

Creation Research Society Quarterly

21st Year

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 21

DECEMBER 1984

NUMBER 3



CREATION RESEARCH SOCIETY QUARTERLY

Copyright 1984 © by Creation Research Society

VOLUME 21

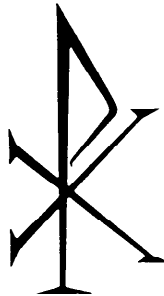
DECEMBER 1984

NUMBER 3

EDITORIAL BOARD

Emmett L. Williams, Editor
5093 Williamsport Drive
Norcross, GA 30092

Walter E. Lammerts, Research Editor



- Harold L. Armstrong.....Queens University,
Kingston, Ontario, Canada
- Thomas G. Barnes.....University of Texas (Emeritus),
El Paso, Texas
- Duane T. Gish.....Institute for Creation Research,
San Diego, California
- George F. Howe.....Los Angeles Baptist College,
Newhall, California
- John W. Klotz.....Concordia Seminary,
St. Louis, Missouri
- John N. Moore.....Michigan State University (Emeritus),
East Lansing, Michigan
- Henry M. Morris.....Institute for Creation Research,
San Diego, California

Notice of change of address, and failure to receive this publication should be sent to Wilbert H. Rusch, Sr., 2717 Cranbrook Road, Ann Arbor, Michigan 48104.

Creation Research Society Quarterly is published by the Creation Research Society, 2717 Cranbrook Road, Ann Arbor, Michigan 48104. © 1984 by Creation Research Society.

Creation Research Society Quarterly is indexed in the *Christian Periodical Index*.

COVER ILLUSTRATION

Oblique aerial view of folds in the Malaspina Glacier; Mt. St. Elias and St. Elias Mountains in the background. The scale of folding in the glacier is in miles. Yakutat district, Alaska Gulf region, Alaska: U.S. Geological Survey photo by A. Post, 23 August 1969.

Did such a condition exist over wide areas of the world at one time in the past? Michael Oard examines methods of dating the so-called ice ages in this issue.

ERRATUM

The last two sentences in column one and the first sentence in column two of page 57 *CRSQ* 21(2) should read as follows: Experiments in optics indicate that there is coherence over distance of at least one meter. This means that the *train of waves emitted by each atom* must be more than a meter long. Each wave train has coherence over the entire coming-and-going distance involved in standing waves.

TABLE OF CONTENTS

	Page
Editorial Comments	104
Invited Paper — Plant Succession Studies in Relation to Micro-Evolution and the Extinction of Species	104
Walter E. Lammerts	
Earth's Young Magnetic Age: An Answer to Dalrymple ...	109
Thomas G. Barnes	
One Error of Dalrymple Corrected	114
Robert E. Kofahl	
Educational Column — Teaching About Origin Questions..	115
John N. Moore	
Did the Universe Start Out Structured?	119
Hermann Schneider	
Proof	123
Phillip D. O'Hern	
Panorama of Science	124
Ice Ages: The Mystery Solved?	
Part II: The Manipulation of Deep-Sea Cores	125
Michael J. Oard	
The Legacy of Duyvene De Wit for Creationist Biology	
Part II: The Folly of Man and the Works of the Lord ...	137
Magnus Verbrugge	
The Creation of Planetary Magnetic Fields	140
D. Russell Humphreys	
Special Feature — Recorded Instances of Wrong-Order Formations or Presumed Overthrusts in the United States: A Bibliography — Part II	150
Walter E. Lammerts	
Report of 1984 Board of Directors Meetings	151
Book Reviews (3)	153
Letters to the Editor (3)	155

QUOTE

Life is not an accident of nature. It is not a question of probabilities. It's not just a whole bunch of sperm that happened to connect up with one egg or one sperm out of a whole bunch of sperm that connected with one egg. It's not an accident. It is a gift of God. If you read the *Roe v. Wade* decision you will see that the implicit assumption of the United States Supreme Court is that life is an accident. It's based upon an evolutionary atheistic world view.

Titus, Herbert W. 1984 Supreme Court perverts due process to sanction shedding of innocent blood. *The Senate Report* 6:3.

APPLICATION FORM FOR THE CREATION RESEARCH SOCIETY

Four Groups can receive our quarterly publication. They are:

- 1) *Voting Members:* these shall have an earned degree in some recognized area of science at least at the level of the master's degree (M.A. or M.S.)
- 2) *Sustaining Members:* these are people with or without advanced degrees in an area other than science, who are interested in the work of the Society.
- 3) *Student Members:* these include high school and undergraduate college students, who wish to become acquainted with the work of the Society.
- 4) *Subscribers:* these include all libraries, schools, churches and other organizations, as well as any individuals who wish to know what the Society is doing, but who feel that they cannot sign the statement of belief. Organizations, by their very nature, cannot sign statements of belief.

In addition, all members (categories 1, 2, and 3 above) must subscribe to the following:

1. The Bible is the written Word of God, and because we believe it to be inspired thruout, all of its assertions are historically and scientifically true in all of 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 man, were made by direct creative acts of God during Creation Week as described in Genesis. Whatever biological changes have occurred since Creation have accomplished only changes within the original created kinds.
3. The great Flood described in Genesis, commonly referred to as the Noachian Deluge, was an historical event, worldwide in its extent and effect.
4. Finally, we are an organization of Christian men of science, who accept Jesus Christ as our Lord and Savior. The account of the special creation of Adam and Eve as one man and one woman, and their subsequent Fall into sin, is the basis for our belief in the necessity of a savior for all mankind. Therefore, salvation can come only thru accepting Jesus Christ as our Savior.

MEMBERSHIP APPLICATION BLANK

(tear off and return)

I fully subscribe to the Statement of Belief of the CRS as stated above, and submit my application as one of the following:

- () Voting Member; dues \$15.00/year \$17.00 overseas), includes subscription to *C.R.S. Quarterly*.
- () Sustaining Member; dues as above, includes subscription to *C.R.S. Quarterly*.
- () Student Member; dues \$10.00/year (\$11.00 overseas), includes subscription to *C.R.S. Quarterly*.
- () Senior citizen (65 or older); same rate as student members.
- () Life Member; \$250.00.

Since I do not subscribe to the Statement of Belief (or represent an organization):

- () Subscriber; dues \$18.00/year (\$20.00 overseas).

My membership should begin with the June 19____ copy of the Annual Issue, since the publication year begins in June and continues through September, December and March.

Name_____ Street_____
City_____ State_____ Country_____
Zip_____ Phone_____ Degree_____ Field_____
University granting degree_____ Year_____
Presently associated with_____

Please complete this blank and return with the proper remittance to the membership secretary:

Wilbert H. Rusch, Sr.
2717 Cranbrook Road
Ann Arbor, Mich. 48104
Phone: (313) 971-5915

Please make out checks to the Society (CRS). Please DO NOT send cash. Foreign orders please use a check drawn on a U.S. bank, or an international money order.

EDITORIAL COMMENTS

A variety of scientific disciplines are represented in the articles in this issue of the *Quarterly*. The invited paper by Walter Lammerts concerns botany, i.e. plant succession studies. Dr. Lammerts summarizes his and Dr. Howe's field work on the changes that occurred in populations of certain wildflowers over a period of years.

Recently since evolutionists have attacked the creationist position of a young earth two physical scientists, Dr. Tom Barnes and Dr. Robert Kofahl, defend these scientific positions against such an attack. As the decay of the earth's magnetic field is a strong argument in favor of a young earth, Dr. Barnes and Dr. Russell Humphreys develop the model further in their articles. Dr. Humphreys, in particular, details the predictive value of the creation and decay of the magnetic field as compared to the dynamo theory so popular in naturalistic circles.

Michael Oard continues his examination of the uniformitarian concept of the ice ages, i.e. the use of deep-sea cores as a method of "dating" these ages. Magnus Verbrugge discusses the philosophy of science of De Wit, the Dutch biologist.

Harold Armstrong reviews the new book released by the Society, *Design and Origins in Astronomy*. May I suggest to our members that a good project to help the Society would be to encourage libraries in your local area to subscribe to the *Quarterly* and to obtain the books published by us. Contact the Acquisitions Librarian to determine if there is an interest in CRS publications. Often interest is kindled when the publications are donated. If books and journals are placed in libraries, more people have access to the material.

I have asked Dr. John Moore to prepare a series of educational articles on the evolution-creation controversy. He graciously consented and the first selection appears in this issue. Dr. Hermann Schneider presents compelling arguments that the universe began fully formed rather than without structure as necessary in the "big bang." Several articles in *Design and Origins in Astronomy* make this same point.

There are several interchanges of comments in Letters to the Editor. Please offer your thoughts on items that appear in the *Quarterly*. May each of you have an enjoyable Christmas holiday and a successful New Year.

Emmett L. Williams

INVITED PAPER

PLANT SUCCESSION STUDIES IN RELATION TO MICRO-EVOLUTION AND THE EXTINCTION OF SPECIES

WALTER E. LAMMERTS

Received 5 January 1984; Revised 30 May 1984

Abstract

No evidence was found for any type of evolution, including micro-evolution in a plant succession study. Extinction (degeneration process) occurred often. Natural selection at best only maintains the status quo.

Introduction

Both creationists and evolutionists have usually accepted the concept that mutations and variations in plant populations eventually lead to the establishment of varieties, then sub-species, and eventually new species. In fact many dedicated creationists readily accept so-called micro-evolution, but believe that the process stops there, and does not continue on to the formation of generic, and eventually family differences. After considerable discussion of this concept, George Howe and I decided in the Fall of 1968 to study plant succession in populations of five species of endemic California plants. So in the Spring of 1969 definite areas were staked out, and the variations found therein were described then labeled with wire stakes. Herbarium specimens of each variation were taken, and seeds collected wherever possible.

Each year the plots were revisited with the objective of determining (1) if any variation increased in number, and (2) if this increase was progressive, that is leading to a change from what was originally the "typical" or more frequently occurring form.

Fortunately the Winter and Spring of 1969 were ones of heavy rainfall and a great profusion of wild flowers occurred, mostly as a result of the heavy Spring rainfall and relatively mild Winter. We later found, however, that a heavy rainfall does not necessarily result in a wealth of flowers, at least not in any given area.

Five species were studied: the California poppy, *Eschscholtzia californica*; the lupine, *Lupinus succulentus*; the thistle sage, *Salvia carduacea*; the owl's clover, *Orthocarpus purpurascens*; and a perennial, the lovely yellow pansy, *Viola pedunculata*. The results of five years of study were presented in the article on plant succession in the March 1974 issue of the *Creation Research Society Quarterly*.¹

Although five years is far too short a time to detect any pronounced micro-evolutionary trends, we did hope to find some shifts in the relative numbers of the particular variants selected. The actual results as summarized in Tables 2-6 of the 1974 article were indeed quite unexpected. They are best discussed by the consideration of each species.

California Poppy — *Eschscholtzia californica*

Following the heavy rainfall and warm Spring of 1969, a great abundance of variation was found. The

*Walter E. Lammerts, Ph.D., is a Founder and Fellow of the Creation Research Society. He receives his mail at P.O. Box 496, Freedom, CA 95019.

33' x 39' plot contained about 1000 plants of which only 33 were the typical solid orange type, or 3.3 percent. Many of the variants reported by A. V. Beatty² such as fringed and yellow petal edge with orange center were found. Beatty felt that these were inherited as simple Mendelian recessives. As shown by Cook³ in the usually arid Southern California the poppy is an annual. In the north the rainfall is much greater and there it is a perennial. Ten of the many variants were staked for plant succession study. During the very dry Spring of 1970 only 93 poppy plants could be found. The Spring of 1971 was equally dry and there was a catastrophic elimination of all poppies. In a nearby area they were monotonously uniform, (a light orange color) and very small. The lack of much variation following the abundant rainfall in 1973 was most unexpected. Only 378 poppies could be found in the plot. Only four variants were located and no types found in 1976 were observed. Most of the plants were below the average size found in 1969 and of a medium orange color. Natural selection, if one wishes to call it that, seems to select the typical form rather than to increase any variation. Evidently only under the most ideal conditions of temperature, rainfall, sunlight and lack of competition from grass do poppies exhibit a full range of variation. The lack of continuity as regards the populations would seem to bar any possible natural selection leading to the establishment of new varieties and eventually species.

Lupine — *Lupinus succulentus*

The year of 1969 was very good for this lovely annual lupine and whole hillsides in the Newhall area were completely covered by this species. A 24' x 36' plot on one of these hillsides was selected for study. Nine selections were staked on April 27, 1969, three of them being the pink *L. microcarpus* var. *ruber*. The others varied mostly in leaf size and shape, though some variation in color occurred also. The typical form has a lavender center in the banner and the remainder of the banner, wings and keel are blue. One of the variants had a very small flower with little white in the banner. There were several hundred plants in the plot and most of them were very lush, luxuriant plants three or more feet in height. The very dry year of 1970 reduced this population to only seven small plants with small racemes of typical flowers. Following two more dry years not a single plant of either species could be found in the plot even after the heavy rainfall in the Spring of 1973! There was a catastrophic elimination of lupines in the plot, though there were many nearby hillsides beautifully covered with lupines. Possibly study of other locations would show that this lupine characteristically colonizes a new area, increases in population size and then dies out as the area becomes heavily populated with other plants. George Howe⁴ has noted that after a fire in the Newhall area, there is a profusion of lupines and other flowering plants during the first growing season. Yet even though seeds are present in great numbers, lupine populations typically decline during the second and later seasons and do not appear as the dominant flower until after another fire.

Thus with *L. succulentus* there is a "boom or bust" situation which is far from the standard reoccurring populations generally required in natural selection

models. Rather than finding stable populations in which the variants or mutations may gradually infiltrate after many generations, *L. succulentus* populations may be separated from each other by decades.

In any event and for whatever reason, the selection plot ended in a complete blank terminating the natural selection of both round and narrow leaf variations as well as other selected types.

Thistle Sage — *Salvia carduacea*

In the case of the thistle sage, there was a catastrophic selection in favor of the very woolly leaf cylindrical type. Now the thistle sage usually has white woolly pinnatifid leaves which are spine tipped and toothed. Three areas selected for study were on adjacent sloping ridges. Because of the heavy rains in 1969 the plants were unusually vigorous some being over three feet high. Ten selections were marked including the woolly leafed cylindrical one. Oddly enough, in the original 1969 plant distribution, this type was a single quite small plant, certainly the *least likely* candidate for any type of selection. Also it did not gradually increase in numbers during the dry 1970, 1971, and 1972 seasons, yet following the high rainfall of the 1973 Spring, it was the only surviving type of plant in the whole plot!

This sort of phenomenon corresponds to the example of catastrophic selection in *Clarkia* reported by Harlan Lewis.⁵ In his examples usually short growing seasons, limited by lack of rainfall, were shown to have catastrophic effects on population size.

Owl's Clover — *Orthocarpus purpurascens*

The succession in this species was in many ways quite similar to that of the California poppy. The plot at Newhall was in the midst of an area near Valencia Boulevard, having a great profusion of very luxuriantly growing owl's clover plants. At least a thousand plants were in the 15' x 30' general area studied April 25, 1969 and these showed a great profusion of variants including five white flowering ones. The typical color is crimson or purplish, the lower lip white tipped, with yellow and purple dots or markings. Variants selected and staked included a range in color from very light lavender to dark purple with a galea either white or yellow. Not one of the 26 variants showed any increase in percentage of population. As with the lupines, absolutely no owl's clover could be found in the Newhall plot following the heavy rains in the Spring of 1973. There was instead a heavy growth of *Erodium cicutarium* or red stemmed filaree, small lupine, *Baeria* or gold fields, and some poppies. Thus any chance for the natural selection of any variation was eliminated. At the Corallitos plot near my home the great majority of the plants in 1973 were the typical lavender purple with leaves showing a considerable amount of purple. Not one of the 21 variations from the type described and staked in 1969 such as white flowered, dark purple, light lavender, "shaving brush" type or trifid leaf could be found. Originally, in 1969, 8336 ± 500 plants were counted. By 23 April 1973 these were reduced in number to about 700 plants. The weather was too cold that year for any growth until April 1. The grass was quite high and evidently the owl's clover had difficulty getting established. Also noticed was the fact that some plants simply withered away during periods of hot weather, probably because of the lack of an ade-

quate root system. Atsatt and Strong⁶ have shown that *Orthocarpus* is a hemiparasite. Roots of this species form haustorial connections with host plants of other species. In this way they supplement the water and nutrient supply potential of their own root system by, in a sense, robbing their host plants.

Evidently, in the dry years, the typical form established contacts more rapidly with host plants. The variations then must have been inferior to this type and also relatively similar to one another in their hemiparasitic ability. Atsatt and Strong have demonstrated that variation in this ability does occur. Selection then based on external flower and plant characteristics would only accidentally coincide with this unusual hemiparasitic ability of the typical form. Since it has the maximum hemiparasitic ability it is indeed difficult to see how any natural selection of variant types leading to micro-evolutionary changes could ever occur.

Yellow Pansy — *Viola pedunculata*

Fortunately one perennial species was included in our study. Thus a basis was obtained for an answer to the question as to whether new seedling populations were being established, which in turn would furnish an avenue for micro-evolution. Twenty-three selections were staked and described in the Spring of 1969. Unfortunately only eight of the stakes could still be located in 1973 but the trend was very clear cut as was shown in Table 7 of our 1974 article. It will be noted that in general either no seedlings or very few of them were found near the clones selected. Thus in 1971, selection #10 had several seedlings nearby. But these evidently died during the interval from the Spring of 1971 until that of 1973, for no seedlings (either newly germinated ones or young two year old clones from the 1971 seedlings) could be found near the large well-established 1969 clone #10. Furthermore, the four seedlings found in 1971 near #14 evidently did not mature since only a few very small seedlings that germinated in 1973 could be found near the original plant. Finally, though selection #25 was still remarkably vigorous in the Spring of 1973, no young plants survived from the five seedlings found within one foot of that plant. It was noted that in spite of the very wet Spring of 1973, there were generally very few seedlings near any older clones. This is in line with the findings of F. W. Went.⁷

Thus he has described "intra plant" competition which frequently inhibits the establishment of young plants as in forests. He suggests that allelopathic substances may be volatile, or may be produced by living roots, or derived from decaying above ground parts of the plants or trees. Such substances may inhibit other plants or be most effective against plants of the same species. The question of how *Viola* clones limit seedlings nearby would be a most interesting subject for further research.

In any event, it is quite clear that no avenue for micro-evolution exists where established clones can successfully prevent the *succession of generations*. Only a vegetative asexual succession of "generations" of this *Viola* occurs by the proliferation of runners. Just how the very considerable amount of variation originated remains unanswered.

Discussion of Results

Certainly then natural selection of seedlings leading to distinctive varieties cannot occur when there are practically no seedlings to select. Lest it be claimed that only a few seedlings are necessary for selection to be effective, the bar to this supposition as regards the pansy is that *in every case* the few seedlings observed in 1971 evidently *died* since no young plants were observed near the pansy clones in 1973. As regards the poppy there was as might be expected a great reduction in the numbers of plants during each of the dry years. But the continued *lack* of much variation following the abundant rainfall in the Spring of 1973 was not at all anticipated. The Spring of 1973 did differ from that of 1969 in that the months of February, March, and April were much colder. Perhaps this low temperature factor is what reduced the population size by more than 50 percent. The luxuriance of the 1969 variation suffered about as much reduction in both variety and percentage of the population from cold weather in 1973 as from the dry Spring of 1970. The plant succession as regards the owl's clover was in many respects similar to that of the California poppy, only even more drastic. As mentioned previously, not one of the 21 variations from the typical form staked and described in 1969 could be found. The lupine selections also completely disappeared and the plot in 1973 was a complete blank as far as lupines were concerned. Only as regards the thistle sage there was a catastrophic selection of the wooly leaf cylindrical variant. In the original plant distribution found in the plot in 1969, this type was a single quite small plant compared to the large, spine tipped, pinnatifid typical form. It *did not gradually increase* in number during the dry 1970-72 seasons. In comparison with the luxuriant and typical large revolute leafed forms, it would seem to be at a very distinct disadvantage. Yet the only plants now in the plot are these small, very wooly cylindrical leafed forms. Whether this variant type will maintain itself and eventually develop any chromosomal differences remains to be seen. Certainly no *gradual* shift in the percentages of the many variants found in the 1969 population, as might be expected in accordance with the usual concepts of natural selection, occurred.

In the above five species there is simply no mechanism for the gradual natural selection of any of the many variants staked and described in the 1969 either because of the eventual death of the selections in the plot, or their being overwhelmed, so to speak, by the typical form as in the poppy and owl's clover. The question now is just how did the complex variation patterns ever arise in the first place? As regards the origin of species varying in chromosome number or special arrangement of genes within the chromosome, Harlan Lewis⁸ suggested inbreeding in populations which normally are outcrossed. He points out that inbreeding may lead to extensive chromosome breakage. Similarly a shift to intense inbreeding will profoundly affect the expression of variation in populations, setting up small "founder" populations as shown by Mayr.⁹ Whether the wooly leafed cylindrical type will become a "founder" population leading to a well-established variety remains to be seen.

But as Lewis asked in relation to two species of

columbine, one the short spurred red (*Aquilegia formosa*) and the other the long spurred cream colored (*A. pubescens*) how did these differences arise in the first place? He admits the first question can never be answered precisely but suggests the usual natural selection of progeny progressively better adapted to either humming birds or hawk moths (for *A. pubescens*). It should be pointed out that although hawk moths are able to effect pollination of the long spurred types, there is little evidence that they cannot also pollinate short spurred flowers.

Suggestions for Further Research

In addition to the investigation of just how clones such as the *Viola* limit the growth of any seedlings near them, the following are other lines of research regarding plant succession which we might well pursue now that we have two research locations. In fact, the Grand Canyon station would be ideal since, like California, Arizona has a climate with usually dry summers.

1. A small 35' × 40' area should be cleared of all plants in the late fall and a record should be made as to just which plants colonize the area first, and which ones later. Especially interesting observations could be made as to whether any species displaced ones which were first established.

2. Herbarium specimens have already been made of all plants found at the Grand Canyon station. Plant density studies such as those of Talbot, Biswell, and Horman¹⁰ should be performed in which the product of plant height times density is used to get the plant volume. In this way it could be determined if there were gradual or perhaps catastrophic reduction of any particular species now present as represented by the herbarium specimens. This of course could only be done in a relatively small but representative area.

3. Should any invasions of the area occur, these plants should not immediately be destroyed but carefully studied to determine if they increase or are eliminated by the already established species.

4. Any seedlings variations should be marked and seed taken. They should also be staked and observed from year to year as to whether they increase or are eliminated. Seedlings of these possible variant types should be grown in a cultivated plot near the laboratory so as to get some idea as to their inheritance pattern.

5. Specimens of closely related species might well be planted near a few of the already established ones in order to see if they could compete with those which presumably have a very special adaptation to the area because of a long history of natural selection. I seriously doubt if this natural selection advantage exists but rather believe that the location of plants in any given area is more or less a matter of chance. Their establishment is of course limited by climatic factors such as rainfall. Here exists a chance to experimentally test whether this is true or whether the plants now present actually do have a selection advantage.

Ten Years After

Though I was unable to go down to Newhall to look at the various plots which we studied from 1969 until 1973, George Howe very kindly investigated them for me about the middle of March 1984. The following is his report:¹¹

1. Thistle sage plot on McBean Parkway. There were no thistle sage plants present anywhere on this whole hilly area. There was no chance to see if the woolly leaf cylindrical type had established itself since all plants of this species were simply gone from this whole area. Some portions of the plot appear as if they should support the thistle sage plant, but now only dried grasses and black mustard can be found.
2. Poppy plot across from the College of the Canyons on Valencia Boulevard. There were no poppy plants present anywhere on this plot or on the nearby hills.
3. *Orthocarpus*—owl's clover plot. Again there simply were no owl's clover plants to be found. The other plot at the end of Valley Street is totally changed into streets and houses!
4. *Viola* plots on Pico Canyon Road. These were still present. There were hundreds of plants with leaves in the shade of oak trees but only a few were flowering. Accordingly no detailed study could be made as to whether any of the clones studied from 1969 until 1973 still survived.
5. Lupine plot. Though George Howe was not able to visit the lupine plot it is his belief that no lupine plants would be found. This is because lupines require scarification of their seeds in order for them to germinate. So only after a fire are there large hillsides of them. So then natural selection and any resultant micro-evolution could only occur after fires or about every 50 years or so.

As Howe wrote in his letter¹² to me in the Fall of 1983, when he made a study of these areas, if micro-evolution depends on the long tenure of plant populations, there simply could not be any. In fact one of the owl's clover plots has been converted into streets and houses. Large piles of dirt have been dumped at the foot of the hill where the thistle sage plot is located. There is a subdivision home and a swimming pool only about a hundred yards away from this plot. Because of the activities of *Homo reitorensis* we are witnessing the obliteration of whole areas formerly available for study of plant population succession. This then brings us to the last subject of our paper, plant and animal extinction.

Extinction Occurring at an Alarming Rate

Though we could find no evidence for even incipient micro-evolution, there is evidence for plant and animal extinction. Thus Peter H. Raven¹³ wrote an article in *Fremontia* (April, 1983) entitled, "The Importance of Preserving Species." He discusses the research which shows that evening primroses have a nutrient called gamma-linolenic acid, found in the oil from their seeds. Whole populations of human beings are characterized by a deficiency of this active essential fatty acid. Thus the oil from the seeds of evening primroses may prove to be important in helping us avoid coronary diseases, eczema and arthritis. There are four species of the primrose on the Endangered List, and one is found in the Antioch dunes. As Raven says, who knows which species of evening primrose will have the richest source of this essential fatty acid? Were it not for two species of endangered butterflies, we might now have only sand mining there. Sand mining began in 1921. By 1951 the dunes were reduced in height from 115 feet

to about 30 feet. Sand mining continued into 1979 and finally was stopped by the State Division of Mines and Geology. Now two small parcels of ground are federally owned. The Antioch Dunes evening primrose (*O. deltoids* subspecies *howellii*) is safe for the time being.

Raven further states that "the extinction of species is probably the most significant event that is occurring in our lifetime." Of the roughly 20,000 species in the United States, about 10 percent are "endangered" or "threatened." The Smithsonian Institution in 1978 listed 1485 species of plants as endangered, 1408 as threatened, and 360 as extinct! The loss of genetic diversity on a world scale caused by plant extinction cannot be stressed too much. It badly limits the growth of biological knowledge. Wild relatives of domesticated plants are of obvious importance, and should receive special attention.

In the July 1981 issue of *Fremontia* there is a review of the book entitled "The Sinking Ark," written by Norman Myers.¹⁴ Myers, an ecological consultant warns us that with the present practice and the likely increase in the human population, as many as 100 species of organisms per day will be lost by the end of the century.

Anthony Huxley¹⁵ in *Fremontia* (July 1976) states that "at present between 50 and 200 plant species become extinct every year, and that the proportions will steadily increase." Dr. Melville believes that 20,000 species will no longer be with us in the year 2000. It is estimated that there are between 250,000 and 300,000 species of flowering plants in the world.

Finally, a most interesting article in *Fremontia* (July 1983) by Walt Anderson¹⁶ entitled "The Sutter Buttes: An Island" has the following to say about the rape of the Sacramento Valley.

To be sure, the land (of the Buttes) has experienced change. The Indians themselves are gone, as are the grizzly bear, tule elk, and pronghorn. Native plants must now compete with a long list of aliens brought in by various human activities. Grazing influences can tip the balance towards the invaders. There are pressures growing in the Buttes for condominiums in addition to the roads, towers, quarries and trailer sites already scarring the land. These will increase.

Conclusions

Though we found absolutely no evidence for even incipient micro-evolutionary changes in our plant succession studies, we did find very strange and sudden disappearances of whole populations in our various plots, especially during the dry years. After three dry years we found absolutely no evidence for the re-establishment of the very large populations with all the fascinating variants found in 1969 even after the very wet Spring of 1973. What plants were present tended to be the typical form of each species except the thistle sage. Here there was a catastrophic selection of a wooly cylindrical type of variant. In 1969 this was a single quite small plant in comparison to the luxuriant large three-feet tall revolute leafed plants typical of this species. Most certainly it would have been the last candidate for any type of natural selection. Furthermore it did not gradually increase in number during the dry 1970-72 seasons. We hoped that possibly we had found a variant which might eventually become

an incipient new variety of the thistle sage. However, unfortunately in August of 1983 not a single dried specimen of any type could be found. As Howe wrote,¹⁷ "It looks as if our little species populations died out."

But though we found no evidence for the continuity of populations needed for any sort of natural selection, Howe reported that some of the plots have been damaged by subdivision activity.

So then though we found no evidence for the sort of selection of variant types which might lead to the evolution of species, we did find plenty of evidence for the disappearance of whole populations of plants, which brings us to the subject of plant extinction. As shown by a number of studies reported in *Fremontia*, the journal of the California native plant society, there is abundant evidence for the extinction of species at an alarming rate. Thus the ecological consultant, Norman Myers, warns us that with the present practice and likely build-up in human population, as many as 100 species of organisms per day will be lost by the end of the century. Though there are several million species of animals, micro-organisms and plants in the biosphere such a rate of extinction would soon leave us with only the most widespread species, certainly a rather monotonous world! It is time that creationists join our environmental protection enthusiasts in combating the tendency of man to destroy what God has given him. For though man was put in the garden of Eden to dress it and to keep it, far too many in the years since creation have forgotten this basic command. Let us then be more aware of the still great beauty of God's creation and strive to maintain it as we are asked to do.

References

1. Lammerts, W. E. and George F. Howe. 1974. Plant succession studies in relation to micro-evolution, *Creation Research Society Quarterly*, 10:208-228.
2. Beatty, A. V. 1936. Genetic studies on the California poppy, *Journal of Heredity*, 27:330-338.
3. Cook, Stanton A. 1965. Genetic system, variation and adaptation in *Eschscholtzia californica*, *Evolution*, 16:278-299.
4. Howe, George F. 1982. Postfire strategies of two chaparral shrubs (Chamise and Ceanothus) cast light on origins, *Creation Research Society Quarterly*, 19:3-10.
5. Lewis, Harlan. 1966. Speciation in flowering plants, *Science*, 152:167-171.
6. Atsatt, P. R. and Donald R. Strong. 1969. The population biology of annual grassland hemiparasites. I—the host environment, *Evolution* 24:278-291.
7. Went, F. W. 1957. The experimental control of plant growth, *Chronica Botanica*, 17(XVII):343.
8. Lewis, *Op. cit.*, p. 170. (See his reference 24.)
9. Mayr, E. 1963. Animal species and evolution, Belknap Press of Harvard University Press, Cambridge, MA.
10. Talbot, M. W., H. H. Biswell and A. L. Hornman. 1939. Fluctuations in the annual vegetation of California, *Ecology*, 20:394-402.
11. Howe, George F. 1984. Personal correspondence, March 16.
12. Howe, George F. 1983. Personal correspondence, August 16.
13. Raven, Peter H. 1983. The importance of preserving species, *Fremontia*, 11(1):9-12.
14. Myers, Norman. 1979. The sinking Ark, *Fremontia*, 9(2):21.
15. Huxley, Anthony. 1978. The ethics of plant collecting, *Fremontia*, 4(2):17-21.
16. Anderson, W. 1983. The Sutter Buttes: an inland island, *Fremontia*, 11(2):3-9.
17. Howe. 1983. *Op. cit.*

EARTH'S YOUNG MAGNETIC AGE: AN ANSWER TO DALRYMPLE

THOMAS G. BARNES*

Received 17 March 1984; Revised 20 August 1984.

Abstract

Dalrymple's attack on the decay of the earth's magnetic field and the resulting young earth concept is found to be flawed.

Desperation of the Evolutionists

G. Brent Dalrymple, research geologist with the U.S. Geological Survey, is spearheading the American Civil Liberties Union all-out attack upon the publications of creation scientists. He acknowledges review assistance from thirteen other noted anti-creationists, such as Carl Sagan, Preston Cloud, and Richard Doell. This is, no doubt, associated with his mission as a technical witness in the ACLU's court efforts to prevent a balanced treatment of origins in the public schools.

Dalrymple's primary concern appears to be with the scientific case that creationist scientists have developed for a young earth-age. That is not surprising because the game is up for evolutionists if the earth is young. This author's publications on the decay of the earth's dipole magnet have been of particular concern to Dalrymple because it is based on rigorous physics and appropriate data. In his article, "Radiometric Dating and the Age of the Earth,"¹ he uses the usual anti-creationist cliché that associates a young earth with "a belief in a flat earth." Working at the same level of intellectuality, the response would be "A hit dog always howls." But creation scientists do not need to resort to ridicule. Their case rests on science itself.

Dalrymple contends that the earth's age can be accurately obtained from radiometric dating. However, his own statements illustrate that a multitude of judgments have to be included in radiometric dating.

Not all rocks have remained closed systems since their formation, some rocks contain daughter isotopes at the time they form, there are instrumental corrections to be made, and not all methods work on all types of rocks under all circumstances. Geologists have learned the circumstances under which each method can be relied on, have developed techniques and categories for circumventing most of the difficulties, and have learned to design experiments so that the data are verifiable. (pp. 3033-3034)

This reminds one of the geology lecturer who, when confronted with a discrepant date, replied: "One must be very careful about which rocks one picks up."

Dalrymple claims that the earth's age has been radiometrically dated to an accuracy of two percent or better.

How old is the earth? . . . The answer is, between 4.5 and 4.6 billion years. How well do we know the age of the earth? Within about 2% or better. How long have we known the age of the earth? For more than 25 years. (p. 3035)

Dalrymple does not use the oldest radiometric dates on earth rocks, 3.6 to 3.8 billion years. He considers those ages too young. He uses the oldest radiometric

dates on moon rocks and claims that it is the earth's age. "The oldest meteorites and moon rocks give radiometric ages between 4.5 and 4.6 billion years." (p. 3035) That is how he got the 4.5 to 4.6 billion year earth age. Where he got the two percent accuracy and 25 years knowledge is not detailed.

Problems with Their Dates

There is a fundamental problem with the aforementioned moon age. It can be shown from celestial mechanics that the moon cannot be 4.5 billion years old. The moon is receding from the earth and would be much farther away if it had been moving away for 4.5 billion years. There is an additional constraint on the time of recession. The moon never was close to the earth. A body the size of the moon would have been ripped apart by the gradient of the tidal forces if the moon had ever been within a distance of about 11,500 miles of the earth, the Roche limit. Celestial mechanics proves that the moon cannot be as old as 4.5 billion years. Using Dalrymple's own claim, that one can date the earth by the date of the moon, it follows that the earth cannot be as old as 4.5 billion years. It has been known for more than 25 years that the earth-moon system cannot be that old. MIT Professor Louis B. Schlichter's celestial mechanics paper (1963) implies that fact: "The time scale of the earth-moon system still presents a major problem."²

Once evolutionary geologists "decide" how old something is, they will find a multitude of ways to interpret data to fit that age. None of their means of dating the earth have anything like the credibility of celestial mechanics. So one should not have to waste his time with their manipulative schemes to confirm an erroneous date. When straightforward radiometric dating does not work, the so-called isochron age dating is employed. Dalrymple resorts to isochron dating of meteorites to give support to the age he has assigned to the earth. The problem is the unreliability of isochron dating. Russell Arndts and William Overn have shown that one can use the isochron dating and obtain either an old date or a young date with that method depending on the postulates one uses.³ Numerous additional problems with isochron dating have been brought to light by Randal Mandock in his Master of Science thesis *Scale Time Versus Geologic Time in Radiosotope Age Determination*.⁴

Decline in Scientific Integrity

Evolutionary doctrine, whether it relates to geology or biology, is fraught with *pretense*. W. R. Thompson, F.R.S., points that out in his scholarly *Introduction* to the centennial edition of Darwin's *Origin of Species*. After documenting a massive amount of pretense, he concludes: "The success of Darwinism was accompanied by a decline in scientific integrity."⁵

That degradation in scientific integrity is evident in censorship of facts that support a young earth age. Not

*Thomas G. Barnes, D.Sc., Professor Emeritus of Physics, University of Texas at El Paso, receives his mail at 2115 N. Kansas St., El Paso, TX 79902.

one article or book ever mentioned *both* Sir Horace Lamb's 1883 theory of the earth's decaying magnetic field and the extensive real time data that confirm it, until my 1971 article.⁶ In fact there was very little mention of either that theory or the data except in highly specialized publications, outside the public's view. The reason for this exclusionary practice is that Lamb's theory and the confirming data refute the old earth age, so essential to evolutionary theory.

