

Creation Research Society Quarterly

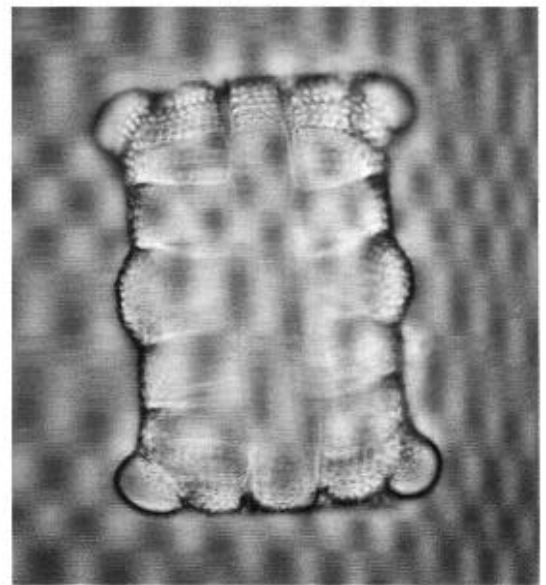
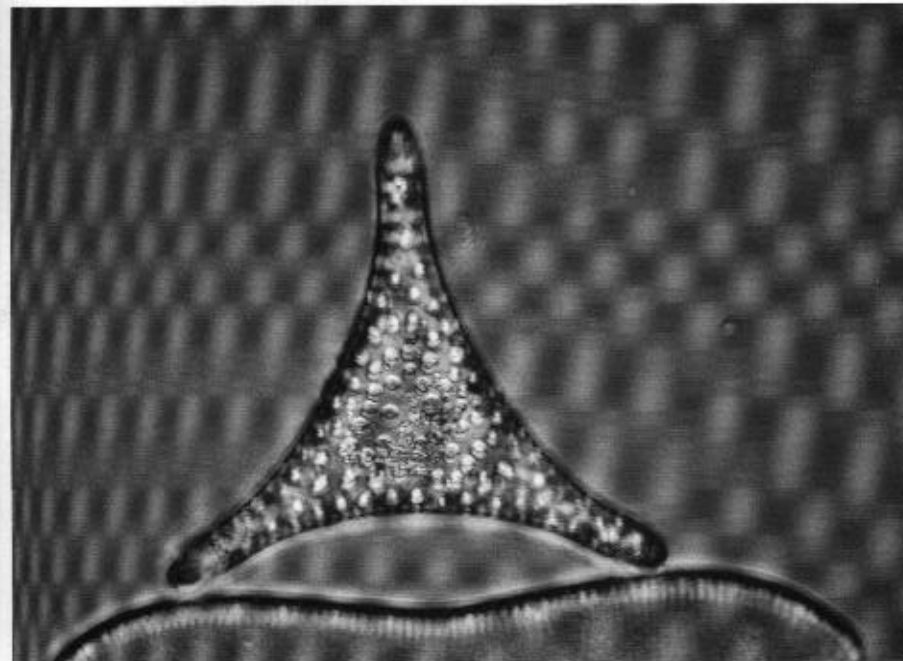
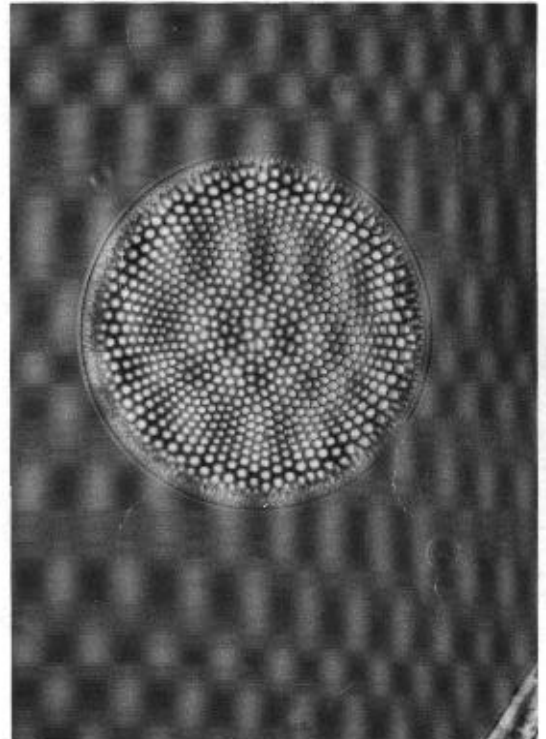
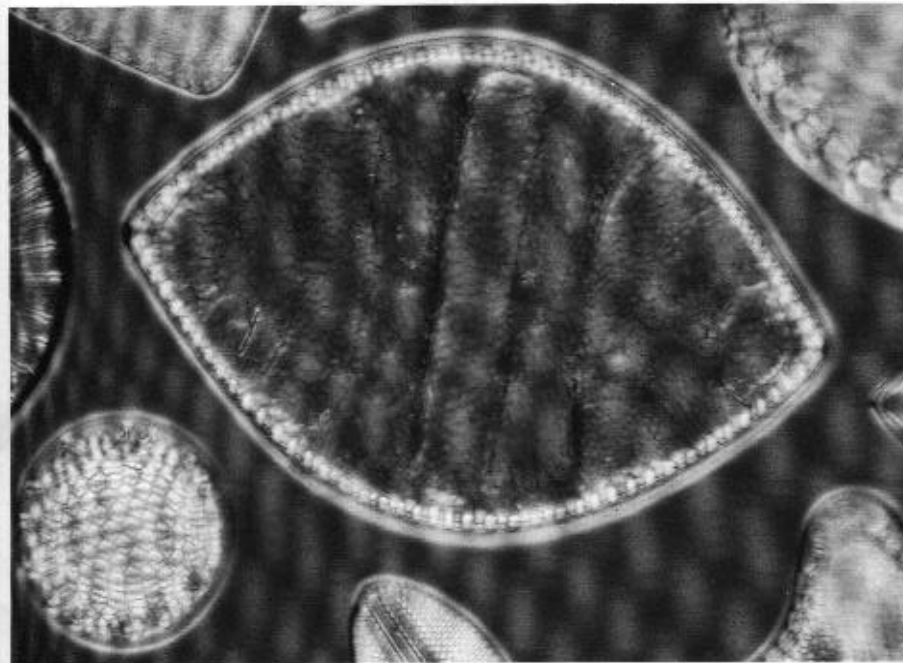
Haec credimus:

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 31

DECEMBER 1994

NUMBER 3



CREATION RESEARCH SOCIETY

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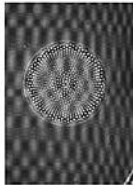
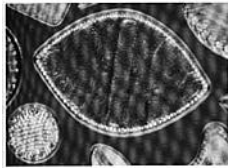
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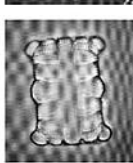
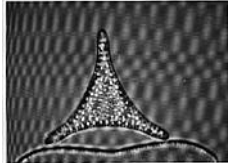
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Cover Photographs

These beautiful photomicrographs of God's well-designed diatoms were taken by Mark Armitage. See his article on pp. 167-170 of this issue.



Instructions to authors can be found in June Quarterly.

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MEMBERSHIP/SUBSCRIPTION APPLICATION FORM
CREATION RESEARCH SOCIETY

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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 two Experiment Stations, the Grand Canyon Experiment Station in Chino Valley, Arizona and the Grasslands Study Site in Weatherford, Oklahoma.

Membership Voting membership is limited to scientists having at least an earned graduate degree in a natural or applied science. Dues are \$20.00 (\$24.00 foreign) per year and may be sent to Glen W. Wolfrom, Membership Secretary, P.O. Box 969, Ashland, OH 44805-0969. 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 \$20.00 (\$24.00 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 or one year: \$23.00 (\$27.00 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. In 1970 the Society published a textbook, *Biology: A Search for Order in Complexity*, through Zondervan Publishing House, Grand Rapids, Michigan 49506. 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.

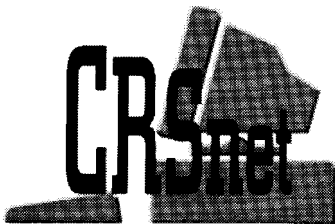
2. All basic types of living things, including humans, were made by direct creative acts of God during the Creation Week described in Genesis. Whatever biological changes have occurred since Creation Week have accomplished only changes within the original created kinds.

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 then 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.

“CHRISTMAS SPECIAL” ON CERTAIN VOLUMES OF CRSQ

S e e c u r r e n t C R S Q f o r o r d e r i n g i n f o r m a t i o n

CRSnet — An “online network” of CRS members

Those members who use computers for e-mail via a commercial online service or the Internet may now use the information superhighway to communicate with each other. Glen Wolfrom is coordinating this effort by assembling a directory of participants, listing their e-mail addresses and areas of interest. This service will also be used to keep members informed about CRS activities.

Send e-mail message to Glen at:

Internet: wolfrom@aol.com America Online: Wolfrom

ERRATA

On page 59, column 1, paragraph 2, line 3, CRSQ, Vol. 31, June 1994, the whole line should read: “against evolution and for ‘intelligent design.’”

Through no fault of Dr. Lane Lester’s, his feature “Copy ‘n Share” CRSQ, Vol. 31, September 1994, pp. 95-97 was printed in our usual page format so that it will not be possible to reprint it to fold into a 5” x 7” form, as he suggested elsewhere in that issue. The Associate Editor apologizes for this mistake and hopes that readers will still be able to reprint and use this article anyway.

CRSQ, Vol. 31, September 1994, p. 125, Figure 2 was reversed right for left.

CRSQ, Vol. 31, September 1994, p. 114, the captions for figures 11 and 13 should be exchanged.

Editors' Comments

Creationists face a monumental task in trying to separate the scientific "wheat" from the "chaff" of uniformitarian philosophy in the field of "historical geology." Mr. Carl Froede, Jr. embarks on that endeavor by demythologizing a geological specialty known as sequence stratigraphy. In two panorama pieces, geologist Froede also tries his hand at exposing such themes as Tertiary vulcanism, the Mississippi Embayment, and karst topography to the cool light of flood geology.

Mathematicians, logicians, philosophers of science, and Christians pondering the meaning and implications of artificial intelligence will be interested in Dr. Robert Herrmann's treatise on "Incompleteness, Creation Science, and Man Made Machines." Besides evolutionism, one of the modern intellectual challenges to the Christian world view is science fiction's assertion that robots will someday be developed that are better than humans. In this respect, Prof. Herrmann develops some powerful mathematical arguments showing that certain human mental processes cannot be duplicated by machines. This uniqueness of human thought is attributed to God himself.

Estimates of the age of rocks and fossils are, from a scientific viewpoint, based on unverifiable assumptions which lie outside the domain of experimental science. The reality of this is illustrated in a new way by Dr. Don DeYoung at a favorite sightseers' stop. He documents the various "ages" derived for the famous Arizona Meteor Crater and shows that they vary among themselves by more than two orders of magnitude.

One of CRSQ's most prolific contributors, Dr. Jerry Bergman, draws attention to errors of scientific fact woven into ancient creation tales. These early errors are notably absent from the biblical origins account. Perhaps some individuals who adhere to the old adage that "religion adversely affects science" will read Dr. Bergman's thesis and revise their opinions accordingly. In a Panorama Note Dr. Bergman also discusses the astounding moves that anti-creationists have made against Dr. Dean Kenyon, a respected biology professor.

Mr. Mark Armitage is known to biology professors in Southern California as "Mark The Microscope Man." In his brief paper Mark demonstrates his skill at using the same tools he sells by focusing on the delightful patterns visible in the silica of cell walls from diatoms of diverse shapes.

We hope that all faithful CRSQ readers will find help and insight browsing through the many other shorter features in this issue including various panoramas, letters, announcements, advertisements, and reviews of books or videos. We thank Dr. Glen Wolfrom for perpetuating a tradition of producing the keyword indices for each year's publication. Dr. Wolfrom's collected indices for years back are inexpensive, indispensable, and available now in booklet form. A KWIC index for CRSQ volumes 1-7 by Nigel McMurray is found in CRSQ 8:81-86, one of our "Christmas Special" bargain volumes.

Eugene Chaffin and George Howe
December, 1994



A panoramic view of a portion of the Sierra del Carmen mountain range, called the Deadhorse Mountains, in Big Bend National Park, Texas taken from the Park road that goes from Persimmon Gap to Panther Junction. The foreground is a typical view of the Chihuahuan desert. For a creationist discussion of a millipede found in this environment, see the June 1991 Quarterly (Volume 28, pp. 7-16). Dog Canyon can be seen in the right center of the photograph. For a discussion of the geology of this canyon, see the September 1988 Quarterly (Volume 25, pp. 109-110). The huge rockslide seen to the left of Dog Canyon appeared in the park on April 11, 1987. The slide occurred in Santa Elena limestone. Photograph by Glen Wolfrom, caption by Emmett Williams.

LETTERS TO THE EDITOR

Luther on Truth versus Evolutionism

Dr. Martin Luther, among other things, had to fight the battle of the truth against reason (read "evolution," which is a product of reason) as he was explaining and teaching God's Word. Here is a quote from his comments on Galatians 3:6:

All the religions of all nations and all the works of all monks and merit-mongers are absolutely nothing in comparison with the sacrifice and service of the pious (believers). For by this sacrifice they kill reason, the greatest and most invincible enemy of God. For reason despises God, denies His wisdom, justice, power, truth, mercy, majesty, and divinity. Moreover, by the same sacrifice pious believers give glory to God for they believe that he is able to do all things, and that all His words are holy, true, alive, and efficacious. This is a most acceptable obedience to God. Therefore no greater acceptable religious service or worship in the world can be given to God than faith. (Plass, 1959)

Reference

Plass, E. 1959. What Luther says. Concordia Publishing House. St. Louis.

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Ham Radio Creationism

I noticed the announcement in the June '94 issue of the CRSQ about the formation of an "on-line" group among members. Although not a member (my degrees are in philosophy and theology) I was nevertheless intrigued by the announcement, and the thought occurred that the idea could be expanded to include amateur radio as an additional mode (John Meyer's letter enclosed in the same issue seemed to indicate some activity by members on 6 meters). It would provide an excellent opportunity for worthwhile discussion in areas of concern, not to mention the resulting voice-on-voice fellowship. With the eavesdropping that goes on in ham radio it could also provide indirectly the basis for effective Christian witness. For years I have been an inactive ham, but the opportunity of being able to chat with fellow Christians having the same common ground interests would compel me to get back on the air, assuming of course that non-members could jump in as well. Some years ago the ASA had such a group, but as far as I can learn the group is no longer active.

Members having a license could write to me, and I would in turn keep you posted on the developments of such a net. They can get in touch with me at the following address:

Howard Dunlap, W9DPO
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Woodstock, IL 60098

Iridium in The Geologic Column

Comments on the Panorama Note, Comments, and Reply: "The volcanic hypothesis for dinosaur extinction," by Oard (1993, p. 163); "Asteroid hypothesis for dinosaur extinction," by Auldaney (1993, pp. 11-12); Response to Comments on the Asteroid hypothesis for dinosaur extinction," by Oard (1993, p. 12).

Introduction

The author will address two different issues raised in the above referenced paper, comment, and response: (1) the Cretaceous/Tertiary boundary and iridium and (2) iridium "spikes" found throughout the geologic record.

The K/T Boundary and Iridium

In response to the first issue, the author supports the premise that an iridium spike might indicate that "something" happened at the Cretaceous/Tertiary boundary. However, the evolutionary geological stratigraphic column represents more than just time; for young earth creationists it represents "events." The "fact" that dinosaurs are linked to the Mesozoic and do not cross into the Tertiary is based squarely on evolution. That iridium is found at the K/T boundary simply "proves" nothing! Whether the iridium comes from volcanoes or from some extraterrestrial source is good to know for correlation purposes, but it does NOT prove any uniformitarian/evolutionary point. We young earth creation scientists must be very careful how we advance these theories in order to ensure that we do not "play into evolutionary hands" and serve to confuse our new or "baby" creationists. Evolutionary/uniformitarian concepts mixed with creationism will only serve to confuse the non-specialist.

One of the issues still to be determined by young earth creation geoscientists is the role of "event" markers (i.e., iridium, volcanic ash, meteoric dust, etc.) which possibly can be used to differentiate stratigraphic sections when examining the Flood Event/Ice Age time frames. For example, does the iridium indicate (consistently) that it "occurred" during the early, middle or late stages of the Flood event or possibly during the early stages of the Ice Age? Hence the iridium layer could be important for its possible use as an "event" marker by young earth creationists. By identifying "real" ecological zones which were buried and capped by an iridium layer, it might be possible to "date the ecozone to a certain period of time (e.g., antediluvian, early, middle, or late Flood, etc.) and then reconstruct the depositional history of that specific site within the context of the Flood Event, Ice Age or even present timeframes. Now that's exciting! Obviously much work exists in order to substantiate these theories and potential concepts. Currently this author, working with others, is in the process of proposing a "Creationist Geologic Timescale" in which we (i.e., young earth creationists) will attempt to determine how the geological stratigraphic column reflects the Biblical record. The occurrence of iridium will be addressed within the context of our geological stratigraphic column based on the evidences which support a certain interpretation, but this will only occur as we discuss and debate the issues in relationship to our own model.

Iridium Spikes and the Geological Record

On the second point, iridium is now reported at six geologic horizons other than the K/T boundary (Raup, 1991, p. 172; see also Stanley, 1987; Donovan, 1989; Dao-Yi, Zheng, Qin-Wen, Zhi-Fang, Yi-Yin, and Jin-Wen, 1989). Presently the entire geologic column is under evaluation to determine if more iridium rich boundaries can be identified.

What does all of this hold for creation geoscientists? Again if we approach the geologic column as ecological zones possibly buried rapidly under Flood deposits this might account for iridium being found from the Devonian to the Pliocene (the lower and upper boundaries in which iridium is found—to date). The author supports the “ecological environment” burial model, **in certain instances**, as proposed by Whitcomb and Morris, 1961, p. 276; Hedtkke, 1971; Coffin, 1983, pp. 69-81; Gish, 1985, p. 50. However, Burdick (1976, p. 37) has pointed out that the paleocommunity might not have really existed, but be the result of selective transport of flora and fauna (caution must be used by the creation scientist when attempting any paleoenvironmental reconstruction). The iridium might provide a significant “event” marker through each of these ecological zones as to allow correlation in time equivalency (chronostratigraphy). Only additional research will determine if iridium can be used in the young earth creationist’s model in this manner.

In conclusion what does the iridium boundary at the K/T boundary mean for young earth creationists? It means that an “event” occurred which resulted in the deposition of a layer of platinum group metals. That is all it means! We need to be very careful how we advance evolutionary/uniformitarian geologic concepts within the young earth creationist model, if it is not done properly it can serve to confuse and turn away those perhaps interested in seeking answers from the Bible.

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The Hip Bones of Dinosaurs and Birds

Concerning the evolution of birds from dinosaurs, it is stated in the popular film *Jurassic Park* that in dinosaurs the pubic bone in the hip turns backward as in birds. The novel *Jurassic Park*, upon which the film is based, says, “In particular, dinosaur hips were bird-like and not lizard-like” (page 120).

The fact is that the dinosaurs are divided into two orders, the bird-hipped and the lizard-hipped dinosaurs—see Figure 1. Furthermore, contrary to the film and the book and contrary to what would be expected, evolutionists derive birds from lizard-hipped dinosaurs and not from bird-hipped dinosaurs!

The skeletons of some dinosaurs so closely resemble the skeletons of birds that they are named *Ornithomimus*, meaning “bird imitator,” and others are called *Struthiomimus*, meaning “ostrich imitator” because they are so similar to an ostrich. Birds are supposed to have evolved from such, but they all are lizard-hipped.

Formerly there was another problem in dinosaur-to-bird evolution. Otherwise qualified dinosaurs had no collarbones, but dinosaurs considered to be *their* ancestors did. Birds have a collarbone—the “wishbone.” According to Dollo’s law, a characteristic lost in an evolutionary progression cannot be regained. This was considered so important that a collarbone to no collarbone to collarbone sequence was taken to rule out dinosaur-to-bird evolution. The closest relatives to birds were accepted as the crocodiles. But then bird-like dinosaurs were found with collarbones and the crocodiles were dropped from the evolutionary sequence leading to birds.

Serious books about dinosaurs mention these things but I have never seen the matter of bird-hipped birds evolving from lizard-hipped dinosaurs instead of from bird-hipped dinosaurs referred to as a problem.

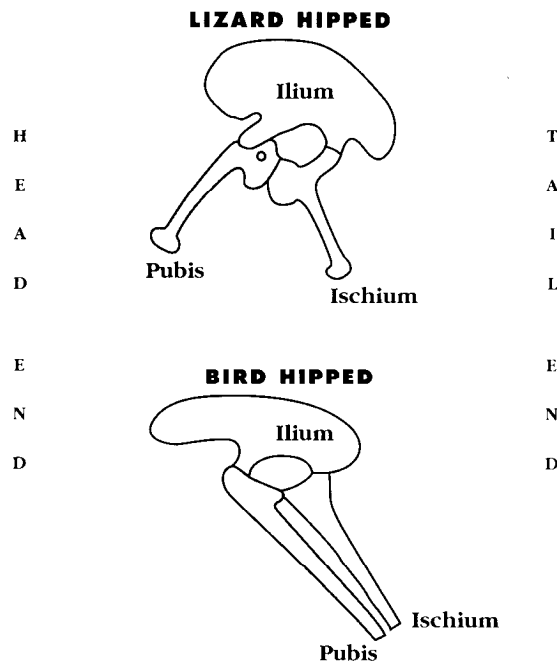


Figure 1. Diagrammatic representation of dinosaur hips.

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Implications of An African Word for "Creator"

The article by Jerry Bergman (1994, p. 205) is very informative and very interesting. One item especially caught my attention. The third paragraph on page 205 refers to "The Akan title, Borebore, given to God . . ." Having had some exposure to the study of Hebrew, albeit a long time ago, I was struck by the resemblance of the word to the second word in the Hebrew Bible. This word "bara" is translated "created." Repetition in order to give strength (emphasis) is a very common thing. I wonder if a study of the Akan language might reveal that they commonly doubled an active verb to indicate the doer of the action. Thus "created" doubled would indicate "creator."*

R. L. Byler
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*Editor's Comment: According to a communication from Dr. John W. Oller, Department of Linguistics, University of New Mexico, "... the repetition of a word, syllable, or other sequence in a language often has much the effect attributed to "Borebore" as suggested by Reverend Byler. This common linguistic phenomenon is called reduplication (a term which exaggerates its intent by its own superfluity) . . ."

Response to Dr. Wood on Chronology

Dr. Bryant Wood of the Associates for Biblical Research (ABR) recently published a critique of my 1993 Institute for Creation Research monograph, *A New Approach to the Chronology of Biblical History from Abraham to Samuel*, in the ABR journal *Bible and Spade* [6:4 (1993) 97-114]. I have been denied opportunity to publish a response to Dr. Wood in *Bible and Spade*, but am happy to make my reply, "Response to Dr. Wood," available to any who request it.

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Announcing The Creation Research Index

To help researchers easily find research articles a computer based Creation Research **Index** is now available. The **Index** lists the contents of the following creation sources.

- *Creation Ex Nihilo Technical Journal*, Vol. 1 through Vol. 7 (1993)
- *Creation Research Society Quarterly*, Vol. 1 through Vol. 30 (March 1994)
- ICR's *Impact*, #1 through #251 (July 1994)
- *Origins Magazine*, Vol. 1 through 20(1) (1993)
- *Proceedings of the First International Conference on Creationism*, 1986, Vol. I & II
- *Proceedings of the Second International Conference on Creationism*, 1990, Vol. I & II

The **Index** lists the entire contents of each publication (articles, letters, article and book reviews, each item in Panorama of Science, News and Comments, Annotations from the Literature, quotes, etc.). Each entry provides the title, author, source, volume number, issue number, page number, year published, and type of entry (i.e. article, letter, and etc.). There are over 3,900 entries.

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SEQUENCE STRATIGRAPHY AND CREATION GEOLOGY

CARL R. FROEDE JR.*

Received 3 January 1994; Revised 4 March 1994

Abstract

Sequence stratigraphy is the reconstruction and dating of sedimentary basins found locally, regionally and worldwide. Creation scientists can use many of the concepts of sequence stratigraphy within the context of the Flood model. However, the use of time intervals is uniformitarian, incorporating evolutionary concepts, and is not acceptable.

Introduction

Understanding the rise (transgression) and fall (regression) of sea level in the earth's past has proven to be an enigma to geologists. For many centuries the Biblical account of the Flood was employed to successfully explain the stratigraphic record. Perhaps because of a naturalistic bias, many scientists turned to other explanations of the stratigraphic record. One such group of men believed the earth to be very old based on their assumption of uniformitarianism. However, even these scientists have been unsuccessful in producing a model which would satisfactorily explain the stratigraphic record.

Globally, much of the stratigraphic record is interpreted as being "cyclical," with transgressive and regressive deposits reflecting the waxing and waning of sea-level (i.e., eustasy) in the geologic past. Many theories have been proposed to explain the sea-level fluctuations, i.e., Suess's "Shrinking Earth" (Hallam, 1992, p. 25); T. C. Chamberlin's "Diastrophic Control" (Dott, 1992b, p. 33); Grabau's "Pulsation Theory" (Johnson, 1992, p. 44); Udden, Weller and Wanless's "Cyclothems" (Langenheim and Nelson, 1992, pp. 60-61); and R. C. Moore's "Cyclic Sedimentation" (Buchanan and Maples, 1992, p. 76).

A new and rapidly developing concept, sequence stratigraphy, is attempting to unify not only the depositional framework but a global chronology of the associated sediments (Miall, 1990, p. 387). This paper will examine the general framework of sequence stratigraphy first within the uniformitarian context in which it is proposed (which the author does not accept) and attempt to determine what this concept might offer to creation scientists, as we seek to discern earth's past in a way that is consistent with the Flood model. Additional information regarding the specifics of sequence stratigraphy and more advanced information on its use as a framework for basin analysis, is found in Van Wagoner, J. C., H. W. Posamentier, R. M. Mitchum, P. R. Vail, J. F. Sarg, T. S. Loutit and J. Hardenbol, 1988; Posamentier, H. W., M. T. Jervey and P. R. Vail, 1988 and Posamentier and Vail, 1988.

Origin of Sequence Stratigraphy

The petroleum industry has used reflective seismic (geophysical) methods for many years in the exploration of the earth's subsurface for hydrocarbon resources. Geophysicists have discovered that many seismic reflections show geologic features which aid in finding elusive petroleum deposits. Additionally, these features

have enabled the reconstruction of depositional sedimentary environments using a technique known as seismic stratigraphy. Seismic stratigraphy is based on using two-dimensional or three-dimensional seismic lines and near-by exploratory wells (as time/stratigraphic control points) in reconstructing the subsurface. Over the ensuing years advances have been made in seismic information processing, resulting in greater depth penetration and increased reflector resolution. This, coupled with additional exploratory well control, has resulted in the further refinement of seismic stratigraphy leading to the outgrowth of sequence stratigraphy see Appendix A for highlights regarding the concepts of seismic stratigraphy).

Sequence stratigraphy is formally defined as the study of rock relationships within a chronostratigraphic framework of repetitive, genetically related strata bounded by surfaces of erosion or nondeposition, or their correlative conformities (Van Wagoner et al., 1988, p. 39). A key to understanding sequence stratigraphy lies in determining the position of worldwide sea-level change (i.e., eustasy) and its resulting depositional sedimentary sequences and systems tracts. Currently, two differing opinions are expressed regarding the primary cause for eustatic sea-level change.

One interpretation for eustatic sea-level change, held by Peter R. Vail and his former associates at Exxon who developed many of the concepts of sequence stratigraphy, supports the idea that most sea-level rise and fall cycles are primarily based on worldwide glacial episodes resulting in rapid eustatic change (referred to as glacio-eustatic control). This group derived the original concepts of sequence stratigraphy and sea level positions in geologic time directly from seismic stratigraphy from the North Sea, although additional input was later provided from other areas of the world (Hallam, 1988, p. 261). Central to this concept of eustatic sea-level change is the fact that tectonic forces (i.e., earth movements that cause uplift, rifting, faulting, folding and volcanism), while considered as having some effect on sea-level change, are not considered a major component. According to their interpretation the stratigraphic record reflects sedimentary conditions which require eustatic sea-level rise above any tectonic input to account for the complete sequence seen in many outcrops and well sections (Mancini and Tew, 1993; Anderson, Siringan and Thomas, 1991; Coleman and Galloway, 1991; Vail and Todd, 1984). However, it is cautioned that each site will require its own interpretation, in terms of glacial versus tectonic control (Posamentier, et al., 1988, p. 125).

These scientists have been criticized for publishing sea-level curves (Figure 1) with proprietary Exxon

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STRATIGRAPHY	LITHOFACIES	SYSTEMS TRACTS	SEA-LEVEL CURVE L P H
QUATERNARY	Sand	LSD	
Upper Rupelian	Alternating Marls and Clays	TS - OFFLAP	
	Fossiliferous Carbonate	TD	
Mid-Rupelian	Massive Limestone	HSD - CS	
Lower Rupelian	Fossiliferous Carbonate	TD	
	Alternating Marls and Clays	TS - ONLAP	
U. Priabonian	Sand	LSD	

Figure 1. Hypothetical stratigraphic interpretation showing how eustatic change is recorded in the sedimentary record. Abbreviations used: LSD-Low Stand Deposit, SB/TS-Sequence Boundary/Transgressive Sequence, TS-OFFLAP-Transgressive Sequence exhibiting a "regressive" sedimentary sequence, TD-Transgressive Deposits, HSD-CS-Highstand Condensed Section Deposits, TS-ONLAP-Transgressive Sequence exhibiting a "transgressive" sedimentary sequence, L-Lower sea-level than present, P-Present sea-level, H-Higher sea-level than present. See text for additional information.

information which cannot be verified (Miall, 1986, p. 131; Hubbard, 1988, p. 49) or using sea-level curves without consideration of obvious inconsistencies (Miall, 1991, p. 504; Dockery, 1991, pp. 141-150). Additionally, it appears that some sea level curve charts provide too much flexibility to the user, allowing the user to "fit" the data in question to a Vail sea-level curve event (Miall, 1992, pp. 787-790).

The other interpretation regarding eustatic sea-level change is summarized with the following statement:

Though many long- and short-term cyclic events of sea-level change can be documented, and many can be correlated worldwide, it is at present virtually impossible to correctly apportion the changes to the appropriate balance of tectonic, eustatic, and other causes (Miall, 1990, p. 448).

This interpretation is based on the idea of tectono-eustatic control or that tectonism plays a larger role in sequence stratigraphy than is currently accepted (Miall, 1986, pp. 136-137; Sloss and Speed, 1974, p. 118; Klein, 1982, p. 17). Computer simulation models reconstructing the stratigraphic record from actual areas have been used to demonstrate sea-level change "cycles" (i.e., Third-Order Cycles) as a function of tectonics alone (Cloetingh and Kooi, 1990, p. 127; Plint, A. G., N. Eyles, C. H. Eyles and R. G. Walker, 1992, pp. 19-20). While multiple glacial episodes are not discounted, they are not viewed as the primary mechanism in all sea-level changes. Additionally, the multiple glaciations necessary to account for the short-term change of sea-level do not become readily apparent when examining the rock record (Miall, 1986, p. 137; Van Wagoner, J. C., R. M. Mitchum, Jr., K. M. Campion, K. M. and V. D. Rahamian, 1990, p. 50).

Eustatic Mechanisms

The primary mechanism recognized by both groups to explain the onset of ice ages and other climatic changes, within the framework of sequence stratigraphy, is the Croll-Milankovitch (Dott, 1992a, p. 2) theory of orbital forcing. This mechanism is based on solar radiation variations caused by eccentricities in the Earth's orbit (wobble and tilt) which do not directly result in

glacial events but coupled with various other parameters can result in a glaciation (Dott, 1992a, p. 2; Miall, 1990, pp. 487-490; Schwarzacher, 1991, pp. 855-863). While there is general acceptance of the Milankovitch theory, many questions remain as to its actual role in climatic changes (Klein, 1990, pp. 455-457; Dott, 1992a, p. 14; Miall, 1990 p. 490). Additionally, Oard (1984a, 1984b, 1985) provides an excellent evaluation advocating a rejection of the Milankovitch theory from a creationist position.

The mechanism used to explain tectonic processes is the plate tectonic model, as originally proposed by Wegener (1929, p. iii) and modified to date. Both orbital forcing and plate tectonics play roles in eustasy and the resulting sediment sequences which are deposited.

Concepts of Sequence Stratigraphy

Sequence stratigraphic interpretation uses facies analysis, through the application of Walther's Law, to reconstruct eustatic sea-level positions. The interaction of eustasy with local tectonics and sediment supply determines the stratigraphic pattern of development (Posamentier et al., 1988, p. 124). Sequence stratigraphy has also been called a special type of event stratigraphy (Miall, 1990, p. 387) and according to P. R. Vail, F. Audemard, S. A. Bowman, P. N. Eisner and C. Perez-Cruz (1991, pp. 617-659), can be used to determine the interplay of tectonics, eustasy and sedimentology on the depositional sequence formed.

