

Creation Research Society Quarterly

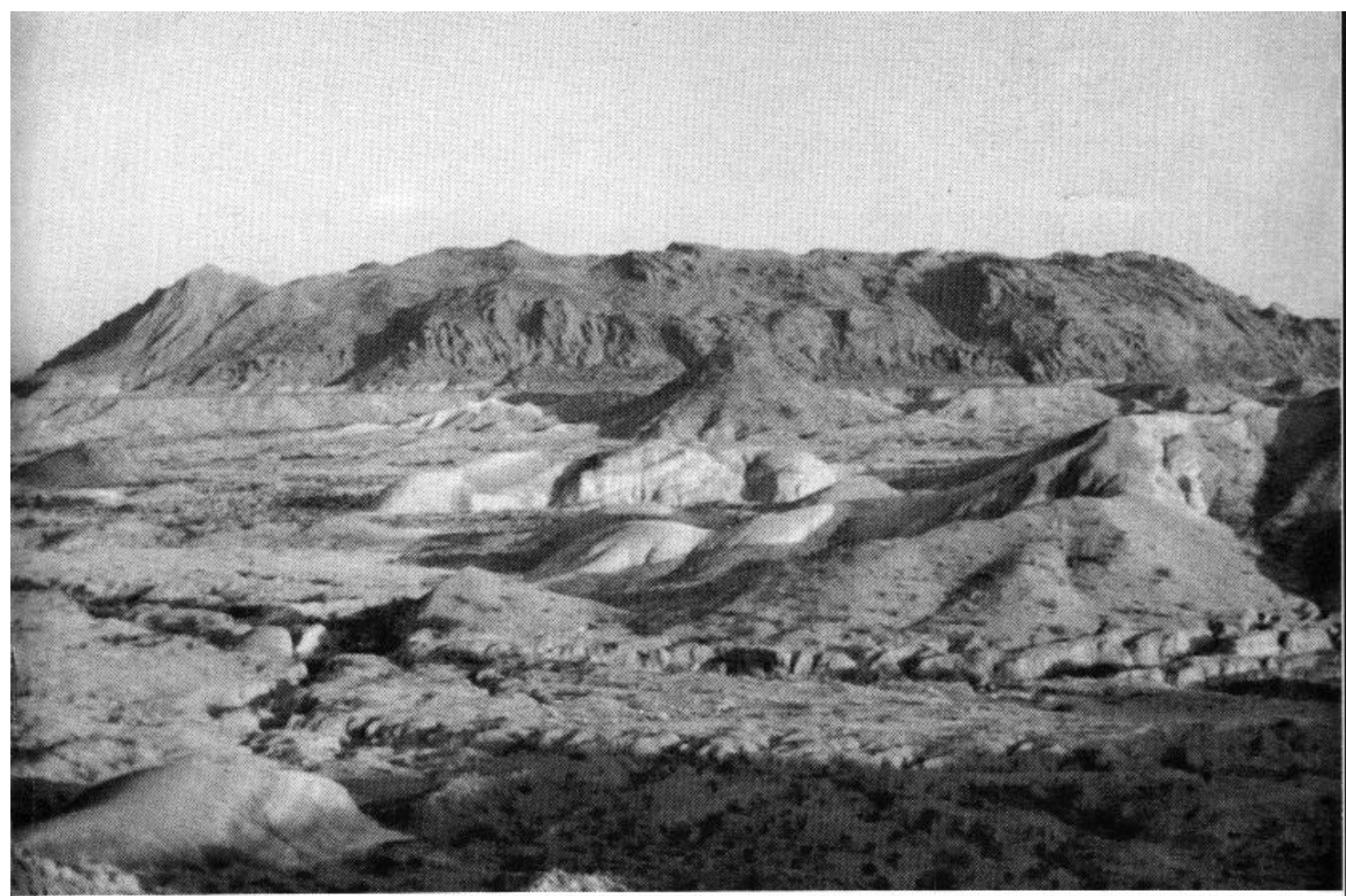
Haec credimus:

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

MARCH 1995

NUMBER 4



**ONE LOCATION OF PETRIFIED WOOD,
BIG BEND NATIONAL PARK**

CREATION RESEARCH SOCIETY

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ISSN 0092-9166

VOLUME 31

MARCH 1995

NUMBER 4

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Cover Photograph

A panoramic view of one of the petrified wood collecting sites in Big Bend National Park, Texas. Fossil wood is found in clay mounds in the center of the photograph. Maverick Mountain is in the background. Previous discussions of petrified and char-coalified wood can be found in the June, September and December 1993 Quarterlies (Volume 30, pp. 47-54; 106-111; 169-176). See pp. 225-232 in this issue also. Photograph by Glen Wolfrom, caption by Emmett Williams.

Instructions to authors can be found in June Quarterly.

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Creation Research Society Quarterly is indexed in the *Christian Periodical index*

Creation Research Society Quarterly is published by the Creation Research Society, P.O. Box 969, Ashland, OH 44805-0969.

Editor's Address: Eugene F. Chaffin, 715 Tazewell Ave., Bluefield, VA 24605.

Book Review Editor: Don B. DeYoung, 200 Seminary Dr., Winona Lake, IN 46590.

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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 their subsequent fall into sin is the basis for our belief in the necessity of a Savior for all people. Therefore, salvation can come only through accepting Jesus Christ as our Savior.

Editors' Comments

It requires editors to foster the production of a journal like C.R.S.Q. but we are aware of the fact that it also takes many other groups of people to make this publication possible. For example, authors are needed, like the dedicated people who prepared the scientific papers and other features herein.

But without readers, like each of you, the Quarterly would also languish and its usefulness would disappear. We hope readers find each feature of this issue valuable and we recommend your reprinting and using our second "Copy-n-Share." It can be removed from the staples and reproduced to form an eight-page booklet.

There are others who enable publication, such as donors who provide monetary support over-and-above their membership dues. Then too, we want to mention our printer, Mr. L. B. Crispin, and his dedicated staff at

the Stone Printing Co., Lansing, MI. Likewise, there are diligent referees who evaluate every paper, thereby helping the editor to decide which ones should be published and how they should be improved. We also appreciate the work of our faithful proof-readers, Emmett Williams and Carol Armstrong who bring a standard of excellence to the details of style, format, spelling, and overall accuracy.

There are still other people who work behind the scenes filling book orders, receiving memberships, and keeping track of financial details. To all of you we say "thanks" and we hope that C.R.S.Q. (Volume 31, Number 4) will be useful to all.

Eugene Chaffin
George Howe

LETTERS TO THE EDITOR

The Creation of Woman

In the second chapter of Genesis there seems to be a significant disorder. Verses 19 and 20 seem to be out of place. From an ordinary outline standpoint, they should have been between verses 17 and 18, or even earlier. However, I think the disorder is designed to show that man, even primitive man—the first creature that could be called man (check the theistic evolutionist) could not find a suitable mate among all that parade of the animal world brought before Adam for him to name. So, there stood Man (Ish) after having viewed and named all of the animal kingdom—there he stood all alone as the only one of his KIND. There was no woman, no Ishah, no helper (meet, fit or suitable) for him. It is obvious that all the others had such a suitable mate. God was not surprised as is evident from verse 18 which says "I will make him an helper meet for him." (Was Adam surprised?)

Then after all that which is in verses 19 and 20 about the naming of the animals (I wonder how long this took.) God proceeded to provide a proper mate for Adam. And He did not rework one of the supposedly existing animals into a proper female for Adam, but took a part of Adam himself and made her into one suitable for Adam as if to say to modern theistic evolutionists, "See, there is no direct connection between man and animals! Adam did not find one among the animals that was in any way suitable."

Judging from the imaginative pictures so abundant in our textbooks, the hairy creature depicted as our ancestor should not have found a female chimp (or some similar simian) so different as to exclude her from being his mate.

It seems clear to me that God inspired the sacred writer to build in an answer to those preachers who want to find a way to believe the Bible and at the same time to believe what they perceive to be "truth" in evolution.

Roger L. Byler
Rt. 1, Box 319
Sweeny, TX 77480

Put Together By Light

There does not seem to be much literature on the subject of photosynthesis and its relationship with respiration in humans and animals from the creation point of view. I have searched for an article on the subject without success. I have been a subscriber to the *Creation Research Society Quarterly* since 1974, to *Acts and Facts*, and also *Bible-Science Newsletter*, nor do I know of a book that relates much space to the subject. But maybe someone does know of such an article. If there is not much out there maybe this will prompt someone to write on this theme.

The first scientific attempt, on record, to investigate how green plants develop was in 1638, by Jan Van Helmont. He cultivated a willow tree in a container with a measured amount of soil. The tree grew for five years, and weighed 164 pounds, but the amount of dirt lost was only two ounces to the surprise of everybody! Until then it was taken for granted that green plants received their substance from the soil. Van Helmont concluded that plant food came from water. That was half the secret. At that time, no one thought that air could be one of the components involved, nor that it would contain the carbon atom the water did not have.

After more than 200 years of arduous dedication by such men as Stephen Hales, Joseph Priestly, Rutherford Lavoisier, Jean Senebier, Nicholas de Saussure, Pelletier and Caventou, who first isolated chlorophyll, Jean Boussingault, and von Sachs; the bare skeleton of photosynthesis began to unravel. Richard Willstätter and Hans Fischer took another 20 years to understand the structure of the chlorophyll molecule. Then Fischer required almost another 20 to get a complete picture of its complexity in 1930.

Scientists rightly assumed that photosynthesis was the opposite of respiration in man and animals. So they made another assumption that plants made oxygen from carbon dioxide, and pursued this way of investigation until 1937, only to find, quite by accident, that they were going the wrong way! It would seem that

evolution has quite an ability to cover up its tracks and lead down a dead end road!

How could two such well designed, interdependent yet diverse systems as respiration and photosynthesis arise simultaneously to so beautifully complement one another? It took the best of brains and science 300 years, not to duplicate, but just to trace the process of photosynthesis. Only in the last decade has science understood how plants split the water molecule, and there are still some unknown factors that are not completely understood!

The system of photosynthesis is far more complicated than a computer. Bill Gates would not think of putting together his software in a random manner. It would be doubtful that it would sell very well! It seems that this is just another good proof that random events can in no way (aeons of time or not) put together anything with meaning.

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The African Eve Hypothesis Again

Marvin Lubenow's knowledge of evolutionary theories regarding paleoanthropology and the emergence of *Homo sapiens* is truly impressive. I have read his book, *Bones of Contention*, and I believe there is no other book that so accurately and fairly deals with the issue of "human evolution."

Unfortunately, recent Letters to the Editor have revealed Dr. Lubenow's lack of knowledge about the molecular issues in the human evolution debate. I speak in particular of the Mitochondrial Eve Hypothesis.

In his original letter (Lubenow, 1993), Dr. Lubenow states that "The mtDNA Eve theory has been invalidated." This is not true. The work he refers to was done by Alan Templeton at Washington University and

David Maddison at Harvard University (Templeton, 1992; Maddison, Ruvolo and Swofford, 1992). What they discovered was that the computer program used to produce the evolutionary "tree," and thus the African origin, was faulty. The program Phylogenetic Analysis Using Parsimony (PAUP) is biased by the order in which the sequences are entered into the computer. Templeton's conclusion (1992) was that "A single heuristic run of the computer program PAUP with simple addition is inadequate for a phylogenetic analysis of large data sets." Hedges et al., (1992) in a letter to *Science* signed by Eve proponent Mark Stoneking, admit that the African origin "is suggested by the mtDNA sequence data," even though "the available sequence data are insufficient to statistically resolve the geographic origin."

These difficulties with the theory address only part of the theory. Originally, the theory indicated that "modern humans" evolved (1) in Africa and (2) approximately 200,000 years ago (Cann, Stoneking and Wilson, 1987). No adequate refutation of the date of Eve has been put forth yet, to my knowledge. In fact, at the 159th Annual Meeting of the American Association for the Advancement of Science in 1993, Maryellen Ruvolo, a Harvard molecular anthropologist, presented a paper supporting the date of Eve (Gibbons, 1993). This is significant because Dr. Ruvolo was one of the scientists who exposed the flaws of the geographic origin of Eve, yet even she admits that the date is most likely accurate (Maddison et al., 1992).

Dr. Lubenow (1993; 1994) also repeatedly points out that the Eve hypothesis deals with the origin of *modern* humans not *all* humans. This objection is irrelevant. The difficulty is that the mtDNA samples were all taken from living people. No mtDNA was taken from *Homo erectus* remains. Evolutionists exclude *H. erectus* from this hypothesis based on anatomical evidence alone. No mtDNA was extracted and tested to be sure that the exclusion was warranted. Therefore, even though the Eve hypothesis deals with the origin of "modern" humans, this is merely a matter of semantics. It may indeed be that the Eve hypothesis deals with all humans after all. We at this point cannot be sure; and until we can, Dr. Lubenow's argument is at best premature.

Dr. Lubenow (1994) also states that it is "unethical . . . to try to use scientific research dealing with the origin of 'modern' humans to support the Genesis account of the origin of all humans." I do not understand this statement at all. I agree that despite the name "Eve," the Eve hypothesis is not, by any stretch of the imagination, support for Genesis. However, the issue of whether it is unethical to use evolutionary research to support a more literal interpretation of Genesis is an entirely different question. I believe that if the data have been collected and reported accurately, it is irrelevant who did the research or why. The vast majority of paleontologists are evolutionists conducting research according to their own evolutionary agendas. Would you then deny their basic conclusions that certain creatures we call dinosaurs lived a long time ago? True, paleontologists claim dinosaurs evolved and went extinct millions of years ago, but are we creationists so ignorant that we must reject everything the evolutionists say simply because their motivation is erroneous?

May we not bediscerning enough to find the truth and reject the error of their research?

Speaking of the Eve hypothesis, I find it interesting that the mtDNA sequence diversity is very low (around 3%) (Vigilant, Stoneking, Harpending, Hawkes, and Wilson, 1991; Stoneking, Sherry, Redd, and Vigilant, 1992). Mark Stoneking's attempts to "calibrate" the mtDNA clock have been based on studies of mtDNA diversity in Papua New Guinea (PNG) (Stoneking, Bhatia, and Wilson, 1986). He based his calibration on a date of the original settlement of PNG provided to him by archeologists (Stoneking et al., 1986). He freely admits to inflating the date within reason to obtain the oldest possible date for Eve (Stoneking et al., 1992). Even so, his 95% confidence intervals indicate that Eve may be as young as 62,000 years (Stoneking et al., 1992). Ruvolo got similar dates, with her 95% confidence intervals as low as 55,000 years (Gibbons, 1993). Again this is nowhere near a creationist's viewpoint. It does capture my attention, however, because mainstream paleoanthropologists and those who favor multiregional evolution (Eve's nemesis) place the origin of humans around one million years ago. While they tell us that a bunch of dead fossils say we are a million years old, our living molecules tell us we are much, much younger. Furthermore, if we deflated Stoneking's date for the original settlement of PNG and allowed for error in the archeologists' dating methods, we would find that Eve becomes much younger still. At this point, however, other difficulties arise, namely that the mtDNA mutation rate becomes such that, in a million years, the entire mitochondrial genome would be changed, an event that is obviously impossible. Once again, I am not saying that this evolutionary theory is right. I merely wish to point out that the mtDNA sequence diversity indicates that the human race is very young.

Finally, Dr. Lubenow (1994) states that the "evidence [for Eve] is flawed." I have done extensive reading on the topic, and have never found the evidence to be conclusively shown to be flawed. The program PAUP was shown to be flawed. The conclusions about the geographic origin of humans were shown to be premature. The "evidence" the mtDNA sequences and their low diversity, still stands.

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Todd Charles Wood
344 Pine Ave., Apt. 2
Waynesboro, VA 22980

Errata

CRSQ Vol. 31, December 1994, p. 164, The third sentence from the end of the review of The Creator and the Cosmos should read: This is a surprise, since the complete birth of a single new star has never been witnessed! Ross claims that Einstein was never offered the Gospel message.

CRSQ Vol. 31, December 1994, p. 137, the Reference for Byler's letter is Bergman, Jerry 1994. Creation and creation myths. *CRSQ* 30:205-212.

In order for readers to order the book *The Myth of Natural Origins* by Ashby L. Camp, reviewed in *CRSQ* 31:166, they will need the following mailing address for Ktisis Publishing Co. 1413 E. Watson Dr., Tempe, AZ 85283-3144.

CRSQ Vol. 31, September 1994, p. 93, the copyright date for the book *Bones of Contention* . . . by Roger Lewin is not 1995 but 1987.

Preparations for 6th European Creationist Congress in The Netherlands Proceed Steadily

The Sixth European Creationist Congress shall be held in The Netherlands from Wednesday 16th August up to and including Saturday 19th August 1995. The Congress is organized by the Evangelical College, Amersfoort, The Netherlands.

The preparations and registration for this Congress proceed steadily. Already many registrations have been received and many papers are offered. Subjects vary from astronomy and geology to (micro)biology and (biblical)chronology There are also a few theological subjects. The participants come from all European countries but also from the United States and even from New Zealand.

A brochure with all details and application form for registration and/or paper is available. For more information please contact Mr. R. P. Plattèl (Director, General Affairs). Evangelical College, P.O. Box 957, 3800 AZ Amersfoort, The Netherlands. Phone: (0)33-621731; Fax.: (0)33-610912.

Quote

Isaiah 40

26 Lift up your eyes and look to the heavens; Who created all these? He who brings out the starry host one by one, and calls them each by name. Because of his great power and mighty strength, not one of them is missing.

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A REVIEW OF EXOBIOGENESIS THEORIES

JERRY BERGMAN*

Received 18 May 1987; Revised 30 June 1987

Abstract

Many evolutionists have concluded that all existing naturalistic origin of life hypotheses are highly untenable. Consequently, some prominent evolutionists have hypothesized an alternate origin of life theory called exobiogenesis, or the theory that life evolved elsewhere in the universe and was carried to earth. Those who reject both the theistic world view and the possibility of abiogenesis on the ancient earth must assume a set of conditions existed elsewhere in the solar system or the universe which were more favorable for the origin of life or biological molecules. Recognizing that conditions on earth historically precluded the spontaneous origin of life forces exploring exobiogenesis to maintain the naturalistic world view. This view has also motivated the reintroduction of an intelligent design theory called directed panspermia. Nowhere does the literature reveal as vividly the impossibility of a naturalistic origin of life on the earth than in this field. The fact that an entirely hypothetical scenario has been proposed in a theory which is supported by virtually no empirical evidence forces a review of the major exobiogenesis theories.

Introduction

Exobiogenesis, the study of the role of organic molecules from outer space in causing the origin of life on earth, is receiving increased discussion in both scientific and popular media. The term exobiology was coined by Joshua Lederberg and refers to the study and distribution of life in the universe. The three basic types of exobiogenesis are, the delivery to earth of complete organisms such as bacteria, the delivery of complex organic molecules, and the delivery of simple organic molecules which synthesize on their way to earth from energy sources such as ultraviolet light or electrical discharges, or as a result of impact shocks (Chyba and Sagan, 1992, p. 125). One theory speculates that during a past heavy bombardment of the earth, which is postulated to have resulted from the collision of the earth with planetesimals left over from our solar system's planetary formation 3.5 billion years ago, may "have had important consequences for the origin of life" on earth (Chyba and Sagan, 1992, p. 125). Modern researchers are also exploring ideas such as the seeds of life came from dust clouds which the earth had at one time passed through during its orbit around the sun:

Earth in orbit sweeps up some 16,000 tons of interplanetary matter each year, much of it the remnants of decaying comets. Are new life forms present in this stellar gift? Did viruses evolved in comets or interstellar dust bring novel genes to influence earthly evolution? Did earth's life itself evolve from these cosmic seedings? (Cowen 1978, p. 6).

Specifically, it is theorized that during the bombardment of earth, volatile-rich impactors may have delivered essential 'biogenic' elements to our terrestrial surface. Moreover, since comets, carbonaceous asteroids, and interplanetary dust particles (IDPs) are rich in organic molecules, some speculate these sources may also have contributed directly to terrestrial prebiotic inventories. The force of the impact of these compounds with the earth may have shock synthesized some organics in the atmosphere (Chyba and Sagan, 1992, p. 125). Some simple organic molecules can remain intact if caught in dust particles small enough to

decelerate them sufficiently to prevent significant pyrolysis (chemical break down by heat). Many have taken this as evidence that complex organic molecules, or even bacteria could likewise have survived an eons long trip from outer space. This paper reviews exobiogenesis theory involving the delivery of both simple and complex organic molecules to the earth, and the motivation behind current speculations in this field.

The Types of Exobiogenesis

The two basic classes of exobiogenesis are the theories that life arrived on earth from outer space either from extraterrestrial molecules which later evolved on earth, or as developed life in the form of seeds, bacteria or of other organisms, the latter idea called panspermia. The two main types of panspermia (which is from the Greek, and means "seeds everywhere") are: *Deliberate* or *Directed Panspermia* — the conclusion that the seeds of life deliberately were brought to earth by beings from other planets, and *Accidental Panspermia* — the position that simple forms of life accidentally were carried here by comets, meteorites or even from garbage left by past space visitors (Gold, 1960, p. 65).

The History of Exobiogenesis Theories

The theory of exobiogenesis has a long history, dating back to the ancient Romans and Greeks. The modern panspermia theory was probably originated by the nineteenth century Swedish chemist Svante Arrhenius (1859-1927), a Nobel laureate who concluded that life must have come from outer space because it could not have begun on earth by naturalistic means (Arrhenius, 1908). He speculated that the earth was seeded by spores that came from another planetary system and which adhered to specks of dust propelled by light waves from stars. As a consequence, life was diffused throughout the universe and took hold where it could exist, including possibly Mars (Asimov, 1972). Scottish physicist Lord Kelvin (1824-1907) argued that, "seed-bearing meteoric stone from another world started life on earth" (Brush, 1982, p. 12). Other past panspermia advocates include Enrico Fermi, the Nobel laureate who designed and constructed the first atomic pile that ushered in the atomic age, and the Hungarian Nobel laureate Leo Szilard who eventually became professor of biophysics at the University of Chicago. Even the

*Jerry Bergman, Ph.D., Northwest College, Route 1, Box 246A, Archbold, OH 43502-9542.

first great defender of evolution, Thomas Henry Huxley (1825-1895), speculated that some type of panspermia could have been the source of all life on earth.

Jules Verne's novel, *From the Earth to the Moon* (1865) and H. G. Wells: *The War of the Worlds* (1898), both served as catalysts to encourage exploring the possibility of life in outer space in our century. More recently, the popular 1950s *Flash Gordon* television show, and now *Star Trek*, *Star Wars*, Carl Sagan's highly acclaimed *Cosmos* series and Sir Fred Hoyle's novel *Black Cloud*, all have made the life-from-other-worlds idea feasible in the minds of much of the public. Much science fiction has eventually become science fact—journeying to the moon, for example—and this should not surprise us. Science fiction writers are often scientists by profession, or at least trained in a science field at the graduate level. The best known examples are Isaac Asimov, a biochemistry Ph.D., and H. G. Wells, a biologist. Writing good science fiction requires both a grasp of science and a vivid imagination. Exobiogenesis is one of the latest science fictions which is fast becoming respectable science theory (Lawren, 1989).

Christian (1986, p. 364) observes that hundreds of thousands of comets exist and, if life exists throughout the universe, it could have been carried here by this means. Many scientists are currently actively testing this theory in the lab and on computers (Lawren, 1986, p.32). Hoyle hypothesizes that life originated in space and migrated by chance to earth by comets, meteorites, or even dust clouds. Some speculate that a meteorite trade between earth and Mars may have seeded the later planet, and these spores may have flourished on Mars when water freely flowed there (Lawren, 1986, p. 37). This conclusion is unlikely though, because, in Phinny's words, "the conditions on Mars are sufficiently extreme that any microbes that survived the trip in space would probably be killed on its desolate surface (quoted in Eberhart, 1989, p. 191).

The Reasons for the Exobiogenesis Theory

Some scientists, after noting the level of evidence against the theory of the spontaneous generation of living molecules on earth, have concluded that life must have come from outside our solar system. For example:

Miller, who after almost four decades is still in hard pursuit of life's biggest secret, agrees that the field needs a dramatic finding to constrain the rampant speculation. . . . "I come up with a dozen ideas a day, and I usually discard"—he reflects for a moment—"the whole dozen." . . . Unlike some origin-of-life theorists, Cairns-Smith cheerfully admits the failings of his pet hypothesis: no one has been able to coax clay into something resembling evolution in a laboratory; nor has anyone found anything resembling a clay-based organism in nature. Yet he argues that no theory requiring organic compounds to organize and replicate without assistance is likely to fare any better. . . . There is one other way out of this frustrating theoretical impasse. If neither the atmosphere nor vents provide a likely locale for the synthesis of complex organic compounds, maybe they were imported from somewhere else: outer space. Joan Urò of the University of Houston raised this possibility as early as the 1960s (Horgan, 1991, p. 125-126).

It is only one step farther to assume that organic molecules or even "simple" life came to earth in this way. Likewise it has "long been speculated that earth accreted prebiotic organic molecules important for the origins of life from impacts of carbonaceous asteroids and comets" during past major comet-asteroid showers (Chyba et al. 1990, p. 366). Since some eminent scientists have championed this theory, it has now achieved surprising credibility among respected scientists.

. . . Drs. Hoyle and Wickramasinghe in developing the concept of the cosmic cradle [have based] . . . their theory partly on their own interpretation of the infrared signatures of some space chemicals [and because] they reject Darwin's warm shallow pond or Stanley Miller's and Harold Urey's lightning-created chemical mixtures as birthplaces or organic life. "The concept of primeval soup," Dr. Wickramasinghe remarked in an interview, "is just a confidence trick which people have bought without much critical analysis. It would be too dilute for anything to happen" (Cowen, 1978, p. 6).

Astronomers Chandra Wickramasinghe and Sir Fred Hoyle have written more about this topic than any other researchers. Their books on the subject include *Lifecloud*, *Diseases From Space*, *Evolution From Space*, and *From Grains to Bacteria*. Adler's summary of Hoyle's view that:

. . . primitive living cells originated in comets and were "seeded" on earth early in its history. In *Lifecloud* he also pointed out that earthly organisms are strangely out of tune with conditions in the rest of our solar system; the wavelengths of light that chlorophyll uses most efficiently, for example, are not these in which the sun's spectrum is concentrated. Such speculation . . . has led Hoyle to exactly the view that seemed self-evident in the Middle Ages: that life did not arise spontaneously on earth (1982, p. 55).

Other mainline scientists who advocate the theory that the origin of life is from outer space via rocket ships, comets, or similar vehicles, or at least conclude that the theory has merit, include Francis Crick. In 1962 he shared the Nobel Prize with James D. Watson for his deoxyribonucleic acid (DNA) research, a substance that had previously been identified as the master molecule of heredity (Lear, 1978; Watson, 1968). In 1953 he and his co-workers demonstrated the now famous *double helix molecular structure* carries the four base code that forms the blueprint which directs the cell's polypeptide construction. Their discovery spawned the now famous genetic revolution, including gene mapping technology, recombinant DNA, and gene therapy (Crick, 1981).

Yet other prominent scientists who have publicly stated Panspermia has merit include *Salk Institute for Biological Studies* researcher Leslie Orgel, University of Toledo astrophysicist Armand Delsemme; Joan Urò, professor of biochemical and biophysical sciences at the University of Houston, and Harvard astrophysicist Brian Marsden (Cowen 1978). University of California's Gustav Arrhenius and Richard Gammon of the National Radio Astronomy Observatory "suggested that solar nebula seeded earth with life-forming chemicals" (Cowen, 1978, p. 6). Flindt and Binder (1974) advocated

a similar theory as did Von Daniken (1969) and Cohane (1977). NASA expert Maurice Chatelain (1978) even concludes that the only way to understand earth history is to postulate some visitation from outer space which started the events that he concludes caused "the sudden evolution" which eventually produced humans.

Ginsburgh (1975) theorizes that the first humans arrived on earth via a spacecraft that landed about 6,000 years ago. The evidence he uses to support his theory includes the well documented knowledge that many of the earliest known civilizations were highly advanced and have enjoyed from their very beginning highly developed religion, culture and language, both written and spoken. He notes the time before these advanced civilizations existed, about 6,000 years ago, is called "pre-history" because virtually nothing is known today about this period. Creationists view this as an inadequate attempt to interpret the facts of history without a creator.

According to Jaroff, Crick and most other proponents concluded that existing abiogenesis evolution theories are untenable, partly because the primeval soup was far too dilute for significant biological activity to occur.

A decade ago the restless Crick . . . began stalking the greatest secret of all: the origin of life itself. Along with other biologists, Crick was troubled by the prevailing explanations of how life began on earth. In 1973, he and Leslie Orgel . . . published an article in the journal *Icarus* theorizing that life on earth originated with micro-organisms sent by rockets from another planet in our galaxy. They call this act of deliberate seeding "Directed Panspermia" (1981, p. 62).

Their research also caused them to "dismiss" neo-Darwinism especially Darwin's "warm shallow pond" theory and Stanley Miller's and Harold Urey's lightning-created chemical mixtures in the earth's oceans as the birth place of organic life (Cowen, 1978, p. 6) and to conclude:

that evolution has been guided not by natural selection but by repeated invasions of 'cosmic genes,' [and] insects in particular . . . are such successful predators and so resistant to human attack that they must be alien invaders, perhaps carrying out the plan of a higher intelligence (Kunzig, 1988, p. 68).

Atmospheric research and other developments also caused a major shift from abiogenesis on earth to exobiogenesis as explained by NASA researcher Chyba:

. . . the production of organics on earth depends on the details of earth's primitive atmosphere. Once again, scientists are hindered by a lack of data. About forty years ago, when the first key experiments on organic production in early terrestrial atmospheres were performed, scientists thought earth's earliest atmosphere consisted of methane and ammonia. . . But most geochemists no longer think that earth's early atmosphere consisted of methane and ammonia. The composition of the atmosphere of early earth was governed by the chemistry of earth's mantle and crust, and the

clues we have about this chemistry now point toward an early atmosphere rich in carbon dioxide and molecular nitrogen, not methane and ammonia. In this case, laboratory experiments have shown that it is vastly more difficult to synthesize organics in earth's atmosphere. So it is exactly in this case where the extraterrestrial sources loom in importance. In this less hospitable kind of atmosphere, IDPs could have been the dominant source of organics on early earth (Chyba, 1992, pp. 34-35).

Among the many reasons for the new theory, Johnson suggests the following:

Assuming away the difficult points is one way to solve an intractable problem; another is to send the problem off into space. That was the strategy of one of the world's most famous scientists, Francis Crick, codiscoverer of the structure of DNA. Crick is thoroughly aware of the awesome complexity of cellular life and the extreme difficulty of explaining how such life could have evolved in the time available on earth. So he speculated that conditions might have been more favorable on some distant planet (1991, p. 108).

Many other researchers have also expressed much dissatisfaction with the prevailing theories about how life originated on planet earth. They have concluded that, given what we know about the environment necessary for life, it could *never* have spontaneously generated here (Yockey, 1992; Thaxton, Bradley and Olsen, 1984). Both Aleksandr Oparin's theory of **Coacervates**, microstructures of water surrounded by a few proteins, and Sidney W. Fox's **proteinoid microspheres** theory have totally failed to bridge the stupendous gap between life and nonlife (Bergbauer, 1993, p. 8). Milner summarizes the exobiogenesis argument as follows:

The conditions for the origin of life may have been better among the vast amount of organic matter he believes floats through interstellar space. Unimaginably immense quantities of chemical molecules colliding in space might make the rare and improbable combinations more likely, almost inevitable (1990, p. 354).

Consequently, researchers are looking elsewhere in search of a viable explanation for life's origin. And in so doing, Adler concluded:

Probing the origins of life on earth, a biologist and an astronomer have performed the improbable feat of reinventing religion. Conventional science has invoked the workings of chemistry over almost limitless time to bring the order of life out of the planet's primitive chaos. But life seems to have begun rather quickly; the more scientists have looked, the further back they have found signs of life; the earliest fossil cells, . . . are almost as old as the solar system itself. Pondering such mysteries, Nobel Prize winning biologist Francis Crick and Sir Fred Hoyle, the distinguished astronomer, have independently supposed a *deus ex galaxia* to explain the sudden appearance of life on earth: the "seeding" of space by intelligent beings from distant corners of the universe (1982, p. 55).