Dalrymple claims that Lamb's paper did not apply to the earth's magnetic field. Dalrymple quotes Barnes' statement:

In 1883 Sir Horace Lamb proved theoretically that the Earth's magnetic field could be due to an original event (creation) from which it has been decaying since. . . .

Then Dalrymple states:

Barnes seriously misrepresents Lamb's work. Lamb's papers are concerned solely with theoretical behavior of electrical currents in a spherical conductor. The earth's magnetic field is not even mentioned by Lamb. Lamb also does not mention either an original event or creation.⁷

Dalrymple is wrong. It appears that he has not read Lamb's paper. Since Lamb's paper is quite complex, he could have at least read the elementary article by J. A. Jacobs in the Society of Exploration Geophysicists' *Mining Geophysics* entitled "The Earth's Magnetic Field."⁸ Jacobs is well aware of the fact that Lamb's theory yields a young earth age. He finds no electromagnetic flaw with this theory itself, only with the result, a young earth age. On page 430 Jacobs states:

H. Lamb showed in 1883 that electric currents generated in a sphere of radius a , electrical conductivity σ and permeability μ , and left to decay freely would be reduced by electric dissipation by Joule heating to e^{-1} of their initial strength in a time not longer than $4\sigma\mu a^2/\pi$. This time is of the order of 10^5 years, whereas the age of the earth is, more than 4×10^9 years.

When the appropriate observational data are applied to Lamb's equation the time constant is about 2000 years, not 10^5 years. But in any case it demolishes the entire theory of evolution.

To refute Dalrymple's claim that Lamb "does not mention an original event or creation," one needs only to go to Lamb's original paper. The following quote is from page 520 of Lamb's 1883 paper.⁹ "In paragraph 4 I discuss the case of electric currents *started anyhow* in the sphere and left to themselves." [Italics added] That clearly means a starting event of unknown origin. On page 530 Lamb gave an illustrative calculation of the decay time for the current and associated magnetic field of a conducting sphere the size of the *earth*. Like Jacobs' calculation, it was rough and not based on the observational data now available. But it showed that his theory provided the mechanism for explaining the earth's magnetic dipole field. Had he known the conductivity and radius of the earth's conductive core, he could have accurately computed the decay time from his equation.

Lamb developed the theory, others provided the appropriate historical values of the magnetic dipole moment after years of worldwide measurements and data

reduction. Together they provide the only theoretically valid explanation of the earth's dipole magnet and the confirmational data. Only a decrease in scientific integrity must be the answer as to why this *combination* of theory and confirmational data had never been published, or even mentioned in any publication, before this author's 1971 article.

Applying Lamb's Theory

If Dalrymple had established his contention that Lamb did not provide a theoretical solution for the earth's dipole magnet, I would have been happy to accept all of the credit. But, having gone through Lamb's lengthy theoretical derivation and having understood it and seen the potential of that great work, I insist that Lamb be given credit for his original work. However, I have redone the derivation in updated terminology, using a more appropriate system of coordinates, extended the derivation to give additional solutions to properties of the core of the earth, and applied the data to make the applicable evaluations.¹⁰

The present value of this freely decaying electric current circulating in the core of the earth is about six billion amperes. The rate of consumption of energy is about 800 megawatts. The only source of energy from which that power is drawn is the present energy in the magnetic field. Its energy half-life is about 700 years.

Faith In a Nonexistent Dynamo

It takes real faith in the evolutionary dogma for a geologist to think that this energy drain has been going on for billions of years and that it will continue to do so for billions of years to come. This is particularly true in view of the fact that there has still not been a single scientifically valid theory of a dynamo to generate the current or energy source to run it. The burden of proof is up to the evolutionary geologist.

Like the other evolutionary geologists, Dalrymple clings to the dynamo theory. He imagines this dynamo to be some type of mechanism associated with some kind of motion in the molten core of the earth. Although there have been hundreds of dynamo theories proposed, not one of them has been shown to be scientifically valid. Here are some comments made by Dalrymple in his *Journal of Geological Education* article, "Can the Earth be Dated from the Decay of its Magnetic Field?"¹¹

Barnes criticizes the dynamo theory because of the absence of a definitive solution. . . . Even though there is near universal agreement that a dynamo exists in the earth's core, the exact mechanism . . . is not known. (p. 130)

Because Dalrymple can not really come up with a known energy source to power the hypothetical dynamo, he uses a "scatter-gun" approach.

At present, scientists do not know which of several sources actually drives the dynamo; in fact, it may be some combination of sources. (p. 131)

Prior to that he stated: "At present it seems that gravitation may be the most plausible source of energy . . ." (p. 131) That is nonsense and completely unsupported. After all these years there is nothing to support the dynamo theory, a necessary link in the doctrine of evolution.

Signal vs Noise

In the language of the engineer, Dalrymple fails to distinguish between the *signal* and the *noise*. The earth's dipole field is the signal. The noise is the superposition of all the other magnetic fields, from whatever magnetic sources. There are literally billions of sources of magnetic noise and ordinarily their location and energy content are not known. For example, magnetic storms may be so intense that transatlantic radio communication is totally disrupted. Magnetic noise is as fickle as the wind.

Dalrymple's failure to distinguish between signal and noise can be seen in his statement:

Barnes' hypothesis also does not fit the facts. Freely decaying currents cannot explain the existence, configuration, movement, or changes of the nondipole field . . . (p. 130)

Dalrymple does not seem to understand that the nondipole field is the noise, not the signal. The dipole field is the signal. The dipole field is decaying in accordance with known theoretical physics equations. That is the signal which Gauss separated from the noise when he made his historic evaluation in the early 1830's.

Dalrymple objects to Barnes' statement: "As of now there is no physical evidence, seismic or otherwise, that there is any motion within the core." (p. 131) His point is to justify the claims of fluid motion as part of the mechanism for the dynamo. That is not relevant, because no dynamo theory has been shown to be valid with whatever type of motion one might have. However, this demonstrates his failure to understand the nature of magnetic noise, the nondipole field. No one knows the location of the source of that noise. Without knowing the location of the sources of noise one can hardly claim to use noise as evidence of motion in the core. Similarly Dalrymple is in error when he claims that the nondipole field is gaining the energy lost by the dipole field. That is nonsense because the loss of energy in the dipole field goes into heat.

The evolutionary geologists are missing the boat by trying to associate noise, which may be of a regional nature, with the symmetrical dipole field magnet. It is the nonconformities that should be of interest to an exploration geologist or geophysicist if they are interested in finding beds of minerals and the like. The dipole field is the clear signal that represents the central magnet.

Additional Fruits of the Theory

Stanley Stanulonis, in his Master's thesis, *The Mechanism Responsible for the Precession of the Geomagnetic Dipole with Evaluation of the Earth's Core Charge Density and Its Implication*,¹² took the data of the type which Gauss and others have provided for the history of the earth's dipole field. He was able to evaluate the charge density in the core of the earth. He was not dealing with noise. The westward drift of the earth's magnetic dipole field was available in the dipole data. He developed the electromagnetic theory which accounts for this, namely the interaction between the rotating earth's magnetic dipole field and the solar wind. This westward drift of the dipole field is due to a shifting of the electric currents in the core of the earth, not a movement of the massive molten metal in the core. There is a great deal of difference

between shifting the position of an electric current and shifting the whole core of the earth. The data employed by Stanulonis are the same basic data which show the decay of the earth's dipole magnetic field. That is the signal not the noise.

Phenomenal Decay Implies Young Age

The basic data substantiating the decay in the earth's dipole magnet are the historic evaluations of its *dipole moment*. The dipole moment is a vector quantity that specifies the state of the magnet, both its strength and its direction. One does not know the state of a magnet unless he knows the dipole moment. Claims to the contrary notwithstanding, the earth's dipole moment can not be accurately evaluated from any amount of rock or archeomagnetic data. One of the most complete tabulations of the historic values of the earth's dipole moment is given in D. Russell Humphreys' paper, "The Creation of the Earth's Magnetic Field."¹³ They cover the period from 1829 to 1890. His analysis yields an exponential decay with a decay time constant of 2049 ± 79 years, which is within the error range of this author's 1971 and later publications. Extrapolating the magnetic dipole field back in time, one obtains a maximum earth age of approximately 10,000 years. That is based on the postulate that the earth's magnetic field was never as large as that of a magnetic star.

The present process of a rapidly decaying magnetic dipole field cannot be glossed over. Sidney Chapman emphasized its importance with this statement in his book, *The Earth's Magnetism*:

When the great scale of the phenomenon is considered, this must seem a remarkably large and rapid secular change, not paralleled for any other worldwide geophysical property.¹⁴

The present process is readily explained by Lamb's theory of freely decaying electric currents circulating in the core of the earth. In fact the theory predicts what is now observed. The evolutionary geologists have no valid theory to support their hypothetical dynamo, much less a dynamo that would predict this decay process or maintain the dipole field for a few billion years.

Flaws in the Reversal Theory

Dalrymple contends that the dipole magnet has reversed its polarity many times, at irregular intervals, while maintaining approximately the same value of dipole moment through about three billion years. We have already shown that his radiometric method of dating moon rocks and earth rocks is invalid. But there are two additional reasons why his reversal theory is fatally flawed: 1) There is no valid theoretical mechanism to produce a reversal. Physics is against him. 2) The magnetization in rocks is not the kind of data from which one can determine the state of the earth's dipole magnet, neither its direction nor its magnitude.

Scientists know that all of the efforts to come up with a physically plausible reversal mechanism have failed. That is well documented in the literature. For example: C. R. Carrigan and David Gubbins in a lengthy *Scientific American* article, while attempting to justify some type of dynamo theory, acknowledge:

No one has developed an explanation of why the sign reversals take place. The apparent random reversals of the earth's dipole field have remained inscrutable.¹⁵

One well-known problem with the rock data is that there can be *self-reversal of the magnetization* in the rock that is independent of the earth's field. Furthermore, there may be local anomalies producing magnetic noise. Richard Doell and Allan Cox, in attempting to defend the reversal hypothesis against the obstacle of self-reversal, state:

The reversed magnetization of some rocks is now known to be due to a self-reversal mechanism. Moreover, many theoretical self-reversal mechanisms have been proposed . . . However, in order definitely to reject the field-reversal hypothesis it is necessary to show that all reversely magnetized rocks are due to self-reversal. This would be a very difficult task since some of the self-reversible mechanisms are difficult to detect and are not reproducible in the laboratory.¹⁶

It is interesting to note that these authors attempt to shift the burden of proof to the opponents of the reversal hypothesis, but in so doing they demolish the reliability of the very data upon which they depend.

Still another example of the unreliability of the type of data that is supposed to support the reversals can be seen in this statement by J. A. Jacobs:

Such results show that one must be cautious about interpreting all reversals as due to a field reversal and the problem of deciding which reversed rocks indicate a reversal of the field may in some cases be extremely difficult. To prove that a reversed rock sample has been magnetized by a reversal of the earth's field, it is necessary to show that it can not have been reversed by a physico-chemical process. This is a virtually impossible task since physical changes may have occurred since the initial magnetization or may occur during certain laboratory tests.¹⁷

Criteria for a Valid History

To know the history of the earth's dipole magnet one must have accurate evaluations of its magnetic moment. The earth's magnetic moment cannot be measured directly. The process of evaluating the magnetic moment includes: 1) Measurements of the raw data on the magnitude and the direction of the magnetic field strength over an extensive portion of the globe. 2) Knowing the time of each measurement of field strength to an accuracy of about a year, because the field is decaying. 3) Employ extensive data reduction to extract the signal (magnetic moment) from the noise in the raw data.

These conditions have been met in the magnetic moment evaluations employed in the confirmation of the decay theory. Those conditions have never been met in the presumed evaluations from rock or archeomagnetic data.

The lack of credibility of the evolutionary data can be seen in Figure 1. The credible evaluation is the top curve. The meaningless evaluation is the bottom curve. It is the archeomagnetic data for the same period of time. The top curve is obtained from magnetic moment evaluations, such as that made by Gauss. The bottom curve is the first 165 years of the presumed magnetic "history" for the last 8,500 years. These archeomagnetic data are from a Russian paper that was supposed to have included all the available archeomagnetic data over the last 8,500 years.¹⁸ Note that

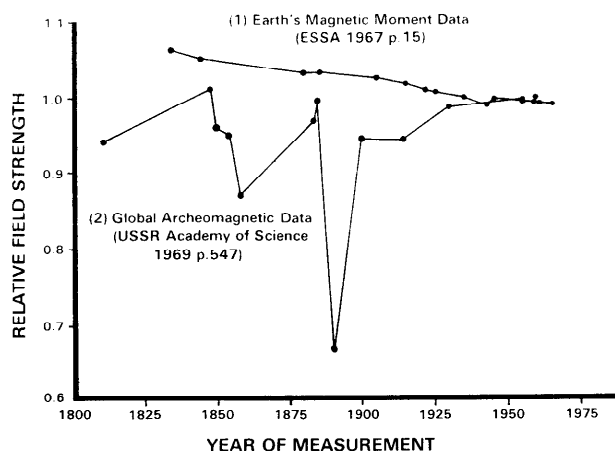


Figure 1. Archeomagnetic data fail to show the decay in the earth's dipole magnet during the period when the decay was known from evaluations of the earth's magnetic moment.

the archeomagnetic data do not show any of the known decay of the state of the magnet. Since those data are meaningless for this 165 years of most recent data, it is nonsense to claim that it is good for 8,500 years.

Independent Check

An independent check on the decay theory has been made by the author.¹⁹ According to the decay theory the only source of energy to perpetuate the earth's dipole magnet is the energy in its magnetic field. As the magnetic field decays it induces the circulating current in the earth's core. The circulating current in the earth's core dissipates energy in the form of heat. The energy transformations are:

Magnetic energy → Electric energy → Heat energy

The author made a confirmational check on his decay theory as follows: 1) The total energy to be lost in heat from now on was evaluated, by integrating the exponential power loss from the present to infinite time. 2) According to the law of conservation of energy, that value of heat energy must equal the present value of magnetic energy. 3) This value of magnetic energy was compared with the magnetic energy in a "standard" reference magnet, a permanent magnet of the same size as the earth's core and having the same magnetic moment. The two values checked to within the accuracy of the equivalence of these dynamic and static magnets.

These two values would not have checked if there were a dynamo running the earth's magnet. It has to be a freely decaying electromagnet of the type to which Lamb's solution applies.

Conclusion

The author's theory of a young magnetic age for the earth is the only theory of the present process in the earth's dipole magnet that is supported by the following facts:

- (1) A rigorous mathematical physics solution.
- (2) A history of real-time evaluations of the state of the magnet (its magnetic moment).
- (3) A clearly identified source of energy (its own magnetic field energy).

- (4) A definitive predictive value.
- (5) A means of computing its source energy and subjecting that value to an independent check that would falsify the theory if there were no check.

On the other hand, the presumed dynamo theory has no substantive theoretical basis. It has no predictive value. Evolutionary geologists themselves cannot agree on any particular dynamo theory; nor can they agree on any particular source of energy to drive the dynamo if there were one. The presumed reversal mechanism has remained an inscrutable problem. Their presumed age dating from radiometric data is fraught with problems and has to be continually amended to take care of known discrepancies. Their presumed magnetic reversal data is fraught with noise problems.

Realizing that it takes but one proof of a young earth age to refute the whole gamut of evolution, it is no wonder that the doctrinaire evolutionary geologists have found that they must fight with all their might, fair or foul, against all evidences of a young earth-age.

References

1. Dalrymple, G. Brent. 1983. Radiometric dating and the age of the earth: a reply to scientific creationism, *Proceedings: Federation of American Societies for Experimental Biology*, 42:3033-35.
2. Slichter, Louis B. 1963. Secular effects of tidal friction upon the earth's rotation, *Journal of Geophysical Research* 68:4281-88.
3. Arndts, R. and W. Overn. 1981. Isochrons. *Bible Science Newsletter*, 19(April)1-7.
4. Mandock, Randal. 1982. Scale time versus geologic time in radioisotope age determination, Master of Science Thesis, Graduate School of the Institute for Creation Research, San Diego.
5. Thompson, W. R. 1963. Introduction to Origin of species, Charles Darwin, Dent: London, Everyman's Library, Dutton: New York, p. xxiii.
6. Barnes, Thomas G. 1971. Decay of the earth's magnetic moment and the geochronological implications, *Creation Research Society Quarterly*, 8:24-29.
7. Dalrymple. *Op. cit.*, p. 3036.
8. Jacobs, J. A. 1967. The earth's magnetic field, *Mining Geophysics*, II (Theory), Society of Exploration Geophysicists:430.
9. Lamb, Horace. 1883. On electrical motions in a spherical conductor, *Philosophical Transactions of the Royal Society*, 174:520.
10. Barnes, Thomas G. 1973. Electromagnetics of the earth's field and evaluation of electric conductivity, current, and joule heating in the earth's core, *Creation Research Society Quarterly*, 9:222-230.
11. Dalrymple, G. Brent. 1983. Can the earth be dated from decay of its magnetic field?, *Journal of Geological Education*, 31(2):124-132.
12. Stanulonis, Stanley F. 1974. The mechanism for the precession of the geomagnetic dipole with evaluation of the earth's core charge density and its implication, Master of Science Thesis, University of Texas at El Paso.
13. Humphreys, D. Russell. 1983. The creation of the earth's magnetic field, *Creation Research Society Quarterly*, 20: 89-94.
14. Chapman, Sidney. 1951. The earth's magnetism, Methuen & Co., New York, p. 23.
15. Carrigan, C. R. and David Gubbins. 1979. The source of the earth's magnetic field, *Scientific American*, 240(2):125.
16. Doell, Richard and Allan Cox. 1967. *Mining Geophysics*, II (Society of Exploration Geophysicists):452.
17. Jacobs, J. A. 1963. The earth's core and geomagnetism, MacMillan, New York, pp. 105-106.
18. Burlatskaya, S. P. 1967. Change in geomagnetic field intensity in the last 8,500 years, Institute of Terrestrial Physics, USSR Academy of Science, *Geomagnetism and Aeronomy* (U.S.A.)(1970)10:547.
19. Barnes, Thomas G. 1983. Origin and density of the Earth's magnetic field, second edition, Institute for Creation Research, San Diego, pp. 100-112.

QUOTE

Assuming that the reader has some knowledge of gnostic thought of the beginning of our era, let us now try to suggest here the theses of the new gnosis. Such a list is nowhere nailed to doors of cathedrals, nor announced in the writings of scholars. The representatives of gnostic thought do not always know or recognize that they are renewing an old tradition; they are most often convinced of having formulated something entirely new. This is the case particularly today when scientists are taking the lead in such a formulation. They believe that the philosophical conclusion they have reached originated from scientific premises according to the logic of their disciplines; it is hard for them to imagine that they have returned to former centuries' wisdom, particularly as this wisdom, in fact a *gnosis*, may prove fecundating for new developments.

1. The first thesis is, albeit unformulated, that the *universe is uncreated*. In spite of the now fashionable "big bang" hypothesis—which, by the way, is no answer to the problem of creation, and in fact reinforces the Great Cycles theory of repeated renewals on a cosmic scale—the firm agnosticism of modern science finds it repugnant to postulate a super-intelligent, personal being as the absolute beginning. Moreover, for all their confusion as to the reality of matter and spirit, the new scientists are inheritors of enough materialism from past ages to assume that matter possesses such potentialities by which it can evolve into an infinite variety of forms. The ultimate question concerning the origins is thus ruled out as "unscientific." As Etienne Gilson has written, and the diagnosis is still valid, scientists prefer to get entangled with a meaningless universe, one whose probability of emerging approaches zero, than to postulate the work of an intelligent agent, God.

2. Matter spiritualizes itself as a result of its own potentialities. This is our reading of the papers presented in Cordoba, and it is also explicitly stated in the works of Teilhard de Chardin. It is of little importance that the latter accepted God as a creator; this creator must have sat back after the initial effort (*deus otiosus*), and entrusted matter and its built-in mechanism to produce whatever was needed, out of itself. In due course matter brought forth *man* (Teilhard's Darwinism), who then took over the demiurgic role and produced culture and morality. . . .

Molnar, Thomas. 1983. Science and the new gnosticism, *Modern Age: A Quarterly Review* 27:137-38.

ONE ERROR OF DALRYMPLE CORRECTED

ROBERT E. KOFAHL*

Received 20 February 1984; Revised 5 April 1984

Abstract

Dalrymple's attack on a creationist calculation of radiometric dating is found to be incorrect.

The capable and well-known geochronologist, G. B. Dalrymple, has participated in the current evolutionist counterattack upon the creationists in an article in *Federation of American Societies for Experimental Biology*.¹ While some of his criticisms of creationist literature may or may not have some validity, one at least is in error and suggests that overeagerness to vanquish his opponents has led Dr. Dalrymple into some unjustified and erroneous charges.

One of the publications which Dr. Dalrymple attacks is *The Creation Explanation* by Kofahl and Segraves.² On page 3034 of his critique he says:

Examples of fictitious data are not uncommon in the creationist literature. For example, in their book *The Creation Explanation*, Kofahl and Segraves make the following statement, for which they reference a paper by Virginia Oversby:

A series of volcanic rocks from Réunion Island in the Indian Ocean gives K/Ar ages ranging from 100,000 to 1 million years, whereas the Pb-206/U-238 and Pb-206/Pb-207 ages are from 2.2 to 4.4 billion years. The factor of discordance between "ages" is as high as 14,000 in some samples.

The problem with this assertion is that the uranium/lead and lead/lead ages that Kofahl and Segraves cite do not appear in Oversby's paper. . . . She did not calculate any ages for these lava flows, nor did she report any data that could be used to do so (emphasis added). I do not know where the uranium/lead ages came from, but I suspect that Kofahl and Segraves took the liberty of doing some calculations of their own. In any event they clearly do not understand either what Oversby did or the meaning of her results.

We have given an almost complete quote of Dalrymple's criticism of our book. Is it justified? No, it is not. We did indeed "(take) the liberty" of doing our own calculations. But his claim that Oversby's paper did not contain the data necessary for calculating lead/uranium ages of the rocks in question is so obviously false that one could wonder if he even read Oversby's article. She gives in her Table 1 the U-238/Pb-204 values for twelve rock samples from a number of lava flows on the island. Then in her Table 2 she gives the ratios of Pb-206 and Pb-207 to Pb-204 for each of the respective rock samples. What more is needed for the calculation of a lead/uranium "age"? Only the respective isotopic ratios for so-called "primordial lead," the commonly used values for which are easily available.³ In addition the ratio of U-238 to U-235 is needed for calculation of lead/lead "ages."⁴ So we took the liber-

ty of calculating the following results in the lead/uranium systems, comparing them with the potassium/argon results cited in Oversby's Table 2:

The Pb-206/U-238 values range from 2.8 to 3.00 billion years.

The Pb-206/Pb-207 values range from 4.42 to 4.45 billion years.

The K/Ar values cited by Oversby range from 0.073 to 1.98 million years.

Note that the lead/uranium "ages" have a fair range, while the lead/lead "ages" are almost twice as great but have only a small relative range of values. However, these consistent lead/lead values are apparently not considered by chronologists to be meaningful. In any event, the lead/uranium "ages" range from 1,300 to 18,000 times as great as the potassium/argon "ages" in particular rock samples, and the lead/lead "ages" range from 2,200 to 42,000 times as great as their companion potassium/argon "ages."

The point which we made in *The Creation Explanation* is that whereas at Réunion Island the K/Ar results are accepted as correct, in other instances such as the 1880-1881 lava flows in Hawaii, the K/Ar results are known from historical data to be incorrect.⁵ So how is one to determine which "ages" are the right ones? The answer is, as all creationists know, those results are accepted which accord with overriding theoretical considerations. So it is usually possible to find reasons for observed anomalies. Thus, the Hawaiian rocks contain "excess radiogenic argon" retained because of solidification before degassing. Conversely, in the case of the Réunion Island rocks, the high lead/uranium ratios, supposedly produced during a multi-billion year sojourn in the earth's crust, were brought along with the magma when it was expelled to form the island.⁶ These explanations may satisfy most chronologists but, we ask, how can we ever be sure that any particular atomic ratio actually corresponds to the true age of a rock sample?

We think we could direct Dr. Dalrymple to some real errors or inadequacies of our book which he may have been too rushed to catch. No book is without fault. Ours is being thoroughly revised and, we hope, made more accurate and useful, as well as more honest. Our enemies fast help to make us more learned men, as Luther observed long ago.

Acknowledgment

I am indebted to Dr. Robert H. Brown, member and former Director of the Geoscience Research Institute, Loma Linda, CA, for invaluable counsel in our earlier calculations and in the refining of this paper.

References

1. Dalrymple, G. B. 1983. *Federation of American Societies for Experimental Biology Proceedings*, 42:3033-3038.
2. Kofahl, Robert E., and Kelly L. Segraves. 1975. *The Creation explanation*. Harold Shaw Publishers, Wheaton. p. 201.

*Robert E. Kofahl, Ph.D., is Science Coordinator, Creation-Science Research Center, P.O. Box 23195, San Diego, CA 92123.

3. The values which we used for primordial lead are Pb-206/Pb-204 = 9.346 and Pb-207/Pb-204 = 10.218. The values for decay constants are $k(\text{U-238}) = 1.55125\text{E-10}$ and $k(\text{U-235}) = 9.8485\text{E-10}$, taken from "Proposal for Simultaneous Adoption of New U, Th, Rb, and K Decay Constants for Calculation of Radiometric Dates," by Richard Lee Armstrong, Dept. of Geological Sciences, University of British Columbia, Vancouver, B.C., Canada V6T 1W5, published informally about 1975. The formula for the lead/uranium age is

$$t = \frac{2.3026}{1.5513 \times 10^{-10}} \log \left[1 + \frac{(\text{Pb-206/Pb-204})_{\text{cretd}}}{(\text{U-238/Pb-204})} \right]$$

The corrected value of the measured ratio, Pb-206/Pb-204,

is obtained by subtracting from it the corresponding primordial lead/lead ratio.

4. The value used for U-238/U-235 is 137.88, taken from Armstrong, *Ibid.* The formula for the lead/lead "age" is

$$\left[\frac{\text{U-235}}{\text{U-238}} \right] \left[\frac{\text{Pb-206}}{\text{Pb-207}} \right]_{\text{cretd}} = \frac{e^{k_{235}t} - 1}{e^{k_{238}t} - 1}$$

The solution for t must be obtained by a reiterative process which is easily programmed on a hand calculator.

5. Funkhouser, John G., and John J. Naughton. 1968. *Journal of Geophysical Research*, 73:4601-4607.
6. This explanation was proposed to me by Prof. James Gill of the University of California at Santa Cruz, an experienced geochronologist.

EDUCATIONAL COLUMN

TEACHING ABOUT ORIGIN QUESTIONS

JOHN N. MOORE*

Received 16 July 1984

Abstract

With this article the author begins a series in which he draws upon a decade of classroom experience in teaching about origin questions. He encourages creative, innovative "solutions" rather than litigation regarding teaching about first origins. Thus the series of articles is intended to generate calm and clear understanding of "how to" teach in a fair and just manner. This article contains a discussion of the validity of two contrasting viewpoints about origins.

Introduction

To protect the integrity of a pluralistic educational curriculum, a positive alternative to the majority "establishment" interpretation of first origin questions is needed in American schools. A viable contrasting position to the "conventional wisdom" of the mechanistic, animalistic origin of human beings is needed as an integral part of curriculum in both public and parochial schools. However, teachers must understand "how to do it," if they are to supplement the exclusive, monopolistic ideas of "evolutionary" origin of modern male and female human beings.

All educators need to recall that the exercise of academic freedom is fully legal in the United States. Thus wherever questions of ultimate origin of the universe, or life on the earth, or mankind arise there are *no legal prohibitions* against open, candid discussion of different interpretations of objective, scientific data in science classes, or in any social studies, history, or anthropology classes.¹

Analysis of many, many cultures results in the conclusion that many, many "creation stories" have been developed. Yet, upon careful consideration of all available "variations," it is imperative for all educators to understand that *only two primary* viewpoints or interpretative approaches on the origin of all things are involved: (1) a theistic viewpoint, or (2) a non-theistic viewpoint. In short, either the Eternal, Personal Creator God was *the* source of *all* things or He was not.

*John N. Moore, M.S., Ed.D., professor emeritus of natural science, Michigan State University, is now Director of Origins Educational Service, 1158 Marigold Ave., East Lansing, MI 48823. Dr. Moore expands his position in this article in greater detail in his book, *How To Teach Origins (Without ACLU Interference)* published in 1983 by Mott Media, Milford, MI 48042 (\$14.95).

The heavens and the earth and all that is therein were created by the Eternal, Personal Creator God, as believed by many of the "founders" of the modern scientific discipline. Or, all things in the universe, in the solar system, in plant form and animal form came into existence in some way from Eternal, Impersonal Matter-Energy, which is the position held by the majority of scientists today. For this on-going discussion of "Teaching about Origin Questions," the latter, majority alternative will be labelled Total Evolutionism, and shall be understood as the fully contrasting viewpoint to that of Total Creationism that identifies the former, "traditional" viewpoint. These are *the two* fundamentally contrasting points of view for different interpretations about first origin questions. (Admittedly variations and modifications of each are possible, but basic comparative statements are provided in Table I.)

Two Contrasting Viewpoints

A clear indication of the grand magnitude of the position of Total Evolutionism can be found in the lead article by the famous evolutionist Dr. Ernst Mayr in the *Scientific American*² of September 1978. That issue contained nine articles on the status of evolutionary thinking at that time and was distributed widely as a "public service." Presumably, according to Dr. Mayr, biological (organic) evolution was preceded by chemical (molecular) evolution, which was preceded supposedly by atomic (cosmic) evolution. (And social studies specialists have extended evolutionist thinking to propose societal (social) evolution as a type of "postlude" to "biological evolution.")³

A majority of professionally qualified scientists support teaching the youth of America the objective, scientific facts that can be used to support Total Evolu-

Table I. Comparative Statements Regarding Origins

- E. 1. Total Evolutionist postulates (believes axiomatically) that the universe began at the explosion of a dense quantity of matter. (No attempt is made to answer the question of origin of matter that supposedly exploded due to some energy change; hence such matter and energy is essentially taken to have been eternal.)
- C. 1. Total Creationist postulates (believes axiomatically) that the universe is the result of creative acts of a Creator. (No attempt is made to answer the question of origin of the Creator that is believed to be the First Cause; hence the Creator is taken to have been eternal.)
- E. 2. Total Evolutionist postulates (believes axiomatically) that the solar system came into being as a consequence of the explosion of a dense quantity of matter resulting in some nucleogenesis of elements and subsequent accretion of matter into the sun and planets.
- C. 2. Total Creationist postulates (believes axiomatically) that the solar system is the result of creative acts of cosmic nucleosynthesis of a Creator which He empowered to form light, the sun, moon, and the earth as essentially stable, "finished" (with interactions of disintegration and conservation "forces").
- E. 3. Total Evolutionist postulates (believes axiomatically) that life on the earth came into being as a consequence of interaction of energy and previously existing sub-molecular portions of matter. (A five-stage "scenario" is often utilized entailing change from supposed reducing atmosphere to present oxidizing atmosphere, some genesis of nucleotides, some genesis of polymers, some genesis of coacervates and proto-cells, and some genesis of living cells.)
- C. 3. Total Creationist postulates (believes axiomatically) that life on the earth is the result of creative acts of a Creator such that organization and complexity of the smallest unit of a living system, the cell, was established with a continual supply of energy and repair of natural processes corrective of harmful chemical reactions.
- E. 4. Total Evolutionist postulates (believes axiomatically) that species come from species through some micro-evolutionary means, such as mutations and recombinations, over time.
- C. 4. Total Creationist postulates (believes axiomatically) that recognizably different organisms (kinds) are the result of creative acts of a Creator which have remained essentially stable over time (though many have become extinct); each kind shows a potential for variability within some genetic limits such that species, genera, and other arbitrary classificatory divisions can be assigned for ease of grouping according to similarities (and differences).
(Note: Any use of the expression: species (kinds), as supposedly meaning a synonymous relation generates confusion. These terms are not necessarily synonymous as modern creationists have published repeatedly.)

tionism. (See Table II for a listing of such data.) This "conventional wisdom" has been taught exclusively in science classes and in social studies classes during the last three decades, if not for the last 100 years. However, for the last 20 years, a minority of professionally qualified scientists have gathered and published extensively the objective, scientific facts that can be used to support Total Creationism. (See Table III for a listing of such data.)

With this understanding that there are two major contrasting positions of interpretation regarding ultimate beginnings, and according to exercise of proper academic freedom, *both* viewpoints of Total Evolutionism and Total Creationism should be considered whenever first origin questions arise. Seemingly even Charles Darwin might have agreed that a balanced treatment of the facts for Total Evolutionism and Total Creationism and arguments for both sides should be presented as public and parochial school curricular content. In the Introduction to *Origin of Species*, Darwin stated:

For I am fully aware that scarcely a single point is discussed in this volume on which facts cannot be adduced, often apparently leading to conclusions directly opposite to those at which I have arrived. A fair result can be obtained only by fully stating and balancing the facts and arguments on both sides of each question; and this is here impossible. (pp. 11-12, The Modern Library Edition.)

Of course "stating and balancing the facts and arguments on both sides of each question" is quite possible in open, candid discussion in the classroom.

Two Viewpoints in Science Classes?

Is discussion of ultimate origin questions possible in science classes? Is consideration of ultimate origin questions a matter of teaching religion and therefore of questionable constitutionality, at least in the public schools? Answers to these questions involve understanding the meaning of the terms, "science" and "religion."

In presentations of Total Creationism, no theistic "religion" or sectarian teaching need be entailed. This is so if all educators understand that "religion" may be defined as (1) "belief in a divine or superhuman power or powers to be obeyed and worshipped as the creator(s) of the universe"; (2) "expression of this belief in *conduct and ritual*"; and (3) "any specific system of belief, *worship or conduct*."

Clearly two main facets of meaning are incorporated in these definitions of "religion": (1) the facet of belief, and (2) the facet of worship. Noteworthy is the fact that *no* attention to worshipful conduct or ritualistic procedure need be included in teaching about Total Evolutionism or Total Creationism, as contrasting approaches to teaching about first origin. Any procedures or practices of using prayer beads, a prayer rug, a head covering, certain wearing apparel, or facing toward the east are not part of any recommended approach to teaching about origins in the public schools.

Rather, exclusive attention can be given to consideration of the *facet of belief* held by different people. Different people have held different beliefs about beginnings, but their beliefs are basically theistic or non-

Table II. Objective, Scientific Data Used by Professionally Qualified Majority Scientists to Support Total Evolutionism

1. Red shift of light spectra.
2. Occurrence of nova and supernovae.
3. Detection of background radio noise.
4. Detection of background radiation.
5. Synthesis of coacervates and cell-like globules.
6. Synthesis of amino acids (non-living "building blocks" of living substance).
7. Production of synthetic "equivalents" of urea, rubber, cloth fibers.
8. Similarities of skeletal, muscular patterns, and brain form.
9. Similarities of embryonic structure.
10. Similarities of DNA and RNA components of life.
11. Similarities of hemoglobin, cytochrome c, and other biochemical aspects.
12. Human behavioral similarities to emotional, territorial, and aggressive animal-like behavior involving reaction to signs, signals, and perceptual thought.

theistic. And teaching *about* the beliefs of people is fully legal and consistent with the U. S. Supreme Court rulings.⁴ The important point to understand is the fact that teaching about origins involves *beliefs* that people have had or do presently hold with regard to beginnings. Total Evolutionism entails one set of beliefs about human origins, and Total Creationism entails another set of beliefs about human origins.

