated the Creation Research Society. He served on the Board of Directors during the long span 1963-1992. His knowledge of administration and finance has been most helpful to the society. John is a member of the Lutheran Academy for Scholarship, American Association for the Advancement of Science, National Association of Biology Teachers, and American Association for Higher Education. We owe a great deal to leaders like John who have volunteered their time and talent to CRS over the years.

Editors' Comments

Our "publication year" will begin anew with the next *CRSQ* issue-June 1996. Please assure its arrival by renewing your membership/subscription—see the enclosed form and note the slightly revised cost schedule, page 188.

This March issue is the end of another volume and we gratefully reflect on the large number of capably written scientific articles and other features that have gone to press. This last issue contains a low number of articles but it is freighted with book reviews and letters in an attempt on our part to get up-to-date with these. We hope readers benefit from such shorter features because each one supplies a clear glimpse into important aspects of the creation-evolution controversy.

In this issue we once again thank Lane Lester and Brenda Lindley-Anderson for gracing the Quarterly with a Copy'n'Share centerpiece. The center four pages can be removed as one sheet and printed in large

numbers for distribution to young readers. We hope this will aid in promoting scientific creationism. We also hope its application information and book advertisements will attract young readers to creationist literature that can bring balance to their slanted educational fare.

Does the library of your alma mater subscribe to *CRSQ*? Would the readers consider donating a subscription to *CRSQ* for the library of their alma mater? We suggest that an extra issue be ordered from the membership secretary and mailed to the librarian of the college or institution. A cover letter could be included explaining that *CRSQ* is a peer-reviewed scientific publication, and that as an alumnus of the institution you would like to donate a year's subscription, provided the library will shelve and archive the journal when it is received. We believe that the benefits to library patrons will be well worth the expense and effort involved.

Eugene Chaffin and George Howe

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NINETEENTH CENTURY DARWINISM AND THE TASMANIAN GENOCIDE

JERRY BERGMAN*

Received 19 September 1994; Revised 29 April 1995

Abstract

It was widely believed in the nineteenth century that the Tasmanians were a living link between modern humans and their primate ancestors. Given the presupposition of naturalistic evolution, the Tasmanian people were often seen as less than human and, consequently, many people felt that it was not wrong or immoral to treat them like animals. This attitude eventually influenced behavior which resulted in the total extermination of the native Tasmanians. Today it is concluded that they were a distinct racial group similar to the Australian Aborigines that possessed a unique culture and were fully human. This event is only one of many examples of the numerous tragedies that evolutionary naturalism has produced in modern times.

Introduction

The story of the complete extermination of the native peoples of Tasmania in the late 1800s is a well documented example of one negative influence of early Darwinism. Tasmania, a 67,000 square kilometer (26,000 square miles) island close to the size of Ireland, is about 200 miles south of the Australian mainland, almost directly south of Melbourne. The island, once called Van Dieman's Land, is now part of Australia. The native Tasmanians, a highly isolated population of about 70 tribes and five language groups, had virtually no contact with other humans for thousands of years (Plomley, 1983; Jones, 1971). Their sole sea transportation was by small rafts, which were usually useful for only short trips (Mulvaney, 1969).

The History of Tasmania and the Conflict

Tasmania was named after Abel Jansen Tasman, a commander of two small Dutch vessels who discovered the island in 1642. It was soon visited by many others including the French in 1772 (Castelain, 1988; Plomley, 1983; Garanger, 1985). In 1777 Captain Cook made an acquaintance with the natives, calling them "mild and cheerful, without reserve or jealousy of strangers" (Bonwick, 1870, p. 6). Other explorers with the benefit of more extensive contact concluded that the Tasmanians were an intelligent people with cheerful dispositions, great politeness, kindness and sincerity (Plomley, 1983). They were also extremely skilled divers and fishermen (Bonwick, 1870). The women were described as excellent mothers, caring, affectionate, gentle and exhibiting marked maternal tenderness. Many of the younger women were described as "most affectionate," gentle, full of grace and wonderful spirit. They also concluded that, although the natives possessed a "primitive mentality," they were an intelligent people. One explorer described them to be:

... intelligent, grasping readily all my gestures. From the first moment, they seemed to understand my object perfectly, and they repeated willingly the words I had not been able to grasp the first time, and often roared with laughter when, trying to repeat what they said, I made a mistake or pronounced them badly (quoted in Plomley, 1983, p. 64).

Peron, from his extended contact with the Tasmanians, added the following details to the above:

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This gentle confidence of the people in us, these affectionate evidences of benevolence which they never ceased to manifest toward us, the sincerity of their demonstrations, the frankness of their manners, the touching ingenuousness of their caresses, all concurred to excite within us sentiments of the tenderest interest. The intimate union of the different individuals of a family . . . had strongly moved us. I saw with an inexpressible pleasure the realization of those brilliant descriptions of the happiness and simplicity of the state of nature of which I had so many times in reading felt the seductive charm (Bonwick, 1870, p. 27).

They wore necklaces and other ornaments, constructed huts, manufactured spears, waddys, spatulas, water vessels, cushions, baskets, cords and ropes, canoe rafts, and many other implements (Plomley, 1983). The island terrain and foliage, often described as a paradise, was:

diverse in scenery and in climate . . . its small area [contains a] tangled masses of mountains, great forests, innumerable lakes, picturesque waterfalls, fertile valleys and probably the roughest and most inaccessible country in all Australia. The climate is temperate, with a warm summer and a moderately cold winter. . . . The . . . coasts have moderate rainfall of up to 40 inches, the central tableland is drier; but within a few miles, in the western belt, the rain is at times practically continuous, and averages over 100 inches in the year (Laserson, 1972, p. 139).

After reviewing the positive early contacts with the Tasmanians, Bonwick sadly noted that the people, although at first "almost universally" regarded positively by English colonists, a few years later, were viewed as creatures

... whose destruction would be a deed of merit, as well as an act of necessity. Smile as we may at the simplicity of Peron, had our faith in the poor creatures been more like that of the kind-hearted Frenchman, the reader might have been spared the . . . mournful record of "The Last of the Tasmanians" (Bonwick, 1870, p. 27).

This change in attitude was due to many factors including greed, economics, the cultural, social and language differences, plus mistrust on both sides and the contingencies of history, but the factor we are focusing on here is the influence of Darwin. Although it is difficult at this point in time to accurately assess

the exact role evolution played in the events that followed, it is clear that it was not small and for years served to justify the atrocities that occurred after the Tasmanians became extinct. The native population consisted of hunter-gatherers and was biologically similar to the Aborigines living on the Australian mainland. The "scientific" view of them then was summarized by Diamond who noted that the

Tasmanians attracted the interest of scientists, who believed them to be a missing link between humans and apes. Hence when the last man, one William Lanner, died in 1869, competing teams of physicians, led by Dr. George Stokell from the Royal Society of Tasmania and Dr. W. L. Crowther from the Royal College of Surgeons, alternately dug up and reburied Lanner's body, cutting off parts of it and stealing them back and forth from each other. Crowther cut off the head, Stokell the hands and feet, and someone else the ears and nose, as souvenirs (Diamond, 1988, p. 9).

The common attitude about the Tasmanians then was expressed by David Collins, a nineteenth century judge-advocate who wrote that, in contrast to British Australia, Tasmania was "the residence of savages" (Fisher, 1968, p. 24). This belief is summarized by the eminent German evolutionist Ernst Haeckel who concluded that "since the lower races—such as the Veddahs or Australian Negroes—are physiologically nearer to the mammals—apes and dogs—than to the civilized European, we must, therefore, assign a totally different value to their lives" (Haeckel, 1905, p. 390). The West's perception of the Tasmanians was described by Mulvaney as follows:

When first encountered by Europeans, Tasmanian material culture appeared so rudimentary that evolutionary theorists later judged it a storehouse of fossil facts. Edward Tylor dubbed Tasmanians the 'representatives of Palaeolithic Man;' John Lubbock implicitly denied their humanity with his mechanistic aphorism: 'The Van Diemener [Tasmanians] and the South American are to the antiquary what the opossum and sloth are to the geologist (Mulvaney, 1969, p. 133).

The result of this belief was well put by Diamond when he stated:

If you ask any anthropologist to summarize in one phrase what was most distinctive about the Tasmanians, the answer will surely be "the most primitive people still alive in recent centuries. The label "primitive" clearly has explosive . . . racial overtones, and in the nineteenth century its application led to tragic consequences (Diamond, 1993, p. 51).

The first major skirmish with the native people of the island occurred on May 3, 1804, beginning a series of conflicts that eventually resulted in a full scale attack on them. A British officer, for reasons that are unclear today, ordered his men to open fire on the Tasmanians, killing or mortally wounding at least 50. The result was that "the friendly disposition of the natives was completely altered by this unwarranted attack and the consequent loss of life. Animosity and revenge were engendered by this atrocious act of barbarity, and the

result was a series of petty encounters . . . in which of course the natives were constantly defeated, many of them losing their lives" (Knighton, 1886, p. 272). Lieutenant Moore, the officer who gave the command to fire, was evidently drunk from an "over-dose of rations' rum," and the firing seems to have been done in order to see them flee. And flee they did, terrified "at the execution" which left in them "a deep rooted hatred of the white faces which never subsequently died out" (Knighton, 1886, p. 272; Bonwick, 1870).

The start of the slaughter came not long after the Europeans began settling in Tasmania and is vividly summarized by Diamond.

Whites kidnapped Tasmanian children as laborers, kidnapped women as consorts, mutilated or killed men, trespassed on [their] hunting grounds, and tried to clear Tasmanians off their land. . . . As a result of the kidnappings, the native population of northeast Tasmania in November 1830 had been reduced to seventy-two adult men, three adult women, and no children. One shepherd shot nineteen Tasmanians with a swivel gun loaded with nails. Four other shepherds ambushed a group of natives, killed thirty, and threw their bodies over a cliff remembered today as Victory Hill (Diamond, 1988, p. 8).

As a result of the Tasmanians' ineffective attempts to defend themselves, Governor Arthur ordered all Tasmanians to leave those areas of the island that were settled by Europeans (Bonwick, 1870). Evidently not content to deal with the situation by this order alone, in November of 1828 the European soldiers were authorized to kill on sight any Tasmanian that still lived or wandered into the areas where the Europeans resided (Diamond, 1993, p. 57). The government even sponsored "roving parties" which consisted of convicts led by police that

hunted down and killed Tasmanians. . . . Next, a bounty was declared on the natives: five British pounds for each adult, and two pounds for each child [that was] caught alive. "Black catching" as it was called because of the Tasmanians' dark skin, became big business pursued by private as well as official roving parties. . . . A commission . . . was set up to recommend an overall policy towards the natives. After considering proposals to capture them for sale as slaves, poison or trap them, or hunt them with dogs, the commission settled on continued bounties and the use of mounted police (Diamond, 1988, p. 8-9).

One account of the violence that the European-Tasmanian conflicts developed into is as follows:

A party of the Richmond police were passing through the bush in 1827, when a tribe, seeing them, got up on a hill and threw stones upon them. The others fired in return, and then charged them with the bayonet. We have Mr. G. A. Robinson's authority for stating that a party of military and constables got a number of Natives between two perpendicular rocks, on a sort of shelf, and killed seventy of them, dragging the women and children from the crevices of the rocks, and *dashing out their brains*." (Bonwick, 1870, p. 64)

The wanton brutality against what many Whites saw as their evolutionarily inferior competitors was enormous. Women were commonly raped and many bore children by the early settlers. Many of the settlers “amused themselves by emasculating all of the native men that they could seize . . . and it was the subject of mutual boasting as to the numbers that they had thus treated, when they held convivial feasts together” (Knighton, 1886, p. 274). Knighton concludes that the whole Tasmanian record was one of outrage, torture, mutilation, murder, and robbery, relieved here and there by noble acts of philanthropy and kindly benevolence” (1886 p. 283). In short he concludes they were “hunted down like wild beasts” because this is what many people believed that they were (Bonwick, 1870, p. 66). The degree of European brutality was described by Diamond as follows:

When British settlers poured into Tasmania in the 1820s . . . racial conflict intensified. Settlers regarded Tasmanians as little more than animals and treated them accordingly. Tactics for hunting down Tasmanians included riding out on horseback to shoot them, setting out steel traps to catch them, and putting out poison flour where they might find and eat it. Shepherds cut off the penis and testicles of aboriginal men, to watch the men run a few yards before dying (Diamond, 1993, p. 57).

The Tasmanian affair was not simply a conflict between cultures but, as vividly brought out by Knighton (1886, p. 268), was also influenced by the beliefs of the “race expert scientists” who concluded that: “All attempts to civilize the Australasians many regarded as absolutely futile. It would be easier . . . to bring down the whites to the level of the natives than to raise the natives to the level of the whites. Many of the whites, it may be replied, have already sunk to the level of the black fellows, by their own unaided effort in descent . . .” (Knighton, 1886, p. 268). The evolutionists rationalized the Tasmanian situation by concluding that it is merely a fact of nature, “an illustration of that struggle for life which is going on around us now, [and] as it has been ever since man made his appearance upon earth” (Knighton 1886, p. 269). Many Christians and clergy did attempt to help them, some with much success, but their help was far too little too late (Bonwick, 1869, 1870).

The foreign office in London was fully aware that in the British colonies lived a wide variety of native peoples. They were far more worried about governing their vast empire than proving theories of evolution, and ordered the natives to be treated with amity and kindness. Consequently many of the local residents—a large number of which were convicts—and the local British government at least part of the time endeavored to deal with them justly and legally. Nonetheless, the people “. . . soon learned that the best game was raping and disfiguring Tasmanian women and killing and mutilating Tasmanian men. No one censored this practice; children were murdered, men emasculated and women stolen from their tribes” (Shepherd, 1990, p. 3). Although some whites tried to blame the conflicts on the Tasmanians, many of the settlers were convicted felons, and the evidence supports the conclusion that most of the unprovoked violence was from the Europeans (Bonwick, 1870). As Knighton (1886, p. 273) notes,

though, many offenses against the natives “could not be substantiated in the courts for want of witnesses. The only witnesses there were the white men who committed the outrages.”

Although Darwin did not publish his *Origin of Species* until 1859, evolution in various forms was widely believed by biologists and geologists in the early 1800s (Osborn, 1929). Darwin’s own grandfather was one of the first researchers to dig up an aborigine from the grave to stuff and exhibit the stolen body at the Royal College of Surgeons—the first of up to 10,000 desecrated “to try to prove their racial inferiority” and that they were the “missing” link between stone age men and fully evolved whites (Gripper, 1994, p. 32). King-Hele (1963, p. 75) stated, “After 1794, statements of the principle of natural selection and evolution came fairly thick and fast.” These ideas were widely discussed, and influenced thinking about race, especially the place of the so-called “primitive” people in the animal kingdom. Many writers predicted that all the “Blacks of Australia” were “a doomed race, and before many years they will be completely wiped out of the land” (Hatton-Finch, 1885, p. 148). Darwin himself concluded that the extinction of inferior races was the process and source of evolution, which is our creator and must be accepted as inevitable:

Extinction follows chiefly from the competition of tribe with tribe, and race with race. Various checks are always in action, serving to keep down the numbers of each savage tribe,—such as periodical famines, nomadic habits and the consequent deaths of infants, prolonged suckling, wars, accidents, sickness, licentiousness, the stealing of women, infanticide, and especially lessened fertility. If any one of these checks increases in power, even slightly, the tribe thus affected tends to decrease; and when of two adjoining tribes one becomes less numerous and less powerful than the other, the contest is soon settled by war, slaughter, cannibalism, slavery, and absorption. Even when a weaker tribe is not thus abruptly swept away, if it once begins to decrease, it generally goes on decreasing until it becomes extinct. When civilised nations come into contact with barbarians the struggle is short, except where a deadly climate gives its aid to the native race. Of the causes which lead to the victory of civilised nations, some are plain and simple, others complex and obscure. We can see that the cultivation of the land will be fatal in many ways to savages, for they cannot, or will not, change their habits (Darwin, 1896, p. 182).

These attitudes did not help to stem the slaughter against them. Nor did it help stop the following solution to the “Black problem.” After telling of how one person used strychnine to kill a large number of Blacks, Hatton-Finch noted:

As a rule, however, few people are ambitious of indulging in such wholesale slaughter, and, when the Blacks are troublesome, it is generally considered sufficient punishment to go out and shoot one or two. They are easily discouraged in their wild state, especially by anything that they cannot understand (Hatton-Finch, 1885, p. 149-150).

The End of the Tasmanians

In 1830, a mere 30 years after the British originally settled in Tasmania, the last 135 of the original population, estimated from 3,000 to as many as 5,000, were rounded up by George Augustus Robinson and transported to Flinders Island, 30 miles northeast of Tasmania (Jones, 1971). Flinders Island, a land with few trees, no rivers, violent cold winds, frequent rain, and over-run with grass-tree scrub and tea-tree thickets, is directly north of the northeast corner of Tasmania (Fisher, 1968). Robinson had long fought for the interests of natives, learned their language, and was thoroughly convinced that the blame for the native-settler conflicts lay primarily with the settlers (Bonwick, 1870). Although he was paid 300 pounds in advance, and was to be paid 700 total if he ridded Tasmania of the natives, he also likely realized that this was the only chance to save the remaining Tasmanians (Hormann, 1949).

Unfortunately, Robinson proved to be a poor administrator, and the natives also had much difficulty adjusting to their new home. The living conditions on the island were horrible, many were extremely homesick, and disease was rampant. Many of the newly transported persons soon died, as evidently did virtually all infants born on the island. Many felt that they were taken there to die, and by 1869 only three Tasmanians remained alive, William Lanne (or Lanney), a woman "with sparkling features" named Truganini, and one other woman called "Mini." Lanne died on March 5, 1859 of choleric diarrhea at age 34, and the last woman died in 1876. The interest of outsiders in these three persons was, even at this point, not humane, but because of:

... the interests of science to secure a perfect skeleton of a male Tasmanian aboriginal. A female skeleton is now in the Museum, but there is no male, consequently the death of "Billy Lanne" put our surgeons on the alert. The Royal Society, anxious to obtain the skeleton for the Museum, wrote specifically to the Government upon the subject, setting forth at length the reasons why, if possible, the skeleton should be secured to them. The Government at once admitted their right to it, in preference to any other institution, and the Council expressed their willingness at any time to furnish casts, photographs, and all other particulars to any scientific society requiring them ... so valuable a skeleton would not have been permitted to remain in the grave, and possibly no opposition would have been made to its removal, had it been taken by those best entitled to hold it in the interests of the public and of science. ... Besides the Royal Society, it seems that there were others who desired to secure "Billy Lanne's" skeleton, and who were determined to have it. ... The dead-house at the hospital was entered on Friday night, the head was skinned and the skull carried away, and with a view to conceal this proceeding, the head of a patient who had died in the hospital ... was ... placed inside the scalp of the unfortunate native, the face being drawn over so as to have the appearance of completeness. On this mutilation being discovered, the members of the Council of the Royal Society were greatly annoyed, and feel-

ing assured that the object of the party who had taken the skull was afterwards to take the body from the grave, and so possess himself of the perfect skeleton, it was resolved to take off the feet and hands and to lodge them in the Museum ... (Bonwick, 1870, pp. 397-398).

The demand for the bones and other body parts was primarily due to the importance of the Tasmanians in documenting and researching evolution. An example is the Royal College of Surgeons museum listed its Aboriginal skulls as "the most primitive of all existing forms of mankind" (Monaghan, 1991, p. 30). When the last woman died, Diamond noted,

Before Truganini, the last woman, died in 1876, she was terrified of similar post mortem mutilation and asked in vain to be buried at sea. As she had feared, the Royal Society dug up her skeleton and put it on public display in the Tasmanian Museum, where it remained until 1947. In that year the museum finally yielded to complaints of poor taste and transferred Truganini's skeleton to a room where only scientists could view it. ... Finally in 1976—the centenary year of Truganini's death—her skeleton was cremated over the museum's objections, and her ashes were scattered at sea as she had requested. While the Tasmanians were few in number, their extermination was disproportionately influential in Australian history because Tasmania was the first Australian colony to solve its native problem ... by ... getting rid of all its natives (Diamond, 1988, p. 9).

And the extent of the problem of desecrating graves was so widespread in science that,

some of the greatest names in British science were involved in a body-snatching trade of huge proportions. Between 5,000 and 10,000 Aborigines had their graves desecrated, their bodies disinterred and parts dismembered. George Rolleson, of Oxford University's Museum of Anatomy, and Sir Richard Owen and Sir Arthur Keith, of the Royal College of Surgeons, were involved, Charles Darwin is also implicated through letters written in the 1870s and found in a Hobart archive in the mid-1970s (Monaghan, 1991, p. 33).

Were the Tasmanians An Inferior Race?

That the motivation for the slaughter involved race and natural selection aspects of evolution beliefs can not be debated:

By the mid-19th century, the scientific interest in the bones of Australian Aborigines was gaining popularity, as early Evolution theorists sought proof. ... The interest grew to a storm soon after Charles Darwin published his *On the Origin of Species* in 1859. A race began to prove his hypotheses. In *The Descent of Man*, Darwin positioned the Australians as crucial proof of his theories: 'At some future period, not very distant as measured by centuries, the civilised races of man will almost certainly exterminate, and replace, the savage races throughout the world.' Within 20 years, Darwin's prediction was to come true in Tasmania. Darwin himself wrote to one of his associate's museums, asking for pure-blood Tasmanian skulls

if it would not upset the feelings of the remaining natives. There were then only four Tasmanian Aborigines left. Darwin's theories had placed Aborigines as a possible evolutionary link between man and ape. Museum curators from around the world clamoured to obtain skulls. A complete set of racial crania was essential for any study. Australian Aboriginal skulls, particularly the increasingly rare Tasmanians, were much sought after (Monaghan, 1991, p. 34).

In Darwin's words, the varieties of mankind "act on each other in the same way as different species of animals—the stronger always exterminating the weaker" (Darwin, 1965, p. 230).

While there were many claims of the Tasmanians being a primitive race, judging by proximity and overt physical characteristics, they seem to be partly related to the Australian Aborigines (Thorn, 1971). The observation that many of their cultural practices, such as burial traditions were very similar, supports this conclusion (Hiatt, 1969). In a study of prehistoric Australia, Mulvaney (1969) concluded that the Tasmanian racial affiliations still remain speculative. Often mentioned racial affiliations are Negritic, Andamanese, and Murrayian morphology (Birdsell, 1949). That the Tasmanians were not an "inferior race" was evident from the observations of many qualified researchers. In answer to the question "Were the Blacks of Tasmania capable of *true civilization*?" Bonwick answered "Yes, undoubtedly;" and provided as an example,

the case of Walter George Arthur, a Tasmanian aboriginal, whom I knew well, who was captured when a mere infant, and brought up and educated at the Queen's Orphan School (at Hobart Town). His ideas were perfectly English, and there was not the smallest dash of the savage in him. He was a very conversible man, fond of reading, and spoke and wrote English quite grammatically. His spelling was also quite correct. This man had a hundred acres of land, and knew his rights in relation thereto quite as well as you do yours [and he was] . . . creditable to his acuteness, sense of right, and of honourable feelings. . . . (Bonwick, 1870, p. 353)

As late as 1926 respected scientists were still teaching that the Australians were "strongly reminiscent of the species *Neandertalensis*" and that the "former inhabitants of Tasmania [are a] . . . race probably a bit more primitive than Australians" (Wilder, 1926, pp. 341,342).

According to historical research, little evidence exists for the commonly alleged behavioral deviancy and other so-called evidences of biological "primitiveness" of the Aborigines and the Tasmanians in general (Burnham, 1980; Thomas, 1981; Mulvaney, 1969; Lockwood, 1963; Thomas, 1959; Turnbull, 1962; Healy, 1978). It is therefore difficult to conclude from the evidence that a "superior" race of individuals conquered an inferior group. Hughes even claimed that "by the 1870s, Tasmania had more paupers, lunatics, orphans, and invalids than South Australia, and Queensland combined, concentrated in a population less than half of theirs" (Hughes, 1987, p. 593). Admittedly this was true partially because a large number of ex-convicts lived there, but according to Hughes the convict population had the worst jobs, the least capital, the lowest education,

were most prone to fighting, drinking, and were more likely to be both charged and convicted of crimes.

In addition, the social system and the non-convict population did little to help matters: "Australia presented them with much the same social disabilities that had pushed them into crime in Britain," and

the unrelenting, go-getting, land-grabbing, cash-and-gold obsessed materialism of free Australian colonists, acting in a vast geographical space, but a small social one" exacerbated matters (Hughes, 1987, p. 588).

Conditions were such that Hughes expresses surprise that "with such a social ethic . . . the conviction rate was not higher." Indeed, the crime level among the convicts appeared to be rather low compared to the rate found in the general population in the average large American city today.

Hughes (1987) even claims that in the middle 1840s, very few of the criminal convictions in Australia—he estimates six percent—were for crimes committed by the natives. Part of the reason, he concludes, is that the Aborigines were "diligent family-oriented workers with a stake in their community." Bates (1973, p. 64) even believes that the moment the Europeans entered their lives "all native social and sexual taboos were broken" to the major detriment of the native people. They also possessed a rich culture and social system which the Europeans destroyed (Brown, 1988; McGrew, 1987; Goede, 1983). Much of the problem was because the authorities allowed, and even encouraged, violence against the Tasmanians:

They have been shot in the woods, and hunted down as beasts of prey. Their women have been contaminated, and then had their throats cut, or been shot, by the British residents, who . . . call[ed] themselves civilized people. The Government, too, by the common hangman, sacrificed the lives of such of the Aborigines as in retaliation destroyed their wholesale murderers, and the Government, to its shame be it recorded, in no one instance, on no single occasion, ever punished, or threatened to punish, the acknowledged murders of the aboriginal inhabitants (*The Hobart Town Times*, April 1836, quoted in Bonwick, 1870, p. 70).

The extermination of the Tasmanians solved the "native problem by Hitler's final solution." The same end has not befallen the mainland Aborigine population partially because they were far too numerous to exterminate in the same manner as the Tasmanians. The new settlers came close though: Diamond claims that after the arrival of the British colonists in 1788, the Aborigine population declined from 300,000 to a mere 60,000 in 1921. Grattan (1942, p. 40) concluded that the Aborigines, whom he notes that Elkin classifies as the "Australoid race," were utterly different from the other native peoples in this part of the world such as the Polynesians, and were at times "brutally slaughtered as one might slaughter vermin." They were also slaughtered for science; "murdered for the body-parts trade" (Monaghan, 1991, p. 33).

The conclusion of one early evolutionist reveals the attitude toward genocide that the Darwinist belief structure engendered: "the Negro alone, . . . of the

dark races, appears to be able to hold his own in the great struggle for existence, when brought into competition with the white man. We may deplore the fact, but *we cannot alter the laws of nature*" (Knighton, 1886, p. 285, emphasis mine). The inferior races were destined to be wiped out in the great struggle for life that Darwinists then believed created all life. The Aborigines were in the way of the new settlers, not unlike the wild animals. Because they interfered with the new population they were not only not to be empathized with, but must be wiped out for the benefit of the superior race. Anthony Trollope expressed the prevailing nineteenth-century attitude toward Australian Blacks: "it is their fate to be abolished" (1873, p. 75) and as an inferior race they "cannot live on equal terms with the white man" (pp. 68-69). Further, the Aborigines are "infinitely lower in his gifts than the African Negro" (p. 69). When they are killed, one would not report it to the police, Trollope notes, and "no one but a fool would say anything about it" (p. 73). They needed "to go" but they "should perish without unnecessary suffering" (Trollope, 1873, p. 76):

If you ask what sort of race the Blacks of Australia are, nine people out of ten will immediately answer . . . that they are physically and intellectually the most degraded race in the world . . . for the purpose of gauging their physical and intellectual merits, we can only do so by comparing [races] with each other. When compared with those nations of the Old World . . . the Australian Black is, of course, a very low specimen of the human race indeed (Hatton-Finch, 1885, p. 137).

Darwin himself used the Aborigines and the Tasmanian holocaust as prime evidence for his theory of natural selection (Monaghan, 1991; Darwin 1896, p. 182). His words on their demise illustrate an example of the tone of his 1859 work *The Origin of Species By Means of Natural Selection or the Preservation of Favored Races in the Struggle for Life*:

When Tasmania was first colonised the natives were roughly estimated by some at 7000 and by others at 20,000. Their number was soon greatly reduced, chiefly by fighting with the English and with each other. After the famous hunt by all the colonists, when the remaining natives delivered themselves up to the government, they consisted only of 120 individuals, who were in 1832 transported to Flinders Island. This island, situated between Tasmania and Australia, is forty miles long, and from twelve to eighteen miles broad: it seems healthy, and the natives were well treated. Nevertheless, they suffered greatly in health. In 1834 they consisted of forty-seven adult males, forty-eight adult females, and sixteen children, or in all of 111 souls. In 1835 only one hundred were left. As they continued rapidly to decrease, and as they themselves thought that they should not perish so quickly elsewhere, they were removed in 1847 to Oyster Cove in the southern part of Tasmania. They then consisted (Dec. 20, 1847 of fourteen men, twenty-two women and ten children (Darwin, 1896, p. 183-184).

What occurred was not just massive killing and genocide, but according to Dr. Broca:

The English have committed upon the Tasmanian race, and that in the nineteenth century, execrable atrocities a hundred times less excusable than the hitherto unrivaled crimes of which the Spaniards were guilty in the sixteenth century in the Antilles (quoted in Bonwick, 1870, p. 66).

After they were forced from their homeland and moved to Flinders Island, Darwin notes that they could not compete with the more advanced races:

Disease and death still pursued them, and in 1864 one man (who died in 1869), and three elderly women alone survived. . . . With respect to the cause of this extraordinary state of things, Dr. Story remarks that death followed the attempts to civilise the natives. 'If left to themselves to roam as they were wont and undisturbed, they would have reared more children, and there would have been less mortality.' Another careful observer of the natives, Mr. Davis, remarks, 'The births have been few and the deaths numerous. This may have been in a great measure owing to their change of living and food; but more so to their banishment from the mainland of Van Diemen's Land, and consequent depression of spirits' (Darwin, 1896, p. 184).

The Australian Aborigines too were hunted and "slaughtered wholesale," and "the bones from their sacred graves [were] dug up to prove the racist theory of white superiority." The carnage was to the extent that proving "racial inferiority" became a "new export industry" of Australia (Gripper, 1994, p. 32). The motivation was to prove that "the Aborigines were the 'missing link' between Stone Age men and 'fully evolved' whites" (Gripper, 1994, p. 32). In the words of Shepherd:

Ironically, the Tasmanians were more interesting in death than they had ever been in life. Darwin's theory placed this society so low on the evolutionary scale that their lifestyle and, concomitantly, their dead bodies became fascinating to scientists. Their graves were robbed so that physicians and anthropologists could study their anatomy; science was the excuse. The discovery of the remains of Neanderthal man paralleled the discovery of the Tasmanians, societies that were almost equally primitive. The Royal College of Surgeons in London had the largest collection of Tasmanian skeletons, and in what may be the final injustice, this collection was destroyed by a German firebomb during the second World War (Shepherd, 1990, p. 4).

Summary

In the concatenation of social, cultural, religious and other influences, Darwinism played a clear, if not a major role, in the demise of the Tasmanian race. Darwin taught that the "inferior" races would become extinct and these teachings influenced many influential people (Bergman, 1992). Clear evidence existed long ago as to the outcome of evolutionist beliefs if applied to humans. Many Christians of this era were also heavily influenced by Darwinist ideas of inferior races, and some even used Biblical arguments to justify the racial inferiority belief. An example is the conclusion that certain races were "the beasts of the earth" or black skin was a sign

of the curse that God put on Ham and all his descendants as mentioned in Genesis 3:14, 7:21 and 8:17, (Buswell, 1964).

The negative role that Darwin's theory played in this history is clear, and the suffering it has caused has been, and continues to be, enormous. If the British fully believed and acted consistently on the belief that all humans were children of Adam, and were all brothers and sisters, the Tasmanian holocaust would likely never have occurred. Never would the "long series of cruelties and misfortunes" that befell these people have happened (Bonwick, 1870, p. 56).

References

- Bates, Daisy. 1973. The passing of the Aborigines: A lifetime spent among the natives of Australia. Pocket Books, New York.
- Bergman, Jerry. 1992. Eugenics and the development of Nazi race policy. *Perspectives on Science and Christian Faith* 44(2):109-123.
- Birdsell, J. B. 1949. The racial origin of the extinct Tasmanians. *Records of the Queen Victoria Museum* 2:223-231.
- Bonwick, James. 1869. The last of the Tasmanians. Samson Low, Son and Marston. London.
- _____. 1870. Daily life and origin of the Tasmanians; or the black war of Van Diemen's land. Samson Low, Son and Marston. London.
- Brown, D. 1988. Review of "Pride against prejudice-reminders of a Tasmanian Aborigine" by I. West. *Journal of the Polynesian Society* 97(2):225-226.
- Burnham, John C. 1980. Psychotic delusions as a key to historical cultures: Tasmania, 1830-1940. *Journal of Social History* 13(3): 368-383.
- Buswell, James O. 1964. Slavery, segregation and scripture. William B. Eerdmans. Grand Rapids.
- Castelain, Anne Marie. 1988. In search of the Australian continent: the Baudin expedition [1801-1804]. *Cahiers de Sociologie Economique et Culturelle, Ethnopsychologie* 9:9-36.
- Darwin, Charles. 1859. The origin of species by means of natural selection or the preservation of favored races in the struggle for life. D. Appleton. New York (1897 ed.).
- _____. 1896. Descent of man and selection in relation to sex. D. Appleton. New York, pp. 226-236.
- _____. 1965. Journey across the blue mountains to Bathurst in January, 1836. In Mackaness, G., Fourteen journeys over the Blue Mountains of New South Wales 1813-1841. Horwitz-Grahame, London.
- Diamond, Jared. 1988. In black and white: How have ordinary people, so often throughout human history, brought themselves to commit genocide? *Natural History* 97(10):8-14.
- _____. 1993. Ten-thousand years of solitude. *Discover* 14(3):49-57.
- Fisher, John. 1968. The Australians; from 1788 to modern times. Taplinger. New York.
- Garanger, J. 1985. The Baudin expedition and the Tasmanian Aborigines 1802 by N. J. B. Plomley. *Anthropologie* 89(3):434-435.
- Goede, A. and R. S. Harmon. 1983. Radiometric dating of Tasmanian speleothems—evidence of cave evolution and climatic change. *Journal of the Geological Society of Australia* 30(12):89-100.
- Grattan, C. Hartley. 1942. Introducing Australia. The John Day Company. New York.
- Gripper, Ali. 1994. Blacks slain for science's white superiority theory. *The Daily Telegraph Mirror*. Sydney, Australia. p. 32.
- Haeckel, Ernst. 1905. The wonders of life. Harper. New York.
- Hatton-Finch, Harold. 1885. Advance Australia! An account of eight years work, wandering and amusement in Queensland, New South Wales and Victoria. W. H. Allen. London.
- Haydon, Tom. 1980. The last Tasmanian. CRM-McGraw Hill Films, Part I; Ancestors, Part II, Extinction. Del Mar, CA.
- Healy, J. J. 1978. Literature and the Aborigine in Australia 1770-1975. St. Martin's Press. New York.
- Hiatt, Betty. 1969. Cremation in Aboriginal Australia. *Mankind* 7(2):104-119.
- Hormann, B. L. 1949. Extinction and survival: a study of the reaction of Aboriginal populations to European expansion. Ph.D. Thesis, University of Chicago.
- Hughes, Robert. 1987. The fatal Shore; the epic of Australia's founding. Alfred A. Knopf. New York.
- Jones, Rhys. 1971. The demography of the hunters and farmers in Tasmania. In Mulvaney, D. J. and J. Golson (Editors). Aboriginal man and environment in Australia. Australian National Press. Canberra. pp. 271-287.
- King-Hele, Desmond. 1963. Erasmus Darwin; grandfather of Charles Darwin. Charles Scribner's Sons. New York.
- Knighton, William. 1886. Struggles for life. Williams and Norgate. London.
- Laseron, Charles Francis. 1972. The face of Australia; the shaping of a continent. (J. N. Jennings, Ed), Angus and Robertson, Sydney, Australia.
- Lockwood, Douglas. 1963. We, The Aborigines. Greenwood Press, Publishers. Westport, CT.
- McGrew, W. C. 1987. Tools to get food—the subsistence of Tasmanian Aborigines and Tanzanian chimpanzees compared. *Journal of Anthropological Research* 43(3):247-258.
- Monaghan, David. 1991. The body-snatchers. *The Bulletin*. Sydney. Australia. 113(5795):33-38.
- Mulvaney, D. J. 1969. Ancient peoples and places; the prehistory of Australia. Vol. 65 in the Series, Daniel, Glyn (Editor). Thames and Hudson. London.
- Mulvaney, D. J. and J. Golson (Editors). 1971. Aboriginal man and environment in Australia. Australian National Press. Canberra.
- Osborn, Henry Fairfield. 1929. From the Greeks to Darwin: The development of the evolution idea through twenty-four centuries. Charles Scribner's Sons. New York.
- Plomley, N. J. B. 1983. The Baudin Expedition and the Tasmanian Aborigines, Tasmania: 1802. Blubber Head Press. Hobart.
- Shepherd, Ann. 1990. The last Tasmanian. Instructors guide for the CRM/McGraw-Hill Film. Del Mar, CA.
- Thomas, Elizabeth Marshall. 1959. The harmless people. Alfred A. Knopf. New York.
- Thomas, Nicholas. 1981. Social theory, ecology and epistemology; theoretical issues in Australian prehistory. *Mankind* 13(2):165-177.
- Thorn, A. G. 1971. The racial affinities and origins of the Australian Aborigines. In Mulvaney, D. J. and J. Golson (Editors). Aboriginal man and environment in Australia. Australian National Press. Canberra. pp. 316-325.
- Turnbull, Colin M. 1962. The forest people. Simon and Schuster. New York.
- Wilder, Harris Hawthorne. 1926. The pedigree of the human race. Henry Holt. New York.