Crick's book, the best seller *Life Itself*, has received mixed reviews—many scientists were extremely favorable; others, such as Niles Eldredge, were very critical. Eldredge (1981, p. 94) called Crick's book "nothing short of a disaster," partly because, as Eldredge concluded "Crick develops his notion of 'Directed Panspermia' unhampered by such pedestrian considerations of testability." Ironically, one of Eldredge's main criticisms of Crick's work was his tendency to see

... science as an alternative to religion and [his lashing] out at "antiscientific fanatics" who fail to hearken to the clarion call of the twentieth century gurus of the West, the enlightened scientists. . . . Crick's characterization of religion as an amalgam of arcane, outmoded beliefs is intemperate in light of his own views on how life came to exist on the planet earth (1981, p. 94).

The fact that some of the greatest of the world's foremost scientists disagree to this extent on this topic illustrates how much we have yet to learn about life's origin.

Coming from a lesser man, Directed Panspermia might well be written off as science fiction. But Crick is a giant among scientists, and his ideas are not taken lightly. While he concedes the weaknesses in his theory and does not hesitate to expound the strengths of others, he insists that Directed Panspermia is built on a foundation of scientific detail. . . . Crick allows that he has several times sworn off further writing on the origin of life "because there is too much speculation running after two few facts:" but he confesses that "the subject is so fascinating that I never seem to stick to my resolve" (Jaroff, 1981, p. 62).

Recent Discoveries Relate to Exobiogenesis

A century of unprecedented scientific advancements finds scientists still arguing over the views that Jules Verne and H. G. Wells outlined in their science fiction, and scientists today do not seem to be any closer in arriving at a reasonably well supported theory of abiogenesis. As Adler observed, we are still "running after too few facts," and:

Crick and Hoyle may have the most far-out hypothesis, but they are not alone in asking whether life on earth was made possible—or at least influenced—by objects from the far reaches of the solar system. Astrophysicist Armand Delsemme . . . believes that the stuff of living things—including hydrogen, carbon and oxygen—came from comets, which brought gas and organic material to lifeless, airless earth . . . (1982, p. 55).

This situation motivated Delbruck to state about existing abiogenesis and exobiogenesis theories:

While all these theories seem quite plausible and very intelligent, in my opinion they tell us very little about the origin of life. I have made it my rule not to read this literature on prebiotic evolution until someone comes up with the recipe that says "Do this and do that, and in three months things will crawl in there." When someone is able to create life in a shorter time than was originally

taken by nature, I will once more start reading that literature (1986, p. 31).

Frank and Huyghe (1990) have discovered evidence that each minute about 2,100 small comets consisting primarily of water and ice dump tons of water on the earth. If the evidence proves valid, our lakes and oceans must have been formed relatively recently, which poses serious problems for most existing naturalistic theories of life's origin. The implications for the current naturalistic origin of life scenario is obvious; without enormous quantities of water, most existing theories break down. Frank realizes that for this reason some type of exobiogenesis is the only savior of atheistic abiogenesis. An exogenesis is also argued for on the grounds that many of the biochemicals necessary for life could not have formed here, and thus must have had their origin elsewhere. Consequently, in Frank's words many scientists "now believe that much of the organic molecules needed to create the first forms of life on earth could well have been brought in by comets that bombarded the planet early in its history" (1990, p. 56). He cites the work of a number of researchers who conclude that "a cometary bombardment could have brought in a hundred to a thousand times as much organic material as the earth itself would have produced photochemically during the same period" (1990, p. 56). And, the oxygen problem is likewise solved by this hypothesis,

... it may be that these small comets provided not only the chemical seeds for life on earth, but the oxygen to protect it from the sun, as well as the marine incubator—the ocean—in which it could grow and thrive. That, in essence, would make us all the children of comets (1990, p. 57).

The tentative terminology used here is appropriate because no evidence yet exists that small comets were historically the source of large amounts of either complex organic molecules or oxygen, and we now have only controversial evidence that small comets today are bringing vast quantities of water and some simple organic compounds from outer space to earth (Marcus, 1991).

In an intriguing interview with William D. Hamilton of Oxford University by the senior editor of *New Republic*, science author Robert Wright reveals another reason for the attraction of exobiogenic theories. A theory of the universe "that I rather like," Hamilton says, is the idea that our planet is a "zoo for extraterrestrial beings" who planted the seeds for life, hoping to create interesting intelligent creatures. And these creatures watching the zoo here "every now and then . . . see something that doesn't look quite right . . . the zoo is going to kill itself off if we let you do this or that. So they insert a finger and just change some little thing. And maybe these are the miracles which the religious people like to so emphasize" (1992, p. 44). He recognizes that this view is fully speculation, yet states, "It is a kind of hypothesis that is very, very hard to dismiss . . . if I were setting up an aquarium. . . this is virtually the way I would do it. I would try to make as interesting an aquarium as I could. And I would try to make sure that this big fish didn't molest little fish too much. And I would occasionally insert a finger and try to stop him." The anthropomorphic projection here, and the parallels with a theological world view of a caring God

who takes an active role in his creation, is obvious. The theory also answers the evidence that this intervention occasionally must have happened—there are too many disasters which were highly likely, but have never happened, and the fine tuning of the natural world often seems too precise to be natural. Hamilton, Wright claims, is “considered by some to be the most important evolutionary biologist of the second half of this century” (p. 44). In the words of Crick and Orgel, one of the strongest arguments for the exobiological origin of life is:

The chemical composition of living organisms must reflect to some extent the composition of the environment in which they evolved. Thus the presence in living organisms of elements that are extremely rare on the earth might indicate that life is extraterrestrial in origin. Molybdenum is an essential trace element that plays an important role in many enzymatic reactions, while chromium and nickel are relatively unimportant in biochemistry. The abundance of chromium, nickel, and molybdenum on the earth are 0.20, 3.16, and 0.02%, respectively. We cannot conclude anything from this single example, since molybdenum may be irreplaceable in some essential reaction—nitrogen fixation, for example. However, if it could be shown that the elements represented in terrestrial living organisms correlate closely with those that are abundant in some class of star—molybdenum stars, for example—we might look more sympathetically at “infective” theories.

Our second example is the genetic code. Several orthodox explanations of the universality of the genetic code can be suggested, but none is generally accepted to be completely convincing. It is a little surprising that organisms with somewhat different codes do not coexist. The universality of the code follows naturally from an “infective” theory of the origins of life. Life on earth would represent a clone derived from a single extraterrestrial organism. Even if many codes were represented at the primary site where life began, only a single one might have operated in the organisms used to infect the earth 1973, pp. 344-345).

Another concern is the uncritical speculation that exobiogenesis has produced. North even concludes that exobiogenesis has influenced the speculation of persons such as Von Daniken:

People who are not skilled scientists but who have come to believe in the doctrines of evolution are therefore easy targets for the Von Danikens of the world. Von Daniken seems to be able to answer questions that standard scientists cannot answer. How is it that mankind could have evolved so rapidly both technologically and philosophically? How is it that his intellect is so advanced compared to changes in his body? How is it that the mind of man seems to have evolved much more rapidly than changes in man's environment would have accounted for? Questions such as these baffled Alfred Russell Wallace, the cofounder of the doctrine of evolution through natural selection and led him into occultism and spiritism in the late

nineteenth century. Similarly, modern readers are baffled by these obvious questions or variants of these obvious questions, and when they find that modern science has no answers, they easily pick up on pseudoscientific answers. Von Daniken's answer sold millions of copies (1986, p. 307).

Von Daniken has been a prolific and influential popular writer (1969, 1970, 1973, 1973a, 1974, 1982) his works having sold millions of copies and resulted in several films. Most scientists classify his works as unscholarly, often containing unfounded and unsupported speculation.

The Major Problems with Exobiogenesis

The most common objection to exobiogenesis is the fact that we simply *have no direct evidence* that any form of natural exobiogenesis has ever actually occurred. Panspermia is more speculative because it presumes both that life exists on other planets and that, given the right conditions, life is able spontaneously to generate itself there. The whole theory, as many of its critics point out, is almost purely speculation. Although several kinds of amino acids have evidently been found in meteorites, we have not detected evidence even for the simplest amino acid, glycine, in outer space, though astronomers “have looked like mad for glycine” (Kunzig, 1988, p. 7). The Murchison meteorite found in Murchison, Australia, “is rich in simple amino acids” and an estimated 300 tons of organic molecules annually fall to the earth. But no complex polypeptides or similar “organic” molecules have yet been found (Chyba, 1992, p. 30; Pendleton and Cruikshank, 1994).

Of the about one-hundred molecules identified by astrochemists in outer space, as is also true on earth, most are simple organic having up to only thirteen atoms (Pendleton and Cruikshank, 1994). The most complex example found so far is simple ethanol (C_2H_6O) discovered in some outer space clouds—a finding which Kunzig states, “is not surprising [because] after hydrogen, helium and oxygen, carbon is the most abundant element in space” (1988, p. 70). Because of the major gaps in our knowledge of early earth conditions, the confidence of scientists in the exobiogenesis theory is mixed, as explained by NASA Ames Research Center scientist Chyba:

The debate about the composition of earth's early atmosphere is far from settled. Remarkably, though, it appears that whatever the primitive atmosphere's exact nature, the heavy bombardment played an important role in stocking the primordial soup of organics available for the origin of life. If the atmosphere was methane and ammonia-rich, the heavy bombardment produced organics copiously by shock chemistry in the atmosphere. If the atmosphere was far less hospitable for organic chemistry, composed of carbon dioxide and nitrogen, say, then the asteroids and comets responsible for the heavy bombardment, and the ever-present interplanetary dust particles, may have played a key role by providing organic-rich dust to seed earth's ancient surface. Either way, the case for an important extraterrestrial connection for the origin of terrestrial life is too intriguing to ignore (Chyba, 1992, p. 35).

Although amino acids are the building blocks of protein, they are “rather simple substances” and a long way from most proteins. The amino acid leucine consists of only 22 atoms, whereas most proteins contain many thousands. Further Hoyle estimates that it requires 200,000 types of protein assembled in an incredibly complex way to make up a cell (1983, p. 12). The compounds found in outer space and in meteorites, while organic, are a long way from life, actually about as far as a bucket of bolts is from a Ferrari (Sandilands 1986, 1986a). Labeling something an organic compound implies to the uninformed that it is a “living organism,” or something close to it, when it is actually only *any compound that contains carbon and hydrogen* (Dorin, 1984). Carbon readily combines with most other elements—actually almost all known types of compounds are carbon based; over 10,000,000 are “organic” compared to only about 1,000,000 nonorganic. Iron is a necessary transport molecule for many forms of higher life; yet the discovery of iron on a planet would hardly prove that life was close to formation there. Crick and Orgel conclude:

It now seems unlikely that extraterrestrial living organisms could have reached the earth either as spores driven by the radiation pressure from another star or as living organisms embedded in a meteorite. As an alternative to these nineteenth-century mechanisms, we have considered Directed Panspermia, the theory that organisms were deliberately transmitted to the earth by intelligent beings on another planet . . . [and] that it is possible that life reached the earth in this way, but . . . the scientific evidence is inadequate at the present . . . (1973, p. 341).

A major problem with explaining the origin of life by exobiogenesis is that it only moves the origin-of-life problem to another location, relocating elsewhere all unanswered questions to a place where they are almost impossible to answer (Wysong, 1976). As Christian (1986, p. 364) notes, pushing “the problem light-years away to some unknown location” does not solve the question of how naturalistic origins can occur. This speculation results from the assumption that there may be other types of planets “on which the origin of life *ab initio* is greatly more probable than on our own” (Crick and Orgel, 1973, p. 341). From what we know about the conditions in outer space, though, it seems that it is far more hostile to the formation of organic molecules than the earth ever was. Heat or other forms of energy are critical to form most compounds, and interstellar space gas is at most only about 25 to 30 above absolute zero and stars are far too torrid (Kunzig, 1988, p. 71). Some simple compounds that exist there may have been formed by cosmic ray energy, but this is also a major means by which many compounds are destroyed (Friedlander, 1989).

Other problems include the low likelihood that extraterrestrial life would be compatible with earth’s environment, or even survive traveling for millions and millions of years in a space environment which is extremely hostile to life and still be viable. We know of no possible source of life within fewer than about five light years away from the earth. Consequently, any possible origins are at the minimum many centuries travel away, depending on how fast the carrier can

travel. The transport problem was summarized by Angelo as follows:

The greatest difficulty most scientists today have with Arrhenius’s original panspermia concept is simply the question of how these “life-seeds” can wander through interstellar space for up to several billion years, receive extremely severe radiation doses from cosmic rays and still be “vital” when they eventually encounter a solar system that contains suitable planets. Even on a solar system scale, the survival of such microorganisms, spore or bacterial would be difficult. For example, “life seeds” wandering from vicinity of the Earth to Mars would be exposed to both ultraviolet radiation from our Sun and ionizing radiation in the form of solar-flare particles and cosmic rays. This interplanetary spore migration might take several hundred thousand years in airless, hostile environmental conditions of outer space (1991, p. 127).

Shklovskii and Sagan (1966, p. 209) estimated if the earth were seeded by a planetary system, it would have to have occurred “several billions of years ago” to fit current evolutionary theory, and thus must have been from a star no more than about 6,000 light years away. This limits enormously the potential sources.

Another concern is that ultraviolet x-rays and other radiation, and the high vacuum (1 atom per cm^3 conditions and the lack of oxygen in space would likely destroy life or life’s seeds during its long journey. Crick and Orgel argue “any known type of radiation-resistant spore would receive so large a dose of radiation during its journey to the earth from another solar system that it would be extremely unlikely to remain viable” (1973, p. 341). A further hazard is the large regions of hot, ionized, interstellar gas pockets that evidently existed in early space (Shklovskii and Sagan, 1966). One objection is answered by assuming that the seeds of life were shielded from space radiation by a meteorite’s outer shell (Lawren, 1986). How life got inside of a meteorite without being destroyed by the heat that formed the meteorite rock originally, or how it survived the heat generated in its travel through space dust or the earth’s atmosphere, is not clear. Shklovskii and Sagan note that if a life bearing meteorite was ejected from a planet that is near a star, which probably includes most planets,

the radiation hazards cannot be avoided by providing a protective shielding for the bug. With a shielding thick enough to be useful for radiation protection, the bug would be too large to be ejected by solar radiation pressure. Similarly, we cannot save the panspermia hypothesis by imagining interstitial spores locked within the fissures of some interplanetary dust particles or meteors and thereby shielded from the harmful radiation (1966, pp. 209-210).

Some have tried to deal with these problems by speculating that

Because much of the kinetic energy of a comet with a density of 1 g cm^{-3} will be partitioned not into heating the impactor but into kinetic energy of ejecta and target heating, it is possible that aerobraking (slowing by atmospheric drag) and uneven distribution of shock energy throughout

the impacting projectile will conspire to yield some region of the comet for which temperatures remain low enough to allow at least the hardier organics to survive (Chyba et al., 1990, p. 367).

The ability of a spore surviving during a trip from outer space to earth has been researched by many scientists, and the most optimistic are Leiden and Greenberg who speculated that: "While 'naked' spores had a life expectancy of only 150 years in space, at least 10 percent of those with molecular shields could last up to 45 million years—more than long enough to survive an interstellar journey" (Lawren, 1986). The spores used in this research, though, were those of the highly developed *Bacillus subtilis*, a hardy bacterium which in contrast to most except a few of its cousins, is very difficult to kill. Further, to be able to produce a set of events in controlled laboratory conditions says only what may be possible, not what actually has occurred historically. The 45-million year survival time is pure speculation which assumes a set of ideal conditions and ignores the extremely destructive effect of cosmic rays. No one is denying the potential contributions of this experiment, but it argues far more for *over design* of bacteria than for *atheistic evolution* of them, illustrating the extent to which some researchers will go to deny a designer to explain design.

Another question of concern is how the spores could break away from their home base gravity and travel into space. This is no easy task, as our space program engineers are keenly aware (Lawren, 1986, p. 32). In the words of Crick and Orgel "The probability that sufficiently massive objects escape from a solar system and arrive on the planet of another one is considered to be so small that it is unlikely that a single meteorite of extrasolar origin has ever reached the surface of the earth" (1973, p. 341). Crick does an admirable job attempting to explain many of these difficulties, but falls far short, leaving most of the major objections unanswered. Many of these objections were recognized long ago. Wells, Huxley and Wells summarized the problem a full half-century ago as follows:

The actual origin of life must always remain a secret: even if man succeeds in artificially making life, he can never be sure that Nature did not employ some other means. Some thinkers have supposed that life was carried to this earth in a dormant state within meteorites. But this is to think timorously and to balk the issue; it only removes the problem of life's origin one step farther back. It does not absolve us from asking how and when life originated, but merely introduces an extra difficulty (1935, p. 8).

Many researchers have recognized these problems with the theory that accidental exobiogenesis was the source of life on earth, so they have proposed the intelligent design theory called directed panspermia. Crick and Orgel attempted to resolve the above fatal problems of evolution.

... by proposing the directed-panspermia hypothesis. ... in the early 1970s they suggested that an ancient, intelligent alien race could have constructed suitable interstellar robot spacecraft; loaded these vehicles with an appropriate cargo of microorganisms, spores or bacteria; and then

proceeded to "seed the Galaxy" with life, or at least precursors of life (Angelo, 1991, p. 127).

In their words, they reason that life could have begun on earth

as a result of infection by microorganisms sent here deliberately by a technological society on another planet, by means of a special long-range unmanned spaceship? . . . If we are capable of infecting an as yet lifeless extrasolar planet, then, given that the time was available, another technological society might well have infected our planet when it was still lifeless. The spaceship would carry large samples of a number of microorganisms, each having different but simple nutritional requirements, for example blue-green algae, which could grow on CO₂ and water in "sunlight." A payload of 1000 kg might be made up of 10 samples each containing 10¹⁶ microorganisms, or 100 samples each of 10¹⁵ microorganisms (Crick and Orgel, 1973, p. 343).

The purpose of this effort by these aliens to spread life, according to Crick and Orgel, was "missionary zeal" (1973, p. 344). In Johnson's words, the exobiogenesis theory of Crick and Orgel includes

the basic idea. . . that an advanced extraterrestrial civilization, possibly facing extinction, sent primitive life forms to earth in a spaceship. The spaceship builders couldn't come themselves because of the enormous time required for interstellar travel; so they sent bacteria capable of surviving the voyage and the severe conditions that would have greeted them upon arrival on the early earth (1991, p. 108).

The motivations of these spacemen were discussed in more detail by Angelo:

Why would an extraterrestrial civilization undertake this type of project? Well, it might first have tried to communicate with other races across the interstellar void; then, when this failed, it could have convinced itself that it was alone! At this point in its civilization, driven by some form of "missionary zeal" to "green" for perhaps "blue") the Galaxy with life as it knew it, the alien race might have initiated a sophisticated directed-panspermia program. Smart robot spacecraft containing well-protected spores, microorganisms or bacteria were launched into the interstellar void to seek new "life sites" in neighboring star systems. This effort might have been part of an advanced-technology demonstration program, a form of planetary engineering on an interstellar scale. These life-seeding robot spacecraft may also have been the precursors of an ambitious colonization wave that never came—or is just now on its way! (1991, p. 127).

Not only the origin of life, but also its extinction has been postulated by scientists as occurring by extraterrestrial events. The best example is the Chicxulub impact Crater, now estimated to be 185 miles wide and 15 miles deep, the largest crater in the universe, even surpassing the 175 mile wide Mead Basin on Venus (Sharpton et al., 1993). It is speculated to have wiped out 60 to 80 percent of all animal species then, allowing the evolutionary diversification of mammals.

The Empirical Evidence for the Theory

One method exists to test the theory that the first living cells which gave rise to life on earth formed in space about 4.6 billion years ago. Since, Hoyle and Wickramasinghe (1978, 1984) concluded that this influx of life from outer space (mainly via comets) may be occurring today, it is feasible to determine empirically whether or not the recent visit of other comets brought germs or complex organic matter of *any kind* aside from amino acids to earth. For a control population, satellites or high flying airplanes could be used to accurately evaluate the contents in a certain area of space. Then, when a comet makes a close enough appearance (as Halley's tail does occasionally) a germ or organic molecule count of the same area can again be taken. If it increases significantly, and if this increase cannot be accounted for by other causes, the result would indicate that the comet was carrying germs or some type of complex organic molecules.

One piece of evidence Hoyle uses to support his view is that smallpox and other diseases tend to appear and disappear at "mysterious intervals" throughout history. Some scientists have even speculated that each return of some comet could herald disaster because of the germs and other life that they believe it carries, a theory not supported by the research completed on the 1986 return of Halley's comet. A space craft sent to Halley's comet to determine, among other things, if it contained complex organic molecules or germs, found no evidence of such.

So far, only simple "organic" compounds have been identified in Halley's comet from infrared detectors in telescopes on earth (Cowen, 1993). Wickramasinghe and Allen used this equipment to measure waves emitted by the comet beyond the visible light spectrum. They found a 3.4 micron wavelength, which indicates that some hydrogen-carbon molecules are present in the comet. Only about 100 compounds so far have been identified in outer space out of over ten million known. Most were found in the thousands of giant molecular clouds that are from 30 to 180 light years across and about 700 times the density of outer space. The density is such that 700 molecules exist in the cloud compared to each one existing in outer space (Cowen, 1978, p. 6). The study of the chemistry in these clouds, called astrochemistry, has grown to the extent that

the fact that Drs. Hoyle and Wickramasinghe are willing to stake their professional reputations on these audacious theories shows how fast the young science of astrochemistry is developing. (Cowen, 1978, p. 6)

The Theory's Implications for Abiogenesis

The theory clearly emphasizes the fact that serious difficulties exist with the assumption that life could have originated spontaneously eons ago in a primordial soup of speculated composition somewhere on the earth's surface. The literature on the various theories of how the spontaneous generation of life on earth could have occurred eons ago is based on the *a priori* assumption that, since life is clearly here and it is not "scientific" to resort to a creator to guide the process, we therefore must speculate on *how life* could have *generated spontaneously*. That scientists of the stature of Hoyle, Crick,

Ginsburgh and Wickramasinghe seriously question the assumption that life could have originated on earth without outside direction clearly portends that serious difficulties exist in *all* of the current origin of life theories (Thaxton, et al., 1984; Johnson, 1991). In the words of Chang, "the primeval soup theory scientists were once confident was valid is, because of much more knowledge, no longer viable and the consensus that once prevailed, the conviction that the basic ingredients of the 'primeval soup' have been worked out, is gone" (Kunzig, 1988, p. 68). In the end, we do not know, in spite of a score of theories, how life *could* have evolved on earth, a far easier question than knowing how it *did* evolve here:

How important were the organics brought in from out there for the origin of life down here? Because scientists don't really understand the origin of life, this question can't be answered with confidence. One way to approach the issue, though, is to compare the extraterrestrial sources with likely sources of organics made on earth. Since the early 1950s scientists have worked out a number of ways for making organics via chemical reactions in earth's atmosphere (Chyba, 1992, p. 34).

And as Chyba elegantly shows, the subject is far more complex today than the 1950s. Consequently, researchers have appealed to exobiogenesis to explain the many existing abiogenesis problems and thus to develop plausible abiogenesis theories. Many researchers also recognize that at least directed panspermia has clear similarities to the intelligent design view of creationists. Hoyle recognizes its similarity to the religious world view, but stresses that many scientists endeavor to deny this because, in his words, "orthodox scientists are more concerned with preventing a return to the religious excesses of the past than in looking forward to the truth" (1983, p. 9). The view of directed panspermia also argues against the "purposeless outlook of orthodox opinion" and argues against the nihilistic outlook which "has dominated scientific thought through the past century" (p. 9). He goes further than this, stressing that publication of the *Origin of Species* "committed mankind to a course of automatic self-destruction" and that many people sense something is "fundamentally amiss with society." It is not only the implications of atheistic evolution that has motivated Hoyle to develop his theory, but his conclusion that the accidental origin of life is more unlikely than solving the Rubik's cube at random, an activity which he concludes mathematically approaches the impossible. If one could make one random move a second, Hoyle concluded that it would take an average of 300 times the estimated age of the earth, or 1,350-billion years, "of just one of our body's proteins having evolved randomly by chance." Since about 200,000 types of proteins exist in each cell, the odds against random creation, Hoyle concludes, are "unimaginably vast" (1983, p. 12).

The motivations for both earth abiogenesis and exobiogenesis involve philosophical presuppositions. A good example is the work of one of the pioneering researchers whose theories have influenced the field for several decades, Soviet scientist A. I. Oparin. In his classic work on evolutionary theory, he reviews the history of atheistic theories of the origin of life. He

appropriately mentions that in the 1870s Frederick Engels, the co-founder of communism with Karl Marx, believed that atheistic evolutionary development of matter was the only path by which life could have arisen. According to Engels, life arises by a process of matter evolution whenever conditions are favorable (Oparin, 1957, p. 92). Oparin explained the difficulty in synthesizing life in the lab by quoting the “distinguished Russian botanist and cytologist,” V. Velyave who stated in 1893, “in the great laboratory of nature . . . we are hardly likely to succeed in obtaining quickly that on which nature as spent thousands of years.” in our efforts to create life (Oparin, 1957). Engels is important in the history of communism because “it is with Engels, the former fundamentalist Christian, rather than Marx, the formerly Jewish child who loved his father and his father-in law, that the atheistic syndrome first enters the history of communism” (Koster, 1989, p. 164). Koster argues that atheism often develops from a hatred of one’s father, producing what he calls the atheist syndrome. Marx, however, is a striking exception to the many examples that Koster documented. Koster therefore concludes the incorporation of atheism, and importantly Darwinism, into communism was primarily through Engels, not Marx. Marx, though, did have “a greater intellectual admiration” for Darwin “than for any other” of his contemporaries because of Darwin’s “theory of evolution and natural selection” (Berlin, 1963, p. 204). The relationship between Darwinism and communism is complex, but essentially

once Darwin’s ideas started to percolate through Europe, the Marxists seized on them eagerly as a sort of antidote to organized religion. . . . the Marxist. . . adopted Darwin as a fixture of the new world view because he was an atheist and because his theory of evolution by natural selection, taken at face value, helped to undermine the Judeo-Christian view of man” (Kosler, 1989, p. 164).

Koster relates that both Lenin and Stalin had come to accept, first, Darwin’s theory of evolution and the belief that “man was a mere animal and not a being created by God” (1989, p. 164). Darwinism also influenced Stalin to abandon his faith in God and to accept the view that “people were descended from apes and not from Adam.” Koster also argues that atheism is a necessary plank for communist philosophy, at least that which developed in the Soviet Union. Theistic evolution would not suffice because it was imperative to totally remove the idea of God, especially the Judeo-Christian God, in order to fully embrace the communist party line. It was, consequently, especially necessary to show that the origin of life itself can occur by natural means. Even many theists accepted evolution from primitive animals to the more advanced creatures including humans. Consequently, the final plank, that of the origin of life itself, had to be dealt with, and this was the challenge Oparin assumed.

Oparin recognized that the origin of life theories accepted in his time were not viable, and therefore devoted his life work to making the ancient spontaneous generation of life views plausible. The view common then was, in Oparin’s words, “H. J. Muller . . . affirms his earlier hypothesis . . . as to the random emergence of one successful gene among myriads of types of molecules” (Oparin, 1957, p. 99, my emphasis). Recognizing

the many problems with this view, Oparin noted one was that it was difficult to accept the idea of one unique past event “because it completely shuts the door on the scientific study of the most important event in the history of our planet, which was the first emergence of organisms. How can one study a phenomenon which, at best, can only have occurred once in the whole lifetime of the earth?” He then hypothesizes that the conditions must have been such that the origin of life was once common and indeed inevitable—and in his classic work he discussed what he felt these conditions were. The research reviewed above, though, has shown that many of the early earth conditions he postulated are not tenable, and the modern recognition that the spontaneous generation of life on earth is highly improbable has led to the exobiogenesis hypothesis in order to maintain the philosophical assumption that life generated spontaneously. If this could not occur on earth, then it occurred somewhere else.

ReMine (1993) argues that life was designed both to look like the product of a single designer, and secondly to resist all other interpretations of its origin. That idea, called **message theory**, asserts that life’s designer would *not* create extraterrestrial life, because to do so would violate one or both of these goals. For example, while all earthly life possesses common designs to intentionally convey that they are the work of one designer, the existence of extraterrestrial life like ours would violate the second goal. If extraterrestrial life existed, it would lend credence to the view that our creator did not create us, but that we are the product of, evolved from, or that extraterrestrial life is in other ways responsible for our existence. Naturalistic evolutionists then could use evidence of extraterrestrial life to argue in favor of naturalistic interpretations. Thus, studying the creation allows us to learn about the traits of the creator, and within the creation is a message. The creator deliberately precluded evidence of exobiology, ReMine argues, because this would confuse the message he intended to convey, namely that we are the product of the creator only, not extraterrestrial life. The lack of evidence for extraterrestrial life, he concludes, supports the message theory hypothesis (1993, p. 441). Although this lack is so far supported by science, many speculate that evidence for extraterrestrial life will be found with continued searching, but at this point this conclusion is based on belief, not empirical evidence.

And in Conclusion

The whole exobiogenesis theory and the speculation it is based upon vividly illustrate how a century of research has revealed many difficulties with all naturalistic theories of life’s origin. The evidence indicates both outer space and the early earth were extremely hostile to life. In Kunzig’s words, “The profusion of hypotheses about the origin of life . . . is a symptom of the fundamental problem in the field: the lack of hard evidence” (1988, p. 76). Outsiders should be cautious and not uncritically accept the many speculations put forth by contemporary scientists and their students. It is recognized by many that even the exobiological theories developed to explain abiogenesis cannot be “a random process, but one carried out under the influence of a greater cosmic intelligence” (Angelo, 1991, p. 128). The panspermia theory is an intelligent design argument

which is acceptable to the scientific community because it assumes the creator of life itself evolved by natural means. Would a God created by natural forces as opposed to an eternal existing God be acceptable to secular scientists and the public schools? Shklovskii and Sagan have concluded this view is an acceptable theory because it "is not inconsistent with materialistic philosophy" (1966, p. 11). The exobiogenesis theory also illustrates the extent that some scientists will go to try to account for the complex reality around us without a creator. We can do no better than conclude with the words of Javor:

Thus there is a crisis in the field of chemical evolution. The best efforts of brilliant scientists over the past 40 years have stalled in logical dead ends. Increasing numbers of evolutionary scientists are accepting now the concept of "panspermia," that life evolved elsewhere in space and was imported accidentally or purposefully to the earth. First proposed at the end of the past century, after Pasteur disproved the spontaneous generation of life, this theory is an admission of failure to find a convincing naturalistic account for the origin of life on earth. It pushes the problem out of the realm of experimentation and gives up on suggesting how life could have come about. But it is also a stubborn clinging to the notion that somehow matter can self-organize into living matter—if not on this earth, then elsewhere in the universe. What we know about living matter makes it clear that this cannot happen (1993, p. 11).

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STONE MOUNTAIN, GEORGIA: A CREATION GEOLOGIST'S PERSPECTIVE

CARL R. FROEDE, JR.*

Received 14 February 1994; Revised 13 April 1994

Abstract

Stone Mountain is an exposed granitic pluton, located in Northeast Georgia. Uniformitarian estimates suggest that the granite was intruded into overlying metamorphic rocks during the last stages of the Alleghenian Orogeny. Later the mountain became exposed at the earth's surface. The uniformitarian model for the formation of Stone Mountain remains unresolved. This paper presents an interpretation, using the young earth Flood model, for the origin of Stone Mountain which would predict its formation and exposure during the Flood event.

Introduction

The Appalachian Mountains form a belt stretching from northeast Alabama to Newfoundland. The mountains are usually separated into northern and southern arcs. It has been proposed that the Southern Appalachian mountain arc has undergone several orogenic events resulting in the complicated folding and faulting of the associated rocks (Cook, Brown and Oliver, 1980, pp. 152-153; Dallmeyer, 1978, 124; Windley, 1977, pp. 183-192). The core of the Southern Appalachian Inner Piedmont is composed of a high-grade migmatitic assemblage of biotite gneiss, granites and granitic gneiss, and minor but widespread amphibolite (Dallmeyer, 1978, p. 127). The Inner Piedmont granitic rock types are associated with an intrusive magma, a molten rock generated deep within the earth's crust. The molten granite rises toward the earth's surface but fails to erupt due to a variety of causes (e.g., heat loss, orogenic activity ends, loss of fluids, etc.). The magma then cooled in the subsurface and solidified into large masses of intrusive granitic rock, called plutons.