To assure students that one pattern of beliefs is not favored above another set of beliefs, modern teachers should practice open, candid treatment of origin questions wherein both the viewpoints of Total Evolutionism and Total Creationism are presented. Such would be consistent apparently with Darwin's "fully stating and balancing the facts and arguments on both sides of each question."

What is Science?

How might this be done in science classes? Actually the *crux* of any decisions about treatment of first origin questions in science classes is understanding the answer to the question, what is science? Today it is assumed generally that scientists can investigate *any* area in inquiry. Yet, is it possible to study *scientifically* the ultimate origin of the universe, or origin of life on the earth, or origin of mankind?

Because proper, orderly scientific activity involves necessarily direct and/or indirect observation(s) of *natural* objects and/or events that occur or exist in the physical environment, questions of ultimate origins are not open to study scientifically. Many, many evolutionists have written⁵ quite authoritatively about the full dependence of the scientific endeavor upon observations (direct and/or indirect) of *natural* objects and/or events. Professional scientists study naturally occurring objects and/or events; modern scientists do not study the supernatural or the *unnatural*.

Importantly, then, modern science teachers are well prepared to help young minds understand that the beginnings of the universe, of life on the earth, and of human beings are each singularities that are beyond any repetition. Since proper, orderly science involves

Table III. Objective, Scientific Data Used by Professionally Qualified Minority Scientists to Support Total Creationism

1. Angular momentum in solar system, of universe.
2. Polonium halo research: rapid rock formation.
3. Orderly patterns (designs) of constellations, comets and planetary motions.
4. Tendency toward breakdown of living systems.
5. Complex pattern (design) of DNA code, molecular interdependency, cell organelle and organ interactions.
6. Definite pattern (design) of exclusively "left-handed" amino acid structure.
7. Law of Biogenesis: All life comes from existing life.
8. Abrupt appearance of fossil forms separated by systematic gaps between fossil forms.
9. Distinctness of DNA, chemical components, and pattern (design) of morphological similarities.
10. Laws of Mendel: combination, recombination always results in easily recognized plant, animal forms; *conclusive* evidence of fixed reproductive patterns (designs).
11. Distinctness of human self-conscious awareness and metaphysical concern.
12. Distinctness of human personality involving moral and ethical concern; reflective, symbolic, abstract, conceptual thought.

necessarily *repeatable* observations of natural objects and/or events, then students can learn that first beginnings are outside of real scientific study.

Thus the Eternal, Personal Creator God that is basic to Total Creationism is not subject to scientific study. Proponents of Total Creationism admit that sudden, *unnatural* concepts are a part of their thinking. They *believe* that the Eternal, Personal Creator God who exists outside of and independent of the cosmos called forth supernaturally the galaxies, stars, comets, and planets, including the earth with special atmosphere; and as well brought forth suddenly the basic plant forms with established potential for variation within genetic limitation, along with sudden appearance of the basic animal forms with established potential for variation within genetic limitation, including special creation of particularly unique sentient human beings.

However, each set of these creative phenomena is beyond the scope of the natural. Therefore, such aspects could not possibly be submitted to scientific study, as is fully recognized and understood by all professional scientists.

Likewise, the Eternal, Impersonal Matter-Energy condition that is basic to Total Evolutionism is *not* subject to scientific study. Proponents of Total Evolutionism repeatedly include catastrophic, *unnatural* objects and/or events in their thinking. They *believe* that the universe began with a supposed explosion of some dense substance of unknown origin; then they imagine accretion of celestial objects, including the earth; followed in time by spontaneous appearance of some living substance as progenitor of all present life on this earth; and then, presumed gradual accumulation of errors due to minor mutations resulting in totally new organisms, including human beings.

However, each one of these supposed changes could not possibly be submitted to scientific study, which conclusion should be readily recognized, understood, and agreed to by all professional scientists.

It is imperative to make quite clear to students, therefore, that both viewpoints about origins—Total Evolutionism *as well as* Total Creationism—involve beliefs about changes that are *unnatural* and are not repeatable; hence such concepts associated with either the theistic or the non-theistic viewpoint about first origins are *definitely* singularities that are outside proper, orderly scientific study. Understandably, special creative phenomena attributed to the Eternal, Personal Creator God may not be studied scientifically, *but also* all the imagined *unnatural* changes presumed to have come about in the distant past that started from some Eternal, Impersonal Matter-Energy condition may not be studied scientifically.

However in the 1980's professionally qualified individuals of the majority do present objective, scientific facts in support of Total Evolutionism; whereas professionally qualified individuals of the minority do present objective, scientific facts in support of Total Creationism.⁶

Nevertheless, in maintaining the integrity of academic freedom of all students and all teachers in a pluralistic educational curriculum, modern instructors teaching about origin questions are responsible to delineate the *significant differences* between beliefs about *unnatural* concepts and proper scientific theories.

Scientific Theories and Hypotheses

Proper scientific theories fully involve *natural* objects and/or events existing or occurring in the present physical environment of some living human investigator, which are either directly or indirectly observable in an understandable fashion that can be repeated. This is true for proper scientific theories such as the Gene Theory (breeding practices involving presumed or imagined genes), the Kinetic-Molecular Theory (studies of gases involving presumed or imagined molecules), or the Atomic Theory (studies of physical structure of matter involving presumed or imagined atoms and sub-atomic entities). (Recall that excellent, repeatable experimental evidence exists for the presumed existence of genes, molecules, atoms, and electrons.)

From these points it follows that an "hypothesis" in proper, orderly science is testable. The very genius of successful scientific endeavor in the biological sciences, and especially in the physical sciences, has been the direct or indirect testing of hypotheses and the purposeful quantification of results. Thus it follows that some Big Bang "Hypothesis," or Steady-State "Hypothesis," or Autotrophic "Hypothesis," or Heterotrophic "Hypothesis" are different from proper scientific theories.

Such "hypotheses" about origins are essentially *speculations* about the unrepeatable past; they involve scenarios of what "could have been," or what "might have happened" without any present-day testability; they are not proper hypotheses formulated as answers to scientific questions. They involve inquiries by scientists, yes, but inquiries about *unnatural* concepts in

the past; thus they are different from proper scientific theories studied in the present.

It is one thing to ask questions about *natural* objects and/or events existing or occurring in the physical environment of some investigator. Contrasting to that is an entirely different set of inquiries that people like to ask about *past, unnatural, non-repeatable* aspects of life on the earth, about the solar system, and about the entire cosmos.

Reasons for Litigation

All of the above notwithstanding, proponents of the "conventional wisdom" accepted by the majority of scientists who *believe* in a mechanistic, animalistic origin of human beings do not favor the idea that young students should learn about the objective, scientific facts that minority scientists use to support the position of Total Creationism. As a consequence numerous cases of litigation have occurred in Texas; in Washington, D.C.; in Arkansas; and litigation is pending in Louisiana in the mid-1980's.

In search of terms that might be useful in such litigation the following have been utilized: scientific creationism, creation-science, evolution-science, and some people are now using origin science. Regrettably confusion abounds. Total Evolutionists do not understand that Scientific Creationism is a rubric for a set of beliefs about the past. (Note: Scientific Socialism is a rubric for a set of beliefs about interactions in the field of economics and social history.)

Total Evolutionists quite correctly ridicule the very thought of creation-science in litigation, as if referring to real science about *unnatural, creative* acts. However, Total Evolutionists are quite unwilling to admit that evolution-science is also ridiculous when used in litigation, as if referring to real science about *unnatural* concepts about all life on the earth having a common ancestry.

Condition of Scientific Thinking

As mentioned, there is an all too easy willingness in these closing years of the twentieth century to think that scientists can investigate *any* area in inquiry. That attitude, when examined closely, is identified as a philosophical outlook labelled *Scientism*. Thus many, many scientists, politicians, and citizens in general have accepted a too broad scope for supposed scientific inquiry. Hence many individuals in the American public are *scientistic* in their thinking.

However, there is *no science* of creative acts of the Eternal, Personal Creator God in whom Total Creationists believe. In parallel, it is imperative for all educators to understand that there is *no science* of *unnatural* changes of the Eternal, Impersonal Matter-Energy condition about which Total Evolutionists have beliefs.

Let it be easily understood that semantic confusion abounds through use of creation-science, evolution-science, and origin science in litigation, *and* when and if these terms are introduced into public school curricula. These combinations of words have been developed to take advantage of the "scientific" attitude or frame of mind so prevalent in the United States; and, as parts of legal strategies, should be reserved for arguments of litigation only.⁷

Conclusions

Teachers seeking to protect the integrity of proper academic freedom in a pluralistic educational curricu-

lum will serve the scientific discipline, and varieties of religious belief systems, if they teach young minds to understand forthrightly that proper, orderly scientific activity is limited to the study of *natural* objects and/or events. Consequently, *discussions* of *unnatural* concepts and first origin questions do not entail scientific studies or scientific theories. Rather *discussions* of *unnatural* concepts and first origin questions entail sets of contrasting beliefs and the associated objective, scientific data that can be used, *after the fact*, to support *either* Total Evolutionism, or Total Creationism.

Again, modern teachers seeking to preserve the integrity of a pluralistic educational curriculum should understand that there is *no* "science" of creative acts that are accepted by Total Creationists; and likewise, there is *no* "science" of *unnatural* changes that are accepted by Total Evolutionists. Yet significant amounts of objective, scientific data, as listed, can be used to support *either* of these two main contrasting viewpoints about first origin questions.

References

1. Rulings by Federal judges are limited to the jurisdiction of the judge. Thus the Judge Overton ruling in Arkansas pertained essentially to the litigation in Arkansas. Evidently, however, the mere suggestion of "legal blackmail" by organization personnel from outside public school systems has deterred some creative, innovative educators in many states with regard to teaching about origin questions.
2. Mayr, Ernst. 1978. Evolution. *Scientific American* 239: 45-55.
3. In debates and forums with evolutionary scientists proponents of Total Creationism find that a great number do not understand the wide scope of application of evolutionary ideas. Thus the article by Dr. Mayr is most instructive of the prevalent "real" situation.
4. The justices of the U. S. Supreme Court have designated only three acts that violate the First Amendment in public schools: (1) state-required prayer—*Engel v. Vitale*, 370 U. S. 421 (1962); (2) state-required Bible reading—*School District of Abington Township, Pa. v. Schempp*, 374 U. S. 203 (1963); and (3) state-required on-premises religious training—*McCormack v. Board of Education*, 333 U. S. 203 (1948).
5. The following are representative: Simpson, G. G., *et al.* 1962. Notes on the nature of science. Harcourt, Brace and World, New York, p. 9 and Ayala, F. J. 1974. Biological evolution: natural selection or random walk? *American Scientist* 62:700.
6. Noteworthy is the needed understanding by all educators of the fact that the majority of scientists supporting Total Evolutionism are in a sense proponents of a philosophic outlook that might well be labelled the "Philosophy of Unnaturalism." Total Evolutionists do *not* formulate "naturalistic" explanations, rather they offer imaginative, *unnaturalistic* scenarios (stories, plays).
7. Actually, in the fullest sense of professionalism, Federal judges are not qualified to determine what is scientific, which was admitted publicly by a leading evolutionist educator at the 1982 National Association of Biology Teachers convention in Detroit. Only professional scientists with qualifications in specific areas are qualified to determine what is scientific in the respective areas of scientific study.

DID THE UNIVERSE START OUT STRUCTURED?

HERMANN SCHNEIDER*

Received 13 February 1984; Revised 16 May 1984

Abstract

The problems of those cosmologies that assume a structureless initial state of the universe seem to make structured-origin models more promising and attractive.

Introduction

Since A. Penzias and R. Wilson discovered cosmic microwave background radiation in 1965, and even more so since S. Weinberg wrote his famous book *The First Three Minutes* in 1977, 'cosmology' has become almost synonymous with 'hot big-bang theory.' The so-called 'standard model' (or big bang) has forced all other concepts aside so that the proponents of other theories are hardly noticed.

One of the most important characteristics of the big-bang model is that it assumes a structureless beginning of the universe: either from a singularity which as such cannot have any structure, or from a completely homogeneous fireball having the same temperature, density, and composition everywhere. This lack of structure of the assumed initial state makes the model beguilingly simple; but this also appears to be its fatal defect.

The Big-Bang Model

The standard model is based on theoretical work by A. Einstein (1917), A. Friedmann (1922), and G. Lemaitre (1927) on the general theory of relativity. It takes into account the observation of E. P. Hubble and M. L. Humason (1927) that the redshift of spectral lines from distant galaxies is largely proportional to the distances of these galaxies. Interpreting the redshifts as 'cosmological', i.e. as a consequence of the speed of recession due to an expansion of space, Hubble introduced the notion of a uniformly expanding universe. In 1948-49 G. Gamov,^{1,2} R. A. Alpher, and R. Herman³ set up the model of the primordial fireball or big bang. They predicted an electromagnetic background radiation having the spectrum of a black body with the temperature 5°K. A suitable microwave radiation of 3°K was detected 15 years later.

At first it was assumed that all chemical elements were created in the big bang. Later the theory had to be changed: only hydrogen, deuterium, helium, and

*Hermann Schneider, Ph.D., Institut für Hochenergiephysik der University Heidelberg, Germany.

lithium were considered to stem from the primordial explosion. According to the model, galaxies formed in the first 10^9 years of the universe. The galactic matter condensed and gave rise to stars. The heavier chemical elements (${}^8\text{Be}$ - ${}^{244}\text{Pu}$) are believed to have been produced inside stars during their lifetime and in their explosion as supernova. The total age of the big-bang universe is estimated to be 10 to 20 billion years.

THE TWO PROOFS OF BIG BANG

The Redshift

The observed redshifts fall into two ranges: $\Delta\lambda/\lambda$ (relative wavelength-shift) $\equiv z < 0.4$ for galaxies and $z < 4$ for quasars. There are strong arguments that not all of the measured redshifts can be cosmological. There exist objects of very different redshifts which are physically associated in space: double stars, double galaxies, quasar and galaxy, double quasars, and triple quasars. G. Burbidge diagnoses:⁴

I believe that however much many astronomers wish to disregard the evidence by insisting that the statistical arguments are not very good, or by taking the approach that absence of understanding is an argument against the existence of the effect {of noncosmological redshift}, it is there and many basic ideas have to be revised. A revolution is upon us whether or not we like it.

The nature of the noncosmological redshift is not yet clear; but even the cosmological component might be interpreted differently as 'aging' of light, energy loss of photons in curved space,⁵ or photon-photon collisions. Detailed investigation by J.F. Nicoll and I. E. Segal⁶ for galaxies having $z < 1/60$ showed a quadratic dependence of redshift from distance instead of the linear Hubble law. The authors conclude: "The Hubble law lacks an objective statistical foundation."

The Microwave Background

In 1948 Alpher and Herman⁷ predicted the temperature of the microwave background to be 5°K . Already in 1926 A. S. Eddington had prophesied 3.2°K for the temperature of a radiation emitted by interstellar dust (the measured temperature is 2.7°K). Other effects might be important, e.g. synchrotron radiation or radiation from the nuclei of galaxies.

More recent measurements did not coincide with the spectrum expected by the big-bang cosmology. Hoyle notes:⁹

The latest data differ by so much from what theory would suggest as to kill the big-bang cosmologies. But now, because the scientific world is emotionally attracted to the big-bang cosmologies, the data is ignored. What was sauce for the steady-state goose is not sauce for the big-bang gander.

Narlikar remarks:¹⁰

This energy density is not too different from the energy densities observed in other astrophysical phenomena in the universe, such as starlight, cosmic rays, galactic magnetic fields and so on. Does this mean that the microwave background also is of astrophysical origin and not a relic of the big bang?

The microwave background is not the only isotropic background radiation. There also exists an isotropic X-ray background.¹¹ These backgrounds cannot both

originate from a big bang. Since one of them came into being without the primordial fireball, the other one might have done so as well.

The common belief that the steady-state cosmology cannot explain the microwave background is no longer true. Hoyle states:¹²

Earlier, when we tried in vain to explain the microwave background, we had assumed a spherical shape for all particles involved in the computations. But, if we suppose that the particles are needle-shaped we can explain the background radiation.

Since the interpretation of redshift and microwave background is not free of problems and since non-big-bang explanations exist for these phenomena, calling them 'the proofs of big bang' is not well founded.

Structureless Origin

The concept of an unstructured initial state has been built into the big-bang model on the basis of philosophical (egalitarian) or mathematical (simplicity) predilections. The 'cosmological principle' postulates that no place and no direction in the universe be distinguished from any other place or direction (homogeneity and isotropy).

If an initial state of extreme matter density is adopted, homogeneity becomes imperative for avoiding the formation of black holes and the disappearance of matter therein. The cosmological principle excludes initial electric or magnetic fields, electric currents, or rotations (angular momenta).

It has been observed¹³ that the larger a system one considers the larger is, on the average, its angular momentum per mass (e.g. planetoid, planet, star, star cluster, galaxy, galaxy cluster, supercluster). This is exactly contrary to the prediction of the big-bang model.

Notable cosmologists point out that the cosmological principle does not match the structure of the actual universe. G. de Vaucouleurs¹⁴ emphasizes that the cosmos has a hierarchical structure: stars being grouped into galaxies, galaxies into clusters of galaxies, clusters into superclusters, with indications of even higher levels. The largest structures, including giant voids, have dimensions of some percent of the observable universe. A map of a million galaxies shows quite clearly that one can tell one region of the universe from others even at very large scale. Alfvén writes:¹⁵ "It is questioned whether the homogeneous four-dimensional big-bang model will survive in a universe of inhomogeneous three-dimensional structure."

In the structureless-origin models the formation of galaxies in the uniformly expanding gas is highly problematic. Hoyle¹⁶ remarks:

Even though outward speeds are maintained in a free explosion, internal motions are not. Internal motions die away adiabatically, and the expanding system becomes inert, which is exactly why the big-bang cosmologies lead to a universe that is dead-and-done-with almost from the beginning. . . . The notion that galaxies form, to be followed by an active astronomical history, is an illusion. Nothing forms, the thing is as dead as a doornail.

The Distribution of Chemical Elements

According to the big-bang model, chemical elements heavier than lithium that are present outside stars (in planets, comets, meteorites, dust, or gas) and at the

surface of stars should have been set free by supernova explosions. One would, therefore, expect an enrichment of such heavy elements in supernova remnants (SNRs). K. Davidson¹⁷ searched for these chemicals in the best observable SNR, the Crab nebula, in the visible and ultraviolet bands of the spectrum. He ascertained that the explosion produced no extra oxygen at all, likewise no carbon, and no other elements except helium.

The big-bang theory teaches that the interstellar medium in a galaxy is constantly enriched in heavy elements. Therefore, stars that formed early in the galaxy's lifetime (old stars) should have a small concentration of heavy elements at their surface and vice versa for stars that formed late (young stars). This is contradicted by the fact that stars believed to be very young, like the Bo star τ Scorpii, and stars considered to be very old, like the red giant ϵ Virginis, and many other normal stars show the same chemical composition.

On the average there is one helium atom for every 12 hydrogen atoms in the universe (27 percent by weight). Less than one percent of this helium could have been synthesized in stars during 10^{10} years. Hence it is believed that this helium stems directly from the big bang. In this case it should be evenly distributed in the universe. This model is seriously questioned by the existence of some B stars¹⁸ which have less than one percent of the average helium concentration. A similar inconsistency is reported by V. Rubin.¹⁹

Astronomers were startled to learn that the hot intracluster gas {gas between the galaxies of a cluster}, identified by its X-ray emission, is not the pristine hydrogen and helium formed shortly after the Big Bang and left over after galaxy formation but is rich in heavy elements such as iron.

These observations indicate that the chemical structure of the universe is not what the big-bang cosmology predicts.

The Inflationary Scenario

When Weinberg popularized the standard model of big bang in 1977, he declared himself unable to approach the zero of time by less than 10^{-2} s. In 1980 A. H. Guth introduced an accessory theory, called 'inflation'.²⁰ His model describes the universe as far back as 10^{-35} s and in later versions even to 10^{-43} s. Inflation was invented in order to solve some of the problems of the standard model-problems which would have rendered the big bang completely implausible:

a) The 'horizon problem': The standard model could not explain why the microwave background radiation received from opposite directions of the sky has the same intensity and spectrum.
b) The 'flatness problem': The observed mass density of the universe differs from the 'critical density' (the density of uncurved space) by less than a factor of 100. This requires a fantastic fine-tuning of the mass density at very early times, e.g. at 10^{-35} s the relative deviation from the critical mass density must have been smaller than 10^{-49} . A slightly higher density would have led to recollapse after a very short time. A slightly lower density would have made the formation of galaxies still much more improbable than it already is in the standard model.

The inflation model postulates that the universe expanded its diameter exponentially in time during the first 10^{-35} s from one μm to 0.1 m involving velocities much higher than the speed of light. A 'cosmological constant' Λ is invoked which had to take on a very large value giving rise to a repulsive gravitational force. After just the right infinitesimal time span Λ had to drop to zero. The concept of the cosmological constant, which lacks any experimental basis, goes back to Einstein, who considered it as "the biggest blunder of his life." The inflation model is based on a family of very speculative theories in elementary particle physics, called 'Grand Unified Theories' (GUTs). GUTs are an attempt to unify the electro-weak and the strong interactions. Involving over twenty free parameters, GUTs are rather unspecific; nevertheless they make three predictions: a) The proton must decay with a half-life of 10^{30} - 10^{33} years, b) There must be magnetic monopoles 10^{16} times as massive as the proton. c) Neutrinos must have nonvanishing rest mass.

In spite of great efforts, none of these predictions could be verified experimentally up to now. There is in fact little reason for believing in GUTs. Should GUTs be correct, there may still be no inflation; but if GUTs are wrong, there is no basis for inflation.

Inflation can at best make the standard model somewhat more plausible; but it can never explain the origin of the universe. For that purpose a still higher and more powerful theory is called for, which usually goes by the name 'quantum gravity.' This nonexistent theory is left with the task of explaining the many ad hoc parameters and processes postulated by GUTs. The mere existence of the inflationary scenario is a strong indication of the difficulties of unstructured-origin cosmologies.

Concepts of Structured Origin

There exists a variety of proposed models differing in amount and detail of structure assumed as the initial conditions. C. W. Misner²¹ advertised an expanding universe that oscillates irregularly between cigar-like and pancake like shapes. It is called 'mixmaster model.' V. A. Ambartsumian²² envisaged the formation of a galaxy as an individual elementary process, which is

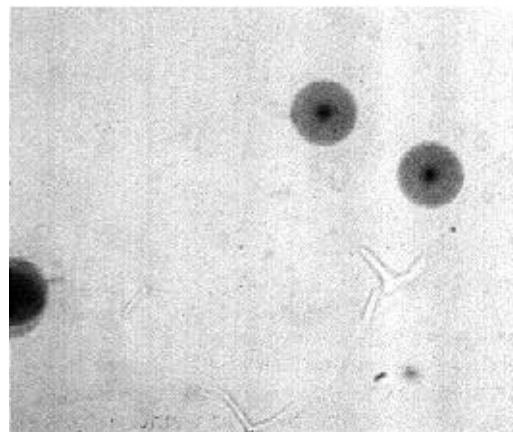


Figure 1. ^{210}Po radiohalos in mica. They were produced by α -particles from the decay of ^{210}Po in the center ($E_\alpha = 5.31\text{MeV}$, $T = 138\text{d}$). Scale 235:1. Photomicrograph by R. V. Gentry, Oak Ridge National Laboratory.

beyond the reach of present-day physics. H. Alfvén²³ announces a paradigm shift in cosmology. He stresses the importance of plasma physics for cosmology and he promotes an inhomogeneous 'fireworks model' of metagalactic evolution involving large-scale electric currents, electric double layers, filaments, and a cellular structure of the cosmos.

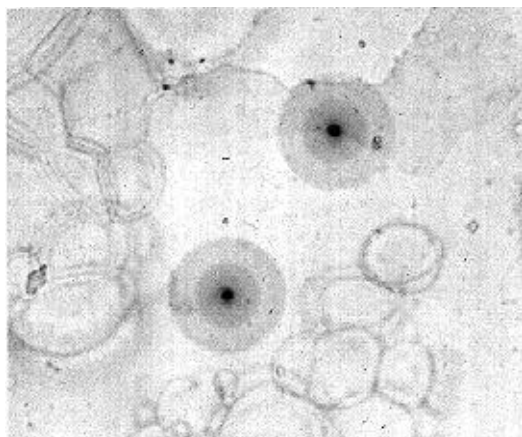
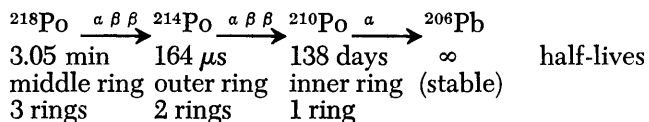


Figure 2. ^{214}Po radiohalos in mica. Outer ring from α -decay of ^{214}Po ($E_\alpha = 7.69\text{MeV}$, $T = 164\mu\text{s}$), inner ring from α -decay of ^{210}Po ($E_\alpha = 5.31\text{MeV}$, $T = 138\text{d}$). Scale 235:1. Photomicrograph by R. V. Gentry, Oak Ridge National Laboratory.

Polonium Radiohalos

A maximum of initial structure is assumed in a concept suggested by R. V. Gentry²⁴ on the basis of his investigations of polonium radiohalos in Precambrian granitic basement rocks from several continents. Radiohalos (pleochroic halos) are spherical discolorations of 10-100 μm diameter in transparent minerals (e.g. mica). They were produced by alpha particles emitted from a central grain—about one μm in size—consisting of radioactive material (^{238}U , ^{232}Th , ^{210}Po , . . .). If the radioactive substance in the center runs through a chain of decay as e.g. ^{218}Po :



there will be a concentric sphere (a ring in the microscopic view) of characteristic radius for each alpha-decay. Gentry found that in primary rocks there exist three types of polonium halos:

- Three-ringed halos which originally contained ^{218}Po
- Two-ringed halos that started from ^{214}Po
- One-ringed halos caused by ^{210}Po .

Though these polonium isotopes are members of the decay chain of ^{238}U , the rings of the earlier five alpha-decays of the chain are missing and the centers do not contain any ^{238}U but only ^{206}Pb . Radiohalos are erased if they are exposed to temperatures above 300°C , which is far below the melting point of the minerals. In view of the extremely short half-lives especially of ^{218}Po and ^{214}Po there has been no convincing explanation how any polonium atoms stemming from the uranium decay chain could have been isotope-separated and moved to the halo centers before they decayed—

at temperatures where the mineral is solid. Hypothetical long-lived isomer precursors of the polonium have been excluded by Gentry's measurements. Gentry concluded:²⁵

Polonium halos, of which there are estimated to be more than 10^{15} in the Earth's basement granitic rocks, represent evidence of extinct natural radioactivity, and thus imply only a brief period between 'nucleosynthesis' and crystallisation of the host rocks.

Such a concept does not appear to be compatible with common ideas about the origin of chemical elements and planetary systems.

Conclusions

G. Burbidge remarks:²⁶

Probably the strongest argument against a big bang is that when we come to the universe in total and the large number of complex condensed objects in it, the theory is able to explain so little.

R. Kippenhahn makes a significant point:²⁷

Cosmologists do not like a solution in which the universe did not explode from a point-like state of infinite density but instead suddenly was there with finite density and obeyed the laws of physics. The reason for this bias may be simply that then by the same token as it came into being the whole world might abruptly be off again.

Such an argumentation reveals magical rather than scientific thinking. In the coming years there will be an enormous wealth of observational data gathered by space telescopes in the full range of the electromagnetic spectrum, by underground and undersea neutrino telescopes, by collectors of interstellar gas, and by

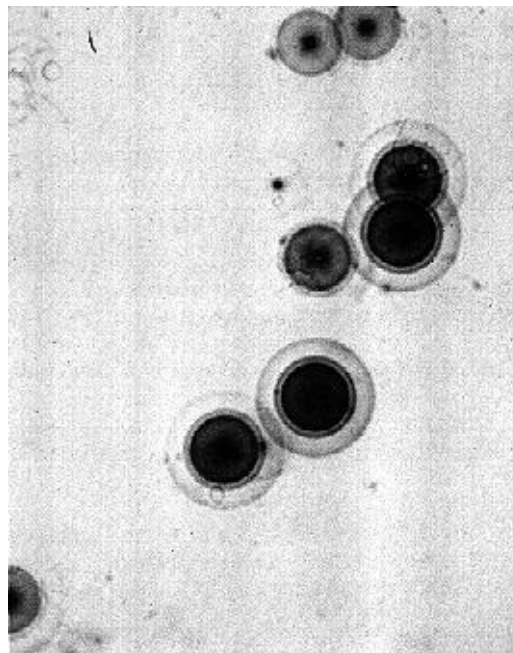


Figure 3. ^{218}Po radiohalos in mica. Middle ring from ^{218}Po ($E_\alpha = 6.00\text{MeV}$, $T = 3.00\text{min}$), outer ring from ^{214}Po ($E_\alpha = 7.69\text{MeV}$, $T = 164\mu\text{s}$) inner ring from ^{210}Po ($E_\alpha = 5.31\text{MeV}$, $T = 138\text{d}$). Scale 235:1. Photomicrograph by R. V. Gentry, Oak Ridge National Laboratory.

other techniques. Alfvén cautions:²⁸ "We should wait for further results from space research before we set up a new paradigm." Narlikar writes:²⁹

Astrophysicists of today who hold the view that 'the ultimate cosmological problem' has been more or less solved may well be in for a few surprises before this century runs out.

The concept of self-organization (evolution) encounters similar problems in different fields of study—on the macroscopic and microscopic levels. What we obviously need is *complexity, structure, information, and organization right from the beginning*—for the universe as a whole as well as for a living system.

References

1. Gamow, G. 1948. The evolution of the universe *Nature*, 162:680-82.
2. Gamow, G. 1949. On relativistic cosmogony, *Reviews of Modern Physics*, 21:367-73.
3. Alpher, R. A. and R. Herman. 1948. Evolution of the universe, *Nature*, 162:774-75.
4. Burbidge, G. B. 1980. Evidence for non-cosmological redshifts—QSOs near bright galaxies and other phenomena. In Abell, G. O. and P. J. E. Peebles, Objects of high redshift, Reidel, Dordrecht, pp. 99-105.
5. Crawford, D. F. 1979. Photon decay in curved space time, *Nature*, 277:633-35.
6. Hanes, D. A. 1981. Is the universe expanding? *Nature*, 289(5800):745-46.
7. Alpher and Herman. *Op. cit.*
8. Woody, D. P. and P. L. Richards. 1979. Spectrum of the cosmic background radiation. *Physical Review Letters*, 42: 925-29.
9. Hoyle, F. 1981. The big bang in astronomy, *New Scientist*, 92:521-27.
10. Narlikar, J. 1981. Was there a big bang? *New Scientist* 91:19-21.
11. Margon, B. 1983. The origin of the X-ray background. *Scientific American*, 248(1):94-104.
12. Devendran, T. 1982. Gegen Fred Hoyle gibt es keine Siege, *Bild der Wissenschaft*, 1982(1):49-54.
13. Hahn, H. M. 1981. Dreht sich das Universum? *Bild der Wissenschaft*, 1981(9):116-117.
14. Vaucouleurs, G. de. 1970. The case for a hierarchical cosmology. *Science*, 167:1203-1213.
15. Alfvén, H. 1982. On hierarchical cosmology. TRITA-EPP-82-03, Royal Institute of Technology, Stockholm, Sweden, pp. 1-24.
16. Hoyle. *Op. cit.*
17. Henbest, Nigel. 1982. Crab nebula's halo betrays hidden past, *New Scientist*, 93:436.
18. Sciama, D. W. 1971. Modern cosmology, Cambridge University Press, Cambridge, pp. 150-153.
19. Rubin, V. 1980. Stars, galaxies, cosmos: the past decade, the next decade, *Science*, 209:64-71.
20. Guth, A. H. 1982. 10^{-36} seconds after the big bang. In Adouze, J. and J. Tran Thanh Van, The birth of the Universe. Proceedings of the 17th Rencontre de Moriond, Gif sur Yvette, pp. 25-43.
21. Barrow, J. D. and J. Silk. 1980. The structure of the early universe, *Scientific American*, 242(4):98-108.
22. Ambartsumian, V. A. 1965. Structure and evolution of galaxies, Proceedings of the 13th Conference on Physics, University of Brussels, Wiley, New York, pp. 1-5.
23. Alfvén, H. 1982. Paradigm transition in cosmic plasma physics. TRITA-EPP-82-04, Royal Institute of Technology, Stockholm, Sweden, pp. 1-39.
24. Gentry, R. V. 1974. Radiohalos in a radiochronological and cosmological perspective, *Science*, 184:62-66.
25. Gentry, R. V. 1975. Spectacle halos, *Nature*, 258:269-270.
26. Burbidge, G. B. 1971. Was there really a big bang? *Nature*, 233:36-40.
27. Stern, B. 1980. Als die Welt in die Physik geworfen wurde, *MPG-Spiegel*, 1980(3):28-30.
28. Alfvén, H. 1982. 32nd Nobel-prize winner Conference, Lindau, Germany.
29. Narlikar. *Op. cit.*

PROOF

PHILLIP D. O'HERN*

Received 23 February 1984; Revised 27 April 1984

Apparently false science,*

Lately grown quite humorsome,

Has proved my evolution

By a Panda's extra thumb.

*I Timothy 6:20

After his first collection of essays, *Ever Since Darwin*, Stephen Jay Gould has published another series of reflections in natural history entitled *The Panda's Thumb* (W. W. Norton, 1980). The purpose of the book is to prove evolution.

Gould states that textbooks usually illustrate evolution with examples of perfect design. But he admits that optimal design is better evidence for omnipotent creation than for ungodly evolution. He argues that oddities are the proof of evolution, because divine creation would not choose that method.

"The proof of evolution," Gould avers, "lies in imperfections." His first essay illustrates the point by using the example of a giant panda's thumb. The panda strips leaves from bamboo by passing the stalks between his fingers and what resembles an opposable thumb. But only humans are supposed to have opposable thumbs! The explanation for this exception is that the panda has five digits, a true thumb, and a flexible, muscled, radial sesamoid. An abductor muscle pulls the radial sesamoid away from the true digits, and this serves as a somewhat opposable thumb. Gould contends that possibly a single mutation caused the evolution.

And so the traditional evolutionist uses examples of perfection to prove evolution. And Gould uses examples of imperfection to prove evolution. In that . . . I find humor. Who says you can not have your cake and eat it too!

*Phillip D. O'Hern, a religious poet, receives his mail at P.O. Box 650, Mobile, AL 36601.

QUOTE

. . . We do not solve social problems but rather create social monsters when man is treated first as an accident and then the particular man is denied his participation in his own being on the grounds that he is only an unfortunate accident of nature. It takes no doctor of logic to conclude that if man is such a random being, it can be only a random force that man himself uses upon his fellows, even if the user is dignified by degree as a sociologist or psychiatrist. If the determinist's premise is correct, then social or psychic manipulations may establish only a random order. Thus determinism entangles mind hopelessly in contradiction.

Montgomery, Marion. 1983. Imagination and the violent assault upon virtue. *Modern Age: A Quarterly Review*, 27:124, 125.

PANORAMA OF SCIENCE

Alteration of Behavior by Parasites — A Problem for Evolutionists

In the popular science fiction movie "The Wrath of Kahn" (Paramount Pictures, 1982), secret information was forcibly extracted from Captain Terrell and Commander Chekov by the introduction of the parasitic young of a sand creature. This familiar literary device in science fiction of a parasite invading a host and altering its behavior has scientific credibility. Janice Moore recently described parasitic-induced behavioral changes that increased the chances of an intermediate host being eaten by the parasite's final host.¹

A variety of parasitic worms require more than one host specie for development. Transmission from one host to the next often involves ingestion of the encysted parasite. Ingestion before the developing worm encysts results in its destruction. Failure to be ingested at the proper time causes death. It is therefore obvious that the worm's survival requires ingestion by the right host at the proper time. Some species of parasites increase their chance of being eaten by the right host by altering color or size of the present host. The Nematode *Tetrameres americana* reproduces in chickens, but has as its intermediate host grasshoppers. The larva encyst in the grasshopper's leg muscles thus making them easier prey for chickens.