LETTERS TO THE EDITOR

Assessment of World Views: Creation, Progressive Creation, and Theistic Evolution

At the heart of the creation/evolution debate is the starting point of one's world view. After the foundational premise is assumed, the interpretation of the data of the sciences, the arts, the humanities and human history follows logically. Therefore, we must examine these foundational assumptions and assess their truth content.

There are three common *a priori* assumptions that form the foundation for the respective world views. These are as follows:

1. Creation — **"In the beginning** God created the heavens and the earth".
The creation week, which was seven rotations of the earth in duration, was **at the beginning** of the history of the universe, which has existed for at least 300,000 weeks.
2. Progressive Creation and Theistic Evolution — **"Throughout history** God created the heavens and the earth."

These two views (PC and TE) differ primarily in the details of God's involvement in creation. The fundamental idea is that God has been creating by either fiat or evolution throughout the history of the universe. The creation of the earth was finished with the creation of mankind some tens of thousands of years ago. This means that God has created the heavens and the earth **throughout 99.9998% of natural history** (from their long ages view) not at the beginning. *These views change the first prepositional phrase in the Bible to mean what it does not say.* Their foundational premise is false.

3. Evolution—**"The cosmos is all** there is or ever was or ever will be."

This presupposition confines all reality to the physical universe. Anything that is immaterial is defined as being unreal. Thus the spiritual realities such as God, the true nature of man (made in God's image), purpose, design and significance are defined as being unreal or illusory, and one is locked into a naturalistic, mechanistic universe. This is the antithesis of the creationist's fundamental premise. **It denies the truth of Genesis 1:1.**

After a person accepts one of these three fundamental premises, the conclusions that he reaches about the world, man, and his place in the universe will flow logically. The problem is not in the data or in our being logical. **The problem is the truth content of the foundational premise.** If I accept the evolutionist's premise, I will agree in principle with him and argue only about the mechanisms of evolution. If I accept the PC and TE's premise, I will agree with one of them, depending on my feelings regarding how involved God has been over the billions of years. However, I accept the Biblical presupposition in Genesis 1:1 at face value. That leads me to accept the rest of the chapter at face value, and conclude (in contrast to the others) that the Intelligent Creator, Who created language, is a good communicator. In discussing these issues with the PC and TE advocates, we need to encourage them to examine their understanding of the word "beginning" in Genesis 1. When the fallacious content of the first prepositional phrase of their foundational presupposition is shown, there is hope for helping them.

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Response to Reed, Bennett, Froede, and Oard

We appreciate the interest of Reed et al. in creationist geologic modeling. Although no specific criticisms or suggestions for our catastrophic plate tectonics model were given in their letter, we remain happy to deal with any substantive critiques of our theory at such time as they are presented.

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Landslide Blocks Virgin River at Zion National Park—Consequences

The Catastrophic Event

My wife and I visited Zion National Park on 25 April 1995. Stopping at the Visitor Center, we found that we could not proceed along the Zion Canyon Scenic Drive to Zion Lodge, Temple of Sinawava and other points of interest. The disaster that necessitated the road closing was explained in a sign recently placed in the Visitor Center.

April 12, 1995, 8:55PM, approximately 200,000 cubic yards of earth and rock slumps and dams the Virgin River. The Virgin River, swollen with snowmelt, begins to build up behind the new dam. In a few hours the raging water had dug a new channel around the slide and a 200 yard section of the road is carried away with it.

The hydrograph of the water flow during the episode, which was kindly copied for me by a park ranger, is shown in Figure 1. Rivers that are blocked by various natural circumstances generally will erode a new channel very quickly. For instance, the Duna River was blocked by an ice jam in 1901 and carved a new channel in a short period of time (Williams, 1990).

Applications and Interpretations from a Different Viewpoint

Another park ranger told me that landslides are quite common in Zion National Park. The geological formations in the park are reputed to be millions of years old (the rocks in the park are dated as Jurassic and Triassic).^{*} Assuming *only* a million years or so of erosional activity, why has not the landscape reached some type of "equilibrium" so that landslides would be rare occurrences? A young-earth creationist would suggest that the geologic formations have only been in place for thousands of years and have not as yet reached a "stable situation" where the occurrence of landslides would be highly improbable. Are the sedimentary rocks in this beautiful park really quite young?

^{*}An account of the development of the formations in Zion National Park from a uniformitarian perspective can be found in Hamilton (1984). The book is well-written and beautifully illustrated.

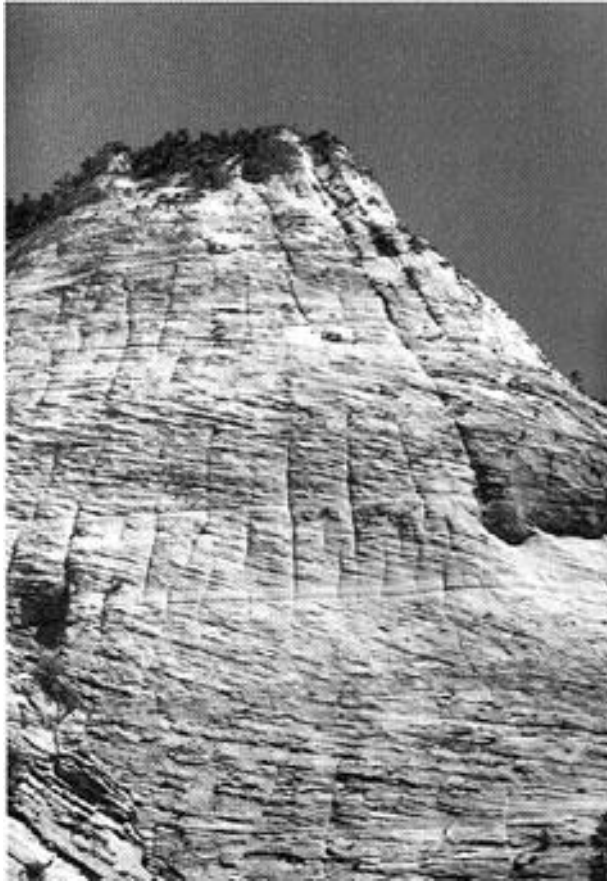


Figure 4. Checkerboard Mesa in Zion National Park; the cross-stratification is in Navajo Sandstone. The almost horizontal set of grooves are considered to be cross sets of windblown sand. The almost vertical set of grooves are thought to be formed on shallow fractures caused by expansion and contraction of the surface rock (Hamilton, 1984, p. 104). Was this cross-bedding caused by water rather than dune action? If the mesa formed as a dune, did it develop during a post-Flood drying period under the influence of strong winds? The geologic features in the park need to be studied from a creationist perspective.

_____. 1993. Comments on the breached dam theory for the formation of the Grand Canyon. *CRSQ* 30:39-46.

Williams, E. L. 1990. Rapid erosion. *CRSQ* 27:96.

_____. 1993. Catastrophism—dam breaching in the Rocky Mountains. *CRSQ* 30:86-89.

_____. J. R. Meyer and G. W. Wolfrom. 1991. Erosion of the Grand Canyon of the Colorado River: Part I—review of antecedent river hypothesis and the postulation of large quantities of rapidly flowing water as the primary agent of erosion. *CRSQ* 28:92-98.

_____. 1992a. Erosion of the Grand Canyon of the Colorado River: Part II—review of river capture, piping and ancestral river hypothesis and the possible formation of vast lakes. *CRSQ* 29:138-145.

_____. 1992b. Erosion of the Grand Canyon of the Colorado River: Part III—review of the possible formation of basins and lakes on Colorado Plateau and different climatic conditions in the past. *CRSQ* 29:18-24.

Williams, E. L., E. F. Chaffin, R. L. Goette and J. R. Meyer. 1994. Pine Creek Gorge, The Grand Canyon of Pennsylvania: An introductory creationist study. *CRSQ* 31:44-59.

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Heat Output from Volcanoes— An Answer to Yake

Here is some further response to Yake's questions. It is when we get to the matter of the effects of the heat released from volcanoes that I believe Yake has really gotten HIMSELF in "hot water."

1. He says that the number of volcanoes reported by "many creationists" is between 1500 and 2000. I would be mighty curious as to some citations here. I have read much of creationist literature and have never read ONE estimate of the number of volcanoes.

2. Yake states the number of calories released by the volcanoes would be 3.65×10^{27} . It is not clear if this is for 1500 or 2000 volcanoes, but since the number of volcanoes is only known to one significant figure, the energy released can only be stated to one significant figure. I assume that he used 2000 volcanoes to calculate his energy figure. This means that he is claiming that the average energy release from one volcano is 2×10^{24} calories, a figure with which I disagree.

3. The radius of the earth is 2.5×10^8 in. This gives an earth surface area of 8×10^{17} in². At sea level, the atmospheric pressure of 14.7 psi means the total weight of the atmosphere is something less than $14.7 \times 8 \times 10^{17} = 1.2 \times 10^{19}$ lbs. Converting to grams, this gives an atmospheric weight of 5.3×10^{21} g (actually less). Then taking his figure of 2×10^{24} cal/volcano, are we to deduce that if today a volcano erupts into the AIR, it will dissipate an average of $2 \times 10^{24} / 5.3 \times 10^{21} = 375$ cal/g of air? Since the specific heat of air is about 24 cal/g, this would mean that a single volcano erupting above ground today would raise the temperature of the entire atmosphere of earth by $375 / .24 = 1526^\circ \text{K}$! I submit that his figure for the energy output of a volcano is too large by a factor of AT LEAST 1000.

4. This being the case, the rise in ocean temperature Yake postulates would drop to something less than 2.7 degrees—obviously a far different story.*

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*Editorial Comment

Phil Hoff's letter is validated by an article on volcanoes in the 1995 edition of Van Nostrand's Scientific Encyclopedia. According to this article, Mt. St. Helens released 1.7×10^{18} joules of energy over a nine hour period. Yake's 3.65 octillion calories, if produce by 2000 volcanoes, is equivalent to 1.8×10^{24} calories per volcano. Since one calorie is 4.185 joules, this equals 7.6×10^{24} joules, a factor of four million bigger than Mt. St. Helens.

The Karroo and Other Fossil Graveyards: A Further Reply to Mr. Yake

Yake Comment:

The Karroo Formation, in Africa, is estimated to contain the remains of 800 billion vertebrate animals or 21 vertebrate animals per acre (average size being that of a fox). It has been estimated that the Karroo Formation houses about one percent of the vertebrate fossils on earth, which would suggest that there would have been 2,100 vertebrate animals per acre living on the earth. However, many scientists argue that the earth could not have housed this dense an animal population. Yake (1995)

The Karroo is like many other fossilized bone beds (i.e., fossil graveyards) which have been reported across the earth. These graveyards span most of the stratigraphic column, starting with the Cambrian (e.g., Burgess shale, Field, Canada) and ending with the Pleistocene mammoth bone graveyards in Siberia. No modern uniformitarian scientist assumes that these graveyards represent the original environmental density but they are instead regarded as the result of mass burial in which creatures died and were subsequently brought in and buried either rapidly or "over time."

I suggest that many of these creatures in the Karroo were dead animals which were concentrated into a limited area after death and were subsequently buried. Thus the Karroo is much like other fossil graveyards around the earth at places like Dinosaur National Monument, Utah and the Bone Valley Member, of central Florida.

Most of the uniformitarian burial scenarios for such beds invoke a fluvial or marine setting in which an "event" such as a storm, a volcanic eruption, a landslide, or a rise in a local river flow rate served to concentrate and bury the creatures found at specific sites. Without such concentrating action, the formations would be expected to contain massive fossil bone deposits across their entire lateral expression and there would be no need to go to specific areas to dig for fossil bones because they would be everywhere.

Because of the evolutionary aspect of the geologic stratigraphic timescale, these bone beds contain creatures which were assumed to have been buried at vastly "different" times. However, young earth creationists propose that the one "event" which killed and buried the creatures was the global Flood. I propose that physical processes generated as a result of the Flood could serve to have killed and buried the creatures in various ways: some were buried in their original environment (i.e., in-situ), others were buried individually but apart from the original environment, and many were "concentrated" into floating masses, much like the "log mat" model proposed by Austin (1979; 1991).

I also propose a "bloat-and-float" vertebrate model by which masses of these dead creatures would have been buried as a result of their sinking to the bottom or eventually becoming grounded on the shallow shore. These creatures were then buried under rapidly accumulating sediments due to Flood water withdrawal coupled with tectonic uplift. Additional sediments for burial would have been provided by volcanoclastics. The creatures were eventually buried below the water scouring energy level and later they became fossilized. This could easily explain the "assortment" of vertebrate fossils found in many of the bone beds and their disarticulation such that the bones of the various animals are found mixed together. Any paleoenvironmental reconstruction of a fossil graveyard or bone bed would hinge on determining whether it represented in-situ or bloat-and-float burial. A very detailed study would be required to determine the "original" environment.

The Karroo Formation Was A Graveyard

The Karroo System contains rocks dated by uniformitarians as being from the Upper Carboniferous to Upper Triassic (Woodford, 1965, p. 228). The Karroo System is commonly divided into four units based on

lithologic content (Woodford, 1965, p. 349). It thickens southward toward the southern tip of Africa. The Beaufort series sandstones, approximately 9000 feet thick in the southern area of extent, contain the greatest concentrations of vertebrate bones (Woodford, 1965, p. 352). Vertebrate fossils found in the Beaufort series include: *Cynognathus*, *Procolophon*, *Lystrorhynchus*, *Cistecephalus*, *Endothiodon* and *Tapinocephalus* (Woodford, 1965, p. 342) which were largely swamp dwelling reptiles. The Beaufort series lies between shales mixed with coal layers. Underneath the Beaufort are the Dwyka series and Ecca series. Above it are volcanic deposits known as the Stormberg series, and more specifically the Drakensburg lavas (Woodford, 1965, p. 342). The Drakensburg Volcanics reflect tremendous volcanic activity with the emplacement of up to 330,000 square miles of basic igneous intrusive rocks (Dunbar and Waage, 1969, p. 332).

Next, the Karroo Dolerites cap the volcanic sequence and coincide with the extrusion of other dolerites found worldwide such as the Ferrar of Antarctica, the Sao Bento of South America, and the Rajmahal of India (Seyfert and Sirkin, 1979, p. 115). All of the volcanic activity associated with the dolerites resulted in the regional uplift of the area, including the Karroo Basin (Gregory, 1955, p. 606).

A Creationist Interpretation Of The Karroo

These vertebrate reptiles were buried in the sandy shallows of the Karroo Basin which had been recently created as a result of tectonic uplift to the north. Clastics eroded from the newly exposed highlands served to bury the mass of creatures stranded in the Karroo Basin as the Flood waters receded toward the south. Following burial, the groundwater created conditions where silica was dissolved from the individual sand grains and precipitate in the pore spaces forming the sandstone which composes the Beaufort series today. Subsequent volcanic eruptions uplifted the region and added additional sediments to the Basin.

This is just one possible way in which creationists could interpret the stratigraphic record found at the Karroo Basin. Site-specific field work should support further interpretations. This scenario provides an example of how the Karroo Formation bone beds could have formed rapidly within the framework of the global Flood model. Woodmorappe (1986, p. 209; 1993) also addresses questions relating to animal density in the Karroo and his work should be consulted for additional information.

The author wishes to express thanks to Dr. George F. Howe for suggesting comment on Mr. Yake's letter and for his editorial comments and to James C. Meredith for editing he did on this letter also.

References

- CRSQ—*Creation Research Society Quarterly*.
 Austin, S. A. 1979. Depositional environment of the Kentucky No. 12 coal bed (middle Pennsylvanian) of Western Kentucky, with special reference to the origin of coal lithotypes. Pennsylvania State University, unpublished Ph.D. dissertation.
 ———. 1991. Floating logs and log deposits of Spirit Lake, Mount St. Helens Volcano National Monument, Washington. Geological Society of America, Abstracts with Programs. Volume 23.
 Dunbar, C. O. and K. M. Waage. 1969. Historical geology. Third edition. John Wiley. New York.

- Gregory, J. T. 1955. Vertebrates in the geologic time scale. In Polderwaard, A. (editor) *Crust of the Earth*. Geological Society of America Special Paper No. 62. New York. pp. 593-608.
- Seyfert, C. K. and L. A. Sirkin. 1979. *Earth history and plate tectonics: An introduction to historical geology*. Second edition. Harper and Row. New York.
- Woodford, A. O. 1965. *Historical geology*. W. H. Freeman. San Francisco.
- Woodmorappe, J. 1986. The Antediluvian biosphere and its capability of supplying the entire fossil record. *Proceedings of the First International Conference on Creationism*. Volume II. Creation Science Fellowship. Pittsburgh, PA. pp. 205-218.
- _____. 1993. *Studies in Flood geology*. Institute for Creation Research. El Cajon, CA.
- Yake, B. 1995. Objections from science to Global Flood. *CRSQ* 32:12.

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Are There 800 Billion Vertebrate Fossils Buried in The Karoo? (A Response to Bill Yake)

I would like to respond to Mr. Yake's letter in the June 1995 issue of the *CRSQ*. Mr. Yake asks about the Karoo Supergroup (*not* Karroo* Formation) deposits in [South] Africa. He states that it has been estimated that the Karoo contains some 800 billion vertebrate fossils. Morris and Whitcomb (1961, p. 160) attribute this estimate to Robert Broom via a second reference; Kitching (1977, p. 6) stated "Broom (1932) gave some astronomical figure for the number of fossil vertebrates that might be preserved in the whole of the Beaufort series" [of the Karoo].

Unfortunately he did not say in which citation from 1932 Broom made his estimate (I have cited the one with the most general topic). So Robert Broom in 1932 estimated that 800 billion fossil vertebrates might be preserved in the Beaufort group of the Karoo Supergroup. How does one substantiate that kind of number? How does one estimate how many fossils are buried in a rock unit? In a block of one degree latitude by one degree longitude containing the town of Graaff-Reinet there are 75 fossil vertebrate sites; the same site block containing the town of Kroonstad has only five sites (Kitching, 1977). Each site represents at least one fossil, and often more than one. How does one take this data systematically so that a realistic estimate can be made? While I have yet to see how Broom made his estimate, intuition tells me that in his excitement about the Karoo fossils, he overestimated the number of specimens that could still be buried in the Karoo rocks. I asked the director of the Bernard Price Institute for Paleontology in Johannesburg how many Karoo fossils have actually been collected; he broadly estimated around 40,000. While this estimate may be conservative, it is certainly not an order of magnitude wrong. Obviously, there are still more fossils buried in the Karoo (I have seen quite a few *in situ*, and many fossils are left behind for school field trips**). The question is how does one estimate how many fossils are still buried?

One must also keep in mind how fossils are formed and preserved. In order for the Karoo vertebrates to be preserved as fossils, they must have been buried almost immediately after death. Otherwise, if they just lay around on the ground or float in the water, scaven-

gers, bacteria, and natural oxidation processes decompose the remains until nothing is left of the animal. In order to bury and preserve the large amount of vertebrate animals which have been found in the Karoo, evolutionists must continually invoke local floods. On the other hand, the Genesis Flood provides a large-scale mechanism in which all these vertebrate animals could be rapidly buried and thus preserved.

Ken Ham asks the question in his talks 'Are fossils found where the animal lived, where it died, or where it was buried?' Only the last statement can be stated empirically. Since evolutionists do not believe in a world-wide flood, they assume the first two statements to be true also. However, fossil graveyards tend to be areas where a large number of animals are catastrophically funnelled into an area from other areas and rapidly buried. The Genesis Flood offers a large-scale mechanism in which to do this for the Karoo Basin.

References

- Broom, R. 1932. The mammal-like reptiles of South Africa and the origin of mammals. H.F. and G. Witherby. London. (cited from Kitching, 1977).
- Ham, K. How to give a creation talk (audio tape). Creation Science Foundation, Brisbane (date of recording unknown).
- Kitching, J.W. 1977. The distribution of the Karroo vertebrate fauna. *Memoir No. 1*, Bernard Price Institute for Paleontological Research. University of the Witwatersrand. Johannesburg. South African Committee for Stratigraphy (SACS).
- _____. 1980. *Stratigraphy of South Africa*. Part I (Comp. L.E. Kent), Lithostratigraphy of the Republic of South Africa, South West-Africa/Namibia, and the Republics of Bophuthatswana, Transkei, and Venda. Handbook 8, Geological Survey South Africa.
- Whitcomb, J.C., and Morris, H.M., 1961. *The Genesis Flood*. The Presbyterian and Reformed Publishing Company. Philadelphia.
- Gordon E. Davison
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*The proper spelling is 'Karoo,' not 'Karroo,' as defined by SACS in 1980 (p. 536). Where older publications use 'Karroo' in the title, the older spelling is retained (the original spelling was 'Karoo').

**Some specimens, such as *Lystrosaurus*, have been "overcollected"; the National Museum in Bloemfontein alone reportedly has 4000 *Lystrosaurus* specimens. A paleontologist I know has left several *Lystrosaurus* fossils *in situ* on a Karoo farm for school field trips, so the kids can "discover" them. I heard a humorous anecdote recently about James Kitching, the famous Karoo fossil hunter, who although retired, still comes to work every day and does field work. He was in the field with a younger paleontologist early this year; while they were walking, the younger paleontologist noticed that Kitching had stepped over a *Lystrosaurus* fossil protruding out of the ground. Thinking that the old man was starting to lose his touch, the younger paleontologist said "Hey, you just stepped over a *Lystrosaurus*!" Kitching replied "I don't bend over for *Lystrosaurus* any more" without missing a step. Even in his seventies, he still leaves the "youngsters" in the dust of his wake!

TAKE STOCK IN THE
LABORATORY FUND.

See Page 215.

DOUGHERTY GAP: EVIDENCE FOR A TURBIDITY CURRENT PALEOENVIRONMENT

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Abstract

A trace fossil exposure located at Dougherty Gap, Walker County, Georgia, provides an excellent opportunity to evaluate existing physical information, and compare a uniformitarian interpretation and a young-earth Flood interpretation for that site. This examination reveals that a turbidity current depositional environment better explains the stratigraphic record found at this site than does the proposed uniformitarian prograding delta model. Additionally, a turbidity current depositional environment fits within both the expected depositional environment and the timeframes of the young earth Flood model.

Introduction

Any attempt to reconstruct paleoenvironmental settings will reflect the model (i.e., uniformitarian or young-earth Flood) on which it is based. Because significant dissimilarities exist between these two models, most of the paradigms used to construct and interpret them will be different (e.g., concept of time, depositional rates, water depth, energy levels, etc.). So while creation scientists have access to much uniformitarian geological information, we must sift through it to determine its relevancy to our own model (i.e., "science" versus "interpretation"). In many cases this may leave us with only the physical information for the site under investigation. Such is the case for this paper. A glossary is included at the end of this article to aid the reader in understanding some of the geologic terminology.

This article addresses what we view as evidence for turbidity current emplacement of alternating sandstones and shales found at an outcrop located at Dougherty Gap in Walker County in northwest Georgia (Figure 1). Additionally, the authors believe that the stratigraphic record presented at this outcrop supports the deposition and bioturbation of these sediments within a much shorter timeframe than is currently recognized by Uniformitarians. This paper will only attempt to present evidence in support of a turbidity current depositional environment specifically for this exposure. Readers who wish to review the uniformitarian prograding delta model for this outcrop are referred to Sheehan (1988).

The turbidity current depositional environment suggested by the writers for this site is presently not recognized by uniformitarian geologists because their current model requires a coastal swamp paleoenvironment to explain the occurrence of coal layers found in adjacent overlying strata. However, as young-earth catastrophists we are required to interpret and defend the sedimentary and stratigraphic record within the framework of the young-earth Flood model. This interpretation is best explained by using changing energy levels, evidenced through physical and biogenic features found in sediments, which were deposited over what we interpret as short periods of time (i.e., the Lower to Middle Flood Event Timeframe—see Froede 1995a).

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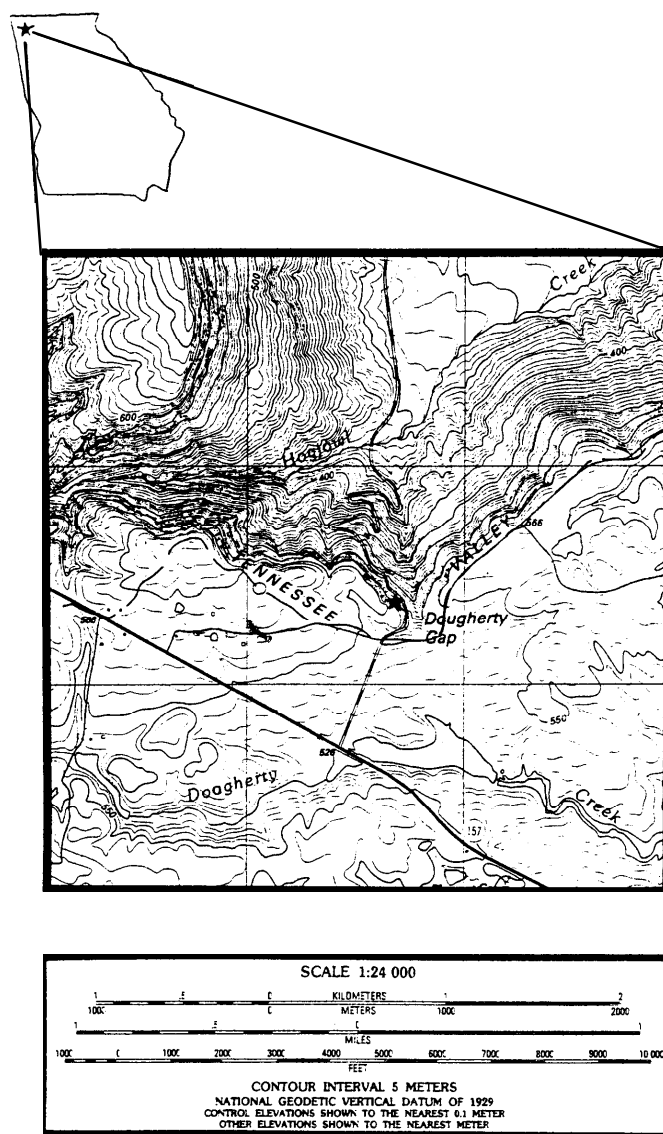


Figure 1. State of Georgia with U.S. Geological Survey (1983) topographic map showing elevation and features of the Dougherty Gap location. The site is located on the west side of West Cove Road, north of Georgia State Highway 157.

Appalachian Depositional Environments

While turbidity current generated strata are recognized within the Appalachian stratigraphic section, these deposits are believed by Uniformitarians to only occur in the lower sections of the Paleozoic (McIver, 1970, pp. 69-81). This is due to the paleoenvironmental restrictions of Walther's law of facies succession and the restrictions imposed by the Carboniferous System on the interpretation of the southern Appalachians stratigraphic sequence.

Current uniformitarian interpretation for most, if not all, of the Appalachian upper Paleozoic stratigraphic sequence is based on a prograding delta model originally proposed by Joseph Barrell in 1908 (McBride 1973). The prograding delta model was proposed due to the presence of coal deposits interbedded in what Uniformitarians postulated as cyclical marine assemblages. This model proposes the autochthonous (i.e., in situ) formation of coal from peat swamps. These swamps are postulated as having been located along epeiric seaways, which with changing sea-levels due to glacial activity, resulted in the cyclical drowning of the swamps and the concomitant deposition of clays, silts, and sands (see Froede 1995b, 1995c). This limited framework for the Carboniferous paleoenvironment resulted in the recognition of many anomalous sites which required explanation not always directly supported with the physical data. We suggest that the current depositional model paradigm for the Carboniferous System should be reexamined to determine if it still "fits" with new data generated as a consequence of sequence, event, and/or dynamic stratigraphy. This examination could result in the formulation of new models which could lead to the eventual change in the depositional model paradigm for the Carboniferous System. However, we acknowledge that this is a complicated task, in terms of removing an old paradigm even with direct evidence to the contrary, and will probably take years to perform (see Lightman and Gingerich, 1991; Kuhn, 1970).

The uniformitarian acceptance of the Appalachian prograding delta model is based on a general concept in geology called Walther's law of facies succession, which states that a vertical sequence of facies will be the product of a series of depositional environments which lay laterally adjacent to each other (Allaby and Allaby, 1969, p. 398; Boggs, 1987, pp. 532-533). Walther's law forces a shallow marine to coastal deltaic plain environment for much of the Appalachian upper Paleozoic geologic vertical section. This is due to the facies succession required when coal deposits are present, because coal is viewed by Uniformitarians as occurring in a coastal setting, while the surrounding clays, shales, and sands are viewed as occurring in a nearshore marine setting. Work performed by Austin (1979, 1991) on coal formation; and Julien, Lan, and Berthault (1993) using sand tank experimentation, now seriously question the validity of Walther's law. Additionally, we suggest that their work seriously challenges the current uniformitarian environmental interpretation for the Appalachian vertical stratigraphic column.

Today any attempt to identify the original depositional environmental setting for the Appalachian upper Paleozoic sequence is confined to locating where, within the prograding delta model, the sediments were de-

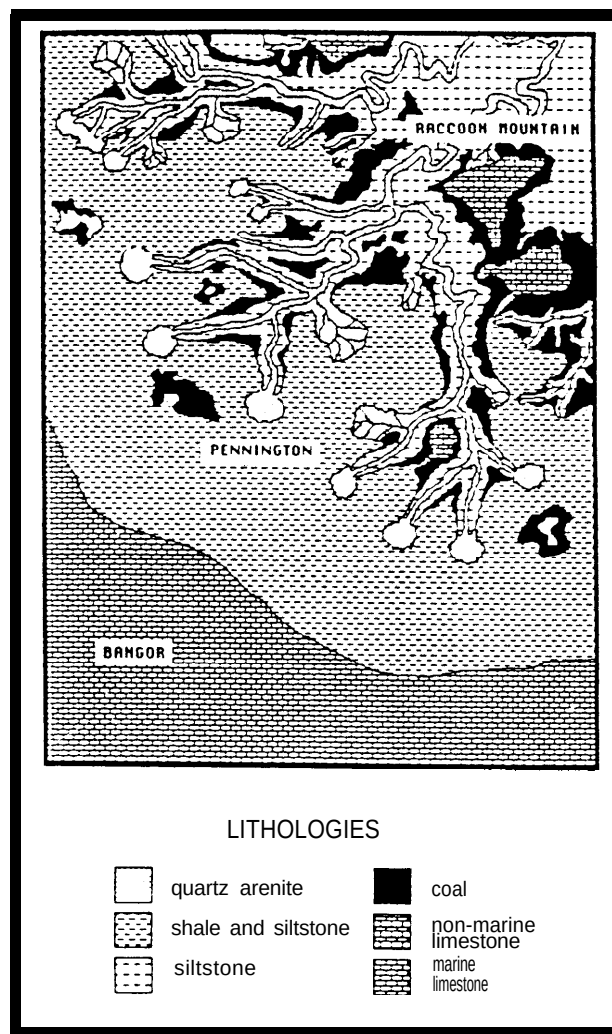


Figure 2a. Prograding delta model used to explain the Southern Appalachian stratigraphic section—Figure 39 (Sheehan, 1988, p. 144). This model is proposed based on the uniformitarian model for coal formation.

posited (e.g., channels, levees, overflow areas, etc.) [Walls, 1975; Humphreys and Friedman, 1975; Horowitz, 1966; Friedman and Johnson, 1966; Bergenback, Wilson, and Rich, 1980; Woodrow and Sevon, 1985; Greb and Chesnut, 1994]. Trace fossils are viewed as providing supporting evidence to the prograding delta model (Gibson and Gastaldo, 1989; Miller and Knox, 1985; Knox and Miller, 1985; Rindsberg, 1991). However, serious questions remain regarding the original location of the prograding delta and its source area (Allen and Friend, 1968; McBride, 1973, p. 113; Miller and Knox, 1985, pp. 77-79; Mack, 1982).

Past Investigations at the Dougherty Gap Exposure

The most intensive study performed at this locale was a Masters thesis investigation conducted by M. A. Sheehan (1988). His investigation focused primarily on the trace fossils preserved in the sediments and what they imply about the original depositional environment. [Background information about trace fossils, i.e., ichnology, within the framework of the young-earth Flood

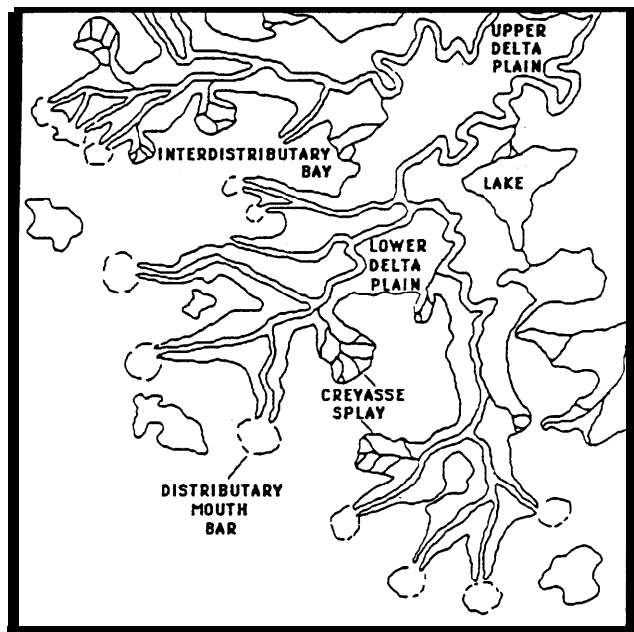


Figure 2b. The proposed location and conditions under which Sheehan (1988) views this specific outcrop—Figure 40 (Sheehan, 1988, p. 148). Sheehan proposed the crevasse splay as providing the original environment for that seen today in outcrop.

model, can be found in Cowart and Froede, 1994]. Sheehan (1988, p. 143) viewed the depositional setting as having been originally a deltaic environment (Figures 2a, and 2b). He envisioned that crevasse splays formed as river channels breached their levees and spilled over into the interdistributary bays, depositing their sedimentary load of sands, silts, and clays (Sheehan, 1988, pp. 152-153) [Figure 2c]. The original source of sediments and the location of the prograding delta were not addressed in Sheehan's investigation.

Interdistributary Bay Depositional Environment

In order to determine if Sheehan's postulated interdistributary bay depositional environment with multiple crevasse splay "events" is correct, we must briefly examine this type of depositional environment.

Coleman and Gagliano (1965, p. 146) describe the modern interdistributary bay environment of the Mississippi River as:

... areas of open water within the active delta which may be completely surrounded by marsh or distributary levees, but which more often are partially open to the sea or connected to it by tidal channels. Bays with some coarse detritus contain a very distinctive group of minor structures. The most abundant single structure is the lenticular lamination, a product of reworking and concentration of the coarse fraction by waves. The horizontal extent of each lens varies, but is generally less than 3 cm (1.18 inches). The lateral continuity of the parallel laminations was not ascertained, but it is believed that they are persistent and probably originated during times of high flooding of the Mississippi. Current ripple marks and scour and fill structures are present in some cores and indicate that currents were occasionally active during depo-

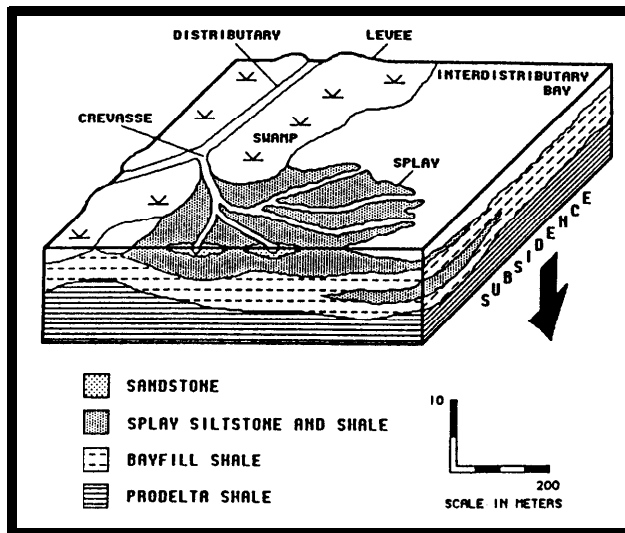


Figure 2c. This is a more detailed figure of the proposed depositional environment—Sheehan's Figure 41 (Sheehan, 1988, p. 153). This environment is required using the uniformitarian model due to the near-by coal deposits found in overlying rocks. This is the depositional environment suggested as being reflected by trace fossils and sediments.

sition. These structures are formed by tidal currents and overflow during floods. Burrows and shell remains attest to the profusion of brackish and marine molluscan fauna. Bays generally enlarge by wave action at the expense of adjacent marsh areas, hence reworked plant remains are often incorporated in bay sediments. [Parentheses ours]

It has been shown that the interdistributary bay depositional environment has physical evidence which reflects its specific type of environmental setting (Archer and Maples, 1984; Coleman and Prior, 1980; Elliot, 1974; Coleman, Gagliano, and Webb, 1964; Prothero, 1990). Some of the physical evidence includes nodular siderite in the shale layers, which reflect the brackish water or fluctuating salinity in sediments of moderately low pH and oxygen content, and a coarsening-upward thickening upward sandstone sequence (Archer and Maples, 1984, pp. 458-459; Coleman and Prior, 1980, p. 58).