Stone Mountain is one such pluton and it is exposed at the earth's surface. The current uniformitarian model for the emplacement and exposure of Stone Mountain remains in question. The uniformitarian model will be presented to the reader in an effort to show how some of this data can be used to support the young earth Flood modeler in reconstructing events in earth's past relating to the formation and exposure of Stone Mountain. Specifically, this paper will discuss the formation of Stone Mountain within the context of the Flood model, which this author believes offers a better model for the emplacement and exposure of Stone Mountain. Age dates used in this paper will reflect those presented within the uniformitarian literature. However, the author does not accept the uniformitarian assumptions or dates as presented and will suggest a chronology within the young earth Flood model. A glossary of terms is provided to aid the reader in understanding some of the geologic terminology used in this article.

Stone Mountain

Stone Mountain is one of many granitic plutons exposed in Georgia (Figure 1). Stone Mountain, located approximately 16 miles east of Atlanta, Georgia, rises approximately 780 feet above the generally flat to slightly rolling land surface, forming a geomorphic feature called a monadnock (Figure 2). The mountain

*Carl R. Froede, Jr., B.S., P.G., 2895 Emerson Lake Drive, Snellville, Georgia 30278-6644.

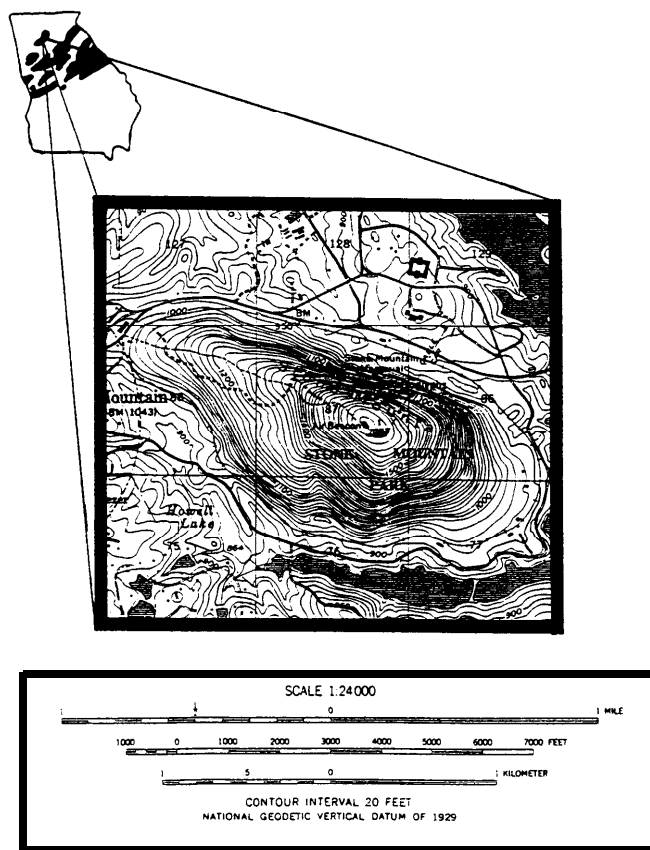


Figure 1. State of Georgia with shaded areas of igneous outcrop and U.S. Geological Survey topographic map showing elevation and features of the Stone Mountain pluton.

is observable from tens of miles away and is surrounded, at ground level, by metamorphic rocks and "Stone Mountain Granite." The highest point of the mountain is 1683 feet above sea-level. Questions remain as to how much overlying rock (termed overburden) once covered the mountain. The overburden thickness has been estimated as 2 to 10 miles (Anonymous, 1987; Grant, 1986, p. 285; Whitney, Jones and Walker, 1976, p. 1067; Atkins and Joyce, 1980, p. 1). The removal of the overburden is a very important point in the reconstruction for the exposure of Stone Mountain. It is proposed to have been removed through slow uniformitarian weathering processes and uplift. These points are key points of separation between the two models.



Figure 2. Stone Mountain rises approximately 780 feet above the surrounding land surface. One building on top of the mountain, seen in this picture, is six stories high.

Origin

The original sediments which, through heat and pressure, altered into a granitic magma, and which now form Stone Mountain are believed to have been derived from clastic (i.e., sandy to argillaceous) sediments possibly combined with volcanic flows or ash deposits (Grant, 1962, p. 5; Herrmann, 1954, pp. 78-79). Tectonic and orogenic events associated with the formation of the Southern Appalachians resulted in the transformation of the original clastics into metamorphic rocks. The formation of the metamorphic rocks, which account for much of what is believed to have been overburden, date to Precambrian time (Herrmann, 1954, p. XV).

Stone Mountain is believed to have been intruded in the last orogenic event (Alleghenian Orogeny) associated with the Southern Appalachians. For a suggested uniformitarian chronology of events associated with the formation of Stone Mountain, see Appendix I.

According to Whitney et al. (1976, p. 1073), the Stone Mountain Granite was intruded into the Lithonia Gneiss and the overlying metamorphic rocks during the Late Pennsylvanian Period. This age date correlates directly with a belt of intrusives in South and North Carolina identified as the "300 Ma old group" (Fullagar, 1971, pp. 2856-2857; McSween, Speer and Fullagar, 1991, pp. 121-125).

Stone Mountain Granite may represent an anatectic granite which was possibly derived from the surrounding metamorphic rock. However, serious questions remain and the source rock for the Stone Mountain pluton and surrounding granitic rock mass remains an unresolved mystery (Grant et al., 1980, p. 52).

Flow structures developed during the intrusion of the pluton which include flowage foliation, mica fluctuation about an axis of rotation, and parallel orientation of micaceous autoliths (Herrmann, 1954, p. XV). These flow structures are also believed to show that the mountain was not intruded in one event, but rather in several pulses, reflected by the occurrence of flow-banded autoliths which represent an earlier cooling period [Figure 3] (Grant 1962, p. 6; Grant et al., 1980, p. 47; Grant 1986, p. 286).

According to Grant et al. (1980, p. 48), the magma intruded from the east into previously folded meta-



Figure 3. Flow structures seen on east end of the mountain. These structures suggest that the granite might have been intruded in pulses, as opposed to one event. However, the author suggests these structures indicate compression of the granite in a semi-solid state.

morphic rocks, as indicated by fold structures. However, it is also possible that the granite was intruded upward through northwest trending dikes (Grant, 1986, p. 286). The intrusion possibly started with the formation of a small, probably basally flattened ellipsoidal mass of magma (Grant et al., 1980, p. 48). The magma expanded parting the country rock into thin sheets. With further intrusion and expansion the country rock would be broken into xenoliths (Figure 4), which were carried outward and away from the initial point of intrusion (Grant et al., 1980, p. 48). The magma is believed to have cooled from west to east as indicated by mica growth in xenoliths found on the east end of the mountain, but not on the west end.

Questions remain regarding the rates of both uplift and erosion. An evaluation of the data shows confusing emplacement depths and uplift and erosional rates. For example, uplift is believed to have played a role in the exposure of Stone Mountain. Erosion alone could only have removed 6 to 8 km (3.7 to 5 miles) of overburden (Dallmeyer, 1978, pp. 142-143; Whitney et al., 1976, p. 1076). The remaining 10 to 15 km (6.2 to 9.3 miles) of overburden is believed to have been

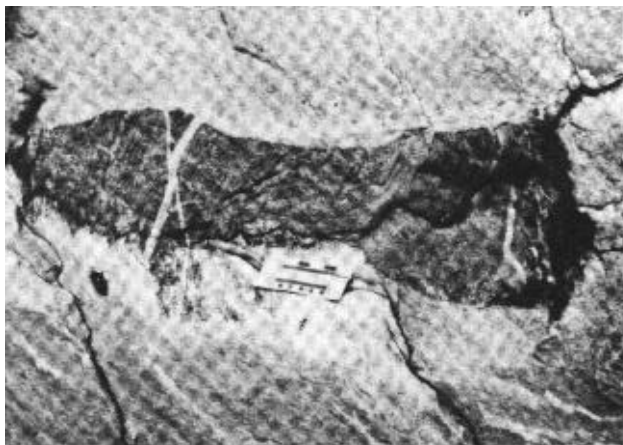


Figure 4. Xenolith of banded biotite gneiss cross-cut by quartz-felspar dikes. Scale in inches and centimeters.

removed by subsequent uplift, but this remains unproven. These numbers do not add up and this reflects just one point of weakness in the uniformitarian model for the formation of Stone Mountain.

As previously mentioned, the rate of uplift remains unresolved. According to Dallmeyer (1978, p. 142), the Stone Mountain pluton was uplifted 37,729 feet (7.1 miles) over 71 Ma. Debate exists as to when Stone Mountain became exposed at earth's surface. Dallmeyer (1979, pp. 141-143) has proposed that Stone Mountain became exposed around 220 Ma ago and offers the Late Triassic unconformity between the crystalline rocks and nonmarine elastic rock within the Dan River Basin of North Carolina as evidence. Atkins and Joyce (1980, p. 1) suggest that the mountain became exposed only 15 Ma ago.

Granitic Composition

Stone Mountain, a leucocratic admellite or quartz monzonite (Herrmann, 1958, p. 29; Whitney et al., 1976, p. 1067), ranges in compositional variation between a granite (nearly equal amounts of quartz, alkali feldspar and plagioclase) to granodiorite (containing equal amounts of quartz and plagioclase with 10% to 25% alkali feldspar) [Grant, Size and O'Connor, 1980, p. 43].

Two divergent opinions exist for the formation of Stone Mountain Granite. According to Whitney et al. (1976, p. 1071), in terms of mineralogy and major and minor-element chemistry, Stone Mountain Granite has a highly differentiated composition brought about by fractional crystallization and fractional melting. This has resulted in a granite of homogenous peraluminous composition, lacking chemically related mafic lithologies. However, according to Grant et al. (1980, p. 44), the wide range in silica composition for the Stone Mountain Granite is believed to represent repeated periods of anatectic granite-melt emplacement rather than indicating a trend in magma differentiation. These conflicting models for the granitic magma source reveal to the reader that serious questions remain regarding a suitable source material.

The minerals which compose the Stone Mountain Granite are described as fine to medium-grained. The granite is composed of quartz, plagioclase feldspar, microcline and muscovite with a minor amount of brown biotite and small tourmaline clusters (Herrmann, 1954, p. 30; Grant et al., 1980, p. 43). The grain size of those minerals, which compose the granitic rock, is believed to be a function of the amount of time that magma has to cool. The faster that magma cools the smaller the grain size of the minerals which form. Stone Mountain granitic rock mineral grain size ranges from 1 to 4 mm (Grant et al., 1980, p. 43). An interesting feature of Stone Mountain Granite is that the grain size is equigranular across the entire mountain. This suggests that the mountain cooled quickly and uniformly. Additionally, the granite exhibits flow banding at several areas across the mountain (Grant, 1986, p. 287). This implies that as the magma was flowing as it was cooling and forming minerals. This movement would serve to expose greater surface area to cooling by the surrounding country rock. Yet with cooling occurring across the granitic mass, the granite retained its uniform granular size and composition.

Xenoliths

Xenoliths are chunks of the original country rock in the granitic rock. The xenoliths found at Stone Mountain consist of biotite gneiss and amphibolite which are believed to be characteristic of the older metamorphic rocks which at one time covered the mountain [Figure 4] (Atkins and Joyce, 1980, p. 11). The lithology of the xenoliths varies and includes biotite and a muscovite-biotite with garnet mica schist (Grant et al., 1980, p. 47). Distribution of the xenoliths is irregular, with concentrations predominantly on the east and west ends of the mountain. Structures in xenoliths include schistosity and gneissic banding (Grant et al., 1980, p. 47).

Sheeting Structure

Sheeting structure is displayed over the entire surface of Stone Mountain. Individual sheets range from a fraction of an inch up to several feet or possibly even tens of feet in thickness (Hopson, 1958, p. 65). Sheet formation has been attributed to the release of overburden confining pressure, which has resulted in the expansion (dilation) of the granitic rock. Dale (1923, p. 30) found that newly quarried blocks of Stone Mountain granite expanded 0.1 percent in the direction of greatest confinement. Hopson (1958, p. 65) has reported sheets of Stone Mountain granite as thick as 12 feet. Sheet thickness has been found to increase with depth. The sheeting of the Stone Mountain Granite will vary due to uplift, warping, release of confining overburden, etc., and will contribute to the breakup and erosion of the mountain.

Jointing, Fracturing and Faulting

Jointing on Stone Mountain is generally poorly developed. Joint attitude measurements collected from different areas of the mountain show no preferential orientation for development [Figure 5] (Grant et al., 1980, p. 47). Joints and joint sets are believed to be caused by two different mechanisms. The first is due to stress during folding and the second is due to contraction of the cooling magma (Atkins and Joyce, 1980, p. 5). Some joints remain as unfilled cracks in the rock, while other joints have been filled with magma intruded later, forming dikes. The mineral composition of the dike is believed to reflect the rate at which they cooled. Aplite dikes form where fast cooling conditions existed (smaller rock crystal sizes), while pegmatite dikes (Figure 6) formed under more slow cooling conditions (larger rock crystal sizes). Additionally, a third type of dike exists at Stone Mountain. These dikes show no real zone of contact, rather these dikes blend into the surrounding granitic rock (Figure 7). These blended contacts suggest that the dike was intruded into the granite while the granite was still molten (Lahee, 1931, pp. 128-129). Also associated with the jointing are biotite schlieren, which appear to be the result of sheared xenoliths rather than magmatically formed concentrations of biotite (Figure 8). Both Mount Arabia, a migmatite dome to the south, and Stone Mountain show minor, late brittle faulting and mineralization along joints which is believed to be in association with intrusion of Triassic diabase dikes (Grant, et al., 1980, p. 41). Much like what was previously stated regarding sheeting, the jointing, fracturing and faulting will occur at various rates due to uplift, warping, breaking of



Figure 5. Jointing and weathering of granite has resulted in widening the joints and eroding the jointed rock into blocks.



Figure 6. A mineralized fracture (i.e., dike) pegmatite. This pegmatite contains crystals of quartz, feldspar, muscovite and tourmaline. Scale in inches and centimeters.

granitic sheets, release of confining overburden, etc., and will contribute to the erosion to the mountain.

Fractures are created by both physical (e.g. dilation, expansion and contraction due to temperature changes, freezing and thawing of the water within the fractures and exfoliation) and chemical (rainwater and plant acid dissolution of the minerals) processes (Figure 9). Fractures also serve as conduits for water movement and several areas of the park have natural flowing



Figure 7. Blended pegmatite dike. This dike does not show sharp contact with the surrounding granite, rather the contact grains blend together.

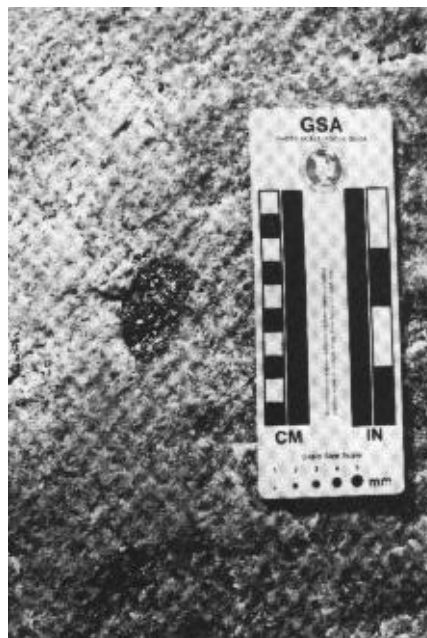


Figure 8. Biotite Schlieren. Heat and pressure are believed to have modified the original xenolith rock pieces into these biotite schlieren.

springs immediately following precipitation events (Figure 10).

Diabase Dikes

Sometime following the intrusion or intrusions of the granitic pluton into the surrounding country rock, another intrusive event occurred quite different from the previous ones. This intrusion was composed of diabase, a rock of basaltic composition (Figure 11). It is unknown

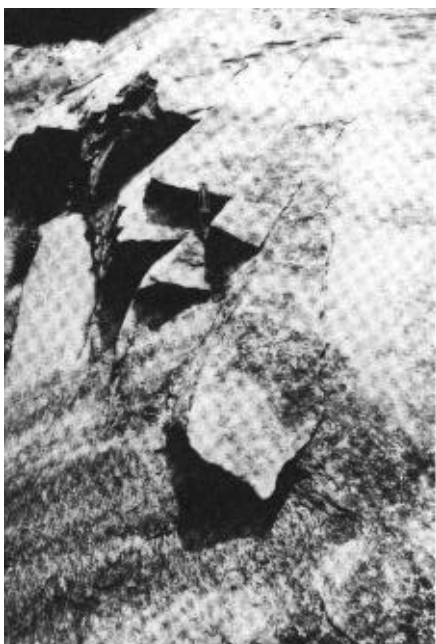


Figure 9. Joints, Fractures and sheeting are all represented in this figure. Scale in center of photo is 6.5 inches.



Figure 10. A spring flows from a fracture in the granite. Several areas in the Park exhibit fracture flowing springs following precipitation events.

whether this rock was derived from melted crustal rock or from deeper rock derived from the earth's mantle. The diabase dikes appear to trend in a north-west-southeast direction (Atkins and Joyce, 1980, pp. 12-13). These diabase dikes are associated with a Triassic age rift which occurred along the eastern side of the Appalachian mountains and are believed to have formed as a result of the breakup of the Pangaeon supercontinent (Olsen, Froelich, Daniels, Smoot, and Gore, 1991, p. 142). A chronological reconstruction of the intrusive events associated with dikes is given in Appendix II.

Geomorphic Processes

Today the surface of the mountain is exposed to atmospheric erosional processes. Weathering begins with meteoric water percolating downward through

vertical joints of tectonic origin and horizontally along sheet joints which are of dilation origin (Grant, 1963, p. 70). The jointing and fracturing aids in the exfoliation (thin sheets of rock which break off parallel to the surface of the exposed rock-like the skin of an onion) process of erosion, by breaking the rocks into blocks (Figure 12). Weathering enhances the exfoliation of the rock resulting in some cases, in the complete detachment of the block from the mountain (Figure 13). This exfoliation process was exploited by quarry workers when the mountain was a source of granite (Figure 14). Stone Mountain is now a Confederate Memorial Park and is no longer quarried for granite.

Today the mountain continues to exfoliate layers of granite from its surface (Figure 15). Additionally, many spall layers lie at the base of the mountain and reflect the fact that they were at one time a part of the mountain (Figure 16). Exfoliation is likely the greatest single

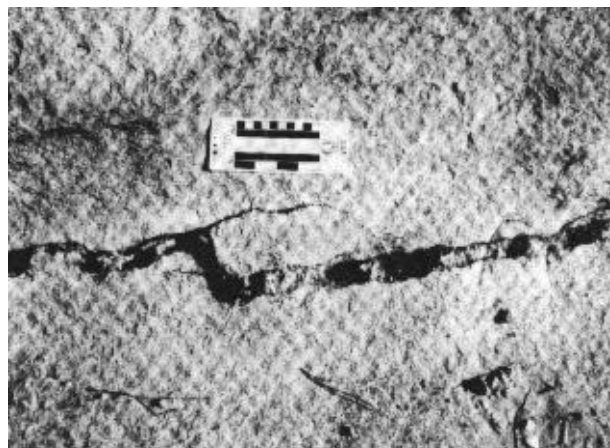


Figure 11. A diabase dike cuts through the granitic mass. Scale is in inches and centimeters.

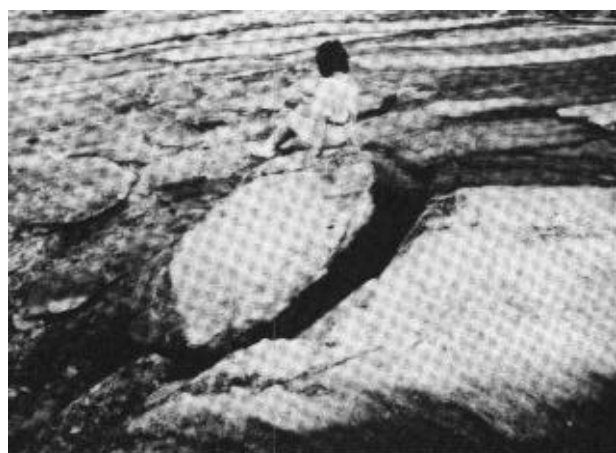


Figure 12. An exfoliated sheet of granite eventually breaks into blocks due to internal jointing and/or fracturing.

process controlling the dome shape of Stone Mountain (Grant et al., 1980, p. 43; Hopson, 1958, p. 73).

A weathering pattern particularly associated with the granite pavement is the pit and dome structure [Figure 17] (Grant, 1986, pp. 296-287). Domes form as

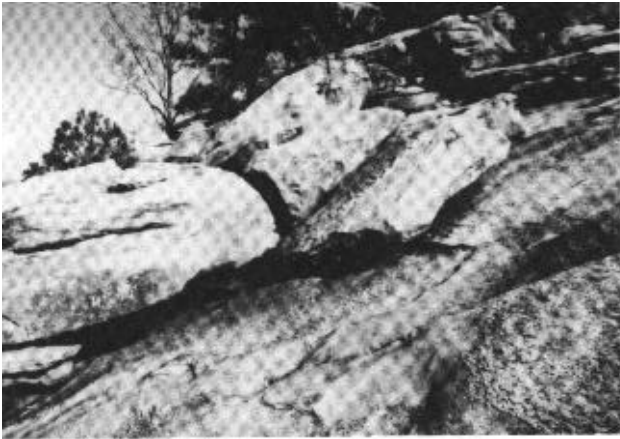


Figure 13. Blocks of granite lie on the mountain surface. These blocks, each weighing several tons, are completely detached from the mountain. At one time these blocks formed another layer of granite over the mountain. Perhaps this outer layer was removed by the Flood? The spall lying at the base of the mountain does not calculate to what is necessary to cover the mountain with another layer.



Figure 16. Large sheets of exfoliated granite lie at base of mountain. These sheets of rock, some weighing several tons, are post-Flood deposits.



Figure 14. Drill holes mark the joint which the quarry workers used to break the granite for use as ornamental stone. Rock hammer rests on ledge in center of block, for scale. Note also the flowing water issuing from lower sheet surface.

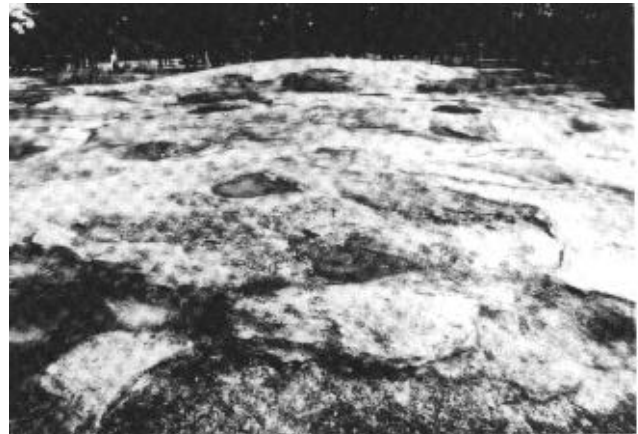


Figure 17. Pit and dome structure. Granite pavement weathers into pits and domes due to exfoliation and dilation.

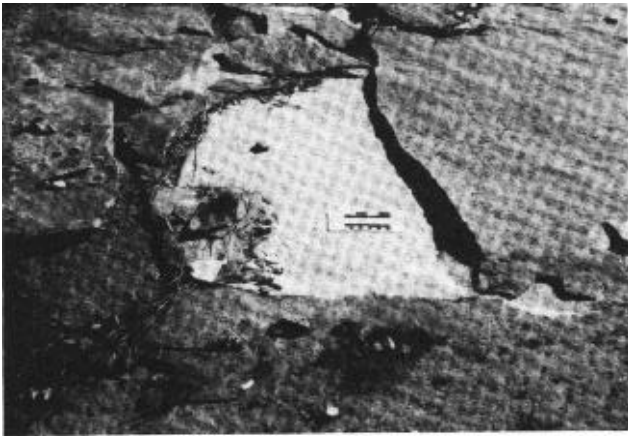


Figure 15. Exfoliation continues on Stone Mountain. Large sheets break from the granitic rock mass due to dilation, jointing and fracturing.



Figure 18. Vernal pools atop Stone Mountain. These pools are home to unique forms of plant and animal life.

areas around them erode into pits. They are believed to be formed by dilation and associated weathering (Grant, 1986, p. 285). The pits or depressions fill with water following precipitation events, turning them into vernal pools (Figure 18). Lammerts (1978) discusses the unique flora and fauna associated with vernal pools occurring in the western U.S. and their possible time of formation within the context of the Flood model. The vernal pools at Stone Mountain range in size from 6 inches to a few tens of feet in diameter and are also home to unique (but surprisingly similar to those discussed by Lammerts) forms of plant and animal life. Two different types of shrimp (i.e., clam and fairy) live in the clear freshwater pools during the rainy season (Anonymous, 1987). Smith (1941, pp. 117-127) found that the standing water in the depressions were acidic (Ph 5.0-5.4) due to plant activity. He further speculated that the acids contributed to the chemical weathering of the granite. Additionally, it is now recognized that acid rain exists, due to air pollution, at a Ph around the previously stated range and also contributes to the chemical weathering of the granite.

A second type of weathering pit has developed on Stone Mountain. These pits are small, elliptically shaped depressions which aligned parallel to the flow structure of the granite [Figure 19] (Herrmann, 1954, p. 6; Hopson, 1958, pp. 72-73). This author believes that these secondary elliptical pits also weather to form vernal pools seen on the mountain.

Rocks exposed at the top of the mountain are subject to freezing and thawing (winter months) and heating and cooling (summer months). The freezing and thawing weathering process is believed to have created a weathering pattern similar to what is seen on the Antarctic continent (Figure 20). Differential erosion occurs where there is a variation in rock composition. This has occurred where the granite has weathered away around the harder tourmaline crystals, creating a pimple like surface (Figure 21). Additionally, wind blown sand contributes in a minor way to the erosion of the mountain by abrasion.

According to Hopson (1958, pp. 75-79), intergranular wedging by crystallizing salts and expansion of mineral grains accompanying hydration are probably the two most effective weathering mechanisms working to break down the granite. According to Hopson (1958, pp. 75-79), Stone Mountain granite is no longer considered of sufficient grade or quality for use as monumental stone due to its low resistance to weathering. The granite has been shown to weather rapidly in a moist environment. The granite weathers into sheets and/or blocks, which further weathers to form a saprolite (i.e., soil).

Saprolite develops as a result of weathering of the granitic or basaltic rock. Weathering of the granite produces a saprolite composed predominately of kaolinite, with minor amounts of endellite, quartz, muscovite and microcline (Grant, 1963, p. 70). The saprolite is usually white and structureless, containing disseminated muscovite flakes [Figure 22] (Herrmann, 1954, p. 5). where diabase dikes (i.e., basalt) are present the saprolite develops a deep red color, due to the iron content of diabase, which oxidizes.

The relatively thin layer of saprolite overburden on and around Stone Mountain (ranging from 0 to 8 feet)



Figure 19. Secondary weathering feature. Scale is in inches and centimeters.



Figure 20. Weathering not only occurs along top and bottom of rock but also along the sides of the granite. This same weathering feature is seen in granitic rock on the Antarctic continent and is called case hardened or core softened granitic weathering. It is believed to be caused by the freeze/thaw cycle.



Figure 21. Tourmaline crystals are harder than the surrounding granitic rock and as a result they weather more slowly and create raised bumps on the granite pavement. Also note secondary weathering patterns and dry pits.

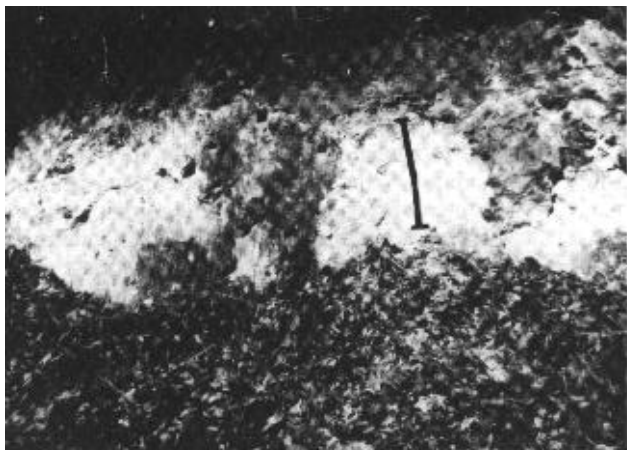


Figure 22. White saprolite which is derived from weathered Stone Mountain Granite. Scale is 3.5 feet (The rod in the photograph has been retouched for clarity). Saprolite at this locale was approximately 6.5 feet thick. The top 2 feet of saprolite has a light brown color due to organic activity.

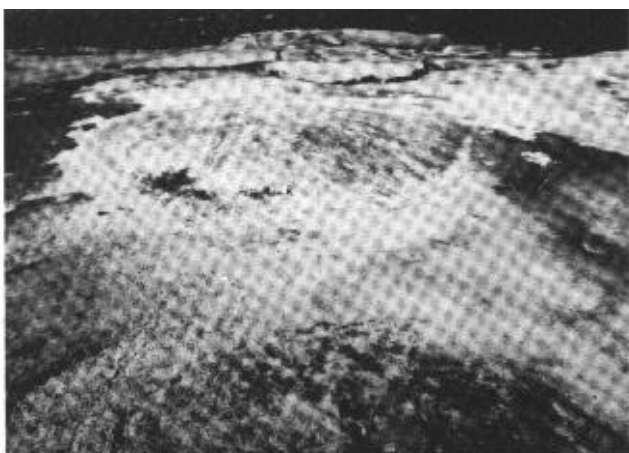


Figure 23. Sand dome atop Stone Mountain. Saprolite has accumulated in a depression on top of Stone Mountain forming a dome approximately 12 feet in diameter by 2 feet high.



Figure 24. Pit and dome structure showing a sand filled vernal pool in the foreground and a plant community in the adjacent vernal pool in the background.

reflect, in the author's opinion, the short amount of time that has been available for soil to develop. The author believes that greater saprolite development should have occurred if the 15 Ma exposure time is used, and especially if the 220 Ma date is correct.

On the mountain pavement, the eroded sand size particles accumulate in areas of low relief behind large objects which block the wind (Figure 23). With a sufficient buildup of this soil, plant life is able to establish itself and grow (Figure 24). Due to the increase in organic content in the soil, the white saprolite changes to a gray and/or black color (Herrmann, 1954, p. 5). Studies of the soils show an increase in clay mineral content with soil thickness (Grant, 1986, p. 287).

Creationist Interpretation

The author supports Gentry's (1988, p. 133; pp. 194-195) position regarding the formation of granites during the creation week (e.g., granite cores of the proto-Southern Appalachians) and again during the Flood event (e.g. Stone Mountain Granite). From a creation geologist's perspective the Appalachian mountains might have had their beginnings when land was first separated from the waters during the creation week (Genesis 1:9). Uniformitarian geoscientists have classified the Appalachian granites in Georgia into either older or younger intrusives, with the Stone Mountain Granite falling into the younger category (Crickmay, 1952, p. 34). It is further believed that Stone Mountain was intruded at or near the end of the regional deformation (Alleghenian Orogeny) associated with the Southern Appalachians (Grant, 1962, p. 6; Grant et al., 1980, p. 41).

According to McQueen (1987, p. 247), the orogenic activity associated with the formation of the Appalachian mountains took place over a six month timeframe towards the end of the Flood event; he defines this time interval as Phase III. McQueen did not differentiate between the uniformitarian orogenic events associated with the deformation of the Southern Appalachian mountains (i.e., Late Precambrian/Cambrian, Taconic, Acadian and Alleghenian orogenies). The author believes that one or more of the above referenced orogenies could be associated with the Creation week and the remaining orogenies could be associated with the Flood event. According to Whitcomb and Morris (1961, p. 9), the Flood waters began to recede beginning on the 150th day. The decrease in water level could directly relate to tectonism via seafloor spreading, continental collisions and tensional lateral plate movements. The author supports McQueen's position for the formation of the Stone Mountain pluton towards the end of the Alleghenian Orogeny (defined by this author as a late Flood orogenic event) in association with the latter stages of the Flood event. Additionally, this author believes that the Stone Mountain granitic magma formed as a result of the mixing of some remelted original primordial granite with melted surrounding rocks and sediments (Gentry, 1988, pp. 184-185). This could explain why the Stone Mountain Granite is compositionally different from all of the other granites in the area.