The "sequence" is the largest definable unit within the framework of sequence stratigraphy and it is composed of various transgressive and regressive assemblages (Figure 1). It is defined by Van Wagoner et al. (1988, p. 39) as being bounded by unconformities and their correlative conformities. Two types of sequences are recognized in the rock record (Van Wagoner et al., 1988, p. 41). They are the "Type 1" and "Type 2" sequence. The Type 1 sequence is the more complex of the two in that a greater variety of sedimentary facies can develop. According to Swift, D. J. P., P. M. Hudelson, R. L. Brenner and P. Thompson (1987, p. 448), Type 1 depositional sequences are built on thermally subsiding continental margins whose tectonic hinge point occurs landward of the region in which the sequences form. Space for sedimentary deposits (accommodation space) is created by eustatic sea-level rise, as modified by differential thermal subsidence of the continental margin. The upper and lower sequence boundaries are cut by a sea-level fall which exposes the sequence boundary to subaerial erosion.

The Type 1 sequence is composed of five different sea-level positions, which are reflected through their associated stratigraphic assemblage, referred to as "Systems Tracts." These five systems tracts are: (1) Highstand systems tract [Figure 2], (2) Lowstand systems tract-Lowstand fan [Figure 3], (2) Lowstand systems tract-Lowstand wedge [Figure 3], (3) Transgressive systems tract [Figure 4] and (5) Highstand systems tract II [Figure 2] (Posamentier and Vail, 1988, pp. 126-129). The figures provided show the sea-level positions in a terrigenous deposition setting. A discussion with figures showing the carbonate deposition setting can be found in James and Kendall, 1992. All of these "Tracts" reflect eustatic change as sea-level moves from a maximum high through the minimum low and

returns to the maximum high point again (Posamentier and Vail, 1988, pp. 126-129).

Eustatic lowstands may result, in some cases, in the exposure of the continental shelf or even the continental rise to subaerial conditions. Exposure of the continental shelf to erosion during a sea-level lowstand

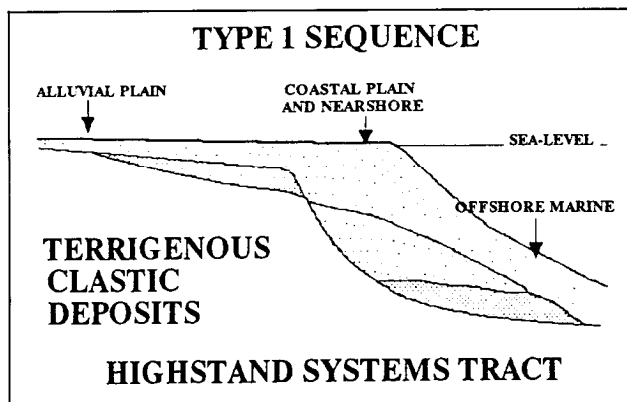


Figure 2. Cross-section showing generalized profile of a clastic Highstand Systems Tract, Type 1 Sequence. The Type 1 Sequence results in the exposure of the continental shelf to subaerial erosion. Redrawn and modified from James and Kendall, 1992.

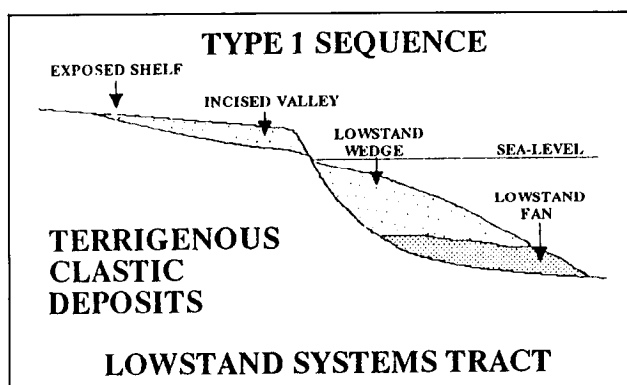


Figure 3. Cross-section showing generalized profile of a clastic Lowstand Systems Tract, Type 1 Sequence. Redrawn and modified from James and Kendall, 1992.

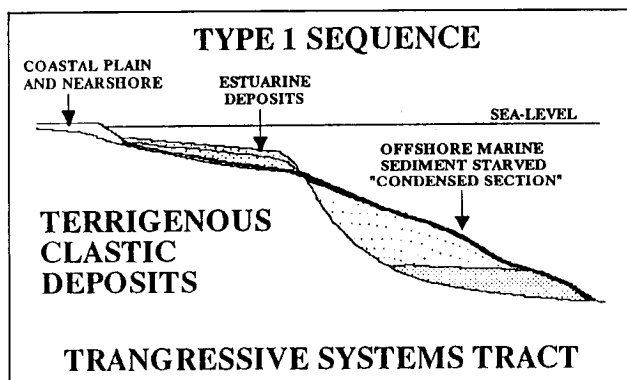


Figure 4. Cross-section showing generalized profile of a clastic Transgressive Systems Tract, Type 1 Sequence. This section shows the sequence formed during a rise in sea-level. Note incised drainage valley is filled with shallow/near shore deposits, usually associated with tectonic or storm events. Redrawn and modified from James and Kendall, 1992.

results in surface runoff coalescing into stream drainage channels which entrench themselves (i.e., incised drainage valleys) into the shelf surface. Usually an erosional unconformity marks the boundary between the lowstand and subsequent sea-level rise (Van Wagoner, J. C., R. M. Mitchum, Jr., Campion, K. M. and V. D. Rahamnian, 1990, p. 30). Deposits from the eroded uplands as well as from the shelf surface serve to fill the incised drainage valleys (unconformity surface) before transgressive material is deposited. These infill deposits (i.e., incised-valley-fill deposits) exhibit a wide variety of rock and/or sediment types due to the distance of the source area to the sea (Van Wagoner et al., 1990, p. 31; Blum, 1991, 71-83). An excellent summary for the development of a Type 1 sequence is provided in Swift et al., (1987, p. 448):

Deposition of the sequence begins as sea-level rises. At first, the rise rate is too slow to accommodate the sediment input, and shelf deposits prograde seaward [Transgressive "off lap" systems tract]. If sea-level drops over the shelf edge during the fall, shelf-edge deltas form during this early regressive phase [Type 1 sea-level Lowstand]. However, as the sea-level enters the main phase of the rise and the rise rate increases, the sediment input rate (assumed to be constant) is no longer sufficient to fill the space being created by subsidence and the regression turns to transgression. The shoreface is driven back over back-barrier lagoonal and estuarine deposits, creating a ravinement surface. Transgressive marine shales onlap the ravinement surface, but as the sea-level rise rate attains its maximum value, the sediment accumulation rate drops [sea-level Highstand]. Condensed section, enriched in authigenic components, culminates in a burrowed omission surface. As sea-level approaches highstand, and the rise rate slows, sediment input is once more able to cause the shoreline to prograde, and regressive shelf sediments downlap over the condensed horizon. [Brackets added]

The Type 2 sequence is characterized by subsidence during sedimentary deposition providing additional space for sedimentation and resulting in no exposure of the continental shelf surface to subaerial conditions (Figure 5). This particular sedimentary depositional package is called a "Shelf Margin Systems Tract" (Posamentier and Vail, 1988, pp. 144-145). This systems tract reflects neither maximum highstands nor minimum lowstands, rather the sedimentary basin "accommodates" the sedimentary influx resulting in a kind of depositional equilibrium on the continental shelf.

Both Type 1 and Type 2 sequences can be subdivided into successively smaller sedimentary units (i.e., systems tracts, parasequence sets, parasequences, bedsets, beds, laminasets and lamina) which reflect the depositional environment in which they were formed (Van Wagoner et al., 1990, pp. 6-7).

Unconformities and disconformities serve as both major and minor boundary surfaces. They are used to identify sequences (Type 1 or unconformity), systems tracts, etc., and reflect, in some cases, sea level position during the deposition or nondeposition (i.e., hiatus or condensed section) of sediments. Many of these uncon-

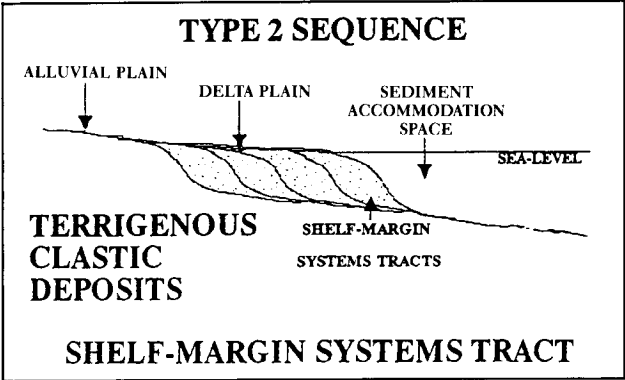


Figure 5. Cross-section showing generalized profile of a clastic Shelf Margins Systems Tract, Type 2 Sequence. Sediment accommodation space is created without a change in sea-level, shelf exposure to subaerial erosion does not occur. This sequence can form anywhere that sediment is deposited, including between Type 1 Sequences. Redrawn and modified from James and Kendall, 1992.

Table I. Five types of stratigraphic cycles, each with a specific cause and range of duration (modified from Miall, 1990, p. 447; Vail et al., 1977, pp. 83-98; Haq et al., 1988, p. 75.

Type	Other terms	Duration* m.y.	Probable cause
First order	Megasequence	200-400	Major eustatic cycles caused by formation and break up of supercontinents
Second order	Supercycle; Sequence; Supersequence	10-100	Eustatic cycles induced by volume changes in global midoceanic spreading ridge system
Third order	Mesothem; Megacyclothem;	1-10	Possibly produced by Sequence ridge changes and continental ice growth and decay
Fourth order	Cyclothem; Major cycle; Sequence; Parasequence	0.2-0.5	Milankovitch glacioeustatic cycles, orbital forcing
Fifth order	Minor cycle; Parasequence	0.01-0.2	Milankotitch glacioeustatic cycles, orbital forcing

*Uniformitarian estimates (not accepted by author).

formity boundaries serve as points of stasis and result in the development of faunal communities. The preservation of the community was usually the result of a catastrophic event (Pemberton, S. G., J. A. MacEachern and R. W. Frey, 1992, p. 58).

Uniformitarian stratigraphers believe that sequence stratigraphy can age date sediments not only locally, but globally. The conventional dating of sedimentary deposits is achieved via the use of biostratigraphy, lithostratigraphy, magnetostratigraphy, radioisotope dating and amino acid racemization. All of these are based on the standard evolutionary geologic timescale. Biostratigraphy remains the primary tool in the age determination of marine sediments. Additionally, sediments can be tied to eustatic cycles and allegedly provide sediment age dates to within 10,000 years (Miall 1990, p. 447). Correlations between basins are based on matching age dates using the above referenced dating methods. According to Vail (1992, p. 90):

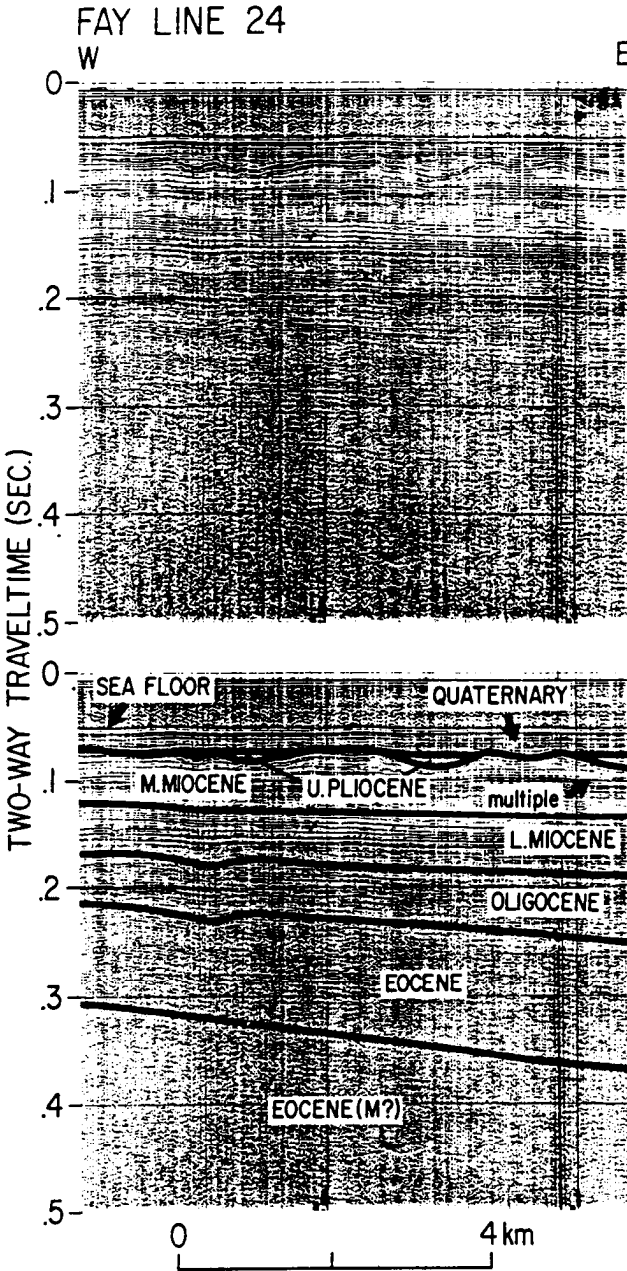


Figure 6. Two seismic lines are shown. A) Top figure shows only the processed information with vertical scale in time. There is no way of knowing what lithologic units are shown and the depth they exist below the ground surface. B) Bottom figure shows the stratigraphy which is based on lithologic and biostratigraphic information gained from nearby wells. This specific seismic section is from the continental shelf off Georgia. From Popenoe, 1992.

Sequence stratigraphy has evolved from the early concepts of Sloss, Krumbein, and Dapples (1949) and Sloss (1963) through the addition in the 1960s of seismic and well-log data (Payton, 1977) to conventional outcrop and biostratigraphic data (Posamentier et al., 1988). Additionally this concept has served to unifying sedimentary basinal analysis and age dating much like "Plate-Tectonics" did for geology and geophysics.

Eustatic cycles, seen in the stratigraphic record, have been assigned different orders of magnitude, due to the different causes which resulted in sea-level change. Currently there are five types of stratigraphic cycles, each with a specific cause and range of duration (See Table I). Additional information regarding stratigraphic cycles can be found in Van Wagoner et al., 1990 and Miall, 1990.

Sequence stratigraphy has renewed interest in sedimentary deposition and facies analysis. This concept is being used in the reconstruction of both clastic (Van Wagoner et al., 1990; Van Wagoner et al., 1991; Walker, 1992) and carbonate (Schlager, 1992; James and Kendall, 1992) depositional environments. Additionally, sequence stratigraphy is not just for subsurface analysis. It is being used to reconstruct sedimentary basins which are exposed on the earth's surface.

While sequence stratigraphy has renewed interest in stratigraphic correlation of sedimentary environments and the associated fauna, it has not gained wholesale acceptance. Many geoscientists have sought to approach the stratigraphic record using unconformity/disconformity bounding surfaces as stratigraphic dividing units (Walker, 1990, p. 785; Walker, 1992, pp. 1-14). Recognition of the importance of unconformities in the stratigraphic record has led to a proposal for a new class of stratigraphic unit, termed the allostratigraphic unit (NACSN, 1983, pp. 867-868) which is identified as a mappable stratiform body of sedimentary rock that is defined on the basis of its bounding discontinuities (1983, p. 867). These stratigraphic units are also considered a part of event stratigraphy (Miall, 1990, 86). While there are similarities between allostratigraphy and sequence stratigraphy there are considerable differences. One major difference is that sequence boundaries can be identified beyond the extent of their bounding unconformities by correlating their correlative conformities. Allostratigraphic units are recognized only where their bounding unconformities or disconformities can be identified (Baum and Vail, 1988, p. 309). There are many ways to interpret the stratigraphic record and as easy as it might seem to follow a certain approach, the stratigraphic record remains in many cases ambiguous and subject to more than one interpretation. Additionally it has been noted that there is a certain amount of "recycling" of stratigraphic concepts which present themselves for a while, are later thrown out for something else and still later resurface under a new name slightly modified (Walker, 1990, p. 777).

Creationist Approach to the Sequence Stratigraphic Framework

It is the author's opinion that many of the concepts within the framework of sequence stratigraphy are relevant and easily adapted for use by creationists. However, there are several aspects of this concept which cannot be accepted, specifically the evolutionary aspects, concepts of uniformitarianism and the ancient age of the earth. In an effort to better examine the concepts of sequence stratigraphy, a quick review of the Flood model is required, then the concepts of creationist sequence stratigraphy will be discussed following the review.

Antediluvian World

The Antediluvian world existed from the "Creation" to the "Flood." This time period is not exact but could be estimated (using inexact biblical "generations") as being approximately 1,200 to 1,656 years in duration (Whitcomb and Morris, 1961, p. 26). The antediluvian earth had mountains (Genesis 7:20), rivers (Genesis 2:10) and seas (Genesis 1:10) and so must have experienced geological activities similar to present processes with several exceptions, most notably that it did not rain (Genesis 2:5) [modified from Whitcomb and Morris, 1961, p. 215]. During this timeframe there was probably minimal geologic deposition occurring. The author believes that sediments were deposited as stratified layers (Genesis 1:6), but without any "dead" life forms (fossils) in them prior to the Fall. Everything in the antediluvian world was created perfectly suited to its environment, be it terrestrial or marine and there was no death prior to the Fall. After the Fall, sediments could possibly have been deposited containing flora and fauna, however, the rate and amount of sedimentation would not have been conducive to mass burial of lifeforms.

The Flood

The author believes that the beginning of the Flood resulted in the first occurrence of rain and the breaking up of the earth's surface resulting in the release of subterranean waters (connate and juvenile) and volcanic materials (i.e., gases and ash). This created an erosional environment on the continents and depositional environments in lakes, seas and along the continental shelves and slopes. The author supports the "Ecological Environment" burial model, in certain instances, as proposed by Whitcomb and Morris, 1961, p. 276; Coffin, 1983, p. 69-81; Gish, 1985, p. 50. However, Burdick (1976, p. 37) has pointed out that the paleocommunity might not have really existed, but be the result of selective transport of flora and fauna. Caution must be used by the creation scientist when attempting any paleoenvironmental reconstruction.

Genesis 7:20 states that the Flood water covered the earth to a depth of at least 15 cubits (approximately 22 ft) within the first 40 days. Following the end of the rain the waters covered the face of the earth for another 110 days and then began to recede. The earth, during this time, did not have an underwater surface of equal elevation and would have provided variation in depositional conditions. High areas would have been eroded with those sediments being deposited either locally or carried away by oceanic currents. Clark, M. E. and H. D. Voss (1990, pp. 53-63) have suggested that amplified tidal induced waves could possibly have circled the globe during the Flood event. This activity would have contributed significantly to the erosion and deposition of sediments and could account for the thick sedimentary sequences seen globally. Additionally, the author suggests that other global oceanic currents would be generated by a number of forces during this time frame, however, mainly by gravitational force and winds. For instance, as the Flood waters receded, winds blew across the face of the earth (Genesis 9:1). These winds would generate currents which could result in the erosion, resuspension and subsequent deposition of those sediments. Evidence for this occurrence can be found in the trace

fossil record, with the development of several ichnofacies in substrate at various depths and their subsequent burial due to catastrophic sedimentation.

The Post-Flood World

According to Whitcomb and Morris (1961, p. 8), Noah and his family departed from the ark 371 days after entering it. Major climatic changes had occurred and tectonic forces were slowing down from their earlier activities associated with the breakup of the fountains of the deep. Sea-level across the globe was in the process of regressing. Additionally, we do not know the position of sea-level when Noah and his family departed from the ark. Possibly it was higher than present.

During the latter stages of the Flood, tectonic forces, still incompletely understood, created basins into which waters flowed, thereby exposing earth's surface. Orogenic (mountain building) events, recognized throughout the geologic record, would have occurred throughout the Flood event and slowed following the recession of Flood waters. Most of the mountain ranges covering the earth's surface today formed in the Cenozoic era (this author believes that this era is Late-Flood / Post-Flood / Early Ice Age time frame). Additionally, massive volcanic deposits cover the earth either as altered volcanic ash or as lava flows and "date" from this era. Cyclic depositional features (i.e., coal) could have developed due to the presence of shallow areas whereby woody materials might have become "grounded" on the uplifted sediments and buried with further sedimentary and volcanic activity. Woodmorappe (1978) has proposed a possible model for the formation of cyclic sedimentation using the Flood model.

Volcanic materials and possibly meteorite materials (i.e., Iridium, etc.) could have been deposited during this time of Flood water withdrawal. Some concentrating of these deposits might have occurred if they were eroded and redeposited in a limited area.

Drainage of water from the Earth's surface had created river channels larger than present. The increase in precipitation occurring immediately following the Flood event (Oard, 1990, p. 60) resulted in a fresh water flush of the continents and provided the source waters for the further development of streams and rivers as they were established on the continents. Sea-level would continue to drop as a result of continental plate spreading and the sinking of oceanic basalt during cooling, accommodating greater volumes of water (Schopf, 1980, p. 48).

The Return of Plant Life

As the Flood waters receded and precipitation associated with climatic disequilibrium occurred, the continents would reestablish ground cover and forests would start to grow once again. According to Odum (1971, p. 261) terrestrial ground cover could go from nothing to grasses in 0 to 2 years; from grasses to shrubs in 3 years or less; from shrubs to pine forests in 25 years and from pine forests to Oak-Hickory forest climax in approximately 150 years.

The Ice Age

This author supports the single "wet" ice age as outlined by Michael Oard (1990) and believes that the

combination of tectonic forces coupled with climatic instability contributed to glacial disequilibrium resulting in the rapid rise and fall of sea level during the ice age and subsequently thereafter until the climate reached its present state. This ice age would directly result in the very rapid change in eustatic sea-level due to the rapid buildup of continental glaciers; lowering sea-level and the melting of the glaciers with the resulting sea-level rise. This in turn would result in a cyclical transgression / regression pattern of sedimentation seen on the continents and continental margins. Additionally, this eustatic change coupled with tectonic uplift could have resulted in the exposure of "land bridges." These land bridges would serve migrating people as they moved from continent to continent, following the dispersal at the Tower of Babel.

Some of the most obvious physical signs of heavier than present rain and snow conditions which occurred during the ice age are that many of the streams and rivers (meandering and braided) are choked with sediments they were unable to wash to the seas and oceans following the melting of the continental glaciers. River valleys and their associated channels which drained the continents during this ice age time frame were several times larger in width and depth than at present. Today these underfit rivers and streams look out of place in their wide valleys (e.g. Mississippi River, MS; Columbia River, WA; Pascagoula River, MS, etc.).

Another important circumstance to consider in this time frame is the amount of sediment washed from the (unforested) continents and deposited in deltas (both on and off the continental shelf. Some of the world's largest deltas (i.e., Nile, Mississippi, Amazon, etc.) are composed of "Cenozoic" era sediments. Many of these sediments could have been deposited during the last stages of the Flood event and the early stages of the ice age time frame.

Present Day

Today's sea level is estimated to reflect 4,000 to 7,000 years of more nearly stable conditions (Dolan and Lins, 1986, p. 13; Curray, 1965, p. 733), which is consistent with the creationist's model (especially if the earth is no older than 10,000 years). While sea-level has fluctuated somewhat in the recent past, no major sea-level changes have occurred as a result of a new ice age event or the melting of our present polar ice caps or glaciers. The sea-level changes which have occurred are the result of tectonic activity associated with volcanism (i.e., areas around the Mediterranean Sea), isostatic rebound of continental ice sheets (e.g., Scandinavia) or the slow rise in sea-level as a result of changing climatic conditions associated with the melting of present glaciers (e.g., U.S. East Coast barrier islands).

Creationist Cause for Sea-level Change in Sequence Stratigraphy

The broad framework of sea-level rise and fall over the geologic past is clearly acceptable within the Flood Model. We know from Scripture that the Flood event resulted in water covering the complete surface of the earth. Sea-level would drop with the receding of the Flood waters into ocean basins. The ensuing wet ice age would result in rapid buildups of ice on the exposed and unvegetated continental landmasses, including the

Antarctic. The ice age would contribute to additional erosion of sediments as large amounts of water would be evaporated from the seas and oceans and be precipitated both as snow and rain. According to Donovan et al. (1988, p. 301), as sea-level drops and sediment deposition occurs further out on the continental shelf/slope, progressive starvation of terrigenous sediments occurs and other sedimentary materials such as volcanoclastics, cosmogenic debris and authigenic minerals can accumulate in significant quantities. Water runoff from the continental landmass would coalesce into river channels entrenching themselves (incised drainage valleys) into the continental shelves. The increase in precipitation would result in the erosion of exposed land surfaces. Previously deposited sediments would be "washed" away as sea-level fell, exposing them to erosion; the Cretaceous/Tertiary boundary is known to be a "regressive" boundary almost world-wide and the sediments associated with this boundary are not present and are believed to have been eroded (Donovan et al., 1988, p. 305; Loutit et al., 1988, p. 200). Rapid eustatic sea-level change caused by the formation, storage and release of water associated with the continental glaciers would contribute to eustatic changes and rapidly affect the sedimentary depositional environmental framework until the various eustatic mechanisms (i.e., climate and tectonics) would stabilize to present levels.

The determination of real versus apparent eustatic change in sea-level can be further complicated by an increase in sediment input (caused by tectonic events and/or by an increase in precipitation which could lead to a false assumption of sea-level fall strictly based on sedimentary buildup (Jervey, 1988, p. 69; Miall, 1990, p. 392). The Flood model would allow for this due to the increased precipitation and erosion associated with the end of the Flood and beginning of the Ice Age time frame.

The Creationist Perspective Regarding Tectonic Forces

The author believes that tectonic forces, initially starting with the onset of the Flood event, would have remained active as the Flood waters receded. During and immediately following the Flood the continents experienced both vertical and horizontal movement due to seafloor spreading, plate subduction and continental collisions. With the cooling and sinking of the freshly formed basalt seafloor (Schopf, 1980, p. 48) greater space would become available draining water from the continents. These same tectonic events would serve as geological forces in the generation of Tsunamis (possibly resulting in the resuspension of newly deposited sediments) and subaerial and subsurface volcanic eruptions (generating new sediments above those previously deposited during the Flood), but would lesson following the end of the Flood. The newly formed mountain ranges would provide the land surface necessary for the Ark's eventual landing. These forces coupled with the ensuing wet ice age, would have created conditions of complicated eustatic change. The Ice Age time frame would have created fluctuating sea-levels which, coupled with still active tectonic forces, could have resulted in the exposure of the then existing continental shelves to subaerial erosion. Tectonic movement coupled with several periods of glacial buildup and retreat could have resulted in the forma-

tion of correlatable cyclical deposits in sedimentary basins around the globe.

As previously described, the resulting eustatic change would have been a function of both tectonics and glaciation. This would prove complicated in interpretation and while local basinal correlation might be possible, regional or global correlation would exhibit the same problems that uniformitarianists are facing (i.e., inexact dating and no direct match).

Creationist Dating Methods for Sequence Stratigraphy

The geologic dating methods commonly used by evolutionary sequence stratigraphers include: radiometric, biostratigraphic, lithostratigraphic, sea-floor spread rates and the associated reversals and polar wandering, oxygen isotopes and amino acid racemization. These dating methods will not be examined or discussed because they are based on the uniformitarian concepts of evolution over vast eons of time. See Haq et al. (1988) for additional information.

Under the creationist model many of the sequences both locally and globally might be correlatable due to the limited time of the Flood event and the ensuing ice age. Hence, the creationist time frame for sequence development would involve hundreds, possibly thousands of years, not the millions proposed by uniformitarianists. So while the evolutionary sequence stratigraphers discuss ice ages in the Cambrian, Permian, Quaternary, etc., we can discuss one ice age which impacted various parts of the planet at different stratal "ecological" positions. Excellent creationist perspectives on the usefulness and validity of uniformitarian dating techniques are presented in Oard, 1984a, 1984b, 1985; Slusher, 1981; Von Fange, 1990; Brown, 1997; Humphreys, 1987; Overn and Arndts, 1987; Overn, 1986; Wise, 1986; Woodmorappe, 1979; Whitelaw, 1993, and Helmick, 1976.

Conclusion

With the basic concepts of sequence stratigraphy in mind, creation scientists can approach the stratigraphic record and seek to understand its significance in relationship to the Biblical account of its occurrence. Clearly this concept, probably more than any other developed in the area of uniformitarian stratigraphy, holds great promise for creationists in understanding how the Flood event and ensuing ice age have shaped earth's geologic past. Sequence stratigraphy is the reconstruction of depositional sedimentary environments, but more than that it can aid the creation scientist in determining when deposits were formed (time frame) and potentially how they were formed. We now have another tool with which we can define sea-level changes (within the young earth Flood model) and confidently defend the creationist position that sea-level has changed globally in earth's past. As we refine the creationist model using concepts like sequence stratigraphy, we can provide to people who chose to follow the evolutionary framework a better model to explain the stratigraphic record. The author hopes to follow this generalized work with additional articles which will present specific sites and their sequence stratigraphic interpretation within the young earth Flood model.

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Glossary

Connate water—water trapped in sediments at the time of deposition.

Conformity—a bedding surface separating younger from older strata, along which there is no evidence of erosion (either subaerial or submarine) or non-deposition, and along which no significant hiatus is indicated.

Disconformity—Unconformity between parallel strata. No change in dip occurs between the strata.

Eustasy—Of or pertaining to worldwide sea-level.

Event stratigraphy—recognition, study and correlation of the effects of significant physical events (storms, floods, turbidity currents, volcanic eruptions or any other event which is not a regular event in that environment, i.e., catastrophic), or biological events (e.g. extinctions) for continents or even the whole globe.

Juvenile water—Water resulting from its release during volcanic emanations.

Offlap—The progressive withdrawal of the sea from the land reflected in the associated sedimentary deposits.

Onlap—The progressive submergence of land by an advancing sea reflected in the associated sedimentary deposits.

Orogeny—The process of forming mountains.

Unconformity—A surface of erosion that separates younger strata from older material (i.e., rocks, strata, sediments, etc.).

Uniformitarianism—The concept that the present is a key to the past and that past geologic events are the same as occur today.

Walther's law of facies—a vertical sequence of facies will be the product of a series of depositional environments which lay laterally adjacent to each other.

APPENDIX A

Seismic geophysical methods have increased in usage due to computer technology. The computer "processes" the seismic line information and allows the user to define and refine the final output information. A seismic line is generated by bouncing seismic waves off of a subsurface lithologic boundary by way of an energy source (e.g., originally dynamite was placed into a shallow drill hole and detonated or a steel plate was placed on the ground and hit very hard with a heavy sledge hammer). Today there are a number of sophisticated energy sources available. The energy source is captured by geophones (magnet recording devices pushed into the ground in a certain pattern and connected by way of an electric cable to a recording device) which records the reflected signals as the energy waves move into the earth and bounce upward. A nearby well is used to correlate the reflector events with lithology. However, as seismic lines can represent

several miles in length, additional well control points are necessary to ensure that lithologic changes are accurately delineated.

One of the biggest advances in seismic processing has come from increased resolution capabilities. Originally the reflectors (geologic units) had to have sharp contrast boundaries and significant thickness to differentiate them from background noise. This meant that the reflector events could be no less than 150 feet thick or they could not be "seen" apart from background. Within the last 15 years seismic line processing and better equipment have resulted in reflector event resolution down to 30 feet in thickness (Sheffiff, 1980, p. 165). This allows a finer amount of detail in interpreting the subsurface. Seismic lines, coupled with well log control, have been used to reconstruct sedimentary depositional basins (e.g., Gulf of Mexico, North Sea, etc.). Transgressive and regressive sedimentation has been recognized on a worldwide scale and its reconstruction using seismic information has resulted in the outgrowth of the concepts of sequence stratigraphy. Figure 6 shows an actual interpretation of a seismic line shot midway across the continental shelf located off the Georgia coast (Popenoe, 1992). This seismic line provides a good example of how seismic data are interpreted using well control. The reader can see that using this method can greatly aid in understanding subsurface lithology on a large scale. Additionally, based on the lithology and macro/microfossils found from the well control points, the sea-level position could be approximated. Note however, that sea-level position does not necessarily reflect eustatic change due to the role of tectonism, which cannot be determined (i.e., was the basin subsiding or stable in relation to sea-level rise?)

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A fault surface in the Tule Mountain Trachyandesite Member of the Chisos Formation. The fault moved laterally from right to left in the photograph. This exposure is located 3 miles west of Lajitas, Texas on FM 170. The geologist showing us this site claimed that it is the best exposure of a fault surface in the world. The Tule Mountain lava consists of approximately 60% SiO₂. Photograph by Glen Wolfrom, caption by Emmett Williams.