According to Coleman and Prior (1980, p. 53), the crevasse splay sequence of sediments can form, adjacent to the river channel, in 100 to 150 years. Regarding the crevasse-splay facies, Osborne, Leverett, and Thomas (1991, p. 60) state:

Crevasse-splay facies are characterized by a coarsening upward sequence of very fine- to medium-grained sandstone, siltstone, and mudstone. The top of the sequence locally shows root penetrations and contains abundant fossil plant debris, suggesting marsh development on the splay.

Some features found at the Dougherty Gap exposure have similarities to those of the modern interdistributary bay environment and crevasse splay facies (e.g., current ripples, scour and fill structures, and burrows). However, many more differences exist (e.g., lack of lenticular lamination, graded bedding, brackish and marine molluscan fauna, root traces, or the reworked plant remains preserved as siderite, pyrite, carbon

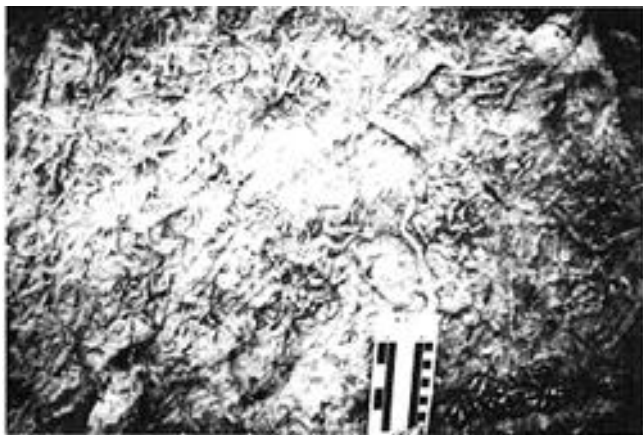


Figure 3. Photograph showing trace makers sole markings cast in sandstone (i.e., convex hypichnia) which we suggest reflect a *pre-vent trace fossil association* (see text). Top layers of the semi-lithified clays were eroded away as the turbidity current passed across it. Sands subsequently filled the traces, resulting in sole casts along the bottom of each sandstone layer.

films, or coal lenses). Now we must ask the question, how much evidence is necessary to support a specific depositional setting and could another depositional setting better explain the physical evidences present at this site?

The Dougherty Gap outcrop will be examined to determine what depositional environment best correlates with the physical evidence of the outcrop, and compare our suggested depositional environment with what is currently proposed.

Trace Fossil Interpretation At Dougherty Gap

Sheehan (1988) suggests that following a crevasse splay event, trace makers would bioturbate those newly deposited sandy sediments in search of organic matter. Primary trace maker activity, which is believed to account for the traces found at this site, is believed to be the result of the search for food (*fodinichnia*) [Sheehan, 1988, p. 166]. However, the traces used by Sheehan (1988, pp. 38-142) to support the deltaic environmental setting are ambiguous in that they do not reflect any specific environment; rather, they only reflect a specific behavior (i.e., feeding). Goldring (1993, p. 403) has accurately stated that deltaic, estuarine, and lagoonal paleoenvironments have not been defined into any particular ichnofacies scheme.

Trace fossils at the Dougherty Gap site consist of sandstone casts primarily of convex hypichnia with less common convex epichnia (Sheehan, 1988, p. 31; see Cowart and Froede 1994, for a discussion of these terms) [Figures 3, 4, and 5]. These same trace fossils are also recognized in turbidity current depositional environments (see Seilacher, 1962, 1978, 1984; Kern, 1980; Wetzell and Aigner, 1986; Bromley, 1990; Einsele, 1991, pp. 322-326; 1992, pp. 214-231).

The trace fossils exposed at the Dougherty Gap site occur in several ichnofacies which range from shallow to deep water depositional environments. However, the authors suggest that based on the ichnogenera found at the site, the sediments of the Pennington Formation could have been deposited on the distal sections of a deep sea fan (i.e., outer fan to basin plain) or on the



Figure 4. Photograph showing a difference in trace maker size between the layers of sandstone. Note the base of an upper sandstone layer contains traces produced from a larger trace maker (perhaps due to greater oxygenation or shallower water depth). Sandstone units above this layer return to the smaller trace makers found beneath this layer.



Figure 5. Closeup of the larger trace maker sole casts.

outermost edges of the then existing continental shelf (see Lemon, 1990, p. 379; Normark, 1978, pp. 927-928; Walker, 1978, pp. 946-947; Reading, 1978, p. 403; Prothero, 1990, p. 114) [Figure 6]. This paleoenvironment would support the tracemaker behavior represented in these sediments.

Sedimentology

Our investigations of the individual sandstone layers have not revealed any differences in their texture or grain size. All the sandstone layers appear to be mineralogically and texturally alike. The sandstone thickness varies from unit to unit. However, no lenticular shapes or changes in thickness in the individual sandstone layers were observed. We noted approximately 40 to 45 sandstone layers, varying from less than 0.5 inches to approximately nine feet in thickness, exposed across the 300-foot long outcrop (Figure 7). Sheehan (1988, p. 21) describes the multiple sandstone layers as:

. . . gray-brown, well sorted, very-fine-grained quartz arenites. They exhibit few internal sedi-

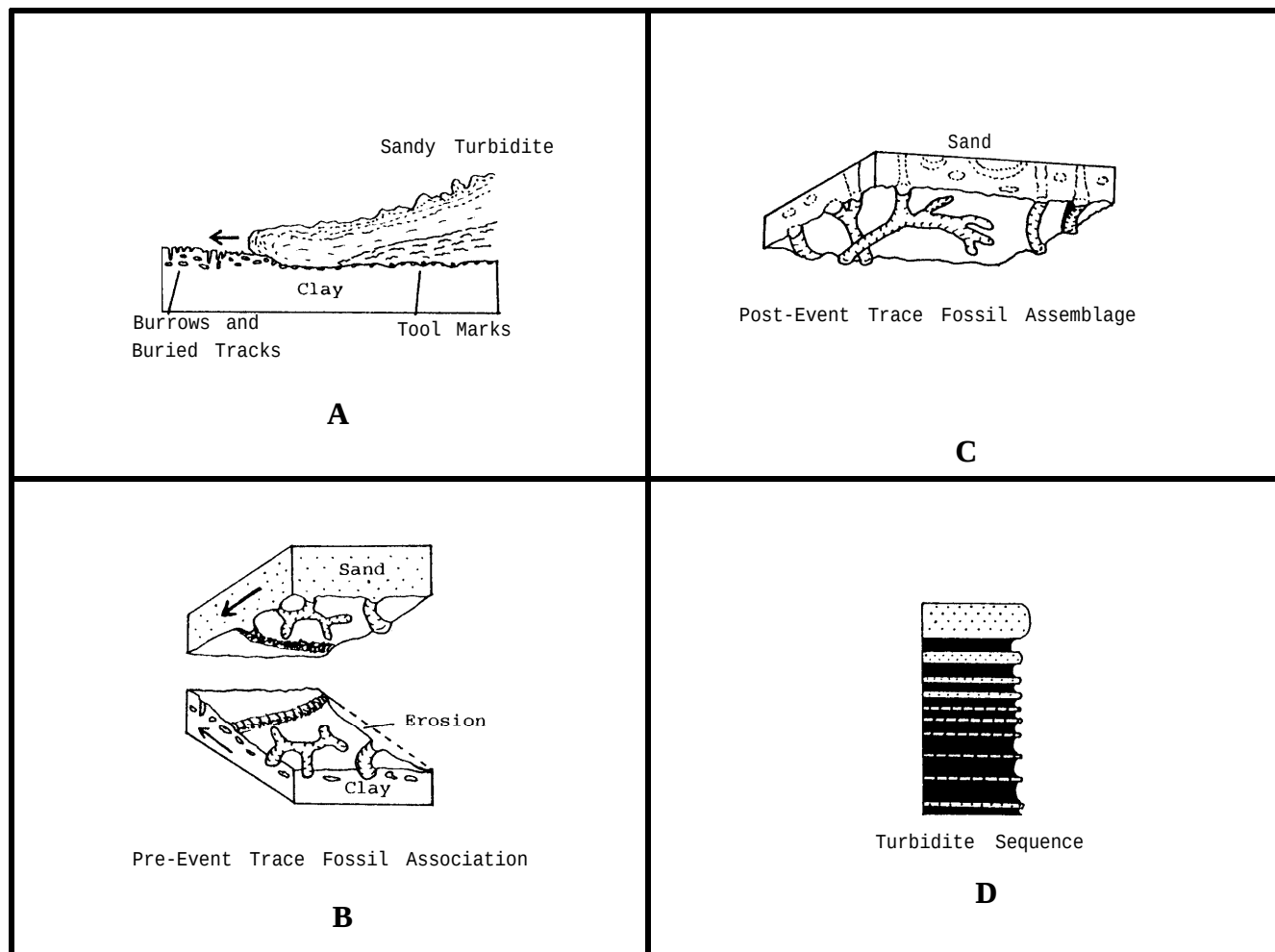


Figure 6. a) Sandy turbidity current as it rapidly passes over a semi-lithified bioturbated clay layer. It serves to remove the upper clay layer and then fill the burrows, trackways, and tool marks with sand. Note Sheehan (1988, p. 26) recognized the occurrence of toolmarks as sole casts. This results in sole cast of the previous pre-event trace fossil association. b) A two-part drawing showing the direction of original sand turbidity current along with the eroded upper clay surface and the resulting sole cast in the bottom of the sand. This is the *pre-event trace fossil association*. c) This is Sheehan's suggested bioturbation model to account for the bioturbation of the sand as sole casts. This is based on the occurrence of traces in the sandstone expressed as sole casts (1988, p. 24, Figure 7—displayed upside down). However, no vertical lined burrows were noted in any of the 40 plus sandstone layers examined at the outcrop. Additionally, most if not all of the ripple marks on the upper surfaces of each sandstone layer would have been removed if this were the actual depositional environment, due to bioturbation. d) This is the classic upward thickening depositional sequence exhibited by turbidity currents (Walker, 1978, pp. 946-948). Figures 6a, 6b, and 6c redrawn and modified from Einsele, 1992, p. 216, Figures 5.15b-f. Figure 6d is redrawn from Lemon, 1990, p. 379.

mentary structures; the most common intrastratal structures are small, variably distinct shale lamina and discontinuous, planar erosion surfaces that are concordant to bedding.

Our examination of the sandstone units revealed no evidence of cross-bedding, internal bedding planes, or any physical sedimentary features. In contrast, Sheehan (1988, pp. 21-28) noted indistinct bedding features and some indication of bedding.



Figure 7. Photograph of the outcrop as it is exposed along West Cove Road. Note the massive nine-foot thick sandstone layer which caps the site and provides the last occurrence of sandstone sole casts of trace fossils. We counted over 40 layers of sandstone which extended across the 300 feet of the outcrop. Each sandstone layer exhibits some degree of sole casts (bottom) and ripple marks (top). Scale is six inch units. Note the "thickening upward" nature of the sandstone units. This is indicative of a nearing sand source in a turbidity current setting (see Walker, 1992, pp. 245-247).

It is interesting to note that no obvious evidence of bioturbation is present in these sand layers as they are exposed across the 300 feet of outcrop. If Sheehan's



Figure 8. Photograph of the outcrop showing the thin sandstone layers. If bioturbation of the sandstone did occur as Sheehan (1988) has suggested, then the sandstones should have been obliterated by bioturbation, especially the thin layers. However, if the sands were deposited in turbidity currents with the clays serving as the trace maker substrate, then the sandstones would serve as sole casts and would reflect the bioturbated nature of the clays. With eventual sedimentary loading and tectonic input, the clays would be compressed into the shale layers seen today, and all that would remain as evidence for trace maker activity would be preserved as sole casts along the bottoms of the sandstone layers. The sandstone trace maker cast is what is found along the bottom of even the thinnest sandstone layers.

model is correct and these sands were deposited as a result of a crevasse splay, then sufficient time (i.e., tens to hundreds to thousands of years) should have existed between "events" (i.e., breaks in the river channel levees) to permit bioturbation of the sand units by existing flora or fauna, especially the thin units (measured at less than one inch in thickness). Additionally, the time between crevasse splay events should have resulted in the obliteration of the distinct sand/clay bedding contacts (Kuenen, 1967, pp. 230-231). However, even the thinnest sandstone units fail to show any obvious signs of bioturbation, blurring of bedding contacts, or internal bedding features. Rather they appear as homogenized small-grained sandstones (Figure 8).

Kuenen (1967) documented the differences in sand textures between interdistributary bay deposits and turbidite deposits. Using his work as a reference the sandstone units found at Dougherty Gap best cor-

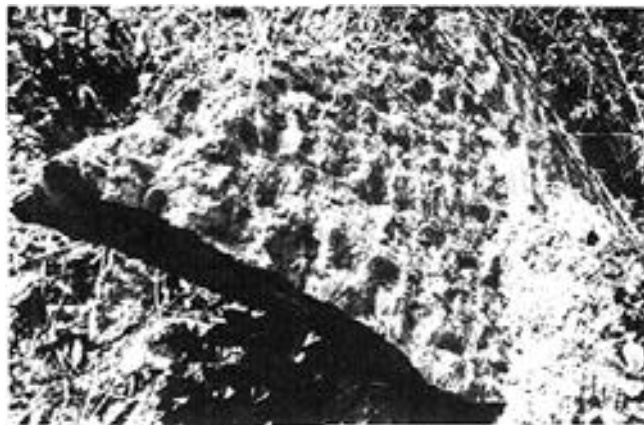


Figure 9. A photograph showing the "asymmetric, linguoid ripples" described by Sheehan (1988). If bioturbation of the sandstone did occur as is proposed then most if not all of these ripples should have been obliterated following the deposition of the sands. The intervening timeframe between "events" should have provided the trace makers the opportunity to completely bioturbate not only the sands but the underlying clays, too. These ripple marks are found on the tops of every sandstone layer exposed at this site, including the thinnest sandstone layers. These bi-directional current ripples are associated with turbidite deposits which have been modified by contour currents. Sheehan fails to supply the evidence necessary to support his "bioturbation of each sand layer." The fact that current ripples and sole casts are found in each sandstone layer for the 300 feet of outcrop exposed reinforces the turbidity current depositional environment.

relate to turbidite emplacement based on both lithology and bioturbation (Kuenen, 1967, pp. 230-231). Coleman and Prior (1980, pp. 52 and 59; 1981, p. 151) present photographs of cores taken from a modern interdistributary bay which in no way resemble the stratigraphy or sedimentation found exposed at the Dougherty Gap site.

Additional evidence for turbidity current deposition versus a river crevasse splay is found in the "thickening-upward succession" of sandstone layers at the outcrop. This type of stratigraphic sequence (i.e., sandstone layers which thicken moving up in section) is a common characteristic of a turbidite deposit (i.e., Bouma cycle), and is believed to reflect the progradation of submarine fan lobes (Walker, 1992, pp. 245-247; Walker and Mutti, 1973) [Figures 6d, 7, and 8]. The senior author noted the same physical features (i.e., alternating sandstone and shale layers with tool marks, trace fossils preserved as sole casts, and a progressive thickening of sandstone layers moving up the sequence) in the lower Red Mountain Formation at the Ringgold Gap, a formation recognized by Uniformitarians as a turbidite deposit (see Rindsberg and Chowns, 1986, p. 161). Enos (1969) also presents an interesting study of flysch (i.e., turbidity current) deposits, in the Northeastern United States, which directly correspond to what is observed at Dougherty Gap. We find it interesting that both Ringgold and Dougherty Gap contain a significant number of similar features, but are interpreted by uniformitarians in two different depositional settings, all based on the nearby presence of coal layers at one of those locales. Such are the requirements of Walther's law.

The same types of homogenized sandstone deposits found at Dougherty Gap have been reported in sandstone layers recognized as resulting from turbidite de-

posits (see Shepard, 1951; Kuenen, 1967; Einsele, 1992; Seilacher, 1962; Kuenen and Menard (1952) have suggested that sand-rich turbidity deposits can form non-graded units as a result of either excellent sorting during deposition or as a result of a submarine slide without turbidity flow. Enos (1969, p. 697-701) observed numerous sand layers in flysch deposits which failed to provide any indication of graded bedding. Shepard (1951, p. 58) documented sharp upper and lower contacts between turbidite sand layers and the overlying and underlying clay layers. Additionally, Shepard (1951, p. 58) found that turbidite deposited sands were well sorted units. He stated:

Good sorting is particularly significant because the sands are found in an environment where, unless deposition is very **fast**, one would expect silt and clay to be contributed as the result of flood waters sweeping out over the sea as suspension clouds of low salinity or as the product of offshore wind transport . . . [emphasis ours]

The thickness of the individual sandstone layers in turbidity current deposits is estimated to be a function of the location of the deposit within the deep-sea fan or along the continental shelf edge (i.e., proximal versus distal; see Walker, 1967). The closer the deposit was to the source, the thicker the sandstone unit and the coarser the grain size. However, while the sandstone units at Dougherty Gap increase in thickness (moving up section) they do not exhibit any increase in grain size from bottom to top or across the 300 feet of exposure.

The intervening shale layers show no indication of any original bedding layers (Figures 7 and 8). Rather, due to their compression they now have parting surfaces which do not correlate to any lithologic variation. Sheehan (1988, p. 25) describes the shale layers between the sandstone units as:

Dark-gray carbonaceous clayshales having fissile to platy parting . . . intercalated with sandstones as even, laterally continuous strata.

Contacts between the sandstone and shale layers are sharp and show no evidence of gradation. This suggests an "event" type or emplacement for each sand layer. Sheehan (1988, p. 26) comments:

These surfaces demarcate distinct breaks between adjacent lithologies, even where the soles are intensely burrowed.

In an attempt to explain why the boundaries are so sharp Sheehan (1988, p. 26) states:

In recognition of their abrupt character, the gently undulose to flat soles of the sandstones are interpreted to have been deposited upon erosional surfaces. This interpretation is further evidenced by scour-and-fill structures and long, straight toolmarks which infrequently punctuate these otherwise completely burrowed horizons.

The reader will note that the tops of the shale units are interpreted by Sheehan (1988) [and we agree] as being both bioturbated and having an erosional surface. How this surface developed is an important difference in the depositional interpretation as we further discuss the physical features of this site.

Stratigraphy

Stratigraphically the alternating sandstone and shale units are placed within the upper portion of the Pennington Formation which is dated to the uniformitarian Mississippian Period (Sheehan, 1988, pp. 9-10). Fossil evidence to support the age of the Pennington Formation is sparse (Sheehan, 1988, p. 12). Approximately 45 feet above the section under investigation lies the Mississippian-Pennsylvanian boundary, which is identified as the contact between the Pennington Formation and the Raccoon Mountain Formation (Crawford, 1989). According to Sheehan (1988, p. 13):

. . . the Pennington-Raccoon Mountain contact is much more difficult to establish and has long been the subject of much disagreement among geologists.

As previously stated, it is generally believed by uniformitarian geologists that the Mississippian to Pennsylvanian Period transition represents an environmental change from a nearshore marine to a terrestrial swamp setting. Again, according to Sheehan (1988, p. 15):

As a result of this shift in depositional regimes, the Pennington and Raccoon Mountain formations share a predominantly conformable and entirely gradational contact that exhibits various lithofacies.

With the previous statements by Sheehan in mind, we are now supposed to accept that the strata above our study site exhibits a seemingly continuous change, and that change is purported, by uniformitarians, to reflect the progradation of deltaic deposits over shallow water marine deposits (again based on Walther's law as a result of the coal deposits).

While we do not disagree with the lithologic or ichnologic descriptions provided by Sheehan, the paleoenvironmental setting and its requiring millions of years to create the stratigraphic column is clearly not acceptable within the young-earth Flood model.

The appearance of a prograding delta paleoenvironment can be explained from a young-earth catastrophic viewpoint if the timeframe for its formation were shortened. For example, the original sediment source area was probably the rapidly rising Appalachian Mountains to the immediate east. This major mountain building event is suggested by the authors as having occurred during the Flood event (possibly Lower Flood Event Timeframe). The appearance of a prograding delta paleoenvironment is easily explained as the remnants of ecological communities that were buried along with masses of vegetation which were washed off of the original Antediluvian (i.e., Pangaeon) supercontinent. These deposits were buried immediately adjacent to the uplifted Appalachians in what was then a continental shelf setting due to the onset of the Flood. Hence the sediments, fossils and coal deposits do not reflect any "age" rather, they reflect rapid burial associated with the Flood.

Systematic Ichnology

Sheehan's (1988) work provides the systematic ichnology of the Dougherty Gap exposure and will not be duplicated here. However, we do wish to note that the trace makers identified by Sheehan do not in any way solely suggest a deltaic setting. Rather, Sheehan's (1988, p. 160) environmental setting (i.e., *Cruziana* ichnofa-

cies) is based on his own interpretation of the original environment. Most if not all of the same trace makers identified by Sheehan at the Dougherty Gap exposure are also identified as occurring at other depths in the marine environment, including those of deep water (i.e., *Cruziana*, *Zoophycos*, and *Nereites* ichnofacies).

For example, Jordan (1985) identifies several traces in black shales in east-central Kentucky which are the same as those found at Dougherty Gap. One of his photographic plates shows a *Planolites* trace (his Figure 5a) which is identical to traces found at Dougherty Gap, with the only difference being the casting material (Jordan, 1985, pp. 284-285). Jordan (1985, p. 285) suggests the original environmental setting for his *Planolites* trace as being from the middle to outer shelf (*Cruziana* and *Zoophycos* ichnofacies).

This raises the issue of the usefulness of trace fossils as paleo-depth indicators. Originally it was thought that they could provide this type of information (Seilacher, 1964, 1967). However, subsequent studies have found this to be untrue (see Frey, 1971, pp. 110-112, and 1975, p. 18; Bromley, 1990, p. 216; Ekdale, 1988; Goldring, 1993; Frey, Pemberton, and Saunders, 1990; Wetzel, 1991, p. 61; Bottjer and Droser, 1992; Bishop and Brannen, 1993, p. 23). So we must consider with caution any attempt to determine paleo-depth from trace fossils without supporting evidence.

Sheehan (1988, pp. 38-142) identified 11 different ichnogenera and various ichnospecies. The large variety seen at this exposure, along with the lack of any lamination within the shale or sandstone, indicates a high level of biogenic activity within the clay layers, perhaps in a short period of time.

Bioturbation in the sandstone layers permits the investigator to determine whether the original traces were created before or after the sandstone was deposited. Sheehan's (1988, p. 24), Figure 7 (displayed upside down) presents what he interprets as evidence of trace maker activity in one sandstone unit measuring 2.5 inches (1 cm) thick. His figure is a freshly cut cross-section of sandstone which exhibits burrows as sole casts (i.e., hypichnia). This is the only way which trace fossils were ever observed at the outcrop by either Sheehan (1988, p. 6) or the authors. We never observed, nor did Sheehan document, the occurrence of lined burrows within any of the sandstone units.

Trace Makers in the Turbidity Current Environment

As previously mentioned, Sheehan (1988, p. 31) describes the preservational sandstone casts of trace makers found at the Dougherty Gap site as being primarily of convex hypichnia with less common convex epichnia. This type of preservation has also been recognized as occurring in the distal portions of deep-sea fans as a result of turbidity currents (see Einsele, 1992, pp. 216-218; Seilacher, 1962).

In a turbidity current environmental setting, any traces found within the **sand layers** would be identified as being a *post-event trace fossil assemblage* (Figure 6c) which developed on and in the sandy substrate following its deposition (Einsele, 1992, pp. 216-218; Seilacher, 1962, pp. 229-232).

We suggest that many of the sandstone layers exhibit sole casts which are best explained as *pre-event trace fossil associations* (Figure 6b). According to Einsele

(1992, pp. 216-218) and Seilacher (1962, p. 232) these traces are physically modified when turbidity currents eroded the top of the bioturbated clay layer and subsequently filled the remainder of the burrows with sand. This created "lebensspuren on the sole of the sand bed." This preservational method (i.e., sole casting) is recognized as a common method of trace fossil preservation in a turbidity current depositional environment Bromley, 1975, pp. 403-404; Roniewicz and Pienkowski, 1977, p. 279; Potter and Pettijohn, 1977, pp. 156-157; Einsele and Seilacher, 1991, p. 379). This same type of turbidity current sole casting is recognized in the Mount Messenger Formation deposits of New Zealand (Jordan, Schultz, and Cherng, 1994, p. 159; King, Browne, and Slatt, 1994, p. 180). The size of the pre-event trace fossil makers is believed to reflect the dissolved oxygen levels found within the substrate (Leszczynski, 1991). Hakes (1985, p. 28) suggests that trace maker size could also vary with depth, due to "environmental stresses."

While Sheehan (1988, p. 26) recognizes the evidence of scour-and-fill structures along with the erosional surface of the original clay, he suggests that the sand, and not the clay, was the bioturbated substrate (1988, p. 173):

... this sequence (alternating shales and sandstones) exhibits a complete restriction of ichnofossils to arenaceous (sand) beds and lenses. Because these structures represent autochthonous records of animal activity, it can be surmised that biotic conditions were associated with sand deposition. In contrast, both the dark-gray shales within and immediately below the study interval appear to have been deposited under abiotic conditions. The conspicuous absence of both trace and body fossils from these shales, therefore, suggests that metazoans were incapable of accommodating the environmental conditions associated with clay deposition. [parentheses ours]

As previously mentioned, support for his position is based on a polished section of sandstone which exhibits trace-bearing sole casts (Sheehan, 1988, p. 24, Figure 7—displayed upside down). While it is acknowledged that some of these traces could have formed following the deposition of the sand layer, we suggest that these traces would only represent an attempt made by a *post-event trace fossil assemblage* to recolonize a freshly deposited sand layer. It does not prove that the sand was the dominant substrate and that the clay layers were anoxic as has been suggested by Sheehan (1988, p. 151). We view the sandstone sole casts as trace fossil structures which resulted due to scour-and-fill turbidite deposition associated with pre-event trace fossil associations (Figures 3, 4, 5, and 6b). These sole casts were originally tracks and burrows made in the clay substrate (not sand as Sheehan has reported) which were partially eroded and filled with sand, thus forming sandstone sole casts.

In support of the turbidity current model, the writers found evidence of sole casts along the bottom of the thinnest layers of sandstone (Figure 8). These layers were barely thick enough to surround the diameter of the trace makers and this does not lend support to the position that the sands served as the substrate of choice,

as Sheehan (1988, p. 173) has suggested. These thin sole casts are better explained as being a pre-event trace fossil association. Additionally, current ripple marks exist along the tops of these thin sandstone layers. These marks should have been destroyed due to bioturbation if Sheehan's (1988, p. 173) sand layers were the substrate of choice. According to Peres (1993), these same bi-directional ripple marks are recognized in thin, very fine, well sorted sandstones of turbidites from the Campos Basin, in Brazil. He suggests that these bi-directional ripple marks are turbidite deposits reworked by contour currents (Peres, 1993, p. 82; see also Carminatti and Scarton, 1991, p. 244; Shanmugam, Spalding, and Rofheart, 1993; Stanley, 1993).

Support for our interpretation can also be found in the lack of any escape structures in the sand layers. Howard (1975, p. 135) states:

If bed thickness is less than 30 cm (11.8 inches) or so, the sequence of rapid sedimentation may be less obvious because of organisms that reestablish themselves in the bed following deposition, or move upward from below; given sufficient time, **these completely destroy the original physical structures . . .** [emphasis and parentheses ours]

If these sand layers represent crevasse splay deposits then why are there no escape structures present? Most of the lower sandstone and clay layers do not exceed the 11.8 inches suggested as representing the maximum escape structure distance. The authors found no evidence of escape structures at this outcrop and Sheehan (1988) does not discuss their occurrence at this site. The lack of escape structures is expected if the sand sole casts represent a pre-event trace fossil association in either a turbidity current or crevasse splay setting.

The creation of the sole casts is suggested by the authors as representing sandy turbidites which were deposited in pulses on distal portions of what might have been a deep-sea fan, or on the outer sections of a continental shelf (Figure 6a). Peres (1993) has proposed a shelf-fed turbidite system model which appears to satisfy many of the depositional features observed at this outcrop. As these sand-bearing turbidites moved across the soft clays they destroyed the uppermost bioturbated clay layers, filling the remaining traces with sand. The weight of the sands in combination with subsequent additional elastic overburden further served to compact the clay into a shale. This compaction resulted in the destruction of the traces within the original clay layer which were not filled with sand. This mechanism is suggested by the type of preservation found at Dougherty Gap and is consistent with that proposed by Einsele (1991 and 1992) and Seilacher (1962) for turbidite sand deposition. Again this is counter to that suggested by Sheehan (1988 pp. 172-174).

Another problem we observe with Sheehan's interpretation is presented in the uppermost sandstone layers found at this exposure. These sandstone layers also exhibit sole casts and are capped by what Sheehan (1988, pp. 26-27, Figure 8) identifies as "asymmetric linguoid ripples" If bioturbation of the sand were occurring with the intensity suggested by the underlying sole casts, then there should be much more evidence both within and along the tops of the sandstone units (e.g., lined tubes in the sandstone, bioturbated

sand and clay zones along the contacts, elimination of the bi-directional current rippled sandstone tops, etc.). Instead what we find are current ripples on top of the sandstone layers and intense bioturbation as sole casts. Additionally, the topmost sandstone unit (measured at approximately nine feet in thickness) has sole casts at its base and no obvious evidences of bedding or bioturbation. To create these sole casts along the base of this nine foot thick sandstone unit would require that trace makers burrowed through (up to) nine feet of sand until reaching its base. However, we have not observed any evidence of bioturbation or bedding features in the entire nine feet of sand, and would suggest its emplacement via a turbidity current with the sole casts of trace makers reflecting a pre-event trace fossil association.

Shallow Water Versus Deep Water

This point is one of "interpretation." The physical evidence presented at this outcrop tends to better "fit" turbidity current deposition in a distal (deep water?) setting. Uniformitarians are limited in their paleoenvironmental analysis because their model is restricted by the occurrence of coal deposits. If this is a crevasse splay depositional environment then the sediments and trace makers should reflect that fact. According to Hasiotis and Bown (1992, p. 86) the crevasse splay complex contains:

. . . overprinted ichnofaunal populations of hydrophylic (high water table) an terraphylic (low water table) organisms. When the crevasse splay is deposited, it is completely saturated with water. Initial infaunal components are those that are fully aquatic and semi-aquatic in behavior like crawling traces, and horizontal and shallow u-shaped burrows of mud-loving beetles, insect larvae, and aquatic worms. Following infiltration and evaporation of the standing water, much lower sediment moisture allows organisms such as annelids, beetles, and other insects (e.g., in the Eocene Willwood Formation) to construct *Edaphichnium* and quasi vertical burrows, respectively, in mud-rich and sand-rich crevasse splay deposits, signifying a low water table.

This type of trace maker activity should be preserved as a *post-event trace fossil assemblage* within each of the sandstone layers. However, evidence to support this interpretation is not found in the sandstone layers. The reported occurrence of trace-bearing sandstone represented by hypicnial sole casts (Sheehan, 1988, p. 24, Figure 7—displayed upside down) fails to provide the expected evidences of bioturbation necessary to satisfy the crevasse splay depositional model (e.g., lined burrows, mixed sand/clay contacts, bioturbated sand and clay units, etc.).

The upper surfaces of all of the sandstone layers, no matter how thick or thin, were found to contain "asymmetric, linguoid ripples" (Sheehan, 1988, pp. 26-27) [Figure 9]. According to Sheehan (1988, p. 26):

. . . these structures formed in response to unidirectional currents which occurred either contemporaneously (at the same time) or penecontemporaneously (immediately following with sediment deposition. [parentheses ours])

We fail to see Sheehan's logic in explaining these features associated with the long stasis—short term events associated with a crevasse splay depositional environment. If Sheehan (1988, p. 173) is correct in assuming that the sands were the original substrate of bioturbation, then bioturbation associated with feeding activity should have served to destroy any evidence of the original current ripple marks seen along the upper surfaces of the sandstones (see Kuenen, 1967).

However, if the sands were deposited on the distal portions of a deep-sea fan or continental shelf via turbidity currents, then the trace makers would be preserved as sole casts, and the upper surfaces of the sand layers would reflect the currents which served to deposit and shape them. These underwater currents are reflected on the upper surfaces of each sandstone layer at the Dougherty Gap site as ripple marks (see Walker, 1973, p. 29). These bi-directional current ripples have previously been suggested as reflecting both the original turbidity current depositional direction and subsequent reworking by contour currents (see Lovell and Stow, 1981). We suggest that additional clays were then flocculated and deposited (see Kuenen, 1965, pp. 59-60; Olphen, 1963, pp. 45-50) above the sand layers and subsequently bioturbated. These clays contained the organic material and substrate in which the trace makers developed. The sands themselves may not have contained enough organic material to attract sediment ingesting organisms away from the richer clays. Therefore, the trace makers would **NOT** have penetrated downward through the current-rippled tops of the previously deposited sands en masse, and would not have served to destroy the "asymmetric, linguoid ripples." This is why each sandstone layer retains its bi-directional rippled top surface, and the trace maker activity record remains preserved in the form of sole casts on the bottoms of each sandstone layer. This would also explain the lack of escape structures following each sand layer depositional event.

Salt Water Versus Fresh Water Environment

One key to understanding the environment of deposition at the Dougherty Gap site is to distinguish between fresh water and salt water environments, and their respective traces. In a fresh water environment burrows are usually not lined with clay or other materials (See Chamberlain, 1975; Hasiotis and Bown, 1992). However, in a brackish or marine environment lined burrows are often found. All investigators of this site agree that this was a marginal marine to marine setting. Therefore, lined burrows should be found at Dougherty Gap. They are not found in any lithology here.

Sheehan (1988, p. 173) states that the sandstone units were the substrate of choice for the trace-making animals at this site. If this were true then some evidence of lined burrows should be present in and throughout the sandstone units. Again, they are not found in the uniformitarian's most likely location. In fact, if sand was the substrate of choice for the tracemakers, at the very least there should be found some burrows in the sand connected to the hypichnial burrows that are present at this site. This is not the case.

The fact that no vertical burrows are found at the Dougherty Gap site argues against a nearshore deposi-

tional environment (*Skolithos* ichnofacies). Vertical burrows are often found in the nearshore environment since the high energy levels there require the endobiontic animals to anchor themselves within the substrate to keep from being washed away. Instead, only horizontal feeding burrows and traces (along with various tool marks) are found at Dougherty Gap.

The authors suggest that the lack of any lined burrows in the sandstone units supports the turbidity current depositional environmental, where the hypichnia represent a pre-event trace fossil association.

Conclusions

Many uniformitarian interpretations are based on the time/facies development requirements of their model. The Dougherty Gap site provides evidence of one such instance. However, we believe that by using many of the same principles and new concepts, we can propose and defend a more catastrophic interpretation or much of the stratigraphic record. This interpretation better fits within the framework and timeframes of the young-earth Flood model.

We suggest that Sheehan (1988) fails to adequately explain the lack of evidence of traces (i.e., lined burrows) within the individual sandstone layers. It appears that he cannot decide if the sole casts were formed as a result of the scour-and-fill and erosional clay surface (1988, p. 26), or if they are a result of the bioturbation of just the sandstone layer (1988, p. 173). Additionally, we found evidence of sole casts in the thinnest sand layers, and these layers are not thick enough to surround the tracemakers as they were proposed to have existed in this substrate.

Sheehan's (1988) defense of the Appalachian prograding delta model using the Dougherty Gap trace fossil assemblage is ineffective. While several observed features are suggestive of an interdistributary bay depositional environment, many more are not. None of the ichnogenera identified at this exposure are indicative of this specific type of environment. Rather, Sheehan's (1988, p. 160) *Cruziana* ichnofacies has a wide range and can be also interpreted as occurring on the outer shelf (Ekdale, Bromley, and Pemberton 1984, p. 187; Cowart and Froede, 1994, p. 119) which could easily fit with our suggested model of turbidity current deposition on the distal sections of a deep-sea fan or continental shelf.

We believe a turbidity current depositional environment on the distal sections of a deep-sea fan or continental shelf can better explain the physical and biogenic features seen at this outcrop. This interpretation better fits with all of the physical evidence presented at the Dougherty Gap exposure. Additionally, the turbidity current depositional environment fits within the time and energy requirements predicted for its formation within the young-earth Flood model. This turbidity current postulate uses the same physical data in a geologically reasonable manner to explain and defend a catastrophic interpretation for this exposure.

The young-earth catastrophist interpretation is not limited by Walther's law of facies succession, and offers a more defensible explanation based on the physical evidence. Our model will develop using the same physical data as our uniformitarian counterparts. The difference in interpretation will be one of time and energy.