The caninc tapeworm *Taenia multiceps* requires ruminants, such as sheep, as an intermediate host. The parasite invades the sheep's central nervous system and causes the infected sheep to stagger in circles, increasing predation by wolves, coyotes, and wild dogs.

The lancet fluke, *Dicrocoelium dendriticum*, matures in sheep but has ants as an intermediate host. Here is an interesting problem. How does the parasite inside an ant get eaten by a grass-eating sheep? When the ant is invaded by a group of worms, one invades the subesophageal ganglion causing the ant to climb to the top of a blade of grass and grasp it with its mandibles. It clings there and thus greatly increases the chances of being eaten by a grazing sheep, thus assuring the perpetuation of the species.

One group of parasites, the thorny-headed worms, *Phylum acanthocephala*, induce specific behavioral changes without damaging either the muscular or nervous tissue of the host. Of the nearly 1,200 species, the complete life cycle of only a few species are known. They live and reproduce as adults in the small intestines of vertebrates, especially birds and fish. The excreted eggs are eaten by arthropods such as insects or crustaceans. The life cycle is completed when the intermediate host is eaten by the appropriate vertebrate.

Some acanthocephalan species inhabit ducks and have aquatic crustaceans such as amphipods as intermediate hosts. To insure ingestion by ducks, the parasite alters amphipod behavior in two distinct ways. First, the normally negative phototropic response of the amphipod is reversed. They seek lighted surface water. Second, instead of burrowing in the mud, infected amphipods cling to floating vegetation. Both

behavioral alterations greatly increase the chances of infected amphipods being eaten by ducks.

Another acanthocephalan worm matures in starlings and has as an intermediate host the common pill bug crustacean. In some areas, 40 percent of starlings are infected. This is of particular interest because pill bugs are fed infrequently to nestlings (one every 10 hours) and only 0.4 percent of the pill bugs are infected. The parasite alters pill bug behavior in three important ways. Non-infected pill bugs prefer to rest in areas of high humidity; infected pill bugs move to dryer areas increasing their chance of being eaten by a bird. Non-infected pill bugs rest under some cover; infected pill bugs avoid cover. Finally, infected pill bugs prefer light background while non-infected pill bugs prefer dark background. Dark pill bugs on light background are easy prey for birds.

Alteration of behavior by parasites to enhance the chances of their host being eaten by the right predator at the proper time is an excellent example of design in nature. It is a perplexing problem for the evolutionist because to be adaptive, the altered behavior must be fully operational. No doubt there are hundreds of ways behavior could be altered, all but one of which would reduce the chances of predation by the proper host at the proper time and thus lead to extinction of the parasite. From the complex morphology, physiology and behavior of even the lowly worms, evidence of design abound. "Thou art worthy O Lord to receive glory and honor and power, for thou hast created all things and for thy pleasure they are and were created (Rev. 4:11)."

Reference

1. Moore, J. 1984. Parasites that change the behavior of their host. *Scientific American*, 250(5):108-115.

Contributed by E. Norbert Smith

Ostrich Feathers and Horse Feathers

A recent item in *Nature* has continued the argument, that the ratites, the flightless birds such as ostriches, are not descended from the carinates, the more ordinary birds.¹ Here the argument centers on the features of the tarsus, and how they develop. It was suggested before that the ostriches and such birds are descended from some kind of dinosaur; and the author appears to consider that a worthwhile hypothesis, although he does not make it part of his thesis.

Is this not one of these theories, appearing in increasing numbers nowadays, with which a creationist can partially agree? For we agree that the ostriches are likely not descended from other birds. But, we should add, neither are they descended from dinosaurs. They were created as themselves. It is easy to see the difficulty with a separate descent for some birds by evolution. For that would mean that some of the peculiar features of birds would have had to evolve twice. For instance ostrich feathers seem to be much like those of other birds, except that for a flightless bird the provision for locking the vanes together is not needed. While it is sometimes said that feathers de-

veloped from the scales of reptiles, there has never been any convincing statement in detail as to how it could have happened once. Is one to believe, then, that it happened twice? No, the proper response to a claim that ostrich—or any other—feathers developed from scales is: “Horse feathers!”

As for the argument, on grounds of features of the skeleton, that ostriches descended from dinosaurs, proves nothing. For the mechanical problems encountered in a large bird would not be too different from those encountered by a fairly large dinosaur which walked on two legs. Hence it would not be at all surprising that the Creator solved both problems in similar ways.

Reference

1. McGowan, C. 1984. Evolutionary relationships of ratites and carinates: evidence from ontology of the tarsus. *Nature*, 307(5953):733-735.

Contributed by Harold Armstrong

QUOTE

... Naturalistic evolution can sustain neither the universal nor the permanent dignity of man.

Henry, Carl F. H. 1984. The crisis in modern learning in The Christian vision: man in society, Lynne Morris, editor. The Hillsdale College Press, Hillsdale, MI, p. 9.

The “Missing Mass” Between Galaxies: An Inescapable Problem for an Old Universe

Creationists (for example Slusher¹) have shown that there is insufficient mass for galaxies to hold gravitationally together over billions of years. Evolutionary astronomers have sought to explain away this difficulty by postulating some hidden sources of mass, but such rationalizations are failures. Rizzo² wrote:

Another mystery concerns the problem of the invisible missing mass in clusters of galaxies. The author evaluates explanations based on black holes, neutrinos, and inaccurate measurements and concludes that *this remains one of the most intriguing mysteries in astronomy.* (Italics added)

The obvious solution is that there really is no hidden mass, galaxies cannot hold together for billions of years, and that galaxies have not been in existence long enough to fly apart.

References

1. Slusher, H. S. 1982. Age of the Cosmos. ICR Technical Monograph. Master Books, El Cajon, CA.
2. Rizzo, P. V. 1982. Review of Mysteries of the Universe by Nigel Henbest. *Sky and Telescope*, Aug., p. 150.

Contributed by John Woodmorappe

ICE AGES: THE MYSTERY SOLVED? PART II: THE MANIPULATION OF DEEP-SEA CORES

MICHAEL J. OARD*

Received 11 July 1983; Revised 10 August 1984

Abstract

This part discusses the basis for the modern revival of the astronomical theory of the ice ages, namely statistical correlations with oxygen isotope fluctuations in deep-sea cores. The analysis of oxygen isotopes and the dating methods for cores are subject to many assumptions, variables, unknowns and problems to objectively relate cores to the astronomical theory.

A) Introduction

Part I of this article presented a brief historical sketch of the astronomical theory of the ice ages. It was shown that long-term orbital variations in radiation are too small to cause ice ages, and that any uniformitarian ice age scheme is practically impossible. Climate simulations supporting the theory actually have many serious problems, namely unrealistic parameterizations that make them highly sensitive to slight changes in radiation. If this is true, then why have most earth scientists accepted it during the past 10 years? The reason is because of statistical relationships with deep-sea cores. During the time when most paleoclimatologists were skeptical of the Milankovitch theory, there were several influential believers trying to prove it by various means. After the Second World

War interest in and exploration of the deep sea was intensified, from which came new technology to sample the sediments of the ocean bottom. Thousands of these cores have now been collected and stored at various oceanographic institutions. Downcore time series (the change in a variable with time) of climate sensitive parameters were derived from the cores and then correlated with the astronomical theory. The best parameter employed is the change in the abundance of oxygen isotopes of foraminifera microfossils. However, before oxygen isotopes could be related to the Milankovitch theory, accurate dates for the cores were needed. This was provided mainly by index microfossils, radiocarbon, uranium series disequilibrium, and paleomagnetic stratigraphy. The time series was analyzed for its predominate cycles by power spectrum analysis. However there are too many assumptions, variables, unknowns and problems in the above procedure to objectively relate oxygen isotope fluctuations to the astronomical theory of the ice ages.

*Michael J. Oard, M.S., receives his mail at 3600 Seventh Avenue, South, Great Falls, MT 59405.

B) Oxygen Isotope Analysis of Deep-Sea Cores

1) THE PROCEDURE

Many geophysical and biological variables have been measured down deep-sea cores. Several of the more important variables are changes in CaCO_3 , certain microfossil changes, and changes in oxygen isotopes. The first two and others not mentioned are not globally synchronous, a needed condition to establish a link with orbital variations. There are also many problems in attempting to relate them to the Milankovitch mechanism.¹ Referring to variables other than oxygen isotopes, Hays and Morley state:

On the other hand there is no a priori reason to believe that the frequency distribution of other geochemical or paleontological parameters in widely separated deep-sea cores should have a common frequency distribution. . . These results suggest that the frequency distribution of other geochemical and paleontological parameters may vary regionally, and provide a record of local or regional climatic changes.²

Oxygen isotopes have been found to be globally synchronous and to correlate with the astronomical theory of the ice ages.

Oxygen has three stable isotopes with approximate abundances of $^{16}\text{O} = 99.76\%$, $^{17}\text{O} = 0.04\%$, and $^{18}\text{O} = 0.21\%$. The percent of ^{17}O is too low to be practically used. The amount of ^{18}O is very small, and in practice the ratio, $^{18}\text{O}/^{16}\text{O}$, measured in parts per thousand or per mil (‰) is used. The ratio, called a delta value is compared to a laboratory standard by the following equation:³

$$\delta^{18}\text{O} = \left[\frac{^{18}\text{O}/^{16}\text{O} - ^{18}\text{O}/^{16}\text{O}_{\text{Standard}}}{^{18}\text{O}/^{16}\text{O}_{\text{Standard}}} \right] \times 10^3 \text{ ‰} \quad (1)$$

There are many standards that have been developed⁴ since Harold Urey and his colleagues at the University of Chicago developed the idea. Negative values of $\delta^{18}\text{O}$ mean the sample is enriched in ^{16}O above the standard, while positive values indicate more ^{18}O than the standard.

Oxygen isotopes are measured in the shells or tests of microfossils in deep-sea cores. The main microfossil group is the foraminifera, a one-celled organism commonly found at most depths of the ocean.⁵ The shell consists of one or several chambers mostly less than one millimeter across and connected by an opening or two (foramen). Species that live near or on the bottom are called benthonic or benthic foraminifera and have short geographical ranges, which make them less useful for correlating.⁶ Those that inhabit the surface (sometimes far from the surface) are called pelagic or planktonic foraminifera. Their shells make up a significant proportion of the sediment on the ocean bottom. Foraminifera are commonly used as index fossils throughout the Phanerozoic. They have been well studied, but there is a "species problem" in their classification because they have been "over-split by zealous taxonomists."⁷ After all the study "Little is known about the biology and ecology of the living organisms,"⁸ which places severe constraints on the interpretation of oxygen isotopes from their shells. Approximately 30 species of planktonic foraminifera⁹ and a lesser number of benthonic species are useful for Pleistocene paleoclimatological analysis.

$\delta^{18}\text{O}$ is measured down a deep-sea core usually at 10 cm intervals. The resulting curve is usually sinusoidal in shape with the lower frequencies the most energetic, like many other geophysical time series.¹⁰ Figure 1 is one of the most used $\delta^{18}\text{O}$ plots from core V28-238 (the 238th core on the 28th cruise of the Lamont-Doherty Geological Observatory ship Vema).^{11, 12}

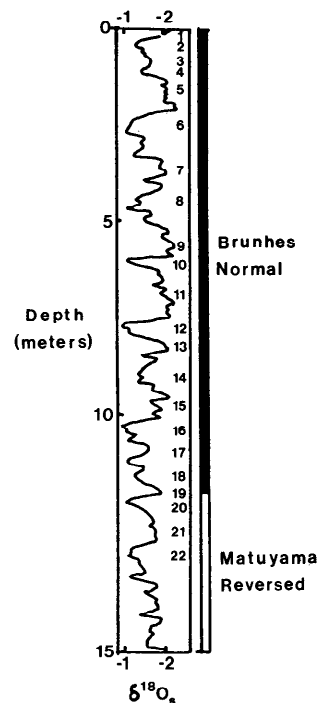


Figure 1. Oxygen isotope variations in core V28-238 from the Solomon Plateau (3120 meters depth), Pacific Ocean. Magnetic declination of core is shown at right.

This core was taken from the Equatorial Western Pacific in 3120 meters of water. The oxygen isotope variations are quite small. Note that the oxygen isotope ratio was multiplied by 1000 in (1). The range of variation in $\delta^{18}\text{O}$ during the Pleistocene in Atlantic cores is about 21 ‰ , while in Pacific cores, it is about 1.1 ‰ .^{13, 14} These slight variations are caused by many geophysical and biological variables. From experiments on corals, two main parameters were isolated. The relationship is expressed by the following equation:¹⁵

$$T = 16.9 - 4.2(\delta^{18}\text{O}_s - \delta^{18}\text{O}_w) + 0.14(\delta^{18}\text{O}_s - \delta^{18}\text{O}_w)^2 \quad (2)$$

where T is the temperature in degrees Celsius of the water at which shell secretion occurs, $\delta^{18}\text{O}_s$ is the measured delta value of the sample, and $\delta^{18}\text{O}_w$ is the delta value of the water.

2) COMPLEX LABORATORY TECHNIQUES

The procedure for measuring $\delta^{18}\text{O}_s$ of foraminifera shells in the laboratory is a very complex task with many inter-laboratory variations and much room for error. The sample must first be cleaned of organic matter and other contaminants. Different cleaning methods give slightly different results, which also depend upon the particular sample and the amount of impurities.¹⁶ The sample is crushed lightly and usually only certain sizes are analyzed since different sizes have been found to give different $\delta^{18}\text{O}_s$ values, although this may be due to the variable procedures.¹⁷

In the cleaning process the samples are washed and dried at least twice. Usually the sample is roasted at about 450°C. Then, CO₂ gas must be extracted from the shell. This is usually done with phosphoric acid, but only two-thirds of the oxygen is released. The reaction must take place at low pressure, and the CO₂ must not come in contact with water. The oxygen isotopes in the CO₂ are measured in a mass spectrometer. Care must be taken during this phase to insure that molecules or radicals with the same mass as CO₂ are not formed within the spectrometer chamber.¹⁸ The analytical precision of $\delta^{18}\text{O}_s$ measurements is about 0.2 ‰,¹⁹ although this figure has varied. After much trial and error in developing the method (while at the same time $\delta^{18}\text{O}_s$ results were being published), a 12 step procedure is normally followed today, the difficulty of which is taken for granted by users.²⁰

3) VERY DIFFICULT INTERPRETATION OF $\delta^{18}\text{O}_s$

a) Introduction

After $\delta^{18}\text{O}_s$ measurements down a core are plotted, the curve needs to be interpreted, which is usually according to (2). However, this is not easy and there are many serious problems of interpretation: "... these data are subject to problems of interpretation, which are only gradually being cleared up ..."²¹ Duplessy confirms this: "However a precise interpretation of these fluctuations is still a matter of controversy."²² In a recent book on marine geology, Kennett repeats: "However, because of the various constraints imposed by the method, a precise interpretation of these fluctuations is still controversial."²³ Most of these constraints, assumptions, and problems will be investigated further in this section. It will be shown that it is very difficult, if not impossible, to know if the $\delta^{18}\text{O}_s$ curve accurately records paleoclimatic fluctuations over time which can be related to the astronomical theory of the ice ages.

b) A Missing Relationship

The most obvious problem in the interpretation of $\delta^{18}\text{O}_s$ during the Pleistocene is that (2) has two unknowns: the paleotemperature, T, and the $\delta^{18}\text{O}_w$ of the ocean water in the past and cannot be solved. Another relationship or equation in the form $T = C(\delta^{18}\text{O}_w)$, where C is a constant, is needed in order to accurately decipher the meaning of $\delta^{18}\text{O}_s$. Paleoclimatologists have actively searched for the value of C for over 20 years, and considerable controversy has resulted.²⁴ Recently, a compromise has been worked out. Over 20 years ago, Emiliani believed that C was equal to about three, so that $\delta^{18}\text{O}_s$ cycles were primarily due to the paleotemperature of the ocean, which fluctuated during the Pleistocene.^{25, 26} However, in the mid and late 1960's many disagreed with him. They believed that C should be about 0.3.^{27, 28} They related $\delta^{18}\text{O}_w$ to the volume of ice stored in the Pleistocene ice sheets during glacial/interglacial cycles because ¹⁸O is heavier and does not evaporate as easily as ¹⁶O. Thus the isotopes are fractionated, the amount depending upon the temperature. Consequently, ice will be enriched in ¹⁶O at the expense of the ocean, which will have a greater amount of ¹⁸O. Based on theoretical assumptions of past ice sheet thickness and the $\delta^{18}\text{O}$ of the ice, they were able to convince most

scientists that past ocean temperatures contributed little to (2).²⁹ They drew further support from $\delta^{18}\text{O}_s$ measurements on benthonic foraminifera by assuming that the deep ocean has maintained its constant cold temperature throughout the Pleistocene. By relating $\delta^{18}\text{O}_s$ to ice volume, they have a more direct relationship to ice age fluctuations and to Milankovitch radiation cycles.

No matter what the value of C, it is based upon shaky uniformitarian assumptions. For instance, the assumption of a known ice sheet thickness for the Pleistocene ice ages is poor because it is really not known or else depends upon analogs from the present ice sheets. In discussing sea level lowering during a glacial phase, which is proportional to ice sheet thickness, Erickson and Wollin state: "The estimates vary because one can only guess how thick ice sheets were ..."³⁰ Bloom says: "Unfortunately, few facts about its thickness are known ... we must turn to analogy and theory ..."³¹ It should not be too surprising that Pleistocene ice sheets are believed to be the same thickness as those existing now. There is a degree of circular reasoning relating sea level lowering to ice sheet thickness, since each has been used to support the other. A recent article in *Science* claims that the sea level data near the maximum of the last ice age is faulty. New measurements on "non-movable" ancient sea level indicators revealed that sea level at that time was 54 percent higher than previous estimates. This implies "... that substantially less ice was present from 17,000 to 10,000 years B.P."³² This new result shows how far off estimates of C can be based on the assumption of past ice sheet thickness. (This also adds support to the author's model of a thinner ice sheet.^{33, 34})

The assumption that the $\delta^{18}\text{O}$ of past ice sheets can be known from present measurements on mid and high latitude precipitation from polar ice, on carbonate sediments from lakes, etc. is also very poor. There are many complex, interacting variables that intervene. $\delta^{18}\text{O}$ of water vapor, which enters into the measurements of all the above quantities, varies considerably with latitude, ranging from -11 ‰ in the warm subtropics to -50 ‰ in the cold polar regions.³⁵ Water vapor can be transported great distances before condensation, and even clouds can move significant distances before precipitating. Besides, there is a large seasonal difference in the $\delta^{18}\text{O}$ of water vapor at high latitude by as much as 25 ‰.³⁶ Other variables include the distance from open water at high latitude, the temperature and height of vapor condensation, the strength of the wind, and the number of vapor evaporation-condensation cycles. Consequently, the uniformitarian principle indicates that the average $\delta^{18}\text{O}$ of the past ice sheets is unknown. Siegenthaler and Oeschger say:

However, the meteorological processes determining the stable isotopic composition of precipitation are complex and only partly understood, so that a *quantitative interpretation of ancient isotope ratios in precipitation* as recorded in polar ice or in carbonate sediments from lakes, *has not yet been possible.*³⁷ (emphasis mine)

Even the assumption that the deep ocean has remained at a constant temperature in the past, so that $\delta^{18}\text{O}_s$ can be directly related to $\delta^{18}\text{O}_w$ in (2), is ques-

tionable.³⁸ The temperature of bottom water depends mostly upon atmospheric conditions at higher latitude, which can change slightly in the present climate, and especially so during or after an ice age climate. A recent measurement of the temperature near the bottom of the North Atlantic showed that it changed 0.15°C in nine years.³⁹ This is a small but significant change, and surprised oceanographers. If the deep ocean can change this much in a short time, it can possibly change several degrees in a longer time. Even a small change in temperature can greatly affect the oxygen isotope ratio in benthonic foraminifera, since a 1°C temperature change will alter $\delta^{18}\text{O}_s$ by about 0.3 ‰.⁴⁰ This does not leave much room for error from a constant temperature assumption in view of the small range of $\delta^{18}\text{O}_s$ variation during the Pleistocene. Besides, $\delta^{18}\text{O}_s$ of benthonic foraminifera are vulnerable to variables other than temperature and $\delta^{18}\text{O}_w$:

Clearly, however, *ice volume cannot be read directly from the benthonic signals* (as has been variously proposed), because of: (1) differences in amplitudes between species; (2) existence of transient events throughout deglaciation and the Holocene; (3) mixing effects; and (4) intra-species variations in $\delta^{18}\text{O}$.⁴¹ (emphasis mine)

More will be said on these problems later. Consequently, the assumption that the temperature can be held constant in the deep ocean and that $\delta^{18}\text{O}_s$ is related only to $\delta^{18}\text{O}_w$ is poor. In summary, the poor assumptions that have determined the value of C make the relationship between paleotemperature and $\delta^{18}\text{O}_w$ unknown, so that (2) remains unsolved.

c) Many Other Variables

Some researchers argue that it does not matter what value of C is used because both T and $\delta^{18}\text{O}_w$ in equation (2) are sensitive to ice age cycles.⁴² Whether this is true or not, modern knowledge of oceanography and marine biology show that many other variables, which are unknown or poorly understood, can influence $\delta^{18}\text{O}_s$ in the shells of foraminifera. These variables often are related to $\delta^{18}\text{O}_w$ or T or both. Applying the principle of uniformitarianism makes it very difficult to know whether downcore oscillations of $\delta^{18}\text{O}_s$ are not just fluctuations of one or more of these variables, unrelated or poorly related to paleoclimate.

One of the main variables affecting the temperature and $\delta^{18}\text{O}_w$ at CaCO_3 secretion is the paleodepth. In the present tropical and subtropical ocean, the upper layer of water is warm and varies seasonally, but a little below the surface, the temperature decreases markedly with depth. The depth of most rapid decline is called the thermocline and its depth and rate of change vary from place to place. Below the thermocline the temperature falls more gradually to the near-freezing temperature of the deep ocean. Figure 2 shows the thermocline for the Eastern Equatorial Pacific off Panama, which is one of the most shallow and steep in the ocean.⁴³ The upper 100 meters decreases a total of 15°C, but between 25 and 37.5 meters, the defined thermocline as indicated by dashed lines in Figure 2, the rate of change is 0.5°C/meter.⁴⁴ Since the oxygen isotope ratio is very sensitive to temperature, the depth habitat of foraminifera during their life cycle must be known, not only for the present, but also for the past, and both can be different.

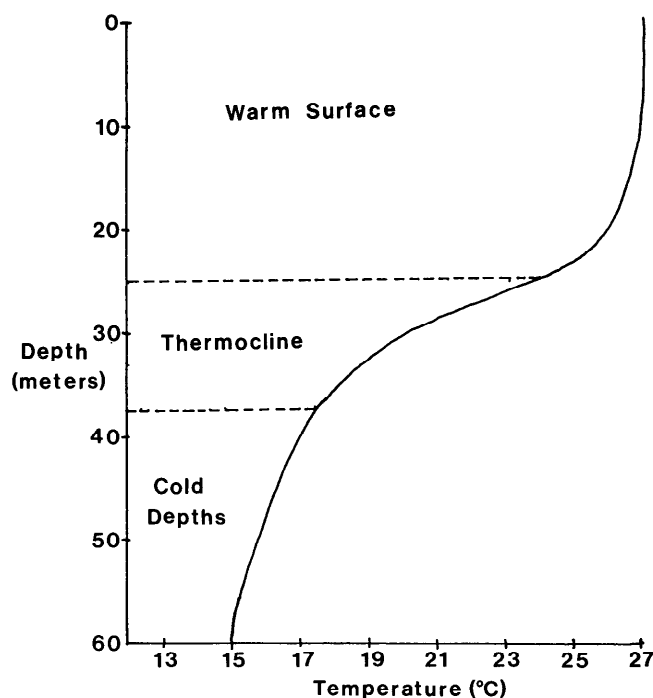


Figure 2. The depth-temperature profile of the Panama Basin in the Eastern Equatorial Pacific.

It has been assumed that each species of foraminifera inhabits a certain average depth and that most CaCO_3 secretion occurs within narrow limits in the top 150 meters of water, which is the nutrient-rich zone. This is generally true from plankton tow results. However, there are significant exceptions.^{45, 46} Since $\delta^{18}\text{O}_s$ is very temperature sensitive and the temperature changes so rapidly with depth within the top 150 meters, very precise knowledge of the depth of shell formation is needed. However, "Very little is known about the vertical distribution and abundance of planktonic foraminifera and how species abundance vary vertically throughout the year and during their life span."⁴⁷ It has been found from plankton tows that foraminifera often have large vertical ranges.⁴⁸⁻⁵⁰ One species of pelagic foraminifera has been observed to range over 2000 meters: "However, living specimens have been found not only near the surface but also as deep as 1500-2000m . . . we cannot be certain of the real depth at which the test was secreted."⁵¹ Another species was observed to descend 170 meters/day for 4 days.⁵² At least part of the test secretion for many species takes place in the thermocline.⁵³ In a study of the Eastern Equatorial Pacific, foraminifera were most abundant in the high nutrient thermocline (Figure 2). A species secreting CaCO_3 at the top of this thermocline would have a $\delta^{18}\text{O}_s$ 1.8 ‰ lighter than the same species 12.5 meters deeper. Since the range of $\delta^{18}\text{O}_s$ variation during the Pleistocene in the Pacific is about 1.1 ‰, and the depth of test secretion is unknown,⁵⁴ it is impossible to objectively interpret downcore $\delta^{18}\text{O}_s$ fluctuations. Oxygen isotope cycles may only reflect systematic long term changes in the depth habitat of foraminifera.

In addition to the depth habitat problem, there are also seasonal differences in temperature and species

abundances in near surface waters of temperate regions. Some species probably migrate vertically with the seasons to maintain a more-or-less constant temperature, but this may be due to salinity or density changes, which are related to surface evaporation/precipitation changes.^{55, 56} For those species that do not migrate, the seasonal change in surface water temperatures as well as $\delta^{18}\text{O}_w$ will greatly affect the oxygen isotope ratio. For instance, the seasonal change of $\delta^{18}\text{O}_s$ of the near-surface foraminifera near Bermuda is 1.6‰ .⁵⁷ Since abundant foraminifera blooms occur at different times of the year, the seasonal temperature change will cause large $\delta^{18}\text{O}_s$ variations in different species, or possibly even in the same species.^{58, 59} A systematic long term change in the timing of these blooms would cause $\delta^{18}\text{O}_s$ oscillations in that species in the sediments below.

There are many other biological or ecological variables that can affect $\delta^{18}\text{O}_s$ in foraminifera shells possibly through interaction with the variables already discussed. There is a difference in $\delta^{18}\text{O}_s$ of the same species in different oceans.^{60, 61} The supply of dissolved oxygen and the nutrients in the water, which vary with time, are important factors. There seems to be a life cycle or age effect on $\delta^{18}\text{O}_s$,⁶²⁻⁶⁴ possibly related to depth, although some have not found this relationship.⁶⁵ "An important consideration is that planktonic foraminiferal shells reflect a range of hydrographic conditions depending on their life-spans, depth habitat preferences, and vertical migration."⁶⁶ These many variables add further constraints to the already difficult interpretation of $\delta^{18}\text{O}_s$.

Sensitive thermal observations of the ocean surface by environmental satellites adds another twist to the meaning of $\delta^{18}\text{O}_s$ fluctuations in deep-sea cores. Eddies of rapidly circulating water have been observed to break off the edge of the Gulf Stream. These eddies are called warm or cold core rings depending upon the temperature inside the ring compared to the normal water temperature. They can last over a year with a size from 125 to 200 kilometers in diameter, and have temperatures as much as 9°C different than the environmental water.⁶⁷ Consequently, organisms that do not normally live in a particular area or do not reflect the normal water temperature thrive for awhile until the ring disappears. It has been estimated that 50-75 percent of the shells falling on the sea floor of the Northern Sargasso Sea are from cold core rings, which occupy between six and 13 percent of the surface.⁶⁸ Rings are found in other strong ocean currents as well. Besides giving a different environmental signal than the normal near-surface water, these rings will cause foraminifera of different $\delta^{18}\text{O}_s$ to become mixed together in the sediment, thus adding to the variability of the measurements.

$\delta^{18}\text{O}_w$ has generally been assumed constant in the ocean at any one time and to depend mainly on ice volume and the mixing time of the oceans. $\delta^{18}\text{O}_w$ of the top layer of water depends upon the evaporation/precipitation ratio, which varies seasonally and possibly over many years due to slow climatic changes. $\delta^{18}\text{O}_w$ averages close to zero near the equator, but ranges from $+1\text{‰}$ in the tropical and subtropical evaporation belt to -1‰ in the higher latitudes. There are also longitudinal differences, especially in

the mid latitudes. These differences can cause significant effects on $\delta^{18}\text{O}_s$ of foraminifera tests. It is also possible that cyclical changes in $\delta^{18}\text{O}_s$ with depth in the sediments are influenced by long term changes in the evaporation/precipitation ratio due to climate change.

In the uniformitarian scheme of repeated ice ages, the top layer of ocean water would be greatly influenced by variable amounts of glacial meltwater. Although, the value of $\delta^{18}\text{O}_w$ of this water can never be known, it may be as much as 30 to 50 ‰ lower than the normal ocean water. The greatest difference would be near the mouth of major rivers that drained the melting ice sheets, but its influence may be felt for long distances out in the ocean, depending upon many unknown factors. One of the main variables is the density of the meltwater, which because of its very low salinity may float long distances before mixing. However, if the water is much colder than the normal water, it may be dense enough to sink and mix immediately. The amount of meltwater, which would mainly be added in summer, would depend also upon whether the ice sheet is building or melting. The higher latitudes would be greatly affected while the lower latitudes would be least. Consequently, the unknown effect of glacial meltwater is another possible source of error.

As previously discussed, the deep ocean water is not immune from long term changes. There are factors that can even affect $\delta^{18}\text{O}_w$ at this depth which would influence $\delta^{18}\text{O}_s$ in benthonic foraminifera. From the uniformitarian viewpoint, Sachs admits that paleotemperature cannot be measured by assuming $\delta^{18}\text{O}_w$ constant:

Given factors like the possible changes in glacial water mass distribution . . . and present uncertainties about glacial climatology and evaporation/precipitation patterns there are more variables than relationships, so that isotopic paleotemperature estimates from benthonic faunas seem premature.⁶⁹

Another variable, over-looked until recently, may significantly affect $\delta^{18}\text{O}_w$ with time. Research has shown that ocean water percolates into the earth's crust, is heated and released again into the ocean. In this process there is an exchange of oxygen between the sea water and the crust, which has a much different average $\delta^{18}\text{O}$. Some researchers believe this effect is large enough to control the $\delta^{18}\text{O}_w$ of the entire ocean with time: ". . . Muehlenbachs believes that the exchange of oxygen between sea water and the crust is so extensive that it controls the oxygen isotope composition of the ocean over geological time."⁷⁰ If this is true, or even partially true, it seems that the interpretation of $\delta^{18}\text{O}_s$ from (2) for this process alone would be impossible for the past.

d) Disequilibrium and the Vital Effect

In addition to all the above problems, another serious problem has emerged that by itself throws the interpretation of $\delta^{18}\text{O}_s$ into confusion. When the three variables in (2) have been measured experimentally or in the present ocean, it was found that the temperature derived from the equation after measuring $\delta^{18}\text{O}_s$ and $\delta^{18}\text{O}_w$ did not match the actual water temperature:

However, isotopic temperatures calculated for living planktonic foraminifera that were collected by plankton net tows were *almost always significantly higher than those observed in the water in which they were collected.*⁷¹ (emphasis mine)

The same also applies to most benthonic foraminifera.^{72,73} Therefore, foraminifera do not form CaCO_3 according to (2) and are said to be out of equilibrium. "These observations conflict with the isotopic equilibrium assumption of the stable-isotope palaeoceanographic method, and can impose severe limitations on the interpretation of stable isotope data."⁷⁴

The amount of disequilibrium varies considerably. Shallow water benthonic foraminifera have been found 2.0-3.0 ‰ lighter while planktonic foraminifera are commonly 0.5-1.5 ‰ lighter.⁷⁵ Two of the most common planktonic foraminifera used in paleoclimatic research, *Globigerinoides ruber* and *G. sacculifer* are measured 0.6 ‰ lighter.⁷⁶ Some specialists have found evidence that each species deviates from equilibrium by a constant amount, so that a simple correction for each species is all that is needed.⁷⁷ However, this species-specific difference in $\delta^{18}\text{O}_s$ is "still a fundamental problem in marine geology."⁷⁸ The species-specific correction factor likely cannot be objectively applied. Vincent and others state:

"... the ranges of variation within individual species and of isotopic differences between species are the same order of magnitude as isotopic changes commonly recorded in Pleistocene sediments. Thus, *our results impose limits on the significance of downcore isotope records* based on single-species analyses, especially if small samples with few specimens are used."⁷⁹ (emphasis mine)

Similar problems occur with mixtures of different species with different average $\delta^{18}\text{O}_s$ since the results will depend among other things upon the species frequency distribution.⁸⁰ Consequently, disequilibrium causes severe difficulties of interpreting $\delta^{18}\text{O}_s$ measurements.

Scientists are actively searching for the cause of the disequilibrium and several mechanisms have been discovered. Some of the variables already discussed may be part of the problem. Other factors include foraminifera size, fertility differences, ecological stress, and the vital effect.^{81,82} The "vital effect" is caused by metabolic oxygen, which is 10 ‰ lighter,⁸³ being mixed into the shell. This seems likely, but the mechanism is poorly understood. Photosynthesis from symbiotic algae in the photic zone (the upper 100-150 meters) has been suggested as a good possibility.^{84,85} In other cases, symbiotic algae have been ruled out.⁸⁶ Besides photosynthesis, food and respiration "... may be of equal importance in producing a 'vital effect' on skeletal isotopic composition of organisms ..."⁸⁷ Again, there are too many unknown variables, and whatever the cause, disequilibrium by itself throws doubt on past climatic interpretations of $\delta^{18}\text{O}_s$ measurements.

4) DEPOSITIONAL AND POST-DEPOSITIONAL PROBLEMS

a) Shell Dissolution

It has been assumed at one time that deep-sea sediments have generally been undisturbed for great periods of time, and the foraminifera shells accurately reflected conditions in the water column above. How-

ever, these conditions are rare and nearly impossible to measure. As foraminifera shells sink to the bottom and while resting in the top layer of sediment, dissolution of the shell can occur. In general, the shell begins to dissolve at about 3000 meters and by 5000 meters is usually completely dissolved. However, the dissolution process and its converse the CaCO_3 sedimentation process depends upon many other factors besides depth: "... carbonate deposition is a complicated process with many controlling factors."⁸⁸ Some of the interacting variables responsible for dissolution include the temperature, pressure, carbonate ion content, amount of CO_2 in the water, the amount of water that flows through the sediment, the organic content of the water, the percentage of aragonite (CaMgCO_3) in the shell and the supply of non-carbonate material in the water.⁸⁹ As a result, there are oceanic and regional differences in the dissolution rate. A recent article indicates that these differences are larger and the dissolution pattern more complicated with depth than previously thought.⁹⁰ It was discovered that the rate of dissolution in the Western North Atlantic increased sharply between about 3000 to 4400 meters, which is about 1300 meters more shallow than previously thought.⁹¹ Below 4400 meters the dissolution rate actually decreased; even fragile foraminifera were well preserved, which rules out downslope transport. This pattern was attributed to the different dissolution characteristics of each ocean current.