The author suggests that possibly the source magma of Stone Mountain was derived from deep within the crust during the tectonic event identified as the Alle-

ghenian Orogeny (a Flood generated orogenic event). Tremendous heat and pressure were generated during this event and the author believes that two separate magmas were created, one being the crustal felsic or granitic magma (of which Stone Mountain is composed) and the other being the mantle mafic or basaltic magma (of which the basalt dikes are composed). Initially the lighter and larger felsic magma would rise quickly being intruded into the metamorphic overburden. The smaller slower rising mafic magma would be later intruded into the cooling semi-solid granitic rock mass and any metamorphic country rock not eroded by Flood waters, thus providing both granitic rock and basaltic dikes. Support for my suggestion comes from the fact that the Southern Appalachian Mountains and all of the orogenic events associated with their formation are viewed (by uniformitarian research) as having occurred as a result of stacking and shuffling of relatively thin sheets of crustal material and all basaltic rock is viewed as being derived from the earth's mantle (Cook et al., 1980, pp. 139-155). The diabase intrusions into the Stone Mountain Granite are believed to have occurred during a rifting period in the Triassic (also a Flood generated orogenic event). Additional research and field work is necessary to reconstruct how this event occurred and the diabase was emplaced.

The formation of granitic rock remains a mystery for geologists. Gentry (1988, p. 131) has pointed out that with all of the volcanic activity across the earth, geologists have yet to show how granites crystallize from a granite melt. Even today there is no way of recreating in the laboratory how granite forms in the subsurface. So the question of how and why granites form coarse grained structures as opposed to fine grained structures remains an enigma.

Granitic rock is commonly characterized by grain size and composition and the Stone Mountain Granite is no exception. What is interesting is in the fact that Stone Mountain Granite is the same, both in grain size and mineral composition, from the east end to the west end of the mountain (a distance of approximately 1.9 miles). Normally magmatic masses are said to cool over millions of years and vary in composition due to differentiation of the cooling magma. Stone Mountain does not show any differentiation in granitic composition. The author believes that the homogeneity of the granite reflects rapid emplacement. At a later time additional intrusive events occurred resulting in pegmatite and aplite dikes and later still the diabase dikes which cross-cut the granite.

The amount of time suggested by the previously cited authors for the cooling and exposure of the Stone Mountain granite (i.e., 71 Ma) is quite rapid considering the timeframe for its emplacement and subsequent exposure. The overburden and surrounding rocks, which at one time covered the pluton, are gone (Figure 2). Today, when looking at Stone Mountain, two obvious questions come to mind: Where did all the overlying and surrounding sediments go and when did it happen?

Once again, from the creationist perspective, the Flood event was a time of intensive tectonic (orogenic) activity. Magma, created as a result of plate tectonic collisions and associated heat and pressure, would have been squeezed into the overlying rocks, causing them

to be uplifted. The author believes that Flood waters eroded away both the overlying and surrounding sediments and rock from the quickly cooling granitic pluton. Eventually, due to the rapid erosion which was occurring, the cooled mountain surface would be exposed to the Flood waters which would further erode the granitic mass. With the release of the overburden weight (which served to compress the cooling magma mass) the mountain would expand, resulting in exfoliation. The Flood waters might even have eroded away the outer exfoliated layers of the exposed granitic surface. The end of the Flood event and subsequent draining of the waters to the ocean basins would place the mountain and surrounding land surface at close to present conditions. The ensuing ice age would contribute increased precipitation to the mountain and surrounding metamorphic rock surface, resulting in the formation of saprolite (i.e., soils) on which plant life would reestablish itself. An oak hickory forest climax could have developed around the base of the mountain in as little as 150 years following the Flood, provided that sufficient soil developed rapidly enough to support such a forest [Figure 25] (Odum, 1971, p. 261). The reader must realize that this is a "catastrophic" interpretation as to events which happen during the Flood event. Many questions and issues remain to be resolved, however, this model is a starting point.

Conclusion

Stone Mountain provides witness to orogenic events of monumental proportion which have occurred in earth's past. I believe that Stone Mountain formed and was exposed as a result of the events associated with the Flood event described in Genesis. The mountain we see today has not been exposed due to peneplanation, but rather has been exposed due to erosion during and following the Flood event. The forest which grows on and around the mountain has adapted to the shallow nature of the saprolite or soils which have formed above the underlying rocks from the Ice Age to present timeframe.



Figure 25. Climax Hardwood forest at the base of the mountain. This forest exists at the base of the mountain in no more than 2.5 feet of soil. Trees are approximately 35 to 45 feet tall. Stone Mountain is immediately in background and provides the dark backdrop.

Appendix I Uniformitarian Chronology for the Formation and Exposure of Stone Mountain

Dallmeyer (1978, p. 142) has suggested the following chronology of events associated with the formation of Stone Mountain (parenthesis mine):

1. At ~365 Ma the present erosional level (i.e., land surface as exists today) was at a depth between 23 (14.3 miles) and 29 km (19 miles) and maintained at a metamorphic temperature of ~725°C (1337°F).
2. At ~325 Ma temperatures had dropped below those required for argon retention in hornblende (for argon dating purposes).
3. At ~300 Ma temperatures had dropped below those required for argon retention in biotite (for argon dating purposes).
4. At ~291 Ma the Stone Mountain granite was emplaced at a depth of ~12 km (7.5 miles).
5. By approximately the Late Triassic (~220 Ma) the present erosional level was nearly exhumed.

Appendix II Cross-cutting Relationships

The Law of Cross-cutting Relationships forms the basis for the chronological reconstruction of an intrusive event into the surrounding country rock. However, this law does not give an absolute age date for the event, it only gives a "what came first" chronology, or relative date. Age dating by radioactive techniques serves to further "refine" the age of the rock. Age dating of Stone Mountain Granite has been done by Pinson, Fairburn, Hurley, Herzog and Cormier (1959, pp. 58-60) and Long, Kulp and Eckelmann (1959, pp. 595-603), using biotite and muscovite, respectively. The biotite was analyzed using the Rubidium-Strontium method and was found to be approximately 280 +/- 14 Ma old. The muscovite was analyzed using the Potassium Argon method and was approximated as 294 +/- 10 Ma old. Standard uniformitarian radioactive dating assumptions were used in both dating techniques and both reinforce the Pennsylvanian/Permian date presumed to be the time of intrusion.

This information is presented to show how the Law of Cross-cutting relationships is used, in this case, to reinforce the preexisting uniformitarian timescale. The youngest rock cross-cut by an intrusion is older than the intrusion and serves as the beginning point for an age date determination of the intrusion. The scale used in age determination is the evolutionary uniformitarian timescale. Hence any radioactive dating method used will seek to reinforce the already accepted Pennsylvanian/Permian date.

Glossary

Admellite—A variety of granite containing a calcium-bearing plagioclase, usually oligoclase and a potassium feldspar in roughly equal amounts.

Anatectic/Anatexis—A high-temperature metamorphic process by which plutonic rock in the deeper levels of the crust is dissolved and regenerated as a magma.

Aplite—A dike rock consisting essentially of quartz and alkali feldspar, with a fine-grained, sugary texture.

Autolith—An inclusion or fragment of older igneous rock that is genetically related to the rock and has partially melted and mixed with the rock.

Country Rock—A general term applied to rocks invaded by and surrounding an igneous intrusion.

Diabase—A rock of basaltic composition, consisting essentially of labradorite and pyroxene, and characterized by ophitic texture.

Dike—A tabular body of igneous rock that cuts across the structure of adjacent rocks or cuts massive rocks. Although most dikes result from the intrusion of magma, some are the result of metasomatic replacement.

Dilation—The expansion of the rock mass following the removal of the overburden confining pressure, usually resulting in exfoliation.

Exfoliation—(also known as spalling or sheeting) The breaking of sheets of rock from the surface of the same rock by the action of either physical or chemical forces.

Fault—a fracture or fracture zone along which there has been displacement of the sides relative to one another parallel to the fracture.

Felsic—applied to light-colored rocks containing quartz, feldspars, feldspathoids and muscovite.

Gneiss—A coarse-grained rock in which bands rich in granular minerals alternate with bands in which schistose minerals predominate.

Igneous—Formed by solidification from a molten or partially molten state. Rocks formed in this manner have also been called plutonic rocks.

Joint—Fracture in rock, generally more or less vertical or transverse to bedding, along which no appreciable movement has occurred.

Law of Cross-cutting Relationships—A stratigraphic principle whereby relative ages of rocks can be established. An igneous rock is younger than any rock across which it cuts.

Leucocratic—A term applied to light-colored igneous rocks which contain from 0 to 30% dark minerals.

Mafic—Pertaining to or composed dominantly of the magnesian rock forming silicates. Synonymous with "dark minerals"

Metasomatism—The processes by which one mineral is replaced by another of different chemical composition due to reactions set up by the introduction of material from external sources.

Migmatite—Rock consisting of a composite of igneous or igneous looking and/or metamorphic materials.

Monadnock—A residual rock, hill or mountain standing above a peneplain.

Monzonite—A granular plutonic rock containing approximately equal amounts of orthoclase and plagioclase.

Ophitic—A term applied to a texture characteristic of diabases or dolerite in which euhedral or subhedral crystals of plagioclase are embedded in a mesostasis of pyroxene crystals, usually augite.

Orogeny—The process of forming mountains.

Overburden—Material of any nature, consolidated or unconsolidated, that overlies the geologic object of interest.

Pegmatite—Igneous rocks of coarse grain found usually as dikes associated with plutonic rock of finer grain size.

Peneplain—A land surface worn down by erosion to a nearly flat or broadly undulating plain.

Peraluminous—In the Shand classification of igneous rocks, a division embracing those rocks in which the molecular proportion of alumina exceeds that of soda, potash and lime combined.

Pluton—A body of igneous rock that has formed beneath the surface of the earth by consolidation from magma.

Saprolite—A soft, earthy, clay-rich, thoroughly decomposed rock formed in place by chemical weathering of igneous or metamorphic rocks.

Schist—A medium or coarse-grained metamorphic rock with subparallel orientation of the micaceous minerals which dominate its composition.

Schlieren—Tabular bodies, generally a few inches to tens of feet long, that occur in plutonic rocks. They have the same general mineralogy as the plutonic rocks, but because of differences in mineral ratios they are darker or lighter; the boundaries tend to be transitional.

Tectonic—Pertaining to or designating the rock structure and external forms resulting from the deformation of the earth's crust.

Xenolith—Rock fragments of surrounding country rock which are unmelted in the original intrusive rock.

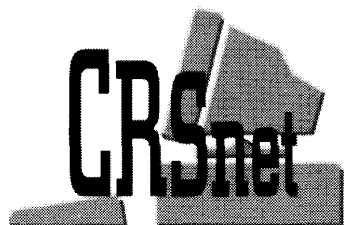
Acknowledgements

The author thanks Dr. E. L. Williams and the anonymous reviewers who reviewed and commented on this article. Additionally, I thank my wife Susan for giving me time to research and write this article.

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FOSSIL WOOD OF BIG BEND NATIONAL PARK, BREWSTER COUNTY, TEXAS: PART IV—WOOD STRUCTURE, NODULES, PALEOSOLS AND CLIMATE

EMMETT L. WILLIAMS, GEORGE F. HOWE, GEORGE T. MATZKO, RICHARD R. WHITE AND WILLIAM G. STARK*

Received 26 March 1994; Revised 7 June 1994

Abstract

The various charcoalified and petrified wood samples collected from the Dawson Creek region of Big Bend National Park are examined optically and by scanning electron microscopy. No discernible growth rings were detected in the specimens. Also the nodules collected are examined by scanning electron microscopy. Possible past climate change in the Big Bend region is discussed.

Key Words: Charcoalified Wood; Silicified Wood; Paleoclimate Fluctuation; Dawson Creek, Big Bend National Park.

Introduction

Several specimens of silicified and charcoalified wood were collected from the Upper Cretaceous Javelina and Aguja formations in the Dawson Creek area of Big Bend National Park by permission of the National Park Service (Williams and Howe, 1993). The mechanisms of silicification and possible rapid petrification of fossil woods were discussed (Williams, 1993). Various chemical tests were performed on the samples and a model for the preservation of the charcoalified wood was offered (Williams et al., 1993). This Part provides more information on the various fossil woods and other geological studies in Big Bend National Park. Also some creationist applications are suggested.

Fossil Wood

Lehman (1989, p. 199) reported that of the well-preserved petrified logs found in the flood-plain deposits of Trans-Pecos, Texas "... 61% were conifers, 31% were dicotyledonous angiosperms and 8% were palms." Three-quarters of the conifers have "... distinct or indistinct growth rings ..." However only about one-half of the dicot specimens contained growth rings.

Wheeler (1991a, 1991b) examined petrified wood from the Javelina and Aguja formations as well as from the Paleocene Black Peaks formation. Wheeler (1991a, p. 41) explained:

The Cretaceous wood assemblages of Big Bend that are dominated by dicotyledons are distinct from Cretaceous wood assemblages of higher latitudes most of which are dominated by conifers.

The Big Bend Cretaceous angiosperm woods lack distinct growth rings and have other characteristics that today characterize woods of tropical forests, by [sic] none to date resemble any single extant family. Characteristics of the vessels in these woods may be of value in tracking climate changes during the Late Cretaceous.

In her work on Paleocene dicotyledonous trees from Big Bend National Park, Wheeler (1991b) described the characteristics of *Paraphyllanthoxylon abbottii* n. sp. and cf. *Plataninium haydenii* Felix from the Black

Peaks formation. These are the first Paleocene dicotyledonous woods from North America whose anatomy has been studied. The *Paraphyllanthoxylon* trees do not have distinct tree rings and Wheeler suggested that they "... grew in a climate without marked seasonality" (1991a, p. 41). She claimed that the anatomy of the

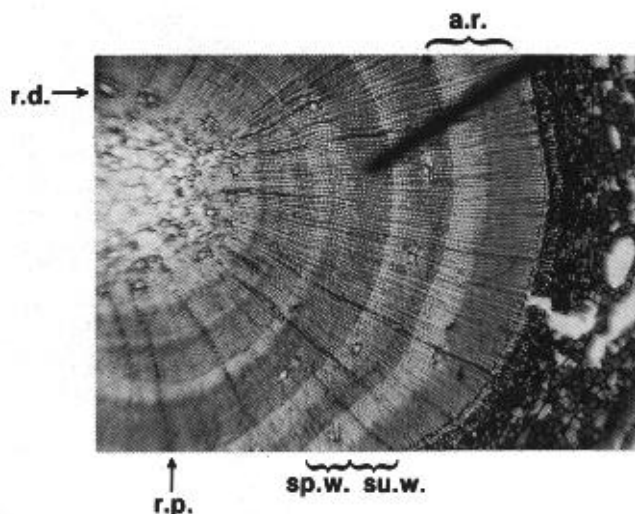


Figure 1a. Cross section of a modern pine twig, *Pinus* sp. The bracket a.r. surrounds one annual ring of xylem production. The region of "springwood" tracheids with a larger diameter (sp.w.) and "summer wood" tracheids (su.w.) are also visible. Resin ducts (r.d.) occur in the wood of pines and certain other modern gymnosperms. These cross sectional views of pine wood structure will serve as a basis of contrast with the cross sections of fossil charcoalified and silicified woods in later figures. The lines of cells appearing like spokes in a wheel are ray parenchyma cells, thought to store starch and to conduct materials in a radial direction throughout the stem (r.p.). Magnification—40X.

Paraphyllanthoxylon trees is similar to the Cretaceous woods from the Javelina formation as well as the Cretaceous woods from Arizona and New Mexico.

Note that some of our petrified woods lack distinct growth rings (see Figure 2). If these were pre-Flood trees washed into the Big Bend region by Flood waters, possibly there was no marked seasonality before the Flood or simply the trees grew in a tropical pre-Flood region. If the specimens are from early post-Flood trees which grew in the Big Bend area, it indicates possibly a tropical climate there immediately after the Flood.

*Emmett L. Williams, Ph.D., 5093 Williamsport Drive, Norcross, GA 30092; George F. Howe, Ph.D., 24635 Apple Street, Santa Clarita, CA 91321; George T. Matzko, Ph.D., 10 Berryhill Road, Greenville, SC 29615; Richard R. White, B.A., 2421 Brown Deer Trail, Acworth, GA 30101; William G. Stark, A.S., 942 Traymore Drive, Norcross, GA 30093.

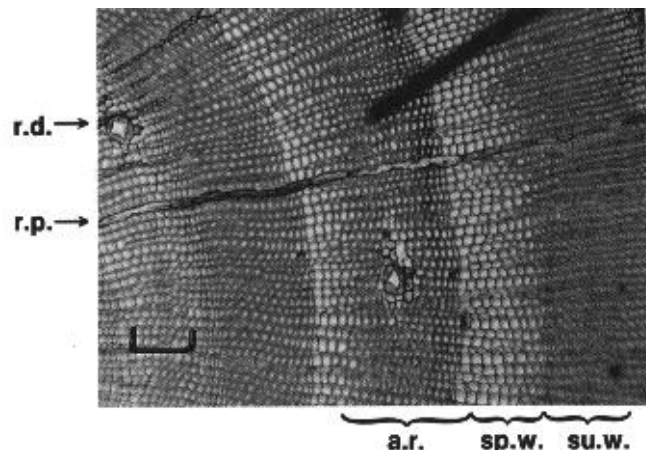


Figure 1b. Cross section of a modern pine twig at higher magnification. Annual rings, spring wood tracheids, summer wood tracheids, ray parenchyma, and resin ducts are labeled as in Figure 1a. Note again the distinct nature of annual rings. Scale bar—100 μ m.



Figure 1c. Cross section of modern pine twig at great magnification. Cell diameter decreases and cell wall thickness increases when moving from springwood tracheids (center at pointer tip, to summerwood tracheids (far right or far left). Note three elongated ray cells stretching across the center. Tracheid cell diameters range from 10-15 μ m, about three times smaller than cell diameters in the fossil wood 19, Figure 2d. Scale bar—100 μ m.

Structures of Charcoalified and Petrified Wood Samples

We have examined thin sections and scanning electron photomicrographs of the samples of fossil-wood we collected. Structural features of the specimens will be noted and compared to thin sections of modern pine trees. The reader is urged to consult Williams et al. (1993) for specific illustrations of many of the samples in situ.

Figure 1 shows various magnifications of a cross section of a modern pine twig for comparison with the fossil woods. Various microscopic views of a fossil wood specimen that may have been charcoalified somewhat before silicification are seen in Figure 2. More chemical analysis work will be performed on this sample (19). [See Williams et al., 1993, Figures 5, 6, 8 and Table II.] Scanning electron photomicrographs of a silicified specimen 19 (Figure 3) should be com-



Figure 2a. Cross section of a silicified wood sample 19 that may have been charcoalified somewhat before petrification (low power). Further chemical analysis will be performed on this sample. See Figures 5, 6 and 8 (Williams et al., 1993) for representative illustrations of this fossil wood. This photograph has the same low magnification as the pine tissues in Figure 1a. In this fossil wood the tracheids are of much larger diameter than in pine. Likewise there are no pronounced "annual rings" as in modern pine stems nor does this fossil wood have resin ducts. It is a gymnosperm wood rather than an angiosperm wood because it has no "xylem vessels" and its water conduction was thus limited to tracheids, as in the pine. Ray parenchyma cells (r.p.) are clearly visible. Scale bar—100 μ m.

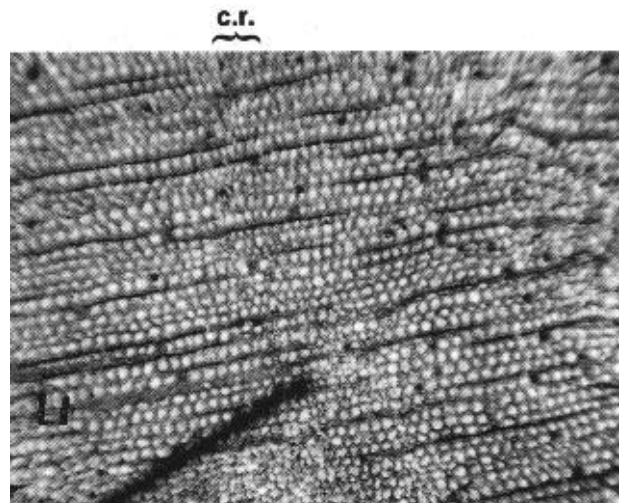


Figure 2b. Cross section of fossil wood specimen 19 showing slight circumferential ring not comparable to an annual ring. This photograph has the same low magnification as Figure 1a and 2a. One area of this slide manifests a faint circumferential ring (c.r.) containing slightly smaller than average tracheids. This may indicate a minor shift in climate for a short time period. This ring is not nearly as pronounced as the annual rings in a modern pine branch—Figure 1a. Scale bar—100 μ m.

pared with Figure 2 (optical microscopy). The structure of two charcoalified wood samples Williams et al., 1993, pp. 169-172) are shown in Figures 4-7. Scanning electron photomicrographs of silicified specimen 25 (Williams et al., 1993, pp. 172-175) are given in Figure 8. All of the data collected thus far in this investigation are summarized in Table I.

Mineral Nodules

Williams et al. (1993, pp. 173-175) collected and chemically analyzed some samples of nodules/calcified wood (?) from the Javelina and Aguja formations. One of the specimens appeared to have some wood struc-

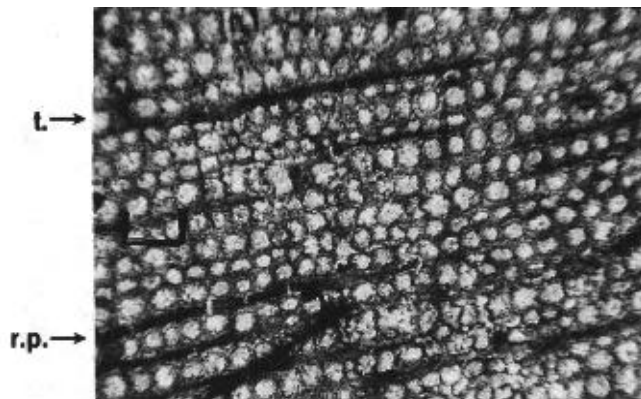


Figure 2c. Cross section of fossil wood specimen 19 at same medium magnification as Figure 1b. Note tracheid cell (t.) diameter is up to 40µm which is 3-4 times larger than cell diameters in modern pine tracheids (Figure 1b). There are no hints of annual rings in this fossil wood. Large tracheid diameters and absence of well defined annual rings fit with the theory that these trees grew where there was a rather uniform annual climate devoid of seasonal fluctuations in either rainfall or temperature. Ray parenchyma (r.p.) cells form the dark line across the center. Scale bar—100µm.

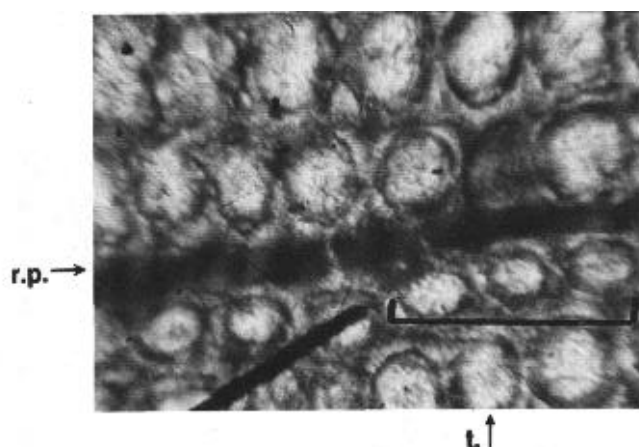


Figure 2d. Cross section of fossil wood specimen 19 at the same magnification as in Figure 1c. Ray cells are dark colored; tracheids have light open centers. No annual rings are evident nor are resin ducts seen. Cell diameter of tracheids in this fossil wood is easily three times larger than in the largest tracheid diameters of the modern pine twig, Figure 1c. Scale bar—100µm.

ture under scanning electron microscopy (Figure 10). However this conjecture remains uncertain until an examination of the sample by an authority on wood structure is completed. Interestingly Kraus (1988, pp. 888-893) examined some calcareous nodules found in Bighorn Basin, Wyoming and deduced that they were nodular remains of early Tertiary forests even though no well-preserved wood structure could be found.

Pieces of the nodules (Williams et al., 1993, pp. 174-175, Figures 13-15) found in the Dawson Creek region of Big Bend National Park tend to tear apart in wedge sections. This reminds one of certain seed plants such as cycads. Perhaps the nodules are organs from fossil cycads or cycadeoids (also known as Bennettitales). Possibly some of our readers would care to comment on the nature and identity of such cone-like nodules.

Lehman (1989, pp. 193-198) examined different types of nodules collected from the Upper Cretaceous paleosols in Trans-Pecos, Texas. None of these petrocalcic

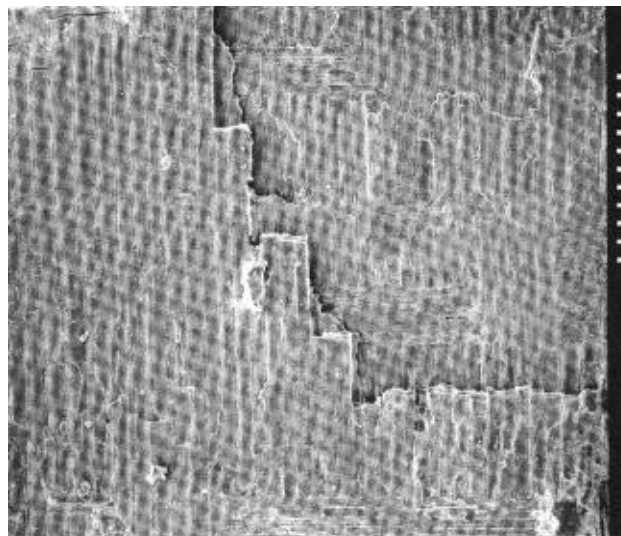


Figure 3a. Scanning electron photomicrograph of silicified wood specimen 19. Compare with Figure 2. A broad band of ray parenchyma is visible (lower center) and numerous tracheids are positioned vertically. In vertical (radial) sections like these, the tracheids look like long, vertical rectangles and the rays look like multicellular ribbons at right angles to the tracheids. Scale bar (dotted line)—500µm.



Figure 3b. Scanning electron photomicrograph of radial section from silicified wood specimen 19. Vertical cells are tracheids; cross bands are rays (composed of ray parenchyma cells). Scale bar (dotted line)—380µm.

nodules appear to be similar to the ones collected by Williams et al. (1993) but Lehman's work may be of interest to many readers.

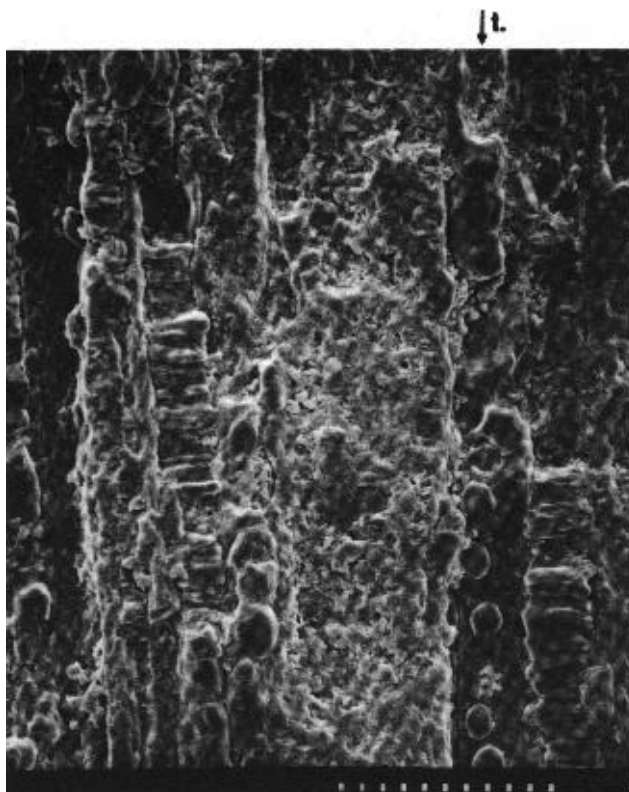


Figure 3c. Scanning electron photomicrograph of silicified wood specimen 19; radial section. Vertical cells are tracheids (t). At this high magnification, pits (p) are visible in one tracheid seen below the arrow. Scale bar (dotted line)—75µm.

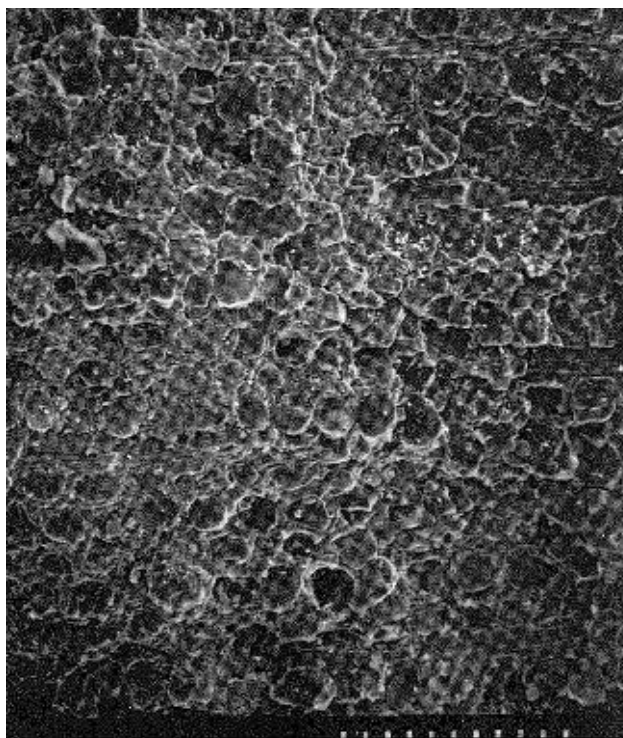


Figure 3d. Scanning electron photomicrograph of silicified wood specimen 19 in cross section. Many tracheids are visible. Scale bar (dotted line)—200µm.

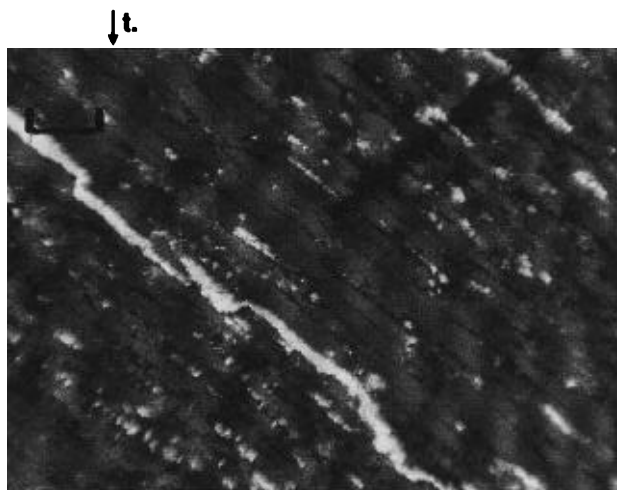


Figure 4. Radial section of the charcoaled wood limb specimen which was illustrated in Figure 1, p. 170, Williams et al. (1993). Tracheids are seen as spindle-shaped objects (t). Scale bar—100µm.

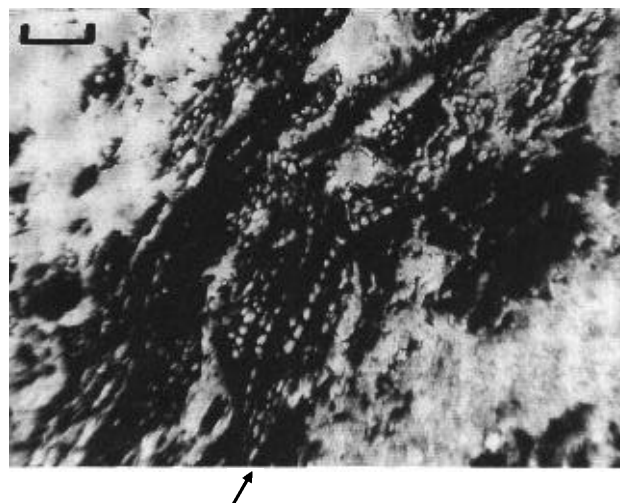


Figure 5. Mineralized surface of charcoaled wood specimen a (Williams et al., 1993, pp. 169-172). Cellular detail in charcoaled region is evident as clear dots in a row—see arrow. The other areas of the slide where no cellular detail is visible are mineralized. Compare with Figure 3. The surface cellular structure may have been distorted by the heat from volcanic action and/or fire and later mineralized. Scale bar—100µm.