The Dougherty Gap site presents evidence that turbidity currents formed the exposure seen at this site. These deposits and trace fossils were probably formed during the Lower to Middle Flood Event Timeframe (see Froede, 1995a). This is suggested due to the tectonic forces and sedimentary overburden which occurred following the development and burial of the traces.

Glossary

Biogenic — applied to material, processes, or activities of living or once-living organisms (Allaby and Allaby, 1990, p. 40).

Clastic — Pertaining to a rock or sediment composed principally of broken fragments that are derived from preexisting rocks or minerals, and that have been transported some distance from their places of origin. Term is usually used in the plural; e.g., the commonest "clastics" are sandstone and shale (Bates and Jackson, 1987, p. 121).

Continental shelf — That part of the continental margin that is between the shoreline and the continental slope. It is characterized by its very gentle slope of 0.1 (Bates and Jackson, 1987, p. 143).

Deep-sea fan — (also known as submarine fan) A terrigenous, cone- or fan-shaped clastic deposit located seaward of large rivers and submarine canyons (Bates and Jackson, 1987, p. 657).

Distal turbidites — A sedimentary deposit consisting of fine grained clastics and formed farthest from the source area (modified from Bates and Jackson, 1987, p. 190).

Endichnia — Traces within the casting medium; i.e., not in contact with the upper surface (Cowart and Froede, 1994).

Endobiontic — Said of an organism living in bottom sediments (Bates and Jackson, 1987, p. 213).

Epeiric Sea — A sea on the continental shelf or within a continent. Syn: inland sea; epicontinental sea (Froede, 1995b; 1995c).

Facies — The aspect, appearance, and characteristics of a rock unit, usually reflecting the conditions of its origin (Bates and Jackson, 1987, p. 232). Can be singular or plural depending upon its usage.

Hypichnia — Traces in primary contact with the lower surface (sole) of the casting medium: may appear as a ridge or a groove (Cowart and Froede, 1994).

Ichnofacies — A characteristic assemblage of trace fossils.

Prograding Delta — A river delta which is being built outward into a water body by the deposition and accumulation of continentally derived sediments (modified from Bates and Jackson, 1987, p. 530).

Proximal turbidites — A sedimentary deposit consisting of coarse clastics and formed nearest the source area (modified from Bates and Jackson, 1987, p. 534).

Substrate — For the purposes of this paper, this term is defined as the subaqueous stratum on or in which an organism lives.

Turbidity current — A bottom-flowing current laden with suspended sediment, moving swiftly (under the influence of gravity) down a subaqueous slope and spreading horizontally on the floor of the body of water, having been set and/or maintained in motion by locally churned- or stirred-up sediment that

gives the water a density greater than that of the surrounding or overlying water. They originate in various ways, such as by storm waves, tsunamis, earthquake-induced sliding, tectonic movement, over-supply of sediment, and heavily charged rivers in spate with densities exceeding that of sea water (Bates and Jackson, 1987, p. 706).

Walther's law — An important statement relating to the manner in which a vertical sedimentary sequence of facies develops. Walther's law of facies implies that a vertical sequence of facies will be the product of a series of depositional environments which lay laterally adjacent to each other. This law is applicable only to situations where there is no break in the sedimentary sequence (Allaby and Allaby, 1990, p. 398).

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References

- CRSQ—*Creation Research Society Quarterly*.
 Allaby, A. and M. Allaby. 1990. The concise Oxford dictionary of earth sciences. Oxford University Press. New York.
 Allen, J. R. L. and P. F. Friend. 1968. Deposition of the Catskill Facies, Appalachian Region: with notes on some other Old Red Sandstone Basins. In Klein, G. dev. (editor). Late Paleozoic and Mesozoic sedimentation, northwestern North America. Geological Society of America Special Paper No. 106. pp. 1-20.
 Archer, A. W. and C. G. Maples. 1984. Trace-fossil distribution across a marine-to-nonmarine gradient in the Pennsylvanian of southwestern Indiana. *Journal of Paleontology* 58:448-466.
 Austin, S. A. 1979. Depositional environment of the Kentucky No. 12 coal bed (middle Pennsylvanian) of Western Kentucky, with special reference to the origin of coal lithotypes. Pennsylvania State University unpublished Ph.D. dissertation. (University Microfilms No. 80-5872).
 ———. 1991. Floating logs and log deposits of Spirit Lake, Mount St. Helens Volcano National Monument, Washington. *Geological Society of America. Abstracts with Programs* vol. 23.
 Bates, R. L. and J. A. Jackson (editors). 1987. Glossary of geology. Third edition. American Geological Institute. Alexandria, VA.
 Bergenback, R. E., R. L. Wilson, and M. Rich. 1980. Carboniferous paleodepositional environments of the Chattanooga area. In Frey, R.W. (editor). Excursions in southeastern geology. Geological Society of America 1980 Annual Meeting Guidebook. Volume I. American Geological Institute. Falls Church, VA. pp. 259-265.
 Bishop, G. A. and N. A. Brannen. 1993. Ecology and paleoecology of Georgia Ghost Shrimp. In Farrell, K. M., C. W. Hoffman, and V. J. Henry, Jr. (editors). Geomorphology and facies relationships of Quaternary barrier island complexes near St. Marys, Georgia. Georgia Geological Society Fieldtrip Guidebook Volume 13, Number 1. November. pp. 19-29.
 Boggs, S., Jr. 1987. Principles of sedimentology and stratigraphy. Merrill Publishing. Columbus. OH.
 Bromley, R. G. 1975. Trace fossils at omission surfaces. In Frey, R. W. (editor). The study of trace fossils. Springer-Verlag. New York. pp. 399-428.
 ———. 1990. Trace fossils: Biology and taphonomy. Unwin Hyman. Boston.
 Bottjer, D. J. and M. L. Droser. 1992. Paleoenvironmental patterns of biogenic sedimentary structures. In Maples, C. G. and R. R. West (editors). Trace fossils. The Paleontological Society Short Courses in Paleontology Number 5. Knoxville. pp. 130-144.
 Carminatti, M. and J. C. Scarton. 1991. Sequence stratigraphy of the Oligocene turbidite complex of the Campos Basin, offshore Brazil: An overview. In Weimer, P. and M. H. Link (editors). Seismic facies and sedimentary processes of submarine fans and turbidite systems. Springer-Verlag. New York. pp. 241-246.

- Chamberlain, C. K. 1975. Recent lebensspuren in nonmarine aquatic environments. In Frey, R. W. (editor). The study of trace fossils. Springer-Verlag. New York. pp. 431-458.
- Coleman, J. M., S. M. Gagliano, and J. E. Webb. 1964. Minor sedimentary structures in a prograding distributary. *Marine Geology* 1:240-258.
- _____. 1965. Sedimentary structures: Mississippi River deltaic plain. In Middleton, G. V. (editor). Primary sedimentary structures and their hydrodynamic interpretation. Society of Economic Paleontologists and Mineralogists Special Publication No. 12. Tulsa. pp. 133-148.
- _____. and D. B. Prior. 1980. Deltaic sand bodies. Continuing Education Course Note Series No. 15. American Association of Petroleum Geologists Department of Education. Tulsa.
- _____. 1981. Deltaic environments of deposition. In Scholle, P. A. and D. Spearing (editors). Sandstone depositional environments. American Association of Petroleum Geologists Memoir 31. Tulsa. pp. 139-178.
- Cowart, J. H. and C. R. Froede Jr. 1994. The use of trace fossils in refining depositional environments and their application to the creationist model. *CRSQ* 31:117-124.
- Crawford, T. J. 1989. Geology of the Pennsylvanian system of Georgia. Geologic Atlas No. 2. Atlanta.
- Einsele, G. 1991. Submarine mass flow deposits and turbidites. In Einsele, G., W. Ricken and A. Seilacher (editors). Cycles and events in stratigraphy. Springer-Verlag. New York. pp. 313-339.
- _____. and A. Seilacher. 1991. Distinction of tempestites and turbidites. In Einsele, G., W. Ricken and A. Seilacher (editors). Cycles and events in stratigraphy. Springer-Verlag. New York. pp. 377-382.
- _____. 1992. Sedimentary Basins: Evolution, facies, and sediment budget. Springer-Verlag. New York.
- Ekdale, A. A. 1988. Pitfalls of paleobathymetric interpretations based on trace fossil assemblages. *Palaio* 3:464-472.
- _____. R. G. Bromley, and S. G. Pemberton. 1984. Ichnology: The use of trace fossils in sedimentology and stratigraphy. Society of Economic Paleontologists and Mineralogists Short Course No. 15. Tulsa.
- Elliot, T. 1974. Interdistributary bay sequences and their genesis. *Sedimentology* 21:611-622.
- Enos, P. 1969. Anatomy of a flysch. *Journal of Sedimentary Petrology* 39:680-723.
- Frey, R. W. 1971. Ichnology—The study of fossil and recent lebensspuren. In Perkins, B. F. (editor). Trace fossils: A field guide to selected localities in Pennsylvanian, Permian, Cretaceous, and Tertiary rocks of Texas and related papers. Miscellaneous Publication 71-1. Louisiana State University School of Geoscience. Baton Rouge. pp. 91-125.
- _____. 1975. The realm of ichnology, its strengths and limitations. In Frey, R. W. (editor). The study of trace fossils. Springer-Verlag. New York. pp. 13-38.
- _____. S. G. Pemberton, and T. D. A. Saunders. 1990. Ichnofacies and bathymetry: A passive relationship. *Journal of Paleontology* 64:155-158.
- Friedman, G. M. and K. G. Johnson. 1966. The Devonian Catskill deltaic complex of New York, type example of a "tectonic delta complex." In Shirley, M. L. and J. A. Ragsdale (editors). Deltas in their geologic framework. Houston Geological Society. Houston. pp. 171-188.
- Froede, C. R., Jr. 1995a. A proposal for a creationist geological timescale. *CRSQ* 32:90-94.
- _____. 1995b. Greenhouse conditions in antediluvian times? *CRSQ* 32:19.
- _____. 1995c. Late Cretaceous epeiric sea or retreating Floodwater? *CRSQ* 32:13-16.
- Gibson, M. A. and R. A. Gastaldo. 1989. Invertebrate body fossils and trace fossils from the Lower Pennsylvanian of Northern Alabama. Geological Survey of Alabama Circular 143. Tuscaloosa, AL.
- Goldring, R. 1993. Ichnofacies and facies interpretation. *Palaio* 8:403-405.
- Greb, S. F. and D. R. Chesnut Jr. 1994. Paleoecology of an estuarine sequence in the Breathitt Formation (Pennsylvanian), Central Appalachian Basin. *Palaio* 9:399-402.
- Hakes, W. G. 1985. Trace fossils from brackish-marine shales, Upper Pennsylvanian of Kansas, U.S.A. In Curran, H. A. (editor). 1985 Biogenic structures: their use in interpreting depositional environments. Society of Economic Paleontologists and Mineralogists, Special Publication No. 35. Tulsa. pp. 21-35.
- Hasiotis, S. T. and T. M. Bown. 1992. Invertebrate trace fossils: the backbone of continental ichnology. In Maples, C. G. and R. R. West (editors). Trace fossils. The Paleontological Society Short Courses in Paleontology Number 5. Knoxville. pp. 64-104.
- Horowitz, D. H. 1966. Evidence for deltaic origin of an Upper Ordovician sequence in the Central Appalachians. In Shirley, M. L. and J. A. Ragsdale (editors). Deltas in their geologic framework. Houston Geological Society. Houston. pp. 159-169.
- Howard, J. D. 1975. The sedimentological significance of trace fossils. In Frey, R. W. (editor). The study of trace fossils. Springer-Verlag. New York. pp. 131-146.
- Humphreys, M. and G. M. Friedman. 1975. Upper Devonian Catskill deltaic complex in North-Central Pennsylvania. In Broussard, M. L. (editor). Deltas: Models for exploration. Houston Geological Society. Houston. pp. 369-379.
- Jordan, D. W. 1985. Trace fossils and depositional environments of Upper Devonian black shales, east-central Kentucky, U.S.A. In Curran, H. A. (editor). 1985. Biogenic structures: their use in interpreting depositional environments. Society of Economic Paleontologists and Mineralogists, Special Publication No. 35. Tulsa. pp. 279-298.
- Jordan, D. W., D. J. Schultz, and J. A. Cherng. 1994. Facies architecture and reservoir quality of Miocene Mt. Messenger deep-water deposits, Taranaki Peninsula, New Zealand. In Weimer, P., A. H. Bouma, and B. F. Perkins (editors). Submarine fans and turbidite systems. Gulf Coast Section of the Society of Economic Paleontologists and Mineralogists Foundation. Fifteenth Annual Research Conference. Earth Enterprises. Austin. pp. 151-166.
- Julien, P. Y., Y. Lan, and G. Berthault. 1993. Experiments on stratification of heterogeneous sand mixtures. *Geological Society of France Bulletin* 164:649-660.
- Kern, J. P. 1980. Origin of trace fossils in Polish Carpathian flysch. *Lethaia* 13:347-362.
- King, P. R., G. H. Browne, and R. M. Slatt. 1994. Sequence architecture of exposed late Miocene basin floor fan and channel-levee complexes (Mount Messenger Formation), Taranaki Basin, New Zealand. In Weimer, P., A. H. Bouma, and B. F. Perkins (editors). Submarine fans and turbidite systems. Gulf Coast Section of the Society of Economic Paleontologists and Mineralogists Foundation. Fifteenth Annual Research Conference. Earth Enterprises. Austin. pp. 177-192.
- Knox, L. W. and M. P. Miller. 1985. Environmental control of trace fossil morphology. In Curran, H. A. (editor). Biogenic structures: Their use in interpreting depositional environments. Society of Economic Paleontologists and Mineralogists Special Publication No. 35. Tulsa. pp. 167-176.
- Kuenen, PH. H. and H. W. Menard. 1952. Turbidity currents, graded and non-graded deposits. *Journal of Sedimentary Petrology* 22:83-96.
- _____. 1965. Experiments in connection with turbidity currents and clay suspensions. In Whittard, W. F. and R. Bradshaw (editors). Submarine geology and geophysics. London. Butterworths. pp. 47-74.
- _____. 1967. Emplacement of flysch-type sand beds. *Sedimentology* 9:203-243.
- Kuhn, T. S. 1970. The structure of scientific revolutions. Second edition. University of Chicago Press. Chicago.
- Lemon, R. R. 1990. Principles of stratigraphy. Merrill. Columbus, OH.
- Leszczynski, S. 1991. Oxygen-related controls on predepositional ichnofacies in turbidites, Guipuzcoan flysch (Albian-Lower Eocene), Northern Spain. *Palaio* 6:271-280.
- Lightman, A. and O. Gingerich. 1991. When do anomalies begin? *Science* 255:690-695.
- Lovell, J. P. B. and D. A. V. Stow. 1981. Identification of ancient sandy contourites. *Geology* 9:347-349.
- Mack, G. H. 1982. Composition of Carboniferous sandstones in the Black Warrior Basin, Alabama: Implications on plate tectonic setting. In Thomas, W. A. and T. L. Neathery (editors). Appalachian thrust belt in Alabama: Tectonics and sedimentation. Geological Society of America Guidebook for Field Trip No. 13. Alabama Geological Society. Tuscaloosa. pp. 67-78.
- McBride, E. F. 1973. Concepts of Appalachian Basin sedimentation. In Ginsburg, R. N. (editor). Evolving concepts in sedimentology. studies in geology No. 21. Johns Hopkins University Press. Baltimore. pp. 93-117.
- McIver, N. L. 1970. Appalachian turbidites. In Fisher, G. W., F. J. Pettijohn, J. C. Reed, Jr., and K. N. Weaver (editors). Studies of Appalachian geology: Central and southern. Interscience. New York. pp. 68-81.

- Miller, M. F. and L. W. Knox. 1985. Biogenic structures and depositional environments of a lower Pennsylvanian coal-bearing sequence, North Cumberland Plateau, Tennessee, U.S.A. In Curran, A. (editor). *Biogenic structures: Their use in interpreting depositional environments*. Society of Economic Paleontologists and Mineralogists Special Publication No. 35. Tulsa. pp. 67-97.
- Normark, W. R. 1978. Fan valleys, channels, and depositional lobes on modern submarine fans: Characters for recognition of sand turbidite environments. *American Association of Petroleum Geologists Bulletin* 62:912-931.
- Olphen, H. van. 1963. An introduction to clay colloid chemistry. Interscience. New York.
- Osborne, W. E., D. E. Leverett, and W. A. Thomas. 1991. Depositional environments and sediment dispersal of the Parkwood Formation (Mississippian-Pennsylvanian), northwest limb of Cahaba Synclinorium, Appalachian thrust belt in Alabama. In Thomas, W. A. and W. E. Osborne (editors). *Mississippian-Pennsylvanian tectonic history of the Cahaba Synclinorium*. Guidebook for the Alabama Geological Society 28th Annual Field Trip. pp. 53-72.
- Peres. 1993. Shelf-fed turbidite system model and its application to the Oligocene deposits of the Campos Basin, Brazil. *American Association of Petroleum Geologists* 77:91-101.
- Potter, P. E. and F. J. Pettijohn. 1977. *Paleocurrents and basin analysis*. Second edition. Springer-Verlag. New York.
- Prothero, D. R. 1990. *Interpreting the stratigraphic record*. Freeman. New York.
- Reading, H. G. 1978. *Sedimentary environments and facies*. Elsevier. New York.
- Rindsberg, A. K. 1991. Ichnology of the Carboniferous Parkwood Formation in the Cahaba Synclinorium near Birmingham, Alabama. In Thomas, W. A. and W. E. Osborne (editors). *Mississippian-Pennsylvanian tectonic history of the Cahaba Synclinorium*. Guidebook for the Alabama Geological Society 28th Annual Field Trip. pp. 133-147.
- _____ and T. M. Chown. 1986. Ringgold Gap: Progradational sequences in the Ordovician and Silurian of northwest Georgia. In Neathery, T. L. (editor). *Geological Society of America Centennial Field Guide—Southeast Section*. pp. 159-162.
- Roniewicz, P., and G. Pienkowski. 1977. Trace fossils of the Podhale Flysch Basin. In Crimes, T. P. and J. C. Harper. (editors). *Trace fossils 2*. Seel House Press. Liverpool. pp. 273-288.
- Seilacher, A. 1962. Paleontological studies on turbidite sedimentation and erosion. *Journal of Geology* 70:427-234.
- _____. 1964. Biogenic sedimentary structures. In Imbrie, J. and N. Newell (editors). *Approaches to paleoecology*. Wiley. New York. pp. 296-316.
- _____. 1967. Bathymetry of trace fossils. *Marine Geology* 5:413-428.
- _____. 1978. Use of trace fossil assemblages for recognizing depositional environments. In Basan, P. B. (editor). *Trace fossil concepts*. Society of Economic Paleontologists and Mineralogists Short Course No. 5. Tulsa. pp. 167-181.
- _____. 1984. Storm beds: Their significance in event stratigraphy. In Seibold, E. and J. D. Meulenkamp (editors). *Stratigraphy: quo vadis?* American Association of Petroleum Geologists Studies in Geology No. 16. Tulsa. pp. 49-54.
- Shanmugam, G., T. D. Spalding, and D. H. Rofheart. 1993. Process sedimentology and reservoir quality of deep-marine bottom-current reworked sands (sandy contourites): An example from the Gulf of Mexico. *American Association of Petroleum Geologists Bulletin* 77:1241-1259.
- Sheehan, M. A. 1988. Ichnology, depositional environment, and paleoecology of the upper Pennington Formation (upper Mississippian), Dougherty Gap, Walker, County, Georgia. Unpublished asters Thesis. University of Georgia. Athens.
- Shepard, F. P. 1951. Transportation of sand into deep water. In Hough, J. L. (editor). *Turbidity currents and the transportation of coarse sediments to deep water*. Society of Economic Paleontologists and Mineralogists Special Publication No. 2.. Tulsa. pp. 53-65.
- Stanley, D. J. 1993. Model for turbidite-to-contourite continuum and multiple process transport in deep marine settings: Examples in the rock record. *Sedimentary Geology* 82:241-255.
- U.S. Geological Survey. 1983. Dougherty Gap, Georgia. 7.5 Minute Series. Topographic Quadrangle Sheet. Scale: 1:24,000.
- Walker, R. G. 1967. Turbidite sedimentary structures and their relationship to proximal and distal depositional environments. *Journal of Sedimentary Petrology* 37:25-43.
- _____. 1973. Mopping up the turbidite mess. In Ginsburg, R. N. (editor). *Evolving concepts in sedimentology* The Johns Hopkins University Studies in Geology, no. 21. Baltimore. pp. 1-37.
- _____. and E. Mutti. 1973. Turbidite facies and facies associations. In Middleton, G. V. and A. H. Bouma (editors). *Turbidites and deep water sedimentation*. Society of Economic Paleontologists and Mineralogists Pacific Section Short Course. Anaheim. pp. 119-158.
- _____. 1978. Deep-water sandstone facies and ancient submarine fans: Models for exploration for stratigraphic traps. *American Association of Petroleum Geologists Bulletin* 62:932-966.
- _____. 1992. Turbidites and submarine fans. In Walker, R. G. and N. P. James (editors). *Facies models: Response to sea level change*. Geological Association of Canada. pp. 239-263.
- Walls, R. A. 1975. Late Devonian-Early Mississippian subaqueous deltaic facies in a portion of the southeastern Appalachian Basin. In Broussard, M. L. (editor). *Deltas: Models for exploration*. Houston Geological Society. Houston. pp. 359-367.
- Wetzel, A. 1991. Ecologic interpretation of deep-sea trace fossil communities. *Paleogeography, Paleoclimatology, Paleoecology* 85:47-69.
- _____. and T. Aigner. 1986. Stratigraphic completeness: Tiered trace fossils provide a measuring stick. *Geology* 14:234-237.
- Woodrow, and W. D. Sevon (editors). 1985. *The Catskill delta*. Geological Society of America Special Paper No. 291. Boulder.

Additional Resources

- Bebout, D. G., E. A. Mancini, and B. F. Perkins. 1984. (editors). *Characteristics of Gulf Basin deep-water sediments and their exploration potential*. Society of Economic Paleontologists and Mineralogists Foundation Fifth Annual Research Conference. Tulsa.
- Doyle, L. J. 1987. Anomalously large marine sedimentary units deposited in a single mass wasting event. *Geo-Marine Letters* 7:59-61.
- _____. and O. H. Pilkey 1979. (editors). *Geology of continental slopes*. Society of Economic Paleontologists and Mineralogists Special Publication No. 27. Tulsa.
- Faugères, T. C. and D. A. V. Stow. Bottom-current-controlled sedimentation: A synthesis of the contourite problem. *Sedimentary Geology* 82:287-297.
- Hallam, A. 1981. *Facies interpretation and the stratigraphic record*. W. H. Freeman. San Francisco.
- Kolla, V. and M. A. Perlmutter. 1993. Timing of turbidite sedimentation on the Mississippi Fan. *American Association of Petroleum Geologists Bulletin* 77:1129-1141.
- Morgan, J. P. and R. H. Shaver. 1970. (editors). *Deltaic sedimentation: Modern and ancient*. Society of Economic Paleontologists and Mineralogists Special Publication No. 15. Tulsa.
- Normark, W. R., Posamentier, and E. Mutti. 1993. Turbidite systems: State of the art and future directions. *Reviews of Geophysics* 31:91-116.
- Pashin, J. C. 1993. (editor). *New perspectives on the Mississippian System of Alabama*. Guidebook for the 36th annual field trip of the Alabama Geological Society. Tuscaloosa.
- Perkins, B. F., W. P. S. Ventress, and M. B. Edwards. 1981. (editors). *Recognition of shallow-water versus deep-water sedimentary facies in growth-structure affected formations of the Gulf Coast Basin*. Society of Economic Paleontologists and Mineralogists Second Annual Research Conference. Tulsa.
- Rindsberg, A. K. 1994. Ichnology of the Upper Mississippian Hartselle Sandstone of Alabama, with notes on other Carboniferous formations. Alabama Geological Survey Bulletin 158. Tuscaloosa.
- Shanmugam, G. and R. J. Moiola. 1991. Types of submarine fan lobes: Models and implications. *American Association of Petroleum Geologists Bulletin* 75:156-179.
- _____. 1988. Submarine fans: Characteristics, models, classification, and reservoir potential. *Earth-Science Reviews* 24:383-428.
- Stanley, D. J. and G. T. Moore. 1983. (editors). *The shelf break: Critical interface on continental margins*. Society of Economic Paleontologists and Mineralogists Special Publication No. 33. Tulsa.
- Winn, R. D., Jr. and J. M. Armentrout. 1995. (editors). *Turbidites and associated deep-water facies*. Society of Economic Paleontologists and Mineralogists Core Workshop No. 26. Tulsa.

TAKING STOCK—LAB DIRECTOR'S REPORT

JOHN R. MEYER,* Director of the CRS Van Andel Research Center

When we think of stock, we may have one of several ideas in mind. It may mean part of a tree, a lineage, a strain of animals, a supply of goods, or a certificate representing corporate ownership.

To "take stock" usually means to evaluate a project or a course of action. "Taking stock" however, may mean to secure certificates of ownership. If we were to say, "take stock and give it"; we would be referring to an increasingly popular way for individuals to support a nonprofit organization that is fulfilling their goals and commitments.

Every year, millions of people "take stock" of their financial affairs. Because the stock market has reached record highs, many people wonder what the future holds for equities. A major market correction could cause stock prices to tumble. Continued economic prosperity in the U.S. could foreshadow increasing prices on Wall Street. In the light of the record highs and the future uncertainties, now may be a critical time to "take stock" and donate it to the Creation Research Society.

Gifts of highly-appreciated stock are especially beneficial to the donor in terms of efficiency of use of resources. Our nation's tax laws provide that one can give appreciated assets and take a current income tax deduction for the current fair market value of the stock no matter what its original value may have been. One limitation on a gift of assets at current value is that it must have been held for one year and one day so that it will qualify as a "long-term capital gain."

When this requirement is met, such gifts may be deductible up to 30% of adjusted gross income in the

year of the gift. All this means that the higher your tax rate, the lower will be the cost of giving securities or certain other assets that have increased in value since you purchased them.

In the past few years, several important gifts of stock have been effectively used by CRS to bolster creation research, which undermines the evolutionary naturalism so prevalent in our culture.

In general, if you are considering giving appreciated stock, do not sell it. If you sell the stock and donate the money, the IRS will require that you pay capital gains tax on the sale. If you give appreciated stock directly, you should not have to pay capital gains tax on it. On the other hand, if you have stock that has decreased in value, you may want to sell it first, then donate the funds. That way you can take a loss on your income tax. Be sure to check with your accountant or attorney before giving any major gift of stocks or funds. The IRS has exceptions to almost everything, and tax laws can be very complex!

If you would like more information on this subject, please write for our free brochure entitled, "Taking Stock and Giving It." This pamphlet, written by professionals, provides more details about the advantages of giving appreciated stock and other items such as real estate.

In addition, many CRS members have received our pamphlet on "Living Trusts" and have been helped in thinking through the many aspects of planning their estates.

You, too, may find that this is an appropriate time to "take stock" of your financial affairs and how this relates to your commitment to your goals in supporting origins research from a creationist perspective.

*John R. Meyer, Ph.D., P.O. Box 376, Chino Valley, AZ 86323.

BOOK REVIEW

Teaching Creation Science in Public Schools by Duane T. Gish. 1995. Institute for Creation Research. El Cajon, CA. 70 pages \$4.95.

Reviewed by Eugene F. Chaffin*

Dr. Gish provides this new, concise summary of the highlights of the creation-evolution controversy. Chapter six discusses the legal aspects of Supreme Court decisions on this issue, pointing out that public school teachers in the United States are free to bring in various aspects of science which indicate a supernatural creation. The Court decisions nullify cases where the state mandates equal time for creation, since the Court felt that the Louisiana legislature did so with religious motivations in mind. On the other hand, the Court

went out of its way to say that local schools and their teachers are free to present evidence which is in favor of creationism.

The other six chapters of the book are devoted to this type of evidence, in the spheres of earth history, age of the cosmos, origin of man, gaps in the fossil record, inadequacy of the punctuated equilibrium paradigm, molecular biology, design and purpose of the body's organs, embryology, homology, origin of life, origin of the universe, philosophy of science, etc. Since the book is only 70 pages the coverage is obviously not exhaustive, but this is certainly an excellent starting point for prospective teachers, school administrators, and school board members who need to be familiar with this subject. It is also an excellent summary for scientists who need to learn about fields of study besides their own.

*715 Tazewell Ave., Bluefield, VA 24605.

Quote

Deuteronomy 4:39

Acknowledge and take to heart this day that the Lord is God in Heaven above and on earth below. There is no other. Holy Bible, New International Version Copyright © 1984 International Bible Society. Used by permission of Zondervan Bible Publishers.

PANORAMA NOTES

Extinction and Evolution

Introduction

Today many groups advocate strong measures to protect and preserve threatened and endangered plants and animals. However, all of the current evolutionary models incorporate extinction as a natural element of plant and animal life and postulate that new life forms will eventually arise to fill any vacant niches. The creationist model predicts that once a "type" or "kind" of animal or plant is lost it is gone forever e.g., dog, cat, horse; not St. Bernard, Siamese, or Shetland—these "varieties" can be bred from a type/kind and are not lost unless the type/kind becomes extinct). Additionally, the Creationist worldview stresses caring (i.e., Matt 28:19-20) not only for the world's plants and animals, but for its people too. Our role in protecting and preserving endangered species of plants and animals is being examined today by many Christians (Hoesch, 1994). We as creation scientists should have an answer ready for every man regarding the power and authority of Jesus Christ and his Creation (Col 4:6; 1 Pet 3:15). This note will briefly develop two different yet interrelated concepts. First, the various "origins" models will be discussed in order to show the differences, then secondly, our role as Christian caretakers of this planet will be discussed with an understanding of what the "evolutionary" model predicts.

Evolutionary Models

There are currently two evolutionary models used to explain the fossil record, phyletic-gradualism and punctuated equilibria. The phyletic-gradualism model was first popularized by Charles Darwin who advocated the slow, gradual change of organisms over time in direct response to their environmental conditions. Darwin postulated that the fossil record would eventually provide enough intermediate species to defend this model. The later discoveries in the field of genetics have been integrated into the model to explain how "characteristics" are passed from generation to generation, to improve the species by means of mutation and natural selection. To date, the fossil record has failed to produce the intermediate or transitional species to satisfy the requirements of the phyletic-gradualist model (Figure 1).

Changes to plants and animals are predicted to occur as species migrate into changing environmental niches. Failure of the species to change could result in extinction. Note that the model predicts continually changing life forms in response to a changing environment and unlimited potential for change is assumed. The fundamental rule in this model is that the life forms underwent intermediate steps as they mutated and evolved to meet the new environmental conditions. Eldredge and Gould (1972, pp. 89-90) have identified the following as tenets to phyletic-gradualism:

1. New species arise by the transformation of an ancestral population into its modified descendants.
2. The transformation is even and slow.
3. The transformation involves large numbers, usually the entire ancestral population.

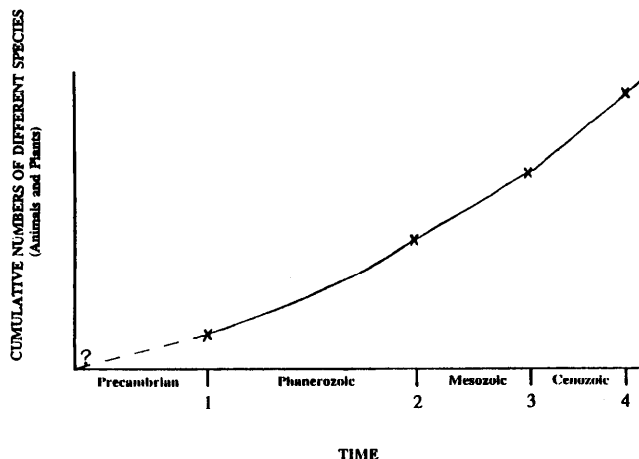


Figure 1. Generalized graph showing the predicted slope (i.e., cumulative numbers of new species generated versus time) using the Phyletic-Gradualism evolutionary model. Numbers indicate the following: 1) Precambrian/Cambrian boundary—famous for the "Explosion" for life. 2) Permian/Triassic boundary—famous for the mass extinction of much marine life, 3) Cretaceous/Tertiary boundary—famous for the mass extinction of the dinosaurs and other animals, 4) Tertiary/Quaternary boundary. Note slope is ever increasing and as the numbers of plants and animals evolve the fossil record should reflect the transitional forms.

4. The transformation occurs over all or a large part of the ancestral species' geographic range.

However, these tenets have failed to provide the necessary intermediate or transitional species in the fossil record to substantiate this theory (Eldredge and Gould, 1972, p. 90; Denton, 1985, p. 56-57; Gish, 1985, p. 229; 1993, p. 252).

Punctuated Equilibria Model

Niles Eldredge and Stephen J. Gould (1972) proposed their modification to the phyletic-gradualism model due to the apparent lack of intermediate or transitional life forms found in the fossil record and to address the "spontaneous" appearance of "end member" life forms. This model is based on the theory of allopatric speciation that arises from the behavior, ecology, and distribution of modern biospecies (Eldredge and Gould, 1972, p. 93). Based on this model, they predicted rapid changes for a small group of life forms which experienced environmental stresses. This small group then "changed" (i.e., evolved) enough to prevent cross-breeding with the original group and through further changes eventually results in the formation of new plant and animal "types." This model predicts most evolutionary changes in morphology occur in a short period of time relative to the total existence of the species (Eldredge and Gould 1972 p. 95). Additionally, Eldredge and Gould (1972 p. 96) have proposed the following tenets for allopatric speciation:

1. New species arise by the splitting of lineages.
2. New species develop rapidly.
3. A small sub-population of the ancestral form gives rise to the new species.
4. The new species originates in a very small part of the ancestral species' geographic extent—in an isolated area at the periphery of the range.

This model is basically the same as the phyletic-gradualism model presented above with the primary difference being the rapid timeframe in which a plant or animal species can periodically change. Under the punctuated equilibrium model the change experienced was so rapid that it failed to be adequately recorded in the fossil record and hence the fossil record reflects primarily the “end members” and not transition or intermediate life forms. What has been “missing” from this model is the “stressing” events necessary to cause evolution.

Mass Extinction Events

Up until recently the fossil record was viewed as a reflection of changing plant and animal evolution/morphology due to the change in environmental conditions. However, this perspective changed with the release of a paper by Alvarez, Alvarez, Asaro and Michel (1980), entitled “Extraterrestrial cause for the Cretaceous-Tertiary extinction.” These authors dealt with the higher-than-background concentration of platinum group metals (specifically iridium) at the Cretaceous-Tertiary mass extinction boundary for several sites found worldwide. Since the release of this paper an intensive effort has been underway to determine the cause and role that mass extinction plays in the evolution of life on earth. Much has been written in the succeeding years combining mass extinction events with the evolutionary geologic record (e.g., Berggren and Van Couvering, 1984; Sharpton and Ward, 1990; Stanley, 1987; Allaby and Lovelock, 1985; Nitecki, 1984; Eldredge, 1987; 1991; Ward, 1992; 1994).

Today, the latest “evidences” serving to reinforce and strengthen the punctuated equilibrium model are the mass extinction events. These repetitious “events” are reported as creating short, high stress environments which serve to evolve the “successful” species while driving the unsuccessful to extinction (Figure 2). The many proofs of mass extinction events are found in the concentration of platinum group metals at uniformitarian/evolutionary boundaries Permian/Triassic, Cretaceous/Tertiary, etc.). Currently, these mass extinction events and the associated platinum group metals are becoming the “proof” necessary to replace the phyletic-gradualism model with that of punctuated equilibria. Much as sea-floor spreading and its associated magnetic reversals served to reinforce the plate tectonic model, mass extinction events are being used to reinforce the punctuated equilibria model.

Evolutionary Radiation

According to both of these evolutionary models, plants and animals started from simple chemicals, and through time and chance combination resulted in single-celled life (thereby proving spontaneous generation—the argument being, given by naturalism “It must have happened as we are obviously here”). Then due to changes in the environmental conditions, the entity was forced to change to better “fit” the new environmental conditions. According to many of the statistical models used to predict the “survivability” of species, it is only a matter of time before any life form becomes extinct (Raup, 1991, pp. 45-63). However, under the evolutionary extinction models life would not really be extinct, just changed to meet new environmental conditions.