Most foraminifera shells eventually dissolve in the deep ocean. Those more likely to be preserved in the sediment include large species, benthonic foraminifera, and small species with a more solution-resistant shell. Thus, a species bias is introduced in the sediments right from the start, "... with selective preservation posing great difficulty for the interpretation of oxygen isotope data."⁹² Another complication arises when CaCO_3 with a different $\delta^{18}\text{O}_s$ sometimes recrystallizes on the shells. Therefore, only well-preserved specimens with no secondary growths must be analyzed.⁹³ This means each shell must be examined microscopically, which is very time consuming. However, even in well-preserved shells, chemical and mineralogical replacement occurs. Therefore, "... it is difficult to prove that the isotopic composition of oxygen has remained unchanged in shells that appear to be unaltered."⁹⁴ Since the variables determining dissolution are complicated and poorly known in the present ocean, it is difficult to determine their past effects under uniformitarian principles. Consequently, dissolution causes big problems: "... there is controversy about the relative importance of the primary productivity of calcareous microorganisms and their dissolution at depth ..."⁹⁵

Some authors have found a shell size effect on $\delta^{18}\text{O}_s$ in sediments. The larger foraminifera are enriched in ^{18}O ⁹⁶⁻⁹⁸ so that dissolution biases the sediment towards higher $\delta^{18}\text{O}_s$. "The interpretation of oxygen isotope values is further complicated by preferential dissolution on the sea floor of isotopically lighter shells."⁹⁹ As previously stated, two of the most widely used foraminifera for paleoclimatic reconstruction are very susceptible to dissolution.¹⁰⁰ In fact, variable or cyclical dissolution rates with time may be responsible for $\delta^{18}\text{O}_s$ cycles in well-preserved sediments. Kent has

shown in a recent article that this is highly likely. He found a strong correlation in deep-sea cores between low CaCO_3 content and high $\delta^{18}\text{O}_s$.¹⁰¹ Even though it is claimed by some that dissolution affects the isotopic composition by only 0.2-0.4 ‰ (this may be difficult to determine in the present, as well as the past), CaCO_3 cycles have very similar frequencies to glacial/interglacial cycles, which are determined by $\delta^{18}\text{O}_s$ fluctuations.¹⁰² Regardless, there are too many poorly known variables to objectively interpret $\delta^{18}\text{O}_s$ measurements in deep-sea cores below about 3000 meters.

b) Bioturbation

Even when a solution-resistant foraminifera becomes incorporated into the top layer of sediment, it does not quietly remain in place for thousands of years. It is common for the top layers of sediments to be mixed by deposit-feeding organisms that ingest the sediment and redeposit it. This is called bioturbation and is very common in the deep sea: "... most if not all deep-sea sediment is susceptible to disturbance by marine organisms."¹⁰³ The depth of mixing by bioturbation has been variously reported as two to five cm,¹⁰⁴ 15 cm,¹⁰⁵ and 10-60 cm.¹⁰⁶ The latter figure was determined by the redistribution of ash layers, the dispersal of microtectites and the incorporation of radioactive contaminants into the sediments. A recent article indicates that bioturbation may extend deeper than previously thought. Burrows down to more than two meters were actually observed in two cores.¹⁰⁷ The extent of bioturbation of this magnitude is unknown because normal coring operations cause the delicate burrows to close so that they are not detected. Such burrows greatly increase the permeability of the sediment. However, it is claimed that sediment mixing is probably minimal, although three-fourths of the horizontal burrows were filled with sediment. Consequently, this claim seems unjustified. Bioturbation "... is not easy to estimate and can be expected to vary from place to place."¹⁰⁸ It can be difficult to detect in carbonate sediments.¹⁰⁹ Therefore, bioturbation presents another complicating factor to the interpretation of $\delta^{18}\text{O}_s$ cycles.

c) Reworking

Erosion and subsequent deposition, called reworking, is also a common occurrence in the deep ocean.¹¹⁰ Besides erosion by bottom currents, several other processes, such as submarine slides, slumps and turbidity currents can greatly disturb the sediment. Erosion causes gaps or hiatuses in the sediment in the erosional area and will mix sediments in the area of deposition. Most cores show evidence of reworking.¹¹¹⁻¹¹⁴ However, it is claimed that reworking is difficult to detect from physical evidence alone: "Unfortunately, the occurrence of local deformations due to slumping, crust loading, mud flows, and so on, even in generally well stratified horizontal beds is common. Such features can be detected in exposures but easily overlooked in cores."¹¹⁵ Therefore, reworking in cores is detected mainly by their anomalous fossil content and wrong dates.¹¹⁶ "The distribution of hiatuses, or unconformities, are readily determined by conventional biostratigraphic and paleomagnetic dating of sediment sequences."¹¹⁷ Thiede says further that reworked fossils are "... easily distinguished by not being contemporaneous with the sediments in which they are found."¹¹⁸

Consequently, many cores and "anomalous" results in one core are discarded because of reworking.¹¹⁹⁻¹²¹ This is usually done aboard ship after an extensive biostratigraphic examination.¹²²⁻¹²⁴ It is for this reason few cores, which are labeled Quaternary by their fossil content, are extensively analyzed and related to the astronomical theory of the ice ages. Whether reworking in a particular core is genuine or not, it can be a powerful tool to reinforce preconceived ideas.

Modern observations of deep-sea erosion indicate that reworking probably was very extensive in the past. Gardner and Sullivan report large fluctuations in turbidity as a result of erosion near the bottom of the abyssal plain in the Western North Atlantic.¹²⁵ The detector was located on a flat rise so that the erosion cannot be due to gravity slides from higher terrain. The results were the largest turbidity readings ever found in the deep sea and were unexpected. Two large fluctuations in bottom water cloudiness were associated with the passage of tropical storms. If the relationship is substantiated with further evidence, oceanographers will have to significantly revise their ideas on the amount of reworking.

5) SUMMARY

In summary, there are too many assumptions and variables that are poorly known and too many problems of interpreting $\delta^{18}\text{O}_s$ measurements in deep-sea cores. Consequently, it should be impossible to objectively correlate these fluctuations with the astronomical theory of the ice ages. Even some paleoclimatic researchers have questioned the oxygen isotope result: "If this theory is correct—and we should be aware that it may not be ... we should always be aware of the underlying assumptions in oxygen-isotope studies ..."¹²⁶ In relating oxygen isotope fluctuations to the Milankovitch mechanism, John cautions:

But we should ask ourselves whether changes in the Earth's orbital geometry are really the fundamental causes of glacial and interglacial stages. In the first place does the oxygen-isotope record really give a reliable indication of the expansion and contraction of the mid-latitude ice sheets? This is a matter of some dispute ... If they do not (and this is quite likely), then the 'fundamental cause' of Quaternary glacial stages may not be so fundamental after all.¹²⁷

C) DATING DEEP-SEA CORES

1) INTRODUCTION

Before $\delta^{18}\text{O}_s$ fluctuations in deep-sea cores could be related to the astronomical theory of the ice ages, the dates of the $\delta^{18}\text{O}_s$ cycles needed to be determined. This introduces many new problems in addition to those already discussed. Dating cores has been a difficult problem: "... there has always been some uncertainty in the dating of the geological record and in the accuracy of computed parameters."¹²⁸ Some have considered "accurate dating" of deep-sea cores the biggest problem in testing the Milankovitch theory.¹²⁹ There are three main dating techniques for cores: 1) radiocarbon dating of the core top in Pleistocene sediments, 2) uranium series disequilibrium method for the late Pleistocene, and 3) paleomagnetic dating of the early and mid Pleistocene.¹³⁰ The many assumptions and problems with these dating methods will be discussed further.

2) INDEX FOSSIL DATING

Before a core can be dated by "absolute" methods, it must first be placed into its "proper" position in the geological column. This is done by index fossils, similar to other periods of Phanerozoic time. The Pliocene-Pleistocene boundary has been especially difficult to define, and a number of different methods have been used in the past. Generally, it is the beginning of the Late Cenozoic ice age cycles, but this is not exactly the case today. In cores, it has been defined by the first appearance of the foraminifera *Globorotalia truncatulinoides*. Since the Pleistocene is the last period of geological time, there is usually little difference between the fossils during this time and modern organisms. However, there are a "... limited number of faunal extinctions that appear to be synchronous globally ..."¹³¹ during the Pleistocene which are used for dating, although the dating is rough and there are not enough of them.¹³² As previously mentioned, much of the biostratigraphic analysis is done aboard ship soon after the core is collected and before other dating techniques are applied: "Indeed, it is difficult to adequately acknowledge the work that precedes the selection of a particular core as suitable for the application of a particular technique."¹³³ (emphasis mine) According to the fossils, "Quaternary sediments are absent over extensive areas of the ocean floor."¹³⁴ Of those cores defined as Quaternary, a large majority cannot be used because of "reworking," variable CaCO_3 dissolution and other such processes. Although some of the thousands of cores can be used for a particular research application, few are extensively analyzed. These are the ones that have already met preconceived ideas and are internally consistent; the many others are conspicuous by their absence and indicate the many problems involved in index fossil dating.

For those really not aware of it, index fossil dating is a very rigid system because it is based on the assumption of evolution. An example of the rigidity occurred several years ago when the new results of paleomagnetism contradicted the assumed age of the index fossil *Globorotalia truncatulinoides*. This case is all the more interesting because this fossil is considered "... one of palaeontology's most reliable datum planes."¹³⁵ With the support of another radiolarian index fossil, it was concluded that *G. truncatulinoides* existed 1 to 1.5 million years before its supposed first occurrence at the base of the Pleistocene. Reworking and contamination were considered and ruled out. Needless to say, this result had serious implications because "... a great many studies based on the validity of this particular datum plane must surely have led to incorrect conclusions."¹³⁶ Consequently, the author of the contradictory evidence was attacked "... with a vehemence that is much less common in science than it was many decades ago."¹³⁷ The author valiantly defended himself and his methods, but in the end, the challenge to the very rigid index fossil dating scheme failed. This is also an example of how specialists can mold various dating techniques into what appears to be a coherent whole.

Modern oceanography indicates that dating cores by extinctions or first appearances of a particular fossil is much too simplified, and the fossil change in the core may actually be due to ecological, biological or physi-

cal factors in the waters above. For instance, planktonic organisms, which are more superior for dating than benthonic species, can have geographically restricted ranges. Sometimes there are major faunal boundaries in mid-ocean for no apparent reason. As a result, "... biologists still do not understand what determines present limits of geographic distributions of planktonic species."¹³⁸ In addition faunal distributions likely change with time, probably reflecting changing oceanographic conditions. Just the seasonal change alone is considerable: "Physical properties of the world oceans show considerable annual variations."¹³⁹ All the present day unknowns have not been sufficiently emphasized in the past "... should be a cause for reflection among those marine paleontologists who infer ocean paleoclimates (essentially temperature) from changes in distributions of species or composition of planktonic assemblages."¹⁴⁰

Applying the principle of uniformitarianism should nullify the Pleistocene index fossil schemes, and if for the latest period, what about for the other periods of geological time? The assumption of synchronous world-wide fossil changes has rarely, if ever been proven within the evolutionary framework.¹⁴¹ Within this system, there are cases where organisms have become extinct at widely different times, and with regard to first appearances, evolutionary scientists can point to a case where a certain species developed in the Quaternary Pacific and Indian Oceans, but not in the Atlantic.¹⁴² Some workers admit that "... using fossils to correlate over long distances has been difficult even when planktonic groups are used."¹⁴³ In fact, it was due to simplified concepts of Pleistocene fossils that much paleoclimatic work in the 1960's was faulted.¹⁴⁴ It is hoped that $\delta^{18}\text{O}_s$ cycles, which all essentially look the same,¹⁴⁵ will be able to validate the index fossil scheme, although it is this system that has dated $\delta^{18}\text{O}_s$ fluctuations.

Few people realize that the index fossil dating system, despite its poor assumptions and many problems, is actually the primary dating tool for geological time. Even though "absolute" dating methods have been widely touted to be accurate, this is not the case at all. They have many serious problems:

One might imagine that direct methods of measuring time would make obsolete all the previous means of estimating age, but these new 'absolute' measurements are used more as a supplement to traditional methods than as a substitute. Geologists put more faith in the principles of superposition and faunal succession than they do in numbers that come out of a machine. If the laboratory results contradict the field evidence, the geologists assume that there is something wrong with the machine date. To put it another way, 'good' dates are those that agree with the field data.¹⁴⁶

In other words, radiometric dating methods are actually fit into the geological column, which was set up by fossil dating over 100 years ago. Bowen does not even like the term "absolute":

The term *absolute* dating is unsuitable: it implies a degree of achievement hardly consistent with the realities of the majority of dating methods, which, in terms of their present status may be

likened to the top of a gigantic experimental iceberg.¹⁴⁷

He says further that there is "... an unrealistic faith in such dating procedures. So many potential pitfalls and errors are inherent to existing methods..."¹⁴⁸ With all the above in mind, let us take a closer look at the main dating methods for Pleistocene deep-sea cores.

3) RADIOCARBON DATING

Radiocarbon dating is used to date the top of a Quaternary deep-sea core when suitable material is available. It is assumed to be valid back to about 30,000 to 50,000 years ago. Creationists have pointed out the poor assumptions and problems with this method. Consequently, it will be discussed only briefly in this paper. As already stated, it was because of C-14 dating of peat, assumed to develop during interglacials, that earth scientists at one time rejected the astronomical theory of the ice ages. A recent article in the *Creation Research Society Quarterly*,¹⁴⁹ which was reprinted from the *Anthropological Journal of Canada*,¹⁵⁰ is a recent exposé of radiocarbon dating.

Contamination seems to be a common problem in radiocarbon dating, and it is likely a convenient excuse to discard dates that do not agree. For instance, a certain layer in several cores of Arctic Ocean sediments was C-14 dated at 12,000 years B.P., 25,000 years B.P. and greater than 30,000 years B.P. However, these variable dates were rejected in favor of a date of 70,000 to 100,000 years ago because the uranium series dates were in better accord with the interpolated date from the last paleomagnetic reversal. The reason for this large discrepancy was "... because of reworking and mixing of the sediments by burrowing animals."¹⁵¹ In a general statement on radiocarbon dating and other dating methods for deep-sea cores, Latham and others state: "The corresponding age data, provided by ¹⁴C, uranium series disequilibrium and other methods may also suffer from such errors as bioturbation and migration of radionuclides."¹⁵² Lee provides a good summary statement on radiocarbon dating: "... the radiocarbon method is still not capable of yielding accurate and reliable results. There are gross discrepancies, the chronology is *uneven* and *relative*, and the accepted dates are actually *selected* dates."¹⁵³

4) URANIUM SERIES DISEQUILIBRIUM DATING

a) Introduction

A common method for dating deep-sea cores, more in the past than in the present, is the uranium series disequilibrium system. This technique takes advantage of the fact that uranium and its daughters are leached out of the soil and into the ocean. (This is one of the main reasons Creationists reject the uranium-lead method of dating—because it is an open system.) ²³⁸U eventually decays to ²³⁰Th (ionium, an unstable isotope of thorium), which has a half-life of 75,000 years. ²³⁵U decays to ²³¹Pa (protactinium), which has a half-life of 32,000 years. There are actually two main methods in the uranium series system that are especially useful for dating deep-sea sediments.¹⁵⁴ The first is the ionium method, which measures the ratio: ²³⁰Th/²³²Th(I₀/Th) with time down a core. Thorium-232 is the long lived radioactive isotope of thorium. The second method is the ionium-protactinium meth-

od, which measures the ratio: ²³¹Pa/²³⁰Th. Both ratios decrease with time, overlapping with C-14 dating in the early stages of decay, and supposedly providing dates back to about 300,000 years. Ionium and protactinium have a residence time of about 300 years in the ocean while uranium remains about 500,000 years. Thus, the daughters become separated from their parents in the water column by being adsorbed onto the surface of detrital mineral grains as they sink to the bottom or by incorporation into authigenic minerals which are formed in place during or after deposition.

The daughters are called "unsupported" for this reason. However, not all the ionium (and probably not all the protactinium) in the ocean is formed by radioactive decay. One-fourth is estimated to arrive directly by rivers or streams along with ²³²Th.¹⁵⁵

b) Poor Assumptions

The uranium series disequilibrium system depends upon assumptions inherent in radioactive dating schemes, plus some unique unverifiable assumptions and problems of its own. It is calibrated to the radiocarbon system,¹⁵⁶ a very poor procedure in view of its unreliability. In fact, it is common practice to calibrate dating methods and paleoclimate indicators, such as $\delta^{18}\text{O}$, sea level fluctuations, fossil pollen, etc., to each other: "Like sensing systems made by man, each natural paleoclimatic indicator must be calibrated, and each has distinctive performance characteristics that must be understood if the data are to be interpreted correctly."¹⁵⁷ (This quotation indirectly admits that paleoclimate indicators do not match, but each can be manipulated through its distinctive performance characteristics to agree.) Needless to say, this practice takes most of the independence away from dating systems, a problem rarely mentioned in paleoclimatic research.

Four basic assumptions must be applied to account for the ionium and protactinium in the sediments: 1) a constant sedimentation rate for the isotopes during the last several hundred thousand years, 2) ionium, thorium and protactinium have similar geochemical properties, 3) the above isotopes within the mineral grains are excluded from the analysis, and 4) the isotopes do not migrate within the sediments.¹⁵⁸ There are many difficulties with these assumptions, and the analytical method of measuring the various isotopes is complex with much room for error.

The first assumption of a constant sedimentation rate for the isotopes depends upon many factors. One is the uranium content of the water,¹⁵⁹ which is variable and due to the interaction of complex processes. Some of these are the variable input of uranium by rivers, the rate of removal by trapping in near-shore anaerobic basins, the rate of reworking from near-shore basins to open water, and the direct sedimentation of uranium to the ocean floor.¹⁶⁰ A second factor is the variable and complex input of ionium and thorium by rivers, which should change with time. The variability of this input is indicated by present day measurements of ²³⁰Th/²³²Th at the ocean surface which ranges from 143-158 in the South Pacific to only 1.5-19 in the Atlantic.¹⁶¹ The amount of ²³⁰Th, ²³²Th, and ²³¹Pa deposited on the ocean bottom ultimately depends on the sedimentation rate of the mineral grains, which likely is not constant.¹⁶² The water depth is another factor

which must be considered because a deep water column contains more isotopes than a shallow column, but this should be accounted for by a depth correction factor. The particles that scavenge the isotopes are considered to be very fine. Hence, they are easily erodable, one indication of which is the clouds of sediment often found a few tens of meters above the ocean floor.¹⁶³ Consequently, undisturbed sediments are needed to apply the dating method.¹⁶⁴ As previously discussed, cores of this quality are very rare: "Only a minute portion of the deep-sea cores . . . are stratigraphically continuous and undisturbed."¹⁶⁵

Assumption two may be good for the two isotopes of thorium, but modern research indicates that ionium and protactinium are geochemically different. Ku and Broecker says: "The commonly made assumption that Pa^{231} and Th^{230} are geochemically coherent is not valid."¹⁶⁶ Erroneous dates have even been blamed on the differences between the isotopes.¹⁶⁷

Assumption three is difficult to monitor. It is hoped that the analytical procedure will measure only the unsupported ionium and protactinium on the mineral surface while leaving those within the grain untouched. The latter isotopes are called uranium "supported" because they are the direct result of radioactive decay of uranium within the grain. Supported isotopes also arise from the decay of uranium contained in the pore water of the sediment. There have been strong disagreements over procedures and results of the uranium series disequilibrium method by various workers. The possibility of contamination by uranium supported isotopes was invoked by Emiliani and Rona to criticize the results from another lab.¹⁶⁸ (Many analytical difficulties also were indicated.) Contamination seems a real problem because a "correction" for supported isotopes is usually invoked. This correction is considered negligible for "young" sediments, but must be applied in an increasing degree the older the sediment is assumed to be.¹⁶⁹ However, if bioturbation down to two meters¹⁷⁰ is common in sediments, the basis for the correction factor is undermined. It seems like the correction factor would be difficult to apply and may actually be a fudge factor.

The fourth assumption ". . . has been the source of some concern."¹⁷¹ It is believed that ^{230}Th does not migrate through the sediments but that its parent does. Some assume the migration is small, while others say it is often a problem.¹⁷² Regardless, it is difficult to estimate the amount of past migration, which is included as part of the correction factor for supported isotopes. Consequently, the many unknowns and problems behind the assumptions cast grave doubt on the uranium series disequilibrium method.

c) Contradictory Results

It is expected that very few erroneous results or glaring contradictions with other dating methods would ever be published. The few that are published are usually just the tip of the iceberg and can give considerable insight into the method. Broecker hints at many problems when a new dating method is used: "As with all new approaches to earth sciences, valid results are accompanied by numerous erroneous ones."¹⁷³ Sometimes, new results will be significantly different from previous research and will be accepted, indicating the plasticity of the dating systems. In re-

gard to the uranium series disequilibrium system, Emiliani used the method to establish a strong relationship between the dominant $\delta^{18}\text{O}_s$ cycle in deep-sea cores and the 40,000 year tilt cycle in the astronomical theory of the ice ages.¹⁷⁴⁻¹⁷⁶ The tilt cycle was considered the dominant Milankovitch frequency at that time. He even derived a correlation coefficient of 0.997!¹⁷⁷ (+1 or -1 is a perfect fit and 0 shows no relationship). His chronology is now considered erroneous, indicating the dating methods used to support his good results are questionable to say the least. In another case, Rona and Emiliani¹⁷⁸ and Broecker and Ku¹⁷⁹ used the ionium-protactinium method on the same core and calculated a 25 percent difference in dating. In regard to the ionium-protactinium method in particular, Emiliani and Shackleton say: "The universal validity of the $^{230}\text{Th}/^{231}\text{Pa}$ method remains unproved."¹⁸⁰

d) Modern Disillusionment

Many paleoclimatic researchers do not use the uranium series disequilibrium method today because of the poor assumptions and divergent results. Shackleton and Matthews say:

. . . there are difficulties in the analytical methods and acute problems regarding the interpretation of the measurements which are widely acknowledged to exist . . . and interlaboratory comparisons have so far only clouded the issue.¹⁸¹

In their landmark paper supposedly establishing the link between $\delta^{18}\text{O}_s$ cycles and the Milankovitch mechanism, Hays, Imbrie and Shackleton say: "We have not used estimates based on Io/Th techniques because we believe the intrinsic inaccuracy of these estimates is large."¹⁸² Shackleton says further: "The method can never be precise . . . moreover detailed studies reveal disconcerting gaps in our understanding of ^{230}Th accumulations."¹⁸³ In discussing dating methods between 50,000 and 300,000 years ago, Shotton says: "Except for fission track dating, none of these other methods can be yet said to be firmly established as reliable, though uranium series dates are certainly often quoted."¹⁸⁴ His skepticism of this widely used method at that time is evident. Consequently, the uranium series disequilibrium method is not objective enough to date deep-sea cores and many are disillusioned. Without this dating method, there is nothing between C-14 dating and the first paleomagnetic reversal at 730,000 years ago as Gascoyne and others lament: "The lack of age dating methods which can be applied beyond the limit of radiocarbon dating makes the global correlation of continental climatic events and stratigraphic sequences with the continuous palaeoclimate record, obtained by (oxygen) isotopic and faunal analysis of deep-sea sediment cores, a difficult task; often only a relative time scale can be obtained using complex and perhaps tenuous litho- and biostratigraphic data."¹⁸⁵ (parentheses mine)

D) SUMMARY

This part has shown in detail that the interpretation of oxygen isotope fluctuations in deep-sea cores is practically impossible, and therefore cannot be related to the astronomical theory of the ice ages. Very small changes in ^{18}O can result in large changes in $\delta^{18}\text{O}$, leaving much room for error. The laboratory procedure for measuring the isotopes in foraminifera is very

complex. The equation relating the measurements to paleotemperature and the oxygen isotopic composition of the sea water cannot be solved. In addition, there are many other unknown or poorly understood variables related to $\delta^{18}\text{O}$ of the sample. Some of these are paleodepth of the foraminifera, seasonal differences in oceanic parameters and species abundance, and biological variables of foraminifera. There are additional complicating factors introduced by possible secular changes in $\delta^{18}\text{O}$ of sea water percolating through the crust, by cold or warm core eddies caused by rapid currents, by shell dissolution with depth, by bioturbation of the sediments and by the reworking of the sediments from common geophysical processes.

Dates for cores are a prerequisite for correlating $\delta^{18}\text{O}$ to the Milankovitch theory, but there are too many assumptions, unknowns and problems with the dating methods of cores. The main dating method is index fossils, a very rigid system based on the assumption of evolution. Modern oceanographic and biogeographic variables indicate this dating method is too simplified. Radiocarbon dating of the top of suitable cores is a selective process with contamination a common problem. The uranium series disequilibrium system has been used to date cores back to 300,000 years in supposed geologic time. However, this method is based on many poor assumptions and is so loaded with difficulties many paleoclimatologists do not use it.

Part III of this article will continue discussing dating methods. The new and much used method of paleomagnetic stratigraphy will be explored in depth. Again, too many unknowns and problems exist. Finally, the method of relating deep-sea cores to the astronomical theory will be discussed. It was found that the controlling cycle for ice ages from cores matched the eccentricity cycle in the astronomical theory. This is a big problem because the eccentricity cycle has an exceedingly weak effect on the earth's solar radiation. Throughout this paper, the question naturally arises of how consistent results or order can be generated out of the chaos of problems, unknowns and assumptions. It will be shown in detail with examples how an extreme bias can manipulate data by various means and how the "reinforcement syndrome" keeps the data and researchers consistent.

References

- CRSQ — Creation Research Society Quarterly
 EPSL — Earth and Planetary Science Letters
 GSAB — Geological Society of America Bulletin
 JG — Journal of Geology
 JGR — Journal of Geophysical Research
 NAT — Nature
 QR — Quaternary Research
 RGSP — Reviews of Geophysics and Space Physics
 SCI — Science
1. Shackleton, N. J. 1975. The stratigraphic record of deep-sea cores and its implications for the assessment of glacials, interglacials, stadials, and interstadials in the mid-Pleistocene. Butzer, K. W. and G. L. Isaac (eds.), *After the Australopithecines*, Mouton Publishers, Paris, pp. 1-24.
 2. Morley, J. J. and J. D. Hays. 1981. Towards a high-resolution global, deep-sea chronology for the last 750,000 years. *EPSL* 53:280.
 3. Faure, G. 1977. Principles of isotope geology. John Wiley and Sons, New York, p. 325.
 4. Coplen, T. B., C. Kendall and J. Hopple. 1983. Comparison of stable isotope reference samples. *NAT* 302:236-8.
 5. Brasier, M. D. 1980. Microfossils. George Allen and Unwin, London, pp. 90-121.
 6. Parker, F. L. 1965. Irregular distribution of planktonic foraminifera and stratigraphic correlations. *Progress in Oceanography* 3:267.
 7. Kennett, J. P. 1982. Marine geology. Prentice-Hall, Englewood Cliffs, p. 538.
 8. *Ibid.*, p. 539.
 9. *Ibid.*, p. 64.
 10. Birchfield, G. E., J. W. Weertman and A. T. Lunde. 1981. Paleoclimate model of northern hemisphere ice sheets. *QR* 15:136, 137.
 11. Shackleton, N. J. and N. D. Opdyke. 1973. Oxygen isotope and palaeomagnetic stratigraphy of equatorial Pacific core V28-238: oxygen isotope temperature and ice volume on a 10^5 year and 10^6 year scale. *QR* 3:48.
 12. Bowen, D. C. 1978. Quaternary geology. Pergamon, New York, p. 72.
 13. *Ibid.*, p. 67.
 14. Erez, J. 1979. Modification of the oxygen-isotope record in deep-sea cores by Pleistocene dissolution cycles. *NAT* 281:536.
 15. Faure. *Op. cit.*, p. 336.
 16. Duplessy, J. C. 1978. Isotopic studies. Gribbin, J. (ed.), *Climatic change*, Cambridge University Press, London, p. 48.
 17. *Ibid.*, p. 49.
 18. *Ibid.*, p. 46.
 19. Faure. *Op. cit.*, p. 325.
 20. Bowen. *Op. cit.*, p. 63.
 21. Anonymous. 1978. Geological perspectives on climatic change. National Research Council, National Academy of Sciences, Washington, D.C., p. 40.
 22. Duplessy. *Op. cit.*, p. 54.
 23. Kennett. *Op. cit.*, p. 633.
 24. Fairbanks, R. G. and R. K. Matthews. 1978. The marine oxygen isotope record in Pleistocene coral, Barbadoes, West Indies. *QR* 10:181.
 25. Emiliani, C. 1955. Pleistocene temperatures. *JG* 63:538-78.
 26. Emiliani, C. 1966a. Isotopic paleotemperatures. *SCI* 154:851-7.
 27. Shackleton and Opdyke. *Op. cit.*, p. 42.
 28. Olausson, E. 1965. Evidence of climatic changes in North Atlantic deep-sea cores with remarks on isotopic paleotemperature analysis. *Progress in Oceanography* 3:221-52.
 29. Shackleton, N. 1967. Oxygen isotope analysis and Pleistocene temperatures re-assessed. *NAT* 215:15-17.
 30. Erickson, D. B. and G. Wollin. 1967. The ever-changing sea. Alfred A. Knopf, New York, p. 136.
 31. Bloom, A. L. 1971. Glacial-eustatic and isostatic controls of sea level. K. K. Turekian (ed.), *Late Cenozoic glacial ages*, Yale University Press, New Haven, p. 367.
 32. Blackwelder, B. W., O. H. Pilkey and J. D. Howard. 1979. Late-Wisconsinian sea levels on the Southeast U.S. Atlantic shelf based on in-place shoreline indicators. *SCI* 204:620.
 33. Oard, M. J. 1979. A rapid post-Flood ice age. *CRSQ* 16:34-36.
 34. Oard, M. J. 1980. The Flood and the ice age. *Ministry* May:22, 23.
 35. Emiliani, C. and N. J. Shackleton. 1974. The Brunhes epoch: isotopic paleotemperature and geochronology. *SCI* 133:511.
 36. Kato, K. 1978. Factors controlling oxygen isotopic composition of fallen snow in Antarctica. *NAT* 272:46, 47.
 37. Siegenthaler, U. and H. Oeschger. 1980. Correlation of ^{18}O in precipitation with temperature and altitude. *NAT* 285:315.
 38. Bowen. *Op. cit.*, p. 67.
 39. Kerr, R. A. 1982. The fickleness of the deep sea. *SCI* 218:670.
 40. Emiliani and Shackleton. *Op. cit.*, p. 512.
 41. Vincent, E., J. S. Killingley and W. H. Berger. 1981. Stable isotope composition of benthic foraminifera from equatorial Pacific. *NAT* 289:641.
 42. Bowen. *Op. cit.*, pp. 68, 69.
 43. Fairbanks, R. G., et al. 1982. Vertical distribution and isotopic fractionation of living planktonic foraminifera from the Panama Basin. *NAT* 298:842.
 44. *Ibid.*, p. 841.
 45. *Ibid.*, p. 843 (Figure 3a and discussion).

46. Duplessy, J. C., P. L. Blank and A. W. H. Bé. 1981. Enrichment of planktonic foraminifera due to gametogenic calcification below the euphotic zone. *SCI* 213:1247-52.
47. Fairbanks, R. G., P. H. Wiebe and A.W.H. Bé. 1980. Vertical distribution and isotopic composition of living planktonic foraminifera in Western North Atlantic. *SCI* 207:61, 62.
48. Shackleton and Opdyke. *Op. cit.*, p. 51.
49. Fairbanks, *et al.* *Op. cit.*, p. 842.
50. Shackleton, N. 1968. Depth of pelagic foraminifera and isotopic changes in Pleistocene oceans. *NAT* 218:79, 80.
51. Duplessy. *Op. cit.*, p. 51.
52. Fairbanks, *et al.* *Op. cit.*, p. 841.
53. Mikkelsen, N., L. Labeyrie and W. H. Berger. 1978. Silica oxygen isotopes in diatoms: a 20,000 yr record in deep-sea sediments. *NAT* 271:537.
54. Fairbanks and Matthews. *Op. cit.*, p. 189.
55. Mikkelsen, Labeyrie and Berger. *Op. cit.*, p. 537.
56. Loubere, P. 1982. Plankton ecology and the paleoceanographic-climate record. *OR* 17:319, 321.
57. Williams, D. F., A. W. H. Bé and R. G. Fairbanks. 1979. Seasonal oxygen isotopic variations in living planktonic foraminifera off Bermuda. *SCI* 206:447.
58. Bowen. *Op. cit.*, p. 64.
59. Loubere. *Op. cit.*, pp. 314, 315.
60. Shackleton and Opdyke. *Op. cit.*, p. 43.
61. Dunn, D. A., T. C. Moore, Jr. and L. D. Keigwin, Jr. 1981. Atlantic-type carbonate stratigraphy in the late Miocene Pacific. *NAT* 291:225.
62. Faure. *Op. cit.*, pp. 336, 337.
63. Shackleton and Opdyke. *Op. cit.*, p. 52.
64. Duplessy. *Op. cit.*, p. 52.
65. Williams, Bé and Fairbanks. *Op. cit.*, p. 447.
66. *Ibid.*
67. West, S. 1980. Ring around the Gulf Stream. *Science News* 118:330-332.
68. Fairbanks, Wiebe and Bé. *Op. cit.*, p. 63.
69. Sachs, H. M. 1976. Evidence for the role of the oceans in climatic change: tests of Weyl's theory of ice ages. *JGR* 84:3148.
70. Kerr, R. A. 1978. Seawater and the ocean crust: the hot and cold of it. *SCI* 200:1139.
71. Erez, J. and B. Luz. 1982. Temperature control of oxygen-isotope fractionation of cultured planktonic foraminifera. *NAT* 297:221.
72. Shackleton and Opdyke. *Op. cit.*, p. 43.
73. Vinot-Bertouille, A. C. and J. C. Duplessy. 1973. Individual isotopic fractionation of carbon and oxygen in benthonic foraminifera. *EPSL* 18:251.
74. Erez, J. 1978. Vital effect on stable-isotope composition seen in foraminifera and coral skeletons. *NAT* 273:199.
75. *Ibid.*
76. Duplessy, Blank and Bé. *Op. cit.*, p. 1247.
77. Shackleton and Opdyke. *Op. cit.*, p. 56.
78. Fairbanks, Wiebe and Bé. *Op. cit.*, p. 61.
79. Vincent, Killingley and Berger. *Op. cit.*, p. 639.
80. Vinot-Bertouille and Duplessy. *Op. cit.*, p. 251.
81. Vincent, Killingley and Berger. *Op. cit.*, pp. 639, 640.
82. Erez. 1978. *Op. cit.*, p. 200.
83. Emiliani, *et al.* 1978. Oxygen and carbon isotopic growth record in a reef coral from the Florida Keys and a deep-sea coral from the Blake Plateau. *SCI* 202:627.
84. Faure. *Op. cit.*, p. 337.
85. Erez. 1978. *Op. cit.*, p. 200.
86. Vinot-Bertouille and Duplessy. *Op. cit.*, p. 250.
87. Erez. 1978. *Op. cit.*, p. 202.
88. Kent, D. V. 1982. Apparent correlation of palaeomagnetic intensity and climatic records in deep-sea sediments. *NAT* 199:538.
89. Kennett. *Op. cit.*, pp. 464-72.
90. Balsam, W. L. 1982. Carbonate dissolution and sedimentation on the mid-Atlantic continental margin. *SCI* 217:929-31.
91. *Ibid.*, p. 930.
92. Bowen. *Op. cit.*, p. 60.
93. Frenzel, B. 1973. Climatic fluctuations of the ice ages. Case Western Reserve University Press, Cleveland, p. 22.
94. Faure. *Op. cit.*, p. 337.
95. Dunn, Moore and Keigwin. *Op. cit.*, p. 225.
96. Vincent, Killingley and Berger. *Op. cit.*, p. 639.
97. Duplessy, Blank and Bé. *Op. cit.*, p. 1249.
98. Lidz, L. 1966. Deep-sea Pleistocene biostratigraphy. *SCI* 154:1448.
99. Mikkelsen, Labeyrie and Berger. *Op. cit.*, p. 536.
100. Erez. 1979. *Op. cit.*, p. 537.
101. Kent. *Op. cit.*, pp. 538-540.
102. Erez. 1979. *Op. cit.*, p. 536.
103. Verosub, K. L. 1977. Depositional and post depositional processes in the magnetization of sediments. *RGSP* 15:134.
104. Imbrie, J. and N. Kipp. 1971. Late-Cenozoic glacial ages. K. K. Turekian (ed.), Yale University Press, New Haven, p. 74.
105. Duplessy, Blank and Bé. *Op. cit.*, p. 1248.
106. Verosub. *Op. cit.*
107. Weaver, P. P. E. and P. J. Echultheiss. 1983. Vertical open burrows in deep-sea sediments 2m in length. *NAT* 301:329-31.
108. Imbrie and Kipp. *Op. cit.*, pp. 73, 74.
109. Watkins, N. D. 1972. Reviews of the development of the geomagnetic polarity time scale and discussion of prospects for its finer definition. *GSAB* 83:563.
110. Duplessy. *Op. cit.*, p. 54.
111. Shackleton and Opdyke. *Op. cit.*, pp. 43, 44.
112. Verosub, K. L. and S. K. Banerjee. 1977. Geomagnetic excursions and their paleomagnetic record. *RGSP* 15:150.
113. Erickson, D. B. and G. Wollin. 1968. Pleistocene climates and chronology in deep-sea sediments. *SCI* 162:228.
114. Kennett. *Op. cit.*, pp. 505, 517.
115. Kukla, G. and J. D. A. Zijderveld. 1977. Magnetostratigraphic pitfalls. *NAT* 266:744.
116. Kellogg, T. B. and D. E. Kellogg. 1981. Pleistocene sediments beneath the Ross Ice Shelf. *NAT* 293:130-33.
117. Kennett. *Op. cit.*, p. 513.
118. Thiede, J. 1981. Reworking in upper Mesozoic and Cenozoic Central Pacific deep-sea sediments. *NAT* 289:667.
119. Shackleton and Opdyke. *Op. cit.*, pp. 43-45.
120. Shackleton. 1967. *Op. cit.*, p. 15.
121. Duplessy, J. C., C. Lalou and A. C. Vinot. 1970. Differential isotopic fractionation in benthic foraminifera and paleotemperature re-assessed. *SCI* 168:250.
122. Shackleton. 1975. *Op. cit.*, pp. 3, 4.
123. Erickson and Wollin. 1967. *Op. cit.*, pp. 221, 222.
124. Hays, J. D., *et al.* 1969. Pliocene-Pleistocene sediments of the equatorial Pacific: their paleomagnetic, biostratigraphic, and climatic record. *GSAB* 80:1481-1514.
125. Gardiner, W. D. and L. G. Sullivan. 1981. Benthic storms: temporal variability in a deep-ocean nephiloid layer. *SCI* 213:329-31.
126. Andrews, J. T. 1979. The winters of the world. B. S. John (ed.), John Wiley and Sons, New York, pp. 179, 180.
127. John, B. S. 1979. The winters of the world. B. S. John (ed.), John Wiley and Sons, New York, p. 226.
128. Kominz, M. A., *et al.* 1979. Bruhnes times scale and the interpretation of climatic change. *EPSL* 45:394.
129. Hays, J. D., J. Imbrie and N. J. Shackleton. 1976. Variation in the Earth's orbit: pacemaker of the ice ages. *SCI* 194:1121.
130. Bowen. *Op. cit.*, p. 71.
131. *Ibid.*
132. Shackleton. 1975. *Op. cit.*, p. 9.
133. *Ibid.*, p. 3.
134. Bowen. *Op. cit.*, p. 57.
135. Anonymous. 1973. Palaeomagnetism and *G. truncatulinoides*. *NAT* 241:431.
136. Anonymous. 1973. *G. truncatulinoides* in dispute. *NAT* 244:74.
137. *Ibid.*
138. Frost, B. W. 1980. Problems in marine biogeography. *SCI* 209:1112.
139. Loubere. *Op. cit.*, p. 314.
140. Frost. *Op. cit.*
141. Hays, J. D. and N. J. Shackleton. 1976. Globally synchronous extinction of the radiolarian *Stylotractus universus*. *Geology* 4:649.
142. Parker. *Op. cit.*
143. Kennett. *Op. cit.*, p. 75.
144. Shackleton. 1975. *Op. cit.*, pp. 6, 7.
145. Bowen. *Op. cit.*, p. 71.
146. McKee, B. 1982. Cascadia—the geological evolution of the Pacific Northwest. McGraw-Hill, New York, p. 25.