Climatic Changes

Based on his studies of the Upper Cretaceous paleosols, Lehman (1989, p. 201) speculated that the "... climate in the Trans-Pecos region must have oscillated between periods of humid and semiarid character." He (1989, p. 188) suggested that the climatic cycles could be attributed to Milankovitch cycles. An excellent creationist evaluation of Milankovitch cycles was given by Oard (1984a; 1984b; 1985) and the author offered much evidence against the concept. Creationists interested in possible past climate changes are urged to read this series.

Lehman (1990, pp. 362-364) examined the paleosols at the Cretaceous/Tertiary transition in the Big Bend region and postulated that:

Table I. Collection Sites, Chemical Analysis and Structure of Fossil Woods—Dawson Creek Region, Big Bend National Park, Texas.

Specimen Designation	Location	Typical In Situ Fossil Wood	Collected Specimens	Quantitative Analysis*	EDX Analysis	Infrared Analysis	Structure of Wood
Charcoalified Wood-a interior	Fig. 1a, b-Part I	Fig. 1a, b, c-Part III	Fig. 1d-Part III	59%C	N.D.	p. 171-Part III	Fig. 4, 7-Part IV
Charcoalified Wood-a Mineralized Surface	Fig. 1a, b-Part I	Fig. 1a, b, c-Part III	— —	— —	Si, Al, S, K, Ca, Fe	— —	Fig. 5-Part IV
Charcoalified wood-b interior and surface	Fig. 1a, b-Part I	Fig. 2-Part I	— —	— —	— —	— —	Fig. 6-Part IV
Silicified Wood 19	Fig. 1a, b-Part I	Fig. 5, 6-Part III	Fig. 8, 9-Part III	94-97% SiO ₂	Si, Al, S, K, Ca, Fe	— —	Fig. 2, 3-Part IV
Silicified Wood 25	Fig. 1c-Part I	Fig. 11-Part III Fig. 9-Part IV	Fig. 12-Part III	91% SiO ₂	Si, Al, Mn	— —	Fig. 8-Part IV
Calcified Wood / Nodules? (CN)	Fig. 1c-Part I	Fig. 13, 14-Part III	Fig. 15-Part III	52% CaO 5% SiO ₂	Ca, Si, Al, Mn, Fe	— —	Fig. 10-Part IV

EDX—Energy dispersive x-ray analysis.
N.D.—No elements detected.
*—Refer to Part III for more exact percentages.
Part I — CRSQ 30:47-54; Part II — CRSQ 30:106-111; Part III — CRSQ 30:169-176.

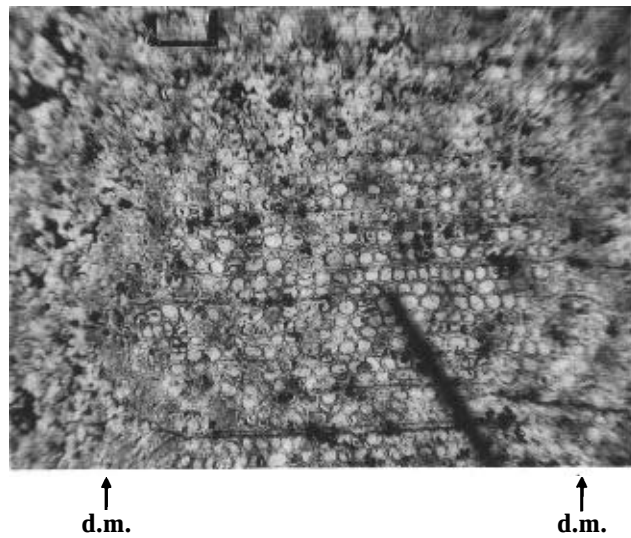


Figure 6a. Cross section of a small charcoalified wood sample b with a mineralized exterior. Sample b has similar microscopic appearance as 19 (Figure 2). Comparing sample b with sample 19, it is obvious that sample b has undergone disturbance noted here by dm (disturbed morphology). This sample was likely heated by volcanic action and/or fire and later mineralized possibly causing cellular distortion. Scale bar—100µm.

... comparison with modern soils suggest that early Paleocene soils developed under conditions of higher rainfall and cooler temperatures than did Late Cretaceous soils (p. 362).

If a post-Flood ice age postulated by Oard (1990) occurred, any soils that formed at that time in the Big Bend region might indicate cooler temperatures with increased precipitation. See Oard (1993, pp. 42-44). All speculated events would occur in rapid succession compared to a uniformitarian time schedule.

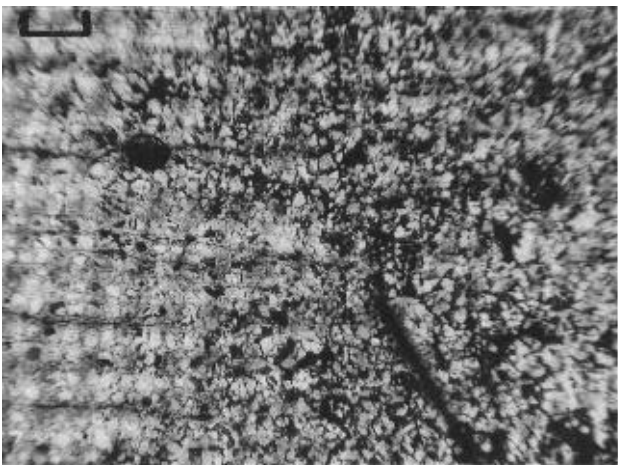


Figure 6b. Another cross section of charcoalified wood sample b—disturbed area. Note at the pointer tip that the usual rows of tracheids are missing and whatever cellular structure that exists is disorganized. A greater degree of such disorganization of original tissues can be seen in Figure 5 of the mineralized exterior of charcoalified sample a. Scale bar—100µm.

Summary and Conclusions

Study of the fossil woods from the Dawson Creek region of Big Bend National Park indicate that they grew in a climate different from the present in that location. Likewise the fossil wood structure appears to be different from modern woody plants and the specimens we examined had no distinct growth rings which agree with the observations of Wheeler (1991a, 1991b) concerning Cretaceous and Paleocene woods of Big Bend National Park.*

We are impressed by the clarity of cellular and sub-cellular detail evident in the petrified wood and charcoalified wood. We suggest that such exquisite preser-

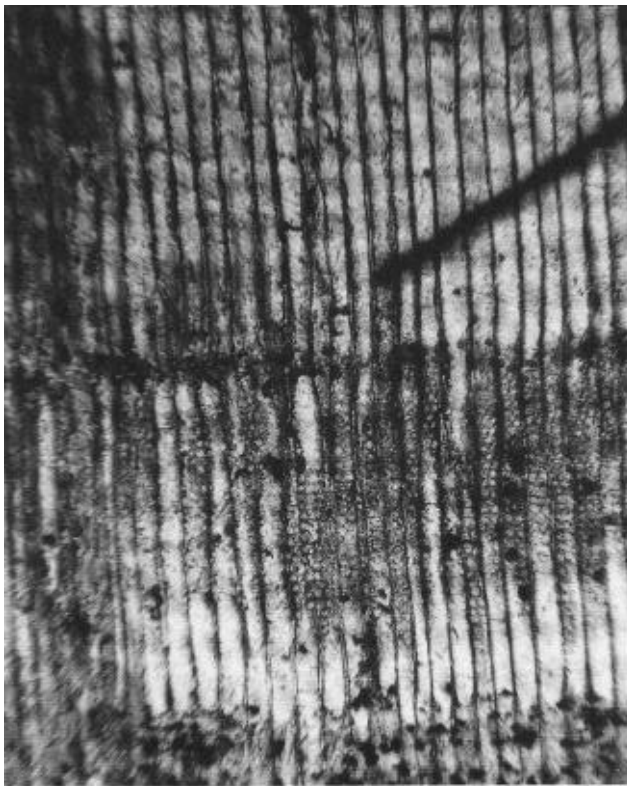


Figure 6c. Longitudinal section of charcoalfied wood sample b. Tracheids in vertical section are long and spindle-shaped. Examination of the tracheids below the pointer tip reveals small openings (pits) which connect tracheids with other tracheids allowing water conduction in living stems. There is an amazing degree of cellular detail still present in this fossil wood. Scale bar same as 2c.

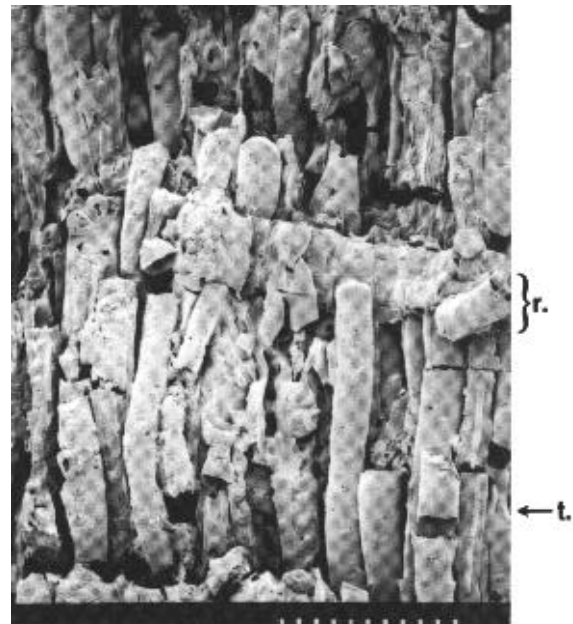


Figure 7b. Scanning electron photomicrograph at greater magnification of a charcoalfied fossil wood specimen in radial view. A narrow ray is visible to the right of the bracket as are the highly magnified tracheids. Small dots on tracheids are likely pit pores. Scale bar (dotted line)—120 μ m.

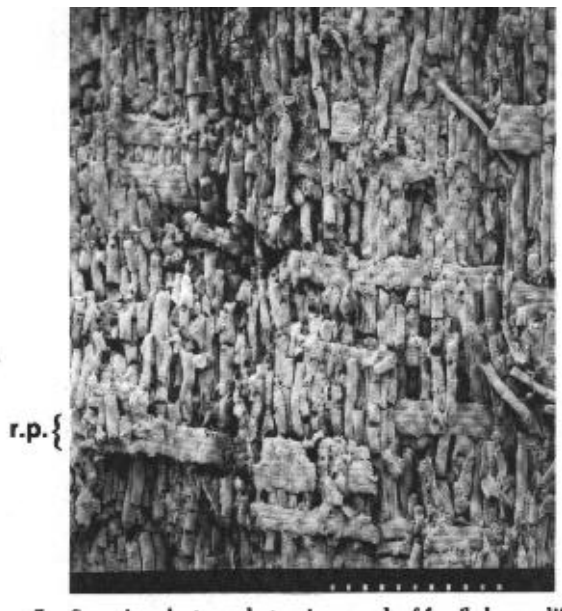


Figure 7a. Scanning electron photomicrograph of fossil charcoalfied wood specimen a (radial view). There are bands of ray parenchyma cells weaving between the upright tracheids. Compare with Figure 4. This specimen is shown in situ in Figure 1 of Williams et al. (1993, p. 170). Scale bar (dotted line)—430 μ m.

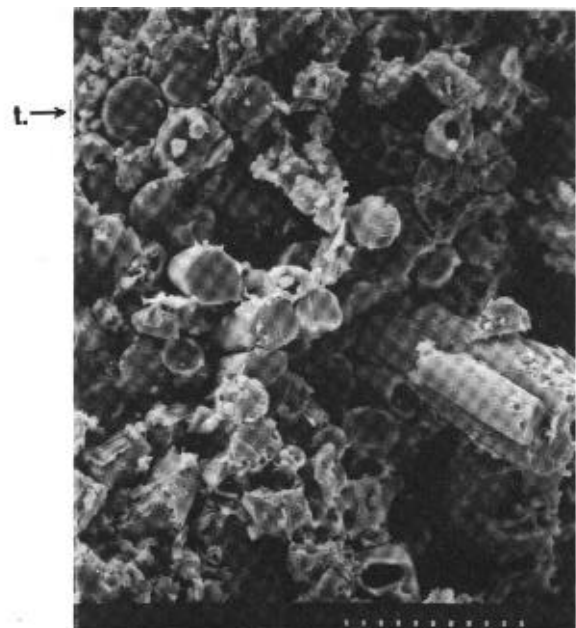
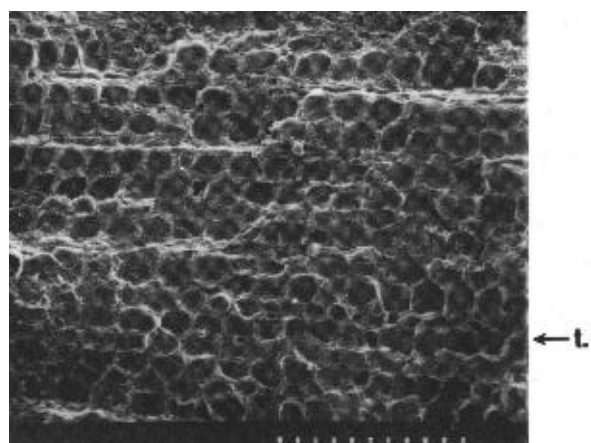
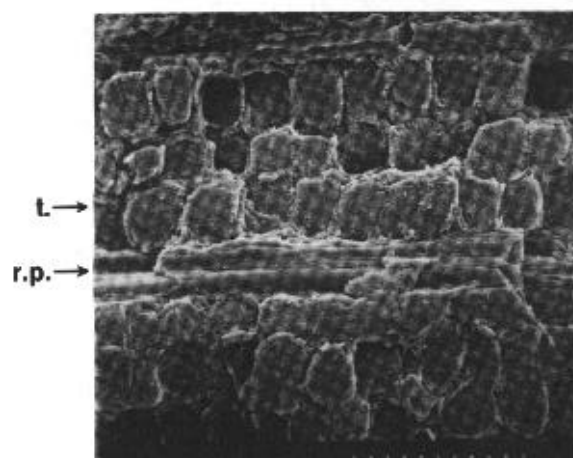


Figure 7c. Scanning electron photomicrograph of charcoalfied fossil wood specimen a (cross or horizontal section). Tracheid cells are protruding from the plane of the section, giving a three-dimensional aspect. Scale bar (dotted line)—100 μ m.



a.

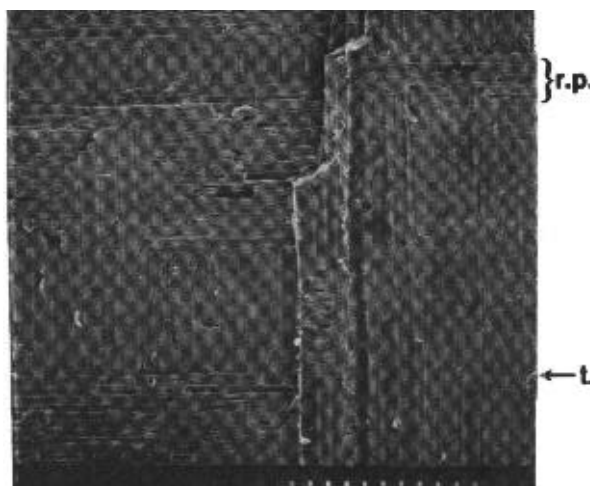


b.

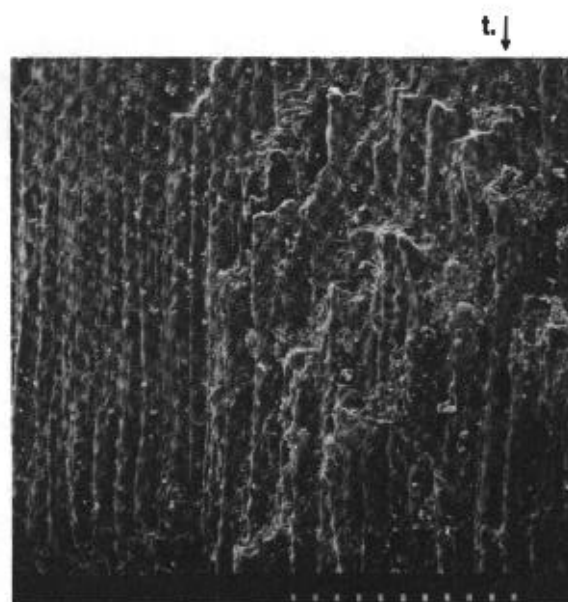
Figure 8a and 8b. Scanning electron photomicrographs of silicified fossil wood—sample 25 (Williams et al., 1993, pp. 173-174 especially Figures 11, 12 and Table II). It is shown here at two different magnifications in cross section. Tracheids are visible in both and ray parenchyma can be seen in 8b as horizontal lines. Scale bar in 8a is 300 μ m and scale bar in 8b is 100 μ m.



Figure 8e. Scanning electron photomicrographs of silicified fossil wood sample 25. Tracheids and rays are both visible in this view.



c.



d.

Figures 8c and 8d. Scanning electron photomicrographs of silicified fossil wood sample 25—radial section. Tracheids are visible as upright cells and ray parenchyma cells are in bands of various heights running crosswise. Scale bar (dotted line)—380 μ m.



Figure 9a. Scattered silicified wood sections (specimen 25). See Williams and Howe (1993, p. 49 especially Figure 1c) for more description and other photograph of the collecting area.



Figure 9b. Smaller pieces of silicified wood (specimen 25) that were scattered over the desert pavement.

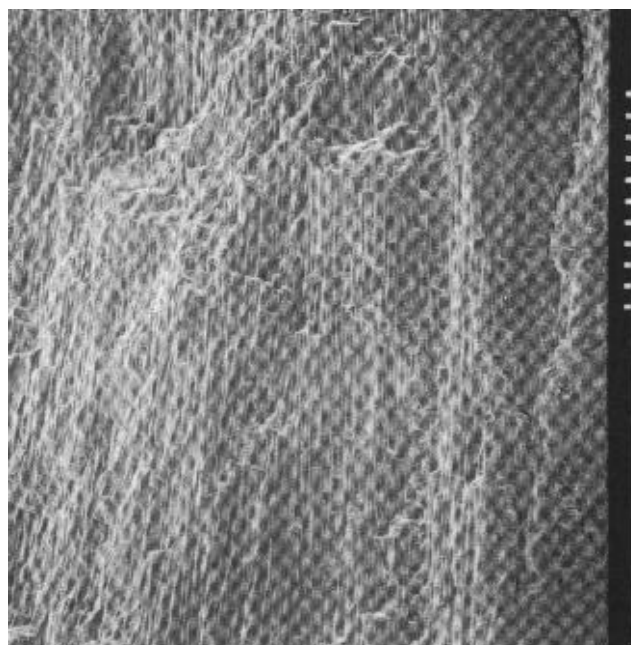


Figure 10a. Scanning electron photomicrograph of calcified wood/nodule? (CN) [Williams et al., 1993, pp. 173-175, Figures 13-16 and Table II]. These are cone-like structures that fall apart easily into wedge-shaped chunks. We speculate that they may be fossilized stems from cycads. But they may instead be only calcium-rich nodules. Complex structure is visible but it is not possible to determine if these are cells or mineral crystal structures. Scale bar—300µm.

vation of detail fits well with the creationist belief that fossils were formed rapidly and recently.

The nodules we collected and examined have some structural features that resemble wood but we have been unable to determine if the material is calcified wood or mineral nodules. Work will continue on this project concerning chemical analyses of the clays in which the fossil wood was found, hopefully to shed some light on how the wood was buried at Dawson Creek.

*M. J. Oard, commenting on Lehman's remarks concerning the fossil wood with and without growth rings found in Trans-Pecos, Texas, suggested that possibly a mixture of woods from different climates was transported to this location by Flood waters.



Figure 10b. Scanning electron photomicrograph of calcified wood/nodule? (CN). Even at this higher magnification, we were not able to determine if the structure is cellular or a crystal growth pattern. Scale bar—60µm.

Acknowledgments

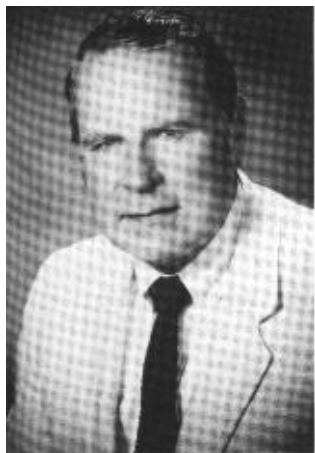
The authors thank the many donors to the Creation Research Society Research Fund, interest from which financed a portion of these studies. Appreciation is expressed to personnel of the Southwest Region of the National Park Service and personnel of the Big Bend National Park for allowing us to collect the various fossil wood specimens. The opinions expressed in this paper remain solely those of the authors.

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RESOURCES FOR RESEARCH AND PUBLICATION — LAB DIRECTOR'S REPORT

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



The Creation Research Society is one of the oldest creation research organizations in the world. For nearly 34 years we have produced the foremost technical journal on Biblical and scientific origins from a recent creationist point of view. In recent years, with expanded outreach and growing costs, increased donations from society members have played a critical role in supporting our challenge to the monopoly which evolution-

ary naturalism has held on modern science.

One area of potential support which we are beginning to emphasize involves gifts through wills and living trusts. Giving is especially easy and efficient with a living trust. Through it, you can be sure your wishes of support to a charity such as the Creation Research Society are carried out—unlike a will which may be contested later. Because there are no probate costs or delays, 100% of your gift to C.R.S. in a living trust will go to C.R.S.

Considerable thought should be given to which charitable organizations one should support. Consider the following ideas in evaluating the Creation Research Society for inclusion in your will or living trust:

1. **Mutual Support** — As a member of the Creation Research Society you have undoubtedly found help in reading the *C.R.S. Quarterly* and other publications. You have a vital interest in our work and you may therefore want to include the Society as a significant beneficiary in your living trust.
2. **Your Commitment to the Charity** — Your membership in C.R.S. is evidence of your deep commitment to its goal of evaluating science in a Biblical framework.
3. **Demonstrated Financial Integrity** — For the entire history of our Society we have operated in the black. Our yearly CPA audits, careful budgeting, and developing endowments are evidence of our commitment to long-range financial integrity.
4. **Influential: Cutting Edge Activity** — Few issues in our culture today approach the foundational significance of recognizing the existence of God and our responsibility to Him as Creator. The Creation Research Society and its members around the world have been playing a major role for over three decades in the rapidly developing creation science movement. Many of the technical and scientific arguments against evolution currently used in debates and in written materials first appeared in the pages of the *Creation Research Society Quarterly*.

5. **Board Members Committed to Creation Research Society Mission**—All of our board members have extensive backgrounds in science, most with earned Ph.D's. Many of them are internationally recognized as world leaders in the creationist movement. They give hundreds of hours per year in writing, editing, accounting, and other Society business.

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On the other hand, a specific project of the Society might be named. In this way the donor can direct funds to an area of his or her choice or interest.

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1. **Quarterly Endowment Fund:** Proceeds from this endowment are used to support, develop, and improve the quality of the *Creation Research Society Quarterly*.
2. **Research Endowment Fund:** Proceeds here are used to fund various types of origins research not directly associated with the Van Andel Research Center.
3. **Van Andel Research Center Endowment Fund:** Proceeds are used to support personnel and develop the existing facilities and to pursue research at the laboratory and in field studies nearby.

Since your will or living trust is a legal document, it requires precise legal terminology and should be written by a competent estate planning attorney. Legal advice is essential.

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Quote: Understanding Origins

Scientific thought in any age owes more than it realizes to its past, and only by understanding the origin of inherited beliefs can we appreciate their continuing worth.

Desmond, Adrian J. 1976. *The hot-blooded dinosaurs*. Dial Press. New York. p. 128.

PANORAMA NOTES

A Simple Expression for Atmospheric CO₂ Pressure as a Function of Sea pH

The effect of a 10 to 20 fold increase of atmospheric carbon dioxide was explored by Taylor (Taylor, 1994) on plant and animal life. The effect on water chemistry is briefly discussed across a wide range of pressure.

The solubility of CaCO_{3(s)} in a distilled water system open to an atmosphere is solved for CO₂ atmospheric pressure P_{CO₂}, for .1 to 1000 times normal atmospheric pressure. A simple equation is obtained by curve fit of the solutions to the equilibrium equations of this case (Snoeyink, Chapter 4, and Chapter 6.7). This case may be used for the assumption that CaCO_{3(s)} dissolves in the high P_{CO₂} of earth's interior, and precipitates when the water is released to the surface at 25°C.

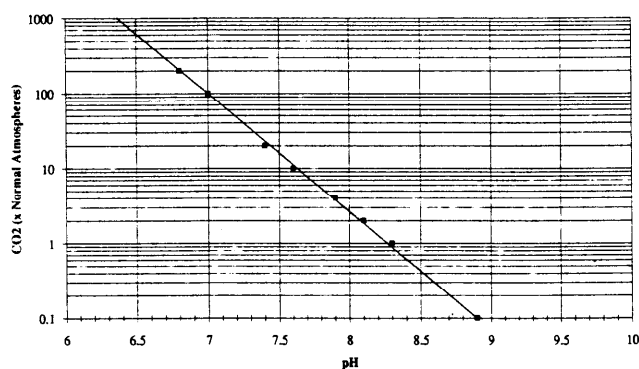
The carbonate content is not controlled by the dissolution of CaCO_{3(s)} but by equilibration with the atmospheric PCO₂ above the solution. The atmosphere consists of about 10^{-3.5} atm. of CO₂, and subsurface pressure is higher. Solving for the unknown [H⁺], by trial and error for a range of pressures, PCO₂, and fitting a curve gives

$$P_{\text{CO}_2} = 1.7615 \left(\frac{\text{pH}}{6.0} \right)^{-26.5802} (\text{atm.})$$

Typical sea water pH is 8 at PCO₂ of .0003 atm., and rain and snow runoff range from 4.4 to 6.4.

The effect of exposing the solution to even trace amounts of atmospheric CO₂ is to depress pH to 8.3 from 9.2. Typical seawater contains about 1.8x10⁻⁴ M of [Ca²⁺], while this example gives 5x10⁻⁴ M at similar pH.

Alkalinity of Carbonate Solution Under Atmospheric Carbon Dioxide



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R. Cooke*

*7365 Main St., #130, Stratford, Conn. 06497.

Reprinted CRSQ Volume 19

Introduction

The *Creation Research Society Quarterly* has been published since 1964 (31 complete volumes). In an effort to make these volumes available, all of the missing issues have been reprinted. Brief synopses have been written on volumes 1-18 and have appeared in the previous 18 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.

Anthropology and Archaeology

Mehlert (1982, pp. 26-27) briefly criticized the Johanson interpretation of the "so-called" Afar Man. The building code for the Tabernacle and the Ark of the Covenant was examined by Ben-Uri (1982, pp. 36-39). Language was created and the ability did not evolve. Thus, Harbin (1982, pp. 52-55, 59) stated that "... the Biblical view of creation, provides the only valid basis for historical linguistics (p. 55). The Tower of Babel was the subject of an article (Peterson, 1982, pp. 87-90). The author speculated that all humans can trace "their roots" back to the events that occurred at the Tower.

Biology

General

Smith (1982, pp. 178-179) discussed the principles of creationist biology. He claimed that the general principle of creation is as follows. "Increasing levels of complexity of an organism require increasing amounts and/or detail of information" (p. 178). The principles of limited variation and conservation of adaptedness also were examined. Brown (1982b, pp. 187-188) listed seven basic biological laws of creation.

Botany

In an extensive field study of the survival of two chaparral shrubs after fires, George Howe (1982, pp. 3-10) explained how his results were related to the origins controversy. The two shrubs, chamise and *Ceanothus*, regrow in different ways after being destroyed by fire. The collected data were interpreted within the creation model. The carnivorous Cobra Head plant (*Darlingtonia*) was viewed from the design perspective (Keithley, 1982, pp. 155, 184).

Genetics

Jones (1982a, pp. 13-18) outlined the genetic integrity of kinds. He claimed that:

Modern evolutionary theory is based on the assumption that all heredity has its basis in the DNA genes. Evidence is presented here to show that this assumption is false (p. 13).

The author suggested some research to possibly validate the suggested creationist concepts.

Limited variation within kinds was examined by Brown (1982a, pp. 100-103). Genetic mechanisms and evolutionary views also were considered in the treatise.

Frank Marsh (1983, pp. 204-206) asked the question, Is variation limitless or limited? His answer was that limited variation pervades and that no new genetic variants other than the already existing types can be produced. Topics developed included:

- Variation and discontinuity
- Microevolution
- Genetic process of variation
- Fossil record
- Macroevolution

Genetic engineering was critically explored by Anderson and Bohlin (1983, pp. 217-219). A Christian view of the subject was presented as well as a discussion of sociobiology.

Zoology

An excellent review of the sickle cell trait was given by McLeod (1982, pp. 19-26). His abstract is worth quoting:

The sickle cell story is often put forward as a demonstration of evolution. Here recent medical knowledge concerning the trait is reviewed. It is seen that in sickle cell nothing has evolved, improved or increased in complexity. All that happens is that in this case protection against one disease, malaria, is conferred by another disease, sickle cell (p. 19).

Jones (1982b, pp. 156-175) offered an extensive creationist critique of homology. Some subjects discussed were:

- Comparative studies
- "Common ancestors"
- Evolutionary approach to the subject
- Lack of progressive mutants
- Adaptation
- Pinna
- Vertebrate cardiovascular systems
- Monotreme and marsupial mammals
- Natural selection
- Convergence and divergence
- Design considerations
- Created kinds
- Intermediate types
- Molecular homologies
- Imperfections

Dyslexia was studied from a creationist perspective (Johnson, 1982, pp. 180-184). A humorous and instructive account of the water ouzel was presented by Keithley (1983, p. 203).

Astronomy and Meteorology

Bouw (1982, pp. 28-31) analyzed several problems of the big bang theory of the origin of the universe. Then Akridge (1982, pp. 56-59) claimed that the expanding universe theory is inconsistent. Longevity and gigantism before the Flood was explained by having a higher carbon dioxide content in the atmosphere (Patton, 1982, pp. 40-52). Paleoclimate changes were discussed within the context of the author's thesis.

Creationists and Evolutionists

An excellent article on the great scientist, Matthew Fontaine Maury, was written by John Meyer (1982, pp. 91-100). Readers will be encouraged if they read about

the pathfinder of the sea and father of modern oceanography to know that he was a strong Christian and thoroughgoing creationist as well as a man with deep moral principles. Tinkle (1982, p. 112) examined Charles Darwin, the unusual one. The evolutionary views of Philip Lieberman were reviewed and debunked by Doherty (1983, pp. 214-217).

Geology—Historical and Philosophical

A biblical approach to the dating of the earth was given by Niessen (1982, pp. 60-66). Fossil succession was approached from the viewpoints of ecology, ichnology biological reproductive rates and the possible fossilization of post-Flood animals (Morton, 1982, pp. 103-111, 90). Hansen (1983, pp. 206-207, 225) discussed continental relocation within a young earth framework. Lee (1982, pp. 117-127), in an article entitled "Radio-carbon: Ages in Error," carefully explained the defects in the "dating" method. He concluded that it is not reliable. An unusual model postulating a paleoexpansion of the radius of the earth during the Flood was presented by Morton (1983, pp. 219-224).

Physics

Gene Chaffin (1982, pp. 32-35) interpreted the fission evidence from the Oklo natural uranium reactor within a Flood-young earth framework. An interesting electromagnetic theory of gravitation was developed by Barnes, Slusher, Akridge and Ramirez (1982, pp. 113-116). Also Barnes (1983, pp. 208-212), in his continuing quest to reinterpret the foundations of modern physics, presented an electromagnetic model of inertial mass. The evolutionary assumptions in certain physics literature was explored (DeYoung, 1982, pp. 185-187).

Philosophy

The meaning of reality was outlined by Bergman (1982, pp. 67-68, 35, 39). An analogy to the development and present status of evolution was cleverly written by Hinderliter (1982, pp. 175-178). "The theory of natural selection is irreconcilable with the Christian view of redemption" (Riss, 1983, pp. 212-214). Thus another non-Christian concept was dissected by a Quarterly author. Many other topics were explored in technical notes, letters to the editors and book reviews. The range of subjects in this volume was quite extensive.

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Emmett L. Williams*

*5093 Williamsport Drive, Norcross, GA 30092-2124.