INCOMPLETENESS, CREATION-SCIENCE AND MAN MADE MACHINES

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Abstract

In this article, in order to correct a few misconceptions, a simple yet in-depth discussion of the procedures, methods and results associated with Gödel type incompleteness theorems is given. In particular, the important concepts of formal and informal reasoning processes are discussed and illustrated. Further, information is compiled from the discipline of Mathematical Logic and elsewhere that gives exceedingly strong evidence that there are human mental processes that cannot be duplicated by a man-made machine.

Introduction

Recently there have appeared within creation-science literature some very imprecise and confused statements relative to various incompleteness results as first developed by Kurt Gödel (1931). This is unfortunate since these incompleteness results have very important consequences for creation-science. In Hoffman (1993, p. 14), we read, among other statements, a Gödel incompleteness theorem interpretation. "In any system diverse enough to be of interest, there will always occur inconsistencies or contradictions." This statement has no meaning unless phrases such as "system diverse enough," "of interest," and "inconsistencies or contradictions" are specifically and nonambiguously defined, for a reader of this statement might conclude, incorrectly, that a formal logical system is, in all respects, the type of system used within the informal mathematical sciences. Certainly, the logical system referred to by Hoffman could not be the dialectic he uses to argue for the acceptance of his conclusions.

In the letter by Groah (1994, p. 190), we have a more formalized interpretation of Gödel's theorem. "Every consistent, recursively axiomatized extension of the Peano system has at least one undecidable i.e., neither provable nor refutable—sentence." A reader not trained in the technical jargon used within the discipline of mathematical logic would find this statement also meaningless even if each term was defined specifically. More importantly, however, is the fact that a significant concept relative to a specific logical system is missing from the Groah's quoted statement. Without this concept, Groah's statement is misleading for the specific Gödel "sentence" referred to by this quotation is a (provable) theorem within the informal theory of natural numbers. This article is an attempt to more accurately describe the significance of such incompleteness results for such results are important in that they indicate that the informal mental processes, the intuition and ingenuity displayed by the mathematician, and, indeed, by all individuals, in producing acceptable informal statements seem not to be formalizable by means of a fixed set of rules and procedures. Assuming that computer programs must include for their proper operation a fixed set of rules or procedures (i.e. algorithms) in order to function properly, then if one accepts as correct the methods used to obtain incompleteness and related results, then the functions of the human brain that produce comprehensible informal statements cannot be regarded as totally reproducible by such a machine. This last conclusion will be discussed more fully.

Informal Versus Formal

It seems that much of the confusion produced by the above quoted statements is simply the result of mixing "apples and oranges." Within mathematics, certain terms take on completely different meanings depending upon the context. With respect to incompleteness and similar concepts, there is always exhibited two distinctly different mathematical approaches, the informal and the formal. Although different names are given to the various languages and methods used within different branches of mathematics, they all fall within two distinct categories. The languages used in an *informal* mathematical approach can be termed "metalanguages." This is a natural native language such as English, French, Russian, Spanish, etc. The term informal will always refer to information conveyed by means of a native language. A *formal* language is composed of a collection of finitely long strings of symbols. They are called *formulas*, *formal symbol strings* or *well formed formula*. For example, for some formulations of the formal predicate language $(x)(P(x,y) \rightarrow Q(x,y))$ is a formula. The logical procedures used in the informal approach are not specified. In some cases, these informal procedures are simply called by the general expression "the metalogical procedures." I mention that 99% of all mathematical discourse is informal.

Gödel used as a formal language a slightly modified Whitehead and Russell (1910-13) language of "types." You will not find this language described in any of your elementary texts in Mathematical Logic. Significant to the ideas within any informally described procedure is the concept called "content." The *content* of any form of informal communication directed towards an individual is the collection of all impressions the communication evokes within the individual's mind, or brain if you wish. The content of a communication depends upon an individual's education, training, life experiences and the like. In order to analyze patterns of human thought without these patterns being confused by content, formal symbol strings are used. However, how does one construct and analyze these patterns? Often using a portion of the informal theory of natural numbers, informal rules are given that detail how to combine the symbols in a left to right pattern in order to form the formula. These informal rules are written in such a simplistic manner and the content is so specific that they can be repeated over and over again by millions of individuals and the end result of these repetitions will be similar collections of formulas. You can think of a formula as a geometric configuration of lines and curves. Because these informal rules, when repeated, yield geometrically similar collections of form-

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ulas, these rules form what is technically called an *algorithm*. Indeed, the rules are so simplistic that I have on my desk a computer program written in True Basic that will also produce the same collection of symbol strings.

Once you have constructed a formal language, then a second set of informal algorithm-like rules gives specific directions as to the exact formulas you are allowed to write down in a finite list and, usually, an informal rule or rules that describe how to use a finite collection of the listed formula to obtain a formula not already present in the list. When a formula is written down, you state which of the informal rules you used to obtain the formula. An individual's ability to obtain a list of formulas depends, of course, upon the content of the informally stated rules. Much like a demonstration in elementary geometry, a *formal proof* is obtained by writing down, in a list, a numbered column of formulas on the left of a piece of paper and a corresponding numbered column on the right that states the informal rule that was used to obtain the formula immediately to the left. This allows the formal proof to be checked by other individuals who can exactly repeat the rules (i.e. individuals who have the requisite training). The final formula listed in the left hand column is called a *formal theorem*. Finally, the entire list of formula with the last one being the formal theorem is called a *formal proof*. Often in the literature, the adjective "formal" is missing from the expressions "language" "theorem," "theory" and "proof." Although, it may seem repetitious or tedious, these adjectives are retained in all that follows.

The Hilbert Program

In order to analyze the processes associated with obtaining a formal proof, David Hilbert chose a certain subset of the informal theory of natural numbers. This subset is of such a simplistic nature that it is assumed to be, at least, empirically consistent. Hilbert allowed a certain subset of the classical rules of informal logic to be used during such an analysis, as well as a very weak portion of the language of informal set-theory. Gödel used all of the allowed informal methods to develop his conclusions. However, as would be expected when new concepts first appear in print, he obtained his results in a slightly compact manner. All modern approaches to the concept of incompleteness are expanded improvements over Gödel's original. Today, there are many different approaches that lead to the same incompleteness conclusions. I will discuss two approaches and mention some of the others.

In Mendelson (1979), we find an approach that improves upon and parallels the Gödel original. Mendelson selects a certain formal axiom system (i.e. a specific set of formula) called *S* and the informal rules for what is termed a *first-order logical system*. But as they are stated, these formal axioms have no content, they have no meaning. By an informal mathematical process called an *interpretation* these formal symbol strings can be given a "meaning." Under an interpretation, these formal axioms are informally shown to be informal theorems in the informal theory of natural numbers where the informal theory's semiaxiom system is called the Peano Axioms. The informal rules for formal theorem con-

struction are then used to obtain formal proofs of various formulas (i.e. formal theorems of *S*).

Next, the allowed informal portion of the theory of natural numbers is used to give definitions and construct informal theorems about recursive functions and relations. The definitions, the theorems and all else relative to recursive functions are produced by application of informal mathematical reasoning and are all informal in character. Now comes the most important *informal* process of all. An informal description is given that produces a correspondence between the informal natural numbers and the formal symbol strings. Whether or not this description is comprehensible by an individual or, indeed, is accepted as a "correspondence" depends upon the descriptions content. Using this correspondence, it is claimed that certain informally expressed recursive functions or relations will model the informal rules and procedures for formal theorem construction. Rules for this modeling process are not specifically described, they are intuitive in nature. The acceptance of these recursive objects as models depends upon an individual's experience with translating informally described physical processes into an informal mathematical language or what is called mathematical modeling. The same can be said about mathematical models for any physical process. But, in this case, the physical processes are certain (human) linguistic processes. This modeling is done in such a way that each of these recursive objects can be further translated into a formal theorem. This last translation process also depends upon an individual's experience in recognizing when a formal symbol string corresponds to an informal mathematical statement. Thus, it is claimed, that we have formal theorems that represent informal processes and objects.

The actual two part incompleteness result is an informal theorem. If one accepts the informal methods allowed by Hilbert (a very important acceptance at this point), then part one of this theorem says, when informally interpreted, that, assuming that *S* has a property called simple consistency, there is a formula, call it *G*, that is not a formal theorem of *S*. At this point, this result is not surprising at all since simple consistency implies that there are numerous many formula that are not formal theorems of *S*.

The general concept of completeness means that a formal or informal process produces *at least* a certain collection of formal or informal theorems. To show how different the specific completeness definitions can be, consider the fact that Gödel previously published his famous completeness result (Gödel, 1930). One year later, he published his incompleteness result. In this article, it is not necessary to discuss, in any depth, the second part of Gödel's Incompleteness Theorem nor the Rosser (1936) improvement—a result that can be interpreted as stating the formal incompleteness of a formal axiom system. [Formal incompleteness for a formal axiom system is described as the existence of two formula, one the formal negation of the other, and neither is a formal theorem.]

Does the formula *G* itself have meaning? The answer is no, unless you supply an informal interpretation. Using an informal argument and an interpretation, the formula *G* can be given meaning within the informal theory of natural numbers and, more importantly, it is an *informal theorem* established by informal mathe-

mathematical means (Mendelson, 1979, p. 159). This means that the interpreted G does not establish the informal incompleteness of number theory. Moreover, a formula with the same character as G can actually be formally proved if the formal logical system is strengthened to one that is called a second-order logical system (Robbin 1969, p. 121). Thus, due to the missing concepts that deal with different logical systems, the informal and the formal, the above quoted statements are, indeed, very imprecise.

Although interpreted G is an informal theorem about natural numbers, does it give any information that can be construed as interesting to a number theorist? The answer is again no, for interpreted G states that there exists a collection of ordered pairs of natural numbers (i.e. a binary relation), call it Pf , and there does not exist a particular natural number as a second coordinate. This is not a very startling disclosure for informally there exists numerous many such relations. But what if we step back out of the informal theory of natural numbers and into the language of the Hilbert mathematical approach to analyze formal logic, then G can be interpreted informally in terms of the formal processes used to produce formal theorems. The number that does not appear as any second coordinate in the relation Pf is a numerical name for G itself. The numbers that appear as first coordinates in Pf are numbers that give to each and every formal proof an identifying name and, informally, the relation Pf exists. Rephrasing this metamathematical interpretation, we have that if one uses a portion of informal number theory, as well as a specific correspondence between the natural numbers and symbol strings, specific algorithm-type informal rules for formal theorem proving, a portion of informal mathematical reasoning, and the informal concept of consistency, then there is a specific formula G that, when interpreted, is an informal theorem of number theory and that shows the existence of a specific mathematical relation Pf . Further, if this relation Pf is interpreted informally with respect to the Hilbert analytical methods, then it states that we cannot use the formal system S to formally prove G . If you reject any of the hypotheses stated in the above two sentences, then there is no Gödel incompleteness theorem. I note that the formal system S can be replaced by other similar formal systems that are listed in a similar manner.

Thus far, this shows that you either do not analyze, with the above stated methods, formal logic, or that, assuming a Hilbert type approach is allowed for all such analysis, a formal axiom system such as S cannot capture all of the “informal theorems” produced by means of informal mathematical reasoning from a broadly interpreted informal theory of natural numbers. Here “broadly” implies the actual use of the theory of numbers to count and analyze real physical entities such as the actual marks on a piece of paper that we call formula.

The major effect of Gödel’s result was to stop the Hilbert program search for a formal axiom system that could capture all of the informal theorems of informal number theory. More importantly, using this result, Gödel’s Second Theorem put a stop to the Hilbert program search for a formal first-order proof based upon a formal axiom system such as S that would have as its last formula a statement that when interpreted would

say that the system is simply consistent. Gödel’s Second Theorem (Mendelson, 1979, pp. 163-164) shows that under the Hilbert procedures no formal first-order proof of consistency exists. I again mention, however, that a formula that can be interpreted to mean “consistency” can be proved formally if we strengthen the formal logical processes used. Further, in Herrmann (1987, p. 13), it is shown that there is an informally produced ultralogic that behaves like first-order logic and that can “prove” all of the informal theorems of number theory. This is one of the ultralogics that can be used to obtain all of the properties of the MA-model (Herrmann, 1991). Historically, the fact is that, even prior to Gödel’s work, many mathematicians conjectured that their informal methods could not be formalized.

Mathematical Logic

Who is it that determines the correctness of such incompleteness results and can we remove some of the vague informal procedures? As in all disciplines, the correctness of a result is determined by expert witnesses. In this case, these are experts in the discipline called Mathematical Logic. All such experts agree that these results follow the proper procedures of their discipline. There are some individuals that claim, especially today, that there are errors of one sort or another with the incompleteness results. Need I mention that many come from the disciplines called Artificial Intelligence and Computer Science. All that I will say is that the expert witnesses from the area of Mathematical Logic have taken on the challenges of these “objectors” and have given very convincing arguments that under the rules of modern Mathematical Logic the claimed errors do not exist. Indeed, the formal incompleteness results for many formal axiom systems can be argued for in a more convincing manner than the arguments given in Mendelson (1979).

Consider what is found in Robbin (1969). We have the formal axiom system called RA . This is larger than the S system and incorporates enough formal symbolism so that the necessary informal theorems relative to recursive function theory can be formally reproduced. This does not remove all informal requirements. You still have the informal rules for formal theorem construction, an informal correspondence that associates some of the recursive functions with language symbols and the use of the informal mathematical reasoning. Indeed, Robbin gives away one of the basic methods that mathematicians use to obtain formal proofs. The actual formal theorems are produced by first establishing the informal theorems and then translating them into formal proofs. This is necessary because there are numerous many formal proofs that can be produced by such an axiom system. We cannot know which to select unless the selection is based upon a procedure that includes content. Formal symbol strings have no content. Further, it is the necessary elements in the informal portion of the Gödel methods that leads to the construction of the language RA .

What one obtains by this process is a “more” formalized proof of a new formal theorem H . Of course, H has no meaning unless we interpret the formal symbols. Interpreting H in terms of the informal rules yields the statement “If RA is simply consistent, then there exists a formula J in the formal language of RA that is not a

formal theorem of RA" which is the informal statement of the first part of Gödel's theorem. The formal statement J that cannot be formally proved, when interpreted, has the same meaning as G. Once again, it can be informally argued that the formula J, when interpreted, is an informal natural number theorem (Robbin, 1969, p. 115), but is of no interest to natural number theorists.

There are other approaches to incompleteness and formal consistency that are considerably different from the above approaches. One is the semantical (algorithmic) approach of Uspenskii (1974), another is the model-theoretic and tree approach that appears in Smorynski (1977). But the most startling result was obtained in 1977. First, I mention that Feferman (1960) showed that whether or not one can formally prove by means of a formal axiom system the concept of consistency depends upon how one formalizes the definition of consistency. In discussing the Paris and Harrington (1977) result, we assume that the concept of consistency has been formalized in the usual way so that Gödel's Second Theorem can be used. Paris and Harrington first prove informally a theorem about modern number theory that adds a great deal of content to this informal theory and that seems to be relevant to computer construction. This informal theorem is not related to the methods of mathematical logic. However, they also show that this informal theorem cannot be a formal theorem for any formal axiom system such as S or RA. It is the first nontrivial Gödel-type theorem ever discovered. The technical evidence continues to suggest that there are informal human thought processes that cannot be duplicated by a man made machine.

Thought Processes

It is rather obvious that a formal language can be considered as a proper subset of a metalanguage. Further, there is a *metaworld* that includes as objects informal entities, informal mental processes as well as formal entities and the formal logical processes. Let M_1 denote the first-order metaworld. Let L_1 denote the formal entities of a first-order logic as well as the formal first-order processes. The symbol " $\subset$ " denotes "subset but not equal to." Then we have that $L_1 \subset M_1$. I have mentioned the idea of second-order logic. Before we have second-order logic, we have a metalanguage. Before we have a second-order language and the second-order formal logical processes, we have a second-order metaworld M_2 . The symbols used, formula constructed and the formal first-order logical procedures can be so defined as to form a proper subset of second-order logic (i.e. $L_1 \subset L_2$). In this case, all of the informal algorithms used to describe second-order logical processes, when restricted to the first-order language, describe all of the first-order processes. This yields that $L_1 \subset L_2 \subset M_2$ and $M_1 \subset M_2$. One continues up the scale of the logical hierarchies and defines, by induction, the n th-order logics and n th-order formal logical processes L_n by using the n th-order metaworld M_n . This yields finite sequences $L_1 \subset L_2 \subset \dots L_n \subset M_n$, and $M_1 \subset \dots \subset M_n$. Significantly, the n th-order metaworld is always the upper bound for the L_n . There is one common feature for each M_n . The same informal mathematical reasoning takes place internal to each M_n , but external to L_n . Why? Because a Gödel-type

formula relative to L_n and determined by an appropriate axiom system S_n can be interpreted in M_n in the same manner as in the first-order case. This is accomplished by an informal argument using the common mathematical reasoning processes.

This logic-language hierarchy is analogous to what takes place within computer science. The basic algorithm-like rules for computer language construction and how to use such a computer language to construct computer programs first requires a metalanguage that contains the computer language as a proper subset. And it also requires informal reasoning on the part of a student to construct a computer program. As mentioned in the introduction, incompleteness and related results are relative to the clash between formalized concepts and algorithms and those informal processes of human thought that are often based upon intuition, ingenuity, reflection and probably vague notions that cannot be verbalized. How did I arrive at this very significant conclusion?

I have often been asked what is abstract mathematical research? Except for teaching, what do research mathematicians do to earn their keep? How does one learn to do what often appears to be an art rather than a science? I can only discuss my personal thirty years of experience with creating new mathematical results—results that number well over 2,000—and how this experience correlates not only to incompleteness results within the above logic-language hierarchy but also to the closely related *decision problems*.

Shortly after Gödel's Incompleteness Theorem appeared, mathematicians realized that the basic reason that Gödel's result could be established using the Hilbert approach was in the method used to describe informally the algorithm-like rules for formal language construction and formal deduction. Turing (1936-1937) proposed what might be considered a new way to describe informally the necessary algorithms—the famous Turing Machines. Post (1936) presented a technique for algorithm description. Markov (1954) described his algorithms. Using computer terminology, Lambek (1961) and Melzak (1961), among others, described what are called register machines. Register machines are more powerful than any actual computer since these register machines have unbounded memory. Then Cook (1971) described the random access machines. Every such attempt to describe informally an algorithm has been shown to be modeled by the partial recursive functions or relations of informal number theory. Again using the discipline of mathematical logic, it can be shown that if descriptions for a repeatable algorithm are modeled by Gödel-type recursive objects (Robbin, 1969, p. 126) or modeled by partial recursive objects (Manaster, 1975, p. 138), then there can be no algorithm producing description for a set of rules that can be used to determine whether or not an informal statement about number theory is an informal theorem. But counter to this negative result, as mathematicians have known for hundreds of years, what differentiates the expert mathematician from others is the ability to select a theorem, *prior to* constructing its proof, from numerous many informal statements. This is yet stronger evidence that certain human mental processes cannot be duplicated by a man made machine.

Expert Witnesses and Creation-Science

Informal mathematics is done in a portion of a meta-world such as M_n . When a theorem is proved, it can then be translated into an L_n . Computers can be programmed to follow the rules of L_n and check the correctness of the informal proof as it has been formalized. As implied at the end of the previous two sections of this article, there appears to be one area of mathematical experience that cannot be replicated by such machines. Although the above negative results are suggestive, they do not present the strongest evidence. The simple reason is that no one has ever been able to describe, in naturalistic terms, the mental processes involved in such a prior selection. When I see an informal statement with terms taken from an informal mathematical theory, I cannot describe the processes, in natural terms, that my brain undergoes that allows me to select one of the two statements "This statement is a theorem that I can prove." Or, "This statement is not a theorem, so don't try to prove it." If I could describe the processes, I could train individuals to become very successful mathematicians. If I select the first statement, then the consuming problem becomes, "How do I construct an acceptable proof?" Dreyfus (1993/94, p. 8) has concluded that "[A]n expert . . . intuitively sees what to do without applying rules." Dreyfus agrees that the rules cannot be described in the required manner and, hence, no computer can successfully become an expert theorem selector, proof creator or an expert in anything. However, I disagreed with Dreyfus' definition for "intuition" which he claims is a process of searching, for example, among all the previously constructed proofs of which I have knowledge and finding one that will fit this particular situation. This is simply not true. It is a fact that I have constructed informal proofs the structure of which I had never encountered previously.

This kind of indescribable selection from a potentially infinite list is actually practiced by most individuals, but for a Christian and, especially, members of the creation-science community, there exists a reasonable explanation. But this explanation does not yield a materialistic description for such a selection process and would not be accepted by secular science. This is especially so when Genesis 1:1-2 is selected as a literal description for the creation of our universe over numerous many other naturalistic statements. "He is the source from which all your reasoning power comes: . . ." and "He lends us a little of His reasoning powers and that is how we think: . . ." (C. S. Lewis, 1960, pp. 52, 60) For a Spirit indwelt Christian, the scriptures add an additional aspect to these materialistically indescribable processes. "But the anointing which ye have received of him abideth in you, and ye need not that any man

teach you: but as the same anointing teacheth you all things, and is truth, and is no lie, and even as it hath taught you, ye shall abide in him." 1 John 2:27

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Quote: Where Have All The Dinosaurs Gone?

Finally, although it is not crucial to the central thesis, comes the nagging problem of the lack of any dinosaurs surviving into post-Cretaceous times. If cold was responsible for their annihilation, even if it accompanied the initial burst of radiation from a nearby supernova, why did dinosaurs not persist in the warmer equatorial regions? Is it conceivable that the entire globe was subjected to intense cold? It seems unlikely. Even though both land masses in the northern hemisphere, America and Eurasia, were situated in middle and high latitudes in late Cretaceous times, and were bordered to the south by the Tethys Ocean, South America and Africa were more favourably situated climatically. The abruptness, ubiquity and severity of the Cretaceous extinctions makes it increasingly difficult to dismiss a cataclysmic theory.

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AGE OF THE ARIZONA METEOR CRATER

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Abstract

The Arizona Meteor Crater is the best preserved and also the most studied impact event on the earth. This large crater, about 1200 meters wide and 175 meters deep, is located in the desert plains of North Central Arizona. The crater penetrates Kaibab limestone and Coconino sandstone layers of Permian age. For many years there was lively debate over the origin mechanism, whether volcanic or impact. Other still-lingering questions concern the location and size of the actual meteorite, assuming impact, and also the time of the event. Date-of-origin evidence, the main emphasis of this paper, includes dendrochronology, rock erosion, radioactivity, and thermoluminescence. Published results have varied drastically between 800-200,000 years ago for the crater's time of formation. This study critiques the various chronology estimates, illustrating the inherent uncertainty of dating techniques.

Introduction

The Barringer Crater, located in northern Arizona, is familiar to many readers. This large depression averages 1200 meters (about 4,000 feet) in diameter; the crater floor lies 175 meters (570 feet) below the rim. It was first explored and publicized by prospectors a century ago; Hopi Indians living in the area were familiar with the crater much earlier. The crater has had many titles over the years:

- Crater Mountain
- Franklin Hole
- Coon Mountain
- Coon Butte
- Crater Mound
- Crater Mountain
- Canyon Diablo (Devil's Canyon)
- Meteor Butte
- Barringer Meteor Crater
- Arizona Meteor Crater

The last term, most common, is actually a misnomer. Meteors by definition disintegrate in the air rather than impacting the ground; it is *meteorites* that contact the earth and sometimes cause craters. A century ago when the crater was named, the distinction between meteors and meteorites was not made. In fact, the Barringer Crater was the first site recognized on earth as an impact from a space object. It remains the best known and most studied crater on earth. In the 1960s the Apollo astronauts trained at this lunar-like site.

Geologic Setting

The Barringer Crater is located in semi-arid North-Central Arizona, 40 miles southeast of Flagstaff and 20 miles west of Winslow (Figure 1). The site is also just 100 miles east of the CRS Van Andel Research Center. Northern Arizona is the southern part of the Colorado Plateau which covers 150,000 square miles, stretching through several southwestern states. This region is characterized by flat-lying sedimentary rock, relatively high elevations (5,000-11,000 feet), and occasional uplift and erosion.

The Barringer Crater penetrates sedimentary rocks of Triassic and Permian age. First intersected are 9-12 meters (30-40 feet) of Moenkopi reddish brown sandstone/siltstone (Figure 2). Beneath this formation, the impact pulverized a 76 meter (250 foot) layer of Kaibab Limestone and a 2 meter (6 foot) underlying layer

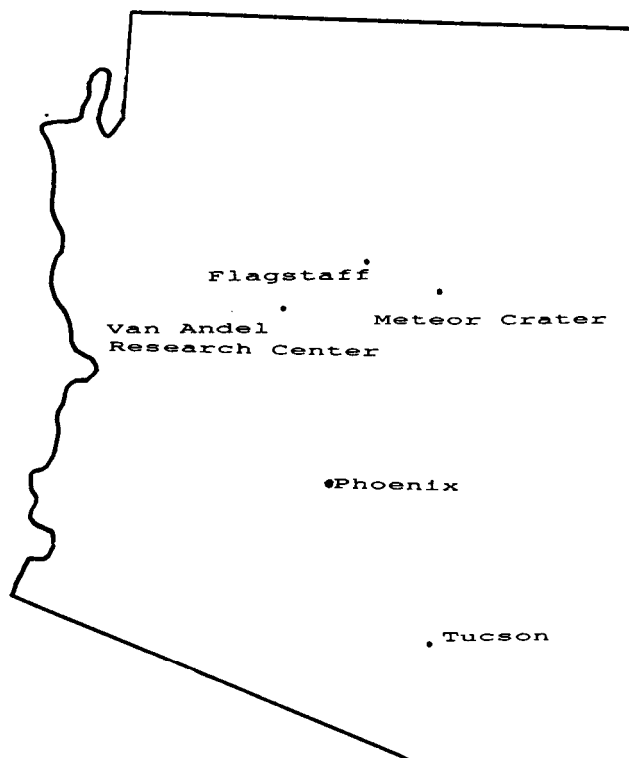


Figure 1. A map of Arizona, showing the location of Meteor Crater and also the Van Andel Research Center.

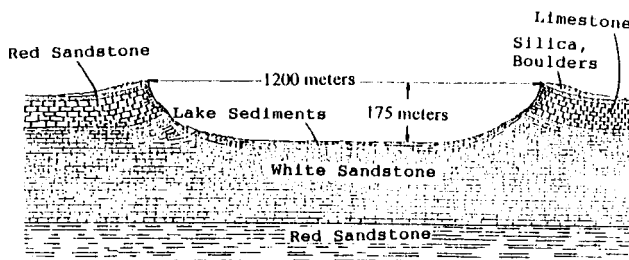


Figure 2. Vertical section through Barringer Crater (Fairchild, 1907). In sequence, from top to bottom, the sedimentary layers are:

- Moenkopi (red) sandstone, 9-12 meters
- Kaibab or Aubrey limestone, 76 meters
- Toroweap sandstone, 2 meters
- Coconino (white) sandstone, 305 meters
- Dark red sandstone, undisturbed

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of Toroweap sandstone. Finally, the impact fractured 76 meters (250 feet) of Coconino Sandstone, which totals about 305 meters (1,000 feet) thick. These same rock layers also occur in the upper exposed portions of the Grand Canyon. Millions of tons of sandstone and limestone were instantly excavated during the meteorite collision. Around the crater edges, 7,000 ton blocks of stone are tossed and overturned. The total energy of the impact is estimated at 10-20 megatons of TNT, roughly equivalent to the 1980 Mt. St. Helens eruption, or to 1,000 simultaneous Hiroshima explosions.

Four Controversies

The Barringer Crater has provided lively ongoing debate in four areas (Table I). *First*, the origin mechanism has not always been seen as an obvious impact event. As a complicating factor, there are many sink-holes in the Winslow area, some just 30 miles from the crater. Thus underground limestone collapse has been suggested for the crater (Hager, 1953). A volcanic eruption with eventual ground collapse, or else a spontaneous underground steam explosion, have also been popular origin ideas (Gilbert, 1906). Sunset Crater, 40 miles northwest of Barringer, is indeed a volcanic caldera which formed around AD 1060 (Mark, 1987, p. 31). Nearby Indian dwellings in the vicinity were buried by cinders in the eruption (Hoyt, 1987, p. 332). Ash, perhaps from the Sunset eruption, appears in the top six feet of fill within the Barringer crater. There are also hundreds of other small, dormant volcanic vents within 50 miles of Barringer.

Table I. A summary of four major controversies regarding the Arizona Crater.

Topic	Alternative Views
Crater Origin	Volcanism, Erosion, or Impact
Meteorite Size	5,000 tons or 15 million tons
Destiny of Meteorite	Buried or Vaporized
Crater Age	800 years or 200,000 years

Daniel Moreau Barringer (1860-1929), a geologist and mining engineer from Philadelphia, visited the Arizona crater site in 1903 and was quickly convinced of a meteorite impact (Barringer, 1905; see also Foote, 1891). This may well have been the first proposal of impact craters on earth. However, this extraterrestrial origin was not a popular idea a century ago. Even the multiple lunar craters were considered to be volcanic features rather than collision blemishes. The meteorite origin for lunar craters gradually superseded volcanic ideas, especially during the 1940s. Likewise, the impact nature of Barringer Crater is today verified by several factors. Iron-nickel fragments are common in the vicinity; over 30 tons of meteorite material have been collected around the crater, the largest weighing 1,400 pounds. Holdouts against the impact theory have suggested an ancient geologic origin for the depression, with a later, coincidental meteorite fall in the same area (Hager, 1953).

Coesite and stishovite, fused-quartz products of meteorite impact, were discovered at Barringer in the 1960s (Chao, et al., 1960; Hoyt, 1987). Shatter cones, surprisingly, have not yet been reported. These are conical, striated slip surfaces in rocks that are often

Table II. A century of research developments at the Arizona Meteor Crater.

1870s	Crater discovered when "silver" (actually nickel-iron) found nearby.
1891	Geologist A. E. Foote visits the crater and suggests an impact origin. G. K. Gilbert of the U.S. Geological Survey also investigates and proposes a volcanic steam explosion.
1904	D. M. Barringer and B. C. Tilghman form the Standard Iron Company begin sinking shafts in search of the meteorite.
1929	Physicist F. R. Moulton calculates a small size (50 thousand tons instead of 15 million tons) for the meteorite. A disappointed D. M. Barringer dies just three months later.
1953	D. Hager proposes a 200 thousand year age for the crater.
1960	The mineral Coesite is discovered at Barringer Crater.

formed by the sudden, intense pressure of meteorite impact. Table II gives a brief chronology of Barringer Crater studies.

The *second* and *third* controversies, assuming an impact origin, involve the size and present location of the meteorite itself. Daniel Barringer and Benjamin Tilghman estimated a weight between 5-15 million tons for the object. Assuming it was buried in the floor or south wall of the crater, they spent a decade and a half million dollars drilling for it (millions of dollars in today's economy). No sizeable metal object was ever found, even at depths of 1,000 feet. The hopes of Daniel Barringer for a financial bonanza (estimated at \$1 billion) were further dashed when he sought help from physicist F. R. Moulton. Moulton calculated, from collision dynamics, that the meteorite probably weighed only 50,000 tons, 300 times smaller than previously thought (Moulton, 1929). The greatly discouraged Daniel Barringer died the same year. More recently, the object has been estimated at only 12,000 tons, and about 50 feet in diameter (Ley, 1966, p. 246).

Whatever the size, what finally happened to the space rock? Most likely it completely disintegrated, leaving no large nucleus behind. The large meteorite, perhaps traveling at 15 miles/sec, probably melted and then largely vaporized upon impact. The collision is graphically described by LeMaire (1980, p. 125):

A house-size asteroid-80 feet thick, attended by a swarm of lesser meteorites, impacts at 35,000 miles per hour. Unable to escape the projectile, the up-front air compresses to the ignition point: a cylinder of the sky is afire, stabbing the target site below. Just before the alien asteroid touches the resistant Earth, the heat flares outward across the Arizona desert, scaring every living thing for perhaps 100 miles. The irresistible force greets the immovable object; the interface between missile and target converts solid matter into radiation. Knowing only the airless raceway of deep space, the asteroid bores through solid Arizona bedrock for hundreds of feet before its forward portion slows abruptly. The back end continues at 35,000 miles/hour, and it turns inside out. As its face vaporizes, the bulk of the mass liquifies.

The Meteorite's core tunnels 250 feet deep into Arizona bedrock. Sixty thousand tons of metal are converted into gas registering a million degrees Fahrenheit and exerting a pressure of 150 tons per square inch on the confining sandstone and limestone strata. A cloud of gaseous metal shoots 5 miles high; heat and shock waves stab deep underground. Subterranean waters become superheated steam and balloon in all directions: down to the sides, and above. The rock ceiling weighing 300 million tons lifts back like an escape hatch. In an instant the Earth's crust vomits one-third the quantity of all material excavated for the Panama Canal. Vented, the metallic vapors shoot miles into the atmosphere. The mushroom cloud congeals into tiny pellets.