147. Bowen. *Op. cit.*, pp. 109, 110.
148. *Ibid.*, p. 78.
149. Lee, R. E. 1982. Radiocarbon: ages in error. *CRSQ* 19: 117-27.
150. Lee, R. E. 1981. Radiocarbon: ages in error. *Anthropological Journal of Canada* 19(3):9-29.
151. Hunkins, K., *et al.* 1971. The late Cenozoic history of the Arctic Ocean. K. K. Turekian (ed.), Late Cenozoic glacial ages, Yale University Press, New Haven, pp. 219-221.
152. Latham, A. G., *et al.* 1979. Palaeomagnetism of stalagmite deposits. *NAT* 280:383.
153. Lee. 1982. *Op. cit.*, p. 125.
154. Faure. *Op. cit.*, p. 283.
155. *Ibid.*, p. 284.
156. Lee. 1982. *Op. cit.*, p. 119.
157. Anonymous. 1975. Understanding climatic change. National Academy of Sciences, Washington, D.C., p. 131.
158. Faure. *Op. cit.*, pp. 284, 285, 292.
159. Shackleton. 1975. *Op. cit.*, p. 15.
160. Rosholt, J. N., *et al.* 1961. Absolute dating of deep-sea cores by the $\text{Pa}^{231}/\text{Th}^{230}$ method. *JG* 69:163.
161. Faure. *Op. cit.*, p. 288.
162. Rosholt, *et al.* 1961. *Op. cit.*
163. Gardiner and Sullivan. *Op. cit.*
164. Rosholt, *et al.* 1961. *Op. cit.*, pp. 165, 166.
165. Emiliani, C. and E. Rona. Caribbean cores P6304-8 and P6304-9: new analysis of absolute chronology, a reply. *SCI* 166:1552.
166. Broecker, W. S. and T. L. Ku. 1969. Caribbean cores P6304-8 and P6304-9: new analysis of absolute chronology. *SCI* 166:405.
167. Faure. *Op. cit.*, p. 294.
168. Emiliani and Rona. *Op. cit.*
169. Faure. *Op. cit.*, p. 286.
170. Weaver and Schultheiss. *Op. cit.*
171. Faure. *Op. cit.*, p. 285.
172. Kennett. *Op. cit.*, p. 79.
173. Broecker, W. S. 1965. The Quaternary of the U.S. H. E. Wright and D. G. Frey (eds.), Princeton University Press, p. 737.
174. Hays, *et al.* *Op. cit.*, p. 1505.
175. Emiliani, C. 1966b. Paleotemperature analysis of Caribbean cores P6304-8 and P6304-9 and a generalized temperature curve for the past 425,000 years. *JG* 74:113.
176. Rosholt, J. N., *et al.* 1962. $\text{Pa}^{231}/\text{Th}^{230}$ dating and $\text{O}^{18}/\text{O}^{16}$ temperature analysis of core A254-BR-C. *JGR* 67: 2910.
177. Emiliani. 1966b. *Op. cit.*, p. 122.
178. Emiliani and Rona. *Op. cit.*
179. Broecker and Ku. *Op. cit.*, pp. 405, 406.
180. Emiliani and Shackleton. *Op. cit.*, p. 512.
181. Shackleton, N. J. and R. K. Matthews. 1977. Oxygen isotope stratigraphy of late Pleistocene coral terraces in Barbados. *NAT* 268:618.
182. Hays, Imbrie and Shackleton. *Op. cit.*, p. 1132 (note 47).
183. Shackleton. 1975. *Op. cit.*, p. 15.
184. Shotton, F. W. 1975. Ice ages: ancient and modern. A. E. Wright and F. Mossely (eds.), Seal House Press, Liverpool, p. 5.
185. Gascoyne, M. A., P. Currant and T. C. Lord. 1981. Ipswichian fauna of Victoria Cave and the marine palaeoclimatic record. *NAT* 294:652.

THE LEGACY OF DUYVENE DE WIT FOR CREATIONIST BIOLOGY PART II: THE FOLLY OF MAN AND THE WORKS OF THE LORD

MAGNUS VERBRUGGE*

Received 15 August 1983; Revised 4 April 1984

Abstract

This is part two of a three-part series of articles on the life and work of J. J. Duyvene De Wit, a Dutch biologist, who ascribed to the Creation viewpoint and actively worked against the falsity of evolutionary concepts.

The Unscientific Nature of Evolution

In the previous article I gave a brief glimpse of the life of Dr. J. J. Duyvene de Wit, a tireless fighter against the nearly overwhelming forces of evolution in the academic world.¹

De Wit had a life-long goal for which he worked till the end. It was that all Christians who accept the creation record, regardless of their other theological differences, would join forces in the battle against evolution.

He felt that it would be much easier to convince undecided and misinformed Christians to do so if they could be shown that *evolution is not a scientific theory but an article of a non-Christian faith*.

We will now examine the contributions he left behind in the ongoing struggle we still must face. I hope to demonstrate that his legacy, which is not widely known among creationists, contains an arsenal of great value in our battle.

Examining Evidences for Evolution

De Wit delivered a lecture entitled "The Paleontological Record and the Origin of Man" to the Scientific Society of the University of the Orange Free State in South Africa on August 28, 1963.

He began with a quote from a speech, given by Dr. Abraham Kuyper in 1899 entitled "Evolution."

The doctrine of evolution is a newly invented system, a newly conceived doctrine, a newly formed dogma, a new rising belief, which places itself over against the Christian faith, and can only found its temple on the ruins of our Christian confession.²

The intervening 64 years have confirmed these prophetic words. De Wit stated that as Copernicus in his day was persecuted for his astrophysical discoveries by scholastic religious doctrinaires, so scientists who have discovered the systemic discontinuities in biology are persecuted and ridiculed by the modern evolutionary doctrinaires with their metaphysical doctrine of a universal continuity of life.

There are non-Christian as well as Christian biologists who recognize how the theory of evolution deviates from the available scientific data, but their minor-

*Magnus Verbrugge, M.D., F.R.C.S. (Canada), is a urologist (retired). He receives mail at The Herman Dooyeweerd Foundation, 1915 Bahia Way, La Jolla, CA 92037.

ity view is not tolerated among the ruling scientists. The violent emotional reaction of the majority against the opinion of the dissenters, which often borders on fanaticism, testifies to the religious character of the transformist doctrine.

De Wit pointed out that the confession of man's descent from the apes is in direct conflict with Scripture and he warned that theologians and elders who have adopted this view are deceiving the people on religious grounds, and, he said, they are equally guilty of *scientific deceit*.

He pointed out the differences between the "Special" theory and the "General" theory of evolution. The former can be studied, because it deals with variation within a species, not with evolution. The general theory exists only as an extrapolation of the "special" theory. But since this special theory does not deal with evolution, this extrapolation is unfounded and hence *unscientific*.

Because the general theory is not based on observed data, it cannot be tested. For that reason *it is not a scientific theory* revealing the gravity of the betrayal of people, including theologians, *by the scientists*.

De Wit then proceeded to give evidence for his thesis that the transformist principle can no longer stand its scientific ground. He based his argument on findings in the fields of paleontology, genetics, embryology, and taxonomy.

De Wit concluded a lengthy discussion of the findings pertaining to fossils of human remains with the words "No fossil documentation whatsoever with respect to the assumed animal ancestors of man has been found. Hence paleontology cannot help us with hard facts."³

Mutations caused by physical influences such as radiation cause changes *within a species only*. No new species have been produced in our experiments. Most such influences produce defective organisms. The rare exception which shows some possibly beneficial change cannot balance the deleterious effects upon the whole population affected.

Recombination of *extant* genetic material is supposed to be the main source of adaptive adjustment to changing environmental factors. Thus, in a border situation of migrating specimens, natural selection will eliminate the less adaptable individuals and a small elite will remain, establishing a new race. Further isolation will prevent interbreeding and it is speculated that eventually beneficial mutations will produce a new species.

De Wit commented that a pioneering population only takes a portion of the genes of the original population along. This results in a *pauperization* of its gene pool. If this had happened, it would have produced disastrous consequences. As he noted "When the process of speciation repeats itself often, a final species arises whose gene pool is so much exhausted that very small environmental changes suffice to contrive their extinction."⁴

He noted that the extinction of some 99 percent of all species that ever lived shows that none of them could adapt to survive. It does not show why only *one percent* managed to survive, nor how they originated. That leaves the optimistic theory of progressive genetic improvement of species through recombination

of extant genetic material dangling without support from the findings of extinction. If man had arisen from the amoeba, he must have lost an uncountable number of genes in the process! As De Wit said it would be more reasonable to expect the amoeba to invent the theory of relativity than poorly endowed man.

De Wit observed that since the pauperization of gene pools rules out evolution through genetic recombination, evolutionists have no alternative but to assume that small populations of basic genotypes, endowed with enormous recombinational potencies, *must have arisen* at different places and times. But he rightly added that no biologist is competent to interpret such postulated appearances. It would amount to "special acts of creation." That, he said, is really a matter of religious and philosophical character. De Wit concluded that the discoveries of genetics have not produced any evidence to support the transformist doctrine.

One of the cornerstones of the transformist doctrine is the thesis that the transition "from amoeba to man" has been accomplished *in the cell nucleus only* through genetic changes. De Wit challenged this concept in his lecture. There are other areas of a cell besides the nuclear genes that play an important role in the transmission of hereditary characteristics. Here are the arguments he presented in his speech.

All the cells in our body possess the same chromosomes with their genes. Yet, there are thousands of different types of cells, all with the same "genetic code" in their DNA molecules. Some individuals have a male chromosome pattern and a female appearance (Turner's syndrome). Others have a male appearance with a female chromosome pattern (Klinefelter's syndrome).

Some animal and vegetable species are so similar that taxonomically they belong to the same species. Yet, their genetic karyogram is different and they do not interbreed. They are called cryptic species or phenocopies. Experiments have demonstrated that many body characteristics are transmitted through the cytoplasm and the cell cortex, not the nucleus.

He quoted embryologists who have discovered these features, which point to the possibility that the genes in the nucleus play a role mainly in the transmission of the *intra*-species characteristics while the rest of the cell, the cytoplasm and the cortex, determine the overall body build, i.e. the *inter*-specific characteristics.

An enucleated egg of the sea-urchin *Echinus* can be fertilized by the sperm cell of the feather-star *Antedon*, which belongs to a different biological order. The cell, without a nucleus, begins to multiply and forms a maternal type of embryo, typical for *Echinus*, as far as it goes. This seems to indicate that the major body features are formed without a contribution from nuclear genetic material.

Experiments with larval hybridization have confirmed this. The major features of an organism are transmitted through the informational code residing in the cortex and cytoplasm. The nuclear hereditary material only controls the minor variations between individuals within a species (wrongly called as evidence for "special" evolution). In other words, the whole cell is needed for propagation.

All this, concluded De Wit, renders the concept of evolution as based on nuclear mutations *only*, obsolete.

If it is true that it is mainly the cytoplasm (minus the nucleus with its genes in DNA) which transmits the characteristics of the species, a change in DNA alone cannot give rise to a new species. Such a change, a mutation, can only cause individual variations (usually deleterious ones) *within* the species. Hence evolution has lost mutation through alteration of its DNA as its "mechanism of operation."

Transformist taxonomists assume that all groups belonging to one major taxonomic group such as a phylum, arose from one root: they are "monophyletic." But now this is being questioned. De Wit quoted authors who claim that the evidence points to a polyphyletic origin of taxonomically similar groups.

There is evidence, he said, that the evolution of the horse might be even as chaotic as that proposed by Osborn for the evolution of the Proboscidae. The squid family is admitted to be polyphyletic as well as many groups of the viruses, bacteria, protozoa, arthropoda, amphibia, reptilia and mammalia. Among the mammals even some orders appear to be polyphyletic.

All this made Kerkut conclude: "... much of the evolution of the major groups of animals has to be taken on trust. It seems at times as if our modern writers on evolution have had their views by some sort of revelation . . ."⁵

A similar predicament has befallen the theories on the origin of man. Some of the more differentiated and "human" looking fossils were more widespread and their possessors lived much earlier than those of some of the less human looking remains.

According to De Wit a much better explanation is that because of the enormous genetic variability of the human race some groups degenerated (as a result of sinful behavior such as cannibalism?) and succumbed while other groups continued to inhabit the earth.

De Wit proclaimed the transformist doctrine to be highly unscientific on all counts and therefore unacceptable. As a result, he stated, we must reorient our thinking towards our real Origin: the word of God, our Creator. And he concluded his lecture with these words:

To those who see, it will be obvious that, on account of accumulated evidence, a Copernican turn of biological thought announces itself. It presents a radical challenge to present-day biological scholars, which is primarily of a religious nature. For this reason this compels us to renewed religious self-examination and subsequent inner reformation of our biological outlook.⁶

Articles on the Philosophy of Biology

In 1964 De Wit published two articles, the first of which was entitled: "Teilhard de Chardin, the Founder of a new Pseudo-Christian Evolutionary Mysticism."⁷ De Wit demonstrated that the famous Jesuit priest (anthropologist-paleontologist) had made yet another futile attempt to marry pagan thinking to the Christian religion. And modern-day theistic evolutionary thinking as held by "reformed" Christians is just as inspired by pagan thinking as that of De Chardin.

De Wit's second article in *Philosophia Reformata*⁸ was of more interest to a biologist. It contained much of what he stated in the public address which I have just reviewed, but a few additional points are impor-

tant to mention. He began by saying that the biologist has always been confronted with the problem of observing verifiable evidence, and his subjective interpretation of it.

His interpretation was always guided either consciously or unconsciously by his philosophical view of the totality of the world. And this in turn was dominated by his religious position.

Modern scientists maintain that their first task is to keep science "rational and neutral." But this attempt must be "dearly paid for" in biology, said De Wit:

The intended attitude of neutrality which aims at the preservation of religious peace of mind, at least in scientific matters, becomes sorely disturbed by the *dualistic split* between *scientific knowledge* (pertaining to discontinuity) and *supra-scientific faith* (in continuity).⁹

Torn between these two poles, the biologist must choose between *scientific evidence* which points to morphological discontinuity and his *faith* in evolution, which makes him look for morphological proof of the phylogenetic continuity in the rise of all living species.

The Christian starts from the other side. Divine revelation teaches that man is of Divine origin just as is the entire cosmos. For that reason there can be no conflict between "God's salvatory revelation in Christ Jesus and God's revelation in His creation or 'nature' because both have their root in the Divine Word itself."¹⁰ The remarkable thing is then that his scientific findings and their interpretation never conflict with his faith. It is not evolution which produces man and his theories. God produces man and man produces his theories. Clearly the evolutionist turns reality upside-down and reverses the existing order of man and his theory-making.

De Wit proceeded to give ample quotations from leading evolutionists which prove that discontinuity is admitted by many from the scientific evidence. But still, they cling to their transformist thesis, especially concerning the evolution of man from the primates. How can this be? He quoted from noted evolutionists and then asserted that the evolutionist reasons as follows.

It is generally acknowledged that nothing is known about the origin of man. A supernatural origin of man is ruled out. In the absence of an alternative it is still *believed* that man evolved from the animal kingdom. Because of the general acceptance of this *belief*, it is held up as a scientific truth.

To make matters worse, wrote De Wit, many Christians are transformists and decry the denial of this "scientific truth" by creationists. These "theistic evolutionists" fail to recognize that *the evolutionary theory is based on faith instead of science*. And so they have the unchristian gall to accuse creationists of doing a disservice to Christianity because of their "obscurantism" or other regrettable defects in their character.

De Wit pointed to another irrational twist in modern theoretical biology. An organism dies from senile decay and now it is assumed that *phyletic units also expire from senility*. Thus evolutionists confer upon the *abstract concept* of a phylum the attributes of a living organism. They "personalize and animate" the abstract concept phylum like the Greeks "personalized

and animated" the abstract concept of beauty, called it Venus, and assigned to it the qualities of a living organism.

This type of reasoning of course represents an old form of idolatry known as *animism*.¹¹ It is a faith that is in direct conflict with the professed rationalistic nature of the science of modern man. Hence transformism is not only profoundly unscientific, it is self-contradictory and thus *irrational* as a philosophy, and it is borne by an apostate faith.

The question "What is man? Who is he?" cannot be answered by man himself, concluded De Wit. For a Christian biologist the answer given by the revelation from God's Word and the limits set by Him to our actual observations form the indispensable point of departure for a veritable science of man.

In a final article I hope to demonstrate how a thoroughly Christian approach to creation can lead us to a Scriptural philosophy of nature and a reformation of the sciences.

References

1. Verbrugge, M. 1984. The legacy of Duyvene De Wit for Creationist Biology, Part I. *Creation Research Society Quarterly*, 21:79-81.

2. De Wit, J. J. Duyvene. 1963. The paleontological record and the origin of Man. *Proceedings of the Scientific Society of the University of the Orange Free State*, August 28, p. 1.
3. *Ibid.*, p. 8.
4. *Ibid.*, p. 13.
5. *Ibid.*, p. 29. Quoted from Kerkut, G. A. 1960. *Implications of evolution*. Pergamon Press, New York.
6. *Ibid.*, p. 35.
7. De Wit, J. J. Duyvene. 1964. Pierre Teilhard De Chardin, the founder of a new Pseudo-Christian evolutionary mysticism. *Philosophia Reformata*, 29:114ff.
8. De Wit, J. J. Duyvene. 1964. Reflections on the architecture of the organic world and the origin of Man. *Philosophia Reformata*, 29:150-170.
9. *Ibid.*, p. 151.
10. *Ibid.*
11. Verbrugge, M. 1982. Animism in science. *Journal for Christian Reconstruction*, 8(2):79-107. I have demonstrated that modern humanists throughout the major disciplines of science still endow abstract ideas and concrete inanimate things with a "spirit," which is to animate them. They personify their own inventions and ascribe to them the power to act, grow and to produce, i.e., the power to create, just like the Greeks did. Animism is the inevitable basis of all science that rejects the Creator.

THE CREATION OF PLANETARY MAGNETIC FIELDS

D. RUSSELL HUMPHREYS*

Received 3 January 1984; Revised 14 August 1984

Abstract

God could have started magnetic fields in the solar system in a very simple way: by creating the original atoms of the planets with many of their nuclear spins pointing in the same direction. The small magnetic fields of so many atomic nuclei add up to fields large enough to account for the magnetism of the planets. Within seconds after creation, ordinary physical events would convert the alignment of nuclei into a large electric current circulating within each planet, maintaining the magnetic field. The currents and fields would decay steadily over thousands of years, as Barnes has pointed out. The present magnetic field strengths of the Earth, Sun, Moon, and planets agree very well with the values produced by this theory and a 6000-year age for the solar system. The theory is consistent with all the known data and explains many facts which have puzzled evolutionists.

Introduction

The Earth's magnetic field is what makes compass needles point north. In an earlier paper¹ I showed that God could have started the Earth's field in a very simple way, by using the magnetic fields of spinning atomic nuclei (Figure 1). He could have created many of the Earth's original atomic nuclei with their spins pointing in a particular direction. The small magnetic fields of so many nuclei would add up to a field large enough to account for the Earth's magnetism.

Immediately after their creation, the atoms would begin to collide due to normal thermal motions. Within seconds these collisions would knock the nuclei out of their original alignment into a more random order. But the ordinary laws of electricity and magnetism would maintain the magnetic field by starting up a large electric current — billions of amperes — in the Earth's conductive interior. The process is shown in Figure 2.

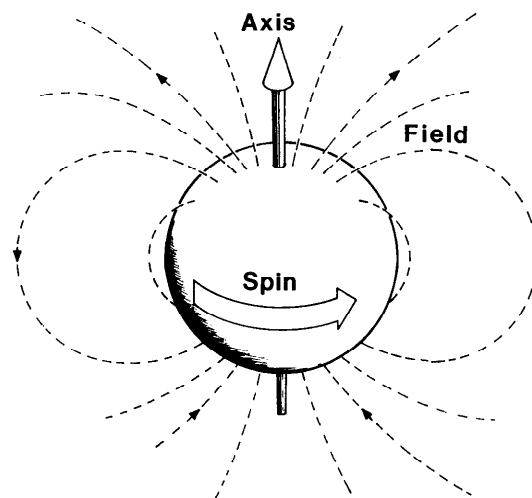


Figure 1. Magnetic field of an atomic nucleus. Atoms of many elements, such as hydrogen, have spinning nuclei. Such a nucleus has a small magnetic field, like that of a small bar magnet lined up with the spin axis.

*D. Russell Humphreys has a Ph.D. in physics and is a physicist at Sandia National Laboratories, Albuquerque, NM 87185.

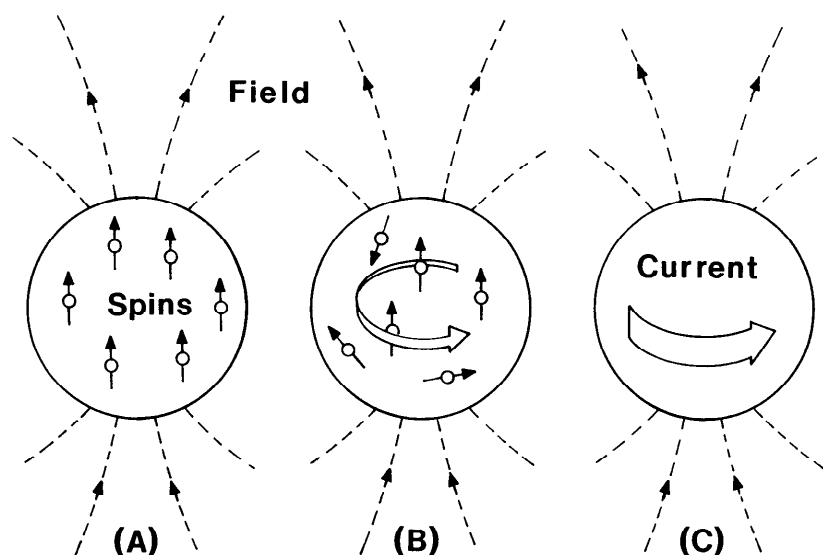


Figure 2. The change from aligned nuclear spins to a circulating current in a planet. (a) God creates atomic nuclei with aligned spins, producing a magnetic field around the planet. (b) Thermal collisions of atoms begin to disorient the spins, starting up an electric current in the interior which maintains the field. (c) A few seconds after creation, the nuclei are completely disoriented. The current is fully established, and the magnetic field is as strong as before.

The electrical resistance of the interior would then cause the current and field to decay steadily over thousands of years down to the size they are today. The field would decrease *exponentially*, that is, by a fixed percentage per unit time (Figure 3). (Since readers of this Quarterly come from very diverse areas of science, I am italicizing and explaining the more technical terms.)

Dr. Thomas Barnes² has used 130 years of published magnetic field observations to show that the earth's field indeed appears to be decaying exponentially at about five percent per century. He also showed that that decay rate corresponds to a reasonable value of electrical conductivity in the Earth's core.

In my article I calculated on the basis of the nuclear magnetism hypothesis that the Earth's field at creation was about eighteen times stronger than it is now. This value agrees to within five percent with the value we get by extrapolating the field's present decay rate 6000 years into the past, well within the experimental error.

A magnetic field generated and decaying in this way would have about the same shape as the field of a bar magnet. Such a field has only two poles (north and south), so physical scientists call it a *dipole* field. Most of the Earth's field today is dipolar.

So the nuclear magnetism idea, the short Biblical time scale, and an exponential decay all fit the main features of the Earth's field rather well. After writing the first article, I began to wonder if God made the magnetic fields of the Sun, Moon, and planets in the same way, that is, by creating the nuclei with their spins lined up.

Fortunately, the last decade of planetary exploration has produced much data against which to check the theory. The next three sections outline the theory. For details and references, see my previous article. In sections 5-9 I apply the theory to the various solar system bodies and compare the results to the known magnetic field data.

As well as I can tell, all of the data fall within the bounds of the theory. I hope that you, the reader, will find this as exciting as I do.

Water: The Raw Material of Creation

The strength of a dipole field's source is called its *magnetic moment*. It is proportional to the amount of current circulating in the source and the area encircled by the current. The dipole magnetic moment of the earth today is 7.9×10^{22} Joules per Tesla ($1 \text{ J/T} = 1 \text{ Ampere-meter}^2 = 1000 \text{ Gauss-cm}^3$).^{3, 4}

To calculate the magnetic moment of a planet at creation, we must know the original material. In the previous article I presented Scriptural evidence that God originally created the Earth as a sphere of pure water. One of the Scriptures is the last part of 2 Peter 3:5 (NASB): "... and the earth was formed out of water and by water." Shortly after that, God must have transformed much of the water into other matter, such as iron, silicon, minerals, and rock.

I know of no explicit Scripture which says that God created the heavenly bodies in the same way He did the Earth. But there is a hint, perhaps. The Hebrew word translated "heavens" in Genesis 1 consists of two other Hebrew words which mean "there, waters."⁵ Let us assume that God created the Sun, Moon, and planets as water, which He then transformed.

Lining Up Nuclei

The next thing we need to know is how much magnetic moment water can have. How magnetic moments in a water molecule line up under normal circumstances, and how God may have aligned them at creation are discussed in this section.

The magnetic moments of the 10 electrons in a water molecule cancel themselves out, so that their total contribution is zero. The magnetic moment of the oxygen nucleus is similarly zero. But the two hydrogen nuclei (protons) in the molecule each have a magnetic moment of $1.41 \times 10^{-26} \text{ J/T}$.⁶ An external magnetic field (however slight) normally lines each pair of nuclei into

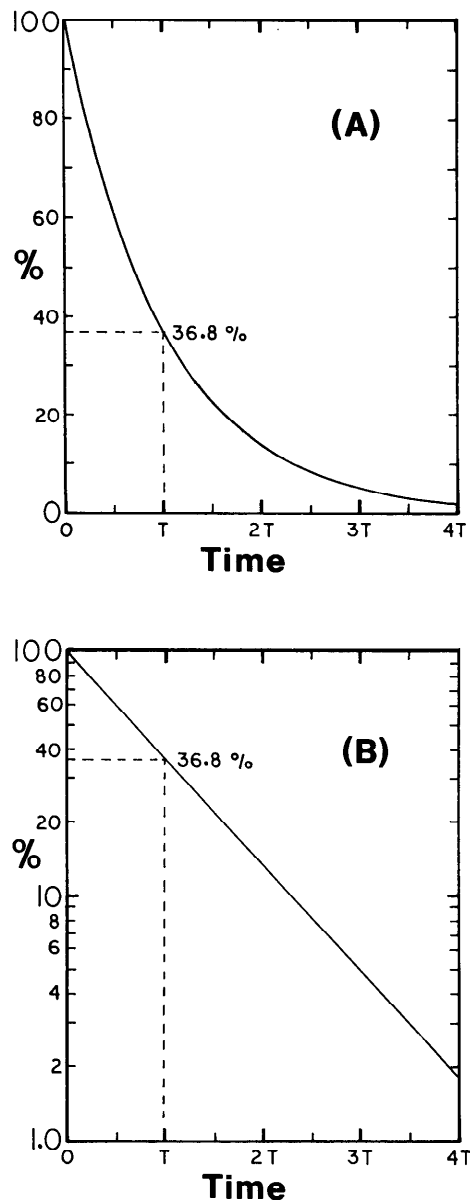


Figure 3. Exponential decay curve, plotted on two types of graph. (a) Ordinary graph with linear (evenly-spaced) scales. Time T is the characteristic decay time. (b) Log-linear graph, having a linear horizontal scale and a logarithmic (compressed) vertical scale. An exponential decay is a straight line on such a graph. The magnetic fields of planets decay exponentially over thousands of years.

one of four possible arrangements. Figure 4 shows the possibilities. A molecule in group (A) has its proton spins pointed in opposite directions, so that its total magnetic moment is zero. Chemists call this the *para* state. Molecules in groups (B), (C), and (D) are in what chemists call the *ortho* state. An ortho molecule has its proton spins pointing in the same direction, so that its total magnetic moment is 2.82×10^{-26} J/T. The three types of ortho molecules have their magnetic moments parallel (B), opposed (C), or in random directions perpendicular (D) to the external field.

In normal circumstances, the number of molecules in each of the four groups—three ortho and one para—is roughly equal. All the magnetic moments cancel

out, so that water normally has no net magnetic moment of its own. However, God was under no requirement to create the water molecules in their normal order. For example, He could have created all the molecules with their proton magnetic moments lined up in a given direction, producing the maximum magnetic moment possible from the protons. Or, He could have lined up the protons of the third ortho group (Figure 4(D)) along the field axis. Figure 5 shows this order. This would produce a field having one-fourth of the maximum strength with a minimum of deviation from the normal order. I do not know from Scripture what proportion of the protons God aligned in each case. In the previous article I put an arbitrary factor, k , into the equations. This alignment factor represents what fraction of the maximum field God chose.

The maximum value of k is one; the minimum is zero. Ordering by whole subgroups would give possible values of $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, or 1. In the previous paper I assumed that k for the earth was $\frac{1}{4}$. I supported this choice by pointing out that it increases the molecular order with a minimum of perturbation from the normal alignment. But it is a subjective choice. In the absence of any better criterion, let us assume that $k = 0.25$ unless we find out otherwise.

Calculating the Fields

The previous sections tell us everything we need to know to calculate a planet's magnetic moment at creation. It is simply the combined magnetic moment of all the aligned ortho water molecules.

The magnetic moment of μ_w of an ortho molecule is 2.82×10^{-26} J/T (section 3). The total number of water molecules comprising the planet at creation is the planet's mass m (in kg) divided by the mass m_w of a water molecule, 2.992×10^{-26} kg. The factor k then gives us the fraction of aligned molecules. Putting all this together into an equation gives us the planet's magnetic moment M_c at creation (in J/T):

$$M_c = k(m/m_w)\mu_w. \quad (1)$$

This equation works out numerically as:

$$M_c = k(0.9425 \frac{\text{J/T}}{\text{kg}})m. \quad (2)$$

That is, every kilogram of water God created had a magnetic moment of nearly k Joules per Tesla.

As I mentioned in the introduction, a large electric current would begin circulating in the planet's interior

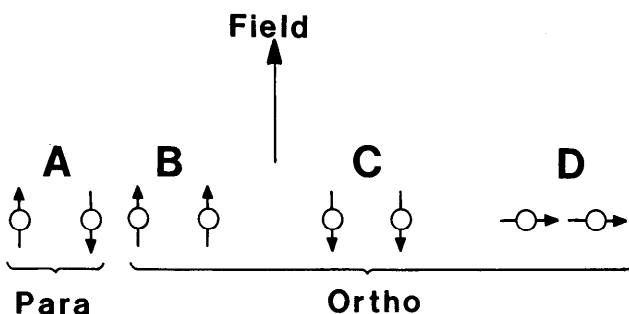


Figure 4. Normal alignment of the hydrogen nuclei in water subjected to a weak magnetic field. Twenty-five percent of the water molecules are in each of the four possible states.