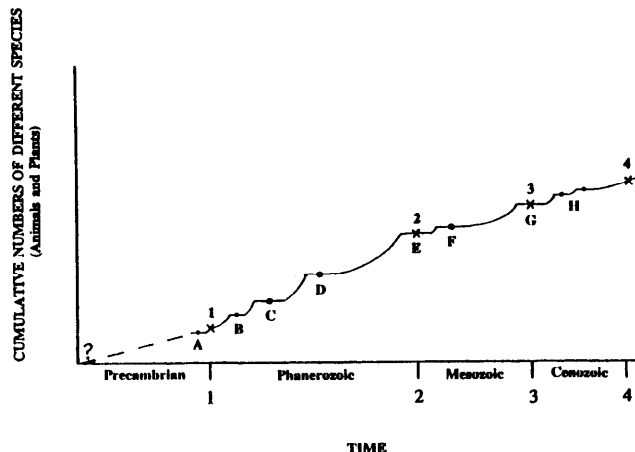


Figure 2. Generalized graph showing the predicted slope (i.e., cumulative numbers of new species generated versus time) using the Punctuated Equilibria/Mass Extinction model. Numbers and letters indicate the following (from Donovan, 1989b, p. xiii): d) End Precambrian—minor mass extinction event, 1) Precambrian/Cambrian boundary, B) Late Cambrian—minor mass extinction event, C) End Ordovician—major mass extinction event, D) Frasnian-Famennian (Devonian) boundary—major mass extinction event, 2) Permian/Triassic boundary, E) End Permian—major mass extinction event, F) Late Triassic—major mass extinction event, 3) Cretaceous/Tertiary boundary, G) End Cretaceous—major mass extinction event, H) Eocene/Oligocene—minor mass extinction events, 4) Tertiary/Quaternary boundary. Note slope flattens due to extinction events believed to be caused by comet/meteor impacts, volcanic activity, sea-level changes, etc. According to this model, life changes so rapidly that the transition forms fail to be fossilized.

In summary the current evolutionary models predict: (1) the rapid changing of life forms due to environmental conditions, (2) the disappearance of the plant or animal (extinction), (3) or its change to another plant or animal (evolution) to meet the new conditions. The possibility also exists that new creatures which arise to fill empty niches at one place on the planet have gone extinct due to changing environmental conditions at another location.

While past research has focused on finding and documenting the intermediate or transitional life forms in an attempt to substantiate the evolutionary model, mass extinction events have replaced punctuated equilibria and phyletic-gradualism as the principle area of macro-evolutionary research and discussion (Donovan, 1989, p. 19). This is due to the evolutionary premise that life progresses toward the more complex and diverse. Anything found above a mass extinction event should, by this model, be more “advanced.” Due to the fact that it is found just above the mass extinction boundary reinforces the premise that life must have evolved relatively “quickly” because it is found in the overlying rocks.

Creationist Origins Model

The creation scientist concludes that all living creatures (i.e., “types” or “kinds”—Genesis 1:21, 24-25) were created and placed within their proper environments by God during the creation week (see Figure 3). Humans were created to fellowship with God and to be the “caretakers” of God’s creation (Gen 1:28-30). Due to sin the perfect planet turned from a garden paradise into a “sin cursed earth” (Gen 3:17-19). Eventually sin reached such levels that God destroyed all but eight members of humanity, as described in Gene-

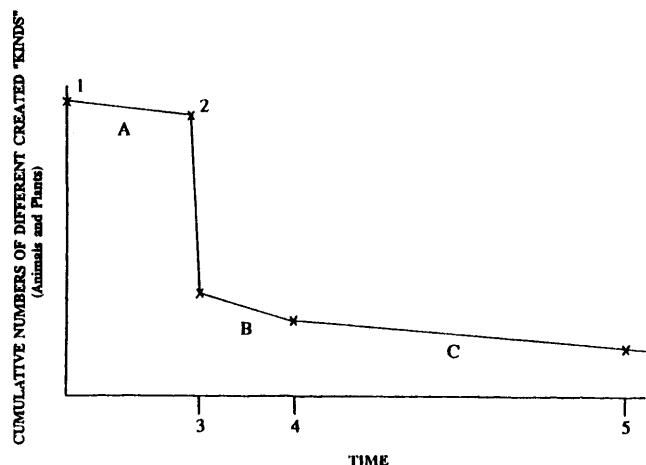


Figure 3. Generalized graph showing the predicted slope (i.e., cumulative numbers of different created "kinds" versus time using the Creation/Flood model. Numbers and letters indicated the following: 1) Creation week event, A) Antediluvian Timeframe and Noachian Flood (note that representatives of all air breathing, non-aquatic animals were on the ark, [Genesis 6:17-20], so all the terrestrial "kinds" were preserved), 2) Flood Event Ends, 3) Beginning of the Post-Flood/Ice Age Timeframe-Earliest civilizations begin (pre- and post dispersion; possibly Genesis 10 and 11), B) Ice Age timeframe, 4) Beginning of the Present Age Timeframe, C) Extinction which occurred naturally (background) and by man, 5) Today on the extinction slope. The Flood event created the greatest fossilized "mass extinction" event ever recorded on earth for both marine and terrestrial life. This event is reflected in the fossil record. Following the end of the Flood and during the ice age timeframe and later, life unable to adapt to new environmental conditions became extinct (without leaving a "fossil" record in most cases!). This model predicts that the greatest extinction of "kinds" occurred starting with the end of the Flood and running through the ice age timeframe.

sis 7:17 to 8:14. The events associated with the Flood would have resulted in the extinction of all terrestrial animals not in the ark or capable of living or surviving in water for many months. Plant life would have been affected, but not at the same level of intensity as animal life.

Following the Flood event, changes occurred in the climate, the character of soils, geography, and elevation of the continents. Many life forms (i.e., plants and animals) were unable to adapt to the new conditions following the Flood and as such they became extinct. However, many animals and plants successfully adapted to the new environmental conditions and survived. Climatic changes evidently played the largest role in the reestablishment of plant and animal life on earth following the Flood event. The single "wet" ice age model as proposed by Oard (1990), would have resulted in temperature variations which stressed both plant and animal life, resulting in greater than present background extinction rates. Additionally, physical conditions associated with tectonics and precipitation would have proven hazardous for the reestablishment of plant and animal life. For example, tectonic uplift would have created new environmental conditions which directly affect the survival of plant and animal life. The formation of continental glaciers would have resulted in immense volumes of water (both snow and rain) being precipitated. During interstadial periods of the single ice age event, large volumes of water could have possibly flowed from the continental glaciers and prove hazardous for life living both near and downstream from the glaciers. Life unable to survive in the new

environmental conditions would have become extinct. Plants and animals which have survived to the present are still subject to extinction, primarily by humans, but some by natural processes (i.e., background extinction).

Fixity Of Kinds

The creationist model predicts that once a plant or animal "kind" is gone, it is gone forever. Additionally, no new "kinds" (Genesis 1:21, 24-25) of life forms would appear (either as transitional or intermediate species) to fill the empty niches. Life forms, i.e., "kinds," (both plant and animal) would remain as they exist today, with variations occurring within them (e.g., dogs, cats, horses, fish, trees, ferns and grasses will vary, but none will evolve into another "kind" of animal or plant). Most creationists have concluded that mutations are rarely favorable to plant or animal and would almost always be destructive to the individual (Lammerts 1964; 1967; 1969; 1977; Moore, 1972; Ouweneel, 1975; Tinkle, 1977).

Lester and Bohlin (1989, pp. 149-191) propose that the evidence for creation can be tested and shown by analyzing: (1) the abrupt appearance of creatures in the fossil record, (2) steady maintenance of the basic body plan through time, (3) adaptive change of the organism, (4) inability of mutations to contribute to the origin of new structures, (5) complexity and integration of the genetic machinery in each living cell, and (6) the complexity and integration of ecosystems. Lester and Bohlin provide an excellent overview and comparison of the three models briefly outlined in this work. The Creationist model predicts that each life form was created basically as it exists today and that the fossil record will reflect the fully formed animal or plant as it was created, without transitional or intermediate forms.

Creationists should approach the fossil record and mass extinction boundaries cautiously due to the "built-in" presuppositions regarding the life and death of plant and animal species. Whether or not a plant or animal is fossilized does not provide any information as to if it later went extinct (e.g., *Coelacanth*, *Lingula*, etc.). For example, many creationists believe that terrestrial dinosaurs were in the ark during the Flood event and some were able to survive the climatic changes which occurred following the Flood. Gish (1992, pp. 80-81) has suggested that some of the dinosaurs possibly lived into the middle ages, becoming the "Dragons" of legends from the Middle East, Asia and Europe.

Creationists as "Care-Takers" of Planet Earth

Our model predicts the end of life when a "type/kind" of plant or animal becomes extinct. We have a fundamental difference of opinion when viewing both the fossil record and life presently on the planet. The evolutionists would have us believe that extinction is a natural form of "life" and that eventually something more suited to the environment will "arise" and fill the niche. Our model predicts an extinction void could be filled by something else, but that something else (i.e., type/kind) is already on the planet and will not "change" into a new type/kind of plant or animal.

We are called to care for the planet (Genesis 2:15) and if we accept Noah's dedication to God's will as our

own example, we should do everything possible to protect and preserve plant and animal species (Genesis 6:19-20) [Dewitt, 1991, p. 91]. However, we must realize that some species may die in spite of all that we can do to save them (Isaiah 55:9, Psalm 104). As Christians, we need to show the world that we are responsible caretakers of life on this planet and more importantly we care for its people too.

Acknowledgments

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References

- CRSQ—*Creation Research Society Quarterly*.
- Allaby, A. and J. Lovelock. 1985. The great extinction: What killed the dinosaurs and devastated the earth? Granada Publishing. Great Britain.
- Alvarez, L. W., W. Alvarez, F. Asaro and H. V. Michel. 1980. Extraterrestrial cause for the Cretaceous-Tertiary extinction. *Science* 208:1095-1108.
- Berggren, W. A. and J. A. Van Couvering (Editors). 1984. Catastrophes and earth history. Princeton University Press. Princeton, NJ.
- Denton, M. 1985. Evolution: A theory in crisis. Adler and Adler Publishing. Bethesda, MD.
- Dewitt, C. B. 1991. Preface. In Dewitt, C. B. (Editor). The environment and the Christian: What can we learn from the New Testament? Baker Book House. Grand Rapids, MI. pp. 7-11.
- Donovan, S. K. 1989. Palaeontological criteria for the recognition of mass extinction. In Donovan, S. K. (editor). Mass extinctions: Processes and evidences. Columbia University Press. New York pp. 19-36.
- Eldredge N. and S. J. Gould. 1972. Punctuated equilibria: An alternative to phyletic gradualism. In Schopf, T. J. M. (Editor). Models in paleobiology. Freeman, Cooper and Company. San Francisco. pp. 82-115.
- _____. 1987. Life pulse: Episodes from the story of the fossil record: Facts on File. New York.
- _____. 1991. The miner's canary: Unraveling the mysteries of extinction. Prentice Hall Press, New York.
- Gish, D. T. 1985. Evolution: The challenge of the fossil record. Creation-Life Publishers. El Cajon, CA.
- _____. 1992. Dinosaurs by design. Creation-Life Publishers. El Cajon, CA.
- _____. 1993. Creation Scientists answer their critics. Institute for Creation Research. El Cajon, CA.
- Hoesch, W. A. 1994. The hyper-environmentalists. Back to Genesis No. 64. Institute for Creation Research. El Cajon, CA.
- Lammerts, W. E. 1984. Discoveries since 1959 which invalidate the evolution theory. CRSQ 1 (Annual):47-55, particularly pp. 49-59.
- _____. 1967. Mutations reveal the glory of God's handiwork. CRSQ 4:35-41.
- _____. 1969. Does the science of genetic and molecular biology really give evidence for evolution? CRSQ 6:5-12.
- _____. 1977. On recombination of rare recessive mutations. CRSQ 14:99-100.
- Lester, L. P. and R. G. Bohlin. 1989. The natural limits to biological change. Second edition. Word Publishing. Dallas.
- Moore. 1972. On chromosomes, mutations and phylogeny. CRSQ 9:159.
- Nitecki, M. H. (Editor). 1984. Extinctions. University of Chicago Press. Chicago.
- Oard, M. J. 1990. An ice age caused by the Genesis Flood. Institute for Creation Research. El Cajon, CA.
- Ouweneel, W. J. 1975. Homoeotic mutants and evolution. CRSQ 12:141-154.
- Raup, D. M. 1991. Extinction: Bad genes or bad luck? W. W. Norton. New York.
- Sharpton, V. L. and P. D. Ward (Editors). 1990. Global catastrophes in earth history: An interdisciplinary conference on impacts, volcanism and mass mortality. Geological Society of America Special Paper 247. Boulder, CO.
- Stanley, S. M. 1987. Extinction. Scientific American Library. W. H. Freeman. New York.
- Tinkle W. J. 1977. The difference between acquired characteristics and mutations. CRSQ 14:113.
- Ward, P. D. 1992. On Methuselah's trail: Living fossils and the great extinctions. W. H. Freeman. New York.
- _____. 1994. The end of evolution: On mass extinctions and the preservation of biodiversity. Bantam Books. New York.
- Carl R. Froede, Jr.*

Extinction of Mammoths and Mastodons

Mammoths, mastodons, and other megafauna supposedly became extinct at the end of the Ice Age, according to most authorities. Yet in 1993 archaeologists were astonished to discover the fossil remains of mammoths as young as 3,700 years ago on the Arctic Island of Wrangel of Siberia (Lister and Bahn, 1994, pp. 34-35, 137). This find should not be surprising to young Earth adherents who discount the extreme ages separating the modern era from the Ice Age.

For years uniformitarian archaeologists have stated that the mammoths and mastodons of North America became extinct between 9-11,000 years ago, after the last Ice Age (Kurten and Anderson, 1980, pp. 345, 352-354; Lister and Bahn, 1994, pp. 119-135; Silver, 1990, p. 36). Creation scientists have also tackled the sudden disappearance of the mammoths, and while there is disagreement as to the exact mechanism for the extinction of the mammoths, there is a consensus that their extinction occurred much more recently than the uniformitarians propose (Dillow, 1977, 1981; Oard, 1990, pp. 124-133). There is also evidence that Paleo-Indians hunted these animals and coexisted with them, living as far south as the Florida peninsula (Alexon, 1988; Carbone, 1983, pp. 4, 11-14; Hoffman, 1983; Lister and Bahn, 1994, pp. 96-114; Neill, 1964; Silver, 1990, 36). There is also some evidence that American elephants existed much later than the Ice Age. Mayan engravings in Central America show elephant-like creatures; a Wisconsin Indian mound resembles the shape of an elephant; North American Indians told of a "great moose" with a kind of limb growing between its shoulders which it used as a fifth leg to prepare its bed. These examples are usually discounted by most authorities (Cohen, 1982, pp. 42-43; Lister and Bahn, 1994, p. 138; Smith, 1915, pp. 340-341).

A few researchers, however, believe that mammoths or mastodons could have existed as recently as the 1500's or 1600's. Thomas Jefferson believed mammoths existed in the western interior of North America, mainly due to stories Indians had told him (Lister and Bahn, 1994, p. 31; Bakeless, 1950, p. 23). As John Bakeless describes:

[The Indians] gravely assured Thomas Jefferson that the hairy mammoth still existed in the wild interior of North America . . . [These Indians] may have simply been trying to tell the white brother what they thought he would like to hear. It is quite as likely, however, that they were remembering tribal traditions not more than a century or two old. The great bones in Kentucky lay on or near the surface of the ground, showing that the huge creatures had not long been dead. Hunters of Daniel Boone's day found the enormous verte-

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brae very comfortable camp seats, admirably rounded to accommodate a hunter's weary rump. Bakeless, 1950, p. 23).

Even more interesting than relatively undisturbed mastodon or mammoth bones is the account of David Ingram who wandered through the eastern section of North America in the 1580's. Ingram's account, though discredited by many, mentions the presence of elephants (this is one of the reasons it is discredited). But the way in which it is mentioned, without emphasis or elaboration, makes one wonder if Ingram was the first (and perhaps last) European to witness a living North American mammoth or mastodon (Ingram, 1589, p. 560).

It is likely these accounts are discredited because most present-day geologists place the Ice Age—and the extinction of large animals like the mammoth and mastodon—to 10 thousand years ago. Yet, if the Ice Age was only several thousand years ago, as young Earth adherents theorize, then the continuing presence of mammoths and mastodons into fairly recent times is not unreasonable. Perhaps the archaeological and cultural evidence for elephants in North America should be reexamined in this light. The mammoth and mastodon extinctions could be much more recent than old-earth adherents indicate.

References

- Alexon, Roger C. 1988. Gingery Cache Site (8Ta99): a cache of possible paleolithic tools found with mastodon bones. *Florida Anthropologist* 41:483-85.
- Bakeless, John. 1950. The eyes of discovery: the pageant of North America as seen by the first explorers. J.B. Lippincott. Philadelphia.
- Carbone, Victor A. 1983. Late Quaternary environments in Florida and the Southeast. *Florida Anthropologist* 36:3-17.
- Cohen, Daniel. 1982. The encyclopedia of monsters. Dodd, Mead. New York.
- Dillow, Jody. 1977. The catastrophic deep-freeze of the Beresovka mammoth. *Creation Research Society Quarterly* 14:5-13.
- . 1981. The waters above: Earth's pre-Flood vapor canopy. Moody Press. Chicago.
- Hoffman, Charles A. 1983. A mammoth kill site in the Silver Springs Run. *Florida Anthropologist* 36:43-87.
- Ingram, David. 1589. The relation of David Ingram. in The principall navigations by Richard Hakluyt. 557-562. Reprint, 1966. University Microfilms, Inc. Ann Arbor, MI.
- Kurtén, Björn and Elaine Anderson. 1980. Pleistocene mammals of North America. Columbia University Press. New York.
- Lister, Adrain and Paul Bahn. 1994. Mammoths. Macmillan. New York.
- Neill, Wilfred T. 1964. The association of Suwanee points and extinct animals in Florida. *Florida Anthropologist* 17:17-32.
- Oard, Michael T. 1990. An ice age caused by the Genesis Flood. Institute for Creation Research. El Cajon, CA.
- Silver, Timothy. 1990. A new face on the countryside: Indians, colonists, and slaves in South Atlantic forests, 1500-1800. Cambridge University Press. Chicago.
- Smith, G. Eliot. 1915. Pre-Columbian representations of the elephant in America. *Nature* 96:340-341.

Brian Rucker*

Running: The Human Foot Uses Automatic Transmission

How effective would locomotion be if humans did not have toes? How would locomotion be if bones, joints and muscles did not have an efficient leverage system to provide movement? An interesting hypothesis by David R. Carrier and co-workers at Brown University suggests that "the human feet improve locomotion

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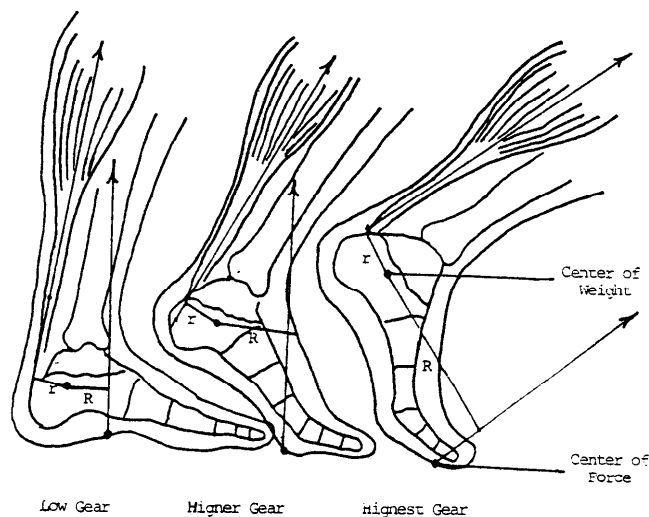


Figure 1. Increased gear ratio (R/r) of foot push-off in running due to moving center of weight.

tor performance by varying the velocity ratio between the ankle extensor muscles and the point of application of the force on the ground (center of force) during the contact phase of a running Step." (Carrier, Heglund, and Earls, 1994, p. 651). Although the technical definition of a gear is "a moving part receiving or imparting force by means of teeth engaging with teeth of a corresponding part," these physiologists claim the bony levers of the foot act "as gears," because during forward translation the foot automatically increases the length of the moment arm between the ankle and the force exerted on the ground, and this increases the velocity ratio of the joint movements. In effect, this functions similar to "shifting gears." This phenomenon of shifting gears is evidence for design and runs contrary to evolution. This factor will not directly aid in survival and cannot be explained adequately by natural selection, i.e., the system will not function until all of the units are in place; thus it would not be selected until the entire system is functional.

The proposed model claims the foot, during running at a constant speed, is a simple Type 1 lever of zero mass with the fulcrum at the ankle by means of the equation $R \times Fr = r \times Fm$, where R is the ground force moment arm, Fr is the ground reaction force, r is the muscle force moment arm, and Fm is the muscle force. During the contact time of a stride, the point at which force is applied to the ground (center of force) moves from under the heel or mid-portion of the foot at touchdown to the tips of the toes at takeoff. Theoretically, this increases the "gear ratio (R/r)" of the foot push off.

Automatic variable gearing would be advantageous in speed running, as it is with the automobile, because in both cases the engines (cross-bridges in the muscle cell and piston assembly in the automobile engine) have a limited speed range over which they can operate at optimal efficiency or peak power (Hill, 1950, p. 209). In order to control a narrow range of optimal engine speeds in automobiles despite changing driving speeds, the ratio of engine speed to driving speed must be altered by an automatic variable "gear ratio." Also, human skeletal muscles have unique properties that

can benefit from automatic variable "gear changing" within the contact time of running strides. Active muscles that are naturally stretched just before shortening are able to perform more work during the total shortening phase. This nonelastic improvement of the contractile properties of the muscle increases, within limits, with the expanded stretch length (Cavagna, Mazzanti, Heglund and Citterio, 1986, p. 571) but is effective over relatively small shortening distances. If a runner were to land at a low gear ratio (R/r) and take off at a higher gear ratio, both the pre-stretch and the subsequent shortening of the muscles could be optimized. Thus, automatic variable "gear changing" would allow humans to move more efficiently, accelerate more quickly, run at higher speeds and possibly even jump higher.

To test this hypothesis, five subjects (three males and two females) ran over a Kistler 9281B force plate apparatus. A sagittal view of the lower limb position was recorded with a Peak high-speed video camera at 120 frames/second. Force recordings on the ground allowed calculation of the magnitude and direction of the ground reaction force and the position of the center of force under the foot landing. For each video frame taken during foot support (at 8.33-ms intervals), the ground force moment arm (R) was computed by dividing the moment at the ankle by the resultant of the horizontal and vertical ground forces. Likewise, the muscle force moment arm (r) was computed as the perpendicular distance from the tendocalcaneus to the calcaneus (heel) bone.

The analysis revealed that during a foot strike, the foot bones act as a team of levers that automatically "shift gears." One lever arm, from the triceps surae muscle (two gastrocnemii and one soleus with their tendocalcaneus tendon) to the calcaneus bone, transfers force to the second lever arm, which runs from the bottom of the tarsal bones to the point where the force is applied to the ground. When the calcaneus lands and the calf muscles absorb the impact, the ratio of the two lever arms (gear ratio) was low, i.e., less than one. As the weight on the foot moves forward to the toes, the lever arm ratio (gear ratio) increases to about three or four, as the second lever arm becomes longer. According to the authors, this keeps "the muscle operating at a lower velocity and in the higher force portion of the force-velocity curve and quite likely would tend to maintain the muscles at a relatively high power and efficiency." (Carrier et al., 1994, pp. 652-653).

Not mentioned by the authors is that this occurs automatically. The gears (lever arms) hook up and disconnect naturally and efficiently as needed by the body. There is no outside mechanism (clutch) that manually controls the gear shifting. The ultimate machine, i.e., the human body, had an efficiently designed automatic transmission long before the humanly designed automobile.

The concept of automatic variable musculoskeletal gear changing has received relatively little attention from biomechanists. The question is: how did this precisely designed automatic transmission system arise in humans? Did it result from trial and error following random physicochemical laws over millions of years or was it put together by a divine Designer who programmed the molecules to organize their structure

(bones and muscles) to function as an automatic transmission system? We know that it took an intelligent human designer, i.e., a creative automotive engineer, to plan and construct our automobile automatic transmissions to function so efficiently. Since designs infer a designer, an unbiased observer would have great difficulty denying the rationality of inferring that the precise functioning automatic gear systems of the human foot had to be designed by an outside, suprahuman intelligent agent which we normally call the Creator.

References

- Carrier, D. R., Heglund and K. D. Earls. 1994. Variable gearing during locomotion in the human musculoskeletal system. *Science* 265:651-653.
- Cavagna, G. A., M. Mazzanti, N. C. Heglund and G. Citterio. 1986. Mechanical transients initiated by ramp stretch and release to P_0 in frog muscle fibers. *American Journal of Physiology* 251:C571.
- Hill, A. V. 1950. The dimensions of animals and their muscular dynamics. *Science Progress* 38:209.

David A. Kaufmann*

Wood Rats, Plant Fossils, Plovers, and the Origin of Creosote Bush Deserts

The Creosote Bush

Some years ago Walter Lammerts (1971) supplied strong evidence favoring a recent origin for the deserts of the Southwestern United States. Botanist Philip V. Wells (1985) has also supported such a recent drying trend, and he has traced the history of the creosote bush (*Larrea divaricata*) in his highly informative review. The creosote bush is a drought-enduring shrub which now covers thousands of square kilometers from Palmdale, California to the Big Bend National Park, TX (Figures 1 and 2). The creosote bush, the tar bush, and many other desert plants appear to have been designed to thrive in the extremely high temperatures and dry climates of the Chihuahuan, Sonoran, and Mohave Deserts.

Fossil Nests

Wells (1985) based his chronological arguments on carbon-14 dates of plant materials found in the fossilized nests ("middens") of wood rats (genus *Neotoma*) from various desert localities. Wood rats (also called "pack rats") hide portions of plants (seeds, fruit, twigs, leaves, etc.) as food in their nests, which also are constructed of leaves and branches from nearby plants (Figure 3). Consequently, wood rats have unwittingly become important botanical technicians for sampling the plant communities in which they lived. Wells identified and listed these plant materials from wood rat nests and dated their cellulosic residues.

C-14 Dating

The amount of C-14 present (per gram of carbon-containing cellulose in the sample) is measured by appropriate counting and analytical procedures. All of this is quite "scientific," but in converting those ratios to dates, it is necessary to make three non-scientific assumptions. 1.) The plant must have carried out photosynthesis (and other phases of anabolism) in an atmosphere which had the same C-14/C-12 ratio as occurs

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Figure 1. *Larrea divaricata* ssp. *tridentata*, creosote bush, Mohave race. Photograph near Rosamond, CA. David Dobson is at the right.



Figure 2. *Larrea divaricata* ssp. *tridentata*, creosote bush. Mohave race. Flower and hairy fruits visible on this closer view, Rosamond, CA.



Figure 3. *Neotoma*, The Wood Rat. This wood rat scurried across a freeway when its home was being destroyed by a brush fire. Photo by Gary Thornhill, *The Newhall Signal*, p. 1, June 30, 1995. Used by permission.

in today's atmosphere. 2.) No significant amounts of C-14 or C-12 have been added to (or removed from) the plant materials since the time of their death. 3.) C-14 has always decayed into N-14 at its present rate, without any changes in the decay rate throughout history. However, none of the above assumptions can be guaranteed. The assumptions and other weaknesses of the C-14 dating procedures have been examined in many CRSQ articles (see appropriate listings in Wolfrom, 1992). In discussing Wells' work I will assume that the C-14 dates he reported possess *relative* accuracy in regards to sample order.

Pack Rat Data

Wells (1985, p. 272) assumed that nest samples which he dated from 20,000 down to 14,800 C-14 years before present were of what he called "full glacial age," meaning that they were formed at the peak of the "pluvial" period during Wisconsin glaciation. He assumed that two nests which he dated at 12,000 and at 11,560 years respectively were fossilized during a transition period when the moist and cool pluvial climate had "... begun to warm or to dessicate" p. 272. One midden that gave a date of 4,200 years was assigned by Wells to mid Holocene, which is after the last glacial advance and after the deserts had come into existence. Two very old wood rat nests contained plant remains which he dated at 36,600 and 40,000 C-14 years respectively.

Middens that he assumed to have come from Ice-age time (dating from 20,000 to 11,560 years) did not contain plants from a typical desert ecosystem. Instead they provided plant pieces from forests composed of pine, juniper and various oaks (pp. 271-272). He concluded that our present desert areas did not support desert vegetation at this time but instead were forests; deserts evidently arose in these localities later, after the glaciers retreated. Several of the drought-resistant shrubs like creosote bush and tar bush were entirely absent from ice-age fossil remains:

Significantly, the macrofossil record of the pluvial age contains no trace of the extreme xerophytes of the lowest and most arid sectors of the existing Chihuahua Desert such as creosote bush . . . and

the tar bush (*Flourensia cernua* DC.), two shrubs that dominate the sparse vegetation over many thousands of square miles of desert today. . . Nor is there any pluvial record of ocotillo . . . , candelilla . . . , or the subtropical bromeliad (*Hechtia scariosa* L. B. Sm). The ocotillo and other desert species do appear later in the mid Holocene *Neotoma* middens with a radio-carbon age of $4,200 \pm 80$ years (UCLA-1062) in Marvillas Canyon at an elevation of 610 m. . . (Wells, 1985, p. 272).

According to these wood rat "records," the American Southwest underwent a marked change such that creosote bush, together with other desert plants, invaded vast stretches of land to form today's warm deserts in relatively recent time.

The arrival and establishment of *Larrea* in the North American deserts has been recent: . . . there is conclusive evidence that the present wide dominance of the *Larrea* zone throughout southwestern North America was not attained before the Holocene (Wells, 1985, p. 273).

None of the fossil wood rat nests from the full-glacial time at any of the three desert areas contained *Larrea*. All of the above data fit with the creationist idea that deserts formed after the Flood.

A South American Source for *Larrea*

Several other features of Wells' report will interest creationists. Based on taxonomic and chromosomal evidence, Wells speculated that creosote bush probably came from South America, where there are several other species of this same genus, some of which display considerable variation in leaf morphology. Chemically, the extensive North American populations of creosote bush are highly uniform, ". . . whereas the South American species . . . show considerable geographic diversity in their chemistry, again indicating a greater antiquity for the genus in South America" p. 272).

Another line of evidence favoring the recent migration of creosote bush northward from South America is the number of chromosomes in each of its three populations (which Wells calls races), located in the three major deserts. The race located in the southernmost (Chihuahuan) desert is diploid ($n = 13$). Then the creosote bush race found in the adjacent desert (Sonoran) is tetraploid, having twice the chromosome number ($n = 26$) of the Chihuahuan race. Finally, the race existing in the Mohave Desert is hexaploid ($n = 39$) with six genome sets of chromosomes in the somatic cells.

The remarkably annectant, largely allopatric, distributional areas of the diploid, tetraploid, and hexaploid races of *Larrea divaricata* ssp. *tridentata* are nearly congruent with the boundaries of the Chihuahuan, Sonoran, and Mohave Deserts, respectively . . . (Wells, 1985, p. 273)

Wells wisely suggested that the Mohave hexaploid race probably came from the Sonoran tetraploid, which in turn arose from the Chihuahuan diploid race.

One problem with this polyploid sequence of events for the origin of the creosote bush races is that the tetraploid and the hexaploid appear to be what are

called "autopolyploids," having extra sets of the same original genome. Ordinarily autopolyploidy causes reduced fertility because multivalent or monovalent tetrads which form during meiosis lead to gametes with unbalanced chromosome numbers. The Designer may have circumvented the sterility problems usually associated with autopolyploidy by practicing a form of genetic engineering at critical times after the Flood. Lammerts proposed a similar origins idea in a previous paper—Howe and Lammerts, 1980, p. 6.

Enter The Plover

After evaluating and rejecting some other possible explanations as to how *Larrea* could have achieved its puzzling disjunct pattern of distribution (in South America and then in the North American deserts), Wells decided that: "Land distance transport across the wet tropics by bird dispersal seems to be the most feasible possibility" p. 273. Golden plovers migrate from Patagonia to Alaska (and back again) each year. Likewise plovers carry seeds of plants cemented by their own dung to the feathers underneath their tails, a phenomenon that has been called the "slovenly plover" mechanism of plant seed dispersal (p. 273).

Wells related that millions of plovers annually fly the right route so that the ". . . diploid South American *Larrea divaricata*, which is apparently self-compatible, could have reached the Chihuahuan Desert of North America by a single direct dispersal" Wells, 1985, p. 273.

C-14 Problem

Wells reported and discussed many other data from his own research and from the studies of other paleobotanists. For example, one fossil midden from the New Water Mountains of western Arizona, not only contained *Larrea* remains but also contained juniper and oak macrofossils. Both fossil materials of that nest were dated by C-14 methods. Wells stated that:

. . . separate dating of macrofossils of each gave an age of only $2,710 \pm 280$ years for the *Larrea* in contrast to $11,000 \pm 505$ years for the *Juniperus* . . . (p. 274)

This discovery highlights the problems of the C-14 method and the uncertainty of the resulting dates; here in the same nest were pieces from plants that evidently lived contemporaneously but gave dates differing by more than 8,000 C-14 years! Wells had nothing more to say about this amazing discrepancy which would seem to warrant extensive discussion.

Summary

Young-earth creationists will discover much to ponder in Wells' work. If the C-14 dates can be trusted at all, the Wisconsin glaciation ended quite recently. After the glaciers, vast stretches of forest land changed into the warm deserts of today as the climate changed, and one key desert species (creosote bush) was evidently brought here from South America. After the Flood and the glaciers, God may have used the sloppy habits of one individual plover to introduce the most important plant species which now covers all three warm deserts of North America.

Fossil nests of the lowly wood rat have become origins laboratories, supplying scientists with direct information about vegetational history. When considering paleoecology, plovers, and wood rats, the Lord's oft-quoted question comes to mind: "For who hath despised the day of small things?" (Zechariah 4:10)

References

- CRSQ—*Creation Research Society Quarterly*.
 Howe, G. F. and W. E. Lammerts. 1980. Biogeography from a creationist perspective: II the origin and distribution of cultivated plants. *CRSQ* 17:4-18.
 Lammerts, W. E. 1971. On the recent origin of the Pacific Southwest deserts. *CRSQ* 8:50-54.
 Wells, P. V. 1985. Post-glacial origin of the present Chihuahuan Desert less than 11,500 years ago. In Dickerson, P. W. and W. R. Muehlberger, Editors: *Structure and tectonics of Trans-Pecos, Texas*. West Texas Geological Society, Midland, TX.
 Wolfrom, G. W. 1992. *Creation Research Society Index and Guide to Volumes 21-28*. Creation Research Society Books, Ashland, OH.
 George F. Howe*

CRSQ Volume 23

Introduction

The *Creation Research Society Quarterly* has been published since 1964 (31 complete volumes). In an effort to make these volumes available, all of the missing issues have been reprinted. Brief synopses have been written on volumes 1-22 and have appeared in the previous 22 Quarterlies. In each synopsis, major articles are reviewed to give a person interested in scientific creationism a general idea of the contents of that volume. Many of the articles are of continuing interest and value. Volume 23 could be called the teleological volume since many of the writings delve into purposefulness and design in nature.

Summer Afternoon and Evening Thundershowers: A Teleological Approach

The second symposium of collected papers on a designated topic to be published in the Quarterly was concerned with thundershowers. Williams (1986a, pp. 6-7) presented an overview of the topic. The benefits of this type of precipitation were noted. Klotz (1986, pp. 7-8) discussed the effect of these showers on plants as the time of occurrence allows for maximum plant growth. Holroyd (1986, pp. 8-10) in a meteorological dissertation explained that the showers served "... an important function in the regulation of the temperature of the surface environment" (p. 10). DeYoung (1986a, pp. 10-11) covered many fascinating teleological details of thundershowers. Howe (1986a, p. 11) highlighted rain in Arizona and noted that "... afternoon showers supply most of the rain that the Kaibab Plateau ever receives." The cover of the March 1987 Quarterly was a beautiful photograph of a lightning stroke taken by Kenneth Nash (1987, pp. 138-139).

Biology

General

Lammerts (1986c, pp. 120-121) reviewed an article that described the link from Newton to Darwin. Particularly emphasized in the review were the defects

*24635 Apple Street, Santa Clarita, CA 91321-2614. I am grateful to E. L. Williams or bringing Wells' paper to my attention.

using natural selection as a mechanism for supposed molecules-to-man evolution

Botany

A field study on the yuccas of the southwestern United States was performed by George Howe (1986b, pp. 12-20). Employing numerical taxonomy, the author placed the nine species into three groups and suggested applications from a creation model of origins. Some of the topics covered were:

- Yuccas in the lily family
- Criteria for classifying yuccas
- Taxonomic splitting
- Mathematical taxonomy
- Origin of yucca groups
- Yucca fossils
- Yucca pollination by a genus of moth

A brief review of an article was written by Williams (1986e, pp. 116-117) on the supposed forest decline caused either by acid rain or lack of soil minerals. A young earth interpretation was offered. The autumn colors of leaves of some plants was considered by Holroyd (1987, p. 179). He stated that:

It seems that only mankind notices and appreciates the brilliant autumn colors. In view of the apparent lack of any other purpose for those colors it would therefore seem that they are a gift and a signature of a loving Creator who designed the plants with a variety of autumn colors solely for the pleasure of mankind.