The dust clears. The desert floor ceases its trembling. For evidence of this cosmic encounter, there remains at ground zero a yawning chasm nearly a mile wide and a thousand feet deep that once contained 300,000,000 tons of solid rock.

If correct, this dramatic description explains the absence of any large remaining meteorite core: It was completely vaporized.

The *fourth* and final controversy, of main interest to this paper, concerns the age of the crater. This question may appear to be largely settled, similar to the other debates; a 50,000 year age is much quoted (Figure 3). However, a closer look reveals much uncertainty regarding the crater's history. This confusion is typified by a 1992 college text which gives two different ages for the crater on the very same page: 22,000 and 50,000 years (Payne, et al., 1992, p. 398). Thomas Arny also states that the crater is both 10,000 and 50,000 years old (1994, p. 261, 279).



Figure 3. The postmark used by the store/museum at the Barringer Crater site. Meteor Crater Enterprises, Inc., 603 North Beaver, Suite C, Flagstaff, AZ 86001. The Barringer family still owns the crater property and regards it as a public trust.

Five Age Estimates

Dendrochronology Daniel Barringer took notice of the hundreds of large Juniper or Cedar trees growing around the crater rim. Some revealed as many as 700 growth rings. Since these trees must have begun growing after the explosion, their lifetime becomes a minimum age for the crater (Blackwelder, 1932, p. 559). Today, a century later, the tree ring figure can be

rounded to 800 years, surely the youngest age estimate for the Barringer Crater.

Erosion Benjamin Tilghman reported further evidence for a recent crater formation in 1905. First, he was impressed with the still-sharp edges of ejected boulders (Tilghman, 1905). Chemical weathering is limited by the dry, stable climate, but mechanical weathering is more extensive. Northern Arizona is an area of desert sands and fierce winds, which "quickly" sand blast all exposed rock surfaces. Second, Tilghman noticed a small red sandstone butte one-half mile north of the crater. This butte was hit by a jet of crushed rock debris during the actual collision. Tilghman noticed that the spray of material traveled up the slope and over the top of the butte:

In spite of the evident rapid erosion to which it is subject, [the debris] lies on the surface right up to the cap, without any red sandstone material having fallen or having been washed down upon it. From its appearance it might have been deposited yesterday (pp. 911-912).

More recently, J. D. Buddhue (1961) estimated the crater age from erosion of sandstone. Beneath the north rim there is a protected nine-foot-thick outcrop of Moenkopi sandstone. In less protected areas, Buddhue assumed the protruding sandstone had completely eroded away. Earlier, D. Hager had estimated that the sandstone eroded one foot every 2,500 years (Hager, 1953, p. 851). Thus Buddhue multiplied this rate by nine, arriving at a minimum crater origin age of 22,500 years (Hoyt, 1987, p. 333).

Brown (1933) long ago called for dating caution at Barringer, warning that erosion estimates might lead to a large error. For example, "the talus slopes were built up by the impact and explosion and not by the usual forces that disintegrate cliff faces" (p. 239). Also, deeply eroded limestone and sandstone might not imply long age at all. Instead, heat from the impact could have weakened the rocks and "rendered them prone to rapid corrosion. . . . If such calcining took place, the advanced state of corrosion might have resulted in a matter of months, even with little rainfall (p. 240).

A Geologic Feature Geologist Dorsey Hager concluded in 1953 that the Barringer structure had an ancient geologic origin. He interpreted the crater rim as the remnant of a collapsed dome. Hager proposed that the original complete mound or dome was 1,000 feet (Hager, 1953, p. 821) higher than now, and was formed much longer ago than 5 million years (p. 851). Within the dome, accelerated erosion of strata by solution activity eventually caused collapse of the dome. Hager, after a thorough analysis of data, estimated the crater age at 200,000 years or more (p. 821). This geologic dome idea is no longer popular; there is little doubt of an impact origin. The point here is that the evidence is ambiguous enough to allow such an extreme alternative view of both origin and age of the crater.

Radioactivity At some period after crater formation, a lake existed within its walls. This implies a water table in the area that was about 92 meters (300 feet) higher than present. The water table is now 61 meters (200 feet) beneath the dry crater floor. The earlier period probably coincided with the humid, post-Flood climate that gave rise to the former lakes of the Colorado Plateau (Williams et al., 1992).

Lake sediments within Barringer are about 70 feet thick. These consist of calcareous material, talus accumulation, and small shells. Radiocarbon dates for gastropod shells vary between 16,000-26,000 years (Reger, et al., 1971). However, radiocarbon dates for shells in limestone terrains are very uncertain (DeYoung, 1974). Still, if the lake formed soon after crater formation, then the shell age provides a broad origin estimate.

There are no reports of organic material such as wood being found beneath ejecta, outside the crater. Such a find would provide a valuable opportunity for further C-14 dating of the crater origin.

Wood (1979) reports that meteorite fragments in the Barringer area were dated radiometrically. Some meteorite radioactivity is considered primordial. Other radioactivity is induced in meteorites by cosmic rays while they are in space. Once on the ground they are shielded from cosmic rays by our atmosphere. As radioactivity decreases, the remaining amount is a measure of the sample's time on earth. This analysis showed that the impact occurred "at least 2,700 years ago" (p. 42).

Thermoluminescence In certain solids, small amounts of radioactive impurities give off ionizing radiation. This internal source of energy can remove electrons from their bonding sites, "trapping" them between atoms and resulting in unfilled "holes."

These solids will later emit a low level of light when heated below the incandescent stage. The heating triggers a return of the electrons to their original locations. The process is similar to the light emitted by a semiconductor when electrons move and fill unoccupied holes (a light-emitting diode).

The thermoluminescent technique has been applied to limestone and sandstone from Barringer Crater by Steven Sutton (Hoyt, 1987, p. 333). At the time of collision, the rocks were shock-heated, which "reset the clock" by allowing large-scale electron migration to their original sites. Upon cooling, the internal radiation once again began the process of electron removal. The amount of thermoluminescent light observed today is a measure of the time since collision and cooling. Sutton arrived at a crater age of $49,900 \pm 2,900$ years. However, this result is very tentative for two reasons. First, calibration of the technique is uncertain. Its success, even with pottery, has been limited. Second, the underlying physical mechanism of thermoluminescence is poorly understood. The method is not a simple, straight forward dating technique.

Age Summary Clearly there historically is a wide spectrum of crater age estimates, anywhere between 800-200,000 years or more. And this uncertainty continues to a substantial extent today: Figure 4 shows a century of published age estimates from technical articles and texts. Table III lists the sources shown in Figure 4. Many recently-published crater ages converge around 50,000 years, perhaps an example of "tracking" (DeYoung, 1976). This is the tendency of published data to cluster around a particular value, similar to peer pressure, whether the value is correct or not.

The range of crater ages appears to be a clear example of the inability of science to absolutely date the past. And Barringer is the most studied crater on earth! The lesson is one of caution in chronological studies of earth history.

Table III. A compilation of 31 published age estimates for the Arizona Meteor Crater, in chronological order. These values are graphed in Figure 4.

Author	Year of Publication	Age of Barringer Crater (In thousands of years)
Barringer, D. M.	1905	.7 - 3
Tilghman, B. C.	1905	.7 - 10
Merrill, G. P.	1908	20
Colvocoresses, G. M.	1925	> 100
Boutwell, W. D.	1928	.7 - 5
Jakosky, J. J.	1930	50
Blackwelder, E.	1932	40 - 75
Brown, F. M.	1953	2 - 3
Nininger, H. H.	1952	50
Hager, D.	1953	≥ 200
Beals, C. S.	1958	50
Buddhue, J. D.	1961	≥ 22.5
Hawkins, G. S.	1964	20 - 50
Reger, R. D., et al.	1971	≥ 16.3
McCall, G. J. H.	1973	6
King, E. A.	1976	20-40
Wood, J. A.	1979	≥ 2.7
LeMaire, T. R.	1980	22
Lewis, R. S.	1983	22
Shoemaker, E. M.	1983	20 - 30
Sutton, S. R.	1984	47 - 52.8
Sagan, C., et al.	1985	15 - 40
Burnham, R.	1988	50
Ronan, C. A.	1991	25 - 40
Payne, CA, et al.	1992	22, 50
Kaufmann, W. J.	1993	25
Pasachoff, J. M.	1993	40
Amy, T. T.	1994	10, 50
Engelbrektsen, S.	1994	25
Kuhn, K. F.	1994	25

Indian Traditions

Could the Arizona crater formation be much more recent than the popular figure of 50 millennia? If so, is it possible that Southwest Indians actually witnessed the actual impact event? Most authorities agree that Indians arrived in the Southwest relatively recently, within the last 10,000 years.

Several intriguing Indian legends have been published which support the observation idea. They come from the Hopi Indian tribe that still lives in the area today:

The use of the pure white rock flour in Hopi religious ceremonies [finely ground silica from the crater edge] links the crater with a legend current in the tribe. Three of their gods, the Hopi believe, came down from the clouds on to the desert. One made his abode in Meteor Crater. . . . That Meteor Crater should have a place in the legends of the Hopi indicates a fairly recent origin. (Boutwell, 1928, pp. 729-730).

It is possible that the fall of the giant meteorite was observed by the local Indians. Three of their legends concern the crater. According to them, one of their gods came down from the sky, accompanied by thunder and lightning, and buried himself at this spot. Even today, Indians still fol-

lowing tribal customs are not permitted to visit the crater; it is considered taboo. It is also significant that (early) Indians did not participate in the search for meteor iron in the crater vicinity (Heide, 1964, p. 32).

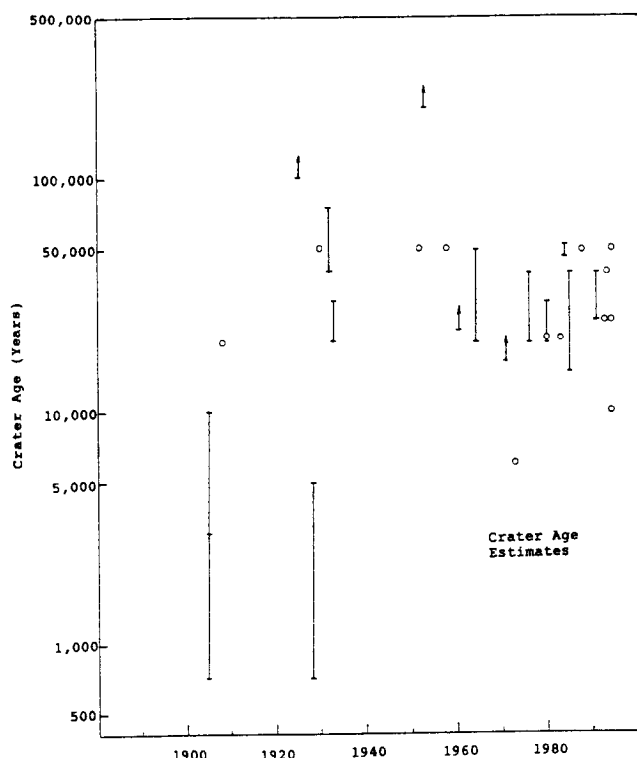


Figure 4. A century of published Barringer Crater ages. The vertical axis is a logarithmic scale which runs from 500 years to 500,000 years. Error bars or arrows are shown where an age range or uncertainty was indicated in the literature. Particular published crater ages are shown by circles. The actual references are compiled in Table III.

It is interesting that the Hopi people speak of a fiery descent from heaven, i.e., a meteorite impact, long before modern geologists recognized this extraterrestrial origin. The Indian observation idea has been discounted by several writers. Perhaps this negative conclusion is based on the presupposition that the crater must greatly predate Indian presence in the region (Blackwelder, 1932, p. 559; Heide, 1964, p. 32; Ley, 1966, p. 244).

Conclusion

Space bombardment of earth is a popular topic today. The failure of slow, uniform changes to explain the appearance of earth has given rise to multiple catastrophism explanations. Collisions are proposed to explain the demise of the dinosaurs, origin of the moon, magnitude of earth spin and tilt, and the mechanism for continental drift.

This paper has reviewed the questions and controversies concerning the earth's best known and most studied collision crater, Barringer. In particular, actual origin date of this instantaneous catastrophe remains

elusive. In the creation view, its formation is postflood and therefore relatively recent. A better understanding of Barringer could be useful in evaluating other collision catastrophes.

Further Study

Odessa Crater After Barringer, the second terrestrial crater was found at Odessa, Texas in 1928. It is a miniature twin of Barringer, 163 meters across (530 feet) and 5.5 meters deep (18 feet). Iron meteorites found at Odessa are very similar in structure and chemical composition to the Barringer site. Could both events possibly have formed from the same meteorite shower (Heide, 1964)? If so, Odessa provides another source for origin data. The Odessa crater is located 540 miles southwest of Barringer. It is generally thought that both meteorites arrived from the north.

The Odessa crater was considered very recent in age until the fossilized remains of a "primitive" horse and an elephant were found buried within it (Mark, 1987, p. 44). The typical age given today is 10,000 years. Investigations of Barringer might well include Odessa. Unfortunately, the Odessa crater nearly has been destroyed by area oil wells, dumping, digging, and bike trails.

Crater Shape The actual shape of the Barringer Crater is almost square, with rounded corners (Figure 5). This shape is little-mentioned in the literature, and is unlike any of the lunar craters. Barringer (1905), Moulton (1929) and other early geologists described the depression as round. Did the lack of early aerial photographs hinder perceptions, or has erosion possibly changed the appearance in just a century? Crater photographs from past decades would make an interesting comparative study. Evidence of rapid erosion, of course, would favor a more recent origin.

If not erosion, how can the unusual shape of Barringer be explained? Shoemaker (1983) refers to pre-existing

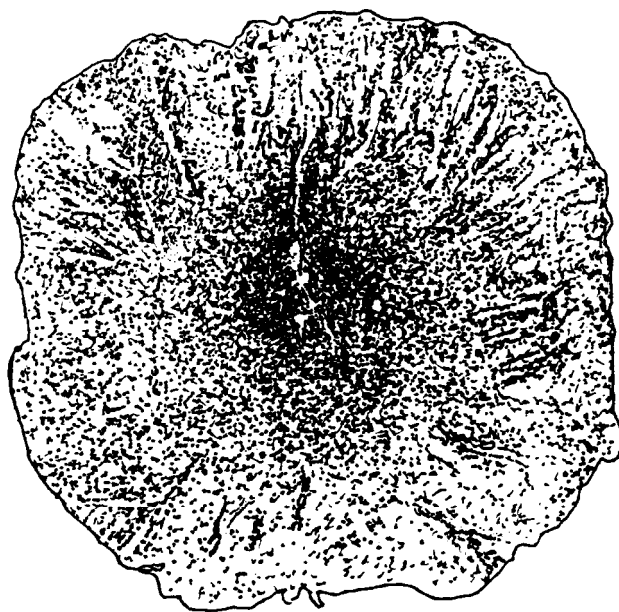


Figure 5. A vertical drawing of the Barringer Crater, with north at the top. Note the square sides with rounded corners. Based on photographs (Beals, 1958, p. 36; King, 1976, p. 99).

fault lines which channeled the explosion in a square pattern. However, LeMaire (1980) rightly compares this idea to channeling a hurricane with tissue paper! The mysterious shape of the Barringer Crater deserves attention.

Other Areas First, Tilghman (1905) reported fresh, unweathered crater debris on a butte one-half mile north of the crater. This particular butte needs to be identified and explored. Second, the slowly-eroding sandstone outcrop below the north rim of Barringer should be remeasured. Is there noticeable change since Hager (1953) studied it forty years ago? Third, personal interviews with area Hopi Indians may clarify their traditions concerning the crater. Such interviews, of course, should be conducted with great sensitivity, preferably with older Hopis in their own language.

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BOOK REVIEW

The Revolution against Evolution by Doug Sharp. 1993. Self published. Available from The Hope Store, 202 Creyts Rd., Lansing, MI 48917. 142 pages. \$5.95.

Reviewed by Don B. DeYoung*

Author Doug Sharp hosts a public access television show in the Lansing area, with the same name as the

book title. In this book he has summarized creation science in a nontechnical, humorous fashion. There is a helpful discussion of 50 separate evidences for creation. However, many older creation ideas are presented as valid without any updated critique: Paluxy footprints, light speed decay, Riemannian space, moon dust, decaying earth magnetism, etc. This book is for those who want a complete collection of creation literature.

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THE ROLE OF RESEARCH IN THE CREATIONIST MOVEMENT — LAB DIRECTOR'S REPORT

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



Why should those who are committed to the historical accuracy of the Bible be interested in supporting origins research? Why should scientists who are Christians be committed to a lifetime of origins research within a creationist context? Why should individuals, churches, and Christian foundations be involved in supporting origins research? These are legitimate questions and are deserving of reasonable answers. While each of

the following reasons could be greatly expanded, perhaps they will serve as a summary of some of the answers to the question of "Why origins research?"

1. Creation research reveals the glory of God. The elegance of creation extends from the far reaches of extra-galactic space to the minutia of sub-atomic particles. In between is the pulsation of life with its molecular motors, complex energy transformations, information processing, and reproducing systems. The glory and grandeur of creation is exceeded only by the greatness, omnipotence, and omniscience of the Creator. To the logical mind, when it is unshackled from the depravity of evolutionary naturalism, the universe in its every intricacy cries out for a Designer. By doing research, we pull back the veil of mist which enshrouds the realm of creation and reveal more of the glory of the Creator. To the Psalmist, "The heavens declare the glory of God." Today our knowledge and view of the heavens is vastly greater than in David's day.

2. Creation research provides credibility in interpretation. Whether appropriate or not, the public's perception of the credibility of a scientist is greatly strengthened by the scientist's active involvement in at least some field or laboratory research. Most people equate scholarship with research. One of my professors once said, "Those who make the observations are the ones who get to make the interpretations." It is no wonder that evolutionary naturalism has gained such ascendancy in our culture. Far too often, creationists have been satisfied with limited education, superficial apologetics, and an unwillingness to grapple with legitimate intellectual questions.

3. Research encourages clear thinking. Active involvement in reading, writing, and research sharpens the mind and in doing so, tends toward precise thinking and encourages cutting-edge familiarity with the subject. Too much of the popular creationist literature has been characterized by sweeping generalities, by illogical arguments, and by a failure to recognize the role of presuppositions in interpretation. The conclusions of rigorous field and laboratory research, which

are placed in clear language, sharpened by peer review, and published in the pages of the *Creation Research Society Quarterly*, will provide much of the material necessary for challenging evolutionary presuppositions.

4. Creation research addresses legitimate intellectual questions. While creationists agree on the major landmarks of the origins' topography, the details of the origins' landscape have yet to be developed. We should not be satisfied with a road map which shows only the peaks over 14,000 feet. The mountains are magnificent, but we need more to travel the sinuous upland highways. In like manner, we have the broad, general outlines of the creationist position, but the landscape has yet to be determined. The goal of establishing a unified creationist model is worthy of our highest efforts and long-term commitment.

Where, for instance, are the limits of the Genesis kinds in the modern world? And which of the geological strata are pre-Flood, which are Flood deposits, and which are post-Flood events? What is the sub-atomic nature of reality? Most of us know what time it is: but few, if any, understand what time is. How much of the Genesis Flood is due to natural events and how much is due to supernatural events? What is the nature and origin of quasars? What causes quantum red-shifts? Where are the missing neutrinos, and are spiral galaxies winding up or winding down? And what is the nature of consciousness, self awareness, intelligence, and creativity?

We have made a start, but it is only a beginning. Dr. Walter Lammerts, world's foremost rose breeder and one of the founders of the Creation Research Society, wrote in the first issue of the *Quarterly*, "We cannot hope in one lifetime to complete the structure of a truly theistic science, but let us begin." We have begun. More than 120 issues of the *Creation Research Society Quarterly* have been produced over 31 years of time, but a task of epic proportions lies ahead of us.

5. It allows creationists to ask questions that the typical evolutionary naturalist would hesitate to formulate. Asking the right question is often half the research effort. Such questions might be—could the Grand Canyon have been catastrophically formed? Could the evolutionary tree really be a brush pile of discontinuity? Could the vitalistic approach to living systems be correct after all? Could Paley be right, and could Darwin be wrong? Could the evolutionary theory simply be 20th century mythology?

6. It fulfills the professional responsibility which every scientist has to his or her chosen field of expertise. Even aside from the Biblical and philosophical implications, it does matter to geology if oil deposits are millions of years old or only thousands of years old. It does matter in astronomy whether the red-shift is related to recession velocity. And the origin and nature of biological control systems is of critical importance to epidemiology and physiology. If one is to be a leader in their chosen profession and have a genuine desire to contribute to its advancement, these kinds of questions must be carefully and accurately answered.

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7. It provides a role model. As secular society continues to sink deeper into the quagmire of evolutionary naturalism, humanism, and relativism, fewer and fewer competent professionals will be in leadership positions. In science, as in sports, politics, and other high-profile activities, our young people desperately need appropriate role models. Such examples are few and far between in our culture.

8. Creation research helps satisfy every person's innate curiosity to know. Man, created in the image of God is possessed with an intrinsic curiosity. Liberal, politically-correct, outcome-based education systems with their humanistic presuppositions are founded on relativism rather than legitimate critical thinking. The result is a stifling of true creativity. The freedom to explore new ideas within the creationist paradigm can revitalize the intellectual world. But it will take creationists with a deep commitment to academic discipline and rigorous scholarship to do so.

9. It provides a means of evangelism by scholarship. Creativity in man is an expression of a characteristic of the Creator. It is part of the image of God in man. Our commitment to the Lordship of our Creator demands nothing less than our utmost effort. Christian scholars have doors of opportunity opened to them that no other segment of the body of Christ has available. It is effective in that it reaches a large segment of culture that is

hardly approachable by any other means. We are in the midst of what many social commentators refer to as "culture wars." Evolutionary theory is the major cornerstone dogma of the culture of humanistic religion. One of the most effective ways to challenge humanism is to directly confront its evolutionary presuppositions.

We invite our members to join us in the enterprise of recapturing science for the Glory of God. If you are an established research scientist with an idea for a creation research project, call or write to us about the use of the Van Andel Research Center in your research plans. To extend our research efforts at the Research Center, we need long-term commitment from our members in terms of regular, monthly support and the development of perpetual endowments through substantial gifts.

The Van Andel Research Center stands at the forefront of the rapidly-developing research program of the Creation Research Society. One financial supporter of our research efforts put it this way:

As a Christian in the biological sciences, I can't imagine a better place to support the truth of our Maker than through the Creation Research Society at their Van Andel Research Center. . . 'When the foundations are being destroyed, what can the righteous do?' It should be obvious to any thinking Christian. Rebuild the foundation with solid research through the Creation Research Society.

BOOK REVIEWS

Grand Canyon: Monument to Catastrophe edited by Steven A. Austin. 1994. Institute for Creation Research. Santee, CA 92071. 284 pages. \$19.95.

Reviewed by Emmett L. Williams*

The Grand Canyon of the Colorado River often is presented in lectures and textbooks as a showcase for very slow deposition of the strata which were later exposed by erosion over the course of millions of years. In other words, it is suggested that the canyon is an example of what uniformitarian processes have wrought over eons of geologic time. Steve Austin and several other creationist scientists have written this treatise showing actually that the strata in the Grand Canyon could have been deposited rapidly and the subsequent erosion involved only a relatively brief interval of time.

Chapters 2-6, written by Austin, form the core of the excellent book. The reader is given a geologic education as he proceeds through the chapters. Interpretations based on creationist assumptions and observations related to catastrophic events are offered. Every scientific fact is explained within a Flood model. A creationist geologic timetable for the canyon is shown on page 58. This is one of the great needs in creationism; a geologic timetable to which creationists can refer as they write. Austin has performed a valuable service in placing the divisions of the rocks of the Grand Canyon within a creation week—Flood framework.

Rapid formation of the limestones, sandstones and shales of the canyon is covered. Water deposition of the layers is stressed. The importance of ichnofossils and shrinkage cracks within the rock layers is discussed. The supposed long ages between the deposition of the different rock formations is debunked.

Austin explores the erosion of the Grand Canyon as a result of post-Flood catastrophism. He notes the problems with the antecedent river and river capture hypotheses and then develops his breached dam theory. He postulates the presence of three post-Flood lakes on the Colorado Plateau. The dams holding these lakes were breached (likely by piping) and as the waters rushed to lower elevations, catastrophic erosional forces formed the Grand Canyon. The sequence of events and the evidence offered for the mechanisms of dam failure and subsequent erosion are detailed in Chapter 5.

Dr. Austin has been performing field work and research on the ages of some igneous rocks in the canyon region employing radioisotope dating methods. He shows some inconsistencies in the methods and discusses the obviously wrong dates derived at times. This important, continuing work is summarized in Chapter 6.

Other chapters deal with the fossils found within the layers of Grand Canyon rocks, the biology of the region, atmospheric studies, archaeology and "things to do and see" in the area. I enjoyed the discussion of the tassel-eared squirrels by Dr. John Meyer. The interpretation of the available data is particularly significant. Also see Meyer, 1985.

The book, a monument to creationist scholarship, is beautifully illustrated with many color photographs. My brief review cannot do justice to the topics covered. *Grand Canyon* should be in the hands of every creationist who plans to visit and study the natural history of the Colorado Plateau. Also your uniformitarian friends might enjoy and be challenged by its contents. I hope this well-written, thoughtfully-prepared treatise receives wide circulation.

Reference

Meyer, J. R. 1985. Origin of the Kaibab squirrel. *Creation Research Society Quarterly* 22:68-78.

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The Biotic Message: Evolution versus Message Theory by Walter James ReMine. 1993. St. Paul Science, P.O. Box 19600, Saint Paul, Minnesota 55119. 538 pages. \$45.00.

Reviewed by Wayne Frair*

The biotic message with its (1) unifying and (2) non-naturalistic components from the world of life comes universally to all people. This scientifically-testable revelation shows that the biosphere was designed for survival and for conveying the biotic message—there is only one designer. This could be the *greatest* communication that earthwalkers ever have received from nature.

ReMine's book was more than eleven years in the making by a man whose "graduate training and professional life have been in the fields of pattern recognition, signal processing, biomedical engineering, and radio communications" (p. 7). ReMine, a voluminous reader, has pulled together into a rather large and monumental book an imposing amount of information from various fields of interest to evolutionists and creationists. But ReMine confines his selection of the many quotations in the book almost entirely to evolutionists, exhibiting how their own data and conclusions fit with his message theory.

The author ventures to "show that evolutionary theory is always either falsified or unfalsifiable" (p. 36), and this depends upon whose version of evolution is being considered. Also he believes that:

Evolutionists are not committed to common descent, they are committed to naturalism and 'Natural' selection. The absences of gradual intergradations and phylogeny have always been a mortifying embarrassment. Evolutionists would drop common descent in an instant, but the data allow no better naturalistic alternative (p. 402).

Even though the book deals with considerable material which casts doubt on the concept of evolutionary continuity, ReMine recognizes some "common descent" of organisms. Presently this can be established by "(1) the ability to interbreed; (2) experimental demonstrations; or (3) clear-cut phylogeny" (p. 449).

The book begins with a Preface which includes a list of chapter contents each accompanied by a brief and very helpful commentary. Readers certainly should read the Preface before exploring chapter texts. Following the Preface are four full pages of Contents—each chapter heading followed by a paginated list of sections. Material in the chapters is thoroughly documented, and the text is spaced well for easy reading. Footnotes are copious, but there are no drawings, photographs, or tables. At the end of the book are thirty-five pages of appendixes followed by thirteen pages of References and an eleven-page Index.

The book virtually is free of "religious" references (including creationist material); yet the evidence referred to does not support naturalism, but rather "points toward the supernatural" (p. 468). ReMine feels that there is nothing unscientific about acknowledging the supernatural (p. 54).

The means for determining boundaries between groups of organisms separated by the gaps is a new

classification scheme termed "discontinuity systematics." This methodology was conceived and then elaborated publicly by ReMine during the 1990 Pittsburgh International Conference on Creationism (ReMine 1990). ReMine contrasts his scheme with phenetics as well as with the quite-popular cladistics procedures. ReMine recognizes that life is unified in a "multi-leveled nested pattern" (p. 383), and he characterizes his classification strategy as:

... a neutral, scientific method for studying nature, communicating the results, and compiling those results. . . It is also the major tool for resolving the debate over biological origins (p. 453).

How does ReMine combine his discontinuity systematics with the main theme of his book which is message theory? He says:

Discontinuity Systematics is a neutral method for studying life's key pattern, and message theory scientifically predicts and explains that pattern. The combination of the two can be called Creation Systematics. It is the scientific study and explanation of biological creation. (It is the creationist's counterpart to evolutionary systematics.) Creation Systematics is not neutral or theory-free. It takes a definite point of view and scientifically pursues it (p. 455).

Even though this book can be of value to specialists in various fields of science, I still think its main "messages" will be intelligible to those without strong backgrounds in science. Two hundred years ago William Paley was arguing the case for a designer; so now ReMine uses the term "biotic message" for nature's communication to all that there is a designer and communicator. The concept is like what theologians term natural revelation (a type of general revelation), the postulation being that nature's basic message clearly is perceivable by all people.

ReMine's thesis is broadly based on scientific evidence from fields including chemistry, mathematics, biology (genetics, anatomy, taxonomy, embryology) and geology. It includes unifying factors like nucleic acids (DNA, RNA), and even novelties, some of which may be interpreted as convergence by modern evolutionists. ReMine sees the novelties as distinctive features like idiosyncrasies in an individual's handwriting. Will evolutionists readily buy into this concept? I have some doubt about this, but since the idea is original with ReMine, it merits serious consideration over an extended period of time.

On the basis of his studies, ReMine understands that:

Modern evolutionists do not identify lineage. Instead they emphasize a highly branching, bushy pattern of evolution, with sister groups and hypothetical common ancestors. By failing to identify specific ancestors, evolutionists have a simple device for maximally adapting to the fossil sequence (p. 422).

ReMine compares the concept of evolution to fog which consistently will assume the shape of a landscape. This is true as demonstrated by the mass of evidence presented in his book, but I do think that ReMine as he supports his own position could be accused by his critics of employing similar tactics.

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How one integrates data will depend to some degree upon his presuppositions. Evolution is pictured as empirical and materialistic (naturalistic), but ReMine, though not stressing the supernatural, does leave open the possibility that a supernatural creator is the source of the biotic message. He indicates that his own inclination is to believe this.

In addition to his “fog” analogy, ReMine sees evolutionary theory as a smorgasborg. Various evolutionary explanations are selected and adapted to accommodate the observational data which ReMine feels actually accord better with message theory. This can include the quirks, novelties, imperfections, and “odd and curious designs” (p. 396) which evolutionists (Darwin, Gould, etc.) have used against the idea of a designer. This important, novel, and perhaps budding idea that ReMine stresses is that if all organisms had “perfect” designs—no pandas’ thumbs, no pythons’ “vestigial hind legs,” nor whale “hips”—then they would appear to be products of “multiple designers” instead of a single designer.

There are just too many designs that are functional, maybe even highly so, but which are *odd* nonetheless . . . Evolutionists have seen “odd arrangements and funny solutions” in nature and they insist these are paths a sensible designer would never tread. They are mistaken. Not only is it sensible, but message theory *absolutely requires* it, though at first it will seem paradoxical . . .

How can I be so utterly sure on this point? Because evolutionists have (unknowingly) said so. In fact, they insist on it. Every one of them—from Darwin, to Ghiselin, to Gould—has emphasized how unreasonable it is for a designer to have created such non-optimal, odd structures. We can rightfully conclude that if evolutionists had the wherewithal to create life, then they would independently go forth and create optimal perfect designs. We can conclude that a world of perfect designs would look precisely like the work of multiple designers acting independently. The biomessage sender created life to look *unlike* the product of multiple designers, and therefore had to use odd designs . . .

Suppose we examined many separate handwritten documents. How would we recognize they all had the same author? Answer: By the overall pattern, especially the funny quirks and odd imperfections. It is the same with living organisms (pp. 27-28).

The point has merit, but needs to be elucidated and refined. I think the issue clearly should be understood against the backdrop of what evolutionists conceive “natural selection” has failed to accomplish concerning their evolutionary criteria for optimal adaptations.

ReMine holds that the odd designs as well as features that evolutionists would call convergent—eyes of the octopus (mollusk) and a fish (vertebrate) for example—rebuff a transposition explanation. By this he means that the designer did not merely select from his stock of standard types of eyes and put the same design in otherwise diverse organisms, the same way one might “create” a letter by selecting sentences or paragraphs from a computer’s memory. Doing this would be transposing. Rather, the parts of disparate organisms were

designed separately even though there may be some similarity in the structure and/or function of the parts (pp. 345-346, 353).

We expect an ordinary designer to use the same design for the same purpose in different organisms. Any designer can easily do this by transposing designs. This is perfectly reasonable, commonplace design practice—we expect it from a designer.

Yet this expectation itself constrains a biomessage sender to do the unexpected. A biomessage sender is no ordinary designer. Rather, a biomessage sender must take conscious steps to make life look unlike the work of an ordinary designer. This is required if life is to *be* a message (p. 357).