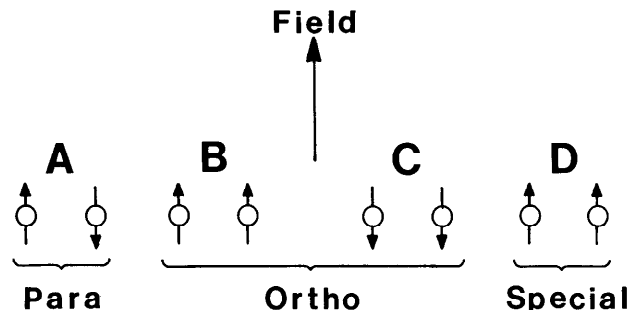


Figure 5. One possible special alignment of water protons at creation. This configuration would produce 25 percent of the maximum possible magnetic field with not much deviation from the normal order.

around the magnetic field axis, replacing the alignment of protons within seconds. The current would then decay exponentially.⁸ So the magnetic moment M at any time t after creation would be:

$$M = M_c \exp(-t/T). \quad (3)$$

Here T is the *decay time*, the time it takes for the field to decrease to 36.8 percent of any given value (Figure 3). M_c is the magnetic moment at creation given in equations (1) and (2). A planetary core of radius R (in meters) and uniform electrical conductivity σ (in mhos per meter) would have a decay time of:⁹

$$T = (\mu_0 \sigma R^2 / \pi^2) \text{ seconds}, \quad (4)$$

where μ_0 is the magnetic permeability ($4\pi \times 10^{-7}$ henry per meter).

Equations (1) or (2) can tell us the original magnetic moment of a planet. Measurements give us the present value. A straightforward reading of Scripture can give us the time t between creation and now. We can then solve equation (3) to give us the decay time of the planet's field:

$$T = \frac{t}{\ln(M_c/M)}. \quad (5)$$

We can use this calculated decay time in equation (4) to calculate the average electrical conductivity of the planet's core:

$$\sigma = \pi^2 T / \mu_0 R^2. \quad (6)$$

If we have a reasonable estimate of the core radius, we can tell whether equation (6) gives us a reasonable value for the conductivity.

The Earth

Figure 6 shows how the Earth's measured dipole magnetic moment has decreased over the last 150 years.^{10, 11} The best fit to the data occurs with a decay time of:

$$T = 2049 \pm 79 \text{ years (data)}. \quad (7)$$

The best-fit line gives a magnetic moment for the year 1980 A.D. of:

$$M = (7.94 \pm 0.05) \times 10^{22} \text{ J/T (data)}. \quad (8)$$

Table I contains a summary of the relevant solar system measurements.¹² Using the table's value for the Earth's mass in equation (1) with $k = 0.25$ (section 3)

gives my theory's estimate of the Earth's magnetic moment at creation:

$$M_c = 1.41 \times 10^{24} \text{ J/T (theory)}. \quad (9)$$

If the chronologic genealogies of Genesis 5 and 11 have no gaps in them, then the date of creation was about 4000 B.C.¹³ That would mean that the Earth in 1980 A.D. had an age of about 5980 years. Using these values in equation (5) gives this theory's estimate of the decay time of the Earth's magnetic field:

$$T = 2075 \text{ years (theory)}. \quad (10)$$

This value agrees with the measured value in (7) to better than two percent, well within the experimental error. Using the experimental decay time (7) and the measured core radius¹⁴ of 3471 km in equation (6) gives us an estimate of the Earth's average core conductivity: 41900 ± 1600 mhos/meter. This value is close to estimated conductivities of some materials under core conditions.¹⁵

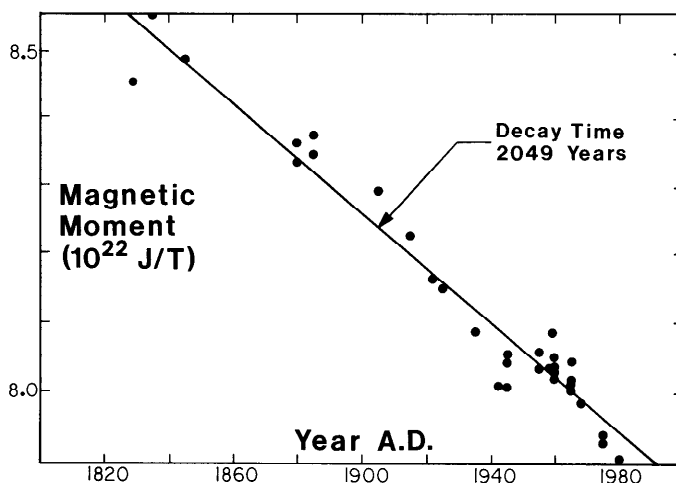


Figure 6. Observed values of the Earth's magnetic dipole moment since 1829 A.D. A straight line on this log-linear graph implies an exponential decay. The straight line shown is the best (least-squares) fit to the data. The data are tabulated in reference 1 which come from references 10 and 11. This includes eight new points since Barnes' paper (Ref. 2).

The Sun

The Sun has the largest magnetic moment of any object in the solar system. The fields at its surface are usually complex. They are very strong in some places, especially near sunspots. The Sun's magnetic fields and sunspot activity go through a fairly regular 22-year cycle.¹⁶ When the number of sunspots is at a minimum, the Sun's general magnetic field is nearly dipolar.¹⁷ At that time, according to spectroscopic observations, the Sun's magnetic moment has its maximum value:¹⁸⁻²⁰

$$M \approx 3.5 \times 10^{29} \text{ J/T (data)}. \quad (11)$$

This value is only approximate because no space probe has orbited the Sun to make more accurate measurements.

The magnetic moment does not stay at this peak level long. Over a period of years it steadily decreases to zero, reverses direction, and begins to increase again. Eleven years after the first peak the dipole mo-

ment is again at a maximum, this time in the opposite direction. After another 11 years the dipole moment and direction are as they were at first. So the Sun's field reverses itself once every 11 years. If the solar cycle has stayed the same since creation, the field has reversed more than 500 times. If we now use the solar mass of Table I in equation (1) with $k = 0.25$, we get the following value for the solar magnetic moment at creation:

$$M_c = 4.65 \times 10^{29} \text{ J/T (theory).} \quad (12)$$

This value is only about 25 percent higher than the latest observed peak. If this theory is correct, the Sun's magnetic field has not changed much since creation. The Sun's energies churn up the field, reversing it periodically, but they have not made the magnetic moment any larger. Instead, the churning seems to have decreased the field a bit. Using the values above in equation (5) gives an effective decay time of about 19000 years. I call this an "effective" decay time because it is shorter than the time we would calculate simply from equation (4). It means that the reversal cycles dissipate more energy than a simple decay does. This picture of the Sun's magnetic cycle differs from the one evolutionists imagine. They want to have solar and planetary fields maintaining themselves by a *dynamo* (self-generating) process for billions of years.²¹

To accomplish this, the fluid motions in the Sun would have to crank as much energy into the magnetic field as various loss mechanisms dissipate. But no dynamo theory at present is mathematically specific enough to determine such quantities. In contrast to the dynamo theories, equation (12) implies that the field loses more than whatever it might gain, making the peak moment decrease a little each cycle. Figure 7 illustrates the difference. If the Sun is a dynamo, the engine does not seem to be chugging. The dynamo is running down.

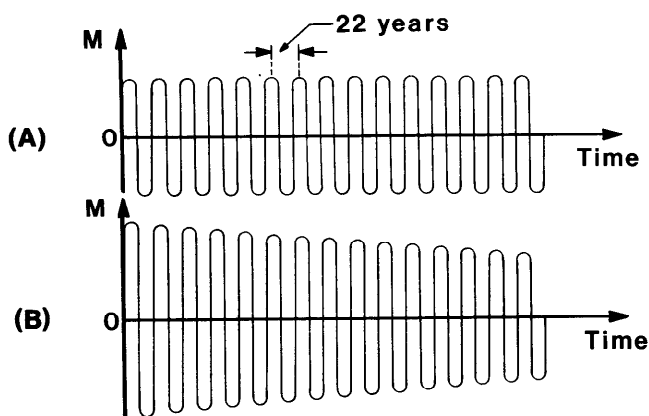


Figure 7. The variation of the Sun's magnetic moment according to (a) dynamo theories, (b) this theory. If the peak magnetic moments are indeed decreasing, then the Sun does not have a self-generating dynamo.

The Moon

Today the Moon has very little, if any, magnetic moment of its own. An analysis of the Apollo 15 lunar orbiter data sets the following upper limit on the Moon's present dipole moment:²²

$$M < 1.3 \times 10^{15} \text{ J/T (data).} \quad (13)$$

But the Moon once had a strong magnetic field in the past. Lunar rock samples brought back by the Apollo crews had a natural *remanent* (permanent) magnetization acquired by cooling in an external magnetic field. Some of the rocks were *basalt*, formed from cooling lava. Others were *breccia*, fragments probably pressed together by meteorite impacts. All magnetically tested samples had a remanent magnetization.²³ But only a few were chemically stable enough to measure the ancient field intensity by the most accurate method.²⁴ The most accurately measured basalt is sample number 62235, taken by the Apollo 16 astronauts near the Descartes highlands.²⁵ The basalt had been in a field of about 0.12 milliteslas (1.2 Gauss) when it cooled down. This intensity would be produced by a lunar magnetic moment of about:

$$M_1 \approx 6.3 \times 10^{21} \text{ J/T (data).} \quad (14)$$

The best-measured breccia is sample number 15498, taken by the Apollo 15 crew from Dune crater near the Lunar Apennines.²⁶ It was in a 2100 nanotesla (0.021 Gauss) field during the meteorite impact. This corresponds to a lunar dipole moment of about:

$$M_2 \approx 1.1 \times 10^{20} \text{ J/T (data).} \quad (15)$$

I have assumed that these samples were near the magnetic equator when they cooled. If they were not, the dipole moments could be up to 50 percent smaller. Local irregularities in the ancient field could easily give a 50 percent error the other way, too. Most of the field intensities measured by the other (less accurate) methods give results between these two values. How do these values compare with the theory? Using the mass of the Moon (Table 1) and $k = 0.25$ in equation (1) gives us the magnetic moment of the Moon at creation:

$$M_c = 1.73 \times 10^{22} \text{ J/T (theory).} \quad (16)$$

Using this value and the present value (13) in equation (5) shows that the decay time of the Moon's field is less than 364 years. This is a very short decay time. But it is a reasonable value, because the Moon has a very small core. Seismic measurements on the Moon give a core radius of about 350 km, which is consistent with other estimates.²⁷ Using this radius and the above decay time in equation (6) shows that the Moon's average core conductivity is less than 30000 mhos/meter. This is about 75 percent of the value we got for the Earth's core. Such agreement is very close, considering the fact that small impurities can easily change the conductivity of a substance by an order of magnitude. It implies that the Earth and Moon could have similar core compositions.

We can now use the above decay time in equation (5) to estimate how long after creation the two lunar rocks were formed. Using the values (14) and (15) in turn for M in equation (5), and solving for t gives a formation time of less than 370 years after creation for the basalt and less than 1840 years for the breccia. Figure 8 shows the various times and dipole moments. The lava forming the basalt flowed less than a few centuries after creation. According to Genesis 5 and 7, the Flood occurred 1656 years after creation. So the

meteorite forming the breccia hit the Moon less than a few centuries after the Genesis Flood.

Evolutionists have disagreed among themselves over how to solve what one called "the enigma of lunar magnetism."²⁸ One faction points out that the data require a field source inside the Moon.²⁹ They deduce from this that the Moon had a dynamo which later stopped. The other faction says that the Moon could never have had a dynamo.³⁰ First, its present slow rotation and small core are incompatible with most dynamo models. Second, current evolutionary theories cannot allow a molten core in the Moon's early history. Yet a molten core is essential to the dynamo theory. So this group keeps trying to find ways that some external field could have magnetized the Moon rocks. Both groups have started from a good point and then reached wrong conclusions. The Moon's field had an internal source, but it was not a dynamo. It was just an electric current running down. Here we have a simple creationist solution to a "paradox"³¹ that has puzzled evolutionists for a decade.

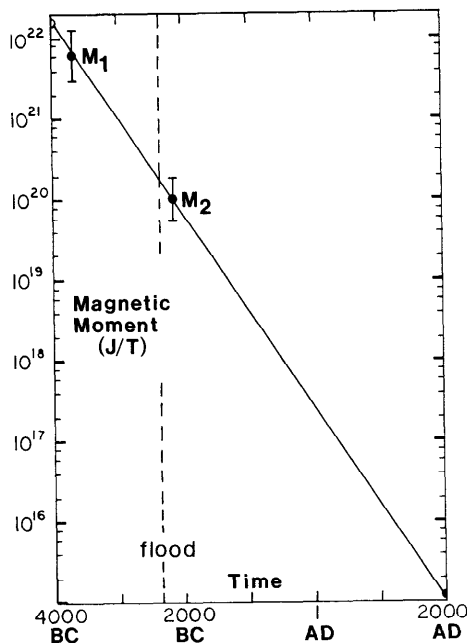


Figure 8. Decay of the Moon's magnetic moment. The present value is an upper limit. The initial value is from this theory. The values M_1 and M_2 are rough (factor of two) estimates of the lunar magnetic moment from the measured natural remanent magnetization of two lunar rocks (Ref. 23 and 25). The times for M_1 and M_2 are estimated from the decay curve.

The Inner Planets

The Mariner 10 flybys of Mercury in 1974 and 1975 showed that the planet has a small but definite magnetic field. That surprised dynamo theorists, who had expected no field at all³² because of the planet's slow rotation. Mercury's lack of an atmosphere and an ionosphere make analysis of even a small field relatively simple. The magnetic dipole moment is:³³

$$M = (4.8 \pm 0.3) \times 10^{19} \text{ J/T (data).} \quad (17)$$

Using $k = 0.25$ and Mercury's mass (Table 1) in equation (1) gives us its magnetic moment at creation:

$$M_c = 7.5 \times 10^{22} \text{ J/T (theory).} \quad (18)$$

These two values, put into equation (5), give a decay time of about 813 years. From Mercury's density and other data, planetologists estimate that it has a fairly dense core with a radius of about 1830 km.³⁴ Using this radius and this decay time in equation (6) gives us an average conductivity for Mercury's core of 60000 mhos/meter. This value is of the same order of magnitude as the core conductivities of the Earth and Moon.

Mercury's magnetism is a problem for dynamo theorists:

... the very existence of the field is puzzling. If Mercury can maintain a steady dipole field, the earth, which rotates 59 times as fast and has a core twice as large, should be able to sustain more complicated fields.³⁵

Again, this theory gives a simple answer to what seemed a difficult problem.

Measurements from both American and Russian space probes show small magnetic fields around Venus. Unlike Mercury, however, Venus has an atmosphere which complicates the analysis of small fields. At present, scientists feel that the planet's magnetosphere (ionosphere and solar wind) generates much of the observed field. If that is so, then the internally-generated magnetic moment of Venus is less than:^{36, 37}

$$M < 10^{19} \text{ J/T (data).} \quad (19)$$

Using $k = 0.25$ and the planet's mass (Table 1) in equation (1) gives us the dipole moment of Venus at creation:

$$M_c = 1.15 \times 10^{24} \text{ J/T (theory).} \quad (20)$$

This implies, by equation (5), a decay time of less than 513 years. If the core radius is about 2700 km,³⁸ this rapid decay implies from equation (6) that the core conductivity of Venus is less than 17000 mhos/meter.

Dynamo theorists say that the slow rotation of Venus explains its low field. But our creationist theory offers an explanation which is at least as good: that the core of Venus is less than half as conductive as the Earth's. The various space missions to Mars have shown that it, like Venus, has a small magnetic field. The upper limit to its dipole moment is:³⁹

$$M < 2.1 \times 10^{18} \text{ J/T (data).} \quad (21)$$

Again, using $k = 0.25$ in equation (1) gives the dipole moment of Mars at creation:

$$M_c = 1.51 \times 10^{23} \text{ J/T (theory).} \quad (22)$$

These values imply a decay time of less than 535 years. Using an estimated core radius of 1750 km shows that Mars' core conductivity is less than 43000 mhos/meter.

This is about the same as the Earth's conductivity. So for the Moon and the terrestrial planets, we find similar core conductivities. But the dynamo theories do not produce such consistency:

Mars has no field, although it rotates more than 50 times as fast as Mercury. If Mars' core is comparable in size to Mercury's, as some workers have argued on the basis of the mean density of the planet, the absence of a field on Mars and the presence of one on Mercury is baffling.⁴⁰

Table I
Solar System Physical Data

From Reference 12

Number	Body	Mass (kg)	Av. Radius (km)	Av. Density (g/cm ³)	Rotation Period (days)
1	Sun	1.991×10^{30}	695950	1.410	24.66
2	Mercury	3.181×10^{23}	2433	5.431	58.82
3	Venus	4.883×10^{24}	6053	5.256	244.59
4	Earth	5.979×10^{24}	6371	5.519	1.00
5	Moon	7.354×10^{22}	1738	3.342	27.40
6	Mars	6.418×10^{23}	3380	3.907	1.03
7	Jupiter	1.901×10^{27}	69758	1.337	0.41
8	Saturn	5.684×10^{26}	58219	0.688	0.43
9	Uranus	8.682×10^{25}	23470	1.603	0.45
10	Neptune	1.027×10^{26}	22716	2.272	0.66
11	Pluto	$(1.08 \pm 1.00) \times 10^{24}$	5700	1.65 ± 1.57	6.41

In summary, the creation/decay theory explains the magnetism of the inner planets more consistently than the dynamo theory does.

The Outer Planets

Jupiter is the largest and most massive object orbiting the Sun. The Pioneer and Voyager missions to this awesome planet showed that it also has an intense magnetic field. Its magnetic moment is second only to the Sun's.⁴¹

$$M = 1.55 \times 10^{27} \text{ J/T (data).} \quad (23)$$

If we use our arbitrary value of $k = 0.25$ in equation (1) to calculate Jupiter's magnetic moment at creation, we get a value less than this. The minimum alignment fraction which will give the present field is 0.87. But since the field must have decayed at least somewhat since creation, the fraction must have been greater. If we use the maximum alignment fraction, $k = 1.0$, then we get a maximum value for Jupiter's magnetic moment at creation:

$$M_c < 1.79 \times 10^{27} \text{ J/T (theory).} \quad (24)$$

So it looks as if God pulled out nearly all the organ stops when He orchestrated Jupiter. Not only did He create a larger mass of water, but He lined up more than 90 percent of the water's hydrogen nuclei. These two values imply that Jupiter's decay time is greater than 41000 years.

We have no direct measurements on Jupiter's core radius R yet. But we can use Jupiter's average surface radius R_s , 70000 km, to express the average core conductivity of equation (6) as a function of R/R_s :

$$\sigma = (\pi^2 T / \mu_0 R_s^2) (R_s/R)^2. \quad (25)$$

Using the above decay time in (25) gives us a minimum value for Jupiter's core conductivity:

$$\sigma > (R_s/R)^2 (2100 \text{ mhos/meter}). \quad (26)$$

From Jupiter's low density and equatorial bulge, planetologists estimate that it is mostly hydrogen and some helium, with a rocklike inner core. The hydrogen is probably in a liquid state (possibly metallic also) below about 0.8 jovian radii from the center.⁴² Using this in equation (26) shows that the average core conductivity is greater than 3000 mhos/meter. This value is some-

what lower than theoretical estimates of the conductivity of liquid *metallic* hydrogen. But it is consistent with the estimated conductivity of liquid *molecular* hydrogen.⁴³ At present there are not enough experimental data on the conductivity of hydrogen at high pressures and temperatures to shed further light.

Saturn is also a low-density planet like Jupiter, but somewhat smaller. Pioneer 11 measurements show that its magnetic moment is:^{44, 45}

$$M = 4.3 \times 10^{25} \text{ J/T (data).} \quad (27)$$

Using $k = 0.25$ and Saturn's mass from Table 1 gives its magnetic moment at creation:

$$M_c = 1.34 \times 10^{26} \text{ J/T (theory).} \quad (28)$$

These two values give a decay time of 5300 years. Using an average surface radius of 58000 km in equation (25) gives Saturn's average core conductivity:

$$\sigma = (R_s/R)^2 (390 \text{ mhos/meter}). \quad (29)$$

If the core radius is about 0.6 Saturn radii,⁴⁶ its average conductivity is about 1100 mhos/meter. So the two gas giant planets have similar core conductivities according to this theory.

Until Voyager 2 flies past Uranus in January 1986, we will not have any direct measurements of that planet's magnetic field. However, observations of ultraviolet light from atomic hydrogen in the atmosphere of Uranus provide good indirect evidence that the planet does have a field.⁴⁷ Using the mass from Table I and assuming that $k = 0.25$ gives Uranus' magnetic moment at creation:

$$M_c = 2.05 \times 10^{25} \text{ J/T (theory).} \quad (30)$$

The maximum value (for $k = 1.0$) according to this theory would be $8.18 \times 10^{25} \text{ J/T}$. One recent speculative model of Uranus has a dense core of about 8000 km radius surrounded by an icy mantle.⁴⁸ If the core conductivity is similar to that of the inner planets, it would be of the order of 10^4 mhos/meter . In that case, according to equation (3), (4), and (30), the present dipole moment of Uranus would be of the order of 10^{24} J/T .

Voyager 2 may go on to a rendezvous with Neptune, the eighth planet, in late 1989. If it is successful, it

will provide the only measurements to date on Neptune's magnetic field. Using the Table I value for Neptune's mass and $k = 0.25$ gives an estimate of Neptune's magnetic moment at creation:

$$M_c = 2.42 \times 10^{25} \text{ J/T (theory).} \quad (31)$$

The maximum value (for $k = 1.0$) would be $9.68 \times 10^{25} \text{ J/T}$. Neptune is supposed to have a core and icy mantle similar to those of Uranus.⁴⁹ If that model is correct, we would expect Neptune to have a similar present magnetic moment, of the order of 10^{24} J/T .

If Neptune does have a field, it would make some difficulties for the dynamo theorists, because its core is supposed to be solid. A solid conductive core is no hindrance to the creationist theory, but it is to the dynamo theory.

Voyager 2 is not scheduled to visit Pluto, the ninth planet. We do not even know its mass very well. From the Table I value and $k = 0.25$, we estimate its magnetic moment at creation as:

$$M_c = (2.55 \pm 2.37) \times 10^{24} \text{ J/T (theory).} \quad (32)$$

Pluto's density indicates that it is mostly ice, which has a low conductivity. If that is so, we would not expect Pluto to have any appreciable magnetic moment at present.

In summary, the magnetism of the outer planets falls within the bounds of our creationist theory. Jupiter's huge field is close to, but under, the limit set by using $k = 1.0$ in the theory. Saturn's field is more typical. The theory indicates that both planets have similar core conductivities, which is consistent with their similar structure. The upcoming Voyager 2 visits to Uranus and Neptune offer a chance to further test the creationist and evolutionist theories. If either of the two planets has a field stronger than the $k = 1.0$ limit, it would be evidence against the creationist theory. On the other hand, if either planet lacks a conductive fluid interior and yet has a sizable field, it would weigh heavily against the dynamo theory.

Conclusions

Table II and Figure 9 summarize the magnetic field data. The magnetic dipole moments cover a very wide range, from 10^{15} J/T to 10^{30} J/T . All the data fall within the bounds of the theory I am presenting. No solar system body yet measured has a magnetic moment greater than the $k = 1.0$ limit. Yet all of the bodies show evidence of having once had a magnetic moment a sizable fraction of that limit.

Evolutionists often say that creationist theories are not "real science" because, they claim, such theories make no predictions which can be tested. But in this theory we have a counterexample to their claim. Here are some specific predictions of the theory which could be tested by future data from space missions:

1. Older igneous rocks from Mercury or Mars should have natural remanent magnetization, as the Moon's rocks do.

2. Mercury's decay rate is so rapid that some future probe could detect it fairly soon. In 1990 the planet's magnetic moment should be 1.8 percent smaller than its 1975 value.

3. The upcoming Voyager 2 encounters with Uranus and Neptune should show planetary magnetic moments less than the $k = 1.0$ limit: $8.2 \times 10^{25} \text{ J/T}$ for Uranus and $9.7 \times 10^{25} \text{ J/T}$ for Neptune.

There are several important points I want to emphasize:

Magnetic reversals are not conclusive proof of a self-generating dynamo. In section 6 we saw that though the Sun's energies reverse its field periodically, the present field is no stronger than the created field. Applying this to the Earth's field means that evidence for possible reversals in the past does not contradict the creation-decay theory. The Earth's field could, for example, have decayed steadily from creation to the Flood, reversed rapidly many times during the upheavals of the Flood and afterwards resumed its steady decay.

This theory is more comprehensive than the dynamo theories. As far as I can tell, it explains everything the dynamo idea does, but in a simpler, more quantitative

Table II
Solar System Magnetic Data

Number	Body	Magnetic Moment at Creation (J/T)	Present Magnetic Moment (J/T)	Decay Time (years)	Core Radius (km)	Core Conductivity (mho/meter)
1	Sun	4.7×10^{29}	3.5×10^{29}	19000		
2	Mercury	7.5×10^{22}	4.8×10^{19}	810	1800	60000
3	Venus	1.2×10^{24}	$<1.0 \times 10^{19}$	<510	2700	<17000
4	Earth	1.4×10^{24}	7.9×10^{22}	2075	3480	42000
5	Moon	1.7×10^{22}	$<1.3 \times 10^{15}$	<360	350	<30000
6	Mars	1.5×10^{23}	$<2.1 \times 10^{18}$	<540	1750	<43000
7	Jupiter	1.8×10^{27}	1.6×10^{27}	>41000	56000	>3000
8	Saturn	1.3×10^{26}	4.3×10^{25}	5300	35000	>1100
9	Uranus	2.1×10^{25}				
10	Neptune	2.4×10^{25}				
11	Pluto	2.6×10^{24}				

Magnetic moments at creation are from this theory with $k = 0.25$, except for the case of Jupiter, where $k = 1.0$. Present magnetic moments are measured values. Decay times are deduced from created and present moments. Core radii of the Earth and Moon are measured; all others are estimates from current planetary models. Core electrical conductivities are deduced from other items. The deduced decay time for the Earth agrees well with the observed decay time of 2049 ± 79 years.

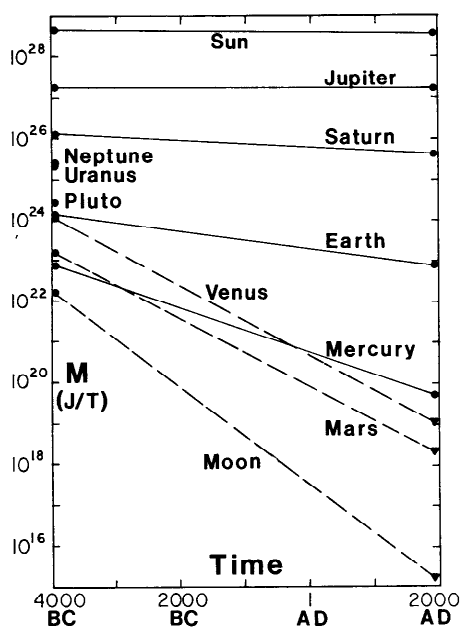


Figure 9. Magnetic moments in the solar system since creation. The initial values come from this theory. The present values are from experimental measurements. Triangles represent measured upper limits.

way. It also explains the presence of a field on Mercury, the absence of one on Mars, and the former field of the Moon—all of which puzzle evolutionists.

The solar system is young. It would be impossible to understand the field strengths of the Earth, Moon, and inner planets on the basis of this theory without a time scale of roughly 6000 years.

Water was the raw material of creation. This theory would not work using the present composition of the solar system. The nuclei of the Moon and inner planets have too little magnetic moment. The hydrogen nuclei of the Sun and outer planets have too much. Only the proportion of hydrogen in an equal mass of water gives the right results.

The Bible is scientifically accurate. A straightforward reading of Scripture supplied the essentials of this theory: the possibility of initial alignment, the water composition, and the short time scale. The fact that the theory fits the facts shows that the scientist can rely on the Bible for new insight into the natural world.

Finally, notice that we find magnetic fields of the right magnitudes throughout the solar system. This may be true throughout the whole universe. I have done “back of the envelope” calculations for white dwarf stars, which have the strongest magnetic fields yet observed in nature. Although the subject of stellar magnetic fields properly belongs to another paper, the theory appears to fit them, too.

In this light we see that what one evolutionist called “the ubiquity of magnetic fields” in the cosmos⁵⁰ is really a clue to creation. It is the Creator’s signature upon his artistry.

“The heavens declare the glory of God,
And the expanse shows forth His handiwork.”

Psalm 19:1.

References

1. Humphreys, D. R. 1983. The creation of the Earth’s magnetic field. *Creation Research Society Quarterly*, 20(2): 89-94.
2. Barnes, T. G. 1973. Electromagnetics of the Earth’s field and evaluation of electric conductivity, current, and joule heating in the Earth’s core. *Creation Research Society Quarterly*, 9(4):222-230.
3. Allen, C. W. 1976. *Astrophysical quantities*. Athlone Press, London. Third edition, p. 27.
4. Stacey, F. D. 1969. *Physics of the Earth*. John Wiley & Sons, New York, p. 276.
5. Humphreys, D. R. 1978. Is the Earth’s core water? Part one: the Biblical evidence. *Creation Research Society Quarterly*, 15(3):141-147. See reference 9, p. 146. The word translated “heavens” is *shamayim*. The first syllable, *sham*, means “there.” The second syllable, *mayim*, means “waters.” See Holladay, W. L. 1971. A concise Hebrew and Aramaic lexicon of the Old Testament. W. B. Eerdmans Co., Grand Rapids, Michigan, pp. 374, 375, 193.
6. Evans, R. D. 1955. *The atomic nucleus*. McGraw-Hill Book Co., New York, pp. 152-155. I am using the value 2.793 nuclear magnetons for the proton magnetic moment. A nuclear magneton is 5.050×10^{-27} J/T.
7. Davis, J. C. 1965. *Advanced physical chemistry*. Ronald Press Co., New York, p. 297.
8. Barnes. *Op. cit.*
9. Barnes. *Op. cit.*
10. McDonald, K. L. and R. H. Gunst. 1967. An analysis of the Earth’s magnetic field from 1835 to 1965. Environmental Services Administration Technical Report IER 46-IES1, U.S. Dept. of Commerce, p. 15.
11. Langel, R., R. Estes, G. Mead, E. Fabiano, and E. Lancaster. 1980. Initial geomagnetic field model from magrat vector data. *Geophysical Research Letters*, 7(10):793-796. (Multiply values in Table 5 by 2.586×10^{18} to get M in J/T.)
12. Weast, R. C., editor. 1982. *CRC handbook of chemistry and physics*. CRC Press, Boca Raton, Florida, 62nd edition, pp. F-140, F-142.
13. Niessen, R. 1982. A Biblical approach to dating the Earth: a case for the use of Genesis 5 and 11 as an exact chronology. *Creation Research Society Quarterly*, 19(1):60-66.
14. Allen. *Op. cit.*, pp. 117-118.
15. Stacey, F. D. 1967. Electrical resistivity of the Earth’s core. *Earth and Planetary Science Letters*, 3:204-206. Stacey estimates the conductivity of a nickel-iron-silicon mixture as of the order of 30000 mhos/meter. He points out that other light elements, such as magnesium or oxygen, would have the same effect as silicon.
16. Newkirk, G., and K. Frazier. 1982. The solar cycle. *Physics Today*, 35(4):25-34.
17. Sheely, N. R. 1981. The influence of differential rotation on the equatorial component of the Sun’s magnetic field. *Astrophysical Journal*, 243:1040-1048 (February 1).
18. Akasofu, S., P. Gray, and L. Lee. 1980. A model of the heliospheric magnetic field configuration. *Planetary Space Science*, 28:609-615. During his visit to Sandia National Laboratories on October 5, 1983, Dr. Akasofu told me that his value is based on an approximate value of two gauss for the general field near the Sun’s poles at spot minimum taken from Allen’s book (Ref. 3, p. 161) and elsewhere. Allen actually says “1 or 2 gauss.” References 19 and 20 below are more detailed studies giving the same result.
19. Howard, R. 1977. Studies of solar magnetic fields; V: The true average field strengths near the poles. *Solar Physics*, 52:243-248.
20. Svalgaard, L., T. Duvall, and P. Scherrer. 1978. The strength of the Sun’s polar fields. *Solar Physics*, 58:225-240.
21. Newkirk. *Op. cit.*, p. 27.
22. Russell, C., P. Coleman, and G. Schubert. 1974. Lunar magnetic field: permanent and induced dipole moments. *Science*, 186:825-826.
23. Gose, W., D. Strangway, and G. Pearce. 1973. A determination of the intensity of the ancient lunar magnetic field. *The Moon*, 7:196-201.
24. Dunlop, D., M. Bailey, and M. Westcott-Lewis. 1975. Lunar paleointensity determination using anhysteretic remanence (ARM): a critique. *Proceedings of the Lunar Science Conference*, 6th, pp. 3063-3069.

25. Stephenson, A., K. Runcorn, and D. Collinson. 1975. On changes in the intensity of the ancient lunar magnetic field. *Proceedings of the Lunar Science Conference*, 6th, pp. 3049-3062.
26. Gose. *Op. cit.*
27. Runcorn, S. K. 1983. Lunar magnetism, polar displacements and primeval satellites in the Earth-Moon system. *Nature*, 304:589-596. See p. 591 for lunar core size review.
28. Hood, L. L. 1981. The enigma of lunar magnetism. *Eos*, 62(16):161-163.
29. Runcorn. *Op. cit.*
30. Hood. *Op. cit.*
31. Driscoll, E. 1972. The magnetic moon: How did it get that way? *Science News*, 101(22):346-347 (May 27). Driscoll quotes Paul W. Gast of NASA's Manned Spacecraft Center as saying: "It would be much simpler to explain most of the things we understand about the moon, if we could somehow dispose of this magnetic field. . . . One of the exciting things about this paradox or enigma is [that] perhaps behind all of this is an explanation that none of us are thinking about today."
32. Parker, E. N. 1983. Magnetic fields in the cosmos. *Scientific American*, 249(2):44-54 (August). See p. 51.
33. Ness, N. F. 1979. The magnetic field of Mercury. *Physics of the Earth and Planetary Interiors*, 20:209-217.
34. Ness. *Op. cit.*, p. 215, using a core radius 0.75 of the planet's radius.
35. Parker. *Op. cit.*, p. 52.
36. Russell, C., R. Elphic, and J. Slavin. 1979. Initial Pioneer Venus magnetic field results: nightside observations. *Science*, 205:114-116 (July 6).
37. Dolginov, S., et al. 1981. Field configuration in the magnetic tail of Venus. *Cosmic Research*, 19(4):434-442 (July-August).
38. Bullen, K. E. 1973. Cores of the terrestrial planets. *Nature*, 243:68-70 (May 11). Based on an iron oxide core model.
39. Russell, C. T. 1979. The Martian magnetic field. *Physics of the Earth and Planetary Interiors*, 20:237-246.
40. Parker. *Op. cit.*, p. 52.
41. Connerney, J., M. Acuña, and N. Ness. 1982. Voyager 1 assessment of Jupiter's planetary magnetic field. *Journal of Geophysical Research*, 86(A5):3623-3627 (May 1). On p. 3625 the authors list the spherical harmonic coefficients of the field. To get the dipole moment in gauss-cm³, multiply the cube of the planet's radius (in cm) by the square root of the sum of the squares of the first three coefficients. Divide the result by 1000 to get the moment in J/T.
42. Ingersoll, A. 1981. Jupiter and Saturn. Chapter 12 of *The New Solar System*, edited by J. Beatty, B. O'Leary, and A. Chaikin. Cambridge University Press, New York, pp. 117-128.
43. Smoluchowski, R. 1975. Jupiter's molecular hydrogen layer and the magnetic field. *Astrophysical Journal*, 200:L119-L121 (Sept. 1).
44. Acuña, M., N. Ness, and J. Connerney. 1980. The magnetic field of Saturn: further studies of the Pioneer 11 observations. *Journal of Geophysical Research*, 85(A11):5675-5678 (Nov. 1).
45. Acuña, M., J. Connerney, and N. Ness. 1983. The zonal harmonic model of Saturn's magnetic field: analyses and implications. *Journal of Geophysical Research*, 88(A11):8771-8778 (Nov. 1).
46. Hughes, D. W. 1983. Inside the giant planets. *Nature*, 305:669-670 (Oct. 20).
47. Durrance, S. T. and H. W. Moos. 1982. Intense Lya emission from Uranus. *Nature*, 299:428-429 (Sept. 30).
48. Smoluchowski, R. 1983. The interiors of the giant planets—1983. *The Moon and the Planets*, 28:137,154.
49. *Ibid.*
50. Parker. *Op. cit.*, p. 45.