Rock Mills or Something Else? (Boquillas Canyon, Big Bend National Park, Texas)

Introduction

Today many people view ancient peoples and cultures as being less “advanced” than our own. This is the evolutionary way of thinking. Actually many ancient cultures were more advanced than we give them credit (e.g., Babylonians, Egyptians, Sumerians, Aztecs, Mayans, etc.) [Ec 1:9-11]. Peterson (1987) provides an excellent overview of “primitive peoples,” falsely so called.

Various groups of ancient peoples (i.e., “Indians”) are known to have lived in the Big Bend, Texas area long enough to be recorded in our recent history (i.e., the Comanches, Utes and the Mescalero Apaches [Tyler, 1984, p. 29]) and uniformitarian archaeologists recognize the fact that Paleo-Indian cultures date back to about 9000 B.C. (National Park Service, 1983, p. 86; Alex, 1986, pp. 165-166).

I recently examined approximately 16 *in situ* rock mills* at the entrance to Boquillas Canyon, in Big Bend National Park, Texas. These round holes have been identified as rock mills in the various guidebooks to the area (e.g., Maxwell, 1969, pp. 47-48; Sparring, 1991, p. 307; National Park Service, 1993, p. 85). Could the rock mills identified at this locale possibly have served another purpose? I was unable to investigate 30 other rock mills reported at the Rio Grande village site

*Rock mills were used to grind foodstuffs (i.e., mesquite beans, corn, etc.) into a flour.

(Maxwell, 1968, p. 49) and have no information regarding their dimensions or orientation.

Description

In my brief examination, I located approximately 19 rock mills (also called metate [Maxwell, 1969, p. 48]) located on a ridge overlooking the Rio Grande River, at the entrance to Boquillas Canyon. All of the rock mills examined (approximately 16 were measured) were 7.5 to 8.0 inches in diameter and extended 12 to 26 inches in depth. They all had relatively straight smooth sides and a flat to slightly concave bottom. They were spaced at various distances from one another (Figure 1) and at different levels (Figures 2, 3 and 4). Some were placed directly in fractures (Figure 5). Several contained water from an earlier rainstorm. Many of the rock mills have vugs and holes in the sidewalls or in the bottom which had drained the rainwater.

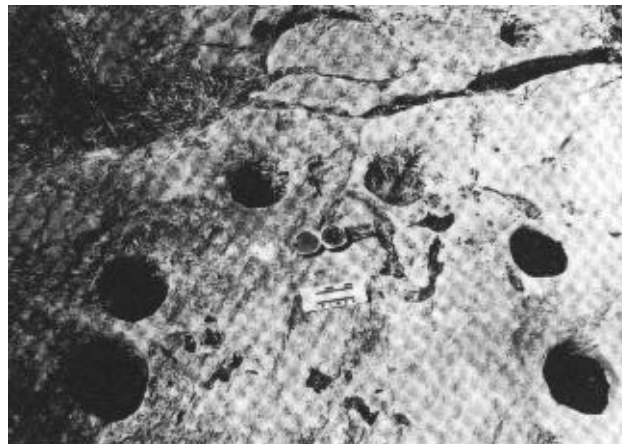


Figure 1. Circular holes in Santa Elena Limestone. Were these used as rock mills? Brunton compass site (right side) points toward the north. Note that some holes still contain water (two on right side) and one is filled with soil. Why are these holes in an arcuate pattern? Holes are 7.5 to 8 inches in diameter. Scale in inches (upper units) and centimeters (lower units).

Implications

1. If these are rock mills then why do they all have the same diameter from the top to the bottom of the hole? This would mean that all the people using them (up to 19 at a time?) had tools the same diameter (within 0.5 inches!). Compare Figure 6 to that of the rock mills found in Boquillas Canyon. This rock mill was mobile (if you could call 150 lbs mobile!) and has a more concave bowl shape like what would be expected from rolling two rocks together to grind foodstuffs (rock chips, created while grinding the rocks together, caused the indians to occasionally break their teeth!).
2. Why do the holes vary in depth? If the tools had the same diameter they must have varied in length to be able to use them in the different holes. It appeared from my examination that the holes of the lower levels were deeper—but I was not able to measure all 19 holes and I am not sure that this is consistent with all the rock mills at this site. Additionally, several were filled with soil and I was not able to determine their depth. Many of



Figure 2. Three tiers of holes in Santa Elena Limestone. Camera bag rests at highest point at this locale. Lookout point for large area of the Rio Grande River is just beyond rise above where the camera bag rests. One-third down from top of photograph is another group of holes in an arcuate shape. Note hole at center and bottom of photograph. Many more holes were found at this site.

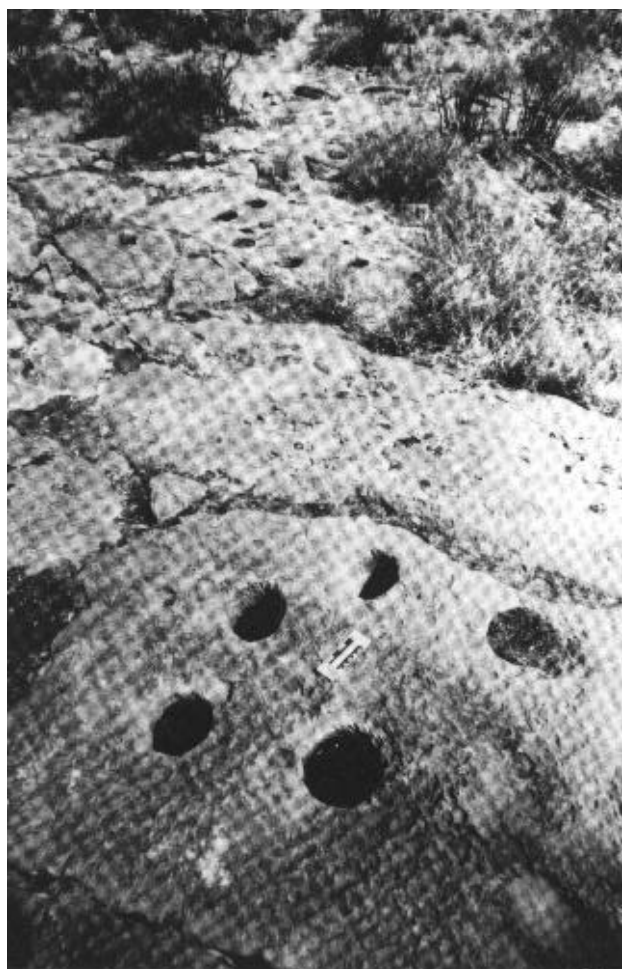


Figure 3. Photograph from where the camera bag was in Figure 2 looking in the opposite direction. Note what appear to be "groups" of holes at different levels. Full extent and direction of all the holes at this site were not determined.

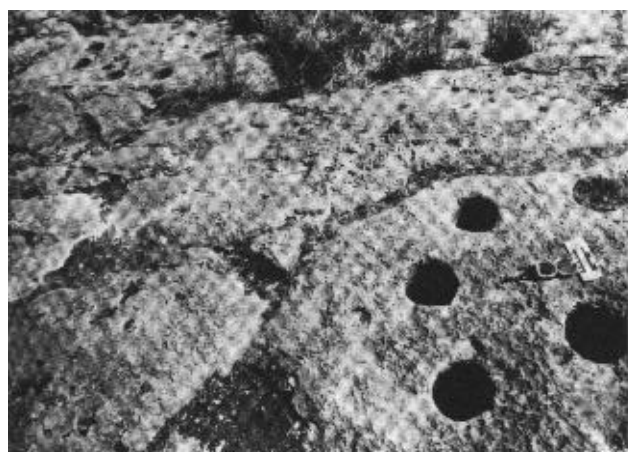


Figure 4. Photograph showing Brunton compass pointing north (left side) with two different levels of holes. Scale in centimeters (left) and inches (right) is perpendicular to compass. Holes appear distorted due to the wide angle camera lens.

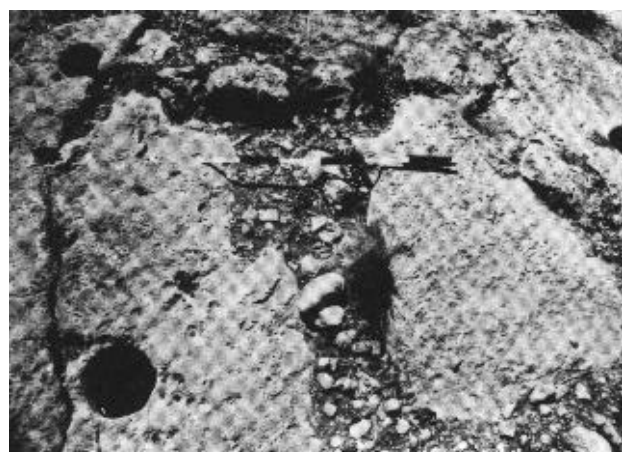


Figure 5. Note upper left hole is adjacent to fracture in Santa Elena Limestone. These three holes appeared to be geometrically related to one another and were to the west of the highest group at a lower level. Scale in center is in six-inch units.

the rock mills contained vugs in them which if used as a food grinder would result in the loss of the foodstuff. These holes and vugs were probably there when the holes were originally cut and it is unclear why they would be used (if in fact they were used as mills). Some holes are located in joints which if used as food grinders would result in the loss of foodstuffs (Figure 5).

3. Why are they spaced at different distances? Some of the workers would be practically on top of one another if they were grinding corn or mesquite beans, while others would be up to 40 feet away.
4. It appeared to my overactive imagination that there was some planned geometry to the layout of the rock mills—is this true or were the rock mill holes placed where it was convenient? I did not place sticks in the holes to see if a pattern emerged.
5. Why are the rock mills only found at the end of this promontory at the edge of the Rio Grande River and not elsewhere in Boquillas Canyon? I did not thoroughly examine the canyon for any other rock mills, but there were none found where I happened to walk.
6. How do these rock mills at Boquillas canyon compare to those found at the Rio Grande Village? Is there a similarity?

Discussion

The location, dimensions, and likely geometric appearance caused me to question if these “rock mills”



Figure 6. Rock mill at Sotol Vista. This is the typical rock mill used by ancient cultures around North America. One rock usually rolled or pounded foodstuffs into a flour used for cooking. This particular rock mill was actually a sandstone. Its use would have resulted in breaking off sand grains into the foodstuff.

are correctly identified. Paleocultures could have originally cut these holes for other purposes.

For example, archaeologists have long noted the existence of “post hole molds” for building structures (McMillon, 1991, pp. 88-91). According to McMillon (1991, p. 89):

Post molds may be an indication of a large structure, a fence, or a ceremonial site, and are often accompanied by indications of walls and floors.

Were these holes used to provide support for a building or structure?

Hawkins (1973) has had great success in studying and decoding sites which had previously been explained incorrectly (i.e., Stonehenge, Callanish [the Spanish version of Stonehenge], Peruvian desert markings [seen only from the air!], the Intihuatana Stone [used by the Incas at Macho Picchu to measure astronomical movements], the solar observatory on Easter Island, various mounds in North America and the American “Woodhenge” at Cahokia, Illinois, etc.). At the Cahokia, Illinois site Hawkins (1973, pp. 178-179) suggested that the wooden post layout was used by that ancient people to mark the seasons and perhaps track the movements of the stars. Could the Boquillas Canyon site have a similar function?

Conclusion

Are the round holes at this locale and at the Rio Grande village correctly identified or could they possibly have served another purpose? I am still not convinced that we have discovered the purpose that these holes served in the past and only through additional investigation(s) will questions be resolved. We need to clear our minds of preconceptions regarding “ancient peoples” and approach sites such as these with more than just the standard “rock mill” answer. I welcome discussion regarding this matter and will provide directions to anyone interested in locating and investigating these features.

Acknowledgments

The author thanks all of the reviewers who have made this a better article. My wife Susan deserves special thanks for allowing me the time to go to Big Bend National Park. Glory to God in the highest (Pr 3:5-6).

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Carl R. Froede, Jr.*

*2895 Emerson Lake Drive, Snellville, GA 30278-6644.

PHYSIOLOGICAL EVIDENCE FOR CREATION

DAVID A. KAUFMANN*

Received 23 October 1993; Revised 3 August 1994

Abstract

A brief review of the academic discipline of physiology is given. The similarities of design and function of organelles and organs are presented. The similarities between the negative feedback systems of household heating and cooling systems and our body's heating and cooling systems are presented. A comparison between the homeostatic functions of a giant airport and our body's hormone system is presented. The precise purposeful functions of six body systems are reviewed. A discussion on the evolutionary beliefs among physiologists and mechanism versus vitalism indicates that evolutionism is on unstable foundations. The exceptionally arranged and precisely operating physiological systems of the human body are indications of the creation of the human body by a Divine Designer and raise doubts whether these systems could arise by a chance, undirected upward development of function.

Although a few articles in the *Creation Research Society Quarterly (CRSQ)* (Brauer, O., 1970; Hamilton, H. 1985, 1991 and 1993; Kaufmann, D. 1974, 1983 and 1994; and McLeod, 1983) have covered some specific aspects of human physiology, the discipline of human physiology has not yet been adequately examined as to its relationship to the creation model. One exception to this sparse coverage of human physiology and evolution/creation is the Institute for Creation Research monograph *Our Amazing Circulatory System . . . by Chance or Creation* by Dr. Marlyn E. Clark in 1976. It is possible that many of the functional processes that occur in humans correlate better with the concepts of design and order rather than the concepts of randomness and disorder. The purpose of this article is to demonstrate the agreement between data from the academic discipline of human physiology and the conceptual framework of the creation model.

Physiology is defined as the study of the operations of the organelles, the cells, the tissues, the organs, the systems or the entire bodies of living organisms. It studies the "why" of their performances. It attempts to discover what processes are carried out and the mechanisms that cause these occurrences to happen. It is significant to note the word "cause" at this point. Physiologists, like creationists and evolutionists, are interested in the root causes of living processes. Because of this emphasis on causes by physiologists, sometimes physiology is referred to as "biophysics." At many universities much interdisciplinary work is performed between the department of physiology and the departments of physics and engineering. It is hoped that this paper can demonstrate that this concern for cause by physiology is directly correlated to the doctrine of creationism and is antithetic to the doctrine of evolution.

From Particles to People: Structural Levels of the Human Body

The human body has five different levels of organization increasing in size and complexity from atoms to cells to tissues to organs to systems ending with a total functional human organism (Figure 1).

1. The chemical level—at its simplest level the human body is composed of atoms, the basic units of all matter. There are about 100 different kinds of atoms, each labeled as an element. The most prevalent atoms

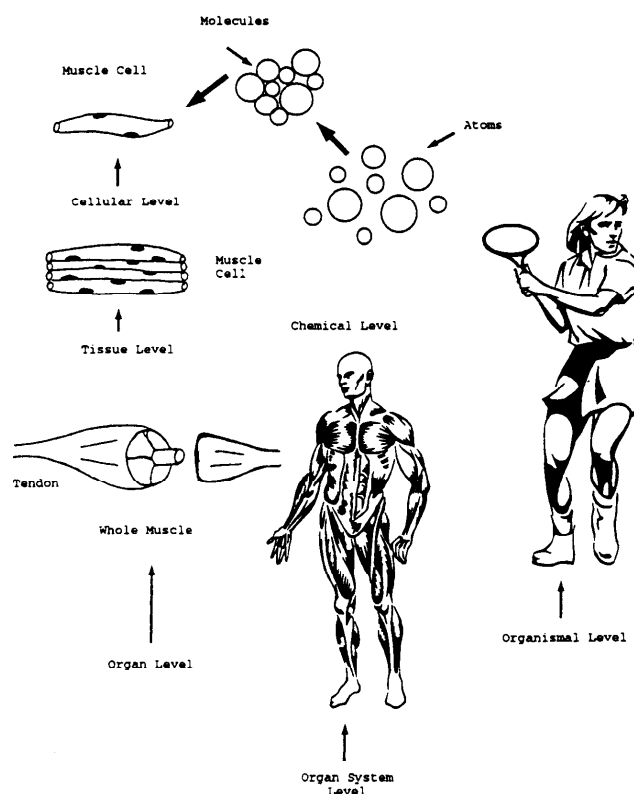


Figure 1. Levels of structural complexity in the human body.

in the human body are carbon, hydrogen, oxygen, nitrogen, and phosphorus.

2. Cells—These are the smallest, independent, protoplasmic units of life. They range in size from a sperm (5 micrometers long) to a nerve cell that may be up to one meter long. The main functions of cells are growth, metabolism, irritability and reproduction.

3. Tissues—These consist of many like cells that all perform a specific function. They are classified into four main groups: epithelial, connective, muscular and nervous.

A. Epithelial tissues are found in the outer layer of skin (epidermis) and in the linings of organs, blood and lymph vessels, and body cavities. They are essentially protective and some epithelial cells are designed for the release of special chemical messengers called

*David A. Kaufmann, Ph.D., F.A.C.S.M., Department of Exercise and Sport Sciences, University of Florida, Gainesville, FL 32611.

hormones. Some of these cells have the ability to regenerate, i.e., when old cells wear out, new cells mitotically divide into two cells which replace the worn-out cells.

B. Connective tissues are found all over the body; the second layer of skin (dermis), between organs, as tendons, ligaments or aponeuroses (flat tendons), as fat, inside organs, as cartilage, bone and even blood and lymph. It is the most widely distributed tissue, and some of its cells can make strips of compounds called fibers (collagenous, reticular and elastic). Some of these cells can regenerate throughout life, i.e., bone and blood.

C. Muscular tissues have the ability to shorten and to pull on their attachments. Skeletal muscle attaches to and pulls on bones; smooth muscle acts on the digestive tube, eyes, blood vessels and some ducts; cardiac muscle is the thick, middle, contractile layer of the heart. According to Marieb and Mallatt "Skeletal and cardiac muscle fibers undergo no division after birth" (Marieb and Mallatt, 1992, p. 232) and therefore muscular growth from then on is an increase in the size (hypertrophy) of the cells one has.

D. Nervous tissue is found in the brain, spinal cord, ganglia and nerves. It reacts to various types of stimuli (changes in chemical environment) and transmits nerve impulses (electrical messages) from one area of the body to another. Nerve cells also, according to Marieb and Mallatt "do not divide. As the fetal neurons assume their roles as communicating links in the nervous system, they lose their ability to undergo mitosis" (Marieb and Mallatt, 1992, p. 298). Therefore, all growth in neurons (nerve cells) is an increase in the branches of the limited number of neurons one has.

4. Organs—These are integrated collections of two or more kinds of tissues that cooperate to perform a specific function. A good example is the stomach: epithelial cells (mucosa) line the inside of the stomach to lubricate and protect it with a slimy substance called mucus; smooth muscle cells contract and churn the food, breaking it down to smaller particles that are moistened by digestive chemicals (juices, enzymes); nerve cells transmit nerve impulses that start and coordinate the muscular contractions, and connective cells hold all the other tissues together.

5. Systems—These are groups of organs connected together to perform a significant body function. The respiratory system, for example, connects the mouth, nose, throat (pharynx), larynx (voice box), trachea (wind pipe), bronchi, bronchioles and lung cells so as to exchange oxygen and carbon dioxide between the air outside the body and the blood inside the body.

The Amazing Human Cell

When a single sperm unites with a single ovum, they form a new cell called a zygote. The zygote contains all the genetic material in its nucleus to grow, develop and differentiate into the approximately 50 trillion cells of a mature adult.

Virtually all medical texts and honest authorities agree that human life begins, not at birth, but at conception. Dr. Watson A. Bowes of the University of Colorado testified to the U.S. Senate Judiciary Subcommittee in 1981:

The beginning of a single human life is from a biological point of view a simple straightforward matter—the beginning is conception. This straightforward biological fact should not be distorted to serve sociological, political or economic goals (Shettles and Norvik, 1983, p. 113).

Dr. Micheline Matthews-Roth, Research Associate at the Harvard Medical School also testified: "It is scientifically correct to say that an individual human life begins at conception" (Shettles and Norvik, 1983, p. 113). Likewise Dr. McCarthy De Mere, a practicing physician and law professor at the University of Tennessee testified: "The exact moment of the beginning [of] personhood and of the human body is at the moment of conception" (Shettles and Norvik, 1983, p. 114).

Scripture (Jer. 1:5, Ps. 51:5, Ps. 139:13) and science agree that the child before birth is a human being with potential for development—not a potential human being. Birth is not the beginning of life. It is only a change of residence for an already living, active human.

The cells that develop from this zygote truly are amazing. Cytologists (anatomists who study cells) divide cells into four basic parts:

1. Plasma membrane—this is a phospholipid bilayer of molecules that forms an outer boundary membrane that keeps the cell separate and distinct from its surrounding chemical environment. It acts as a selective mechanism that allows specific substances to enter and leave the cell.

2. Cytoplasm—this is the portion of the cell within the plasma membrane but outside the nucleus. The fluid part of the cytoplasm is called cytosol. Within the cytosol are living, functional, membrane-bound structures called organelles. Also interspersed within the cytosol are chemical substances called inclusions which are either nutritional components or stored products of cellular metabolism. Unlike organelles, inclusions are not permanent materials and are constantly being destroyed and replaced.

3. Nucleus—this is a dense, spheroid control center of the cell. It is separated from the surrounding cytoplasm by a sheet of molecules called a nuclear envelope. Within the nucleus are chromosomes which contain the genes that direct all cell activities.

4. Nucleoplasm—this is the chemical material inside the nucleus which contains a dense rounded mass called a nucleolus which contains a few chromosomes and serves as a maker of ribosomal subunits.

Organelles and Organs:

Parallelism of Design and Function

Since there are larger organs in a body that perform some metabolic function for given systems in the body and smaller organelles in a cell that perform some metabolic function for mechanisms within the cell, one wonders whether there is some analogy of design and purpose between organs and organelles? Would not chance events over a long period of time result in great variation of design between a cell and an entire body? Would not a Divine Designer probably use a similar design for a cell and an entire body during a short, unique period of creation? The variation of design is logically associated with the concept of randomness of evolutionary doctrine while the similarity of design is logically associated with the orderliness of a Divine

Creator. Let us examine if there is any similarity of design and function between an organelle and an organ.

In Table 1 a comparison of structure and function between organelles and organs is presented. The cell membrane has similarities to the skin, the endoplasmic reticulum (ER) has similarities to the liver, the ribosome has similarities to all cells, the Golgi apparatus has similarities to glands, the mitochondrion has similarities to the muscles, the lysosome has similarities to lymphocytes, the peroxisome has similarities to the liver and kidney cells, the microtubule has similarities to axial bones, the microfilament has similarities to muscles, the intermediate filament has similarities to appendicular bones and the nucleus has similarities to the brain.

Although all cellular biologists would not agree that there are direct similarities between all these structures on these two different levels, one has to admit that there are some general, indirect, structural and functional resemblances for all 11 of these organelles and their corresponding organs and that a few of them, e.g., endoplasmic reticulum, lysosomes, microtubules, microfilaments, indicate specific, direct, structural and functional likenesses. Is it not possible that when more definite knowledge on the histochemistry of the organelles is discovered that this concept of parallelism of design between organelles of the cell and organs of

an entire body will be further proven? Did not the scientist who named these living functional structures "organelles" also conceptually think of these structures as having some strong association in design and function with their counterpart organs in the body? Is not this evidence for parallelism of design between organelles and organs further correlation with the creation model? Would not random factors over a long period of time produce a disorganized pattern of design and function on both the cellular and gross levels? Would not there be great variability of arrangement and performance if the hodgepodge of the many chance factors of the evolutionary model were in operation over a long period of time. However, if a Divine Planner had to formulate a plan for both the cellular and body structures during a unique, short period of time, would not He probably use similar designs and processes on both levels? What engineer would not use the same general design and mechanical principles of the gears of an automobile motor on some lower level type of motor, e.g., the motor of a watch? He would be a fool not to utilize the same prototype of the higher level on the lower level. He would even be more foolish to wait for random factors to occur over a long period of time in the hopes of acquiring a similar or even better structural arrangement and functional performance for the lower level.

Table I. Comparison of Structure and Function between Organelles and Organs.

Organelle and Its Function	Compared to	Organ and Its Functions
1. Cell or plasma membrane—enveloping the cytoplasm that controls the inflow and outflow of materials to or away from the cytoplasm.		Skin, and outer covering of epithelium and connective tissue that controls a limited inflow and outflow of materials to or away from the body.
2. Endoplasmic reticulum (ER) types of membrane—lined tubes (rough and smooth), involved in protein synthesis and detoxification of lipid-soluble drugs.		Liver cells which process proteins and detoxify lipid-soluble drugs (alcohol and phenobarbital)
3. Ribosomes—small structures containing RNA and protein that synthesize other proteins. Some are free; others attach to ER making it rough ER.		All cells since they build and maintain the protein components of their structures.
4. Golgi apparatus—membranous vesicles stacked like hollow saucers that package and secrete proteins and membranes made by the rough ER.		Cells of endocrine and exocrine glands especially mucous cells of the digestive tract which secretes mucus.
5. Mitochondria—double membrane-bound structures which are the main site of oxidative operations and production of ATP, the fuel for muscular contraction.		Muscle cells—contractile units that split ATP which causes mechanical work (contraction).
6. Lysosomes—membranous sacs that secrete enzymes that disintegrate harmful biological molecules.		Phagocytic cells (lymphocytes) that degrade ingested bacteria and viruses.
7. Peroxisomes—membrane-lined sacs resembling small lysosomes that secrete enzymes that cover dangerous free radicals to hydrogen peroxide which is converted to harmless water and oxygen.		Liver and kidney cells which perform similar detoxification processes.
8. Microtubules—hollow tubes providing structural support in the center of the cell.		Bones of the axial skeleton (head, shoulder girdle, vertebral column, pelvic girdle) which give structure to the center axis of the body.
9. Microfilaments—strands of protein (actin and myosin) that slide inward causing a sarcomere (unit of contraction inside muscle cell) to shorten.		Muscle cells that shorten.
10. Intermediate Filaments—microfibers with a diameter between microtubules and microfilaments that resist forces in the outer part of the cell.		Bones of the appendicular skeleton (upper and lower extremities) which support the outer body parts.
11. Nucleus—large spherical structure containing nucleolus and genetic material (DNA) that controls cell's activities.		Brain (cerebral hemispheres, diencephalon, brain stem and cerebellum) which activates and controls all cells and organs.

The general and indirect similarities along with the specific and direct similarities between organelles in the human cell and organs in the human body correlate with the creation model of similar arrangements and processes which are brought about by the omniscient mind and omnipotent authority of a Divine Creator.

Negative Feedback Control and Homeostasis

Everyone reading this article is comfortable because the correct temperature that is just right in order to feel comfortable is maintained by the heating and cooling system of the building. We all do not completely understand how this operates, but we do know that some knowledgeable human engineer designed the heating and cooling system of our buildings based on some

sound engineering principles. We know that this heating and cooling system did not come about by the owners of buildings waiting for chance factors to develop it over a long period of time.

A brilliant human mind planned the system, and highly skilled craftsmen built it into the building. The system that assures us that we will be adequately warm in winter and comfortably cool in summer is called a negative feedback mechanism. This series is called negative feedback, because it acts to minimize the difference between an actual temperature response and a desired, pre-set response. In such systems, the level of the temperature that one desires to control is sensed: it is sent to a contrasting device where comparison to the desired temperature is made, and if a

Table II. Relationship of Designed Structure to Purposeful Function in Various Body Systems.

System	Design Structure	Purposeful Function
Skeletal	Bursae (sacs filled with synovial fluid) interspersed between bones, tendons, ligaments and skin.	Reduction of friction due to rubbing of parts.
Skeletal	Inferior radioulnar joint capsule (ligament) designed to tighten and relax.	Allows for pronation (palm up to palm down) and supination (palm down to palm up) of radioulnar joint.
Skeletal	Thumb bones (metacarpals, phalanges) angled at right angle to bones of palm (metacarpals II, III, IV and V).	Allows for opposition of thumb (crossing over palm to touch little finger.)
Skeletal	Medial and lateral menisci (crescent shaped fibrocartilagenous structures) seated between the femoral and tibial condyles of knee joint.	Besides deepening the shallow joint surfaces of tibia, the menisci prevent side-to-side rocking of femur and tibia and absorb shocks transmitted to knee joint.
Skeletal	Anterior Cruciate (crossing) ligament of knee joint.	Prevents anterior sliding of tibia on femur when the leg is flexed and prevents hyperextension of calf about the knee joint.
Skeletal	Posterior Cruciate (crossing) ligament of knee joint.	Prevents forward sliding of femur or backward displacement of tibia. Both cruciate ligaments lock knees when one stands.
Skin	Lack of sebaceous (oil) glands on palms of hands and soles of feet.	Lubrication of these areas would cause slippage and loss of grip or footing.
Respiratory	Right primary bronchus is wider, shorter and more vertical than left bronchus	Right lung is larger (greater volume) than left lung and needs more efficient inflow and outflow of air.
Respiratory	Lung mass is framework of connective tissue containing many epithelial cells with elastic fibers.	Allows lung to easily inflate and deflate during inspiration and expiration providing greater exchange of gases (O ₂ , CO ₂) with blood.
Cardiovascular	Atria (top, receiving chambers of heart) are small and thin-walled.	Allows for pumping of blood into ventricles (discharging chambers) with less pressure.
Cardiovascular	Left ventricle larger and thicker-walled than right ventricle	Left ventricle must pump blood to entire body (out of aorta) while right ventricle only pumps blood to nearby lungs.
Cardiovascular	Heart surrounded by double-walled sac (pericardium) filled with serous fluids.	Pericardium acts as a lubricating bag around expanding-contracting heart to reduce friction.
Cardiovascular	Red blood cells lose their nucleus and become biconcave discs.	Allows more room for more hemoglobin to pick up oxygen.
Cardiovascular	Capillary diameter somewhat larger than diameters of red blood cells.	Membrane of red blood cells are in contact with capillary wall which facilitates exchange of gases. (O ₂ , CO ₂).
Immune	Spleen has elastic partitions and smooth muscle covering.	Can contract to add a small amount of blood to circulation when there is blood loss.
Digestive	Small intestine has finger-like processes (villi) which in turn have micro finger-like processes (microvilli) on them.	Greatly magnifies the absorptive area surface of small intestine.
Digestive	Small intestine has larger and thicker muscular wall than large intestine.	Small intestine must exert greater mixing, moving and absorbing than large intestine.
Digestive	Stomach is lined with hills (rugae) of mucous cells that secrete mucus.	Rugae increase surface area for absorption and protective mucus prevents gastric acids from digesting stomach's own wall.

difference is detected, a reaction is triggered to correct the difference in temperature. The following simple diagram (Figure 2) of a thermostatically controlled furnace in a typical house illustrates this point.

As one can see, someone pre-sets the desired temperature on the thermostat which is sent to a comparing device. A temperature sensor in the thermostat detects the magnitude of the temperature in the room and also sends it to the comparing device. If there is a difference between the actual temperature in the room and the desired, pre-determined temperature, an error signal is given which triggers the furnace either to kick-on or kick-off in order to reduce the discrepancy between the actual room temperature and the desired temperature as set on the thermostat. If the system is properly designed by an engineer and is soundly constructed by skilled workmen, room temperature can easily be held approximately constant at an optimal level in spite of great changes in the outside temperature.

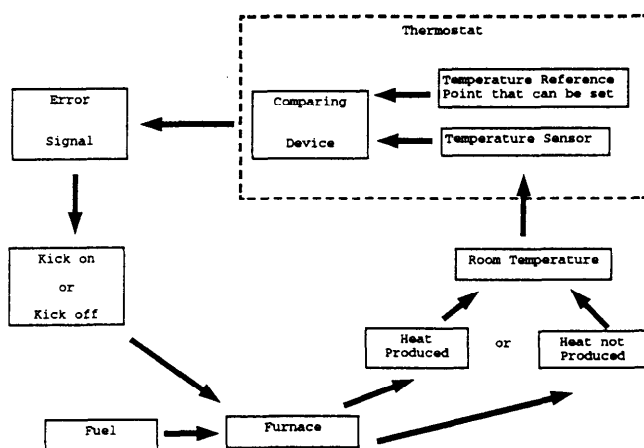


Figure 2. Diagram of thermostatically controlled furnace.

The thermostatically controlled furnace is just one of many examples of highly skilled minds planning a life-maintaining situation by use of a negative feedback control system. Other examples would be missile guidance systems, automatic airplane pilot control systems and various servomechanisms in industrial automation.