Regarding convergence ReMine says:

. . . “convergent” traits are common in nature because they serve a purpose in the biotic message. Specifically, they look *unlike* evolution. The human-like eye of the octopus, the fish-like bodies of whales and ichthyosaurs, the duck bill of the platypus—these are all visible clues that life was designed by a single designer. Yet they are especially difficult to explain convincingly by evolution (p. 142).

Message theory . . . expects that “convergences” should be common because they serve the goals of the biotic message: (1) They unify life; (2) They thwart phylogeny; and (3) They resist naturalistic explanation (p. 264).

There is a long (probably too long) section on natural selection which ReMine feels often is “formulated as a tautology” (p. 98) “not science,” “metaphysical,” usually “naïve.” He says:

. . . evolutionists often present their case by extrapolating. They do this with the help of naïve natural selection. Evolutionists imply that a microscopic view of the fitness slope looks the same as a macroscopic view. Therefore, they say small biologic change can be extrapolated to prove evolution. Their error is naïve natural selection. Evolutionary theory is so tangled that any extrapolation of results is questionable (p. 258).

When discussing the fossil record with its persistent gaps between categories, ReMine says:

Life’s designer had specific and unusual intentions. Message theory is explicit. It says life was fashioned to look unlike evolution. To successfully accomplish this, the designer had to avoid creating life forms too densely packed within morphology space. A densely packed system of life—without gaps—would look like evolution.

Message theory says the gaps in life are intentional, because they look *unlike* evolution. If life forms could be significantly spanned by linking them together with experimental demonstrations, then message theory would be wrong. If gradual intergradations of small steps linked life on a large scale, then message theory would be refuted. Message theory is testable science. The biotic message cannot peacefully coexist with evolution. They cannot both be correct. It is one or the other, and

clear-cut evidence of large-scale evolution would be clear-cut evidence against the biotic message 259).

So message theory is falsifiable. ReMine believes that discovery of extraterrestrial life could defeat his biotic message (p. 441). In considering biochemicals he says:

Look at the unifying message. It says life was designed as a unified body of objects. Not one single species is an outlander. All organisms are tied together, intentionally, by a unity of design. All organisms are united by underlying similarity. A complex web of factors links all life. These similarities extend down to biomolecules. Biologic universals such as DNA/RNA, proteins, amino acids, and ATP join life together at the molecular level.

If you could find a single endemic living species dis-associated from the rest of life, then message theory would be refuted. What kind of species would this be? Perhaps a marine invertebrate based on silicon chemistry rather than carbon? Perhaps bacteria that use a genetic molecule unlike DNA/RNA? Perhaps organisms made of crystallized clay? The possibilities are endless. If capable research into a living species failed to show its distinct unification with the remaining system of life, then message theory would be irrevocably wrong (p. 23).

But I wonder if ReMine would abandon his message theory if an outlander were discovered. Life in general employs levorotatory amino acids to build all the proteins, but there are bacteria utilizing dextrorotatory amino acids in synthesis of their capsules. I assume that ReMine would consider this phenomenon to be among the quirks employed by the Creator. Not only does ReMine use the universality of DNA/RNA to support his view, but also evolutionists use this same unity argument to bolster their concept of genetic continuity among all forms of life. Why wouldn't an outlander (as a quirk) be good evidence against the evolutionary presumption that similarity indicates descent from common ancestry?

Concerning man's relationship with apes, ReMine says the relationship is according to design, not descent.

The apes thwart any attempt to separate man from nature: they unify man with nature. The apes possess innumerable similarities to us. The apes show that we are a part of this unified collection of objects. We are part of the biotic message, so we must draw the same conclusions about our origins. The apes make it abundantly clear—The designer of earth's diverse life forms and the designer of man are the same. Our designer authored the biotic message . . . All organisms are linked by design, not descent. This has been part of creationist thinking from the beginning (p. 324).

Some will read this book with a sense of experiencing the perfectly obvious and wonder why all this has not been stressed before. Most of it has, but a distinctive feature of this book is its contemporary comprehensiveness. All of nature (including even the universe) is screaming the biotic message.

Negative responses to the book can be expected, particularly from naturalistic evolutionists, perhaps fewer if they will exercise the assiduity to read the entire book. The ReMine book is part of a relatively recent chorus of communications heralding anti-chance factors, design, and purpose in nature. It is noteworthy that Paley's 1802 book supporting design with the famous watch analogy now is back in print.

Hoyle and Wickramasinghe (1981, p. 97) have said that William Paley still is "in the tournament with the chance of being the ultimate winner." See also Hoyle & Wickramasinghe (1993). Recent books by Davis and Kenyon (1993) and Moreland (1994) also stress "intelligent design" in nature.

Hubert P. Yockey (1992) has grappled with many of the same issues that have engaged ReMine, but the former has probed to greater depths with chemistry and mathematics. Near the end of his book Yockey says:

In this chapter I am using probability as a measure of degree of belief. It is clear that the belief that a molecule of iso-l-cytochrome c or any other protein could appear by chance is based on faith. And so we see that even if we believe that the 'building blocks' are available, they do not spontaneously make proteins, at least not by chance. The origin of life by chance in a primeval soup is impossible in probability in the same way that a perpetual motion machine is impossible in probability . . . A practical person must conclude that life didn't happen by chance (p. 257).

Personally, I am waiting for the smoke from the creation/evolution battle to clear away so that it will be easier to determine how far teleology (design and purpose) is advancing or retreating. When will this be?—perhaps within a decade or hopefully within even half a decade. I think that then the teleologists will have taken control of the terrain. Their thoughts will have been tempered and there will be a second or even third edition of *The Biotic Message*—probably briefer, more incisive, illustrated, and with more references to creationist scholars.

The Biotic Message now is a vanguard type of book—a daring attempt to pull together information primarily from molecular biology through biogeography, the latter being weak in this edition. I hope that the book, heavy as it is, will be read widely and discussed frequently. I predict that the main "truths" in this text will triumph in time.

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The Creator and The Cosmos by Hugh Ross. 1993. NavPress. Colorado Springs. 185 pages. \$12.00.

Reviewed by Don B. DeYoung*

This is Hugh Ross' latest book, readable and packed with items of creation interest. As usual, however, Ross assumes the universe is 22 billion years, which he calls "relatively recent history" (pp. 55, 65). He also has believed since age 15 that the big bang is the "only reasonable explanation for the universe" (p. 14). Ross mentions his disagreement with the recent creationists when he promotes the day age theory (p. 52).

Several summary tables are of special interest. For example, there is a helpful list of twelve elementary particle candidates for the alleged dark, hidden, or missing matter in space (p. 30). Later, Scripture is tabulated which implies extra-dimensional capacities of God (p. 72). I think Ross pushes higher physical dimensions too far in his attempt to understand the atonement, free will, and the Trinity (pp. 148-150). The Bible clearly states that many such doctrinal truths remain completely beyond our understanding (Rom. 11:33-36).

Lists of 57 design details are clearly presented (pp. 111, 129). These point to the Anthropic Principle, the experimental finding that the universe is especially designed for our well being. Examples include the polarity of water molecules, the sun's size, and also the average distance between stars. And herein lies a challenge for recent creationists: Many of the design items appear to be intertwined with the big bang and its immense time scale. For example,

If the universe expanded too rapidly, matter would disperse so efficiently that none of it would clump enough to form galaxies. . . . On the other hand, if the universe expanded too slowly, matter would clump so effectively that all of it, the whole universe in fact, would collapse into a super-dense lump before any solar type stars could form. The expansion rate . . . cannot differ by more than one part in 10^{55} from the actual [measured] rate (pp. 109-110).

Now, aside from the doubtful reality of the big bang and the inability of anyone to measure expansion to such precision, the question remains: Why is expansion so finely tuned if the universe was created in an expanding mode, a short time ago, as many of us believe? The rate of expansion seems to make little difference on a time scale of only a few thousand years. One possibility comes to mind:

Perhaps there are physical reasons why universal expansion appears precisely balanced, reasons which do not demand a big bang. Could the expansion be a consequence of the integrity or internal consistency of the creation? By this I mean that the entire universe is surely interconnected, similar to complex ecosystems. Any imagined alteration of one physical property would throw everything else out of equilibrium in unknown ways, even with the recent-age time scale. Thus the built-in balance of expansion or the appearance of age could be essential to the stability of the universe. What-

ever the case, there are alternate explanations for the long age, big bang-oriented design evidences listed by Ross.

Several items in the book must be challenged. The previous quote of a precisely-known universe expansion to one part in 10^{55} (p. 110) cannot be supported. After all, the Hubble constant which describes expansion is grossly uncertain. The microwave "ripple in space," measured by COBE in 1992, is said to have "precisely matched the level of fluctuation the astrophysicists had predicted" (p. 31). In truth the big bang model is so imprecise that any temperature fluctuation of space can be made to fit. The luminous bridge between galaxy NGC 4319 and quasar Markarian 205 which fundamentally challenges the red shift interpretation, is glossed over (p. 77). Ross' explanation of quantum mechanical tunneling is misleading; the process does not defy conservation of energy (p. 90).

It is proposed that animal life was created and annihilated at least 30 times during early earth history (pp. 103, 137). This is a clear contradiction to the biblical story. Star formation is said to be "quite well understood and observed" (p. 132). This is a surprise, since the complete birth of a single new star has never offered the Gospel message. However, my friend John C. Whitcomb, a student at Princeton in the late 1940s, did indeed greet Einstein at the showing of a campus Gospel film, and handed him a tract. With the preceding serious problems in mind, this book will still be of value to creationists.

Science and The Bible: 30 Scientific Demonstrations Illustrating Scriptural Truths by Donald B. DeYoung. 1994. Baker Books. Grand Rapids, MI. 110 pages. \$6.95.

Reviewed by Emmett L. Williams*

This unique book could be useful to Christian teachers, home-schoolers, pastors and youth directors. The author describes a particular demonstration that illustrates a scientific principle. A brief, relatively non-technical, explanation is presented. Also a Bible verse and lesson are included to emphasize a scriptural theme. The list of materials needed for each project as well as careful instructions for the demonstrations are given. Having seen the author perform many of these activities, I can assure you that the audience is spellbound during the demonstrations.

A few examples of the illustrated lessons are listed:
Magnetic field is made visible
Sheet of paper is cut to make a doorway
Eggs are safely thrown at a target
One balloon is popped inside another one
A banana is sliced without being peeled.

Using this book, a person can demonstrate both scientific and scriptural principles to young people (and adults as well) in a palatable, interesting and informative manner. Rest assured that no one will sleep through the demonstration. Techniques are offered in this book that can hold the attention of a TV-saturated generation. I highly recommend these demonstrations to imaginative parents and Christian workers who wish to teach in an effective manner.

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The Biotic Message: Evolution versus Message Theory
by Walter James ReMine. 1993. St. Paul Science,
P.O. Box 19600, St. Paul, MN. 538 pages. \$45.00.

Reviewed by Paul Bartz*

While Carl Sagan and his pals were looking among the stars for signals that would indicate unearthly intelligence, Walter ReMine was finding just such signals closer to home. The signals are buried in codes that no scientist worth his salt could miss—because it's a signal that's *intended* to be understood.

Creationists have often said that the creation itself is an act of communication. They have pointed to designs large and small in the creation as evidence that God is asserting that He is Creator. As good as these efforts might have been, ReMine goes further, grasping rather convincingly for a "grand unification theory" that ties all living things together. He says that, "Life was designed to look like the work of a single designer and to resist all other interpretations of origin." Specifically, life was designed to look *unlike* the result of evolution.

But doesn't evolution already claim to have a grand unification theory that ties together all living things? The familiar evolution argument that living things can be classified into a hierarchical pattern of nested similarities dates back to Darwin. Modern evolutionists point to life's hierarchical pattern of nested similarities as evolution's primary prediction and evidence. This is nothing more than a rather clever illusion, says ReMine. Evolution is really a smorgasbord of ideas. Nor does it make any true scientific predictions.

How does evolution get by with this trick? In the author's preface, ReMine draws on his experience as an amateur magician or illusionist. The successful illusionist is very studied in the psychology of illusion. After doing an illusion, the magician knows that members of the audience have certain ideas about how the illusion was accomplished. So he repeats the illusion, using a different technique that's designed to rule out the explanation audience members began to suspect after first seeing the illusion. A third performance of the illusion can use a third technique to rule out other explanations. ReMine says that each technique is designed to be seen from a certain angle and hand position. A skillful illusionist can use this strategy to convince the audience of what they know is not true—during the illusion, natural laws were somehow suspended. ReMine has concluded that it is on this level of illusion that evolution hides its errors.

Specifically, evolution's greatest illusion is that life's pattern of nested hierarchy is consistent with proposed evolutionary development.

After carefully dismantling evolution's claimed link to life's nested hierarchy, ReMine warns, any set of objects can be forced into a nested hierarchy. The real question is whether life naturally falls into a pattern of nested hierarchy. ReMine concludes that life does indeed fit quite naturally into such a pattern. Knowing that life naturally fits into such a pattern, evolutionists have tried to equate this natural and obvious pattern with the not-so-natural and obvious conclusion that therefore, evolution happened. The problem is, says ReMine, evolution would not result in life's pattern of nested hierarchy.

The author of *The Biotic Message* believes that his work, for the first time, offers the first testable theory of life's creation. He writes, "Life was designed to look like the work of a single designer and to resist all other interpretations of origin."

ReMine offers an ingenious illustration of the type of illusion created by evolutionists on page 345. The bottom third of the page features a long, technical-sounding defense of natural selection. It reads like something that might be found in a column by Stephen J. Gould or Richard Dawkins. However, as the next page reveals, the paragraph "was written by a computer running a simple artificial intelligence program." The computer randomly assembled phrases from a list, and combined them into sentences. The paragraph that appears to explain natural selection is nothing more than randomly assembled non-sense sentences.

The program that produced the non-sense paragraph uses the very simple method of transposing phrases. With a little study, one can see that the phrases are repeated identically as they are assembled without intelligence. ReMine's point is that identical repetition is not a sign of intelligence. Rather, repetition *with variation* (such as we see in the biological world) is a sign of intelligent design. This further illustrates that the pattern of life itself cannot be explained by evolutionary processes.

Having established this insight, ReMine goes on to examples, as he does throughout the book. First he offers evolutionists' explanation for why the octopus has eyes that are nearly identical to human eyes. The evolutionary defense of this similarity is that the similarity is not absolutely identical, therefore evolutionary theory is saved. By this point, it is clear that the evolutionary explanation of this convergence is based on "the illusion that evolution has something to say about nature."

ReMine points out that if such convergences in nature were identical, they would look like the transpositions that would support evolutionary explanations, just as did ReMine's computer generated paragraph. Therefore, since the Creator wanted to make sure that convergences would not look like evolution, He made them slightly short of identical.

ReMine does not neglect some of the hottest potatoes of the biological origins debate. He deals with the important issue of whether science is necessarily naturalistic. He tackles embryology, vestigial organs, and the illusion of fossil sequence and how this issue relates to message theory. There are also excellent sections on biogeography, cosmology and population genetics. Each topic comes under the knife of ReMine's sharp blade of logic. His surgery produces a beneficial readjustment of the reader's thinking, and settles all fear that creationism has no answer for evolution's most virulent challenges to the idea of a Creator. What's more, the authors treatment of each subject rests consistently within his unique model, thereby strengthening his primary thesis as well as each of its details. Simply put, ReMine's model and explanations work. They deserve scrutiny, review, and comment especially by degreed creationists.

Does *The Biotic Message* fulfill ReMine's promise of offering the first testable theory of life's creation? Paley's argument for design, says ReMine, established a scientific basis for concluding that a Designer was

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necessary for the origin of life. Paley assumed that such a Designer had to be Divine. ReMine's theory goes further, establishing a scientific basis for concluding that only a Divine Designer could have created all life with a design that communicates a single, consistent message. This theory is testable science, says ReMine, because it is explanatory of the empirical world, it is self-consistently logical, and it is falsifiable. This reviewer would agree that ReMine's theory, as presented, satisfies these requirements. The author clearly shows why evolution fails to explain the empirical world because it fails to be consistently logical or falsifiable. However, it would have been interesting to see the author suggest how a *critical experiment* might be designed to test his theory. The simple answer as to whether *The Biotic Message* fulfills its promise of offering a testable theory of the Divine origin of life is that, if the reader concludes that it doesn't, he would still be likely to grant that it appears to cut important new ground in that direction.

The reader should know that *The Biotic Message* is not filled with technical charts and graphs, but it is written for a college level reader who has a keen interest in science and the origins question. And though I have used creationist language to describe the Creator in this review, ReMine has written *The Biotic Message* without specifically Christian references. This makes the book suitable for the public classroom.

Evolutionists are hoping that this book will not receive much attention among creationists. If creationists begin using ReMine's arguments, evolutionists are going to have to face them head on. The evolutionists who have read *The Biotic Message* cannot help understanding that thoughtful treatment offers one of the most difficult challenges they have faced in some time.

The Myth of Natural Origins by Ashby L. Camp. 1994. Ktisis Publishing, Tempe, AZ. 134 pp. \$9.95 pb.

Reviewed by George F. Howe*

In this book Ashby Camp has shown that origins by "natural" means alone is merely mythology. Furthermore, it is not harmless myth but a serious delusion. On p. 6 Camp wisely applies the poignant words of a great Christian defender (Dr. Machen) to evolutionism as being a modern false idea and a great obstacle to the spread of Christ's Gospel.

The average interested origins reader seldom musters the time or the energy to search through the many books written on the various facets of the origins debate. With the skill of a lawyer, which he is, Mr. Camp supplies such folk with an important key to quotations that will equip them to demonstrate that evolutionism is not really "science" and creationism is not merely "religion."

But this book will also aid busy specialists. After surveying literature bearing on my own research projects, reading what is needed to teach my classes, and studying the manuscripts slated for publication in the *Creation Research Society Quarterly*, most of my time for discretionary reading has been exhausted. Select portions of "The Myth . . ." have been of help to me, especially section II on "spontaneous generation" research and section IV on the origin of man.

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No book, save scripture is perfect. Camp's treatise would have been stronger had he challenged the way certain astronomers wrongly use the red-shift, low energy cosmic background radiation, and other data to bolster their belief in the "Big Bang Theory" and billions of years for Earth's history. Here Camp takes a "fail-safe" position of showing that even if the Big Bang and vast ages were true, origins could not have proceeded by "natural" means anyway; this may be of help to some readers.

I hope this book is widely read and that it will work against the prevailing belief in macroevolutionism. As Machen would have said, may this book help ". . . destroy the obstacle at its root."

VIDEO REVIEW

An Evening at Oxford: Evidence for Noah's Flood by John MacKay. Video. 1992. Creation Research Center, P.O. Box 281, Hartsville, TN 37074. Two hours. \$30.00.

Reviewed by Carl R. Froede Jr.*

This presentation was made by John MacKay to the Association of Geological and Earth Sciences at Oxford University, UK. John is an Australian young earth creation geologist who provides an excellent presentation regarding the many evidences to support diluvial catastrophism. Specifically, he provides physical evidence which supports the Noachian Flood of Genesis. John has toured the globe and his collection of slides showing physical evidence of a catastrophic flood event is staggering. Subjects covered include the formation of coal, the Grand Canyon, fossil footprints, sedimentation processes, a geological interpretation for the first week of creation and also the Flood, fossilization, fossil graveyards, radiometric dating, post Flood conditions, reasons for the special creation of plants and animals, and the various Flood legends that he has encountered in travels around the world. Much more information is presented and an exhaustive list is not attempted here. John covers a lot of geological territory in support of the Flood.

A lively question and answer session follows his presentation. Students raise questions which are common in today's academic setting, including interpretation of scripture, radiometric dating, origin of races, the size of the Ark, and genetic mutation. Unfortunately the sound quality of some of the questions is poor, however, John's response is sufficient to enable the viewer to understand the content of the question. John's responses are consistent with scripture and provide the viewer with information which might be of use when discussing these same issues with others.

The video provides accurate information which is consistent with the young earth Flood model. John's diluvial catastrophist approach to the stratigraphical record is a refreshing departure from the uniformitarian interpretations.

I would highly recommend this video to anyone interested in the young earth creationist's approach to the geological sciences, or interested in understanding how the Flood affected life on this planet.

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THOSE WHO LIVE IN GLASS HOUSES STOW NO THRONES

MARK ARMITAGE*

Received 31 December 1993; Revised 7 April 1994

Abstract

Evolution is held to be a purely random mechanism which operates by chance. The possibility of an intelligent designer and director of the process of evolution is anathema to scientists who hold to this theory. To many, the presence of apparent design within the structure of biological organisms is purely coincidental, and may even be attributed to the organizational properties of the matter itself. The presence of three dimensionally symmetrical geometrical shapes such as squares and triangles is demonstrated, implying that an intelligent designer was behind the manufacture of biological diversity.

The premise behind the supposed mechanisms for evolutionary development and change states that all terrestrial biological life forms came about solely by chance random processes operating on matter, and then, once initiated, diversified globally into the many phyla we see today. This mechanism was governed, it is said, only by the "blind" guidance of natural selection and the undirected adaptation of organisms to the pressures of an ever changing environment over geologic time. The theory holds that no advanced intelligence could have directed these mechanisms or designed the basic biological structures that these mechanisms were able to "manipulate."

These structures and mechanisms it is postulated are purely random, could have taken one of many different forms and an apparent design inherent in them is strictly coincidental. The theory negates also that this "relentless march" of diversity could have taken place suddenly, or even over a few thousand years because the small genetic changes required for adaptation and diversity can only be "heaped up" over vast stretches of time. "There was sufficient time and energy available for life's molecular combinations to arise from chemical alliances encouraged by the cyclically changing, energy-charged environment," say Margulis and Sagan (Margulis, Sagan 1986.)

They wax poetic with "Bacteria invented fermentation, the wheel in the form of the proton rotary motor, sulfur breathing, photosynthesis, and nitrogen fixation, long before our evolution." The primary pillars of evolution then, are chance and time. They alone must support the entire weight of chemical, biological and physical evolution. If one or both of the primary pillars of evolution are crumbled, the whole structure of evolution collapses.

A simple test for the possibility of intelligent guidance in biological diversity is to look for the presence or absence of complex geometrical shapes within the structure of the organisms in that diversity. Lack of geometric shapes such as squares and triangles would certainly not disprove the concept of intelligent design, but their presence presents severe difficulties for an explanation based on a purely mechanistic system of biological diversity. Their presence would crumble the pillar of chance.

Microscopic Design

It is said that a man's house is his castle, and man has certainly designed and manufactured many interesting living structures throughout human history, but few of

these can rival the geometric beauty of the homes made by the diatoms. Diatoms (Fig. 1) have incredible beauty because they are symmetrical top to bottom, left to right and front to back. They come in many geometrical shapes, for example circles (Fig. 2), squares (Fig. 3), triangles (Fig. 4), ovals (Fig. 5), stars (Fig. 6), and rectangles (Fig. 7). No other organism that man knows of manufactures shells in such perfect geometrical shapes.

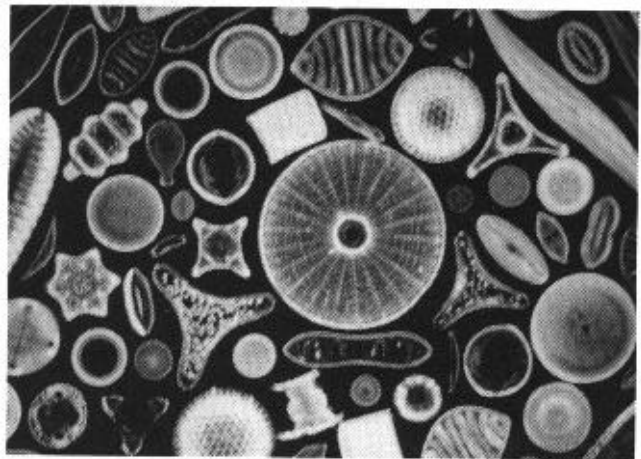


Figure 1. Diatoms in Darkfield, 125X.

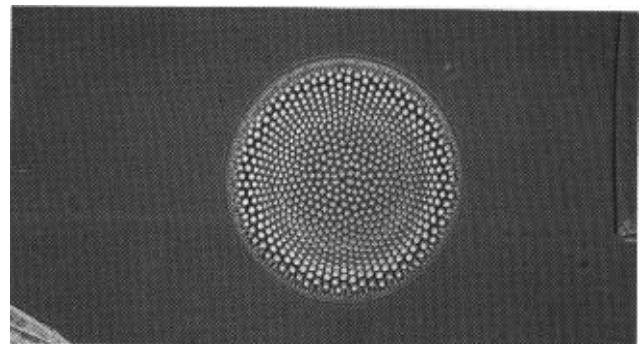


Figure 2. *Coscinodiscus elegans*, Nomarski 450X.

Diatoms, otherwise known as the Bacillariophyceae, are single celled planktonic algae that use the dissolved silica found naturally in seawater to fashion glass houses or tests to live inside of (Werner, 1977.)

There are generally two varieties, the pennate (or bilaterally symmetrical) and the centric (or radially symmetrical) diatoms (Figures 8, 9.) Their form comprises a matching together of a top and bottom like a

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tiny crystal pillbox, cemented together around the outside by a girdle. The single celled alga lives inside this container and either floats at the mercy of the currents or moves along a substrate via cytoplasmic streaming (pushing a part of the cytoplasm out through the pores in the test.) Some of the centric diatoms, such as *Melosira varians* produce flagellated male gametes with a whip like structure that they use to swim to the female gamete with (Lee, 1980.)

Only one other microorganism on earth manufactures its shell from silica, the radiolarian which is essentially a heterotrophic (non-photosynthetic) shelled amoeba.

Microscopic? Yes. But Primitive . . . ?

Most diatoms are tiny and cannot be seen by the naked eye. Averaging 25 microns in diameter, four of them will fit side by side across one of your hairs. (A human hair is about 100 microns in diameter.) In fact,

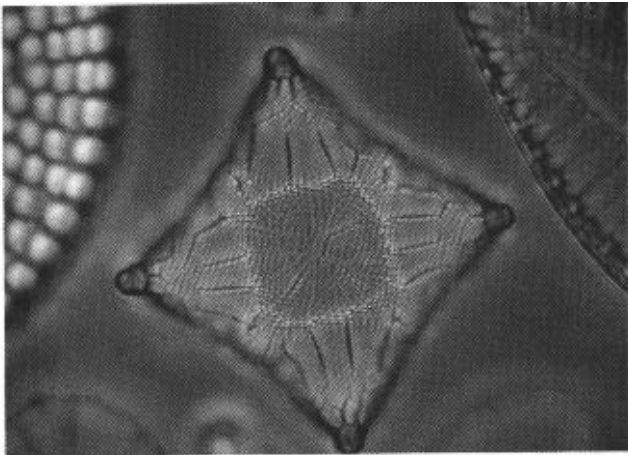


Figure 3. *Triceratium* sp., Nomarski 450X.

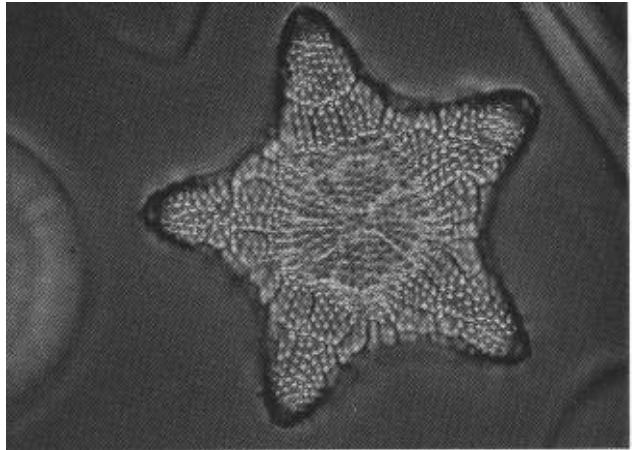


Figure 6. *Triceratium pentacrinus*, Nomarski 450X.

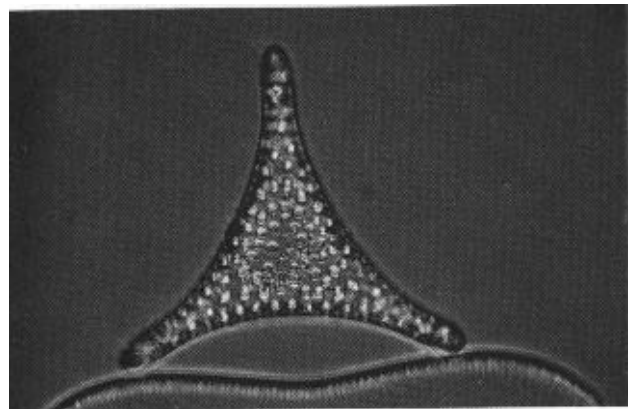


Figure 4. *Triceratium pileolus*, Nomarski 450X.

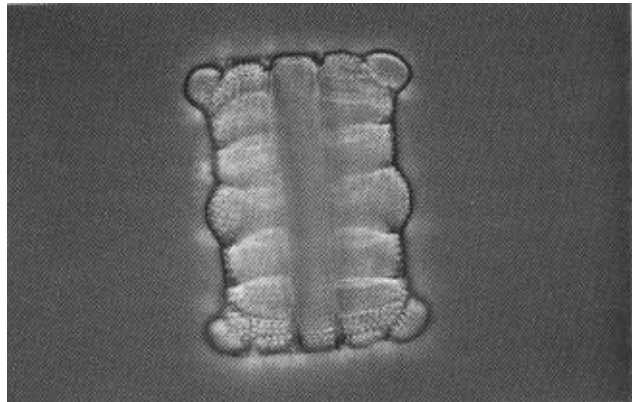


Figure 7. *Biddulphia* sp., Nomarski 450X.

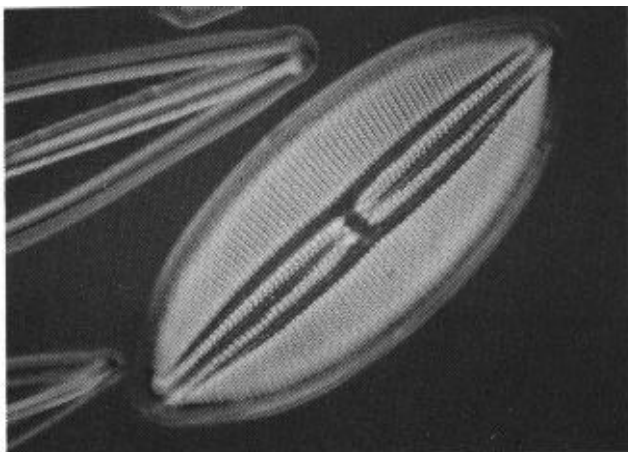


Figure 5. *Navicula lyra*, Nomarski 450X.

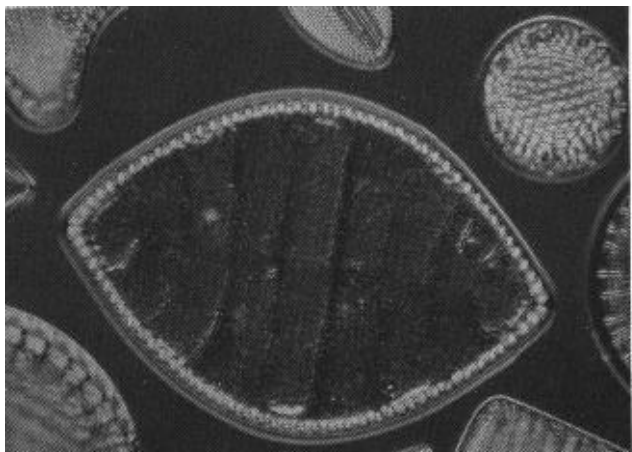


Figure 8. *Cymatopleura elliptica*, Nomarski 450X.

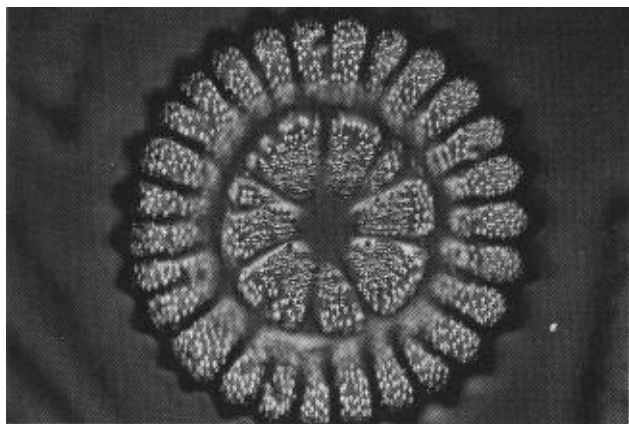


Figure 9. *Cyclotella*, Nomarski 600X.

you cannot begin to see them clearly under the microscope until you reach at least 150X magnification. Diatoms as protists or single celled organisms, are placed at the “primitive” end of the plant kingdom by many authors.

Consider for a moment that these tiny wonders use glass, an inert silica compound to build their cell walls with. What other organism would ingest glass to develop a stronger skeleton or skin? Consider also that they synthesize extremely complex compounds that we still do not entirely understand, and that as autotrophs, they synthesize not only their own food but a very high quality oil as well (Round, 1989.)