Zoology

Williams (1986b, pp. 27-28) reviewed a Master's thesis concerned with the use of changes that occur to the English peppered moth (*Biston betularia* L.) as an example of evolution. Actually the change (melanism) that occurs in the populations of the moths is a poor example of supraspecific evolution. The eyes of the jumping spider were briefly examined from a design perspective by Hamilton (1986, pp. 63-64). The same author (Hamilton, 1987, pp. 177-178) discussed some characteristics of the eyes of snakes in the order Ophidia. The evolutionary mechanism of divergence for the development of the eyes of these creatures was dismissed and it was suggested that a superior "... Intelligence designed the Ophidian eye along with its other senses to wonderfully satisfy its peculiar needs in its appointed environment" (p. 178). Frank Marsh (1987, pp. 145-151) discussed his research on hyperparasitism involving a five-linked food chain of insects. A creationist interpretation of the data was given. This interesting interaction between organisms seems to be a situation that is best viewed from a design standpoint. The December 1986 cover contained three scanning electron microscopy photographs of a Japanese beetle (*Popillia japonica*). The destructive beetle is well-designed to feast upon many varieties of plants (White, 1986, pp. 89-90). Was there another function that this creature performed before the Fall?

Genetics

A review of an article on molecular taxonomy comparing the DNA and RNA of various species was written by Lammerts (1986b, pp. 78-79). The author rightly questioned how could enough collagen remain in a

fossil reputed to be two million years old to permit an analysis of the substance. Lammerts concluded that these fossils are not as old as claimed. Also a brief discussion of the Piltdown man was offered. Mehlert (1986c, pp. 131-132) pointed out the rise and fall of various evolutionary mechanisms as an indication of the inadequacies of naturalistic theories. Gradualism vs. punctuated equilibria was considered. Wolfrom (1987, pp. 178-179) outlined some findings "... that cheetahs lack genetic diversity usually observed in wild animal populations" (p. 178). He then asked why have the animals survived the past 10,000 years with this genetic "defect." So much evolutionary reasoning leads scientists up blind alleys.

Archaeology

Johns (1986, p. 37) noted some problems in the carbon-14 dating of Egyptian artifacts. The contamination by modern wood, the reuse of ancient wood for funerary artifacts and the destructiveness of the method itself to valuable artifacts were briefly examined. A review of the problems confronting biblical archaeology was detailed by von Fange (1986, pp. 93-99). The interpretation of field evidence and the typical chronology arguments that surface in creation-evolution discussions were covered.

Chemistry

The stereochemical design in lipid molecules was discussed by Heyes (1986, pp. 20-27). The topics reported from a teleological viewpoint were:

- Structure of biolipids
- Brain lipids
- Hormones
- Biosynthesis of lipids
- Stereoisomers
- Materialistic speculation

The laws of thermodynamics were elucidated in a popular manner by Matzko (1986, p. 29). The laws were explained within a creationist format and their implications outlined. In a well-written letter, Benton (1986, p. 86) used thermodynamic reasoning in a presentation of snowflakes and zygotes!

Astronomy

Don DeYoung (1986b, p. 117) briefly examined "bubbles" in space. He noted that: "The natural origin of the universe remains an insoluble problem for cosmologists." Readers may be interested in a new book by Russell Humphreys (1994) which outlines a new creationist cosmology. A letter written by DeYoung (1986c, pp. 129-131) on the subject of an empty place in the north (Job 26:7) from scientific and biblical standpoints was included in this volume. A very perceptive essay on comets was authored by Steidl (1987, pp. 153-160). Since comets are quite fragile objects, they cannot exist for more than a few hundred revolutions around the sun. Thus it is likely that the continuing presence of comets is evidence for a young solar system. Various naturalistic theories, which cannot account for comets, were debunked by the author. The redshift controversy and the age of the universe were briefly addressed by Oard (1987, p. 176). Klotz (1987b, p. 176) suggested that Galileo was not persecuted for his belief in the heliocentric universe and offered evidence to support the claim.

Physics, Mathematics, Age of the Earth, Pre-Flood Canopy

Tom Barnes (1986, pp. 30-33), using circuit theory, claimed that in yet another way the earth's young magnetic age had been confirmed. Later Barnes (1987, pp. 167-171) exposed the lack of reasoning of a theistic evolutionist concerning various theories or the age of the solar system. He effectively defended certain evidences that suggest a recent creation. A unique model of a pre-Flood canopy was developed by Johnson (1986, pp. 54-61). He suggested that a combination of a liquid water and ice canopy met "... the requirements of both temperature and radiant energy for the pre-Flood era" (p. 61). Also it would require a miracle or some undiscovered physical mechanism to maintain such a canopy. A critical examination of quantum physics was conducted by Smith and Geist (1986, pp. 66-71). Some of the flawed philosophic conclusions drawn from quantum mechanics were exposed. Humphreys (1986, p. 115) offered some data on the magnetic field of Uranus that supported his model for the creation of planetary magnetic fields.

The general theory of relativity was explored from a creationist view by Chaffin (1986, pp. 118-120). Some interesting conclusions were developed in the discussion. A mathematical model to explain physical reality was presented by Herrmann (1986, pp. 47-54). This was the final selection in a series on the author's deductive-world model and its relation to Scripture.

Geology

A continuing bibliography on wrong-order formations in the geologic column was listed in this volume (Lammerts, 1986a, p. 38; 1986d, p. 133). Some local flood damage in Nelson County, Virginia as a result of hurricane Camille in 1969 was discussed by Williams (1986c, pp. 62-63). Applications from this catastrophe were compared with what possibly could have happened in the Deluge. Woodmorappe (1986 pp. 79-83) defended his Flood model against some recent criticism from another creationist geologist. Topics discussed were the improbability of long-distant transport of fragile plant material, most sediment eroded from the continents would not settle in deep ocean basins, reproductive-repopulation models after the Flood, ecological zonation, differential escape during a Flood, desiccation mudcracks vs. synaeresis cracks and pure sandstone without fossils not being proof of slow deposition. A comparison of diluvology and uniformitarian geology was presented by Mehlert (1986a, pp. 104-109). He defended Woodmorappe's Flood model (Woodmorappe, 1993) against gradualism so prevalent in geological circles. Peterson (1986, p. 129) disagreed with an earlier article in the Quarterly on an expanding earth model.

A field study in the Grand Canyon (Waisgerber, Howe and Williams 1987, pp. 160-167) concerning a supposed unconformity between the Mississippian Redwall Limestone and Cambrian Muav Limestone was the subject of an article. Micaceous shale layers found in both limestones supports the claim that the Mississippian and Cambrian formations were deposited almost simultaneously. Also other evidences were noted that suggested a rapid deposition of one limestone on the other without the necessity of a 200-million-year hiatus. This research report deserves serious study.

Paleontology, Palynology, Ichnology

The September Quarterly cover photograph revealed a polystrate tree trunk embedded in a cliff at Joggins, Nova Scotia (Mulfinger 1986, pp. 41-42). Likely this trunk was buried during a catastrophic event. An earlier Quarterly article contained a section on polystrate fossil tree trunks (Rupke, 1966). The first part of a series on the Society's work in the discovery of pollen grains in rocks designated as Precambrian was written by George Howe (1986d, pp. 99-104). He traced the history of Cliff Burdick's work, a later field trip by Williams and Howe and the methods used to extract the fossil pollen from the rocks. Part II of this series detailed some experiments concerning possible modern pollen contamination on microscope slides (Lammerts and Howe, 1987, pp. 151-153). These tests were undertaken to illustrate how difficult it is to contaminate slides with recent pollen grains when examining palynomorphs. It was almost impossible to contaminate slides by airborne pollen during slide preparation in the laboratory. Likewise the likelihood of contamination of rock samples by airborne pollen while collecting in the field is highly unlikely when reasonable care is taken. Some trace fossil findings are discussed from a creationist standpoint by Calais (1987, pp. 176-177). An article review by Polsdorfer (1987, pp. 179-180) briefly covered some aspects of the *Archaeopteryx* controversy. Mehlert (1986b, pp. 128-129) presented some fossil evidence that speaks against the "constancy of change."

Philosophy

An interesting exchange between Wolfe (1986, pp. 84-85) and Ancil (1986, p. 85) occurred on the subjects of substance, change and continuity in the creation-evolution debate. The non-material hypothesis and its implications for modern science were elucidated by Riemen (1987, pp. 141-145). Examples were given from the physical, biological, medical and social sciences. Klotz (1987a, pp. 173-174) pointed out the unfair attacks on Bishop Lightfoot concerning the exact hour of creation. It appears that some of Andrew White's writings on the subject are simply untrue. Different discussions of the watchmaker argument (intelligent design) were offered by Williams (1986d, pp. 64-65) and Howe (1986c, p. 65). One was taken from an 1868 novel and the other was an update of the argument. McGhee (1986, p. 131) suggested that when the terms chance, luck and randomness are used in a scientific context they are employed to hide ignorance as to why a series of events has transpired.

This volume of the Quarterly makes for interesting reading on a wide variety of subjects.

References

- CRSQ—*Creation Research Society Quarterly*.
 Ancil, R. E. 1986. Reply to Wolfe. *CRSQ* 23:85.
 Barnes, T. G. 1986. Earth's young magnetic age confirmed. *CRSQ* 23:30-33.
 ———. 1987. The dilemma of a theistic evolutionist: An answer to Howard Van Till. *CRSQ* 23:167-171.
 Benton, D. J. 1986. Thermodynamics, snowflakes and zygotes. *CRSQ* 23:86.
 Calais, R. C. 1987. Another crypto-ichnological excursion. *CRSQ* 23:176-177.
 Chaffin, E. F. 1986. Article review of Hermann Weyl and the unity of knowledge. *CRSQ* 23:118-120.
 DeYoung, D. B. 1986a. Watering the land. *CRSQ* 23:10-11.
 ———. 1986b. Bubbles in space. *CRSQ* 23:117.
 ———. 1986c. Is there an "empty place" in the north? *CRSQ* 23:129-131.
 Hamilton, H. S. 1986. The jumping spider's wondrous eyes. *CRSQ* 23:63-64.
 ———. 1987. The snake's spectacular spectacle. *CRSQ* 23:177-178.
 Herrmann, R. A. 1986. D-world evidence. *CRSQ* 23:47-54.
 Heyes, G. B. 1986. Stereochemical design in lipids. *CRSQ* 23:20-27.
 Holroyd, III, E. W. 1986. Some notes on the timing of precipitation and the thermodynamics of afternoon showers. *CRSQ* 23:8-10.
 ———. 1987. Autumn colors. *CRSQ* 23:179.
 Howe, G. F. 1986a. Arizona rain. *CRSQ* 23:11.
 ———. 1986b. Yuccas of the southwestern United States: A study in numerical taxonomy and in origins at the species level. *CRSQ* 23:12-20.
 ———. 1986c. Addendum to as a watch needs a watchmaker. *CRSQ* 23:65.
 ———. 1986d. Creation Research Society studies on Precambrian pollen: Part I—a review. *CRSQ* 23:99-104.
 Humphreys, D. R. 1986. The magnetic field of Uranus. *CRSQ* 23:115.
 ———. 1994. Starlight and time: Solving the puzzle of distant starlight in a young universe. Master Books. Colorado Springs.
 Johns, W. H. 1986. Egypt and carbon-14 dating. *CRSQ* 23:37.
 Johnson, G. L. 1986. Global heat balance with a liquid water and ice canopy. *CRSQ* 23:54-61.
 Klotz, J. W. 1986. Water for plants. *CRSQ* 23:7-8.
 ———. 1987a. Bishop Lightfoot and the exact hour of creation. *CRSQ* 23:173-174.
 ———. 1987b. The "crime" of Galileo. *CRSQ* 23:176.
 Lammerts, W. E. 1986a. Recorded instances of wrong-order formations: A bibliography—part VI. *CRSQ* 23:38.
 ———. 1986b. Article review of molecular approaches to the identification of species. *CRSQ* 23:78-79.
 ———. 1986c. Article review of natural sciences in the 1830's: The link from Newton to Darwin. *CRSQ* 23:120-121.
 ———. 1986d. Recorded instances of wrong-order formations: A bibliography—part VII. *CRSQ* 23:133.
 Lammerts, W. E. and G. F. Howe. 1987. Creation Research Society studies on Precambrian pollen—part II: Experiments on atmospheric pollen contamination of microscope slides. *CRSQ* 23:151-153.
 Marsh, F. L. 1987. Five-linked food chain of insects. *CRSQ* 23:145-151.
 McGhee, L. 1986. Chance, luck and randomness. *CRSQ* 23:131.
 Matzko, G. 1986. Thermodynamics and the Christian. *CRSQ* 23:29.
 Mehlert, A. W. 1986a. Diluvialism and uniformitarian geology—a review. *CRSQ* 23:104-109.
 ———. 1986b. Creation science, taxonomy and fossils. *CRSQ* 23:128-129.
 ———. 1986c. Evolution's revolutions. *CRSQ* 23:131-132.
 Mulfinger, G. 1986. Cover photograph and caption. *CRSQ* 23:41-42.
 Nash, K. A. 1987. Cover photograph and caption. *CRSQ* 23:137-138.
 Oard, M. J. 1987. The redshift controversy. *CRSQ* 23:176.
 Peterson, E. 1986. Flaw in expanding earth model. *CRSQ* 23:129.
 Polsdorfer, J. R. 1987. Article review of the *Archaeopteryx* flap. *CRSQ* 23:179-180.
 Riemen, W. P. 1987. The non-material hypothesis and its implications for modern science. *CRSQ* 23:141-145.
 Rupke, N. A. 1966. Prolegomena to a study of cataclysmal sedimentation. *CRSQ* 3(1):16-37.
 Smith, S. G. and C. E. Geist, Jr. 1986. Quantum physics: Historical review and current directions. *CRSQ* 23:66-71.
 Steidl, P. M. 1987. Comets and creation: *CRSQ* 23:153-160.
 von Fange, E. A. 1986. A review of problems confronting biblical archaeology. *CRSQ* 23:93-99.
 Waisgerber, W., G. F. Howe and E. L. Williams. 1987. Mississippian and Cambrian strata interbedding: 200 million years hiatus in question. *CRSQ* 23:160-167.
 White, R. R. 1986. Cover photograph and caption. *CRSQ* 23:89-90.
 Williams, E. L. 1986a. Overview of symposium on summer afternoon and evening thundershowers: A teleological approach. *CRSQ* 23:6-7.
 ———. 1986b. A reevaluation of the English peppered moth's use as an example of evolution in progress (Osborne). *CRSQ* 23:27-28.

- _____. 1986c. Local flood damage. *CRSQ* 23:62-63.
- _____. 1986d. As a watch needs a watchmaker (circa 1868). *CRSQ* 23:64-65.
- _____. 1986e. Acid rain or lack of minerals causing forest decline: A view from a young earth perspective. *CRSQ* 23:116-117.
- Wolfe, S. T. 1986. Substance or no substance—the plot thickens. *CRSQ* 23:84-85.

- Wolfrom, G. W. 1987. The genetics of cheetahs. *CRSQ* 23:178-179.
- Woodmorappe, J. 1986. Some additional comments concerning several matters (part II). *CRSQ* 23:79-83.
- _____. 1993. *Studies in Flood geology: A compilation of research studies supporting Creation and the Flood*. Institute for Creation Research. El Cajon, CA.

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BOOK REVIEWS

I Studied Inscriptions from before the Flood edited by Richard S. Hess and David T. Tsumura. 1994. Eisenbrauns. Winona Lake, IN. 480 pages. \$60.00.

Reviewed by Don B. DeYoung*

This publisher specializes in studies of the Ancient Near East. The scholarly books typically assume a working knowledge of Hebrew and other ancient languages. For readers with the courage to explore such texts, a treasure of ideas awaits.

The unusual title of this book is not a quote from some modern Indiana Jones. Instead it comes from the writings of Ashurbanipal, king of Assyria during 669-626 B.C. His library, uncovered in Ninevah a century ago, includes the Enuma Elish and Gilgamesh Epic (Babylonian creation and flood accounts).

In this book 28 authors compare Ancient Near Eastern writings with Genesis 1-11. I had expected a liberal approach to Genesis from these world-class scholars but was pleasantly surprised. The popular idea that Genesis 1-2 is a composite of two separate, conflicting creation stories (J an P, Jaywistic and Priestly accounts) is thoroughly debunked (p. 27). "The first part of the story [Gen. 1] relates the creation of mankind in general . . . the second part of the story [Gen. 2] narrates it in more specific terms" (p. 169). Two examples of similar writing style from contemporary Sumerian and Akkadian literature are described.

Writer E. A. Speiser considers the location of the Garden of Eden, "obviously a geographic reality" (p. 175). Many scholars reject a literal garden, but the only "real fantasy in this instance is the unintentional contribution of interpreters" (p. 175). The entire book is carefully referenced, including those who have placed the original garden in Australia, Mongolia, and even at the North Pole!

This volume shows the depth of creation research that is being done by analysis of ancient literature. Ashurbanipal fully accepted the creation and flood accounts; this book will encourage readers to do the same.

Genetic Engineering: Dreams and Nightmares by Enzo Russo and David Cove. 1995. Freeman. New York. 234 pages. \$22.95 hardcover. This review is based on a pre-publication copy.

Reviewed by Eugene F. Chaffin**

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The future is likely to bring human embryo research, the misuse of genetic screening, the release of genetically engineered microbes, plants, and animals into the environment, and the modification of genes in the human germ line. All of these possibilities and more are discussed in this book, written by two Europeans but addressed primarily to an American audience. The authors are not creationists, and apparently are not very familiar with creationist literature, judging by various statements in the book. For instance, in the chapter on science, technology, and ethics they denounce the *Deus ex machina* philosophy as explaining almost everything but teaching nothing.

The authors divide the book into three parts: an exposition of our knowledge of genes, DNA, RNA, and protein synthesis in part one, a discussion of past application of this knowledge in medicine, science, and agriculture in part two, and finally some speculation about what society is likely to become in the future. The book is directed to adult persons who are not specialists in molecular biology or genetics. It helps such persons to understand what science has recently learned in this field in addition to reviewing what has been done in the past, say in Nazi Germany or other scientifically advanced countries. This naturally leads to ethical questions. The subject of abortion occurs repeatedly whenever it is pointed out that genetic screening is likely to become a reality. The authors take what they seem to feel is a neutral viewpoint on this subject. They point out that abortion is legal in the United States. Many conservative Christians, Jews and Moslems believe that killing of the fetus is not morally justified, except in rare cases where the life of the mother would be forfeited. The authors occasionally allude to the existence of this segment of society, but attempt to remain neutral, even suggesting that, given that abortion is legal, perhaps it should be offered to parents in cases where genetic screening results are bad. Thus, although the ethical failures of Nazi Germany are discussed in the book, it does not seem that the authors appreciate fully what is needed to avoid the repeat of the Auschwitz type moral failures of the past.

The book explains what is known about the nature of viruses, human development from a zygote, the composition of chromosomes, and other related topics. For non-specialists, these are interesting and educational topics, and I would recommend this book for that purpose.

QUOTE: Similarity but not Kinship

Full application of Mendelian laws of genetics results in reliable evidence that no genetic relationship (as a familial relationship) exists, or has ever been known to exist between us and vertebrate organisms. Furthermore all recognizable types of plants and animals are primarily distinct and really separated genetically from each other according to all direct or indirect evidence gained through Mendelian genetics.

John N. Moore, from *Lansing State Journal*, Nov. 22, 1982.

A BIBLICAL CHRISTIAN FRAMEWORK FOR EARTH HISTORY RESEARCH: INTRODUCTION TO THE SERIES

JOHN K. REED* AND CARL R. FROEDE, JR.**

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Introduction

Within the earth sciences, the modern creationist movement is commonly perceived as reactionary rather than innovative. Any theoretical capacity for discipline-wide innovation is limited by the inability of the comparatively small number of creationist workers to perform and publish research on the same scale as their secular peers. This difficulty was noted by Whitcomb and Morris (1961, p. 332)

A complete reorientation of all the enormous accumulations of pertinent data and interpretations would take not a few hundred pages, but several large volumes at least, and would require the intensive efforts of a great number of specialists trained in the various areas of geology and geophysics.

Since that time, progress in creationist geological earth history research has proceeded on a limited basis (primarily because of the small numbers of researchers). No research to date has persuaded large numbers of the geologic profession to rethink and reject their commitment to naturalism and uniformitarianism.

Modern historical geology is primarily a paradigm-driven rather than a data-driven discipline. Therefore, changes in foundational assumptions are more crucial than the accumulation of specific examples in bringing about major changes. 'Proof by example' has certainly persuaded many and is an attractive method, but it is impossible to prove a paradigm by examples. That is not to imply that research investigating specific problems is inappropriate; indeed it forms the building blocks of any new approach to historical geology. But there must be an accepted understanding of the relative place of both paradigm and example, and an appreciation of the limits of empirical demonstration, if historical geology is to be changed.

What follows will be a series of papers which trace a logical sequence of steps that the authors believe are required for the development of a young-earth approach to earth history studies. We recognize and acknowledge the tremendous quantity and quality of

work performed, both in the past and the present, by the secular geologic community, and demonstrate that countering their research by the accretion of a sufficient quantity of examples to support proposed concepts is neither necessary nor desirable. This conclusion is fortunate, because the last 35 years have demonstrated that such a program is impossible.

Instead, a twofold progression is proposed: (1) the replacement of the extrascientific naturalist-uniformitarian system[†] that is foundational to modern geology with a biblical Christian[‡] alternative; and (2) the development of geologic models of earth history within that alternative framework. The first step must be taken on a metaphysical level, and without that step, piecemeal geologic studies done from a creationist perspective, while useful, will probably never generate the major shift in thought (i.e. paradigm shift) required to accomplish major changes in the discipline of geology.

Therefore, this series begins with an attack on the metaphysical system of naturalism-uniformitarianism by highlighting logical inconsistencies between foundational axioms and both conclusions and methods of that system. In the first paper we utilize a comparison of similarities between Christianity and modern naturalism to show how naturalism had been built on the foundation of biblical Christian axioms that are contradictory to the completed naturalistic structure, and which cannot be internally justified by naturalism. A positive demonstration of the consistency of the biblical Christian system in each of the failures of naturalism is presented in Parts I and II. In addition, methodological constraints in earth history research are described. Following the reviews outlined in Parts I and II, the focus begins to move from the metaphysical framework towards the development of geologic models of earth history within that framework.

Constraints on these models imposed outside of science are discussed. Although these constraints are not exhaustive, we are confident that their application will provide powerful tools for creationist geologists in the field. In the final paper we recognize the plausibility of interpreting geologic strata by comparison to an "ideal" stratigraphic chart, but we propose that this stratigraphic chart be event-oriented rather than centered on chronology. Although specifics of any proposed model may not be acceptable to all researchers, we believe that a common base should be extended as far as possible, and widely accepted by creationist geologists. It is intended that this series will provide a basis for future work by the authors, and hoped that it will similarly profit other workers interested in doing geological research within the biblical Christian system. The authors are both professional geologists, but only amateur philosophers and theologians. Parts of this series may seem elementary to professionals in theology and philosophy, and we welcome the supplementary explanation of those individuals. We are committed to the recognition that science, and especially historical

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†The term "naturalist-uniformitarian" is employed throughout this series as a blanket description of the system of thought that underlies most of modern secular geology. We recognize that at many places it is cumbersome, and at others it is not specific enough, but it does provide a consistent shortcut to label something that would otherwise multiply verbosity. We believe that professional earth scientists will immediately grasp the nuances implied by the authors, and for others we recommend Austin (1979) for insight into understanding the role of uniformitarianism in geology.

‡The term "biblical Christian" is employed throughout this series as a blanket description of the system of thought that underlies orthodox Christianity. We used "biblical" because many in our time appear to believe that Christianity does not depend on God's revelation as much as man's religious ability, and "Christian" because aspects of biblical revelation are common to religions other than Christianity.

geology, cannot function apart from reference to theology and philosophy as well as other disciplines. On the other hand, explicating those ties to the extent performed here may be novel to professional earth scientists, and may possibly be initially considered a waste of time and effort. Therefore we beg the indulgence of the professional theologians and philosophers in our often basic presentation of those issues, as well as that

of fellow professional earth scientists in what may be to them a different perspective.

References

- Austin, S. A. 1979. Uniformitarianism—a doctrine that needs rethinking. *The Compass of Sigma Gamma Epsilon* 56(2):29-45.
Whitcomb, John and Henry Morris. 1961. *The Genesis Flood*. Baker Book House. Grand Rapids, Michigan.

LETTERS TO THE EDITOR

Why Sediments Are on Continents: An Answer to Mr. Yake

Yake Comment:

Many Flood geologists contend that both the ocean basins and continents consist of the same crust. If this were true, it would have resulted in most of the sedimentary rocks being found in the oceans when the Deluge swept across the continents. However, the scientific data do not support this concept. Can Flood geology explain what this means? (Yake, 1995)

For many years geoscientists (both uniformitarian and creationist) believed that the continents were fixed in place and had not moved. Land bridges were hypothesized in order to explain the migration of similar creatures seen across the vast oceans. Many of these land bridges had no physical evidence of their existence. This concept began to change in the early twentieth century.

The Continental Drift theory was originally proposed by Alfred Wegener in 1929 (Wegener, 1929). He based his proposal on the way the continents fit together (along the Atlantic Ocean side) and the corresponding match of fossils found in both South America and Africa. However, it was not until the early 1960's that the "Continental Drift" theory became more widely embraced as a result of oceanic studies performed during the 1940's and 1950's. Previous to that time no mechanism could be found to "move" the continents apart and, (as is typical in science) until one could be found, scientists were not ready to change their paradigm. With the discovery of sea-floor spreading centers and subduction zones, the Continental Drift theory became more widely accepted. It has been subsequently modified into the theory of Plate Tectonics and is now accepted by many geoscientists.

Many creationist geoscientists have also accepted the Plate Tectonic theory based on the evidences used to support it. Recently a major research project was presented by several creationist geoscientists in which they explained how the theory works very well within the framework of the young earth Creation/Flood model (see Austin et al., 1994). Today the concept of a Pangaeon Supercontinent is accepted among creationists because it explains how God could have easily moved the animals to the Ark from across a single landmass. Otherwise, the animals would have had to travel thousands of miles across the various land bridges to get to the awaiting Ark.

One of the main requirements of the Plate Tectonic theory is that there be a density difference between

that of oceanic crust and the continents. It has been scientifically demonstrated that the density of oceanic basalt is much greater than that of the continental rocks. So by accepting the Plate Tectonic theory, creationists would agree with the uniformitarians that there is a density difference between the oceanic and continental crusts. This density difference does result in the continents' lying atop the more dense basaltic mantle (which also composes the ocean basins).

Creationists advocate that the breakup of the Pangaeon supercontinent (via Plate Tectonics) occurred at a very rapid rate. This is true whether it happened during or after the Flood. The only "source" of clastic materials would have come from the eroding landmass itself. I propose that the highest rate of erosion would have occurred mainly within the original 40 days and nights of rain with the "breaking of the fountains of the deep." The remaining "331 Flood Days" (Whitcomb and Morris, 1961, p. 8) reflect a period when "winds" blew across the face of the waters (Gen 8:1). These winds would serve to create currents. However, these currents would not erode the continental materials at the same rate as had occurred previously. These currents would have lower sediment carrying capacities such that less sediments would be moved during this period.

Sediments would only be transported as far as the water energy could keep them in suspension. It would also be correct to assume that the area of greatest carrying capacity would be on the continents where the water was the shallowest and the agitation would have resulted in the highest sediment carrying capacity. Moving off the continents would result in deeper water conditions with lower sediment carrying capacity. This would result in the Flood water dropping its sedimentary load along the continent edges much like the major rivers of today drop their sedimentary deposits where they enter the sea. This is what is seen along today's continent margins. Thick continental deposits have formed along the edges of many of the continents. These sedimentary deposits rest on top of the adjoining oceanic crust.

Where these deposits have formed is also a result of the type of continental margin found. Where there are trailing margins (e.g., the North American Atlantic Coast) the sediment accumulation is great. Where there are subduction margins (e.g., the North American Pacific Northwest) the sediment accumulation has been "swept under the continent."

The oceans contain deep sea oozes and volcanic ash deposits, but little to no continental sediments. This is because the sediments which underwent erosion would only be transported as far as the water carrying capacity would allow. I propose that with rapid separation of

the Pangaeon supercontinent during the Flood, the continental sediments would only be transported across the shallow areas with deposition ending along the continental margins. No massive sedimentation would have occurred in the open oceans because the sediment carrying capacity would not have allowed it. This is what is seen along the continental margins of today and this fits with what would be expected with the breakup and subsequent movement of the continents from the original Pangaeon supercontinent.

Acknowledgements

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References

- Austin, S. A., J. R. Baumgardner, D. R. Humphreys, A. S. Snelling, L. Vardiman, and K. P. Wise. 1994. In Walsch, R. E., Editor. Catastrophic plate tectonics: A global Flood model of Earth history. Third International Conference on Creationism. Pittsburgh, PA. pp. 609-621.
- Wegener, A. 1929. The origin of the continents and oceans (Fourth edition). Translated by J. Biram. Dover. New York.
- Whitcomb, Jr., J. and H. M. Morris. 1961. The Genesis Flood: The Biblical record and its scientific implications. Baker Book House. Grand Rapids, MI.
- Yake, B. 1995. Objections from science to global Flood. *CRSQ* 32:12.
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How Did the Green River Varves Form in a Global Flood?

Thank you and the various CRS geologists for your help with my previous questions. I am personally of the persuasion that the Noahic Flood was global, but I can see why some people, including certain Christians, have problems with the concept of the global flood. I would like to solicit input from CRSQ readers as to how they would answer the following geological objection.

A primary geological difficulty (in relation to the Genesis Flood model) to which some critics point is the Green River varve formations (Bradley, 1929, pp. 99-101; Weber, 1980, pp. 24-37; Moussa, 1968, pp. 1435-1437; Schadewald, 1982, pp. 12-17). This lake has an estimated 13 million individual layers or 6.5 million varves. Varves are a particular type of deposit which occur in certain lakes. The Green River formation is about 2,000 feet thick, and beneath it lies another 25,000 feet of additional fossiliferous strata (Dott and Batten, 1971, p. 404). If the Noahic Flood is to account for this geological phenomenon, it is estimated that these varves would have had to have been formed (on average) between 6 and 36 seconds.

Mudcracks and probable rain-drop impressions are common features in the varves, as are ripple marks of the oscillation type. In addition, there are bird and insect tracks and bird droppings found along side these marks. How could these markings have been made if the varve formation was taking place every 6 to 36 seconds? Why are they there and at various points in the layered sediment?

The Green River formation lies at the top of the local geologic column (which global flood proponents place at the end of the one-year flood), but surely these birds, etc. would have died earlier.

According to Stokes's Law, a fierce storm or cataclysm should deposit large particles on the bottom, and the finest ones on the top. This is not the case with the Green River formation. On the contrary, dead plankton (measuring 50 microns in diameter) are found on the bottom (100 feet below the surface). Accordingly, it would take almost one week for this material to reach the bottom. Based on the above computations, it would have taken over 178,000 years to form the varves found in this lake at a minimum. Others such as Schadewald contend that it would have taken at least 20 million years to form these varves (Schadewald, 1982, pp. 12-17).

Any help that flood geologists can afford in answering this difficulty would be greatly appreciated.

References

- Bradley, W. H. 1929. The varves and climate of the Green River Epoch, U.S. Geological Survey Professional Paper 158, pp. 99-101.
- Dott, R. H. and R. L. Batten. 1971. Evolution of the Earth. McGraw-Hill. New York.
- Moussa, M. T. 1968. Fossil tracks from the Green River Formation (Eocene) near Soldier Summit, Utah. *Journal of Paleontology*. 42:1435-1437.
- Schadewald, R. J. 1982. Six 'Flood' arguments creationists can't answer. *Creation/Evolution* IX:12-17.
- Weber, C. J. 1980. The fatal flaws of flood geology. *Creation/Evolution*. I:24-27.

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Varves and the Flood: A Reply to Mr. Yake

Reading the June 1995 issue of the CRSQ, specifically the replies to Bill Yake, was a somewhat frustrating experience for me. The frustration comes from the fact that many of the issues raised have been answered long ago. For instance, the arguments about the proliferation of reptilian remains in the Karoo, the excess of fossils, etc., have all been refuted in my work *Studies in Flood Geology* (Woodmorappe, 1993). I would expect the anti-Creationists to keep raising the same bogus issues over and over again, but I would like to see scientific creationists be better informed of the work that has been done to date.

As for the Green River Formation, I do not have time to research this topic at present, since I am involved in other work now. However, the oft-repeated arguments about its "annual" formation rest on misconceptions about Flood Geology:

- (1) The premise that each of the many millions of laminae must have been an independent turbidity event. In actuality, a large turbidite can easily generate many such layers at a time.
- (2) The premise that the Green River Formation must have been deposited towards the latter stages of the Flood. In actuality, the entire local sedimentary sequence could have been deposited entirely during the early stages of the Flood.
- (3) The premise that mudcracks and synaeresis cracks are always discernible (arguments to the contrary notwithstanding).

(4) Uncritical acceptance of allegations that 11-year cycles have been found in the laminae. Such claims have been made for decades, and most of them have been statistically discounted. Indeed, modern claims of cyclicity in ancient data are viewed increasingly with a grain of salt, even if the statistical analysis seems to support it.

(5) Repetition of hoary arguments about the vast amounts of time needed for small sedimentary particles to settle. It ignores the ability of turbidity currents to carry fine particles in slurry form, something shown by Kuenen and Migliorini (1950). It also ignores the effects of flocculation.

(6) Uncritical acceptance of the genuineness of biogenic sedimentary structures. How many "bird footprints" are actually synsedimentary or even diagenetic features?

(7) Complete lack of discernment on the scale of so-called emergent features. How many different Green River laminae actually have unquestionable footprints? How widespread are these footprint-bearing layers? How many such horizons are unquestionably superimposed in any one locality?

References

- Kuenen, P.H.H. and C.I. Migliorini. 1950. Turbidity currents as a cause of graded bedding. *Journal of Geology* 58:91-127.
 Woodmorappe, John. 1993. Studies in Flood Geology. Institute for Creation Research. El Cajon, CA.

John Woodmorappe

Comments on "Polar Dinosaurs and the Genesis Flood" by M. J. Oard, 1995, *CRSQ* 32:47-56

Introduction

The author wishes to address two different issues raised in the above referenced paper, both which support portions of Oard's (1995) proposed theory. The first issue is a "fourth hypothesis." By addressing this hypothesis I believe that it will serve to resolve any issues of trackway or egg clutch paleoenvironment within the context of the young-earth Flood model. The second issue is a suggested "proof" in support of an elevated terrane which occurred during the early stages of the Flood.

A Fourth Hypothesis?

Michael Oard (1995) presented three most interesting theories to account for the occurrence of dinosaur footprints and trackways found from central Texas, through the Rocky Mountains, extending into northern Alaska. One concept within his theory (here referred to as the Elevated Flood Terrane Model) does appear to hold great promise in resolving the occurrence of dinosaur trackways and nests found in the western regions of North America. However, I wish to raise a fourth theory, one to which I hold no particular fondness, yet one which must be addressed in order to either discount or incorporate it within the Elevated Flood Terrane Model.

This fourth hypothesis begins with landing of the Ark on the mountains of Ararat (Gen 8:4), and the eventual release of the animals from the Ark (Genesis 8:19) on the 428th day of the Flood (Whitcomb and

Morris, 1961, p. 8). Representatives of all the terrestrial creatures are believed to have BOTH entered and exited the Ark, dinosaurs included. The climate at this time was still considered mild due to the climatic conditions associated with the still receding Flood waters and the unstable global climatic circulatory system. It should follow that extreme cold would not have started in the polar regions until sometime thereafter (Oard, 1990, p. 31; Vardiman, 1993). Plant and certain types of animal life (e.g., small animals, insects, fish, reptiles, and amphibians) are suggested as having population explosions soon after leaving the Ark (Oard, 1990, p. 83). Several generations of these creatures could have led extended lives in a manner similar to what humans experienced immediately following the Flood (see Whitcomb and Morris, 1961, p. 24, Figure 3) contributing to the population explosion (i.e., numerous sexually mature animals—all capable of producing numerous offspring). This would also hold true for any dinosaurs which were living following their departure from the Ark. They could have multiplied rapidly (possibly forming large herds) and would have migrated due to the demand for new food sources. If they migrated eastward they could have been trapped and buried in different Post-Flood environments (e.g., Mongolian Gobi desert) and could have been some of the first creatures to cross any existing Bering Strait land bridge. This is dependent upon this high latitude still remaining temperate and the existence of a land bridge to the North American continent. If the dinosauria were able to successfully cross the land bridge, they would move into the relatively small area from which the Flood waters had withdrawn (i.e., the Cordillera). This area along with much of the area presented in Oard's Figure 2 (1995, p. 50) was subject to BOTH tectonic uplift and associated extrusive volcanism. This then leaves us with several questions:

1. Could the dinosaur herds have been the first to colonize the western United States as the receding Flood waters withdrew from the Western Interior Seaway (see Froede, 1995)?
2. Could they have then become subject to tectonically induced tsunamis, diastrophism (creating an unacceptable temperature change and drier climate), and burial by extrusive volcanics which were more active during this period in Post-Flood (i.e., Lower Ice Age) history?
3. Currently, the vertebrate paleontologists tell us that the various dinosaurs died in floods (both big and small). Could these floods have been the result of the onset of the Ice Age and increase precipitation, from both rain and snow (with the rain and snow melts creating conditions of flooding and rapid burial)?

Again, this rapid migration of dinosaur herds could provide both the trackways and nests which are in many places common to the area, and it would also answer the shallow nature of their burial in semi-lithified to consolidated sediments. This theory could also explain the occurrence of trackways and nests found in association with the Western Interior Seaway.