It is apparent to physiologists that for the body to survive it must somehow preserve life-maintaining environments for its organelles, cells, tissue, organs, and systems. This process of maintaining life-maintaining environments is called homeostasis. Homeostasis literally means "always the same state." Its technical definition is: "a state of inner balance and stability in the body, which remains relatively constant despite external environmental changes" (Carola et al., 1990, p. 613). In other words, for organelles, cells, tissues, organs, or systems to carry on their normal functions, their internal chemical environments must be held constant at an ideal operating level. A prime example in the human is the maintenance of our relatively constant average core temperature of 37°C. According to Powers and Howley:

An increase in body temperature above 45°C (normal core temperature is approximately 37°C) may destroy the protein structure of enzymes, resulting in death, while a decrease in body temperature below 34°C may cause a slow metabolism

and abnormal cardiac function (arrhythmias). (Powers and Hawley, 1990, p. 252).

The following simple diagram (Figure 3) of the hypothalamic-controlled core body temperature in the human body illustrates this example.

In the hypothalamus of the brain a pre-determined ideal core body temperature for homeostasis is sent to a comparing nucleus along with the actual core body temperature that is picked up by a temperature sensor. If there is a significant difference, an error signal of too hot or too cold is relayed to an anti-rise center (nucleus) or anti-drop center (nucleus) respectively. All these postulated structures are located in the hypothalamus, a conglomeration of nuclei group of nerve cells in central nervous system) in the diencephalon of the brain. If the anti-rise center is stimulated, it activates the sweating and vasodilation mechanisms (opening of blood vessels) which releases heat to the environment and decreases heat production in the body. If the anti-drop center is stimulated, it starts the shivering and vasoconstriction mechanisms (narrowing of blood vessels) which preserve heat and produce heat in the body.

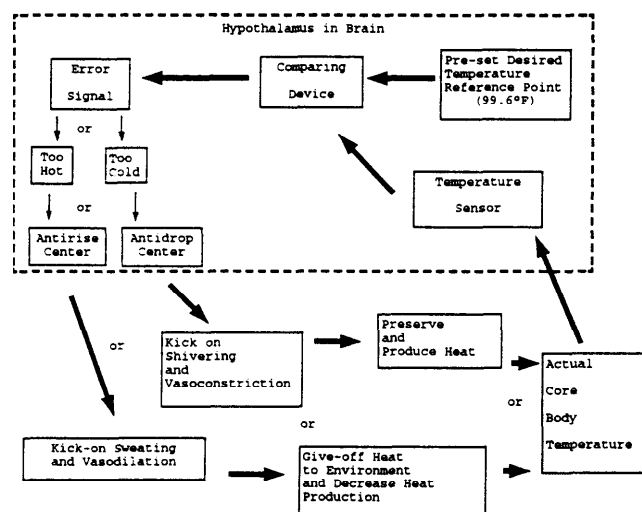


Figure 3. Diagram of hypothalamic control of core body temperature in the human.

Here is an example of the negative feedback control system in the human body. Its arrangement and function are very similar to that of the thermostatically controlled household furnace. It is obvious that core body temperature is not the only example of a negative feedback control system that regulates an optimal life-maintaining situation in the human body. Other examples are: blood pressure, blood glucose concentration, electrolyte concentrations, oxygen and carbon dioxide levels in the blood, muscle tone, etc.

A few questions are now in order. Since it took the skillful human mind of an engineer with a constructive purpose to plan and develop the many negative feedback control systems of our household heating and cooling systems, remote control systems and servomechanisms of industrial automation, is it not logical to believe that some Divine Planner designed and made functional the similar negative feedback control systems of heat regulation, blood pressure, blood glucose

concentrations, electrolyte concentrations, and muscle tone in the human body. Is it not far-fetched to believe that since the negative-feedback control systems in our houses and industry *did not* arise by chance/environmental factors occurring over a long period of time in recent history that the negative feedback control systems in our bodies *did* arise by chance/environmental factors occurring over a speculated long period of time in ancient history?

The evolutionist has a real dilemma. Either he must provide evidence for chance development of these systems over a long period of time or he must believe something that is logically inconsistent with the development of these systems in our real lives during modern history. The former solution is scientifically untenable for there is absolutely no evidence in existence to prove a chance development of negative feedback control systems in our houses or in our bodies. The later solution is illogical and anti-intellectual for it is inconsistent with what has happened in real life during modern history. The only recourse for fair-minded individuals is to accept the logical deduction that the many precise operating physiological negative feedback control systems in the human body were produced by a Divine Engineer Who methodically arranged their structures and systematically made operational their functions to insure efficiency and health throughout life.

Hormonal Control of Homeostasis

The example of maintaining a relatively constant 37°C core body temperature in humans is one in which the nervous system is the biological control system that is used. Another fascinating example of a negative feedback control system in the human body is the regulation of hormonal activity. Hormones are “messenger molecules that are released by endocrine glands and travel in the blood to regulate specific body functions” (Marieb and Mallatt, 1992, p. 722). The ensuing discussion will elaborate how hormones provide for the best level of internal chemical environment for many of our metabolic cells.

The endocrine gland system was once thought to be an independent system, but we know that the endocrine system is coordinated with the nervous system, and physiologists now refer to it as the neuroendocrine system. The following diagram (Figure 4) of the control of endocrine glands and target cells by the integrative system illustrates the overall situation.

Before we proceed through an explanation of the diagram, the key must be fully understood. A plus stands for facilitation, i.e., increase in function due to stimulation. A minus stands for inhibition, i.e., a decrease in function due to stimulation. A dotted arrow stands for transmission by an electrical nervous impulse. A dashed arrow stands for transmission by a combination electrical and hormonal modality. A lined arrow stands for transmission by a hormone.

It was previously thought that the pituitary gland was the control center of the endocrine system, because it secreted a total of nine hormones that influenced other glands and target cells. For this reason, it was called the “master gland.” Now it has been discovered that the hypothalamus, a specific collection of nuclei in the diencephalon of the brain, controls not only both

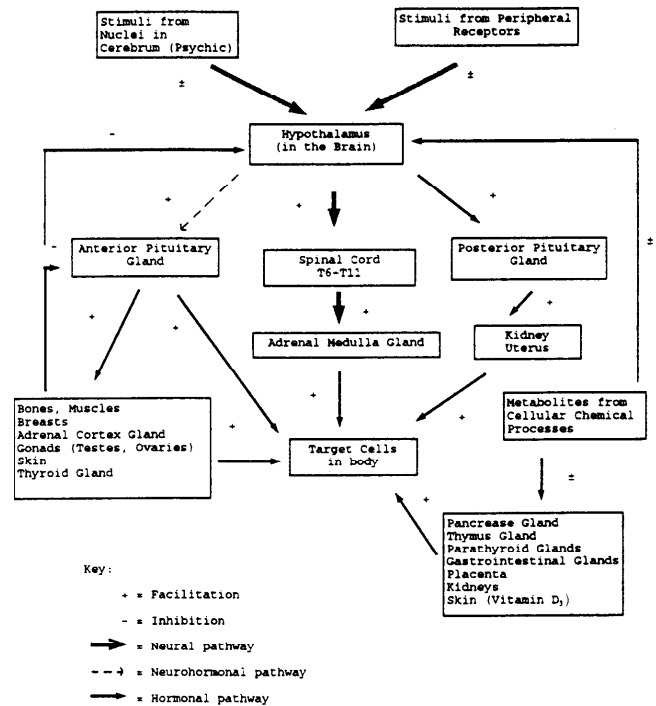


Figure 4. Control of glands and target cells by the integrative system.

the anterior and posterior pituitary glands but also the adrenal medulla glands.

Since the anterior pituitary gland controls by its secretion of specific hormones four target glands—the thyroid the adrenal cortex the testes, and the ovaries (along with a host of target cells in the bones, muscles, breasts and skin, plus the kidneys and uterus and some other target cells). The hypothalamus is now thought of as the “chairman of the board.” After receiving chemical advice (physiological input) from the board of directors (nuclei in the cerebrum, peripheral receptors, target glands, and metabolites in the blood), the hypothalamus determines if there are deficiencies in any of the local businesses (glands or target cells), and either facilitates or inhibits activities there to keep the businesses financially in the black (metabolically living). Thus the hypothalamus acts as a compact integrating headquarters, receiving information neurally, hormonally or chemically from all areas of the body and it sends facilitative or inhibitor messages by nerves and hormones to keep the functional situations under control and at a healthy level.

Here is another wonderful example of a negative feedback control system in the human body. It is analogous to a giant airport operation. The head control tower receives information from the weather stations plus the incoming and outgoing planes. It constantly computes all these data into a complex system that provides the control tower operators with the necessary information for making wise decisions for the safe taking-off and landing of all planes. This system keeps the airport in an optimal functional state, i.e., planes safely arrive on time and planes safely depart on time. In other words, the airport maintains a state of desired homeostasis.

This example of airport control is very analogous to glandular control in the human body. Since it took a

number of intelligent airport experts with past experience in airport operations to develop this highly structured and efficiently operating system of negative feedback airport control, is it not logical to believe that some intelligent, supra-human Power designed and made operational the highly efficient and life-sustaining control of the glands and target cells in the human body? If chance physicochemical forces could not develop our negative feedback airport control system during modern history, how could physicochemical forces by random methods develop our highly organized and precisely coordinated glandular negative feedback control system regulated by the hypothalamus over a speculated long historical period of time? The argument here is definitely in favor of creation (with its concepts of design, order, plan, system, and harmony of operation) and against evolution and its concepts of randomness, disarray, disorganization, and chaotic operation.

The Safety Mechanism of the Reflex

Many people today fear the threat of a fire to their homes. Because of this threat of fire to their homes while sleeping, some have attached smoke detection devices to their houses. When the device detects the presence of smoke in the house, an alarm goes off which awakens the sleeping members of the household so they can flee the burning building to safety. This is just one of the many safety type devices developed by skilled engineers to provide a means of escape for persons in danger.

A reflex in the human body acts in same way. A reflex is an involuntary neural response that provides a safeguard against destroying one's tissues. Basically a nerve-ending receptor picks up some detrimental chemical change acting on some cells and sends a message to the spinal cord or brain urging them to elicit a motor response that will take away the threat of cellular damage. The spinal cord or brain receives this information and automatically sends a message to some effector (muscle or gland) to perform its function so that tissue safety can be maintained.

Many examples of a reflex could be given. Putting one's hand on a hot stove or sitting on a tack are typical illustrations. If a nerve ending receptor did not detect the extreme heat of the stove or the piercing pain of the tack and tell the brain to do something about it, much tissue would be damaged and considerable pain would be endured.

These situations are quite analogous to the smoke detection devices that prevent bodily harm to sleeping persons in a burning house. Since the safety mechanisms in our houses were designed and constructed by intelligent engineers and craftsmen, is it not logical to believe that the many reflexes that protect our body tissues from destruction were formulated and developed by an intelligent Creator Who desired to protect His highest form of creation? Could the many precise working superficial, deep, visceral, and pathologic reflexes in our human bodies have developed by biochemical processes operating by random methods over an unknown period of time? Such a uniquely arranged and harmonious operating safety system in the human body is further indication of a divine plan for precise func-

tioning and opposed to a chance gradual development of the human body to a higher organized state.

Other examples of safety mechanisms in the human body that are better explained from a creationist viewpoint are the contraction of the spleen with its subsequent discharge of hemoglobin-rich red blood cells to maintain optimal blood volume homeostasis during exercise, hemorrhage or hypoxia (decreased oxygen in the blood) and the secretion of the hormones, epinephrine and norepinephrine, from the adrenal medulla glands to provide for suprahuman strength or energy during an emergency.

Magnificent Design of the Human Body

Our automotive engineers try each year to perfect new automobiles into the best possible running machines. Yes, our automobiles are getting better and better, but they will never approach the "ultimate machine," the human body. The healthy human body is designed so well and functions with such precision that human physiologists will never fully understand how superlative it is. Each decade scientists discover new bodily functions based on the well designed structures of the human body.

Table II portrays 18 basic designed structures from six body systems that show the relationship of unique design to precise, purposeful function. Various designs of structures in the skeletal, skin, respiratory, cardiovascular, immune and digestive systems attest to the remarkable, purposeful functioning of these structures. Could any of these designs with precise functions have originated by non-directed, physicochemical forces causing particles to fall together into such developed structures? To reproduce order out of disorder, code from non-code, and program from non-program, one needs energy—directed energy. Order never arises out of disorder, unless energy is somehow directed by an outside power. Directed energy has to be pumped into the chaotic chemical materials so that ordered chains of new designs of substances result. Codes and designs with precise function presuppose an intelligent Power behind them. To the author, the magnificent designs and precise function of human body parts are clear indications of a supernatural intelligence behind human life.

Are Physiologists Evolutionists?

In surveying a list of 17 basic texts in physiology only four references to evolution were found. This may indicate that many physiologists do not consider evolution as a critically important principle to this field of study. Crouch (1965, p. 22) made a neutral reference to "Organic Evolution" as the "history of the race," but this was merely to introduce the classification system of organisms. Two references to evolution are made in *Physiology* edited by Ewald E. Selkurt. One of the contributors, Sidney Ochs, in discussing the general properties of nerve states: "The fundamental plan of the higher life forms made its appearance very early in evolution" (Selkurt, 1963, p. 18). Another contributor, Carl F. Rothe, in discussing the role of the autonomic nervous system, asserts: "The human body has a large number of negative feedback systems, all perfected through evolutionary development" (Selkurt, 1963, p.

155). This latter statement certainly takes issue with the main thrust of this article.

Astrand and Rodahl, two world renowned exercise physiologists, make two references to the "evolution of higher organisms" in their classical text, *Textbook of Work Physiology* (Astrand and Rodahl, 1970, p. 3). *Human Physiology* by Vander, Sherman and Luciano, emphasizes the evolutionary model of the origin of life. They attribute all phenomena to evolutionary development. They maintain that "Evolution is the key to understanding why most bodily activities do indeed appear to be purposeful" (Vander et al., 1970, p. 5). Here is an attempt to associate teleology, the explanation of processes in terms of purpose, with the physicochemical changes due to natural laws. This brings up the conflict between mechanism and vitalism.

Mechanism and Vitalism

Mechanism in the philosophical sense means that all operations of living organisms are explained by the interrelationship of physicochemical forces. The opposite view, vitalism, means that programmed operations of living organisms are performed by some life principle distinct from physicochemical forces. Vander and others make some interesting comments on these doctrines (Vander et al., 1970, pp. 1-2):

The mechanist view of life holds that all phenomena, no matter how complex, are ultimately describable in terms of physical and chemical laws and that no 'vital force distinct from matter and energy is required to explain life. This view has predominated in the twentieth century because virtually all information gathered from observation and experiment has agreed with it. But vitalism, its opposite, is not completely dead, nor is it surprising that it lingers in fields (like brain physiology) where we are almost entirely lacking in hypotheses to explain such phenomena as thought and consciousness in physicochemical terms. We believe that even these areas will ultimately yield to physicochemical analysis, but we also feel that it would be unscientific, on the basis of present knowledge, to dismiss the problem out of hand, . . .

It is apparent that the doctrine of mechanism is foundational to the evolutionary model of the origin of life and the doctrine of vitalism is associated with the creation model of the origin of life.* Note what Vander and others have said. They claim that the mechanistic view predominates in this century, because the evidence has agreed with this view, and that vitalism still exists in various forms. They are willing to concede creationism has some rights to exist as a possible option. However, they confidently feel that vitalistic thought will soon be intellectually annihilated in the near future.

*Editor's note: There is considerable difference of opinion among creationists on the historic vitalism-mechanism debate. Some, like Harold Armstrong (*CRSQ* 21:78), Robert Kofahl (*CRSQ* 26:12-14 and 28:146), and L. McCann (*CRSQ* 27:151), would agree with David Kaufmann that historic vitalism should be resurrected as an appropriate stance for creationists. Others defend a God-centered mechanistic philosophy in which each biological system is viewed as one of the Creator's "living machines" involving great complexities of physics and chemistry but no "vital spirit," as such—see Richard Lumsden, *CRSQ* 30:63, and his printed debate with McCann.

Is this not the new psychological trend among evolutionists? They admit that evolutionary doctrine has enjoyed the belief of the majority of peoples both scientist and lay people alike, during the 20th century, but they admit that creationism has not been intellectually destroyed and has a loyal following with a minority of scientists and people. There is a grudging admittance that creationism deserves the right to exist as an intelligent alternative for one's personal belief, but they hope in due time it will be completely demolished from a scientific standpoint.

Many of the recent evolution-creation debates on our college campuses have indicated that the evolutionists are not as scientifically secure in their positions as they thought they were. When creation scientists are correlating recent data with the creation model of the origin of the universe, and evolutionists are having trouble correlating the new and even some of the old evidence with the evolutionary model of the origin of the universe, this is generating strong reactions from certain segments of the scientific community. What is needed is for creation scientists not only to believe, teach, and confess their creationistic beliefs in their classrooms, but to publish scientific articles and textbooks in their respective fields interspersing their creationist view just like Vander and others have done in their text such as *Human Physiology*.

Summary

A brief review of the academic discipline of physiology, the study of the operations of the organelles, cells, tissues, organs, systems and entire bodies of the human, has been presented. The evidence of parallelism of design and function between organelles and organs, negative feedback control and homeostasis, hormonal control and homeostasis, the safety mechanism of the reflex and other magnificent designs in the body is better correlated with the concepts of design and order of the creation model of the origin of life and is diametrically opposed to the concepts of randomness and disorder of the evolutionary model of the origin of life.

A discussion on the amount of evolutionary belief among physiologists and mechanism versus vitalism indicates that the traditional arguments for evolution are on shaky grounds. The exceptionally arranged and precisely operating physiological systems of the human body are persuasive indications of a divine creation of life on earth and militate against a chance gradual upward development of life on earth over a speculated long period of time.

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BOOK REVIEWS

Catastrophe Reference Database edited by Steven A. Austin. 1994. Master Books. Colorado Springs, CO. \$24.95.

Reviewed by Emmett L. Williams* and Glen W. Wolfram**

The author of *Catastrophes in Earth History*, with help from other creationists, has collected considerable material on catastrophic natural events and their importance in understanding the geology and topography of the earth. What is a catastrophe? Austin, in his introductory remarks to the database, states:

A catastrophe may be defined as a natural event of large magnitude (energy), short duration (power), wide-extent (area), and low frequency (probability) Because a catastrophe is a natural event which can be characterized by energy, power, area and probability, its study lies within the domain of geology and can be described using principles of physics.

Key words can be used to find abstracts of scientific writings on catastrophes within the database. For instance under the key word "cavitation," five abstracts can be printed. Also an abstract (no. 267) on the rapid petrification of wood in water glass (sodium silicate) solutions is available. This abstract could be utilized with the recent series of articles in the Quarterly on that topic. The first 249 abstracts are placed under subject headings and were included in Dr. Austin's book, *Catastrophes in Earth History*, available from CRS Books.

The system requirements for a person to be able to employ the database are as follows:

MS-DOS and/or Windows 3.X
 3½ inch hi-density disk drive
 Hard drive recommended
 Printer in a parallel port

Can be used with Macintosh, Apple II, Amiga, and Atari—database file will need to be imported into a wordprocessing program for browsing and searching.

The file CATASTRO.TXT is written in ASCII code. There is also a card provided to be mailed back to Master Books so that the user will be notified of all software upgrades.

Dr. Austin and those who worked with him are to be congratulated on placing this vital information in a form that requires small storage space and is potentially quite useful. Dr. Austin is one of the pioneers in his field that has stressed the importance of catastrophism as opposed to gradualism in the history of the earth. If you would enjoy having access to references that refute the contentions of uniformitarian geologists, this database is what you need.

*5693 Williamsport Drive, Norcross, GA 36692-2124.

**PO. Box 969, Ashland, OH 44805-0969.

How to Rescue the Earth without Worshipping Nature by Tony Campolo. 1992. Thomas Nelson Publishers. Nashville. 213 pages. \$18.99

Reviewed by Kevin Colling*

This book offers many good suggestions on how Christians should practice greater stewardship with respect to environmental issues. However it is seriously flawed with an exegesis that comes close to "worshipping nature" (e.g.: the "salvation that John 3:16 talks about is for everything in the universe, not just for people" p. ix.) and poor scholarship (Campolo fails to substantiate claims of environmental disaster by saying that he doesn't "have to pound you with facts and figures" p. 2).

These perspectives combine to promote a worldview that does not seem biblical. The book openly advocates an environmental eclectic composed of a "host of ideas and beliefs that have come from sources as diverse as hard empirical scientists and Christian mystics" (p. 6). However, while attempting to appeal to hard empirical evidence that the environment is really facing a disaster (evidence which is never referenced), the book slams the very method by which any such evidence could be discovered and also by which any necessary solutions may be developed. The appeal to mystical Christianity is further discouraging and results in such unbiblical declarations as "I contend that not only should women be allowed to be preachers and teachers, but if the environment is to be rescued from destruction, men need to have women in such roles" (p. 194). There is a fuzziness in these arguments that fails to separate real science (the honest study of God's works) from fanatical science and to separate real Christianity (the honest application of Gods Word) from ecumenical emotionalism. Is the environmental "disaster" so important that we should rewrite God's Will in order to save it?

It is disappointing to find that Campolo has been duped by evolutionism and that he finds it necessary to work this false doctrine into his arguments:

One of the consequences of Satan's work is that the evolutionary process has gone haywire. That is why we have mosquitoes, germs, viruses, etc. God did not create these evils. They evolved because Satan perverted the developmental forces at work in nature (p. 38).

He is convinced that "Through a perverted process of evolution, a mean and threatening spirit has become omnipresent in nature" (p. 42). This evolutionary premise also becomes a justification for arguing that Jesus meant animals to be included among the "least of these My brethren" (p. 51) as quoted from Matthew 25:40. Does this mean that animals are truly our equals, both materially and spiritually? Is not this the

*Kevin Colling, M.S., 2512 Jones Rd., Geneva, NY 14456.

essence of hyper-environmentalism and its handmaiden evolutionism.

Not only is Campolo content with questionable theology and misrepresentations of science, he offers a simplistic picture of masculinity that he says must be changed, not by men but by women! "But if men are to learn how to take on this new kind of maleness, women must teach them. If men are to enjoy this new kind of humanness, then women must show them how. And if men are to be delivered from offensive, destructive, and dominating ways, then women, who are much less inclined toward such behavior, must be their tutors" (p. 103). What is more frightening than the espousal of evolutionism is this open advocacy of the continued feminization of men.

I think this is a dangerous book.

Creation and Time by Hugh Ross. 1994. Navpress. Colorado Springs. 190 pages. \$12.00.

Reviewed by Don B. DeYoung*

Dr. Hugh Ross is an "old earth" creationist. He promotes the day age view of Genesis, believing that God progressively created different kinds of life over vast ages. In this book Ross sharply criticizes the recent creation position. He also misrepresents it; very few creationists actually fit his descriptive quotes:

[Creationists suggest] you cannot be a Christian unless you reject the teachings of current science about the origin of the earth (p. 1, quote from Dallas Willard).

Many young-earth creationists assert that God created the fossils in place (Quotes from Ted Martin and Steve Allen on pp. 2, 13).

Young universe creationists deny the reality of the universe astronomers observe and measure (p. 122).

... Young-universe creationists often and sometimes loudly demand equal access in the secular arena, such as public schools (p. 123).

[Creationists believe] every respectable Christian must deny the facts of science (p. 160).

This grossly unfair portrayal of recent creation will *not* help solve the creation-date controversy, Ross' publicized goal for the book (back cover).

Perhaps *Creation and Time* is best described by reacting to three of its basic weaknesses. Each of these points illustrates why the time issue is so controversial. First, Hugh Ross confuses scientific fact with interpretation. Recent creationists do *not* deny the facts of science, nor do they oppose scientific inquiry and research. This is charged by Ross but proved otherwise by publications such as this Quarterly. However, the *meaning* of data does indeed sensitively depend on one's worldview of history, especially concerning origins and rates of change in the past. Notice how these Ross quotes move subtly between data and interpretation:

In the case of coral atolls, scientists can measure the daily accumulation of band-like deposits over millions of years (p. 111).

Because only 6 percent of the galaxies near our own are spirals, the universe cannot be any younger than about 12 billion years (p. 113).

... the laws of physics [that God] designed and His plan to minimize human suffering and evil required [billions of years] (p. 141).

One wonders whether Ross even realizes how the long age assumption entirely controls his thinking. In the center of the book he reacts to several scientific arguments for a recent creation; rapid sedimentation and erosion, halos, comets, and a mature creation. In each case Ross suggests an alternative explanation, then assumes that his particular view must be correct and therefore the problem is completely solved in his favor. I would challenge Dr. Ross that these divergent interpretations of data are not resolved quite so easily.

The *second* weakness is his elevation of the rational mind of mankind far beyond what it demonstrates or deserves. Certainly the creation and also the Bible are rational, that is they are entirely consistent and reasonable. Fulfilled prophecy, miracles, and the regularity of nature point to this conclusion with absolute clarity. However, rationality cannot be said to control our fallen minds. Otherwise, every person would instantly see the truth of the Creator and Savior. This limitation does not rule out scientific investigation and thinking—in fact mankind is without excuse in view of the bountiful evidence which surrounds us (Romans 1:20). What it *does* mean is that some truths must be accepted on faith. This certainly includes the supernatural creation week which lies completely beyond the realm of science.

Here are two Ross quotes which illustrate his own weakness in rational thinking:

Neither Adam and Eve nor the water Jesus turned into wine are available for accurate age testing. ... Therefore neither should be brought forward as evidence supporting appearance of age (p. 54).

By this poor reasoning Ross disqualifies discussion of nearly everything from the past, whether big bang, evolution, or fossils. In truth biblical miracles are strong evidence of a mature, fully-developed creation.

The splendor of each [created] item, its beauty of form as well as of function, speaks not of instantaneous mass production but rather of patient attention to detail (p. 142).

Here Ross is attempting to prove that creation required a long period of time. Thus he pictures God as an artist who must work very slowly to get things right. However this anthropomorphism simply does not apply to the infinite Creator who is entirely beyond the constraint of time, and who can therefore create instantly.

Promotion of the big bang and accompanying long ages are very popular today. People want to believe that they can understand creation details for themselves, and that science shows the way. However, without sacrificing intellect or denying valid facts of science, a recognition of the limitations of human understanding is a very healthy alternative to a pompous attitude.

The *third* weakness portrayed by Ross is a gross naivete on the time issue itself. He calls the age question a peripheral (p. 8) and trivial (p. 11) point. It is certainly

*Grace College, 200 Seminary Drive, Winona Lake, IN 46590.

not: The time scale of history impacts one's worldview in many basic ways.

Ross proposes a final solution to the time debate. He attempts to draw a parallel with the early church debate over the circumcising of Gentile converts (Acts 15). A council in Jerusalem finally resolved this particular issue. Ross therefore calls for a modern council of Christian leaders to resolve the time issue once and for all. The weaknesses of his circumcision-age analogy could fill an entire review article. In truth, many councils and conferences have already been held concerning the age question. Each attempt has shown how deep and unresolvable this issue is. Ross naively believes that the time question can quickly be answered in favor of long ages: "The creation-date controversy will doubtless evaporate" (p. 165). This wishful thinking is clearly unfair to the scholarship and integrity of the young-earth position.

The CRS Quarterly will continue to research creation and time. We also continue to support the recent creation position without apology. May this effort maintain respect for contrary views, for science data, and most of all for Scripture.

Technopoly; The Surrender of Culture to Technology
by Neil Postman. 1992. Alfred A Knopf. New York.
222 pp. \$21.00.

Reviewed by Jerry Bergman*

Technopoly—the ruling of society by technology as opposed to people (democracy), or God (theocracy), or an all-powerful group of individuals (oligarchy)—is a development that Postman argues should deeply concern us all. He concludes that the United States is the only culture to become a technopoly and bemoans the loss of a societal world view with purpose, meaning, hope and a promise for the future. In his words, it is necessary for us to have a belief "that gives meaning to the past, explains the present, and provides guidance for the future" and he admits that "The source of the world's greatest narratives has been religion, as found, for example in Genesis" (p. 172).

Noting that Arnold Toynbee concluded "... without a comprehensive religious narrative at its center, a culture must decline," Postman concludes that this was the basis of our nation: "the American constitution is largely ... our political equivalent of Genesis" (p. 173). Even modern secular education is failing "... because it has no moral, social, or intellectual center ... the curriculum is ... a meaningless hodgepodge ..." (p. 186).

Postman concludes past attempts to replace Genesis have not been successful:

Undeniably, fewer and fewer people are bound in any serious way to Biblical or other religious traditions as a source of compelling attention and authority, the result of which is that they make no moral decisions, only practical ones (p. 79).

As Postman stresses, most modern technology does "... not offer guidance about what is acceptable information in the moral domain" (p. 79).

*Northwest State College, Archbold, OH 43502.

Although saddened with the loss of spiritual and human values which Postman concludes have been replaced by technical values that do not have human needs at their center, he nonetheless concludes that its loss is inevitable because the God as Creator and Sustainer world view is no longer viable. The school is a mechanism for information control, and college catalogs

... amount to a certified statement of what a serious student ought to think about ... [and] what is omitted from a catalog, we may learn what a serious student ought *not* to think about. A college catalog, in other words, is a formal description of an information management program ... and in so doing systematically excludes, demeans, labels as trivial—in a word, disregards certain kinds of information ... in the university where I teach, you will not find courses in astrology ... or creationism. There is, of course, much available information about these subjects, but the ... university does not allow such information entry into the formal structure of its courses. Professors and students are denied the opportunity to focus their attention on it, and are encouraged to proceed as if it did not exist. In this way, the university gives expression to its idea of what constitutes legitimate knowledge (p. 74).

Yet, Postman himself admits that "It is inspiring to note that the Biblical version of creation, to the astonishment of everyone except possibly a fundamentalist, has turned out to be a near-perfect blend of artistic imagination and scientific intuition ..." (p. 187). And that,

... scripture has as its core such a powerful mythology that even the residue of that mythology is still sufficient to serve as an exactant control mechanism for some people. It provides, first of all, a theory about meaning of life and therefore rules on how one is to conduct oneself. ... The greatest of these commandments tells us that humans are to love God and express their love for Him through love, mercy, and justice to our fellow humans" (p. 78).

These ideals that Postman so highly values, though, are not dead, only less mainstream in many spheres of society, especially academia. Research and thinking on the question and a critical evaluation of the naturalistic world view reveals that Postman's funeral eulogy is wholly premature. The reason why so few scientists do not accept the theological world view is not because it has been disproven as Postman infers but, as Postman rightly concludes that

... those who reject the Bible's theory and who believe ... in the theory of Science are also protected from unwanted information. The [science] theory, for example, instructs them to disregard information about ... creationism, which they usually label as medieval superstition. ... [but] their theory fails to give any guidance about moral information, and, by definition, gives little weight to information that falls outside the constraints of science (p. 79).

Postman has effectively articulated a dilemma—and also, evidently unknowingly, has suggested a solution.

He admits the gatekeepers of our educational institutions refuse to objectively consider the world view as a viable option which he assumes has been shown to be false. How can he know this if he has not carefully analyzed it? Postman clearly recognizes that the god of science cannot save us and openly says that the creator is dead, and he is not hopeful about the chances for a resurrection. If students were permitted to explore the censored information, they would find that the patient is, indeed, not only alive, but actually thriving.

The Scientific Alternative to Neo-Darwinian Evolutionary Theory by A. E. Wilder-Smith. 1987. TWFT Publishers. Costa Mesa, California. 198 pages.

Reviewed by Lloyd To*

This is the only creationist work I know of which contains a detailed discussion of the impact of information theory on the origin of life issue. It is a recurring theme in the book. Thus matter plus time plus energy cannot produce increasing levels of structure and organization. An additional factor must enter the equation. This is the information factor, the "antipole" of randomness which cannot arise from stochastic processes, as claimed by Eigen, Prigogine and others. Inorganic matter does not spontaneously organize itself into a machine. Matter has to be "hybridized" with extrinsic information to produce a machine. Similarly the transformation of a simple machine into a more highly developed one requires the addition of higher levels of extrinsic information.

Information consists of surprise effects, which "govern or shepherd natural law into paths which natural law would otherwise not take" (p. 104). The source of information belongs to the category of "impenetrable mysteries," beyond the capacity of the human mind to grapple with (here the book author is referring to a private communication from Noam Chomsky).