As much as 10 percent or more of the cell can be composed of this oil. Some scientists are reluctant to call them primitive because once studied under the microscope one can see how intricate they are, and that few, if any, other organisms match their geometric beauty. Single celled protists are classified as procaryotic (without a defined nucleus), and eucaryotic (with a defined nucleus and other complex cell components). Diatoms are eucaryotic—just like the higher plant and animal cells. They are found in all aquatic areas on earth, and even though microscopic, they make up about 90% of all living organisms in the ocean! There are at least 10,000 different species (including fossil varieties,) and all of the differences have to do with the external shape of their test. They make up the major food component for many fish and other aquatic organisms, including some baleen whales which will feed for hours on them, straining them out of the water with their finely spaced teeth (Hutchins, 1966.)

Wanted Dead or Alive

Not only are diatoms incredibly complex and beautiful, they have become a major component of modern day life. Living, they serve as the foundation of the aquatic food chain. They are also responsible for the production of much of the earth's atmospheric oxygen, for most of the vitamin D found in fish oils and for the purification of fouled water supplies (Ford, 1976.) Huge fossil deposits of diatomite are found along the California coast, most notably at Lompoc where deposits range for miles at depths of up to 1400 feet. Santa Maria, California also has very deep deposits of up to 1000 feet deep. Other world wide deposits are found in France, Spain, Iceland and Mexico. Scientists are

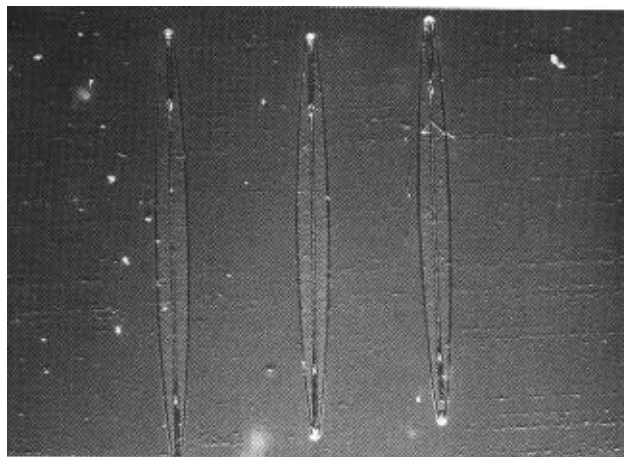


Figure 10. *Amphipleura pellucida*, Nomarski 1200X.

divided today on the possible mechanisms that could account for such localized deposits because once dead, most of the test silica redissolves into the seawater, (Lee, 1980,) and the majority of the diatoms found in these deposits have been crushed and splintered into tiny fragments.

This does not sound like the slow settling out of these tests in a warm shallow sea over many millions of years (Prescott, 1977.) What is certain is that countless billions of diatoms lived in the past. Many scientists think that they could even be responsible for much of the world's oil reserves due to the high quality oil they produce.

Although these deposits are fossilized, (i.e. other organisms found in the deposits have become mineralized,) the diatom tests have remained as pure silica and as such are extremely valuable (Bold, 1978.) Diatomite is used worldwide today as a highly effective filtration tool for the food, pharmaceutical, beverage, agricultural, plastics and solvent industries. It provides the sparkle and clarity in beer, wine and many fruit juices. Diatomite filters remove suspended solids from liquids without affecting the odor or taste of the beverage. It is used also in the production of vegetable oils, organic and inorganic chemicals, lube oils, and cane, beet and corn sugars. Safe drinking water and the clear water of swimming pools also result from diatomite filtration.

As a fine abrasive, diatomite is found in toothpaste, industrial cleansers and silver polish. Diatoms are used as a reflective in road marking, a filler in flat paints, as an insulator in temperature sensitive areas and as a buffer in the transport of dangerous explosives. They have also found their way into the booming biotechnology industry (Gest, 1987.) It has been found that certain microorganisms can be immobilized in a bed of diatomite, which will allow them to multiply rapidly into the billions and metabolize specific hazardous waste substances, leaving non toxic, disposable or recyclable materials. Finally, as any good microscopist will tell you, a good sample of *Amphipleura pellucida* under the microscope (Fig. 10), will quickly settle a dispute about the better of two microscope objectives, all to demonstrate that diatoms are as valuable dead as they are alive.

The perfect geometric shapes found in diatoms lead one to wonder if natural selection and the pressure to adapt to a changing environment alone can account for their dazzling beauty. Surely an intelligent designer programmed into their genetic code the ability to create superbly symmetrical three dimensional shapes such as these. As a scuba diver, I can readily appreciate all of the wonders that the sea has to offer. As a microscopist, I am thankful that I do not have built-in microscopic vision, for then I could never see the coral and fish for all the glass houses. As a Christian, I can clearly see that these tiniest of jewels, unlike many evolutionists today who worship the created thing rather than the Creator, make no thrones to sit upon and admire their own beauty, but rather, quietly speak volumes of the Creator's mighty power and intellect.

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MINUTES OF 1994 CREATION RESEARCH SOCIETY BOARD OF DIRECTORS MEETING

On Thursday, 14 April 1994, a meeting of the Executive Committee was held at the St. Michael's Hotel, Prescott, Arizona, from 2015 to 2245 hours to set up the agendas for the committee meetings on Friday. On Friday, 15 April 1994, between the hours of 0800 and 1700, the Constitution/Bylaws, Financial, Publications, Quarterly Editorial and Research Committees each held meetings of approximately two hours. The Chairman of each Committee recorded the business in preparation for the Saturday business meeting.

The Friday evening open meeting of the Creation Research Society was held at the First Baptist Church, Prescott, Arizona. Dr. Wayne Frair, President of C.R.S., welcomed everyone to the meeting. This was followed with a silent prayer. Dr. John Meyer, Director of the Van Andel Research Center (VARC), gave a report on the opening and activities of VARC. Dr. George Howe gave a report on recent publications and research. Dr. Emmett Williams gave a report on CRS Quarterlies and back issues.

A Minisymposium on Developments in Creation Science followed. Dr. Don DeYoung gave a presentation on "Michael Faraday: An Early Creationist." Dr. Russell Humphreys gave a presentation on the "Earth's Magnetic Field and the Genesis Flood." Dr. Duane Gish gave a presentation on "Jurassic Park: Fact or Fiction." The meeting was adjourned at 21:15 hours for refreshments, book sales and social discourse.

On Saturday, 16 April 1994, the closed business meeting of the Board (BOD) was called to order at 0815 hours. Present: T. Aufdemberge, E. Chaffin, D. DeYoung, W. Frair, R. Gentet, D. Gish, G. Howe, R. Humphreys, D. Kaufmann, L. Lester, R. Lumsden, J. Meyer, E. Williams, G. Wolfrom. Absent: D. Boylan, D. Rodabaugh, P. Zimmerman.

The minutes of the 1993 meeting were read and accepted. Secretary Kaufmann reported that the following were elected to the Board for a three-year term: E. Chaffin, L. Lester, R. Lumsden, D. Rodabaugh, G. Wolfrom.

The Treasurer's report by Gentet was given as follows: total income for 1993 was \$121,299.31. Total expenses for 1993 were \$329,846.79.

The Financial Secretary's report by Gentet was given as follows: for the year ending 1993, the total equity in investments was \$406,207.94 and the balance in the VARC investment fund was \$26,639.00.

The membership report by Wolfrom was given as follows: membership for 1993/94 was 1743 (652 voting, 735 sustaining, 320 subscribers and 36 students). This was an increase of 27 over 1992/93.

Editor DeYoung reported the following five-year summary of Quarterlies, June 1989-1994: 20 quarterlies, 902 pages, 97 articles, 60 reviews, 96 panoramas and a 50% article acceptance rate.

The Financial Committee report resulted in the following action. It was passed to separate all investment funds into VARC and General Funds. It was passed to have more than one signature on all investment documents. It was passed to develop a General CRS Budget (adjusted 93 figures to 94 budget) to be approved at BOD meetings for each calendar year. It was passed that the purpose of VARC be accepted in principle with further development to be handled by the Constitution/Bylaws Committee. It was passed that the maximal amount of money in the Chino Valley checking account be \$4000 with the limit of an individual check written by the VARC Director to be \$1000. It was passed that the honorarium checks for Meyer's presentations be made out to CRS. It was passed to acquire the mailing list of the Associates for Biblical Research for promotion of CRS membership. It was passed to allow Meyer to attend a Sharpe and Company Development Seminar for Fund Raising at a cost of about \$1800. It was passed that 6% of the Director of VARC's salary be given to a retirement account. It was passed to give the Director of VARC a 3% cost-of-living raise starting 1 July 1994.

The Editorial Committee reported that former Editor DeYoung has agreed to be Book Review Editor for the coming year.

The Research Committee reported the following research projects in progress: Williams; Kanab Canyon, Pine Creek Gorge, Big Bend and Providence Canyon Studies, G. Howe; Structure of Cretaceous Wood, Haymond Formation, Pinene Studies and Alamosarus

Bone Research, G. Wolfrom; 1993 Midwest Floods and Rapid Canyon Formation, R. Humphreys; Paleomagnetic Studies and R. Lumsden; Transmission Electron Microscopy of Millipede Defense Organs.

The Publications Committee reported that Roy Holt, physicist and CRS member, has volunteered to allow CRS Books to retail his Index for all CRSQ, Origins and *Creation Ex Nihilo* articles and other creationist journals. It was passed to publish M. Oard's manuscript on pre-Pleistocene glaciation.

It was passed that Meyer retain the master copy of the Friday night video, review it and if acceptable market it and negotiate royalties with the speakers.

The report of the Constitution/Bylaws Committee resulted in the following action. It was passed that the Executive Committee inquire into the legal ramifications of incorporating CRS in Canada and if feasible to proceed with official approval. It was passed that, instead of putting non-scientists on the BOD as had been suggested, the Executive Committee be permitted to invite creationists with business/legal expertise to future BOD meetings when it appears their advice would be helpful to the Executive Committee and/or a particular standing committee concerning business/legal problems on the agenda. It was passed that the

long range planning be formally written into the constitution. How this was to be done was assigned to the Constitution/Bylaws Committee.

It was passed to nominate D. DeYoung, D. Gish, R. Goette, R. Humphreys, D. Kaufmann and E. Williams for the 1995 Board of Directors election.

The following officers were elected for 1994/95: President, E. Williams; Vice President, D. DeYoung; Secretary, D. Kaufmann; Treasurer, R. Gentet; Membership Secretary, G. Wolfrom; Financial Secretary, T. Aufdenberge.

G. Wolfrom was elected Fellow by unanimous vote of the BOD.

It was passed that the 1995 BOD meeting be held at Chino Valley, Arizona, April 20-22.

It was passed that D. Rodabaugh be Program Chairman for the 1995 BOD open meeting.

The 1994 Budget was adopted with income of \$200,000 and expenses of \$195,000.

It was passed that the Secretary send a letter of appreciation to Dr. P. Zimmerman for his many years of service to CRS, especially for his financial expertise.

The meeting was adjourned at 1505 hours.

Respectfully submitted,
David A. Kaufmann

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*Glen W. Wolfrom, Ph.D., is Membership Secretary of the Society. For multi-page items, the reference is to the first page only. Letters following numbers indicate: a = article; L = letter; p = panorama; r = review; and n = note.

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Quote: Jefferson on The Way The Judiciary Branch Can Twist The Constitution

“The Constitution . . . is a mere thing of wax in the hands of the judiciary, which they may twist and shape into any form they please. It should be remembered, as an axiom of eternal truth in politics, that whatever power in any government is independent, is absolute also; in theory only, at first, while the spirit of the people is up, but in practice, as fast as it relaxes. Independence can be trusted nowhere but with the people in mass. They are inherently independent of all but moral law.”

Jefferson, Thomas. 1819. Letter to Judge Spencer Roane. Reprinted in Jefferson, Thomas. 1903. The writings of Thomas Jefferson, Volume 15. The Thomas Jefferson Memorial Association. Washington, D.C. pp. 213-214

THE CREATION ACCOUNT—THE EVIDENCE FROM WHAT IS NOT THERE

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Abstract

A review of the scientific beliefs relative to origins found a considerable contrast between the ancient cosmological theories and the Genesis record. This contrast reveals that Genesis managed to avoid all of the erroneous ideas held by the most respected thinkers and philosophers of the pre-Christian era. With the advantage that researchers have today of accumulated data and wisdom, we are far better able to evaluate the simple straightforward account in Genesis which contrasts greatly to cosmological beliefs widely held by the ancients, almost all which we now see as totally erroneous. The implications of this contrast are discussed.

Introduction

The Scriptures are completely devoid of thousands of ideas and beliefs held by the ancients now shown to be false—even those that were commonly believed at the time by most of humankind (Thiessen, 1950; Smyth, 1892). It is significant evidence for their inspiration that not one of these found their way into the Biblical Canon. If the Bible writers personally believed some of these ideas—which is very likely because they would not have been omniscient—the fact that they were not included in their writings which became part of the canon provides evidence for the belief that divine guidance not only directed them to record certain things, but also prevented them from recording others. Although divine guidance operated in their work as God's writers and prophets, many historians have concluded from a study of contemporaneous extra-Biblical writings that they accepted many of the beliefs held by those around them in their other areas of life (Scott, 1946). Asimov, a self-proclaimed atheist who believes the Bible is of human authorship, admitted:

The Biblical writers and editors were thoughtful men who borrowed selectively, choosing what they considered good and rejecting what seemed nonsensical or unedifying. They labored to produce something that was as reasonable and as useful as possible. In doing so they succeeded wonderfully. There is no version of primeval history, preceding the discoveries of modern science, that is as rational and as inspiring as that of the first eleven chapters of the Book of Genesis (1981, p. 3)

The traditional evidences of the plenary inspiration of the creation account and the entire Scriptural record almost invariably focus upon the view that the intellectual sophistication of the concepts they discuss are far advanced compared to those believed in the cultures existing around the original writers. A few of the more common examples include the expression in Isaiah 40:22 which mentions the "circle (for sphericity) of the earth" indicating the originator of these words knew that the world was round, and not flat as most people at that time believed. The Hebrew word translated circle here is *chuwg* which means *round, circle or circuit* (Strong, 1890). The many statements such as this which indicate a level of insight far beyond the level of contemporary knowledge are an important evidence of the Holy Scripture's inspiration.

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Another, probably equally important evidence, is that the creation account did not include many of the ideas that the ancients accepted without question and which *we now know are false*. Literally thousands of major false beliefs about cosmology were commonly held by the those living when the Scriptures were penned—including by most of the cultures living around the Hebrews, such as the Greeks and Romans and the Hebrews themselves—which did *not* find their way into the Scriptures (Barnstone, 1984; Charlesworth, 1983).

For example, the eminent Aristotle, whose teachings were viewed as almost inspired by many for over 1000 years after the birth of Christ, believed ideas which were not only wrong, but so contrary to experience that it is surprising that they were almost universally accepted in the ancient world for so long. He taught that the direction of the wind during conception influenced which sex the future child became—and, to insure healthy children, it was best to conceive them in the winter when the wind comes from the north. To insure a male child, he added, couples should conceive when they are older (Gardner, 1954, p. 243). Aristotle also taught that the color of the blood of females was black, and that of males red (Thorndike, 1923). Evidently, a woman who noticed that her blood was not black would not broadcast this fact for fear that others would think that she was different, possibly a male. Aristotle also concluded:

... the heart was a source of fiery bodily heat, so that one had to breathe air and bring cold humours from the brain to cool and moderate it. For him the heart was also a seat of intelligence, distributing its influence through the arteries, which contained hot, bounding, mystic, airy pneuma. And at the same time, tendinous strings attached to the valves of the heart were in some way connected up, again rather mysteriously, to all the other tendons in the rest of the body, as in a marionette. (We still speak of things tugging at our heart-strings.) For Aristotle had noted that parts at which free movement occurred, such as the wrists, were well supplied with tendons, which he regarded as the prime movers. (He mistakenly took it that the muscles were concerned only with sensation.) In his books he divided animals into two groups—those With Blood, and those Without (Hackett, 1973, p. 84).

These Greek beliefs spread to most of the Middle East through the conquests of Alexander the Great, and most westerners held Aristotle's works as almost of

equal value as the Bible until as late as the middle 1700's (De Santillana, 1955).

Other absurdities taught by Aristotle include the idea that the only animal able to contract measles is the pig, and that a cure for insomnia in elephants is rubbing its shoulders with salt, olive oil and warm water. Even a conclusion which could easily be disproved, such as "women have fewer teeth than men" was believed by many respected, learned philosophers of the time, some that are even today considered "paragons of wisdom" for their other teachings. Many ideas that are still with us today, called superstitions, were at one time fully believed and taught as truth by those widely considered wise and consequently accepted as valid by the masses (Daniel-Rops, 1962). Most people recognize that walking under a ladder, breaking mirrors, and existing on Friday the thirteenth have no more effect on us than we cause them to have (Batchelor and DeLys, 1954; Berry, 1940). Nonetheless, these ideas were taught by those reputed to be very knowledgeable and were believed by the masses for eons (Heaton, 1956). Even the eminent Anaxorgoras, historian of science Sarton concluded, "his scientific knowledge was not only meager, but mostly wrong" (1959, p. 243).

The Ancient Greeks' View of the World

The views that various ancient peoples of Biblical times commonly accepted were very similar to many modern day "fairy tales." Archelaos of Miletos (Socrates' teacher), proposed that when life first emerged from the earth by some type of spontaneous generation, a milk-like fluid also appeared so that these first creatures would have a source of nourishment. Diogenes added that living things are generated from the earth when it is heated, and it also gives off milk then to serve as a sort of nourishment—and, he concluded, the earth produces humans in this same way.

The respect of these philosophers was such that their teachings were accepted as fully true by many of the Greek population, and most of their ideas were still very much in vogue at the time of Christ (Daniel-Rops, 1962). Since the Greek, Roman, and other ancient governments did not conduct scientific polls (such as Gallup), we cannot fully assess the thoughts of these people, nor do we know for certain the extent they were accepted as literally true. While enough evidence does not exist to reconstruct what the typical Greek or Roman probably believed, we do know that their ideas have permeated the extant ancient writings (Heaton, 1956). And this evidence supports the view that most of those philosophers whose works exist today were held in very high esteem, almost inspired, by the masses (De Santillana, 1955).

Aristotle's influence was especially strong. He was the son of Nicomachus, court physician to the father of Philip of Macedon, and worked with Plato for 20 years. Aristotle, Plato and the other Greek philosophers in this school were so widely respected that the early Christian writers went to great pains to try to "reconcile" Christian thought with it (Turner, 1913). St. Thomas Aquinas' *Summa* was partially an attempt to harmonize Christian revelation with Aristotelian thought (Barker, 1943). Extensive research by scholars has found some, but limited deviation from the views of this major school of thought, a fact which is probably true of

most *dominant* beliefs throughout history. Today, the concept that the Earth is round and travels around the Sun is almost universally accepted.

Likewise, because the teachings of the ancient philosophers were commonly accepted does not mean that they were unequivocally believed by *all* Greeks, or even all ancient peoples. Some early Greek scientists recognized that the earth is round—noting evidence such as the circular shadow that the earth cast on the moon, and the way ships seemed to sink below the horizon as they sailed away from land (Sagan, 1980). An astronomer by the name of Aristarchus of Samos argued around 275 B.C. that the sun, not the earth, is the center of the solar system, and that the sun was much larger than the earth. Although many of his conclusions were correct, we do not fully understand how he reached them nor how widely his views were accepted. Conclusions such as these, though, *were rejected by most as incorrect and were never held by more than a small minority of scientists*. Sagan concludes that "for most of the 1,800 years between Aristarchus and Copernicus nobody knew the correct disposition of the planets" and "there were cries" that Aristarchus "be condemned for impiety" (1980, p. 189).

Sometimes the *more* respected philosophers were more apt to discuss ideas that we today conclude are totally fanciful. That these philosophers became well known indicates the level of the ancients' respect for their general views. Plato believed that humans were fashioned out of earth, air, fire and water by a deliberate creative act of the main deity (McMullin, 1965). Unfortunately, though, the major deity's "helpers" devily, and against the will of the supreme God, placed an "irrational soul" in our bodies in addition to the rational soul previously placed in our head by the major deity. They then reasoned that the farther from the head that thinking occurred, the less rational it becomes because thoughts farther away from the brain utilized more of the irrational soul which tended to become stronger as the origin of one's "thought" moved away from the brain. The body itself became the battleground for the opposite personalities of these two souls.

Plato popularized both the belief that humans have an immortal soul and the idea that after one died, what type of creature one became in the next reincarnation depended upon the type of life one lived or the person he/she was while alive. Plato believed that reasoning was a far more important source of truth than learning through one's senses. He termed experimentalists "dim-witted but harmless," and felt those whose knowledge was obtained largely through the evidence of their eyes became birds in the reincarnation (Eslick, 1965). Those who became land animals after death were persons who had no use for philosophy and had let their lives be governed by their instincts instead of their reason. The ignorant and foolish became fish because they were "unworthy" even of breathing air.

Air was one of four elements, and was the basis of the mind and the source of many personal qualities such as intelligence. They reasoned that because humans and other living creatures live by means of breathing air, if air is removed, their intelligence will depart and they will die. Diogenes argued that variations in internal

temperatures was the cause of most all of the different types of animals—bats are different than lions, for example, only because their temperature was different. Other philosophers, including Socrates' mentor, Archelaos, concluded that one makes dirt (soil) simply by heating water—the fire causes the water to “stick” together, forming a semi-solid mass (as opposed to dry sand) and this process generates air as a by-product (Russell, 1950).

The Ancients' View of the Solar System and Universe

The ancients were little aware of the true nature of the solar system (Bok and Jerome, 1975). Many then understood the world as consisting of a small patch of land bounded by distant hills beyond which was the sea. Not far overhead, they believed, was the sky across which “rode” the beneficent sun. The sun was seen as a parent god who provided his children with light and warmth and the moon and planets were “lesser gods” that rode at night with the stars. Beyond this, few of the ancients had an accurate picture of what else actually existed in the universe—actually neither did moderns until the last few decades (Bok and Jerome, 1975; Coleman, 1967). The belief that the stars were “living beings” was evidently accepted by many of the most brilliant thinkers who ever lived, including Plato and Aristotle (Clark, 1977).

The beliefs many of the ancients held about the shape and structure of the universe were generally “remarkably uniform” (Reichen, 1963, p. 10). Many concluded that the earth was a flat disk, or close to a fairly flat hemisphere, surrounded by a great river on which the earth floated. The river was surrounded by a “hollow,” or space, part of which formed the heavens. Above this was believed to be an immense reservoir containing the “upper waters” which was the source of rain. Everything below was “sheol,” a land of darkness where everybody went when they died. One reason ancients buried their dead in the ground was to give them a head start on their journey to sheol. (The gods then took them the rest of the way.) The living dare not take their dead *too far* underground—six feet was assumed safe—because no one wanted to get too close to the other world for fear they would “fall” into sheol. This is also why many of the ancient civilizations mined metal ores only in caves or mountains—and in caves the workers dug forward, sideways or upward but never downward.

Many romantic ideas about the earth were commonly espoused by the ancients. To the Hindus, it was supported by four elephants whose feet stood on giant tortoises swimming in a river of mild milk (Beiser, 1962). The Egyptians and Mesopotamians envisioned the earth as a solid, flat object which was the main object in the universe in terms of mass, size and importance. The Egyptians taught that the cosmos was encompassed by a star-studded, female sky goddess who swallowed the sun each evening and vomited it up each morning (Sagan and Leonard, 1972, p. 10). The Greek Thales taught that the earth was a “disc” floating in the waves of a huge pool of water. Air was mere vapor and the stars were a series of “thoughts” floating on the “higher waters,” those in the heavens which produced the rain (Russell, 1950). Anaximander

of Miletus saw the earth as a cylinder—three times as broad as deep, inhabited only in the upper part. He envisioned his cylinder stood *without support* in the center of a perfectly spherical sky. The stars were the open ends of enormous tubular wheels filled with fire—and when they were blocked, an eclipse occurred.

Until the early 1700's, the Greeks and many other civilizations believed that the sun, moon, planets and stars were kept from falling to the earth by invisible plastic-like concentric spheres that rotated and carried with them the various planets (De Santillana 1955). The sun, moon and the six known planets were in turn each supported by their own spheres. The planets and our moon were each embedded in a “plastic” sphere and each one was smaller than the next so as to form a set of organized layers. The moon was thought to be a feminine creature because of “her waxing and waning on a 29 day cycle.” She continually but regularly changed from full to half size, then to only a “slit of light.” The Greeks knew of nine different types of heavenly spheres—five planets, the earth, moon, sun and the fixed stars—but nine was an imperfect number, so they reasoned the number must be ten, a “perfect” number. To obtain ten spheres, they invented another planet which “always stayed on the far side of the world where it could never be seen” (Bergamini, 1962, p. 12).

It is significant that none of these ideas—all which were radically different from our modern concept of the Universe, and commonly believed by the Greeks at the time when the New Testament was written—found their way into the Bible (Heaton, 1956). Probably one of the most well known—and most highly defended—ancient concepts was the belief that the earth was the physical “center” of the solar system and Universe. Yet nowhere in the Bible does even a single Scripture directly teach this view. Although it does not teach that the earth is *not* the *physical* center, the very absence of this almost universally believed concept is significant in view of present day astronomy conclusions. In an extensive human authored document the length of the Bible, it would be likely that this world view, or parts of it, *would be mentioned somewhere*. In the over 2,000 times that the Scriptures refer to the creation, never once does the document even reflect these beliefs. The few alleged cases of this such as the “firmament” controversy or Lamarckian biology inference are covered adequately elsewhere (Morris 1976).

Astrology Beliefs of the Babylonians

The Babylonian priests studied the heavens for the purpose of learning about the gods, whose actions they believed were intimately connected with the movements of stars (Thorndike, 1923). This common view was close to universal in this part of the world, yet never once do the Scriptures link star movements with God's actions. They do relate the incident of the three astrologers (Magi in the Greek; actually, according to Herodotus, Magi were a tribe of Medes) who located the child Jesus by “following” a “star.” The star, though, was only for the purpose of direction—this passage nowhere teaches that the star itself was a god or an intelligent being. Using stars for direction was common in the days of both Moses and Jesus, and even today—and because a “star appeared to move” does not alter

its purpose, i.e. direction. Whether the star or planet actually physically moved is another paper (Chester, 1993). Nonetheless, although the Scriptures mention star groups (Job 9:9; 38:31) they never teach the art of astrology which was widely practiced and a core belief in much of the biblical lands, especially the Babylonians and the Chaldeans (Lindsay, 1971).

The Scriptures do make use of comparisons with the stars in the heavens, or grains of sand on the seashore, to emphasize size or amount. These illustrations are appropriate and very meaningful, actually more so today than in the past. We are now far more aware of the truly awesome number of stars in the universe. The ancients knew of only those they could see with the naked eye, about 6,000, a minuscule amount compared to the number now known to exist—about 100-billion galaxies, each with about 100-billion stars (Ross, 1993). Of the many times that the stars are discussed in the Scriptures, not once is the inference made that we can learn the will of God or our future by observing star movements or even a particular star; in fact, the Scriptures condemn such practices—Deut. 18:10-12; Isa. 47:13-15; Daniel 2-8 (Lindsay, 1971).

Examples of Creation Beliefs of the Ancients in the Middle East

The Phoenicians believed that violent thunderstorms were the source of the many differences now so evident in living things. The Babylonian creation stories are highly fanciful compared to the Genesis account. In one account, the god Apsu displeased Ea, the god of wisdom, so Ea killed Apsu which made his consort, Tiamat, extremely angry. To avenge Apsu's death, Tiamat gathered together the evil gods to fight Ea. In defense, the good gods appointed Marduk as their leader and successfully destroyed Tiamat. Her body was then cut in two, one half formed the heavens, the rest the earth. Humans were later created from the blood of Tiamat's former followers who were killed in the battle (Thorndike, 1923). This fanciful story has little similarity with the Genesis account, and is even farther removed from all modern scientific theories of origins than Genesis. The theme of Genesis is primarily simply that God created the plants, animals and humans in an orderly way out of nothing or existing matter, depending on the section of Genesis. This is not to say these people were less intelligent than moderns, only that we have the benefit of 6,000 years of research and experience.

The Greeks taught the source of light for the earth is not the sun, but the god Apollo (the Egyptians gave this role to his counterpart, Amon Re) who provided light by driving blazing chariots across the skies. Many of these beliefs were not held by a few individuals but, according to the best historical estimates, were firmly and almost totally accepted by the vast majority of Egyptians (Erman, 1971). This imagery, although picturesque, does not even resemble our modern understanding of reality. These beliefs are absent from the Bible account of creation, even though it was written contemporaneously to when they were widely accepted. Most of the Bible writers were common people who were unlikely to question the wisdom of their culture if it did not contradict the Scriptures. This contrast in non-biblical accounts and the Scrip-

tures was noted by Ross when he first read Genesis. In his words:

In the first several holy books I examined, my initial hunch was confirmed. I found statements clearly at odds with established history and science. I also noted a writing style perhaps best described as esoteric, mysterious, and vague. My great frustration was having to read so much in these books to find something stated specifically enough to be tested. The sophistry and the incongruity with established facts seemed opposite to the Creator's character as suggested to me by nature . . . [When] I picked up a Bible. . . . The book's distinctives struck me immediately. It was simple, direct, and specific. I was amazed with the quantity of historical and scientific references and with the detail in them. It took me a whole evening just to investigate the first chapter. Instead of another bizarre creation myth, here was a journal-like record of the earth's initial conditions—correctly described from the standpoint of astrophysics and geophysics—followed by a summary of the sequence of changes through which Earth came to be inhabited by living things and ultimately by humans. The account was simple, elegant, and scientifically accurate. From the stated viewpoint of an observer on Earth's surface, both the order and the description of creation events perfectly matched the established record of nature. I was amazed (Ross, 1993, p. 15).

Not only in their conception of the universe did the ancients believe some clearly erroneous ideas, but especially in areas such as the structure and the function of the human body and its organs.

Spontaneous Generation Ideas of The Ancients

The spontaneous generation of life idea was almost universally believed among the ancients until it was disproved by Louis Pasteur and others in the middle 1800's (Farley, 1979). The Greek historian Diodorus of Sicily, while visiting Egypt stated:

Even at the present day the soil at Thebes at certain times generates mice in such size as to astonish all who have witnessed the phenomena: for some of them are fully formed as far as the breast and front feet, and are able to move, while the rest of the body is unformed, the clod of earth still retaining its natural character . . . for even at the present time, when the soil of no other country generates any such thing, in it alone certain living creatures may be seen coming into being in a marvelous fashion . . . forms of animal life can clearly be seen taking place in the pools which remain the longest: for example, whenever the river has begun to recede, and the sun has thoroughly dried up the surface of the slime, living animals come, they say, take shape, some of them fully formed, but some only half so, and still actually united within the earth (Diodorus, 1962).

In contrast, the Scriptures teach that the only source of plant and animal life is from life (called biogenesis) and abiogenesis is never even implied.

Another belief held by a number of extremely prominent ancient philosophers, including Aëritus, Hippolytus, Censorius and Plutarch, was that humans could spontaneously generate inside of certain large fish, often sharks (Rostovtzeff, 1928). And once generated, they lived inside of the fish until grown. The fish then burst, and adult men and women who now could feed themselves came forth, went ashore, and lived on their own. The writings of many of the ancients indicated that they concluded that marine and land animals were in most respects identical—the major difference was that marine animals were covered with a “prickly bark,” enabling what was essentially a land animal to survive in the water.

Some ancient peoples, though, believed in a different abiogenesis theory. Anaximander (610-546 BC), a major sixth century Greek thinker called the founder of astronomy, concluded that air was the material substance from which all things originate and, when rarefied, become fire. He taught that the entire universe was made up solely of different concentrations of air. When it condensed, it first exists as wind, and as it condenses further it turns into clouds, then water, later dirt and, last, stones. This logical but naive view was commonly accepted and taught by some of the most eminent philosophers then (Sarton, 1959). Aristotle modified this and taught that *four* element existed — *earth, air, fire and water* — and from these emanated everything in the universe. These four substances all are, of course, not elements or even compounds, but mixtures. Oxygen is the primary component of both air and water, and is a fuel for combustion, a reaction involving primarily oxygen and some other element. They failed to recognize the many gross differences in physical properties between what we recognize today as the elements. Arsenic and oxygen are both elements, but are very different in many physical and chemical ways.

Anaximander not only reduced all matter to air, but concluded that living creatures were primarily “homogeneous air and wind” (Ovid, 1916). He noted that when humans breathed in air, it was cold, but when it came out, it was warm. Since he believed hot and cold are fundamental qualities of matter (all matter has temperature, even absolute zero is a “temperature”) and both of these qualities owed their existence to air, he concluded that the physical stuff of life must owe its existence to air, the most basic of all substances. Anaximander also concluded that life originated naturally in water, and the first forms resembled sea urchins. On the other hand, Thales of Miletos (b. 624—c. 548) and many others concluded that *water* is the source of all things (Sarton, 1959, p. 172). Others felt that fire was the primary element, even speculating that earth and water were essentially fire that had been extinguished or changed in some way, but was still fire at its core.