However, this concept does not explain the occurrence of trackways and nests buried in vertical cycles or under considerable amounts of sedimentary (i.e., Flood) deposits. It also does not explain why more

nests are not found today, if the then existing landmass was in fact a terrestrial land surface. If dinosaurs existed in the large migrating herds suggested by paleontologists then evidence to support this concept should be plentiful. It is not. Most of the dinosaurs are found in jumbled bone beds. Dinosaur nests are sporadic.

Also this fourth hypothesis does not appear to fit with the occurrence of multiple trackways which are found at great depth (e.g., Lockley, 1991, p. 90, Figure 8.2; Lockley, Hunt, and Meyer, 1994, 260, Figure 10.10). I find Oard's hypothesis of an elevated terrain in select areas during the Flood most interesting. However, I also believe that further investigation and refinement of this Elevated Flood Terrain Model is necessary to further understand how these trackways and nests fit within the creationist geological timescale (Lower/Middle/Upper Flood Event?).

Trackways in Coal Measures

In support of Oard's concept of an Elevated Flood Terrain I wish to relay the following. I have on several occasions come across references of vertebrate footprints in shale layers associated with coal seams. These various references usually document (with photographs) the occurrence of footprints (from amphibian to reptile, including a variety of dinosaurian ichnospecies) as either sole casts (i.e., hypichnia) along the roof and/or footprints on the floor (i.e., epichnia of shale layers associated with the coal seams (e.g., Aldrich and Jones, 1930; Parker and Balsley, 1989; Parker and Rowley, 1989; Lockley, 1991, Plate 5; Lockley and Hunt 1995, pp. 216-229).

The current young-earth Flood model for the formation of coal (i.e., allochthonous), from buried woody material (Austin, 1979; Woodmorappe, 1978; Coffin and Brown, 1983), would make the occurrence of these trace fossil footprints extremely difficult to explain. Using the allochthonous model for a depositional setting would appear to require that footprints occurred in two different circumstances: 1) in soft clay layers which were later covered over by woody debris and that this occurred several times (to account for the occurrence of these tracks in the vertical profile) and/or 2) that the log mat would be buried and then walked over by either an amphibian or dinosaur, leaving footprints in the roof of the coal seams. All of this occurred in some unknown depth of water. However, if we can invoke the rising of select subaqueous surfaces due to diastrophism, which makes sense when we think of the complex tectonic processes in effect during the Flood, we can then create temporary land surfaces which would allow the creation and development of trackways. Thus uplifted log/plant mat Flood deposits could have served as temporary subaerial and/or subaqueous highgrounds from which certain creatures could temporarily stand until additional forces resulted in its loss (e.g., rise in water level, creature is washed from an elevated surface, creature dies due to exhaustion, and exposure). The footprints made in the soft sediments overlying the log/plant mat would then be preserved as sole casts. If additional woody materials then buried the footprints the impressions would then remain preserved as imprints. This is how certain dinosaur and amphibian footprints are observed today in various coal seams.

Conclusion

One of Oard's (1995) concepts regarding the occurrence of elevated terrain in select areas during the Flood provides answers for more than just dinosaur trackways and egg clutches. This concept also solves the occurrence of amphibian and reptilian footprints as both impressions and casts found in the shale layers both overlying and underlying various coal seams.

Further refinement of this concept could help to resolve the time frames (within the Flood event) when diastrophic movement occurred for the various mountain ranges, and possibly aid in the modeling of the topographic land surface as it became exposed with the withdrawal of the Flood waters.

References

- CRSQ—*Creation Research Society Quarterly*.
 Aldrich, T.H., Sr. and W.B. Jones: 1930. Footprints from the coal measures of Alabama. Alabama Museum of Natural History Museum Paper No. 9. University, AL.
 Austin, S.A. 1979. Depositional environment of the Kentucky No. 12 coal bed (middle Pennsylvanian) of Western Kentucky, with special reference to the origin of coal lithotypes. Pennsylvania State University. unpublished Ph.D. dissertation.
 Coffin, H.G. and R.H. Brown. 1983. Origin by design. Review and Herald Publishing. Washington. D.C.
 Froede, C.R., Jr. 1995. Late Cretaceous epeiric sea or retreating Floodwater? *CRSQ* 32:13-16.
 Lockley, M.G. 1991. Tracking dinosaurs. Cambridge University Press. New York.
 ———, A.P. Hunt, and C.A. Meyer. 1994. Vertebrate tracks and ichnofacies concept. In Donovan, S.K. (editor). The paleobiology of trace fossils. Johns Hopkins University Press. Baltimore. pp. 241-268.
 ———. 1995. Dinosaur tracks and other fossil footprints of the Western United States. Columbia University Press. New York.
 Oard, M.J. 1990. An ice age caused by the Genesis Flood. Institute for Creation Research. El Cajon, CA.
 ———. 1995. Polar dinosaurs and the Genesis Flood. *CRSQ* 32:47-56.
 Parker, L.R. and J.K. Balsley. 1989. Coal mines as localities for studying dinosaur trace fossils. In Gillette, D.D. and M.G. Lockley. 1989. Dinosaur tracks and traces. Cambridge University Press. New York. pp. 353-359.
 Parker, L.R. and R.L. Rowley, Jr. 1989. Dinosaur footprints from a coal mine in east-central Utah. In Gillette, D.D. and M.G. Lockley. 1989. Dinosaur tracks and traces. Cambridge University Press. New York. pp. 361-366.
 Vardiman, L. 1993. Out of whose womb came the ice? *Acts and Facts* 22(11):i-iv (ICR Impact Article 254)—with corrections cited 6/95. Institute for Creation Research. El Cajon, CA.
 Whitcomb, J.C. and H.M. Morris. 1961. The Genesis Flood: The Biblical record and its scientific implications. Baker Book House. Grand Rapids.
 Woodmorappe, 1978. A diluvian interpretation of ancient cyclic sedimentation. In Studies in Flood geology. Institute for Creation Research. El Cajon.

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Comment on Polar Dinosaurs and the Genesis Flood

Dinosaur trackways and nests are of great palaeontological importance because they represent *in situ* evidence of the dynamic activity of dinosaurs during life (Lockley and Gillette, 1989, p. 3). Tracks and nests are also of crucial significance in the development of creationist models of earth history. Michael Oard's recent paper, 'Polar dinosaurs and the Genesis Flood,'

attempts to account for Mesozoic nests and tracks within a Flood model. However, on a number of counts, we feel that his paper is fundamentally flawed. In order to explain why, we first need to go back to the Biblical record.

Scripture teaches that all air-breathing land animals were destroyed in the Flood, except for those on board the Ark (Whitcomb and Morris, 1961, p. 13). A straightforward reading of Genesis 7 leads to the conclusion that the Flood had inundated all pre-existent land surfaces by the end of Day 40 (Whitcomb and Morris, 1961, p. 4), although Oard's view is that this point was not reached until the end of Day 150. Oard frankly admits that he favors a 150-day period because it allows longer for the formation of multiple track- and nest-bearing horizons (1995, pp. 52, 54). However, we believe that Scripture must constrain our theorizing, not the other way round, and we reiterate that the most straightforward reading of the text indicates that the Flood had inundated the continents by Day 40. Oard cites Coffin (1983) in support of the 150-day interpretation, but, although Coffin allows for it as a possibility, he actually appears to favour the 40-day interpretation. In any case, the point remains that all air breathers were dead by either Day 40 or Day 150.

Since tracks and nests can only be the product of living animals, Bible-believing creationists should therefore expect tracks and nests of air-breathing, terrestrial vertebrates to have a characteristic stratigraphic distribution. The Bible allows for the possible formation of tracks and nests during the inundatory phase (the first 40 or 150 days), but then tracks and nests of air-breathers should disappear from the fossil record until the recolonization of the earth after the Flood by descendants of the creatures preserved on the Ark. Even trackways formed during the inundatory phase of the Flood may not have been preserved because of the extremely catastrophic nature of early Flood events. Oard's proposal is that essentially all dinosaur trackways and nesting sites were formed during the first 150 days of the Flood, while the Flood was still transgressing onto the continents.

It is here that we encounter the first major problem with Oard's thesis. His model demands that the Mesozoic sediments must have been deposited early in the Flood. The problem with this is that the Mesozoic sediments occur too 'high' in the stratigraphic column for this to be the case. As Oard himself points out, many track and nest sites overlie tremendous thicknesses of Palaeozoic and earlier Mesozoic sediments:

Deep fossiliferous Flood sediments underlie the tracks. In other words, the dinosaurs were walking on thousands of meters of freshly deposited Flood sediment. (Oard, 1995, p. 51)

Ironically, in the same issue in which Oard's article appeared, arguing that the Mesozoic of North America was early Flood, a paper by Froede (1995) argues that the Mesozoic of North America was late Flood. It should be obvious that the Mesozoic cannot record both the transgressive and regressive stages of the Flood at the same time! The stratigraphic position of the Jurassic and Cretaceous rocks demands that if they are Flood sediments at all then they must be **late** Flood—and if they are late Flood, then they should contain no

tracks or nests since all terrestrial air-breathers would already have died. This means that neither Froede nor Oard can be correct. If the inundatory phase lasts from at least the Cambrian until the Upper Cretaceous we are forced to squeeze the entire period from when the earth was totally submerged right to the end of the Flood—still over 200 days according to Oard's chronology—into just the Tertiary. This gives us a seriously distorted record of the Flood, and does not provide a sensible correlation between Biblical and geological events. So how should we understand these track- and nest-bearing sediments? We suggest that the global stratigraphic distribution of tracks and nests is almost precisely what creationists should expect—if the Mesozoic is **post-Flood**. In a forthcoming series of papers in the *Creation Ex Nihilo Technical Journal* we will argue that the Mesozoic rocks are indeed post-Flood, and that the Flood proper is essentially a Palaeozoic phenomenon with the Upper Palaeozoic recording its regressive phase. We feel that this interpretation of the geological record explains a range of data which do not fit into more traditional creationist models.

Leaving aside the all-important fact that the Upper Cretaceous sediments are in the wrong stratigraphic position to be early Flood deposits, there is also another serious difficulty with Oard's hypothesis. We do not believe that Oard has done justice to the evidences for time that exist at some of the nest sites. For instance, Horner and Makela (1979) describe fifteen 1-meter-long juvenile hadrosaurs ('duck-bills') found together in 1978 in a nest-like structure in the Two Medicine Formation near Choteau, Teton County, Montana. However, not only had a nest been built, and eggs laid and hatched, but, according to the authors, wear on the teeth of these young dinosaurs indicates that they had been feeding for some time. They state, "Some of the individual teeth are worn more than three-quarters their length" (p. 297). These data are consistent with a post-Flood interpretation. However, it is virtually impossible to imagine how this sequence of events could take place within the 40 or even 150 days of the Flood's transgressive phase, taking into account that any previously deposited Palaeozoic and Mesozoic sediments would also have to be squeezed into this period. Flood geologists must avoid falling into the trap of indulging in the same kind of imaginative storytelling that we find so objectionable from evolutionary biologists.

A second nesting site in Teton County has yielded 10 ornithopod nests, each approximately one meter in diameter, and separated horizontally from one another by about two meters. The important point to note here is that these nests have been found on at least three different sedimentary horizons within three-meter vertical section (Horner, 1982). This indicates that nest construction, egg-laying, and nurture of juveniles occurred at this locality at least three successive times. One cycle of this sort is difficult to accommodate during a period of 40 or even 150 days, but the establishment of three successive nesting colonies one after the other during the Flood surely strains the imagination, even allowing for the fact that the growth rate of baby dinosaurs was rapid (Paul, 1994). This is powerful evidence that these sediments should be assigned to the post-Flood era.

The problems are not limited to nest sites. Stokes (1987) has investigated gastroliths (stomach stones) from some Lower Cretaceous dinosaurs. He found that many of these gastroliths were composed of lithified, fossil-bearing sedimentary rock which appeared to be derived from Palaeozoic and pre-Cretaceous Mesozoic sedimentary rocks. This is further evidence that these dinosaurs were living after the Flood, unless we want to suppose that—as well as fleeing from the rising Flood waters, making tracks, building nests, and feeding their young—they were swallowing pebbles of earlier Flood sediments for use as gastroliths!

Both Oard and Froede assume that the Mesozoic rocks were formed during the Flood year, and do not consider it necessary to justify their assumption. Their Flood models should, however, be evaluated alongside a whole spectrum of Flood models which satisfy the constraints of Scripture, and which attempt to do justice to geological evidences. The issues raised in this letter indicate that a greater awareness of alternative Flood models is needed. It is time for us to rethink our ideas about the location of the Flood/post-Flood boundary in the geological record. In our view, it is no longer possible to place this boundary in the Cenozoic or even at the end of the Mesozoic. Rather, the evidence points to a Flood/post-Flood boundary somewhere near the end of the Paleozoic. Rethinking our cherished beliefs is not a comfortable experience, but we must not allow ourselves to exhibit the same kind of closed mindedness for which we so often criticize evolutionist colleagues. We must not become trapped by our models, but be willing to re-examine them in the light of Biblical and scientific data, while holding firmly to fixed Scriptural points (e.g. young earth, global flood, no death before sin). Until this happens, we fear that our reinterpretation of earth history will win few converts from the evolutionist establishment. We should avoid erecting unnecessary barriers in the way of belief. We invite open discussion on this neglected issue of the Flood/post-Flood boundary.

References

- CRSQ—Creation Research Society Quarterly.
Coffin, H.G. 1983. Origin by design. Review and Herald Publishing Association. Hagerstown, MD.
Froede, C.R. 1995. Late Cretaceous epeiric sea or retreating Floodwater? *CRSQ* 32:13-16.
Horner, J.R. 1982. Evidence of colonial nesting and 'site fidelity' among ornithischian dinosaurs. *Nature* 297:675-676.
Horner, J.R. and R. Makela. 1979. Nest of juveniles provides evidence of family structure among dinosaurs. *Nature* 282:296-298.
Lockley, M.G. and D.D. Gillette. 1989. Dinosaur tracks and traces: an overview. In Gillette, D.D. and M.G. Lockley (editors). *Dinosaur tracks and traces*. Cambridge University Press. pp. 3-10.
Oard, M.J. 1995. Polar dinosaurs and the Genesis Flood. *CRSQ* 32:47-56.
Paul, G.S. 1994. Dinosaur reproduction in the fast lane: implications for size, success, and extinction. In Carpenter, K., K.F. Hirsch and J.R. Horner (editors). *Dinosaur eggs and babies*. Cambridge University Press, pp. 244-255.
Stokes, W.L. 1987. Dinosaur gastroliths revisited. *Journal of Paleontology* 61:1242-6.
Whitcomb, J.C. and H.M. Morris. 1961. *The Genesis Flood: The biblical record and its scientific implications*. Presbyterian and Reformed Publishing Company. Phillipsburg, NJ.
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Late Cretaceous Epeiric Sea or Floodwater? (A Reply to Garner, Robinson, Garton, and Tyler)

Recently Garner, Robinson, Garton, and Tyler (1995) have suggested that I have failed to justify my assumption of the North American Cretaceous (and really all of the Mesozoic Western Interior Seaway) sediments as being Floodwater derived. Additionally they have suggested that these Mesozoic deposits which I date to the Middle to Upper Flood Event Timeframe, should be moved instead to the Post-Flood (Ice Age Timeframe?). My following comments will generally be aimed at defending my interpretation of the epeiric sea/Floodwater issue within the Young-Earth Flood Model. However, I will also address some issues which support both my interpretation and Michael Oard's (1995) Elevated Flood Terrain hypothesis. It does appear that the basic point in this disagreement is on the placement of the North American Mesozoic sediments within the creationist geological stratigraphic column (i.e., Flood Event versus Ice Age).

Summary

Previously, I suggested that Floodwaters slowly receded from the North American Continent during the Middle/Upper Flood Event Timeframe, which is analogous to the middle to late Mesozoic (Froede, 1995a, p. 14). This interpretation is based on the fact that all of the Cretaceous Western Interior Seaway sediments are composed of marine sediments and fossils. Some of the Mesozoic deposits adjacent to this epeiric seaway are not believed to be marine (but even these sediments exist on top of Mesozoic marine sediments). Many of these non-marine deposits have been found to contain dinosaur bones and in certain cases even dinosaur nests. These dinosaur bone and nest containing sediments are usually buried by additional sediments which may or may not infer a marine environment.

My central point in attempting to identify specific stratigraphic boundaries within the Young-Earth Flood Model lies with a determination of energy forces in effect during certain Timeframes. I view the Flood Event Timeframe as providing the greatest geological energy available for generation and erosion of earth materials. Energy levels would only decrease from this Flood Event Timeframe and this would be reflected in the types and amounts of sediments which were deposited.

The Issues

As previously mentioned, this whole discussion regarding the middle to late Mesozoic epeiric seaway as reflecting retreating Floodwaters versus Ice Age deposits, is based on a difference in the interpreted position of the Flood Event/Ice Age boundary. In order to define the appropriate placement of that boundary we should examine the issues which will effect this determination.

Environment

The first issue to be addressed is the environment in which these various Mesozoic sediments were deposited. Much work has been performed, and is not cited here, on the Western Interior Seaway. This epeiric seaway existed across the North American continent during most of the Mesozoic (which I date to the Flood Event Timeframe). This seaway changed positions laterally on the continent due to diastrophic processes in effect during this era. All evidence (both lithologic and paleontologic) point to a marine environmental setting while these sediments and fossils were deposited. If these deposits date to the Post-Flood (Ice Age Timeframe?) then how would we explain the marine nature of those deposits (e.g., glauconite, carbonates, coal) and the fact that these deposits usually contain fossils which reinforce a marine environment (e.g., fish, whales, turtles, crocodiles, pelecypods, and micro-invertebrates)? I fail to understand the Garner et al., (1995) position regarding the dating of these marine sediments within the Post-Flood (Ice Age) when they appear to support evidence of the Flood waters on the continental landmass. Therefore, I refer these individuals back to my cited references for a reexamination of the details of the suggested epeiric seaway and would ask to review their evidence which suggests that this was not a marine environment. Additionally, I would appreciate an explanation as to how marine sediments and fossils can be deposited if there were no marine water body (i.e., Floodwaters) present? Clearly the physical evidences do not match with their suggested interpretation.

In a paper upon which I am currently working, I have proposed that the Flood Event/Ice Age boundary for the North American continent be identified with the end of marine deposition and the beginning of freshwater deposition (Froede, in preparation). This Flood Event/Ice Age boundary would then reflect a change in physical conditions and not be based on a globally equivalent time event (i.e., not based on biological evolutionary paleontology!—Froede, 1994). Derek Ager (1993, pp. 97-111) discussed this same concept when he described the placement of a “golden spike” (i.e., the boundary separating two different geologic periods). Today geoscientists face this same issue when attempting to determine the end of the Pleistocene Ice Age (or single—Oard, 1990) and the beginning of the Holocene in areas such as the Antarctic. We have the same issue here. We have the termination of marine conditions (Upper Flood Event) and the initiation of freshwater depositional conditions (Lower Ice Age). This “boundary” will not necessarily be located at the same uniformitarian stratigraphic position globally, as some areas would have established terrestrial conditions soon after the Flood waters drained (e.g., elevationally high areas) while other areas would exist in a marine environment for possibly hundreds of years. Knowledge of both the local and regional stratigraphy, including bio- and litho-facies transitions, would also be essential in identifying the Flood Event/Ice Age boundary. This is the approach I take when examining the continental stratigraphic column within the context of the creationist geological timescale. Boundary determination for the oceanic basins will require a different model, perhaps based on temperature change as ex-

hibited by microfossils, oxygen isotopes, or some other means (Oard, 1990; Vardiman, 1993; 1994). This possible oceanic boundary determination will not be addressed here.

Paleontology

The next issue is the applicability of fossils in dating strata and their relationship to the creationist geological timescale (Froede, 1995b). Our timescale will require a complete reevaluation of the uniformitarian stratigraphic column on both the local and regional scale. We are working from a position diametrically opposed to biological evolution. What is at issue is time/evolution versus energy/events.

The young-earth creationist stratigraphic column must be reconstructed within the framework of the Biblical record (Froede, 1995b). In many cases this will result in direct conflict with uniformitarian evolutionary stratigraphic (i.e., biostratigraphic) interpretations. For example, the Jurassic in certain sections of Europe might correlate to the Cretaceous in North America, and to the Triassic in sections of South Africa, all based on the energy/event comparison required using the creationist geological timescale. The Flood was a high energy event and through a correlation of energy/effect relationships we can attempt to reconstruct depositional environments (not ecological) and correlate those strata across areas and ultimately globally. The same holds true for the Ice Age and its energy/effect relationships. Again, only through careful field characterization can we accurately make this determination.

Stratigraphy

The Paleozoic/Mesozoic boundary reflecting the Flood Event/Ice Age as suggested by Garner et al., (1995) does not appear to fit with locations such as the United States Gulf Coastal Plain. The Gulf Coastal Plain contains tens of thousands of feet of sedimentary deposits which would all fall into a post-Flood (i.e., Ice Age) timeframe. These deposits include massive halite layers, carbonates, clastics, and volcanoclastics. All of these deposits would require a tremendous “energy” setting from a time frame following the Flood Event. Clearly this presents a serious issue if we wish to place the Flood Event/Ice Age boundary this far down the stratigraphic section. I believe and continue to support the Flood Event/Ice Age boundary as being tied to a change in depositional environments (i.e., marine to freshwater). This transition in depositional environments can also reflect the change in energy as we move from a high energy Flood Event into the decreasing energy of the Ice Age Timeframe. Hence, for the Gulf Coastal Plain, this boundary would then translate to the Oligocene/Miocene.

Evidences In Support of An Elevated Terrain Model

The authors also cite Michael Oard’s (1995) work as inaccurate in relationship to the Young-Earth Flood Model. Again their position is based on paleontologic evidences which they suggest should move these Mesozoic strata into the Post Flood (Lower Ice Age?). However, many more evidences exist which would suggest that these elevated areas possibly existed during the Flood and might have served as refuge for the dinosaurs. Probably the most impressive evidence is that

these trackways and nests all line up and follow a general north-south trend directly adjacent to areas of uplift (e.g., Llano uplift and the Rocky Mountains). The author has also noted "amphibian" (based on the evolutionary age of the rocks, i.e., pre-dinosaur) trackways adjacent to the uplifted Appalachians in the eastern United States. Previously, I have suggested that perhaps these trackways and nests might help us identify the timing of orogenic movement within the Flood event (Froede, 1995c). However, I believe that Oard's (1995) theory does require additional study (as does mine) to further define and refine the exact timing in which these elevated areas existed (e.g., 40 days versus 150 days), and how they were used by the various dinosauria. Additional theories to explain dinosaurs, nests, and trackways should be suggested and tested against the Biblical record and physical evidence. None of us have "THE" answer; and the young earth Flood model can only be improved upon with competition from a variety of theories—all of which must address the physical record.

Trackways in Coal Measures

I have on several occasions come across references to vertebrate footprints in shale layers associated with coal seams. These references usually document (with photographs) the occurrence of footprints (both amphibian and reptilian, including a variety of dinosaurian ichnospecies) as either sole casts (i.e., hypichnia) along the roof and/or footprints on the floor (i.e., epichnia) of the shale layers associated with coal seams (e.g., Parker and Balsley, 1989; Parker and Rowley, 1989; Lockley, 1991, Plate 5; Lockley and Hunt, 1995, pp. 216-229). Many of these coal seams are "dated" to the Mesozoic and are used to support the allochthonous model for coal formation along the Western Interior Seaway (Lockley and Hunt 1995, pp. 216; Parker and Rowley, 1989, p. 361; Parker and Balsley, 1989).

The current young-earth Flood model theory for the formation of coal, from autochthonous woody material (Woodmorappe, 1978; Austin, 1979; Coffin and Brown, 1983), would make the occurrence of these footprints difficult to explain. This coal formation model would appear to require that footprints occurred in two different circumstances; 1) in soft clay layers which were later covered over by woody debris and that this occurred several times (to account for the occurrence of these tracks in the vertical profile) and/or 2) that the log mat would be buried and then walked over by dinosaurs, leaving footprints in the roof of the coal seams. All of this occurred in some unknown depth of water during the Flood.

If we can invoke the rising of select subaqueous surfaces due to tectonic activity, which makes sense when we think of the complex diastrophic processes in effect during the Flood, we can then create elevated surfaces which could allow for the development of trackways and possibly even nest sites. These uplifted terrain and log/plant mat deposits could have served as temporary subaerial and/or subaqueous highgrounds from which certain creatures could temporarily have stood until additional forces resulted in its loss (e.g., rise in water level, creature is washed off of elevated surface, creature dies due to exhaustion, exposure, etc.). The footprints made in the soft sediments overlying

the log/plant mat would then be preserved as sole casts. If additional woody materials then buried the footprints the impressions would then remain preserved as imprints on the floor of the coal seams. This interpretation could also explain the vertical stacking of dinosaur footprints in multiple sedimentary deposits as dinosaurs walked across a new, higher surface as additional sediments were deposited on these elevated areas.

Conclusion

Much information exists which identifies the middle to late Mesozoic Western Interior Seaway as a marine environment stretching across the North American continent. This is based on the physical evidence of both marine lithology and paleontology (not to mention the trace fossil evidence!). All of this points to a period in which the North American continent was covered by marine waters. I would suggest that this correlates directly with the Middle/Upper Flood Event Timeframe.

Terrestrial-freshwater conditions developed on the continents following the withdrawal of the Floodwaters. This resulted in the generation of sediments which typify a freshwater facies (e.g., root traces, structured soil profiles, freshwater fossils, and paleosols). The boundary separating these marine and freshwater sediments could exist as either a gradual or sharp contact depending on the nature of Floodwater withdrawal. This contact would exist for all exposed continental areas (this would also be true for areas which became exposed with a drop in sea-level during the single Ice Age; e.g., the Bahama Banks).

The occurrence of dinosaur trackways on elevated ridges formed at some period during the Flood Event has yet to be refined in terms of timing of those events within the young-earth Flood model. Additionally, other sites across the globe have yet to be compared to this suggested Elevated Terrain Model to determine its appropriateness.

I agree with Garner et al., (1995) that creation-catastrophists must further develop and define our young-earth Flood model using sound scientific judgment as bounded by the Scriptures. We must all serve to "sharpen" one another and to develop accurate scientific models within the framework of the young-earth Flood model, as we wait for our Saviour's return.

References

- CRSQ—*Creation Research Society Quarterly*.
 Ager, D. V. 1993. The nature of the stratigraphical record. Third Edition. Wiley, New York.
 Austin, S.A. 1979. Depositional environment of the Kentucky No. 12 coal bed (middle Pennsylvanian) of Western Kentucky, with special reference to the origin of coal lithotypes. Pennsylvania State University, unpublished Ph.D. dissertation.
 Coffin, H.G. and R.H. Brown. 1983. Origin by design. Review and Herald Publishing, Washington, D.C.
 Froede, C.R., Jr. 1994. Letters to the editor: Fossil wood of Big Bend Park. *CRSQ* 30:187-189.
 ———. 1995a. Late Cretaceous epeiric sea or retreating Floodwater? *CRSQ* 32:13-16.
 ———. 1995b. proposal for a creationist geological time-scale. *CRSQ* 32:90-94.
 ———. 1995c. Comments on the Article: "Polar dinosaurs and the Genesis Flood," by M.J. Oard 1995, *CRSQ* 32:47-56. *CRSQ* 32:231-232.
 ———. Determination of the Flood event/ice age stratigraphic boundary on the United States Southeastern Coastal Plain. Article in preparation.
 ———. 1996. Late Cretaceous epeiric sea or retreating Floodwaters? *CRSQ* 32:234.

- Garner, P., S. Robinson, M. Garton, and D. Tyler. 1995. Comment on the Articles: "Polar dinosaurs and the Genesis Flood," by M.J. Oard, 1995, *CRSQ* 32:47-56.
- Lockley, M.G. 1991. Tracking dinosaurs. Cambridge University Press. New York.
- _____. A.P. Hunt, and C.A. Meyer. 1994. Vertebrate tracks and ichnofacies concept. In Donovan, S.K. (editor). The paleobiology of trace fossils. Johns Hopkins University Press. Baltimore. pp. 241-269.
- _____. 1995. Dinosaur tracks and other fossil footprints of the Western United States. Columbia University Press. New York.
- Oard, M.J. 1990. An ice age caused by the Genesis Flood. Institute for Creation Research. El Cajon, CA.
- _____. 1995. Polar dinosaurs and the Genesis Flood. *CRSQ* 32:47-56.
- Parker, L.R. and J.K. Balsley. 1989. Coal mines as localities for studying dinosaur trace fossils. In Gillette, D.D. and M.G. Lockley (editors). 1989. Dinosaur tracks and traces. Cambridge University Press. New York. pp. 353-359.
- Parker, L.R. and R.L. Rowley, Jr. 1989. Dinosaur footprints from a coal mine in east-central Utah. In Gillette, D.D. and M.G. Lockley (editors). Dinosaur tracks and traces. Cambridge University Press. New York. pp. 361-366.
- Vardiman, L. 1993. Ice cores and the age of the Earth. Institute for Creation Research. El Cajon.
- _____. 1994. Out of whose womb came the ice? *Acts and Facts* 23(8):i-iv (ICR Impact Article No. 254).
- Whitcomb, J.C. and H.M. Morris. 1961. The Genesis Flood: The Biblical record and its scientific implications. Baker Book House. Grand Rapids, MI.
- Woodmorappe, J. 1978. A diluvian interpretation of ancient cyclic sedimentation. In Studies in Flood geology. Institute for Creation Research. El Cajon.

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Polar Dinosaurs: Response to Garner, Robinson, Garton, and Tyler

I welcome comments on my hypothesis to account for dinosaur nests, eggs, babies, tracks, and graveyards within the first 150 days of the Genesis Flood (Oard, 1995). The reader must remember that the scenario of exposed Flood sediments from New Mexico to Alaska parallel to the Rocky Mountain Front is an hypothesis that needs development, just like other hypotheses of Flood and post-Flood events of the prehistoric past. I agree with Garner, Robinson, Garton, and Tyler (1996) that the in situ dinosaur remains are of crucial significance for the development of creationist models of earth history.

I admit to being surprised at the Third International Conference on Creationism that many European creationists believe that most, if not all, the Mesozoic as well as the Cenozoic is post Flood. Based on observations and the geological literature, I have come to more and more believe that the Flood/post-Flood boundary is in the **late Cenozoic**. I too plan to defend this belief in the same future issue of *Creation Ex Nihilo Technical Journal*. In this letter, I will try to briefly answer the objections of Garner et al. (1996).

Although Garner et al. (1996) admit that all the air-breathing animals outside the Ark could have died within 150 days, they do not favor this interpretation of Genesis 7 I have reread Genesis 7 four more times and I can make a case for either a 40 day or a 150 day period for the death of the air-breathing animals. Both seem like a **straightforward** reading of the text without exegetical gymnastics. Reiterating what I said in Oard

(1995, p. 52, 53), the text of Genesis 7 jumps ahead of itself by about 40 days in verse 12. Furthermore, verse 17 could mean that the Flood came upon the earth for 40 days before the Ark floated. Alternately, the verse could summarize the first 40 days by saying within that period the Ark floated away. Verses 18 to 20 continue with the water prevailing more and more and finally covering the high mountains. There is no more mention of the 40 days after verse 17. Verses 21 to 23 tell us the result on the biota of the earth. Verse 24 ends with the total length of the waters prevailing—150 days. If the Flood had already wiped out all mankind and animals, one logical question that can be asked is why would God continue the Flood past 40 days?

I have come to believe that the dinosaur tracks, eggs etc. occurred during the inundatory phase of the Flood, according to a new creationist geological timescale developed by Tasman Walker (1994) and Carl Froede (1995a). Most of the sedimentary rocks should more easily conform to a Flood scenario than to a uniformitarian scenario of generally slow deposition over vast periods of time. The contrast between the two models is vast, but part of the problem is the geological presuppositions one takes to the field. Footprints would be one of the indications of the inundatory stage (Walker, 1994, p. 591) or would be post-Flood as Garner et al. (1996) believe. I would say the same conclusion can be drawn from nests, eggs, and newly hatched babies.

The first major problem Garner et al. (1996) see in my hypothesis is that the sediments containing the dinosaur remains, tracks, eggs, etc. are **too high in the stratigraphic column**. I am not sure whether this means the geological column or the lithostratigraphic column in the area I surmise was exposed during the early stage of the Flood, or both. Garner et al. (1996) essentially say that too many sedimentary rocks were laid before the tracks were made, the nests dug, and the eggs hatched. Somehow, the authors conclude that these tracks, eggs, etc. would therefore have occurred late in the Flood, which is unscriptural.

These stratigraphic ideas by Gamer et al. (1996) need substantiation and I will be interested to examine their reasoning and their data. Creationists, at this point in time, have many ideas (including myself) that need some kind of plausible verification, if that is possible for a prehistoric event. One problem pertinent to this discussion is that we do not know the rate of sedimentation during the Flood from the beginning to the end to say that the Mesozoic, or even most of the Cenozoic, is late Flood. (This is why I believe the new creationist rock classification scheme is so valuable—it gives us defining criteria.) The standard classification systems are part of the uniformitarian geologic system, and this geological column in a Flood model also needs substantiation.

I see many scientific problems with creationists taking the geological column at face value and plugging it into a Biblical timescale. Possibly the geological column is a loose vertical order of death during the Flood. But the Flood was a three dimensional event, and sedimentation extremely variable and complex. It seems you can trace some strata for hundreds of kilometers, but other strata change facies so fast, you cannot trace a bed for more than several meters. Fossils that date

various strata should be diachronous in a worldwide Flood. Regardless of the many beliefs on the subject, data gathering and substantiation is what is needed.

In summary of this point, Garner et al. (1996) believe the Mesozoic could not have been deposited within 150 days of the Flood, but they need to substantiate this belief, which I assume they are in the process of doing. Why cannot the rate of sedimentation during the Flood be very rapid at the beginning of the catastrophic event? After all, explosions expend most of their energy at the very beginning.

A second objection to my hypothesis is more substantial and that is evidence of too much time for all the dinosaur activity in and around nesting sites. There are still many unknowns and mysteries associated with the nesting areas and dinosaur graveyards west and northwest of Great Falls, as well as other areas of the world (Carpenter, Hirsch, and Horner, 1994a, p. 366). The wear on the teeth of babies associated with one nest is mysterious. Assuming Horner and Makela's (1978) analysis is correct, the babies had abnormal tooth wear for their age. Some of the individual teeth are worn three-quarters their length. However, there is plenty of evidence these dinosaurs were **newborns**:

The skeletons . . . have several characteristics indicative of very young individuals. The sacral vertebrae are not fused; the neural arches are not fused in the vertebral centra; the proximal and distal ends of the limb bones are not well-formed, and the absence of basicranial bones suggests that they were not ossified (Horner and Makela, 1978, p. 297).

I do not know why the teeth are worn, but it could have been due to the abnormal environment in which they were born. Or, it could simply be the dinosaurs ground their teeth in the eggs, as suggested by Horner and Currie (1994, p. 312), based on the discovery of embryos with worn teeth in a nesting site near the Montana/Alberta border. Regardless, the baby dinosaurs had hatched only a short time previous to their deaths, and this is not necessarily contradictory to my hypothesis, since there is plenty of evidence that dinosaurs grew rapidly (Carpenter, Hirsch, and Horner, 1994b).

A third problem relates to the different stratigraphic levels on Egg Mountain where the nests and eggs of the hypsilophodon *Orodromeus makelai* have been found (Horner, 1982). A picture of Egg Mountain and an egg clutch were shown in Oard (1995). Nests as well as dinosaur tracks on different stratigraphic levels seems to be a common feature from all over the world. At this point, there is not much detailed data. I will make only a few general comments.

In the Flood, I would expect rapid deposition of sediments. So, if sea level fluctuated at the nesting site, it is possible that a particular clutch horizon would be covered by a layer of mud. Then the dinosaurs laid more eggs on the new layer, etc. The clutches themselves do not appear to be in nest structures, but just laid on the mud or "caliche." There are no babies in the nests, but juveniles that appear to be older than hatchlings were found around the nests. Horner (1982) infers the babies hatched because the lower portion of the eggs is intact, while the upper portion is broken. This

could be due to post-burial diagenesis or the eggs could have been broken by scavengers. It is not uncommon to find *Troödon* and other carnivorous dinosaur teeth among nesting sites and bonebeds (Horner, 1994, p. 117). At Egg Mountain, remains of lizards, mammals, and *Troödon* have been found. If the babies were born, they should have destroyed the intact lower portion of the nest. Therefore, the inference that eggs hatched and babies grew from three different stratigraphic levels is not necessarily the case.

I have not read the reference to dinosaur gastroliths (if that deduction is correct) composed of sedimentary rocks. This assumes that it takes a fair amount of time to harden rocks, which is another unsubstantiated assumption. Given the right conditions of cementing agents and/or overburden pressure, sedimentary rocks can harden quickly—likely in a matter of days. We must also remember that the Flood was not just one big deposition event. Sediments had to be eroded first. From the rocks, I can surmise several depositional and erosional cycles in the northern Rocky Mountain area. So with a little imagination (which the authors seem to be against), I can see hardened sedimentary rocks available after an erosion event to be swallowed as gastroliths. I am coming to realize from my cursory study of dinosaurs, that they did not just simply fall over and die at the beginning of the Flood. They lived for awhile during the inundatory stage of the Flood, doing many normal (as well as abnormal) activities a dinosaur would do.