The information theory aspects of the Second Law of Thermodynamics are labored at great length. The 'open system' rejoinder of evolutionists is powerless to obviate implications of the Second Law. The input of raw energy into a system, whether open or closed, increases its randomness, unless the process is regulated by an energy conversion mechanism (which embeds information in its design). Another attempt by evolutionary biologists to escape this predicament is to speculate that living systems somehow have a way of circumventing the Second Law. The answer to this is two-fold. In the first place abiogenesis involves the self-organization of inorganic matter, and that is certainly subject to the Second Law. In the second place modern biology views life forms as the exact analogue of machines. It follows that inorganic matter cannot organize itself into living systems without being hybridized with extrinsic information, and vertical evolution (what the author calls evolutive speciation) of a lower life form into a higher one requires the coupling of additional levels of information. Such information never arises spontaneously. Time destroys, but does not create information.

This argument is fortified by viewing life forms not merely as ordinary machines, but as self-replicating

machines. According to von Neumann such machines are many orders of magnitude more complex than ordinary machines. "von Neumann found that building a self-replicating machine involved so many component parts . . . that it would become defective more quickly than the designers could build it" (p. 34). Before a machine can become self-replicating it has to be self-diagnosing as well as self-repairing, i.e. it has to become more complex still. Such a machine is known as a von Neumann machine. The Second Law precludes the self-assembly of such a machine.

The author differentiates between "actual information" and "potential information." Single bits of information, such as a single musical note or a dot in a picture, may arise spontaneously. A collection of such single bits possesses potential information, but no actual information. The actual information resides in the musical score and the picture. This secondary information is superimposed on the primary information, and is a surprise effect. Random processes create random arrangements of notes and dots (potential information), but not actual information. The same applies to biological molecules.

Where is the source of all this information? The author appears to accept implicitly the existence of higher dimensions (or "realities") beyond our space-time reality, and points to the dimensions assumed to exist beyond the event horizon of a black hole as an example. He suggests that the information needed to structure our space-time universe could have been mediated unidirectionally from some higher dimension (but does not suggest the example of the black hole to be the source). This is a part of the thesis that I find myself uncomfortable with. In his eagerness to develop a *scientific* alternative to evolution is the author, unwittingly perhaps, reducing spiritual realities to the higher dimensions supposed to exist in modern physics?

A chapter on abiogenesis includes an informative account of the synthesis of self-replicating RNA by Sol Spiegelman and of DNA by Arthur Kornberg, and the implications of their achievements i.e. the necessity of information. In the case of the Miller experiments the author draws attention to the following fact (p. 90):

Because Darwinians *expected* some macromolecules to be formed under such simulated Darwinian conditions, they profess to have found some . . . Vollmert makes the following statement: 'All reports according to which the Miller experiments yielded proteins or nucleotides (DNS/RNA) *sic* such as reported in the Eigen lecture . . . do not correspond to the facts' . . . 'On the other hand . . . biologically important macromolecules such as peptides, proteins, nucleotides, nucleic acids, saccharides . . . *have in not a single case been discovered in meteorites, on other planets, or even in older sedimentary rocks on our earth.*' . . . Eigen and others have reportedly altered known chemical findings to suit their own particular ideologies (all emphases in original).

A discourse on ETI points out that ETI research is based on the criterion that reception of a non-random signal sequence would prove the existence of an intelligent source, and hence that evolution by random processes has occurred in another part of the universe, a truly non-falsifiable theory!

*24 Southwood Close, Worcester Park, Surrey KT4 8QQ, United Kingdom.

An interesting, and regrettable, sidelight is the issue of censorship and academic freedom. On censorship the author mentions his own experience at Oxford University. On 14 February 1986 he gave the Huxley Memorial Lecture at the Oxford Union. In December of the same year he received an inquiry from the Radcliffe Science Library at Oxford asking if he had ever really given the lecture. No record of his lecture could be found in any library and the substance of the debate following the lecture was never recorded, nor was there any media coverage whatsoever. The author was also unable to persuade any reputable scientific journal to publish his manuscript.

On academic freedom, mention is made of: (1) the denial of the Nobel Prize to Sir Fred Hoyle for his anti-evolution sentiments, (2) the withdrawal of Robert Gentry's research grants and the termination of his research post, all because he published the results of his high quality research on radiohalos with its implications on the formation of the earth's crustal material in virtually zero time, and the case of Dean Kenyon, biology professor at San Francisco State University.

One point which I take issue with is the author's unfair remarks about creationists, whom he describes as being "so disunited and disrupted by internecine fighting as to make their whole school of thought uninviting to materialistic outsiders" (p. 141). How so? Because they include various schools of thought such as Theistic Evolutionist, Progressive Creationist and Gap Theorist. But Theistic Evolutionists are by definition Evolutionists, at least in the context of the book's theme (they offer no scientific alternative to evolution), and the label 'Progressive Creationist' is little more than a euphemism for 'Theistic Evolutionist.' It is remarkable that the author should include these two groups in the creationist camp, and then accuse creationists of disunity! As for Gap Theorists who reject evolution, their only fundamental disagreement with six-day creationists is over the matter of time.

The only compelling reason why creationism is uninviting to materialistic outsiders is its appeal to factors which transcend natural law, as the author himself concurs, and as many evolutionist spokesmen have admitted.

As for 'internecine fighting,' surely debate between fellow creationists, conducted in a charitable spirit and with mutual respect, is to be encouraged. It enables creationists to develop and refine their model and acts as a self-checking, self-correcting mechanism. Creationist science would hardly be creditable if all its advocates dot every "i" and cross every "t" of a narrow orthodoxy.

The author's thesis seems to be that the concept of information, which transcends natural law, serves as a viable alternative to evolution. However evolution is a comprehensive integrative principle within which data from all scientific disciplines are interpreted. The information concept alone is not adequate to take over this role—how does the geologist use the information concept to interpret field observations? The full biblical model, with its concepts of Creation, the Genesis kinds, the Fall, and the Flood is needed to provide that broad base. The Genesis kind replaces evolutionary relationships in taxonomy, biblical chronology replaces evolutionary chronology, and Flood geology replaces

uniformitarianism or the geological equivalent of punctuated equilibrium.

The author also seems to entertain the hope that divorcing the source of information from the nature of information would make the pill easier for materialists to swallow. But the two questions are inseparable, and as long as the source of information necessitates religious implications, which the author admits (p. 143), that hope is vain.

Dr. Wilder-Smith has already made some distinctive contributions to creationist thinking in his past publications. *The Scientific Alternative* is a worthy addition to that valuable contribution. Creationists could profit by developing the author's ideas further.

Hydridic Earth by Vladimir N. Larin. 1993. Polaris Publishing Co., P.O. Box 4220, Station C, Calgary, Alberta, Canada T2T 5N1. 247 pages. \$52.25 Canadian.

Reviewed by David J. Tyler*

Hydridic Earth is presented as a new geology of Planet Earth. Readers will not be disappointed. The book is revolutionary in the way it addresses a whole spectrum of related geological data. The author starts out by questioning conventional views of the chemical composition of our planet: namely, that Earth has an iron-rich core, an ultramafic silicate mantle and a great diversity of silicate rocks in the crust. Oxygen-rich silicate minerals are considered to predominate and to have a direct influence on the geological processes which are believed to have operated in the past and in the present. Larin presents his case for a radically different model of the Earth—one where the composition is predominantly non-oxic silicide. The core is no different chemically from the mantle, but the outer core contains dissolved hydrogen and the inner core has metals combined with hydrogen to form hydrides. This revised composition permits alternative explanations to be proposed for all the major geological features of the Earth.

The most fundamental consequence of the new model is that the Earth is increasing in volume over time. *Hydridic Earth* provides, for the first time, convincing arguments about the cause of Earth expansion.** External and internal processes associated with Earth expansion are discussed in detail, including sea-floor spreading, ocean evolution, mountain building geosynclines, flood basalts, oceanic trenches, Benioff zones, changes in the core/mantle boundary, thermodynamic implications, geomagnetism and the structure of the terrestrial planets.

One chapter, of particular interest to all students of age dating methods, is entitled "Isotope geochemistry and the new model of the Earth." The rubidium-strontium, samarium-neodymium and uranium-lead isotope systems are analyzed and reinterpreted in the context

*Whitegates Cottage, The Mudd, Mottram-in-Longdendale, Hyde, Cheshire, SK14 6JW England.

**Editor's note: Readers wishing to locate creationist sources in which it has been proposed that the Earth's radius expanded in conjunction with the Flood of Genesis 7 should consult the various papers and books by Glenn R. Morton with special reference to "Mountain Synthesis on an Expanding Earth" CRSQ 24:53-61. Also consult Morton CRSQ 19:219-224, 18:42-45, 24:37-38, and his book entitled *The Geology of The Flood*.

of a hydridic Earth. Conventional thinking is shown to have a number of arbitrary features imposed by advocates of oxygen-rich Earth models who require the isotope systems to behave in a certain way. Larin does not develop an alternative chronology of Earth history, but his helpful critique is a valuable resource for those who are interested in revising the interpretations placed on radiometric clocks.

There are energy resource implications if the hydridic Earth model is correct. Larin proposes, in a chapter devoted to the subject, that superdeep drilling in selected localities may allow the extraction of very large quantities of hydrogen gas. The prospect of transforming the world's energy crisis is sufficient, in itself, to warrant exhaustive evaluation of the new model by the geological community.

Larin is deeply conscious that his hydridic Earth ideas are at variance with almost everything taught to students of geology. A systematic analysis of the reasons underlying this divergence is not attempted, but the following quotation reveals something of Larin's thinking.

Earth scientists have not even come close to having a comprehensive, unifying, basic theory, or even a correct premise at the base of their science. They have shut themselves off, each tending to develop independently, often inventing his own specialised hypotheses or models uncoordinated with other researchers. All this has led to a conviction that geology is too complicated, and that geologists are comfortably ready to swallow any contradiction of their theories, and to do so without indignation! (page 228)

Vladimir Larin has degrees in geology and mineral prospecting from Moscow University and began his career as an exploration geologist. He has gained extensive field experience working for the Geological Institute of the Russian Academy of Science, with specialist interests in the geology of Phanerozoic granites and their associated metal deposits. He has focused his scientific research on the themes of this book since 1968, and defended successfully a doctoral thesis on hydride systematics in 1990. The editor-on-translation of the Russian original, Warren Hunt, has done an excellent job in preparing this material for English-speaking readers.

This book provides stimulating reading for all serious students of Earth science. My only criticism is that the literature base is rather limited and opportunities to interact with advocates of expanding Earth concepts are not taken. How can creationists use this material? At very least, it provides a serious alternative to conventional theories of the Earth. In the world of geological education, this text can be used to promote openness, critical analysis and an awareness of the importance of conceptual frameworks. In developing biblically consistent models of the Earth, creationists will find much to stimulate thought and many leads to follow up. Although *Hydridic Earth* is presented within conventional time-frames, there is ample scope here for catastrophism related to the Genesis Flood and its after-effects.

Observations upon the Prophecies of Daniel, and the Apocalypse of St. John by Sir Isaac Newton. 1991. Oregon Institute of Science and Medicine. Cave Junction, OR. 323 pages. \$19.95.

Reviewed by Eugene F. Chaffin*

I have heard many negative things about Newton, including comments about his disputes over priority of discovery with Hooke and Leibnitz. The secular scientists seem reluctant to report on Newton's Christian faith. This book is a reprint of a book which was originally published in 1733, six years after Newton's death. The reprint is based on a copy which originally belonged to Thomas Jefferson, and is now in the Library of Congress. It contains Newton's attempts to understand Biblical prophecies. One finds from reading it that Newton interpreted the Bible in a straight forward fashion, believing it to be the inspired Word of God. This God, in Newton's opinion, governs all things.

In addition to his renowned mathematical acumen and physical intuition, Newton was an expert in ancient history and languages, and this expertise shines through in the book. In chapter 10, Newton successfully interprets Daniel's prophecy of the 70 weeks, identifying the Anointed Prince as the Lord Jesus and explaining the arithmetic involved. I am doubtful about some of the interpretations in the latter chapters, and probably Newton was also. The manuscript was not published until after his death. I would strongly recommend this volume to students of the Bible and to those interested in the life of Newton.

The Creation Hypothesis by J. P. Moreland, Editor. 1994. Intervarsity Press. Downers Grove, IL. 335 pages. \$15.00.

Reviewed by Don B. DeYoung**

Several years ago producer John Ankerberg brought a group of scientists together in Dayton, Tennessee to discuss creation. They met in the Dade County Courthouse where the Scopes trial took place. Some of the results were shown on his television program; the more in-depth material is in this book. Contributors include:

John Ankerberg	Theology
Walter Bradley	Engineering
William Dembski	Mathematics
Stephen Meyer	Philosophy
J.P. Moreland	Philosophy
John Oller, Jr.	Linguistics
John Omdahl	Biochemistry
Hugh Ross	Astronomy
Charles Thaxton	Chemistry
John Weldon	Theology
Kurt Wise	Paleontology

Early on, it was decided to sidestep the age question for creation. However the book does not always maintain a neutral stance:

[There exists] history prior to the arrival of human beings (Moreland, p. 13).

*715 Tazewell Ave., Bluefield, VA 24605.

**Grace College, 200 Seminary Drive, Winona Lake, IN 46590.

... in spite of certain scientific problems with the big bang theory, it is currently the most reasonable and widely respected view (Moreland, p. 20).

... all matter, energy, space and time began simultaneously about 16-18 billion years ago (Ross, p. 142).

Conflict over these types of statements eventually led to the dropping of two young earth creationist writers from the book project.

There is helpful material presented, much of it philosophical in nature. For example, it has been popular clear back to the time of David Hume, to deny the need for a Designer to explain the delicately balanced universe. Thus the Anthropic Principle has been secularized. The faulty logic of this thinking is clearly shown; design does indeed strongly call for a Designer (p. 30).

Creation science is described as a new paradigm which challenges established science. This is in the sense of Thomas Kuhn's 1962 classic *The Structure of Scientific Revolutions*. That is, major science shifts often come from people outside the mainstream. Although not a new idea, Kuhn's ideas are well presented here and are probably correct (p. 37).

There are several "meaty" chapters which make good resource material. The final section gives many good quotes by evolutionists, thoroughly referenced, showing the tentativeness and weakness of their position. The book has no subject or author index, a major weakness.

*Michael Faraday: Sandemanian and Scientist** by Geoffrey Cantor. 1991. St. Martin's Press. New York. 359 pages. \$45.00.

Reviewed by Danny R. Faulkner**

This book will be of great value to all who are interested in biographies of great creation scientists. A number of biographies of Faraday have previously appeared, but none have considered Faraday's religious beliefs to be of much consequence, generally treating his membership in the Sandemanian church as a passing afterthought in a page or two. Author Cantor has now corrected this gross oversight. Indeed, the author argues persuasively that once one understands the intensity of belief of the Sandemanians, it is inconceivable that this faith could not have had a profound influence on the world view and science of its adherents.

Thus Cantor examines Faraday's life from the viewpoint of how his faith affected his work. The author makes it clear that he is not a Sandemanian, nor is he even a Christian, but he is so fair in his treatment that his book could be termed sympathetic. Cantor obviously highly respects Faraday.

The book describes the history of the Sandemanian church and details some of the beliefs. I found this most helpful, since other sources do not seem to discuss this in great detail. Much of what the Sandemanians believed is common to conservative independent churches in this country: belief in the inspiration of the Bible, reliance upon scripture as our sole authority, and a rejection of church hierarchy. Some of their practices may be considered a little peculiar to many today, but are still practiced by some groups. Examples of this would be their very closed nature in society and their

practice of extreme church discipline. Participation in their love feast was open only to members, and much of their social interaction was with members of the church. Members were often excluded for various infringements, which even Faraday was subjected to once. The wrong committed by Faraday is not known for certain but it appears to have been a very trivial matter by most standards today. A second exclusion would have resulted in no possible reconciliation.

The emphasis on living in strict accord with scripture naturally resulted in a scientific life governed by the same principles. Modern creationists would view the world in much the same way that Faraday did. He

... accepted the Bible as indubitably true and placed revelation far above reason. This commitment to revelation identifies one important issue on which these writers were in agreement—they did not doubt that God had created the universe and that Genesis contains the true account of how the physical world was brought into being (p. 166).

The creation imposes a simplicity and order on the world, and thus men can deduce the laws of nature by study. Once certain principles are understood, these laws of nature can be harnessed to man's advantage, and this is part of our commission to subdue the world given by a loving creator. This is especially true in the field of electricity and magnetism, for which Faraday is particularly remembered.

Though Faraday was one of the best known and respected scientists of his day, he shunned the public spotlight, rarely accepting public social engagements. This was in keeping with the close knit structure of his church. His lifetime was a time of tremendous social awareness and upheaval in Britain, and most publicly known figures freely offered their opinions on these topics. In keeping with his church Faraday shunned public comments on contemporary issues, and so beyond his science writings or church teachings, little is known about other beliefs that he held. This may be important in explaining one gap in the records of Faraday's life. Though Darwin's *Origin of Species* was published a few years before Faraday's death, there are no recorded comments of Faraday on this. This is a little odd in that Darwin's ideas had a very large and swift impact on public thought in England, and it is not possible that this could have escaped his attention. Cantor suggests without any evidence that Faraday may have compartmentalised his beliefs to accommodate these ideas (p. 146). This is a very popular choice today, but I do not believe that it was 130 years ago. If Faraday did this, he would hardly be a hero or role model for modern creationists. Is there another explanation? Elsewhere in his book Cantor points out that Faraday's scientific output was already declining in his latter years, so he may have not been in a position to offer opinions. Also granted that Sandemanians refused to become involved in political and social issues, is it possible that he refused to comment publicly given the current nature of the issue? Without powerful evidence I find it difficult to believe that such a highly principled and consistent individual could have had such a lapse.

Overall Geoffrey Cantor is to be commended for writing such a fine book. Creationists will be encouraged to explore more about the Christian testimony of this eminent scientist. It is highly recommended.

*This book also was reviewed earlier. *CRSQ* 30(3). September 1993. p. 177.

**1402 University Drive, Lancaster, SC 29720.

VIDEO REVIEW

Origin of The Races by John MacKay. Video. 1993. Creation Research Center, P.O. Box 281, Hartsville, TN 37074. 30 minutes. \$25.00.

Reviewed by Robert L. Powell*

John MacKay is a gifted geologist, researcher, and writer, who is committed to presenting the science and history of the world from a Biblical viewpoint. The basic premise of this video is that the various races of people around the world are descendants of Adam and were dispersed at the time of the Tower of Babel incident as presented in Genesis.

The video was filmed on location around the world. John interviewed natives from various tribes regarding their ancient stories and traditions about the creation of man and woman, a world-wide Flood, and a once common language which is consistent with the Biblical story that all "races" have a common ancestor. The video includes common stories not found in the Bible which indicate a common origin along Biblical lines.

The strength of the video is that it is not just hearsay evidence; the stories are recorded from the people themselves. In every case the natives were emphatic that these stories did not come from Christian missionaries, but from their ancestors. One fascinating aspect of those interviewed is that regardless of tribal skin colors, all traditions claim the same color for the first man. Much insight is also presented about the degenerate effects of spiritual darkness on the social conditions of various tribes.

Many spectacular places were visited during the making of this documentary: Australia, the Grand Canyon, Hawaii, the Canadian Rockies and ancient ruins in England. This documentary is produced for a secular audience and has proved to be easily understood by all. One positive effect has been in understanding the root of racial issues. The video is highly recommended for anyone who wants evidence to support the Biblical truth about origins, and a tool to help solve racial problems. John's unique ability to present facts with humor makes this a pleasant experience.

ATTEND THE 1995 C.R.S. MEETING IN BEAUTIFUL DOWNTOWN PRESCOTT

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At 7:00 p.m. there will be an opening prayer by the president of C.R.S. followed by a 25-minute package of talks about C.R.S. Research and The Research Center. Next there will be a mini-symposium with speakers and topics as follows:

Dr. Richard Lumsden on Millipeds, Cyano-genesis, and Cyanide Tolerance

Dr. David Kaufmann on Design in The Human Body

Dr. Don DeYoung "A Visit from Isaac Newton"

Dr. Russell Humphreys on A Young Earth Cosmology

Dr. Duane Gish concerning Biology Refutes Evolution.

A time of refreshments and fellowship will follow. Come and bring a friend. There is no admission charge.

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Genetics: Enemy of Evolution

Lane P. Lester, Ph.D.

Genetics and evolution have been enemies from the beginning of those two concepts. Gregor Mendel, the father of genetics, and Charles Darwin, the father of evolution, were contemporaries. At the same time that Darwin was claiming that creatures could change into other creatures, Mendel was showing that even individual characteristics remain constant. While Darwin's ideas were



based on erroneous and untested ideas about inheritance, Mendel's conclusions were based on careful experimentation. Why then did Mendel's work lie unappreciated for some 35 years? No one really knows; therefore, anyone is free to speculate. My own speculation is that Darwin's



ideas were immediately adopted because they gave fallen men a justification for ignoring their Creator, even for denying His existence. But by the end of the 19th century, other research had so clearly confirmed the principles discovered by Mendel that evolutionists had to incorporate these principles into their theories. They did so, and have continued to do so, on a very selective basis. Only by ignoring the total implications of modern genetics has it been possible to maintain the fiction of evolution.

Having said the above, I do not plan to say much more about evolution, I would prefer to talk about creation and the testimony of genetics to the power and glory of the Creator. Too long have creationists concentrated on pointing out the fallacies of evolution, and spent too little time demonstrating the truth of creation. Indeed with some justification, the evangelists of evolution prefer to call us anti-evolutionists rather than creationists. Dr. William Mayer claims repeatedly that there is no creation model and that anti-evolutionists merely call attention to weaknesses in the evolution

model. Of course, if there are only two competing concepts, destroying one is almost as conclusive as proving the other. But it is probably true that creation will never receive anything like its proper acceptance until it is fully developed as a foundation for modern science. Tom Bethell, writing on economics in *National Review* said, “The discrediting of a theory, whether in science or economics, must necessarily await the arrival of an alternative hypothesis. Darwin’s theory of natural selection, for example, exposed in recent years as devoid of meaning because of its circular nature, survives in practice for lack of a rival” (Bethell, 1980, p. 1562). I believe that the lack of a creation-based science has helped evolution maintain its total ascendancy, even among those who would be philosophically inclined to reject it.

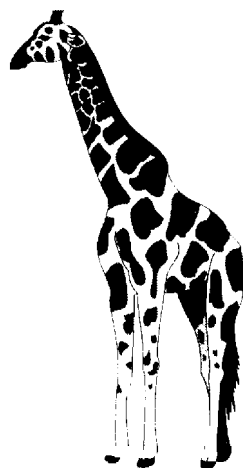
Fortunately, the wind is shifting. More and more creationist scientists are concentrating on building the creation model rather than just tearing down the evolution model. Research is being done at both secular and Christian colleges and universities that seeks to rebuild science on a foundation of creation. I say “rebuild” because modern science was developed primarily by creationists who knew that a rational God had created a rational universe, and that rational man could, through observation, experimentation, and reason, learn much about the creation.

Now let us sample some of the evidence from genetics as it helps us develop a new biology based on creation rather than evolution. It may be helpful to arrange this evidence under the four sources of variation: environment, recombination, mutation, and creation. A combination of these four sources can explain any and all differences between any one creature and another.

Environment

By environment I mean all of the external factors which influence a creature during its lifetime. For example, one may have darker skin than another simply because he is exposed to more sunshine. Or one may have larger muscles because he exercises more. Or one may have a greater resistance to disease because he eats right. Now these environmentally-caused variations may have great importance for the individuals who possess them. But they have no importance to the history of life, because these variations die with their owners; they are not inherited. In the middle 1800’s some of the scientists who had rejected the Creator believed that variations caused by the environment could be inherited. Charles

Darwin accepted this fallacy, and it no doubt made it easier for him to believe that one creature could change into another. He thus explained the origin of the giraffe's long neck through "the inherited effects of the increased use of parts" (Darwin, 1958, p. 202). In seasons of limited food supply, giraffes would stretch their necks for the high leaves and these longer necks would be passed along to the offspring. One who is studying the living world on the basis of creation is not tempted to fall into this fallacy because a perfect creation would already contain perfect variations without the necessity for new ones.

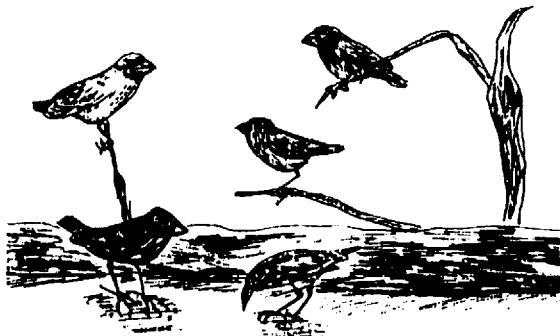


Recombination

The second source of variation is recombination. This involves shuffling the genes and is the reason that children resemble very closely their parents but are not exactly like either one. The discovery of the principles of recombination was Gregor Mendel's great contribution to the science of genetics. Mendel studied seven pairs of traits in the garden pea. In each of these he showed that while traits might be hidden for a generation they were never lost, and when new traits appeared it was because their genetic factors had been there all along. Recombination makes it possible for there to be limited variation within the created kinds. But it is limited because virtually all of the variations are produced by a reshuffling of the genes that are already there. A few examples might help us appreciate the limited nature of variation through recombination.

Many varieties of chickens have been produced from the wild jungle fowl, a lot of variation. But no new varieties are being produced, because all of the genes in the wild jungle fowl have been sorted out into the existing varieties, limited variation. From the science of plant breeding we have the example of the sugar beet. Beginning in 1800, plant breeders sought to increase the sugar content of the sugar beet. And they were very successful. Over some 75 years of selective breeding it was possible to increase the sugar content from 6% to 17%. But there the improvement stopped, and further selection did not increase the sugar content. Why is that? Simply because all of the genes for sugar production had been gathered into a single variety and no further increase was possible.

Finally, let us consider an example of recombination provided for us by Charles Darwin. During his voyage around the world which began in 1831, Darwin observed many fascinating plants and animals. But none were more fascinating than those he saw on the Galapagos Islands. Among these were a group of land birds, the finches. In this single group we can see wide variation in appearance and in life-style. Darwin provided what I believe to be an essentially correct interpretation of how the finches came to be the way they are. A few individuals were probably blown to the islands from the South



American mainland, and today's finches are descendants of those pioneers. However, while Darwin saw the finches as an example of evolution, we can now recognize them merely as the result of recombination within a single created kind. The pioneer finches brought with them enough genetic variability to be sorted out into the varieties we see today.

Mutation

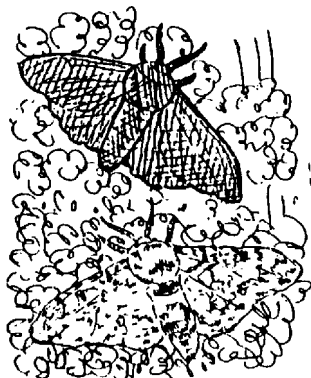
Now to consider the third source of variation, mutation. Mutations are mistakes in the genetic copying process. Each living cell has an intricate molecular machinery designed for the copying of DNA, the genetic molecule. But as in other copying processes mistakes do occur, although not very often. Once in every 10,000—100,000 copies a gene will contain a mistake. The cell also has machinery for correcting these mistakes, but some mutations still slip through. What kinds of changes are produced by mutations? Some have no effect at all. The genetic code has a certain amount of redundancy, so that some slight changes in the DNA produce no change in the end result. Other mutations produce so small a change in the end result that they have no appreciable effect on the creature. But many mutations have a significant effect on their owners. Based on the creation model, what kind of effect would we expect from random mutations, from genetic mistakes?

We would expect virtually all of them to be harmful, to make the creatures that possess them less successful than before. And this prediction is borne out most convincingly. Some examples help to illustrate this.

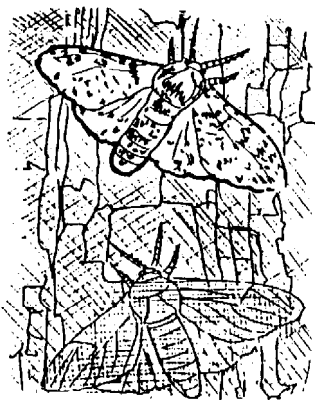
A rather interesting mutation is albinism, found in many plants and animals. This particular genetic mistake prevents the production of color. Various harmful side effects are seen in albino animals, such as impaired eyesight. But in plants albinism is lethal. Without chlorophyll photosynthesis is impossible, and as soon as the food from the seed is gone, the seedling dies. For a thorough study of the effects of mutations *Drosophila melanogaster*, the common fruit fly, is unsurpassed as a source of information. Geneticists began breeding the fruit fly soon after the turn of the century, and since 1910 when the first mutation was reported, some 3000 mutations have been identified (Lindsley and Grell, 1967). All of the mutations are harmful or harmless; none of them produce a more successful fruit fly—exactly as predicted by the creation model.

It seems appropriate at this point to take a side trip and consider the control of mutations. Certainly if mutations were free to spread through populations of organisms, life would soon disappear. It is one of the roles of natural selection to prevent the spread of mutations. We must not allow the fact that circular reasoning is present in discussions of natural selection to cause us to deny that it is a real and an important factor in the history of life. The fact that it was Charles Darwin who called our attention to natural selection is more a comment on the sorry state of creation science in the mid-1800's than it is a comment on the validity of the concept.

Natural selection is no more or less than the label we give to what now seems to be the obvious fact that some varieties of creatures are going to be more successful than others, and that they will contribute more offspring to future generations. Everybody's favorite example of natural selection is the peppered moth of England, *Biston betularia*. As far as anyone knows, this moth has always existed in two varieties, speckled and solid black. In pre-industrial England, many of the tree trunks were light in color



because of the color of the bark or of lichens growing on the bark. This provided a camouflage for the speckled variety, and the birds tended to prey more heavily on the black variety. Moth collections showed a vast preponderance of speckled over black. When the Industrial Age came to England, coal was one of the primary sources of energy. Since there was then no Environmental Protection Agency, the burning of coal put a layer of soot on everything, including the tree trunks. The trunks were blackened, and the camouflage of the peppered moth was reversed. Then the black variety was hidden, and the speckled variety was conspicuous. Soon there were many more black moths than speckled. This might be considered as the positive role of natural selection. As populations encounter changing environments, such as that described above or as the result of migration into a new area, natural selection increases the combinations of traits which will make the creature most successful in its new environment. The negative role of natural selection is seen in the elimination or minimization of harmful mutations when they occur. The disadvantage of the mutation prevents its spread through the population.



Is there no such thing as a beneficial mutation? I'm afraid that I have to depart from my creationist colleagues that maintain the impossibility of such an occurrence. A beneficial mutation is simply one that makes it possible for its possessors to contribute more offspring to future generations than do those creatures that lack the mutation. For example, there occurred in Florida in 1914 a mutation in the tomato which caused a change in its growth pattern, making the tomatoes much easier to harvest. Because of human selection for this mutation, it has been spread throughout the cultivated tomato. The mutation for antibiotic resistance in bacteria is certainly beneficial for those bacteria whose environment is swamped with antibiotic. Of course, none of these types of mutations are relevant to any ideas about one kind of creature changing into another.

A type of change of a rather more significant nature involves the decrease or loss of some structure or function. Darwin called attention to wingless beetles on the island of Madeira. For a beetle

living on a windy island, wings can be a definite disadvantage. Mutations producing the loss of flight could be helpful. Similar would be the case of sightless cave fish. Eyes are quite vulnerable to injury, and a creature that lives in pitch dark would benefit from mutations that would reduce that vulnerability. While these mutations produce a drastic and beneficial change, it is important to notice that they always involve loss and never gain. One never observes wings or eyes being produced on creatures on which they have never existed.

Creation

And now the fourth and final source of variation: creation. Why is it a necessary part of the history of life? Simply because the first three sources of variation are woefully inadequate to account for the diversity of life we see on earth today. An essential feature of the creation model is the placement of considerable genetic variety in each created kind. Only thus can we explain the possible origin of horses, donkeys, and zebras from the same kind; of lions, tigers, and leopards from the same kind; of some 118 varieties of the domestic dog, as well as jackals, wolves, and foxes from the same kind. As each kind obeyed the Creator's command to be fruitful and multiply, the chance processes of recombination and the more purposeful process of natural selection caused each kind to subdivide into the vast array we now see.

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Credits

Brenda Lindley-Anderson is the artist for the drawings of Gregor Mendel, Charles Darwin, and the Darwin's finches.

Ross Marshall is the artist for the drawing of the peppered moths.

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Dr. Glen Wolfrom
Membership Secretary
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P.O. Box 969
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