The well known Greek writer, Pliny the Elder, who lived when the writing of the Greek Scriptures was being completed, described the chameleon as “the only animal that receives nourishment neither by meat nor drink nor anything else, but from the air alone” (Button, 1977, p. 12). He described a tribe of half-men and half-women who alternately performed the function of each sex called *Androgyny*. Then there were

the *Troglodytae*, a tribe that lacked necks and had eyes in their shoulders (Woodruff, 1979). The *Desdemona* were normal men except that their feet were turned the wrong way and they “eat” simply by smelling the fragrance of certain flowers and fruits. The umbrella foot men (*Sciapodae*) laid on their backs to use their huge feet to protect themselves from the sun. Pliny probably picked up many of these tidbits from his extensive travels—and many of these creatures that he described were believed by the people of his day to actually exist (Thorndike, 1923; *The Encyclopedia Britannica*, Vol. 18, p. 78, 1945 ed.).

One of the more interesting early theoreticians was Empedocles of Acragas (c. 490-431 B.C.). Like many of his contemporaries, he accepted the theory that the universe was made up of four elements, fire, air, earth and water. Believing that motion was not an innate characteristic of matter, an idea which some in his day accepted, he proposed two basic natural forces—love and strife. The former was the uniting force, the latter the divisive one. All that was needed for the universe to function, Empedocles felt, was the four elements and these two energy sources. The origin of life was very simple—life arose spontaneously from the growth of trees as a result of the action of both love and strife upon the four basic elements. Empedocles also proposed a “first generation” of incomplete animals and plants—separate limbs and other body parts not joined together. These “faces without necks, arms wandering without shoulders, unattached, and eyes strayed alone, in need of foreheads” were united in the second stage (Burnett, 1930, p. 40). The process of joining, though, was somewhat happenstance and things, “fell together as each chanced to meet the other.” This random coming together resulted in mismatches—creatures with faces and legs on their trunks, and others having, for example, an ox’s head and a man’s body (Russell, 1950).

All of this supposedly occurred in the eon when love was predominant and strife was prevented from exerting its influence. The next eon was governed by strife and functioned similar to Darwin’s natural selection idea. During this stage, the functional combinations would win or survive, and the nonfunctional ones would not, resulting in everything turning out “as it would have if it were happening for a purpose.”

Empedocles also envisioned a fourth stage where the species of both sexes were attracted to each other because of being “alike” or, as he explained, “sweet seized on sweet, bitter rushed towards bitter, sour moved towards sour, and hot settled upon hot.” This highly picturesque explanation of sexual selection was evidently accepted literally by the ancients—even Aristotle incorporated rudiments of Empedocles theory in his writings:

Where everything turned out in a way which simulated purpose, these creatures survived because by chance they were so constituted in a certain way, whereas all that were not so constituted perished, and continued to perish . . . like the oxen with human faces [which Aristotle believed existed]” (1952, p. 146).

This imaginative explanation for the origin of plant and animal life likely doesn’t have a single defender today. Because Empedocles’ ideas regarding natural

selection as well as his general outline of development resembled evolution, he is sometimes called “father of evolution” (Osborn, 1929). Many in Empedocles’ day accepted this view, yet not even a semblance of it has crept into the inspired Scriptures. Exclusion of this idea and countless others, some of which are mentioned above, would seem incredible if the compilation of the Scriptures was determined by human direction alone. Since these ideas were undoubtedly entertained by the Jews and early Christians, and the Bible writers would not have any special knowledge of the physical structure of the universe if God did not specially reveal reality to them, they would likely have included some of these fanciful ideas in their writings. Considering the fact that their world view was very different from ours today, it is amazing that we today are still able to closely relate to the Scriptures.

A study of recent history indicates that many of these clearly incorrect beliefs were tenaciously held by vast numbers of people until very recently. For example, in the middle 1800’s the French still subscribed to the doctrine of “maternal impressions” which held that if a pregnant woman saw an unpleasant sight or was frightened in some way, this experience could deform in some way her unborn child. (Dimmer, 1973, p. 29).

The Problem of Interpretation

Some persons today feel that many concepts such as the idea that the sun is a living “god” was believed only metaphorically by the Ancients. In other words, they did not understand this idea as literal, but only spoke of the sun as a god much as we today speak of the earth having four corners. This, though, was not the case with ideas in many cultures. For example, the Ionian, Anaxagoras (500-428 B.C.) was once overheard asserting that the sun was not really a god, but only an incandescent stone somewhat larger than the region of Peloponnesus. This event, and evidently also his irreverent attitude, caused the citizens to become incensed to the extent that he was imprisoned. If it was not for his friend, the powerful Pericles who arranged for his escape (eventually he lived in exile in the Milesian colony of Lampsacus), Anaxagoras would surely have been put to death by the Athenians just as Socrates was a few years later (Rostovtzeff, 1928). In Sagan’s words, Anaxagoras:

was the first person to state clearly that the Moon shines by reflected light, and he accordingly devised a theory of the phases of the Moon. This doctrine was so dangerous that the manuscript describing it had to be circulated in secret, an Athenian *samizdat*. It was not in keeping with the prejudices of the time to explain the phases or eclipses of the Moon by the relative geometry of the Earth, the Moon and the self-luminous Sun. Aristotle, two generations later, was content to argue that those things happened because it was the nature of the Moon to have phases and eclipses—mere verbal juggling, an explanation that explains nothing. The prevailing belief was that the Sun and Moon were gods [and in contrast] Anaxagoras held that the Sun and stars are fiery stones. . . . [As a result] Anaxagoras was convicted and imprisoned for the religious crime of impi-

ety—because he had taught that the Moon was made of ordinary matter, that it was a place, and that the Sun was a red-hot stone in the sky. Bishop John Wilkins commented in 1638 on these Athenians: “Those zealous idolaters [counted] it a great blasphemy to make their God a stone, whereas notwithstanding they were so senseless in their adoration of idols as to make a stone their God” (Sagan, 1980, p. 182).

Often little tolerance existed for anyone then who did not accept what was believed to be a firm reality, which in this case was the idea that the sun was literally a god, as was thunder and virtually everything else in the natural world. True, the New Testament was not written until 500 or so years later, but the Greeks clearly influenced the Hebrews, even though the Hebrews tenaciously tried to keep their beliefs pure from Gentile views.

The Greeks’ influence upon the early Christians, most of which were Hebrews, is clearly evident in their writings (Heaton, 1956). Paul spent a great deal of time debating and discussing their philosophers, trying to help Christians from being dominated by certain Greek ideas. Further, we know that many of the early Christian writers were very familiar with Greek philosophy (Daniel-Rops, 1962). Many were trained extensively in this area, and the early Christian writers spent a great deal of time either refuting or “accommodating” Christianity to the various Greek philosophical ideas (see *The AnteNicene Fathers*, 10 volumes, Eerdmans; Grand Rapids, Michigan).

Exactly how much the Greeks deviated from our modern understanding of the universe is illustrated by the common belief stressed by both the Atomists, headed by Leucippos and Democritus of Abdera in Thrace, and the Milesians. They believed that motion was an innate characteristic of all matter, but why or how matter was imbued with endless movement was never adequately explained. Consequently plants “grow” because they are made out of matter, and movement is a characteristic of matter. The wind “blows” because it is made up of air, and air is matter which contains the “drive” to move. In contrast to this belief, Newton’s now confirmed laws of motion and inertia demonstrated that an object will remain motionless forever until acted upon by some outside force, and will continue to move forever unless again acted on by an outside force to cause it to slow down until it stops.

Christianity’s Influence in the Development of Science

The major laws of modern science, namely that the universe exists by a set of unchangeable laws, and these laws are knowable and understandable to humans, were not developed in the pagan world. Nor was this view a cornerstone of its belief system, but some historians conclude was essentially a result of Christian theology (Hooykaas, 1972). These laws are partly responsible for much of the scientific progress in western society, and are one reason why, for example, the Egyptians and Babylonians never progressed as far scientifically as did the west. True, the Egyptians and Babylonians collected and cataloged a great deal of information from careful observation, but they developed few

broad *generalizations* or *concepts*. They recorded facts, but produced few valid physical laws that could be generalized to new circumstances or conditions. Thus Able concluded:

For the most part, the major impediment to scientific progress in the Near East followed from the assumptions that these people held about the universe. While we today assume that events in nature can be fully explained as a result of specifiable causal factors, the Egyptians and Babylonians assumed that the course of events in nature was indeterminant and therefore beyond the understanding of mankind. Consequently, they made no effort to seek lawful relationships between various recurrent events, nor did they ever gain a deep insight into the events that they observed and recorded (1973, p. 22-23).

Many argue that a belief in the existence of a creator, and specifically the teachings of Scripture, was critically important in the rise of science (Jaki, 1978). Jaki (1988) actually concludes and that science was stillborn in the great ancient cultures, including Greek, Moslem and much of the rest of the ancient world, and that Christianity was the "savior of science" specifically the teachings of Paul in the New Testament. Critical in the development of science was the teaching that the universe was designed and obeyed created laws, and that this order was knowable to mankind. Christianity taught that this reality was produced by the sovereignty of God who is not subject to any other law or being other than Himself (Isa. 45:9; Romans 9:20,21). Consequently, humans could unlock many of the secrets of the universe, a factor which motivated many early researchers. The importance of this motivation is adequately illustrated by such individuals as Isaac Newton and Johann Kepler (Sagan, 1980). George Washington Carver as a young man "developed a strong desire to learn more about God's creation" which he stated motivated him throughout his life (Tiner, 1994, p. 6). In his words, "I love to think of nature as an unlimited broadcasting system through which God speaks to us every hour, if we will only tune in" (quoted in Tiner, 1994, p. 6).

Summary

The beliefs the ancients had about the plant and animal world around them—the universe, the earth, the planets, the sun, the wind, rain, the structure and function of the body and the process of life itself—were all very different from our views today. Unless the Bible writers received special revelations about the nature of the world, they probably held the same incorrect beliefs as did those around them. Because a first century man was a Christian would not mean that he had a proper understanding of the germ theory, the number of satellites hovering around Jupiter, or the function of the pituitary gland. In these matters, the Christian and Hebrew writers probably believed much like everyone else.

Although to fully understand the Genesis account of creation requires that one understand the language usage and culture of the time, the fact that many commonly held beliefs which are radically opposed to our modern picture of the entire natural world were not found in the writings of the Holy Scriptures consti-

tutes powerful evidence for their inspiration. Modern Biblical research, instead of being almost totally preoccupied with what the Scriptures contain, would profit from an examination of comparisons of the beliefs of the ancients and with that found in the Scriptures. The contrast is, indeed, most striking and reveals that in the area of science, the creation account stands far above most other contemporaneous writings (Morris, 1984). God gave us a dual revelation, the Scriptures and the creation, both of which can teach us much about Him. As a person can learn about a painter by studying his paintings, or a musician by studying his music, likewise one can learn much about the creator by studying the creation. A major motivation for medieval scientists in studying the creation was to learn about, and know more intimately, the Creator. In the words of Reichen "It has been rightly said that all science begins as metaphysics and ends as metaphysics. This is especially true of astronomy, which, as one might say, places man directly in the presence of God's miraculous work. Yet perhaps the greatest miracle of all is that man has the capacity to understand this work and to profit from it" (1963, p. 7).

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PANORAMA NOTES

Much Thinner Laurentide Ice During The Ice Age

A new analysis of an old problem often shows how much scientists really do not know about the past. This was recently demonstrated in a re-analysis of the past thickness of the Laurentide ice sheet during the ice age.

For many years scientists have preferred to use what is called the CLIMAP max model in modeling the climate of the ice age. This model assumes that the Laurentide ice sheet was 3.5 km thick over a large area. Since the thickness of the ice is related to the drop in sea level, sea level was believed to have been 163 m below, present sea level during ice age maximum. Another model, CLIMAP min has thinner ice thickness, which reduced sea level 127 m.

Richard Peltier of the University of Toronto has recalculated the thickness of the Laurentide ice sheet based on new past sea level data from the Caribbean island of Barbados. The maximum sea level drop is postulated to have been only 105 m, which corresponds to a maximum ice sheet height of 2 km. This is more than 55% less ice than most scientists believe.

This new result shows how tenuous previous ice thickness calculations have been. The CLIMAP model was based on an ice sheet in dynamical equilibrium. The application of the steady-state ice mechanical equations with the areal boundary of the Laurentide ice sheet resulted in a thickness and shape similar to Antarctica. Even from a uniformitarian perspective, there is no reason to believe the ancient ice sheets were in dynamical equilibrium. From their perspective, once the ice sheet started to form, the central parts should dry out and become a polar desert similar to Antarctica.

This would reduce the amount of snow accumulating each year in the interior, so that equilibrium likely would never occur. A post Flood ice age (Oard 1990) would surely not have been in dynamical equilibrium as the uniformitarian scientists envision the Laurentide ice sheet.

The new results of Peltier (1994) are also based on many assumptions. Although I believe his downward trend is heading in the right direction, creationists should not assume his estimates are accurate. He bases his model primarily on the new results of sea level lowering, deduced from Barbados corals. Multiple coral reefs on the island are presumed related to various events during many Pleistocene ice ages. As the island rises, these reefs are left high up on the island. However, reefs forming during the past ice age in the uniformitarian model have not had time to become exposed. So, the scientists had to collect the coral by cores from off the southern coast. The corals are dated by a refined U-Th disequilibrium method (Fairbanks, 1989; Bard, Hamelin, and Fairbanks, 1990; Gallup, Edwards, and Johnson, 1994). Thus, the resultant sea level curve depends upon the accuracy of the U-Th disequilibrium method, that the corals have remained in a closed system, and a presumed uplift rate for the island. These assumptions are developed or determined by other results, such as the astronomical theory of the ice age, and so on it goes. This makes it difficult to determine what is an accurate conclusion and what is not. For certain, old age is built into the conclusion.

Peltier also used a certain rebound rate of the earth's crust from unloading during deglaciation. This rebound rate is determined by sea level histories, dated by C-14. Again old age is built into this assumption, and the

rebound rate is probably too slow. He also assumes a certain rheological model for the earth's mantle with its attendant viscosity distribution. In a short companion article by Richard Kerr (1994), some geophysicists disagree with Peltier's model viscosity. As with all models, the initial and boundary conditions are very important in determining the results.

So, although Peltier's new result is intriguing and moving in what I believe is the right direction, there are too many assumptions for the results to be reliable from a creationist perspective. The bottom line is stated by Kerr (1994): "Just how thick this Laurentide ice sheet was, no one is sure."

I thank Trevor Major of Apologetics Press for bringing Peltier's article to my attention.

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Michael J. Oard*

A Post-Flood (Early Ice Age?) Paleoenvironment in Mississippi

Post-Flood Volcanic Activity

Extensive volcanism has been recorded throughout the uniformitarian Tertiary Period. Many creationists believe that some strata "dated" to the Tertiary reflect the Late-Flood and Post-Flood (including the Ice Age) timeframe (Austin, 1974; Williams and Howe 1993; Williams, Matzko, Howe, White and Stark, 1993). Many locations with flora and fauna preserved in Tertiary volcanic sediments have been identified from the United States and around the world (Axelrod, 1981; Lewis, 1992; Lockley and Rice, 1990).

According to uniformitarian Tertiary chronology, tectonism (i.e., volcanic activity) associated with the Laramide Orogeny and subsequent orogenic events (occurring in the western United States) resulted in sporadic volcanic ash releases which drifted eastward, burying flora and fauna (Axelrod, 1981, pp. 4-9). Additionally, I suggest that fluvial reworking of any previously deposited volcanoclastic material could also have served as the original sediments which buried and preserved flora and fauna deposited with those sediments. These volcanoclastics would have subsequently altered forming various clay minerals, depending upon the environment in which they came to rest. The resulting "clay" deposits would not necessarily reflect their volcanic origin, rather they would only be recognizable as "clays." I believe that many of the clays found in the eastern half of the United States were deposited in this manner.

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Johnston (1993) reported finding a significant amount of flora and fauna in a lithified clay layer exposed in a brick clay pit in Benton County (north central), Mississippi (Figure 1). Fauna found at this site include beetles, ants (Figure 2), termites, phantom midges (Figure 3), dragonflies, damselflies, caddisfly larval cases (Figure 4), insect larvae, and spiders (Johnston, 1993, p. 71). Plant material found at this site includes leaves (Figures 5-7), flowers, fruits, seeds, and leaf-spot fungi (Figures 8 and 9) (Johnston, 1993, p. 71).

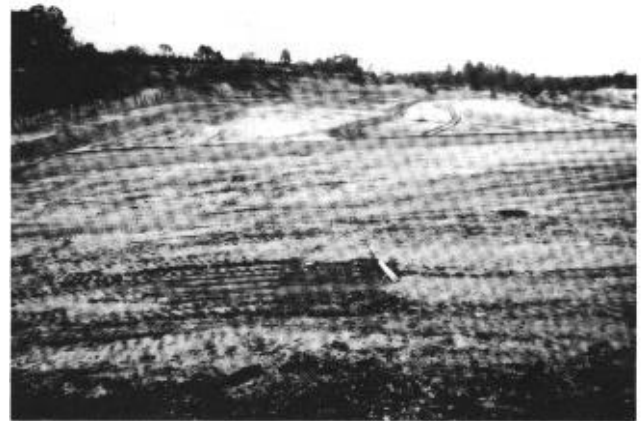


Figure 1. The U.S. Brick clay pit located in Benton County, Mississippi.



Figure 2. Delicate ant wing impression. Scale in millimeters.

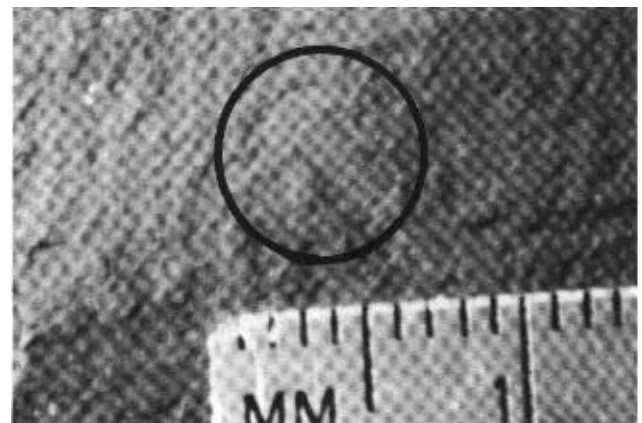


Figure 3. Delicate phantom midge pupae. Scale in millimeters.

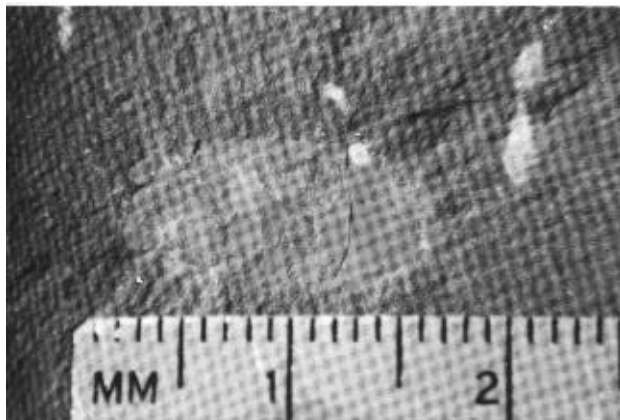


Figure 4. Delicate caddisfly larval case, constructed of leaf fragments. Scale in millimeters.

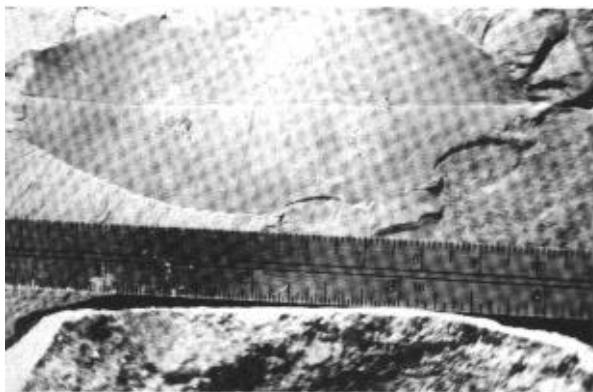


Figure 5. Leaf impression. Scale in inches and millimeters.



Figure 6. Two leaf impressions. Scale in inches and millimeters.

The unit in Johnston's (1993) study, the middle Eocene Tallahatta Formation, has not been characterized as to its origin. However, in Alabama, the Tallahatta is believed to be derived from the chemical alteration of detrital fine-grained volcanic pyroclastics (Reynolds, 1966, p. 34; Clarke, 1970, pp. 25-26; Reynolds, 1970, p. 837). Ritchie, Hawks and McHenry (1972) sampled from various exposures just south of the Benton County clay pit. Their analysis showed that the Tallahatta Formation contained more than three times the levels of

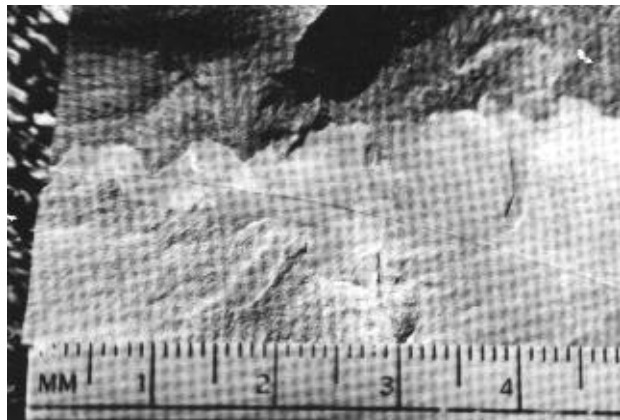


Figure 7. Closeup of insect cut leaf. Scale in millimeters.

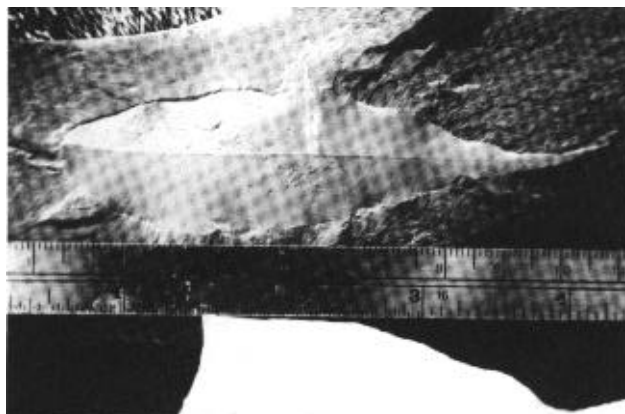


Figure 8. Leaf exhibiting pronounced leaf-spot fungi. Scale in inches and millimeters.

uranium and thorium, and six times the level of potassium when compared to both the overlying and underlying formations (Ritchie, Hawks and McHenry, 1972, p. 226). According to Fisher and Schmincke (1984, p. 339), and Zielinski, Lindsey and Rosholt (1980, p. 139), volcanic rocks commonly contain higher concentrations of uranium, thorium and potassium. Such high levels of uranium, thorium and potassium would be expected if the Tallahatta were derived from an altered rhyolitic ash, as predicted by Reynolds (1970, p. 837).

The clays exposed both on the floor and sidewalls in the Benton County pit are stratified and vary in both color and thickness (Figure 10). The various multi-colored clay sidewalls appear to weather into a crumbled crust which spalls from the front of the weathering clay surface (Figure 11). I believe that both the coloration and weathering pattern exhibited by the stratified clays reflect their volcanic origin (i.e., badlands topography). The issue of origin could possibly be resolved based on further examination of the clays in question using X-ray diffraction analysis, scanning electron microscopy, heavy minerals and trace element analysis.

The Benton County clay pit is south of fossil sites in Tennessee and Kentucky which exhibit similar flora and fauna (Berry, 1919; 1930; Potter and Dilcher, 1980). Several sites in Tennessee contain flora preserved in units believed to consist of volcanically derived clays (Axelrod, 1981, p. 4). Ross, Miser and Stephenson

(1928, pp. 202) describe a volcanically-derived kaolin deposit five miles southeast of Murfreesboro, Arkansas, which contained laminated kaolin layers which contained fossil leaves.

All of the locations previously mentioned are found within the Mississippi Embayment. Tschudy (1984, p. 333) has suggested that the floral change in the Mississippi Embayment at the end of the Cretaceous was the result of the final withdrawal of the epeiric¹ sea. However, I believe that this change in flora reflects the revegetation of the earth's surface following the Flood event.

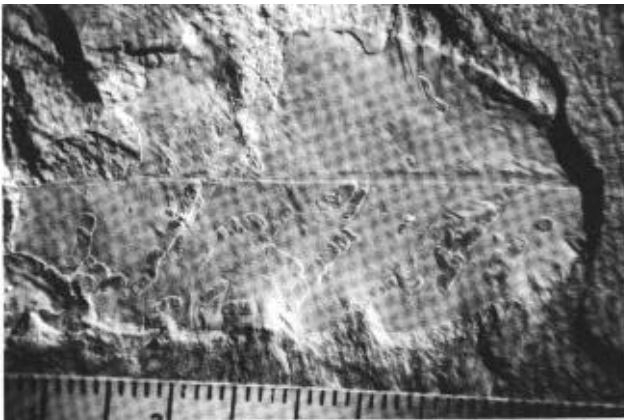


Figure 9. Closeup of leaf impression with leaf-spot fungi. Scale in millimeters.

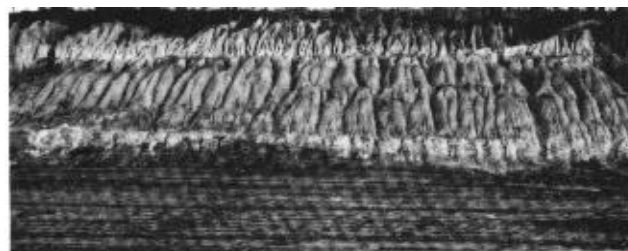


Figure 10. East side wall of U.S. Brick clay pit, exhibiting multi-colored stratified clay layers. These colors reflect the oxidation of various minerals and elements in the clay and have similar coloration to weathered clays found in volcanic terrains. Note person on upper left side for scale.

The preserved flora and fauna found at the Mississippi site suggest warm temperatures. Johnston (1993) has found many waterborne insect pupae which would tend to require moderate water temperatures for survival. I agree with Johnston's (1993, pp. 80-91) statement that little to no transport of the flora and fauna has occurred. The preservation of the flora and fauna in the detail found suggests that this was a Post-Flood / Early Ice Age environment.

The Flood Model Interpretation for the Mississippi Embayment

I propose that at the end of the Flood event, waters receded slowly down the Mississippi Embayment toward the Gulf of Mexico. The increased precipitation

¹A sea on the continental shelf or within a continent. Syn: inland sea; epicontinental sea.



Figure 11. East side wall of U.S. Brick clay pit, exhibiting weathering features (i.e., crumbled outer surface) typical of, what is in my opinion, volcanic clays exhibiting "badlands" type weathering (see Reynolds, 1966; 1970).

associated with this timeframe (Post Flood / Early Ice Age) would result in fluvial / lacustrine conditions. The Mississippi River would have started its development within its flood plain during this timeframe. Plant life was attempting to reestablish itself in this environment. Sporadic volcanic activity continued to occur to the west, associated with the closing stages of the Flood event and onset of the Ice Age timeframe. These volcanic eruptions would generate ash, which would drift eastward and fall over this area.

The Benton County Clay Pit

The Tallahatta Formation, exposed in the clay pit, contains flora and fauna which appear to have been well established in what was a fluvial and / or lacustrine environment. Although the types of flora and fauna found buried at this site indicate warm temperatures, climatic conditions during this timeframe i.e., Post-Flood / Early Ice Age) may not have been equivalent to today's seasons or temperature range. This difference is generally believed to have been caused by the disequilibrium of climatic conditions following the Flood event (Oard, 1990, pp. 33-65; Vardiman, 1993). As previously mentioned, volcanic activity occurred to the west, which resulted in the fall-out of volcanic ash and the subsequent rapid burial of leaves and insects in the Benton County clay pit. Several preserved leaves found in the lithified layer still retain their original green coloration (i.e., had not died, turned brown and were then buried). The fact that several leaves have been found with what appears to be the original green coloration strongly suggests "catastrophic" burial.* Leaf impressions found sometimes occur as solitary leaves or in some cases, as multiple leaves attached together via

*Editor's note: Readers will find further mention of the amazing green color and form of plant fossils in T. Clutter, 1985, The Clarkia fossil bowl, *American Forests* 91:22-25. In the following quotation from Clutter, the reader learns about the freshness and detail visible as volcanically deposited fossils were unearthed near Clarkia, ID:

Below, however, the age-old sediments are still wet with the lake's original water, and actual branches, leaves, needles, cones, flowers, seeds, and even pollen are trapped within the soft, clay-like rock. There's something wondrous, almost magical in seeing a color that's millions of years old . . . pastel against black rock, avocado's dull green, or oak's dusty red disappear rapidly upon exposure to light and air. *On a hot day, eons vanish in seconds.* [emphasis ours] Clutter, pp. 22 and 24.

See also Howe (CRSQ 24:9-12).

stems. However, no significant tree material (i.e., tree trunks and branches) has been found buried with the leaves, insects or spiders in the lithified clay layer. The lack of woody material suggests that vast quantities of ash did not bury the trees from which the leaves were derived. Petrified wood (i.e., branch and trunk material) is found near the top of the pit, close to and on the original ground surface. I believe that the petrified wood is derived from strata overlying the lithified clay layer. However, further investigation is required to determine the specific layer(s) which weathers to expose the petrified wood.

The mechanism(s) which resulted in the removal of various leaves from their branches and the burial of those leaves, insects and spiders under a volcanic ash layer, in a watery environment (i.e., fluvial or lacustrine), remains unclear. Fossil insect and leaf imprints are not found in any one specific layer within the 2.5 inch thick clay, rather they are found throughout the lithified clay layer. This may reflect one or more volcanic burial events. The fossil flora and fauna themselves do not aid in discerning between one or multiple volcanic events.

The north side wall of the clay pit is unique in that it appears to exhibit alternating clay layers, which reinforces my theory regarding multiple volcanic events occurring in a fluvial/lacustrine depositional environment (Figure 12).

Licht (1986, pp. 163-164) has found that heat, expelled when volcanic ash meets water, causes spiders to die with their legs fully extended and the fine grained ash serves as excellent preservational material. Fossilized spiders found at this clay pit exhibit the extended leg and body positions and suggest that this is indeed what happened.

Conclusions

My reasoning for interpreting the Benton County, Mississippi site as a Post-Flood environment, versus Flood deposition, is based upon the fact that several of the preserved leaves still retain green leafy material and the fossil insects are, in many cases, perfectly preserved. I believe that the highly erosive conditions



Figure 12. North side wall of U.S. Brick clay pit, exhibiting layers some of which contain leaf impressions. This seems to indicate that volcanic ash falls and/or fluvial or lacustrine deposition of volcanics occurred in pulses. Layers are 15 to 20 centimeters (6 to 8 inches) in thickness.

prevalent during the Flood event would not have preserved the flora or fauna in the detail in which they are found. For this reason, I propose that the Post-Flood / Early Ice Age Time Frame Upper Flood / Lower Ice Age Time Frame) represents the best period of time for explaining both the original environment and subsequent burial of the flora and fauna found at this site. Additionally, the lithified clay layer which contains the best preserved specimens of flora and fauna found in the clay pit is approximately 35 feet below the previous ground surface, and this would represent a thin overburden if these fossils were in fact deposited during the Flood event. I believe that the thin overburden reinforces my placement of this paleoenvironment in the Post-Flood / Early Ice Age timeframe (the overburden being composed of terrigenous clastics mixed with additional pyroclastics, deposited during the Ice Age Time Frame).

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- Carl R. Froede Jr.*

The Professor Dean Kenyon Case

Of the many well documented cases of university professors who encountered conflicts with their colleagues due to holding a creationist world view is that of Dean Kenyon, a professor of biology at San Francisco State University. The case is important because the issues involved have been clearly articulated, and so far there has not been an attempt by either party to allege other reasons for the conflict. Often in cases in which the major issue is the differing religious and world views of the department and the professor in question, the real reasons are covered over or even other, totally superfluous reasons are alleged (Bergman, 1993, 1993a; Bube, 1989). Kenyon, who has a Ph.D. in biophysics from Stanford University, is a quiet, hard working, highly respected professor. He has numerous publications and over a decade of teaching experience. Of this case, Meyer states:

When most of us think of the controversy over evolution in the public schools, we are likely to think of fundamentalists [administrators and school board members] pulling teachers from their classrooms and placing them in the dock. Images from the infamous Scopes "monkey" trial of 1925 come to mind.