I have not just assumed the conclusions I have come to with regard to dinosaurs and the Flood/post-Flood boundary. It has come from a review of the literature and looking at rocks. I will present one piece of evidence of why I believe the Mesozoic of at least this part of North America belongs well within the Flood.

The dinosaur fossils, nests, eggs, tracks, and graveyards found in southern Alberta, Montana, and Wyoming are part of a huge deposition of Mesozoic sedimentary rocks. These sedimentary rocks, either at the surface or in the subsurface, stretch about 5,000 km from northern Canada to the New Mexico/Texas area and extend about 1,500 km east-west. I do not know the average thickness of these Mesozoic rocks, but they must be at least 1,000 m thick.

The existence of flat-topped igneous and sedimentary remnants, such as Devils Tower in northeastern Wyoming, also provide strong evidence that Montana and Wyoming east of the Rocky Mountains were covered at one time by hundreds and possibly a thousand meters of sediments. The dinosaur fossils, tracks, eggs, etc. are erosional remnants! Not only that, the eroded sediments are nowhere to be found (I presume they are in the Mississippi River area or the Gulf of Mexico). This is not a post-Flood signature, but evidence of a mighty erosive event at the end of the Flood—the recessive stage in the new creationist geological classifications (Walker, 1994, Froede, 1995a). Carl Froede (1995b) is coming to a similar conclusion of massive erosion in the Big Bend area of Texas.

There does not seem to be enough time for all the above activity after the Flood. The dinosaurs would first have to increase and spread out from Mount Ararat. They would have to reach almost every large land mass, including Antarctica, New Zealand, and Spits-

bergen. I suppose in this scenario, the dispersion would be aided by one supercontinent that split apart at the time of Peleg (another assumption that needs evidence both Scripturally and geologically). All the animals must live during a time of tremendous Mesozoic erosion, sedimentation, mountain uplift, etc., etc. The dinosaurs must be adept at not running into most of the mammals that would have been around at the time. In Montana and Wyoming, they finally were buried under about 500 m of sediments; the circumstances of burial in many cases indicating catastrophic conditions. Then the Cenozoic sediments collected, in some locations in Montana 5,000 m deep. Afterwards, erosion took away the 500 m of Mesozoic sediments and any Cenozoic sediments that collected on top.

How can all this sediment accumulate and erode after the Flood? The belief of Garner et al. (1996) that the Mesozoic and Cenozoic are post-Flood requires about half the sedimentary rocks of the world to be post-Flood (Holt, unpublished manuscript)! Ice age and post-Ice Age erosion would be modest at best (Holt, unpublished manuscript). Under this scenario, there would have to be multiple catastrophes on the scale of the Genesis Flood, but after the Flood. There just does not seem to be enough time from the straightforward reading of the Scriptural genealogies. The big picture speaks of a massive Flood, and although I do not have the answers to some specific dinosaur activities or on such problems as paleosols, burrows, root casts, etc., I believe that if we had enough information, those too would demonstrate the Genesis Flood. Besides, if the Paleozoic represents the only Flood sedimentary rocks, did not many of the dinosaurs, reptiles, and mammals die in the Flood? Where is their record in the Paleozoic?

I thank Mr. Peter Klevberg for input on this letter.

References

- CRSQ—*Creation Research Society Quarterly*.
 Carpenter, K., Hirsch, K.F., and J.R. Homer. 1994a. Summary and prospectus. In Carpenter, K.F. Hirsch, and J.R. Homer (Editors). *Dinosaur Eggs and Babies*. Cambridge University Press. London. pp. 366-370.
 ———. 1994b. (Editors). *Dinosaur Eggs and Babies*. Cambridge University Press. London.
 Froede, Jr., C.R. 1995a. A proposal for a creationist geological time-scale. *CRSQ* 32:90-94.
 ———. 1995b. Thunder eggs: evidence for subaqueous deposition? (Big Bend National Park, Texas). *CRSQ* 32:101-104.
 Garner, P., Robinson, S., Garton, M., and D. Tyler. 1996. Comments on "Polar dinosaurs and the Genesis Flood." *CRSQ* 32:232-234.
 Holt, R. unpublished manuscript.
 Horner, J.R. 1982. Evidence of colonial nesting and 'site fidelity' among ornithischian dinosaurs. *Nature* 297:675-676.
 ———. 1994. Comparative taphonomy of some dinosaur and extant bird colonial nesting grounds. In K. Carpenter, K.F. Hirsch, and J.R. Horner (Editors). *Dinosaur Eggs and Babies*. Cambridge University Press. London. pp. 116-133.
 ——— and R. Makela. 1978. Nests of juveniles provides evidence of family structure among dinosaurs. *Nature* 282:296-298.
 ——— and P. J. Currie. 1994. Embryonic and neonatal morphology and ontogeny of a new species of *Hypacrosaurus* (Ornithischia, Lambeosauridae) from Montana and Alberta. In K. Carpenter, K.F. Hirsch, and J.R. Homer (Editors). *Dinosaur Eggs and Babies*. Cambridge University Press. London. pp. 312-336.
 Oard, M.J. 1995. Polar dinosaurs and the Genesis Flood. *CRSQ* 32:47-56.
 Walker, T. 1994. A Biblical geological model. In Proceedings of the Third International Conference on Creationism, Technical Symposium Sessions. R.E. Walsh (Editor). Creation Science Fellowship. Pittsburgh, Pennsylvania. pp. 581-592.

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BOOK REVIEWS

The Soul of Science: Christian Faith and Natural Philosophy by Nancy R. Pearcey and Charles B. Thaxton. 1994. Crossway Books. Wheaton, IL. 298 pages. \$10.99.

Reviewed by John Kaplan*

The Soul of Science is coauthored by science writer Nancy Pearcey and chemist Charles Thaxton. It debunks the erroneous idea that scientific progress is at enmity with religion, demonstrating rather that motivations or scientific work are largely religious or philosophical. The purpose in writing the book is to enlighten Christians to our scientific roots (p. xiii). The book is written for a semi-popular audience (p. xiii). The authors seek to be neutral historians, not taking sides on the various controversies.

The first half of the book discusses the history of science at a time when most scientists were Christians; the second half contains the revolutions in mathematics, physics and biology since the decline of Christianity.

Chapter one explains that since God created the universe in an orderly fashion, the experimental method should be successful in unlocking its secrets. Events occur in a reliable, predictable fashion (p. 24). Aristotelian logic and forms are covered along with scho-

lasticism and voluntarism. The Galileo controversy is also discussed. Chapter two talks about reductionism and pragmatic realism versus subjective relativism. Personalities such as Giordano Bruno and Thomas Kuhn and their views are covered.

Chapter three begins by noting how scientific facts are interpreted through different theoretical frameworks. Three worldviews are presented, the Aristotelian, the neo-Platonic, and the mechanistic. The work of early astronomers such as Copernicus, Kepler and Gilbert and early chemists such as Paracelsus and Van Helmont is shown to be an outworking of their beliefs. In chapter four Robert Boyle and Isaac Newton are shown to have a middle ground of both the mechanistic and neo-Platonic traditions. For example, while Boyle held a generally mechanistic view of nature, he sought to "capture and reproduce the work of those active principles in a chemical compound" (p. 88), which was from the neo-Platonic side. Interestingly the term "active ingredient" is a carryover from this work.

The mechanistics saw matter as passive and believed that God created natural law as a clockmaker builds a clock and initiates its motion. The neo-Platonists felt that certain phenomena were not reducible to mechanistic terms. Adherents of both outlooks

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were concerned to avoid the same danger—that nature would come to be regarded as independent of God. Neo-Platonists were afraid that a mechanistic view would lead to a conception of the universe as a vast machine operating by built-in physical forces. Mechanists feared that the active principles would be conceived as independent powers inherent within matter. Both sides hoped to articulate a role for God in a world increasingly seen as a closed order of cause and effect (p. 83).

Contingent order is presented as a balanced view where the universe was created and sustained by God (p. 80). Chapter five explains how the discipline of biology was promoted from one's worldview. Scientists such as John Ray, Linnaeus, Cuvier, Buffon, and Lamarck are discussed within the various philosophical categories mentioned above. Darwin and natural selection are treated in a section on reductionism.

Emphasis is made that metaphysical assumptions are held prior to observation and experimentation and are

not a conclusion from the evidence . . . even the research methods employed are strongly affected by prior conceptions about what life is—about what kind of facts are 'out there' to be discovered. A researcher's prior interpretation of life guides him in making decisions whether or not a particular method of investigation is appropriate to the subject matter and whether or not it is likely to be fruitful" (p. 119).

Chapters six and seven cover the rise and fall of mathematics. God created the universe with a consistent and predictable order. Later, with the decline of Christianity, a different foundation was sought to account for the reliability of mathematical knowledge. This foundation became that the operation of the universe was bound by necessary laws which could not be any other way. A balanced Christian view of mathematics is presented at the end of chapter seven.

Chapters eight and nine deal with relativity and quantum physics. What is exceptional about these chapters are the outstanding analogies employed to clarify the complex concepts presented. Einstein's special and general theories of relativity are clearly elaborated. It is noted that Einstein denied being a philosophical relativist, one who is against all absolute principles. "In fact, he was originally reluctant even to use the term 'relativity theory,' saying it had given rise to 'philosophical misunderstandings' " (p. 183). Galileo's theory of relativity is also touched upon.

Various quantum mysteries are unclouded through the authors' analogies. These include the existence of quanta, the particle/wave theories of light, probability theory, the Heisenberg Uncertainty Principle, along with others and their philosophical implications.

The last chapter treats the chemical code in DNA and contains a brilliant discussion on life's irreducible structure based largely on philosopher/chemist Michael Polanyi's writings. Various headings include The Language of Life; Who Wrote the Genetic Code?; Natural Order; Measuring Information; How does a Molecule Become a Message?; and Design in DNA.

"The rule of intelligence," state the authors,

"becomes even clearer if we turn from the code to the encoded message. Discussions about DNA are often muddled by confusion among three things: 1) the molecule itself, which is the material medium for the message; 2) the code, which consists of the rules of grammar and translation; and 3) the message, the actual content that is translated into protein structure. Mechanistic biologists concentrate on the material medium. They assume that once we explain the origin of the molecule itself by physical-chemical forces, the origin of everything else is thereby also explained. Once the nucleotides can be induced to come together and form a chain, the base sequence somehow 'acquires meaning.' It's as though we took Scrabble letters, randomly arranged the letters and spaces in a long line, and then hoped that a linguistic convention would arise from it, with rules to give the letter-groups meaning" (p. 242).

The book contains extensive notes, a suggested reading section, and an index. If I were to make any recommendations for improvement it would be to add a glossary to accommodate the layman who may be unfamiliar with words such as "epigenesis" or "emboitement."

I greatly enjoyed and benefitted from the book and I second the statement made by Oxford Cell Biology Lecturer David Shotton that this is a "most significant book which, in our scientific age, should be required reading for all thinking Christians and all practicing scientists" (back cover).

Darwinism; Science or Philosophy? Proceedings of a Symposium Entitled 'Darwin; Scientific Inference or Philosophical Preference' held at the Southern Methodist University Campus, Dallas, Texas, March 26-28, 1992, edited by Jon Buell and Virginia Hearn, Foundation for Thought and Ethics. Richardson, TX. 228 pp. \$37.50.

Reviewed by Jerry Bergman*

Ten Ph.D.s and one J.D. endeavor in this symposium to review some key creation/evolution controversy issues. Several concluded that "a priori commitment to metaphysical naturalism is necessary to support Darwinism" (p. 15). The reader can judge whether the critics of this position have effectively defended their view, but Phillip E. Johnson concludes that

although the scientists have won all the legal battles, there are still a lot of creationists around who are very much unconvinced by what the Darwinists are telling them (p. 10).

Stephen Meyer argues that it is logically possible to conclude that an outside agent could have designed or influenced the origin of life on earth—and that knowledge of such an agent could in principle be empirically accessible. The conclusion that it is unscientific to suggest that such an agency could exist—an intrinsically unprovable position—is why science must a priori presuppose metaphysical naturalism (p. 34).

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Johnson convincingly shows that those on both sides, from Michael Ruse to Henry Morris, realize that the controversy has profound implications in the areas of morality, behavior, social policy, and judgments of right and wrong. Consequently, it is critical that Darwinism is debated. The blind watchmaker thesis (the term Johnson prefers for evolution) concludes that we "live in a purposeless cosmos that cares nothing for our sufferings" (p. 17). As Johnson argues, the presumption of philosophical naturalism in science has produced a bias which unjustifiably excludes a world view and a position on origins which must be considered. He quotes evolutionists such as Grasse to show that Darwinian theory predicts a "cone of increasing diversity" but what is actually found is that far greater diversity existed in earlier times which has been lost through extinction. Contemporary research has, for example, uncovered fossils in the Burgess shale that provide evidence for some 15 to 20 previously unknown phyla.

Johnson also takes the evolutionists to task for playing "Darwinist apologetics" by using the theological argument that, "God wouldn't have done it this way." An example is Stephen J. Gould's argument that if God had designed life, surely He "would not have used a collection of parts generally fashioned for other purposes" (p. 17). Likewise, Ruse argues, "how could there be a God with so much evil in the world"—yet states "I am proud to be a human" (p. 27). This is ironic because most evil today is caused directly by humans, both evil persons and good humans that do nothing about evil. Obviously, if it is invalid to use design to prove God, it is invalid to use design to prove the opposite. Gould's best example, the panda's thumb, is actually an argument creationists use to illustrate the incredible complexity, diversity, and intricacy of the natural world created by God. The Panda's thumb is wonderfully designed for its total ecological niche, a conclusion that evolutionists explain by arguing that "design" is actually a result of fine tuning by natural selection.

David L. Wilcox points out in his excellent article that many of the conflicts between the two sides involve terminology—noting that evolution has been used to mean a paradigm, a world view, a mechanism, and even any change—"more linguistic freight than any word can meaningfully carry," (p. 128). The word evolution literally means to "roll out," and is often used to describe common phenomena, such as the development of flowers from seeds, humans from embryos, or 200 breeds of dogs from one dog type. He eloquently shows that the core of the creation-evolution controversy is the attempt to replace the divine with a naturalism process, theism for atheism, the scientist for the priest, and human fallibility for scriptural infallibility (p. 130).

A concern raised by Michael L. Behe is that life can tolerate enormous amino acid chain diversity; 15 or 20 amino acids can be changed and still produce a functional properly folded protein. At other positions on the chain, only three or four replacement amino acids can be tolerated before the protein no longer functions. In spite of this diversity, an enormous amount of consistency exists, especially within a species. This indicates that both a conserving force, and also a designer, exist. The commonality found in living things is not necessary for life to live, but exists, the opposite of what evolution predicts. The implications of this are profound—as

Behe notes, "the laws of nature are insufficient to produce functional proteins and, therefore, functional proteins have not been produced through a nondirected search" (p. 69). The reason is a huge gap exists between one protein type and another, and no major functional stepping stones that can cross the chasm are possible. He adds that Darwinian selection can discriminate only on the basis of function and "with the exception of those found in living organisms, virtually all protein sequences are functionless." An amino acid sequence can be replicated and mutated for centuries, and "the odds are still about one in 10^{65} that a new functional protein class will be produced" (p. 70).

Many of the contributors advocating evolutionary naturalism imply that we know a lot more about the natural world than we do. For example, Morrow notes that we understand the AIDS virus "down to the most fundamental molecular level" even mapping it "to the point where we know every single molecule that composes it." The gene exons may be mapped, but sequencing is largely a mechanical process that can be completed by a lab technician. Although knowing the base sequences is an important first step, it is a long way from understanding how the virus works and how the amino acid chain sequence that it produces functions.

Morrow also makes the observation that proteins which have greatly different functions often contain very similar gene sequences. For example, the cholesterol receptor molecule has a portion which contains a gene sequence that is the same as that found in the epidermal growth factor gene. He then makes an enormous mental leap, concluding that this is true because natural selection takes "advantage of whatever happens to be handy at the time" (p. 97). The fact is, good reasons often exist for the structural similarity found, and we are only beginning to understand protein function. We know the structures of only about 500 proteins, and this knowledge has come only from extensive study and research, plus the development of NMR and X-ray crystallography (Branden and Tooze, 1991).

Consequently, Morrow's conclusion is at best grossly premature, and as such should be labeled assumption. Morrow then makes a further jump to theology, concluding a god who pulls odds and ends out of biological systems and puts them together, sometimes ineptly Morrow adds, is a long way from an omnipotent creator God, thus this God does not exist. Conversely, the many examples that do eloquently illustrate the design argument are rejected by evolutionists as simply an example of the precise fine-tuning that is produced by natural selection. As Johnson eloquently argues, one cannot have it both ways: if the design argument is invalid, it cannot be used to argue something or other about God.

The articles by Michael J. Behe, professor of chemistry at Lehigh University and David Wilcox, professor of biology at Eastern College, alone are well worth the price of the book. Ironically, even those on the blind watchmaker side were positive about the debate, welcoming the opportunity to present their side to creationists, yet several participants argued elsewhere to deny this same opportunity to creationists. One, the chief expert witness in the Arkansas trial, testified in favor of denying this opportunity to students in the public schools. In short, this book is a must read, one

that every creationist should encourage their high school, college and public library to obtain. Delightful, easy to understand, yet informative for the specialist, hopefully this volume represents a trend, and one way that the creation world view can get past the censors.

Reference

Branden, Carl and John Tooze. 1991. Introduction to protein structure. Garland Publishing. New York.

Noah to Abram: The Turbulent Years by Erich A. von Fange. 1994. Living Word Services. Syracuse, IN. 372 pages. \$17.95.

Reviewed by Carl R. Froede Jr.*

Erich von Fange provides a highly enjoyable, chronological, and easy to read approach to Biblical events starting with the creation of the Earth and extending to the time of Abraham. The book discusses the fallen antediluvian world in a manner which was foreign to this reviewer. The interpretation, however, is within scriptural possibilities. Von Fange makes it clear from the start that he is a "hawk" when it comes to his interpretation of the antediluvian timeframe. He states:

Nature has gone on many a rampage since the time of the Flood. We can see the evidence in the scarred earth, and every year there are sobering tales of floods, hurricanes, earthquakes, volcanic eruptions, giant mudslides. Yet all these are nothing compared with the cursed world before the Flood. animal life—on the earth, in the sky, in the waters—was full of deadly peril. The earth bears witness of great catastrophic events, world-wide in scope in many cases, of meteoric showers, huge strikes from outer space, and plagues. These horrors in turn were accompanied by massive floods, earthquakes, and volcanic eruptions.

Perhaps we can now begin to see what life was like for Cain and his descendants when they turned their back on God, only to face nature at its worst (pp. 33-34)

The book appeared somewhat weak in discussing the physical processes (i.e., climate, geological, and astro-geological processes) suggested by Erich as having occurred during the Antediluvian Timeframe. This is due to the lack of both Biblical and physical evidences to support the "hawk" interpretation. However, the information presented from the time of the Flood throughout the remainder of the book provides a well documented and defensible interpretation of both scriptural and historical records.

The book moves rapidly through the Flood citing various references and addressing physical features formed. A timeline/chart is presented and developed throughout the book to quickly orient the reader to specific periods in Biblical Earth history. This timeline/chart and its development throughout the course of the book make an outstanding contribution to the young-earth Flood model.

Starting with Chapter 4 (the Post-Flood world), Dr. von Fange presents photographs and charts which clearly present the course of human cultural development, starting with the departure of the Noah clan from the Ark and eventually moving to the destruction of Sodom and Gomorrah.

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Explanations are provided, within the Biblically based young-earth Flood model, to address such enigmatic problems as cave men and the Stone Age, the Ice Age, the "days of Peleg," the development of civilizations including the "Golden Age," the great desiccation, and more recent catastrophes. This work presents an exhaustive research effort which defends the young-earth Flood model. Throughout the book von Fange presents answers to questions which are currently unresolved within the uniformitarian framework, specifically within the fields of archaeology, linguistics, technology and invention, and climatology.

I highly recommend this book to any person, scientist or not, who is interested in understanding how mankind has developed since the Flood. Von Fange presents the parallel development of various cultures on the Earth, each with different levels of technological expertise. This simple Biblical approach solves the uniformitarian problems of human cultural development and answers questions regarding the development of stone age and ice age cultures, along with the more recent civilizations (i.e., Greece, Egypt, Persia, and Rome).

"The Floods That Carved the West" by Michael Parfit. 1995. *Smithsonian* 26(1):48-58.

Reviewed by Robert E. Gentet*

Parfit's article in the *Smithsonian* is a well-written story of geologist J. Harlen Bretz's controversial explanation of the Ice Age flood that suddenly carved out the channeled scablands of Eastern Washington. As the subtitle under Bretz's picture notes: "In 1923 geologist J. Harlen Bretz cracked the mystery of the scablands but was scorned by other scientists" (p. 51). Catastrophism has been a dirty word in evolutionary geology until relatively recently. Now catastrophism seems to be the "in" thing, as long as evolution and long ages are somehow still preserved in the process.

Bretz began his study of the unusual geological features in Eastern Washington in the early 1920s and published various papers until 1969. The geological features Bretz noted were often so huge that conventional geologists were not even looking for evidence of a flood of this magnitude. In the words of Parfit:

Once you see it, the evidence seems overwhelming. How could Flint and colleagues have been so obtuse? Perhaps because things like this look obvious only after someone has the nerve to see them (p. 54).

I had the opportunity to view a portion of the scablands during August of 1995 and I can certainly personally verify that statement!

Admittedly, the idea of uniformitarianism hindered a true scientific explanation. In the process, the belief in uniformitarianism has undergone a transformation, but any serious introduction of Noah's Flood into the conventional study of geology is still *verboten*. Again, in the words of Parfit:

It's ironic that the very qualities that turned Bretz away from his strict religious background helped him kick some pins out from under the geological theory that had undermined the biblical view of creation. . . . The [Uniformitarian] idea, supported by much evidence, had discredited the theory known

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as Catastrophism, which explained Earth's shape through a series of upheavals far more violent than any seen today—events like Noah's flood (p. 51).

Besides this *Smithsonian* article, the serious inquirer would benefit by reading some of Bretz's original articles—The channeled scablands of the Columbia Plateau. 1931. *Journal of Geology* 31:617-649; The Grand Coulee. 1932. American Geographical Society. Special Publication No. 15; Washington's channeled scabland. 1959. Washington Division of Mines and Geology. Bulletin 45; The Lake Missoula floods and the channeled scabland. 1969. *Journal of Geology* 77:505-543.

Bretz saw the huge (and now mainly dry) waterfalls, canyons, plunge pools, rock basins, cascade and cataract ledges, immense gravel bars, giant ripple marks and other features carved and deposited in the vast basalt deposits of the Columbia Plateau as overwhelming evidence of perhaps six or seven gigantic floods (some now estimate many more—see page 58 of Parfit). The roadblock in geological circles to Bretz's ideas was the source of all this water.

The uniformitarian dam began to crack in June of 1940 at an American Association for the Advancement of Science meeting where a United States Geological Survey (USGS) geologist, Joseph Thomas Pardee, described evidence that glacial Lake Missoula (originally beginning just east of the present northern scabland area) had suddenly burst its ice dam and emptied its contents across what is now Eastern Washington. This was the unknown water source needed by Bretz. Ancient Lake Missoula contained an estimated 500 cubic miles of water—about the combined total of present-day Lakes Erie and Ontario. It would still be another 42 years (1982) before the USGS yielded to Bretz's theory.

The ancient Spokane Flood that carved the scablands towards the end of the Ice Age is just one of many catastrophic floods now acknowledged by main-line geologists (See Meyer, L. and D. Nash. 1987. Catastrophic flooding. Blackwells. Oxford). The evidences of known catastrophic local floods need to be carefully studied by creationists as well. For although large events, they are still small when compared with the larger one depicted in Genesis 6-8. Yet, for the creationist they will provide some valuable data in evaluating what to expect from the Flood. And maybe out of it all, the "smoking gun" for the Flood itself will begin to dawn upon the scientific community.

Cadborosaurus—Survivor from the Deep by Paul H. LeBlond and Edward H. Blousfield. 1995. Horsdal and Schubart Publishers. Victoria, British Columbia. 134 pages. \$9.50.

Reviewed by Bruce Scoggan*

I first became aware of this sea serpent from the article "Beast from the deep puzzles zoologists" (Park 1993). It described and pictured a three meter long juvenile specimen which had been removed from the stomach of a sperm whale. A subsequent call to one of the article authors indicated a research book was in progress regarding these creatures. This book is the result of their research.

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According to the researchers these serpentine sea creatures have been seen along the west coast from California to Alaska from prehistoric times to the present day. Four 1994 sightings are listed in the book. *Cadborosaurus* was the name proposed by a newspaper editor in the 1930s because of their frequent sightings around Cadboro Bay near Victoria, British Columbia.

Primarily the book consists of descriptions of verified sightings including hand sketches prepared by the individuals who reported the sightings. The adult creature is generally reported as serpentine in configuration, approximately 5 to 15 meters in length, with a giraffe or camel shaped head. Single flippers on each side are located just below the neck. A split fluted tail is generally observed. Swimming speeds up to 40 knots have been reported. The book lists eight distinguishing criteria which allows for differentiation from other aquatic animals such as whales or dolphins (p. 71).

Appendix I details 182 reliable sightings from 1881 through 1994, most of which were reported in reputable local and national newspapers and journals. Selective criteria was carefully followed for inclusion as reliable sightings thus eliminating speculative, false, or hoax reports (p. 7, 93).

Appendix II provides details of 11 strandings or captures where physical contact was made. The most recent of these was in 1991 when a Seattle pharmacist reported finding a baby dinosaur on the beach of John's Island. He reported forcing this 16 inch-long creature back into the water with a stick. The article and picture of the *Cadborosaurus* carcass taken from the sperm whale in 1937 is one of these 11 captures. Three original photographs have been preserved. Appendix II also provides information which may cause some to regard the entire book as being unreliable in that it lists possible (obviously speculative) alternative specimen identifications when so provided by the source reporting the stranding or capture.

A comparison is made of *Cadborosaurus* with his possible freshwater cousins such as Nessie in Scotland's Loch Ness; Ogapogo in western Canada's Lake Okanagan; Storsjoodjuret in Sweden's Lake Storsjon; and Champ in New York's Lake Champlain. No mention is made of the plesiosaur carcass snagged off the coast of New Zealand in 1977 (Koster, 1977). In the first chapter the authors also present petroglyphic evidence from various sites along the British Columbian shores. What then is this *Cadborosaurus*? The authors admit that this creature remains a "cryptid," a creature whose existence is still in doubt because of insufficient evidence. Cryptozoology is the term for the study of hidden animals, animals about which only testimonial evidence is available, or material evidence considered insufficient by some. Either the evidence presented is to be rejected as insufficient, or there still roams in the waters of the North Pacific a large undiscovered marine creature. A fundamental question is "How much material evidence does it take for a person to be convinced?"

References

- Koster, John. 1977. Creature feature: What was the New Zealand Monster? *Oceans* 10(6):56-57.
- Park, Penny. 1993. Beast from the deep puzzles zoologists. *New Scientist* 137(1857):16.



The History of life

Lane P. Lester, Ph.D.

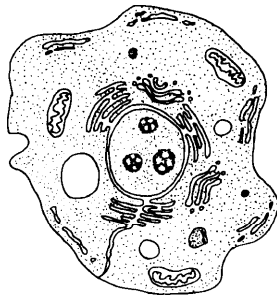
It has often been claimed that the evolution-creation controversy is a conflict between science and religion. This is given as a primary reason for keeping the creation alternative out of the science classroom. But the two powerful ideas of evolution and creation cut across the academic disciplines of science, religion, philosophy, and history. Both are developed from the findings of scientists and are appropriate subjects for science classes. But both go beyond the capabilities of science and require a measure of faith from their proponents.

Although there are variations in both the evolutionist and the creationist camps, the controversy can be simplified to state that either evolution is true or creation is true. To eliminate one is to confirm the other. Many writers have concentrated on exposing the fatal weaknesses of the evolutionist position, thereby showing that creation is the superior scientific model. But rather than follow this same approach, I would like to provide a positive statement of the creation alternative and give you some of the evidence supporting it. I'll frame this in two somewhat simplified statements, one about the origin of life and one about the origin of species.

Origin of Life

The origin of life had to be by supernatural creation, because life is too complex to arise through natural processes.

The living cell is, in many ways, like a chemical factory, but more complex than any designed by humans. Hundreds of chemical reactions are simultaneously going on in each cell. And the cell is not just a bag of chemicals reacting with one another. It is subdivided into many specialized compartments, just as a human factory is divided into areas with different functions. Both the physical design of the cell and the chemistry in it are clear examples of intelligent design.



There have been many attempts in the laboratory to show how life could have originated through natural processes alone. Scientists have succeeded, usually using extreme measures, in simulating

a few tiny steps of the total process of life. Anyone who expresses satisfaction with these attempts shows us one of two things. Either they have a poor understanding of the complexity of life or they have an incredible amount of faith in evolution. In spite of headlines about the creation of life in a test tube, scientists are nowhere near being able to demonstrate a natural procedure for the origin of the first cell.

Origin of Species

A large number of different organisms had to be created supernaturally, because the processes of biological change are not capable of significant innovation.

Let's consider first the processes that produce change in *individual* living things. Then we'll look at a process that produces change in *populations* of living things. The physical characteristics that we and other members of God's creation possess are largely controlled by our genes. Both creationists and evolutionists agree that *mutations* are the

only source of different genes. These are genetic mistakes, errors in transmitting the information of inheritance from one generation to the next.

Mutations are almost always harmful or neutral in their effects. However, the evolutionist believes in mutations as the source of all the diversity of life on earth today. This would require the production of untold numbers of beneficial mutations. That the same handful of examples is always offered is again testimony to the faith of the true believer in evolution.

One of the favorite examples of beneficial mutations is the ability of bacteria to change so that they are resistant to antibiotics. Of course, that is beneficial only to the bacteria, not to the humans they infect. Insects, similarly, undergo mutations that make them resistant to insecticides. These resistance mutations are very beneficial to organisms confronted by these poisons. However, they do not produce the kind of change that is needed to convert one type of creature into another.



Fruit fly wing mutants



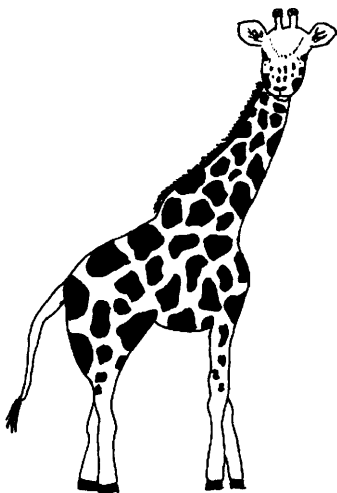
Normal fly

There are some beneficial mutations that produce large changes. Charles Darwin, during his voyage around the world, discovered wingless beetles on the island of Madeira. These beetles had undergone mutations causing the loss of wings, a good idea on a windy island. A similar example would be the blind fish that inhabit caves. Here mutations have eliminated organs which have no use in the dark. These changes are, indeed, significant, but notice that they involve the loss of existing structures. No one has ever seen a species undergo mutations that produce wings or eyes in animals that have never had them before.

There is, however, another process by which individuals can vary. *Recombination* explains why children look different from their parents. This shuffling of the genes can produce superior combinations of different genes. However, because we see that mutations are incapable of supplying useful variation, the useful genes that are there to be shuffled must have been created at the beginning.

We have mutation and recombination as the processes by which individuals can change. But the history of life is primarily the story of populations, not individuals. What causes populations to change?

Charles Darwin correctly described *natural selection* as a powerful process in the history of populations. If some gene combinations have an advantage over others, their owners will leave more offspring for future generations. And this will cause a shift in the genetic make-up of the population. But Darwin thought that because a little change was possible with natural selection, any amount of change could result. One reason for his mistake was his ignorance of genetics. For example, he thought that the giraffe could have gotten its long neck by stretching it and passing the results on to its offspring. It is interesting that, during the 1850's, when Darwin was doing his research, Gregor Mendel was discovering the principles of genetics. While Darwin was building a case for



unlimited change, Mendel was finding an unchanging pattern of inheritance. What does natural selection accomplish? Using the genes provided by the Creator, natural selection makes it possible for populations to survive changes in their environments. It may also may allow a population to migrate into a new environment. Finally, natural selection also prevents change as it eliminates or minimizes the effects of harmful mutations.

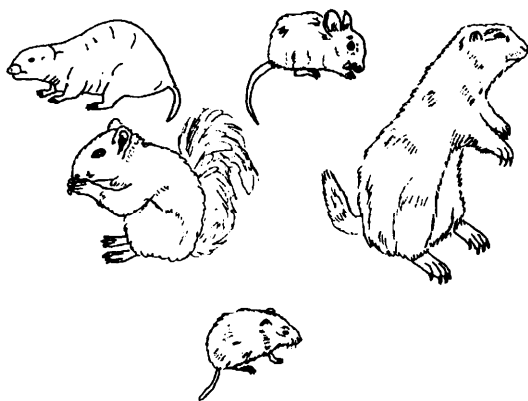
With these basic statements about the origin of life and the origin of species, let's try to put the history of life into a meaningful framework.

First Kinds

According to the creation model, each basic type of living thing was supernaturally created. Can we identify the created types today? It is obvious that some species are related, so "species" can't be the unit of creation. The higher taxonomic categories (genus, family, etc.) are subjective and can't serve this purpose. A new term is needed, and various ones have been proposed. In our book, *The Natural Limits to Biological Change*, Ray Bohlin and I proposed the word "prototype" (first kind). Unfortunately for our egos, this word has not become popular. The clear-cut winner so far is "baramin," which is derived from two Hebrew words meaning essentially "created kind."

A baramin could be defined as the descendants of a single created population. So each baramin has its beginning at the creation, and unless extinct, continues to exist today in its descendants.

After the creation, each baramin population grew and subdivided as it spread over the earth. The processes of recombination and natural selection in new environments in many instances caused the members of the same baramin to divide into separate races and species. A question that arises is whether a small original population could provide all the variability seen today in that baramin. An example that suggests



a positive answer is the inheritance of skin color in the human species. Humans come in many different shades of color, but it is genetically possible that the First Couple could have been the same color, had children the same color as themselves, and yet produced the entire rainbow of humanity. All this would have been possible without the necessity of mutations being involved.

There are many examples of multiple plant species that have come from the same baramin during historical times. Animals are harder to determine in this regard, but it is possible that the horse, donkey, and zebra are descendants of one baramin. The same may be true of at least some of the big cats: lions, tigers, etc.



Basic Designs

To appreciate fully the living world around us today, we need to have another word in our vocabulary, “archetype” (ancient form). This refers to basic designs used repeatedly by the Creator. There is an endless variety of examples known to biologists. One of the most fundamental archetypes is the living cell, the building block of all life. An example seen in most biology text books is the front limbs of different back-boned animals. The evolutionist believes that this is evidence of common ancestry, but it is just as logically evidence of the same Designer. Architects today will use similar materials and techniques in several buildings, varying the basic design for the needs of the particular client.

Summary

With the above concepts about the origin of life and the origin of species, all the history of life and the great diversity of life today can be understood and appreciated. The known processes of beneficial change (recombination and natural selection) are capable of taking a group of created populations and developing them into the richness of life on earth today.

Further Reading

Acts and Facts, Institute for Creation Research, Box 2667, El Cajon, CA 92021, donations appreciated. News about ICR, group of creation scientists. Includes articles on Biblical and scientific topics.

Creator, His Creation, P.O. Box 785, Arvada, CO 80001, donations appreciated. Fine little newsletter including excellent materials for children.

The Natural Limits to Biological Change, L. P. Lester and R. G. Bohlin, Word Books. The evidence of genetics shows the weaknesses of modern theories of evolution. Adult reading level.

What Is Creation Science?, Henry M. Morris and Gary. E. Parker, Master Book Publishers, P.O. Box 1606, El Cajon, CA 92021. Very readable overview of the creation-evolution controversy.

Evolution: The Challenge of the Fossil Record, Duane T. Gish, Master Book Publishers, P.O. Box 1606, El Cajon, CA 92021. The best treatment of fossil record.

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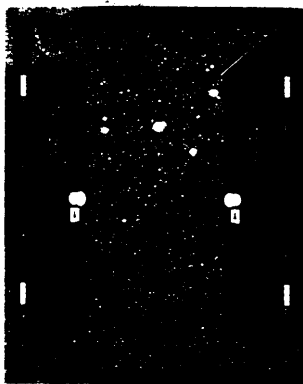
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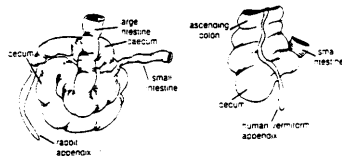
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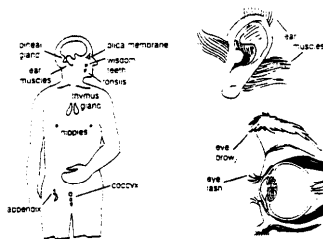
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