Unfortunately, intolerance of this sort has shown itself in California. . . . Unlike the original Scopes case, however, this case involves a distinguished biology professor at a major university—indeed, an acknowledged expert on evolutionary theory. Also unlike Scopes, the teacher involved was forbidden to teach his course not because he taught evolutionary theory (which he did), but because he offered a critical assessment of it [something he has now been forbidden to do] (1993, p. A14).

The problem originally developed when Kenyon added three lectures on the subject of biological origins to his introductory biology course. The concerns of his opposers arose not only because he critically assessed evolution, but also because he presented information which lends credence to the theory of "intelligent design" i.e., a creator exists. The chair of the biology

department, Dr. John Hafernik, viewed Kenyon's critiquing evolution and discussing the philosophical implications of the complexity exhibited everywhere in nature as synonymous with teaching creationism, a term he never defined. This is another example of the common tendency to view any theistic position as creationism, and consequently declaring it banned in the public school forum. For this reason, often only nontheistic evolution can be presented in public schools without problems (Johnson, 1992). Specifically, Chair Hafernik told Kenyon not to teach creationism in his biology class (Meyer, 1993a, p. 1-2). Still not sure exactly what Kelly meant by the very general label creationism, Kenyon wrote to the dean to ask him to delineate specifically *what* he is not allowed to discuss, and Kelly replied that Kenyon was to teach only "the dominant scientific view," not the religious view" (Meyer, 1993, p. A14). To this Kenyon replied, as paraphrased by Meyer, that he *does* teach the dominant view, merely adding that some biologists view the facts of biology as evidence for intelligent design. Hafernik responded that this was not allowed — *only* non-theistic evolution can be taught. Consequently, Kenyon was removed from teaching the introductory biology course and reassigned to teaching primarily labs (a task often assigned to graduate students). In the words of Jukes: "The arguments for 'intelligent design' presuppose the existence of a Creator and are therefore religiously biased" and for this reason cannot be presented in a state university (1993, p. A17).

Most of Kenyon's professors were so involved in their individual research that they were only vaguely familiar with the creation-evolution arguments (Kenyon, 1993). The incongruity of assigning Kenyon to teach the labs includes the fact that he is not only a Stanford Ph.D., but also did post doctoral work at University of Southern California at Berkeley, Oxford University in England, and NASA. Further, he is the coauthor of the seminal theoretical work on biochemical evolution entitled *Biochemical Predestination* (1969). The book covers primarily "what was arguably the most plausible evolutionary account of how a living cell might have organized itself from chemicals in the 'primordial soup'" (Meyer, 1993, p. A14). A committed evolutionist throughout most of his training, Dr. Kenyon began to question the atheistic evolutionary viewpoint only much later in his career. Part of the reason for his conversion was that his research caused him to conclude that it is impossible for chemicals to become arranged into complex information bearing molecules by natural processes alone. He concluded that "perhaps a directing intelligence has played a role" (Meyer, 1993, p. A14).

Of course, one familiar with the extensive literature in this field realizes that thousands of others have accepted this conclusion. Researchers of the stature of Nobel laureates Francis Crick and Fred Hoyle, have concluded much the same thing (Shapiro, 1986; Crick, 1981, and Hoyle, 1983). Even though this view is widely acknowledged in the scientific world, Kenyon found himself in the position of being forbidden to "report the negative results of research or give students his candid assessment of it" (Meyer, 1993, p. A14). The debate does not revolve around teaching religion in

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the class, but the requirement that he teach only atheistic evolution or, at best, functional atheistic evolution, a world view often called naturalism.

... as Kenyon has been at pains to explain to his administrators, his view hardly qualifies as unscientific biblicism, let alone religious advocacy. ... As Kenyon's personal history suggests, his present view has resulted from long years of experimentation and study, not a prior religious commitment. ... Why must theistic professors refrain from discussing evidence that seems to lend credibility to their philosophical predilections? If universities no longer are a free market place for ideas, on what basis do they command pride-of-place in public financing? (Meyer, 1993, p. A3).

That the question in this case is of teaching atheism versus theism in American colleges is clear. Most biology textbooks constantly argue against any form of intelligent design—even theistic evolution. This author has reviewed scores of textbooks in the process of selecting one for his college level biology classes, and he is not aware of any recent textbook that argues for, or even favorably presents, theistic evolution. All of them without exception openly—although many very tactfully—argue for evolutionary naturalism. Typically is the following from an introduction to biology textbook:

Darwin compiled enough support for his theory of descent with modification to convince most of the scientists of his day that organisms evolve *without supernatural intervention*. Subsequent discoveries, including recent ones from molecular biology, further support this great principle—one that connects an otherwise bewildering chaos of facts about organisms (Campbell, Mitchell and Reece, 1994, p. 258, emphasis mine).

Further, not only is atheism taught, but also in many texts the philosophical implications of this world view arc inferred or openly taught:

All appearances to the contrary, *the only watchmaker in nature is the blind forces of physics*. . . . A true watchmaker has foresight: he designs his cogs and springs, and plans their interconnections, with future purpose in his mind's eye. Natural selection, the blind, unconscious, automatic process which Darwin discovered, and which we now know is the explanation for the existence and apparently purposeful form of all life, has no purpose in mind. It has no mind and no mind's eye. It does not plan for the future. It has no vision, no foresight, no sight at all. If it can be said to play the role of watchmaker in nature, it is the blind watchmaker (Dawkins, 1986, p. 5; emphasis mine).

The Kenyon case and scores of others unequivocally underscore the point that among the set of beliefs which are required to pass the political correctness censors in academia—a violation of which can result in loss of one's job, or even one's occupation or worse—is

to advocate a non-theistic position in science courses (Hart, 1984; Hearn, 1993; Sykes, 1988). Even the presentation of theistic evolution or deism is condemned in a science class:

Mr. Meyer has the Kenyon affair all mixed up. As a teacher of the history of science he should know that "intelligent design" of organisms stopped being a tenable hypothesis early in the 19th century (Thwaites, 1993, p. A17).

The concerns about the Kenyon case summarized above are not an isolated pronouncement made by extremists. Indeed, *San Francisco State University's Academic Freedom Committee* (AFC) ruled decisively in Kenyon's favor, arguing that the university can *not* require professors to teach some in-vogue political-religious orthodoxy, but "the university should permit and encourage vigorous dialogue, even controversy." The committee ruled that although "mandated teaching of creationism in the K-12 schools has been forcefully rejected by the courts," Dr. Kenyon's teaching of intelligent design does not violate the separation of church and state principle because his teaching does not constitute endorsement by the university of a specific religious view: "AFC's support of Dr. Kenyon's right to teach his ideas does not. . . constitute endorsement by AFC or the university of any religious viewpoint" (Gregory, 1993, p. 12). Their extensive investigation of the case concluded that Kenyon's "academic freedom was abridged by the process that led to" his reassignment from biology 100, which is the same course that this author regularly teaches without problems (and the author is far less qualified than Dr. Kenyon). Not unexpectedly, Kenyon's opposers refused to honor the Academic Freedom Committee report. In the letter to Kenyon, Hafernik (1993) denied Kenyon's request to teach biology 100. Hafernik refused to change the policy of preventing Kenyon from teaching the lecture classes, even though the Academic Freedom Committee supported Kenyon's right to do so and presumably also supported Kenyon's right to present evidences against evolution and favoring design.

In spite of the extensive well-documented sixteen page report strongly in favor of Dr. Kenyon signed by five fellow professors at his university, the biology chair refused to assign Kenyon the basic biology course often taken by non-majors to fulfill their basic science requirement. Although occasionally successfully challenged, often only atheism can be presented in a state university, a situation that hardly results in religious neutrality as the American Constitution requires. Those who do not toe the line may well face the same problems that scores of professors have experienced (Bergman, 1984, 1993). In Johnson's words about the Kenyon case:

Like many science educators, they insist that academic freedom does not extend to those who would question the philosophical materialism that rules evolutionary biology. Perhaps the august National Academy of Sciences, which opposes all dogmatic restrictions on scientific thought, should

address the following question: "Is a scientist allowed to criticize the reigning materialist theories of chemical and biological evolution, even to the point of suggesting that something other than purposeless material processes may have been at work?" (Johnson, 1993, p. A17).

Among the ironic developments in this case was the publication of a *Wall Street Journal* Op ed piece that Meyer wrote some time ago. The long shelf life article was not published until Monday, December 6, 1993—and on the following day, the faculty senate at the university met to discuss the Kenyon censorship case. One faculty member at this meeting compared teaching evolution objectively to teaching that the Holocaust never occurred—fortunately at this meeting, numerous other faculty rose to Kenyon's defense. In the end, the vote was twenty-five in favor of Dr. Kenyon, eight opposed, and three abstained (Johnson, 1993, p. A17). Further, even the American Association of University Professors openly came out in support of Professor Kenyon! The intolerance of Kenyon's detractors was so obvious, blatant and open that even the moderates now clearly saw who was the actual enemy of freedom and human rights. Only then did the biology chair budge, but almost immediately put the issue to Dr. Kenyon's biology colleagues. They voted twenty-seven to five with two abstentions to force him to censor all critiques of naturalism and favorable evidence of theism. In the words of Mims:

Dr. Kenyon's case raises the troubling secondary issue of institutionalized pathological science practiced by scientists whose faith in what they have failed to prove is as dogmatic as that of the staunchest religious fundamentalist. Prof. Kenyon's research has convinced him to reject Darwin's unproved speculation that life arose spontaneously. Although his views are at least as philosophically tenable as those of the Darwinists, to the Darwinists Dr. Kenyon is a threat. Irrational howls of protest appear any time a suggestion is made that views like those held by Kenyon be included in a school textbook. Any so-called scientific institution or publication that reassigns a distinguished professor or fires a columnist solely because of a scientific view that leaves room for God is neither scientific nor American. Tolerating such religious discrimination or soft-pedaling it as "political correctness" erodes the cause of science and blocks one of the most fundamental of human rights (1993, p. A17).

It is not a question of whether or not theistic and creationist ideas can be discussed in the classroom. These topics are discussed by thousands of professors at just about every college and university in the United States without problems. The major concern is whether university officials believe that students are being influenced in one direction—and if there is suspicion that students are being influenced in the direction of theism, the professor often will encounter problems as Kenyon did in this case. This is hardly academic freedom—the only way that the origins controversy will be solved is for open debate to occur (Meyer, 1994). The evidence if this is revealed in the arguments to indoctrinate students only in naturalism (Wiester, 1993).

An example is the head of an anti-creationist group, Eugenie Scott (1994), who recently endeavored to articulate her reasons for presenting only one side of this issue in the schools of America—a position we used to call indoctrination (Bloom, 1987). One of her arguments is the bogus concern of labeling: if one takes a course in geometry, she argues, one expects material which usually excludes a discussion of theology. The fallacy of this argument is that the subject of origins touches on almost every science field, and a professor's beliefs in this area are going to be reflected in his or her teaching content and slant. Her argument actually is an appeal to insure that those who discuss this subject present only one side, the side that she advocates. Unfortunately, the courts most often agree with this position, resulting in one world view, naturalism, receiving official state sanction and the censorship of all other views and, at times, the punishment of its advocates (Dickman, 1993; Johnson, 1992; Aiuto, 1993; Bergman, 1984). This is ironic because according to one survey, fully 91% of Americans "believe God created the universe" (Patterson and Kim, 1991, p. 205).

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Karst Development in the Clayton Formation, Fort Gaines, Georgia

Introduction

The hydrologic cycle, initiated following the Flood event, results in the precipitation of water on the earth's surface. The water then follows two paths for drainage, either it runs off (i.e., overland flow) forming creeks, streams and rivers, or it percolates down through the soils and rocks and serves to maintain the groundwater table. The groundwater table serves as the base level for rivers, streams and creeks. Various geologic factors come into play under both conditions of drainage.

Many of the ideas presented within this paper are based upon the author's own opinion, using the most reasonable geologic interpretation of events which occurred in earth's past. Hence, the "testability" of many of these concepts is impossible. However, references are cited to support much of my interpretation. The author welcomes open discussion in defining the various mechanisms which could have played a role in the formation of these geomorphic features. A glossary is provided to aid the reader in defining some of the terms used in this note.

This note addresses two unusual geomorphic features found exposed along the Chattahoochee River and in several creeks around the city of Fort Gaines, Georgia. Both of these weathering features have occurred in a semi-consolidated limestone (Clayton Formation—Paleocene). The Clayton Formation in this specific area has been described as:

Limestone, yellowish gray (5Y7/2), calcareous, highly fossiliferous. Top of unit is karst (Marsalis and Friddell, 1975, p. 57).

Limestone, massive; silt and sand; microfossiliferous, bryzoan and shell fragments; yellow to light grey (Reinhardt and Gibson, 1980, p. 456).

Two different geomorphic features were observed while performing field work in the area. First, I found that solution channeling has and is occurring in the Clayton Limestone. Secondly, surface water runoff has resulted in the formation of deeply incised, steep-sided creek and river channels in the Clayton Limestone (Figure 1). The reader should note that both of these processes (i.e., solution channels and the incision of creek/river channels) occur independently of one another, and yet appear to be somewhat interrelated as they are found in this area.



Figure 1. Town Creek deeply incised into the Clayton formation. Approximately 35 feet to creek floor. Note broad slope (original creek slope) breaks sharply to form steep sidewalls (tiered valley). This break marks the contact between the overlying alluvium (approximately 30 feet thick) and the top of the Clayton Limestone.

Solution Channels

A discovery was made at an unnamed creek, located adjacent to the Chattahoochee River. At this specific site the 50 feet of overburden, common to this area, had been previously removed by the meandering of the Chattahoochee River (possibly during Ice Age and/or the Present Age Time Frame, when the river was at flood stage). It was discovered that a surface stream, flowing across the top of the Clayton Limestone, was captured by a vertical conduit (stream piracy). Solution channels in the limestone had interconnected with the surface stream and redirected the surface stream into the subsurface. This resulted in the formation of three small scale natural bridges (Figure 2), a small cave (Figure 3) and a sinkhole (Figures 4 and 5) approximately six feet in diameter. One of the natural bridges has partially collapsed, but a pinnacle remains due to a vegetative cover which serves to protect the limestone from further erosion (Figure 6). Examination of the limestone sidewalls indicates that the groundwater table probably decreased slowly or has fluctuated greatly in this particular area (Figure 7). Specifics related to each of these features is found in the figures provided.

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Figure 2. Natural bridges separated by sinkholes. Photograph taken standing on one of the natural bridges looking toward other geomorphic features. Note person in upper right for scale. Note that the overburden (Nanafalia Fm) has been removed exposing the Clayton Limestone at the surface. Both rapid incision and solution channeling have occurred at this site.

Several mechanisms are probably responsible for the formation of solution channels (e.g., tree roots, groundwater movement, dissolution areas which coalesce into channels, etc). These solution channels have been observed in the field and range in size from several inches to several feet in diameter.

The author suggests that the formation of the solution cavities and channels could have involved the following:

1) Considerable precipitation occurred in the past creating the first tier of wide creek and river valleys, which are present in the area around Ft. Gaines, GA.

2) The paleo-groundwater table in this region was possibly higher than present day which elevated base level conditions such that the first tier of creeks spread out in width and not downward. Thus the creek and river channels would only erode down to base level (usually established by the regional groundwater level). As long as base level was high, little to no incised erosion would occur. However, many of the area creeks exhibit a terraced drainage valley. This seems to indicate that the groundwater table dropped quickly, creating conditions for rapid creek incision through the clay overburden, down into the Clayton Limestone. Many of the solution channels were probably initiated when the groundwater table was higher (in the past).



Figure 3. "Canyon" style solution cavity (White, 1988 p. 72). I believe that this feature reflects fast-moving water downcutting the floor, not solution joint widening under completely water-filled conditions. The solution channel is curvilinear and not straight which would seem to indicate that joints were not the controlling factor in solution channel development. Note roots along sidewalls.

3) Solution channels would form in the soft limestone and drain groundwater toward the rivers and creeks. Debate still exists as to where (i.e., vadose zone, top of the saturated zone or within the groundwater zone) solution channels and caves form (White, 1988, pp. 264-271). This specific locale tends to support the vadose theory, as proposed by Malott (1937), and Woodward (1961), for solution channel formation. The vadose theory predicts that solution channels would form in an area close to the groundwater table contact. According to Woodward (1961), solution channel and cave development requires an abrupt downward change in base level. This is what is exhibited at this locale.

4) The drop has possibly occurred in the regional groundwater table, by both a decrease in precipitation and by the construction of the Walter F. George Dam, in the 1950's, located approximately 7000 feet upstream. As a result, today many of the solution channels drain water only when the local groundwater table is higher than the channels. It was also noted that even today vertical conduits form as a result of dead trees (tree send their roots downward and break up the limestone and upon their death those root holes form vertical conduits). Additionally, any existing conduits will con-



Figure 4. Sinkhole expression from cave perspective. This photograph shows how the sinkhole connects into the solution cavity. Note roots along sidewalls.

tinue to expand as they erode. Precipitation will serve to incise the nearby creek channels through the clay overburden (approximately 30 to 50 feet in this area) down into the limestone. This erosional rate within the creeks and rivers would continue downward until reaching an equilibrium point (i.e., base level) with the regional groundwater table and further downward erosion would cease.

5) Because the 50 feet of overburden was previously eroded from the top of the Clayton Limestone at the unnamed creek site, the creek eventually joined a horizontal solution channel which resulted in stream piracy. The unnamed creek now flows through the subsurface, via the horizontal solution channel (conduit/cave), and drains into the Chattahoochee River (Figure 8).

Deeply Incised Creek Channels

As has been stated previously, several of the creek channels found within this area exhibit two terraces. The 30 to 50 feet of overburden above the Clayton Limestone has not been removed in many circumstances and this has allowed the development of the tiered creek valleys. My interpretation to explain the mechanisms necessary to create the terraced valleys would include:

1) Regional uplift—this would raise the land elevation, resulting in downward erosion by the creek

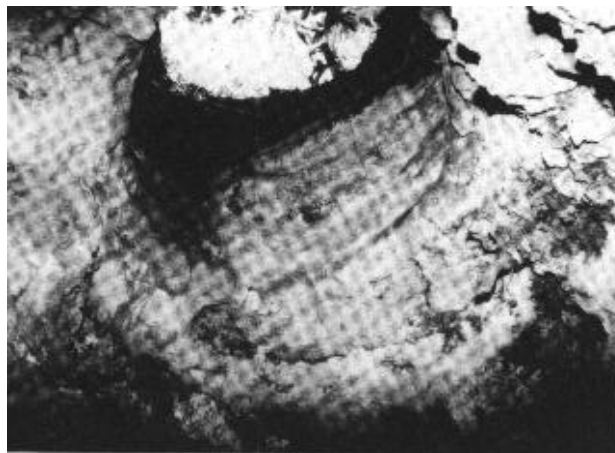


Figure 5. Sinkhole expression from cave perspective. This photograph shows the smooth side walls of the sinkhole, looking up toward the surface. The sinkhole is approximately 6 feet wide and extends 6 feet down to the opening of the solution cave.

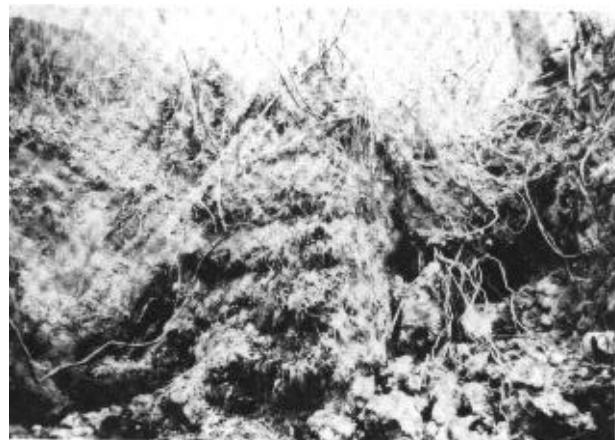


Figure 6. Pinnacle in center of photograph with partially collapsed solution cave to the right. Tree and plant roots are exposed in gap between right sidewall of collapsed solution cavity and pinnacle. Plant roots are contributing to the formation of sinkholes and the destruction of the Clayton limestone. Note person in upper right for scale.

until reaching base level conditions. The greater the uplift, the deeper the incised channels.

2) Increased precipitation—this would result in a higher groundwater table (raise the base level) and greater volumes of overland flow, resulting in wider creek channels. Following the lowering of base level the creek channels would incise downward until reaching the new base level.

Of these two mechanisms, I believe that changes in precipitation and a lowering of base level better explain conditions found at this site. Geologically, this area has not undergone any regional or local uplift. Elevated precipitation and groundwater levels also satisfy conditions necessary for solution channel formation and development.

The steep-sided, deeply incised creek and river channels reflect what I believe was rapid incision. Uniformitarian geologists date the Clayton Formation as having been deposited approximately 60 to 65 Ma (Ma—million years) [Raymond, Osborne, Copeland



Figure 7. "Rectangular passage: wide canyon" style solution cavity (White, 1988, p. 72). I believe that this feature reflects fast-moving water downcutting the floor, not solution joint widening under completely water-filled conditions. The wide nature of this channel indicates that the groundwater base level conditions have either slowly decreased or fluctuated greatly, allowing sufficient time for channel widening. The sidewalls are notched which seems to indicate some periods of stasis; however, nothing can be firmly established. Note erosion at opening of downgradient side of solution channel. This channel continues to erode downward seeking base level with the Chattahoochee River. The conduit roof serves as a natural bridge connecting one side of the bank with the other side. This is one of two natural bridges discovered at this site.

and Neathery, 1988, p. 34; Hardenbol and Berggren, 1978, p. 231]. The Clayton Limestone is not resistant enough to have survived millions of years of erosion. Several million years of erosion would result in the weathering and erosion of the Clayton limestone into broad creek and river drainage valleys, not the deeply incised creek and river channels we see today. Additionally, if several millions of years were available for weathering of the limestone, then a much more extensive conduit and solution channel system should also be present to reflect this fact.

The Flood Model Interpretation

My interpretation for the reconstruction of the site within the young earth Flood model would start with the deposit of the Clayton Limestone, probably during the last stages of the Flood event (Upper Flood Event). It was subsequently buried by terrigenous and volcani-



Figure 8. Solution channel flows to the Chattahoochee River. The center bright oval, in approximate center of photograph, is looking out onto the Chattahoochee River. Note water channel in bottom of the photograph. Also note large tree roots along sidewalls of cave. The river is approximately 3 feet below the outfall of the solution channel.

clastic sediments (approximately 30 to 50 feet in thickness) [Upper Flood Event-Lower Ice Age]. The single Ice Age (Oard, 1990) resulted in increased deposition and precipitation on, what was by then, an exposed land surface. The Paleo-Chattahoochee River drained the area and initially did not incise into the Clayton Limestone, because the regional groundwater level was high enough to prevent downward erosion. Local creeks feeding into the river also maintained higher than present drainage channels due to the higher groundwater base level conditions.

A glacial maximum (Wisconsin) [Upper Ice Age] occurring towards the end of the single Ice Age time frame, might have caused the sea-level to drop as much as 300 feet below present levels (Dolan and Lins, 1986, p. 12). This sea-level drop would also have affected the regional groundwater level, resulting in its dropping below present levels. Dropping the sea-level would result in the lowering of the regional groundwater base level, which would result in the incision of creeks and rivers downward, as they attempted to reestablish base level. Solution channels possibly formed more rapidly as groundwater level dropped.

With the establishment of more stable sea-level and climatic conditions, several thousand years ago, the downward incision rate of the creeks and rivers has slowed. Where vadose zone solution channels have intercepted surface channels (i.e., creeks and streams), this has resulted in the formation of small scale natural bridges, caves and sinkholes, in addition to the piracy of the creek or stream. The Walter F. George Dam (located upgradient to the site) has contributed to the lowering of the groundwater table in this area and possibly accelerated the downward incision of the area creeks and streams. Additionally, this lowering of the groundwater table probably developed solution channels in the Clayton Limestone much more rapidly than expected by "uniformitarian" time frames. Additional research is needed to determine what other possible factors contributed to the formation of the deeply incised creek channels.

Glossary

Karst—A type of topography that is formed over limestone, dolomite, or gypsum by dissolving or solution, and that is characterized by closed depressions or sinkholes, caves, and underground drainage (American Geological Institute, 1976, pp. 241-242).

Ma—is the geologists way of abbreviating "million years ago" (North American Commission on Stratigraphic Nomenclature, 1983, p. 854).

Solution channel—An elongate void within a rock, which has been enlarged by the solution action of moving groundwater on the rock itself (Allaby and Allaby, 1990, p. 347).

Stream piracy—Typically defined as the diversion of the upper part of a stream by the headward growth of another (American Geological Institute, 1976, p. 329). However, as it is used in this article it refers to the diversion of a surface stream by the inter-connection of a subsurface solution channel. This results in the stream disappearing into the subsurface and flowing to the point of discharge via the subsurface conduit (i.e., solution channel—this is common in karst terrains). Some of these conduits form caves (e.g., the Mammoth Cave system, KY).

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I thank Dr. E. L. Williams and C. R. Froede, Sr., for their valuable field assistance. Additionally, I thank my wife, Susan, for allowing me the opportunity to do both the field work and report writing necessary to complete this project. Glory to God in the highest (Pr 3:5-6).

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Reprinted CRSQ Volume 18

Introduction

The *Creation Research Society Quarterly* has been published since 1964 (30 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 1-17 and have appeared in the previous 17 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.

Since Dr. Wilbert H. Rusch, Sr., a longtime Board member and officer of the Society, died recently, a fitting tribute to him was written earlier by Wayne Frair (1981, p. 3) in volume 18.

Biology

General

Tinkle (1981a, pp. 25-26) wrote an incisive essay on the evolutionary philosophy and its lack of scientific validity. He offered many creationist answers to naturalistic postulations. Later in this volume, he (1982b, pp. 163, 167) noted that an intelligence was behind the natural order in nature and this order or complexity did not result from any so-called struggle for existence. John Moore (1982, pp. 189-197), in his typical thorough style, discussed the then-current status of evolutionary thinking. A portion of his abstract indicates his critical analysis:

... disregard of the grounds of and limiting principles of scientific methodology ... equivocations of the word "evolution" ... primary reliance on circumstantial evidence ... extensive extrapolation ... dependence on error ... use of cover words (p. 189).

This practice continues in the scientific literature today.

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Genetics

The problems with the philosophies of gradual evolution through micromutations and saltational evolution (punctuated equilibrium) through macromutations was developed by Melnick (1981, pp. 22-25). Population sizes as they relate to random genetic drift can be evaluated by creationists using computers. Lester (1981, pp. 71-73) suggested various population genetics programs that could be used. "Have Genesis kinds ever crossed?" was the question asked and answered by Frank Marsh (1981, pp. 164-170). In exploring the genetic code, virility and vitality, antediluvian crossing within kinds and hybridization, Dr. Marsh demonstrated that only limited variation is possible.

Zoology

Rea (1981, pp. 4-7, 26) conducted experiments on the feeding habits of a Fiery Skipper butterfly and reached the conclusion the creature was endowed at creation with a neurological program that enabled it to efficiently forage. A brief note on butterfly wings with two photographs of scales from these structures was offered by Keithley (1981, p. 83).

The hoatzin should not be considered as a primitive creature or as an evolutionary link (Brown, 1981, pp. 111, 92). The koala was presented as a dilemma for evolutionary thinking (Martin and Smith, 1981, p. 139). An examination of the Darwin finches was given by Harper (1981, pp. 171-175). This well-illustrated paper approached the subject by exploring two different viewpoints, speciation and irruption. Brown (1982, pp. 187-189) discussed some features of the monotremes (egg-laying mammals) and concluded that they are not links between mammals and reptiles.

Design

Lipson (1981, pp. 14-15) briefly compared the two opposing philosophies as to the origin of the complexity in the natural world from an examination of physical laws and processes. Mechanical design in the human body was explored by Kaufmann (1981, pp. 155-158). He concluded that the human body was the result of divine planning and workmanship.

Anthropology

Primate evolution was examined by Mehlert (1981, pp. 20-21). When considering the fossil record, one finds little evidence for the supposed changes, resulting in much speculation and statements of faith on the subject. An analysis of the same topic was given by Cheek (1981, pp. 93-110, 134). He discussed the nature of science, neo-Darwinism, fossil record, origin of primates, *Hominoidea*, *Dryopithecus*, *Ramapithecus*, *Australopithecus*, *Homo erectus*, *Homo sapiens* and the uniqueness of man. All of his conclusions indicated the superiority of a creationist model for anthropology. Erich von Fange's study (1981, pp. 140-154) of Neanderthal man is especially interesting. He gave a history of the finds with their evolutionary interpretation. Finally it was realized that *Homo neanderthalensis* was not very different from modern man which was devastating for previous evolutionary postulations.

Astronomy

West (1981, pp. 15-20) proposed a model for certain types of binary stars. The model when used, sets an upper limit for the age of the 11 binary systems investigated which was well below that of the so-called "accepted" ages. In 1980, two papers appeared in the Quarterly on solar shrinking and the lack of solar neutrinos (Hinderliter, 1980; Steidl, 1980). Hanson (1981, pp. 27-29) contributed additional information on the luminosity and age of the sun. Don DeYoung and John Whitcomb (1981, pp. 84-90, 83) examined the big bang theory from both scientific and biblical perspectives. They concluded that the theory did not fit the biblical viewpoint. This well-written essay can be used as an answer to those who claim that there is no conflict between the big bang theory and revelation. A heating model was proposed by Akridge, Barnes and Slusher (1981, pp. 159-162) to explain the 3°K background radiation in the universe within a recent creation model.

Panorama of Physics

Tom Barnes (1981, pp. 39-41) continued his work on the decline of the earth's magnetic field. This particular paper noted some data obtained from NASA's Magsat satellite. It was claimed (Bouw, 1981, pp. 91-92) that the special theory of relativity cannot explain the generalized Doppler effect and drag aberration. Continuing in this line of inquiry, Barnes and Ramirez (1982, pp. 198-200, 235) critically examined the concept of time dilation employing the experimental and theoretical work of Herbert Ives. Some of their conclusions are quoted (p. 200).

From his two postulates Einstein developed his special theory of relativity which introduces the concept of time dilation. This theory contains logical inconsistencies. Furthermore it is not in accord with the experimental evidence from certain rotational experiments such as the Sagnac experiment. Those experiments imply a light bearing medium which Einstein rejected.

The authors of this treatise prefer classical physics solutions where time is independent of motion.

Morton (1982, pp. 227-232) suggested that a solution to the creationist appearance of age hypothesis is to assume that possibly at the time of the Flood a change occurred in the electrical forces associated with elementary particles. The author postulated that radioactive decay constants changed with time.

Geology

Morton (1981, pp. 42-45) speculated that the concept of continental drift would not fit into a creationist framework. Over the years many articles have been published in the Quarterly defending and attacking the continental drift postulates. In a very detailed article (Woodmorappe, 1981, pp. 46-71), employing extensive world-wide maps, demonstrated that the evolutionary uniformitarian geologic column does not exist. In the author's own words (p. 68):

The more the earth's surface fails to display the vaunted evolutionary-uniformitarian geologic column in terms of actual presence and "correct" stratigraphic layering of geologic periods rocks, the more the geologic column passes into the realm of fantasy.

Also the author suggested a Flood interpretation of sedimentary strata that exist over the surface of the earth. Serious creationist geology students should examine this carefully-written article.

Cox (1981, pp. 112-116, 126) considered vertical movements of the crust of the earth within a creationist model. Also the role of water and volcanoes was examined. Peterson (1981, pp. 118-126) presented a unique model of the crust of the earth and discussed how the Flood may have altered the earth. Implications of palaeolithic stratigraphy as well as a critical examination of radiocarbon dating was covered by Guenter (1981, pp. 168-170). Woodmorappe (1982, pp. 201-223, 239) listed over 200 published instances of anomalously-occurring fossils. In this encyclopedic article he examined biological evolution (20 entries) as well as fallacious claims of "ancient reefs" in the geologic record (13 entries). Also evidence was offered against the overthrust concept in certain cases and geologic process rates and uniformitarianism were critically discussed. This article is a gold mine of useful material for creationist geologists.

History

Watson (1981, pp. 30-39) noted that Scripture and the works of pagan writers of antiquity indicated that the earth is young. Likewise he claimed that ancients viewed their world as a result of intelligent design. The growth and decline of civilizations was briefly discussed by Clark (1981, pp. 117-118).

Philosophy

Randall Hedtke (1981, pp. 8-13, 26) stated that the real purpose of the evolutionary hypothesis is not scientific but rather dedicated to remove God from the universe. A discussion of Darwin's confusion was included in this treatise. "Creation, why and how?" was the title of an article by Peterson (1982, pp. 223-226, 243). He suggested that the second law of thermodynamics operated as soon as creation was finished and that radioactivity developed at the Fall. When the second law initiated has been discussed many times in the Quarterly (see Williams, 1973, pp. 156-157). Most creationists who believe that the law operated before the Fall fail to realize that man could have died without being cursed by God. This is a controversial subject in creation science.

Several notes, letters and book reviews are included in this volume of the Quarterly. The scope of creationist thought as revealed in these issues is refreshing and timely.

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