QUOTE

Lecturing in the fourteenth-century medieval universities consisted of reading the books of a prominent ancient author, very often Aristotle, and commenting on the text. This had by then been an old tradition going back to Hellenistic times and in particular to Muslim schools. One of Aristotle's scientific books which was most often commented upon was his cosmology, called *On the Heavens*. There Aristotle most explicitly states that the world is eternal and that its motion, and in particular the daily circular motion of the sphere of stars, is also eternal because the world is and must be uncreated, that is, without a beginning. Whatever else the Prime Mover of Aristotle was, he was not a Creator. Aristotle had only scorn for the idea of creation out of nothing. For Aristotle, the world, the universe, the cosmos, was the ultimate entity, likely identical in its better or celestial parts with the Prime Mover himself. The cosmos, according to Aristotle, had necessarily to be what it is—in no way could the Prime Mover fashion, let alone create, a different universe.

Newton's first law was formulated by medieval schoolmen in reaction against such and similar statements of Aristotle and of other pagan classical scholars who held those statements to be absolute dogmas. The eternity and uncreatedness of the universe was indeed the chief dogma of all pagan religions, old and new, crude and refined. The medieval reaction to that dogma was, as one could expect it, made in terms of the first dogma of Christian Creed, the dogma of creation of all time, that is, in the beginning. How productive and fruitful that reaction was for science can be seen in John Buridan's commentaries on Aristotle's *On the Heavens*. After rejecting Aristotle's doctrine on the eternity of motion, Buridan wrote: "In the beginning when God made the heaven and the earth, He imparted a certain amount of impetus (motion) to the stars which impetus they still keep because they move in a space where there is no friction." This statement, which is essentially equivalent to Newton's first law, reappeared in many medieval lecture notes and appeared in print many times before Descartes came to the scene.

Jaki, Stanley L. 1984. God and man's science: a view of Creation in The Christian vision: man in society. Lynne Morris, editor. The Hillsdale College Press. Hillsdale, MI, pp. 42, 43.

SPECIAL FEATURE

RECORDED INSTANCES OF WRONG-ORDER FORMATIONS OR PRESUMED OVERTHRUSTS IN THE UNITED STATES: A BIBLIOGRAPHY — PART II

WALTER E. LAMMERTS*

Received 16 November 1983; Revised 9 June 1984

Introduction

These lists are being published in order to give our readers some idea of the large number of areas in the United States in which thrust faults had been reported through the mid-1950's when the list was compiled. When it is realized that the only reason these are called thrust fault areas is that strata considered geologically older because of the fossils which they contain are lying on top of younger strata and that many of these areas are quite extensive, it becomes clear that the stratified rocks certainly do not always show a progression from relatively simple organisms to more complex ones. And of course since the 1950's many more thrust faults have been reported and carefully studied. It should furthermore be remembered that a number of these have been investigated and reported in our quarterlies and in no case was there any physical evidence for actual thrusting found. Hopefully someone of our geologically minded readers living near one of these areas may wish to make a study of it and report to us what he actually found as evidence for thrusting.

References

1. Kerr, P. F. and H. A. Schenck. 1928. Significance of Matilija Overturn (California) *Bulletin of the Geological Society of America* 39:1087-1102.
2. Hewett, D. F. 1928. Late Tertiary thrust faults in the Mojave Desert. *Proceedings of the National Academy of Sciences* 14:7-12.
3. Clark, B. L. 1925. Thrust faulting in the region of Mount Diablo, California. *Bulletin of the Geological Society of America* 36:152.
4. Lovering, T. S. 1928. Williams thrust fault. *Bulletin of the Geological Society of America* 39:173-74.
5. Douglas, G. V. and A. V. Douglas. 1929. A solution of fault problems. *Transactions of the Canadian Institute of Mining and Metallurgy* 31:12-16.
6. Washburne, C. W. 1927. Relation of faults to folds. *Bulletin of the Geological Society of America* 39:175-6.
7. Keith, A. 1927. Great Smoky overthrust. *Bulletin of the Geological Society of America* 38:154-55.
8. Reeves, F. 1927. Landslide origin of thrust faults around Bear Paw Mountains. *Journal of the Washington (DC) Academy of Sciences* 17:127.
9. Reeves, F. 1927. Thrust faulting adjacent to the Highwood Mountains, Montana. *Journal of the Washington (DC) Academy of Sciences* 17:232.
10. Flint, R. F. 1926. Thrust faults in southeast Missouri. *American Journal of Science* 12:37-40.
11. Longwell, C. R. 1922. The Muddy Mountain overthrust in southeast Nevada. *Journal of Geology* 30:63-72.
12. Mook, C. C. 1926. Note on the occurrence of faulting in western Newfoundland. *Geological Magazine* 63:348-50.
13. Link, T. A. 1928. Relationship between over and under thrusting as revealed by experiments. *Bulletin of the American Association of Petroleum Geologists* 12:825-54.
14. Flint, R. F. 1924. A brief view of Rocky Mountain structure. *Journal of Geology* 32:410-31.
15. Jillson, W. R. 1923. Emory River overthrust of east Tennessee. *Pan-American Geologist* 39:373-8.
16. Keyes, C. R. 1926. Geological data of Red Oak faulting. *Pan-American Geologist* 45:321-8.
17. Calkins, F. C. 1921. The faulting in the Cottonwood district, Wasatch Mountains, Utah. *Journal of the Washington (DC) Academy of Sciences* 11:422.
18. Hewett, D. F. 1920. The Heart Mountain overthrust, Wyoming. *Journal of Geology* 28:536-557.
19. Mansfield, G. R. 1923. Structure of the Rocky Mountains in Idaho and Montana. *Bulletin of the Geological Society of America* 34:263-84.
20. Rich, J. L. 1934. Mechanics of low angle overthrust faulting as illustrated by Cumberland thrust block. *Bulletin of the American Association of Petroleum Geologists* 18:1584-96.
21. Faye, W. G. 1919. A report of the geological overthrust block within the Rochester Vermont Quadrangle, Vermont State Geologist Eleventh Report, pp. 76-98.
22. Davie, W. M. 1922. Geological overthrusts and underchanges. *Science* 55:493.
23. Keith, A. 1928. Recently determined overthrust blocks in the Appalachians. *Bulletin of the Geological Society of America* 39:178.
24. Butts, C. 1927. Fenster (windows) in the Cumberland overthrust block in southwestern Virginia, Virginia Geological Survey Bulletin 28.

*Walter E. Lammerts, Ph.D., Fellow of the Creation Research Society, receives his mail at P.O. Box 496, Freedom, CA 95019.

REPORT OF 1984 BOARD OF DIRECTORS MEETING

Board members had been encouraged to arrive on Thursday, 26 April; and a meeting of the Executive Committee was held Thursday evening. During the morning and afternoon of Friday, 27 April, the new Research, Quarterly, Publications, Constitution, and Financial Committees held meetings.

The official annual meeting of the board was opened at 1900 hours Friday, 27 April, by President Rusch at Concordia College, Ann Arbor, MI. Present: W. Frair, D. Gish, C. Howe, D. Kaufmann, J. Klotz, R. Korthals, J. Meyer, J. Moore, G. Mulfinger, W. Rusch, H. Slusher, N. Smith, E. Williams, G. Wolfrom, P. Zimmerman. Absent by prior arrangement: H. Armstrong, D. Boylan, C. Burdick. Also present were about 25 visitors including some students from University of Michigan.

Minutes of the 1983 Board of Directors meeting were read and approved. The secretary reported that 181 votes had been cast in election of the following for three-year terms on the C.R.S. board: Clifford L. Burdick, Wayne Frair, George Howe, John R. Meyer, John N. Moore, George Mulfinger. Additionally, David A. Kaufmann was elected to fill the two-year unexpired term of Thomas G. Barnes. The election report was accepted.

Vice-President Howe explained the research fund, indicating that research activities were to be supported using only interest from the fund. History of the Research Committee was presented. The 1983 projects of Smith at the G.E.S. (Grassland Experiment Station) were the first research resulting from either of the field stations. There is progress on the establishment of the G.C.E.S. (Grand Canyon Experiment Station).

Howe further presented work by Williams and himself in removing some Grand Canyon rock. Two different techniques will be used by other participants in this investigation to determine whether fossil pollen grains can be found in this rock.

Smith gave a slide presentation on 1983 activities at the G.E.S. This included a study of "Survival of Freshwater and Saltwater Organisms in a Heterogeneous Flood Model Experiment."

After this Meyer gave some impressions (illustrated with slides) about the G.C.E.S. including the possible origins of the sedimentary strata in that region and of the Grand Canyon.

Mr. David Golisch, president of the Detroit Science Association, greeted the audience and said they were pleased to participate in the 20-year anniversary celebration of the Creation Research Society. For the occasion a special decorated cake had been made, and it was enjoyed during an intermission.

Mulfinger reported that during 1983-1984 \$1735 were received from sale of 467 books, and of 1000 total copies of the thermodynamics monograph 411 still remained. To print the 152-page astronomy monograph \$3100 was expended. The next monograph, entitled *The Argument*, by Rusch, should be completed in the summer of 1984.

The Secretary read the editor's report indicating that Volume 20 of the Quarterly consisted of 244 pages. Armstrong had expressed appreciation for the cooperation extended by authors, printers, and everyone with

whom he had worked as Editor of the Quarterly for ten years.

Editor Williams reported that he intends to have more invited papers, many of which hopefully will summarize the author's research published in earlier papers. The editor prefers that papers be no more than ten Quarterly pages long; and he does not anticipate reprinting papers of any kind. At least two reviewers will check each submitted manuscript and good reasons for accepting or rejecting will be expected.

At this time Dr. David Schmiel, president of Concordia College welcomed the C.R.S. and offered his encouragement.

The treasurer's report indicated that the 1983-1984 total income was \$76,891.80 and total expenditures \$62,408.98. Total cash assets equal \$133,015.23. The Society is receiving about \$1000/month interest on its investments, but the general fund has decreased from about \$20,000 to \$11,000, a matter which should be of some concern to the organization.

The membership report showed a total of 608 voting members; 889 sustaining members; 178 student members; 66 senior memberships; 107 subscriptions; 210 library, 25 school, 4 church, and 33 free subscriptions, for a total of 2120. The number of voting members increased. Financial problems occur particularly with clearance of checks written on foreign banks; the bank charge for collecting from such a check often comes close to or even exceeds the value of the check itself. At each mailing about 30 Quarterlies are returned because apparently the addressees no longer are at those addresses. To send a Quarterly to Canada costs \$.23 more than to an addressee in the United States.

The textbook report from Rusch indicated that work was proceeding. The book will contain a signature of color photographs; and these were available for viewing.

The meeting was adjourned at 2200 hours.

On 28 April the meeting was opened at 0835 hours by President Rusch who called for a time of silent prayer. In his report for the Research Committee Chairman Howe said that the C.R.S. owns a stereo-zoom binocular scope as well as camera equipment. Howe is willing to photograph any materials for those who need them. Also Williams indicated that he has access to a scanning electron microscope; and those wishing to pursue projects may obtain grant money through the Research Committee. At the G.C.E.S. they hope soon to drill a well to an estimated depth of 100-150' at a total cost of \$1300-\$2250. Howe and Meyer will go to the site in late July and early August; and they expect to fence the property and have a sign erected. Also some research on squirrels as well as lichens may be conducted. Smith has been authorized to spend up to \$200 for summer help in continuing studies at the G.E.S. and the erection of a sign.

For the Quarterly Editorial Committee Williams reported that since the Quarterly costs about \$100/page, voluntary page charges will be recommended to authors. Moore will have a regular column which may

be three-four pages long. There was discussion of indexing of the Quarterly.

The Publications Committee report by Mulfinger included a plea to encourage distribution of C.R.S. books. The Constitution Committee report was given by Kaufmann.

The following motions were passed;

1. Adoption of the new Article II of the bylaws with the added stipulation of a 75-year age limit for election to the Board of Directors;
2. A triennial photograph of the board be taken, placed in the archives, and retained in the file of the secretary;
3. Individual photographs of C.R.S. officers be published in the Quarterly as soon as practical and that future new officers should likewise be published;
4. There be a \$2.00/year dues increase for each category effective 1 June 1984;
5. It be stipulated on the membership application that all foreign subscriptions must be paid in U. S. funds, drawn on a bank with a U. S. office;
6. There is endorsement of the principle of adding to the membership application provisions for donations to further the work of the C.R.S.;
7. Details should be worked out for offering a life membership at \$250;
8. All income received from life memberships be invested in a special fund, with only the interest to be used for the operation of the C.R.S. The principal is to form an endowment fund, the expenditure of which would take place only at the specific direction of the C.R.S. Board of Directors to meet an emergency situation;
9. The monograph fund and C.R.S. Books fund be combined into one C.R.S. Books fund;
10. The location of the next board meeting be in Ann Arbor, MI, on 26-27 April 1985;
11. The C.R.S. endorses preparation of a rebuttal to the American Museum of Natural History anthropology exhibit, funding to be from outside sources, the Executive Committee being responsible for final approval of this written material (no new exhibits to be involved);
12. Persons listed elsewhere in this issue be nominated to the Board of Directors, starting their terms in 1985;
13. All present officers be reelected;
14. Wolfrom be designated membership secretary elect;
15. Korthals and Moore be elected to Fellow;

It was suggested that the president write commending Armstrong for ten years of faithful service as editor.

Members were advised to give John Meyer their request for C.R.S. promotional brochures.

Meeting was adjourned at 1405 hours.

Wayne Frair, Secretary

... Rather, the scientist today sees himself as a demiurge, capable of formulating if not actually a religious system, at least a kind of *open-ended absolute*, a super-religion. He—the nuclear physicist, the neurosurgeon, the psychiatrist, the student of mysticism and the sacred—is aware that the various systems elaborated in the West since the Renaissance have failed to provide *une vision d'ensemble*, while the traditional religions and philosophies had been discredited (and lost their impact) since about the fourteenth century. The scientist is thus cast again in the role of Pascal's libertine interlocutors, frightened by infinite space, but this time without a Pascal's guidance toward faith . . .

Molnar, Thomas. 1983. Science and the new gnosticism, *Modern Age: A Quarterly Review* 27:133-34.

PROPOSED AMENDMENT TO ARTICLE III: MEMBERSHIP

The following amendment to Article III: Membership has been proposed. It will be presented to the 1985 meeting of the Board of Directors for action.

Article III: Membership

Section I — No change.

Section II. Membership in the Creation Research Society shall be in one of the following categories:

- (1) Voting: persons with an earned degree in a recognized area of science or engineering at the Master's or Doctor's level.
- (2) Fellow: persons elected by the Board of Directors at an annual meeting by a ballot vote. To be designated as a fellow an individual must receive a favorable vote of 2/3 of the members of the Board of Directors. Fellows have all the rights and privileges of voting membership but are exempted from the payment of dues.
- (3) Sustaining: persons who are interested in the work of the Society but who do not choose to be a voting member and/or who do not have a Master's or Doctor's degree in some area of science or engineering. Sustaining members have all rights and privileges except those of voting and holding office.
- (4) Life Member: voting or sustaining members who have made a single gift in amounts designated by the Board of Directors to the Creation Research Society Endowment Fund and who are exempt from the payment of further annual dues.
- (5) Senior Member: voting and sustaining members who have reached the age of 65 and who are entitled to membership at a reduced membership fee.
- (6) Student: persons matriculated in high school or college who wish to participate in the work of this Society. Student members are not entitled to vote or hold office.
- (7) Emeritus: persons who have served as officers or in other official capacities for the Society and who by reason of age, health or other conditions can no longer serve in such capacities.

In addition there shall be a category of:

- (8) Subscriber: persons, schools, churches or organizations interested in the literature of the Society and its activities but not interested in or qualified for other membership categories.

The following candidates have been nominated to the Board of Directors to serve beginning in 1985:

Klotz, John W.
Korthals, Richard G.
Rusch, Wilbert H., Sr.
Slusher, Harold S.
Smith, E. Norbert
Wolfrom, Glen W.

BOOK REVIEWS

Space by James A. Michener. 1982. Fawcett Crest, New York. 808 pages.

Reviewed by Clifford L. Lillo*

Creationists are not usually concerned with fiction, but the contents of Michener's current novel should be known by every creationist. The book text includes a conflict between evolution and anti-evolution forces. If it were a fair presentation of actual events, even in a fictionalized form, it not only would do much to acquaint the reading public with the controversy but it could also be well recommended by creationists. However, Michener has chosen to ridicule the evolution/creation controversy by not presenting the facts, preferring instead to introduce a character who takes a position against evolution purely for the financial gain it might provide. The character is a highly educated, extremely intelligent man who personally believes that evolution is factual, and therefore he does not investigate the validity of creation science. Presumably, the same is true of Michener himself.

Some of the contrasts between real life and this fictionalized version of the controversy are as follows:

1. The anti-evolutionist, called Rev. Leopold Strabismus, reaps great financial rewards in appeals to radio listeners to contribute to his crusade. In real life, the dedicated scientists in the Creation Research Society accept no remuneration for their services. This is not to deny that there are people in real life who do what Strabismus does, but Michener does not mention the CRS, nor for that matter the Institute for Creation Research nor the Bible-Science Association, thus giving the reader a very distorted view of those who oppose evolutionism.
2. The character Strabismus does not undertake to show that creationism is more correct than evolutionism from a scientific standpoint. Instead, he makes it a science-religion fight. He heads a movement to stop the teaching of "evolution, geology, everything in science." (p. 734) In many places where the movement is touched upon, Michener links evolution and geology. (pp. 704, 707, 752, 756) This would indicate to the thinking reader that the case against evolution must really be strong, since Michener evidently feels that he must link a true science like geology with it to gain the sympathy of the reader. There are not many people in the country who think that the teaching of geology should be prohibited, and certainly the creationists do not advocate any such action.
3. In California, according to the text, there was a movement "to ban the teaching of evolution outright, or at least to require the parallel teaching of Biblical Genesis." (p. 682) In Alabama the complaint is heard that "they are starting to pass laws" favoring creationism with the result that children "will not be allowed to learn the truth." (p. 735) (The irony of the situation is readily apparent to creationists, who are fighting laws currently on the books in many states that do prevent children from being taught the truth of creationism.)

4. Michener has also made a farce of the concept of evolution:creation debates. In the book he says:

Several professors of geology volunteered to debate Strabismus, but he would meet them only in his tent, where the choir, the charm of Mrs. Strabismus, . . . the cheers of his supporters, and the antics of Chimp-Champ-Chump [his pet monkey] put the scientists to rout. (p. 705)

No mention is made of any debates conducted on a strictly scientific basis on college campuses, as have taken place in real life.

5. Another distorted concept used by Michener is that creationists believe that God "placed those fossils in the rocks" (p. 756), at the time of creation. Michener paraphrases an English writer, Philip Gosse, claiming that God had "hidden all these bits of evidence in the rocks and in the dinosaur bones as a kind of temptation to man's intellectual presumptions." (p. 704) Admittedly, some Christians do believe this to be the case, but this is not the teaching of creationists. The fossil record is our greatest ally because it is such an embarrassment to evolutionists. Incidentally, Michener has his facts mixed up, even from an evolutionary standpoint. He has a scientist, Dr. Stanley Mott, asking Rev. Strabismus, "So if I wrote a science book that showed fossils and spoke of dinosaurs roaming this area thirty million years ago . . ." To which Rev. Strabismus replies, "It would be obviously false, because the world did not exist thirty million years ago." (p. 757) We know even from an evolutionary standpoint dinosaurs did not roam around thirty million years ago. "Sixty-five million years ago the dinosaurs vanished," according to John Man and most other evolutionists.¹ How could Michener's proof-readers have missed this one?

Another error exists in the book, this one from a purely historical viewpoint. In telling of Neil Armstrong setting foot on the moon on July 20, 1969, Michener says, "Firmly, confidently, the man left the security of the ladder and stepped safely upon the Moon. Lunar dust did not envelop him as some had predicted . . ." (p. 534) Scientists at this period in history were not predicting that lunar dust would envelop our astronauts. The very concept of NASA experimenting with human life in this way must cause all of NASA to shudder. The issue had been settled more than two years before, when the Surveyor spacecraft:

Confirmed once and for all that the moon was a safe place for manned landings . . .

Then, on April 19, 1967, Surveyor 3 landed on the Ocean of Storms . . . dug a hole in the surface of the moon . . . The experiment . . . demonstrated that lunar soil was fine-grained stuff that tended to stick together like damp clods. It would present no problems to astronauts . . .²

According to Willy Ley, "The digging scoop had the purpose of finding out how hard the lunar soil is; it was found to be equal to hard soil on earth."³

In summary, Michener has written a book in which he has played fast and loose with the truth and has given us a not-too-careful blending of fiction and fact to make it look as though some things are facts when

*Clifford L. Lillo, BEE, M.A., receives his mail at 5519 Michelle Drive, Torrance, CA 90503.

they are not. Creationists should be aware of what he has done so that they can set the record straight if called upon to do so.

References

1. Man, John. 1978. *The day of the dinosaur*. Bison Books Limited, London, p. 167.
2. Wilford, John N. 1969. *We reach the Moon*. W. W. Norton and Company, Inc., New York, p. 97.
3. Ley, Willy. 1969. *Events in space*. David McKay Company, Inc., New York, p. 172.

Design and Origins in Astronomy, edited by George Mulfinger, Jr. Creation Research Society Books, Norcross, Georgia. 1983. 152 pages. \$7.50

Reviewed by H. L. Armstrong*

If only scientists—and others—who hold uniformitarian views would read some of the creationist literature reasonably and carefully, they would see that creationism offers no threat to the integrity and progress of science. In fact, far from being a threat, creationism can perform a useful function, even to science as conducted on a uniformitarian basis. For treatments are selective; the tendency of a writer is to dwell on those aspects of the subject which agree with his own views, and to ignore or play down aspects and phenomena which oppose his views. Thus creationist writers are likely to deal with matters which are scarcely mentioned in the uniformitarian literature. Comparison of the two viewpoints can help in forming a well-rounded understanding of the subject.

It might be added that NOW is very suitable for the presentation of such dissenting views in astronomy. The recent rocket flights which have given close views of several planets and celestial bodies have gathered much new information, some of which simply contradicts what was formerly believed as part of the uniformitarian picture. In short, the time is ripe for re-considering some astronomical questions; and this book suggests one way in which they may be done.

The work is organized into four sections. First is a defense of the teleological viewpoint in astronomy. Creationists believe in teleology: the universe was created with a pattern to serve a purpose; and the Earth, in particular, was created with a purpose: to be inhabited. Many correlations and adaptations of one thing to another are emphasized; these must be either results of intelligent design or lucky coincidences. But it is incredible that so many coincidences could have occurred.

The next section deals with the universe as a whole, and especially questions about its origin. The standard uniformitarian account is some version of the "big bang." (Incidentally, it is hard to imagine anything less uniformitarian!) Of course, this cannot be a complete theory if it says nothing about what happened before the bang; but that can be only speculation, for the bang would have destroyed any evidence. In any event, it is not hard to raise objections to the bang. For one thing, it is about conditions and states of matter which cannot be realized in the laboratory; so the theory is speculation, completely adrift from experi-

mental work. Again, the question remains, how a featureless big bang could lead to a universe which has many features. Would it not just lead to an undifferentiated cloud of debris?

This fact, that order does not arise spontaneously out of disorder, is considered under thermodynamics, especially in connection with the second law. It is appropriate to have a chapter on thermodynamics and it is concluded that thermodynamics offers no support to the notion that the order which undoubtedly exists in the universe could have arisen spontaneously.

The notion of the big bang depends on that of the expanding universe (although even if the universe is expanding now that does not prove that it began to do so in an explosion ages ago) and for the expansion the only observational evidence is the redshift. The whole matter of redshift receives careful attention, and especially the question, whether it must be considered a Doppler effect as the stars and galaxies move away from us, or whether it may be due to something else which affects the starlight on its way to us. The conclusion is that, at the present, there is simply not enough independent evidence to answer the question.

Finally in this section is a discussion of nucleosynthesis. It is generally believed that only a few of the lightest elements were formed directly in the big bang; the rest were formed later, in the interiors of stars, and then recycled. The awkwardness of such a theory is apparent, and creationism can dispense with it entirely.

The part of the universe which we know best is the Solar System, which is considered in the third section. There is a very interesting summary of the latest information, especially as found by the unmanned rockets, about the planets and satellites. Some of these findings have been real surprises, such as the very high temperatures on Venus. As for others, such as the absence of living things on Mars, creationists might have said: "We told you so!" Some of the most interesting findings concern the satellites of Jupiter and Saturn, with their great variety, some having volcanoes, one an extensive atmosphere, and all of them being unique. Likewise the rings, which have recently proliferated in the System, have provided surprises.

Of course the Solar System involves Sol—the Sun—and it is considered in this section. Points of especial interest include the failure to find neutrinos coming from the Sun, which casts some doubt upon the notion that the Sun's heat comes from a nuclear reaction. It is known that gravitational contraction could supply the energy, but only over a time of some millions of years, a restriction which poses no problems to many creationists. Moreover, there is some evidence that the Sun may indeed be shrinking, although this point seems still to be involved in controversy. This section closes with the question, whether the Sun's rather stable behavior as a source of heat and light can be expected to continue indefinitely. Some of the prophecies are very suggestive on this point, making it appear that some remarkable developments in these matters may be expected in the future.

The fourth section, with which the book concludes, is entitled: "A Scriptural Framework for Astronomy. The Bible and Astronomy." It is pointed out that science in general, and astronomy in particular, is not in

*H. L. Armstrong, M.Sc., teaches Physics at Queen's University, Kingston, Ontario, Canada.

conflict with the Bible, as some suppose. On the contrary, there are statements in the Bible which, humanly speaking, would have seemed incredible when they were first written, but which are now confirmed. God's greatness can be seen both in the creation of a perfectly working universe, and in the inspiration of an inerrant Bible.

Archaeopteryx Lithographica Reconsidered by Gerald H. Duffett. 1983. Biblical Creation Society, 51 Cloan Crescent, Bishopbriggs, Glasgow, G64 2HN, Scotland. 31 pages. £1.

Reviewed by John V. Collyer*

Archaeopteryx has been regarded by many for so long as an unmistakable 'missing link' between reptile and bird, that it is refreshing to see the publication of this brief, yet reasonably comprehensive reconsideration of the subject. The writer is already known to readers of the Quarterly. (See *CRSQ*, Sept. 1983, p. 96) He is head of Biology Department, City of Ely College, Cambridgeshire, U.K.

Gerald Duffett writes in a manner that is easy to follow. The style of this booklet suggests that he is accustomed to communicating scientific information to the layman in comprehensible terms. Yet, as his recent contribution to the Quarterly shows, he is equally able to make a sophisticated analysis of palaeontological findings. This booklet is a further example of the orderly method that he adopts in presenting his thesis, being neatly arranged in numbered paragraphs for ease of study and reference.

Starting with a comparison of the alternative explanations for the origin of birds, there follows an analysis of the known facts about Archaeopteryx. The features that make this fossil unique are enumerated, illustrated by a number of charts and diagrams. The arguments for the evolutionary model, and for the creation model are both fairly stated, with ample quotations and ref-

erences. The considerable divergence of opinion among evolutionists is compared. The reptilian features, and the avian features are charted in a manner that highlights the complexity of Archaeopteryx, but at the same time precludes any clear pattern of the alleged ancestry for an evolutionary model. The reader is reminded that the supposed relationships between species are a human fiction.

While Duffett likens the various reptilian and avian features of this fossil to a 'mixed up Rubik cube,' he does not say outright into which classification he places it. One gets a strong impression that he opts for the evidence that it was a bird. He does not appear to have noticed that of the five known specimens of Archaeopteryx, only two exhibit feather markings, nor does he mention that the feather impression on the London specimen is suspect. He does, significantly, appear to be surprised at the perfection of the feather, complete with "barbules as well as barbs that lie parallel in the well preened condition of the single feather fossil."

But if Duffett is personally convinced that Archaeopteryx was a bird, he fails to support his view by evidence that he could have adduced. For the fossil of an undoubted bird was found in 1977 in the same rock formation, thus eliminating any possible claim that Archaeopteryx is a transitional form. Fully formed birds were already in existence! (See *Science News*, 24 Sept., p. 198.)

Whether it is revealed eventually that Archaeopteryx was a unique reptilian, or a unique avian form of life may depend upon further close examination of the suspect feathers of the London and Berlin fossils. Whatever the outcome, Duffett makes it clear that it is definitely not a 'missing link,' and he spells out good reasons why it cannot be so regarded. This booklet is a very useful addition to creationist literature, filling a real need, complete with tidily arranged information in paragraphs and charts that are easily comprehended.

*John V. Collyer receives his mail at 35 Westward Ho, Grimsby, South Hamberside, DN34 5AF, England.

LETTERS TO THE EDITOR

Evolutionism Is Not Science.

Period & Paragraph.

The search for an equal-time, two-model compromise with the evolution establishment continues to cause us no little pain. Why compromise when one truth can pin evolutionism (and all its concomitants) to the mat in a single, swift, irresistible move? How? What's the one Truth that can cook evolutionism's goose in a way that everyone with eyes can tell it has been cooked?

Answer: Prove something that is very easy to prove, something that is very easy to see; namely, that evolutionism never was, is not now, and can never be called "science" or "scientific."

Here is how it is done; here, indeed is the exact, precise, and one and only argument needed to expose and destroy evolutionism on the world stage. Hammer on this one Truth and the job will be done.

First, one takes any dictionary and looks up the word "science." Dictionaries are relatively impartial

when it comes to spelling out the basic roots and connotation of words. Evolutionists use dictionaries and believe in root words. We were once ardent evolutionists and we did that, and so do others.

So what does that much maligned word "science" mean anyway?

Every dictionary we look into says the same thing, namely, that the root of the word "science" (whether taken from Middle English, Middle French or Latin base *scientia*) means "knowledge" which is equal to *sci* which is the root of *scire* which means "TO KNOW."

Get that in mind. The root meaning of the word "science" is "TO KNOW." Check your dictionaries, your encyclopedias. You will find the same thing. Check the connotations. You will see that each has to do with knowing, with facts, with knowledge.

Now all who keep an eye on matters having to do with the evolution myth are aware that there are many publications which print flat statements saying that evolutionary science is a proven fact. These state-

ments, of course, are baldfaced lies. Whether knowingly or ignorantly perpetrated, they are still lies. Evolutionism does not *know* one fact. If it had one fact, the argument would be over. It does not. It is not science and it can be demonstrated beyond question that it is not science, simply because science means to know and it does not know one fact.

Only one example needs to be set forth to demonstrate finally and forever that evolutionism does not and cannot know that its claims are true and that, therefore, by definition it is not and cannot be science.

That one example is the concept of spontaneous generation (or abiogenesis if you'd rather). All non-theistic evolutionary doctrine falls like Humpty Dumpty on this one point. It is positively a known fact that life comes only from life. This is the Law of Biogenesis. It is true science because it meets the definition of what science must be; i.e., it *knows* some fact.

But look at this: All traditional, non-theistic evolutionism says the exact opposite of what true science knows (that life comes only from life). Evolutionism turns this Law upside down and says all life came out of dead matter. The earth was lifeless, the evolutionist teaches. It cooled off they say and was dead as a hammer. No plants, no animals, no micro-organisms. No nuthin'. Dead. Is that not right? Is that not exactly what the evolutionists say?

Then lightning struck the mud and life came into being out of non-living matter.

Folks, that's not science. It is not known. It can never be known and be science. Moreover, it is *contra-scientific* because it goes against what *is known*, what is science, namely, the Law of Biogenesis.

If some evolutionary chemist objects that it took 500 million years for the chemicals to come together into what could be called life, so therefore evolution is not an example of spontaneous generation of life, he is in a trap from which there is no escape. Look: At some particular *moment* during that mythological 500 million years something that had been non-living became living. Right? There's no way out of this conundrum. It is still *spontaneous generation*, a contra-scientific fraud with no more credibility than the tooth fairy.

Evolution a science? Bah! It can be proven not to be. *And why should this not be the singleminded line of attack?* Is not the reason the world has been successfully indoctrinated with this Brobdingnagian myth really and truly because it has been passed off as scientific? People think that if something is scientific it is *known* to be true. And that is what science is all about. Trouble is, a demonstrably contra-scientific lie has been palmed off as true science.

The way to expose evolutionism, then, is to put it in the box just described and shake vigorously and relentlessly. What entered the box with a lion-like roar as Evolutionary Science will shake out scurrying and squeaking as Evolutionary Myth. And the reason for the change will be obvious to one and all.

Trying to combat evolutionism with Creationism has served its purpose. However, that strategy is now spinning its wheels and getting nowhere, and everybody can see that this drive went 18 yards and fizzled.

That helped. But God's business is touchdowns, not offensives that are checkmated anywhere on the field.

Prove evolution is not science and Creation is logically proven anyway. There simply is not any other explanation of how everything including mankind came to be here. Accident or Plan. That is it. Abstractologists can scratch their beards and protest till they turn blue in the face and they will not escape the conclusion that the answer to the origin of all things must be explained as the result of either accident or plan.

Shoot down evolutionism (accident) by proving that it is not science, and you are left with "plan." And where there is a plan there is a Planner. So, you see, the strategy is foolproof.

But, wait, you say? What about theistic-evolutionism? Would not the pure evolutionists just retreat to this position and set up an impenetrable defense, still claiming evolution to be true but saying that God just did it that way (instead of the Bible way)?

Certainly this will be the pattern. No doubt about it.

But first things first. For starters, the pure evolutionary myth must be beaten to a pulp with the dictionary. (Theistic evolutionists must either support this activity or remain sullenly silent in the wings, for the very essence of their position is opposition to spontaneous generation of life by natural forces without God, is it not??)

Then, once the pure evolutionists—the agnostics and atheists—see that they cannot call their position scientific, it remains only to show the theistic-evolutionists the same thing.

And how difficult can this be? With the old lion of pure evolutionism rendered toothless, how awesome can its cub—theistic evolutionism—be? Can it stand against expanding multitudes ready to force its baseless postulates to the wall? Can it survive a single-minded attack centered upon proving that true science *knows* that "after its kind" is the only genetic truth there is and that evolutionary genetics is simply not science but only "science falsely so-called"?

Let us gird our loins with this one Truth, *viz.*, Evolutionism is *not science*. Let us then rise confidently and with a whoop out of the trenches (where the Creation movement is now pinned down). Let us concentrate all firepower on one objective; *viz.*, tearing down the false flag under which evolutionists fight; that flag which has *science* written on it.

Once the flag is down, once this standard is destroyed, none who love Truth can bemoan its passing, and none who hate the Truth can fool themselves or anybody else any longer as to what god they follow and what God they will not follow. . . .

Marshall and Sandra Hall
Fair Education Foundation, Inc.
Rt. 2, Box 415
Murphy, NC 28906

Survival of Organisms During the Flood

The article by Dr. E. Norbert Smith (CRSQ 21(1): 33-37) on the survival of freshwater and saltwater organisms was interesting. A heterogeneous model would surely be the best with all the tectonic and volcanic activity. The idea of stratified, stable layers of water in local areas is very reasonable. They would be more stable in non-turbulent areas than in the Smith-

Hagberg research tank. I was thinking as I read the article that the stratified water may provide an explanation for the congregation of some organisms, which later died to become fossil graveyards. I am thinking of the Miocene fish graveyard in California, but it could apply to others also.

Michael J. Oard
3600 Seventh Avenue, South
Great Falls, MT 59405

Comment on Howe's Book Review

I agree wholeheartedly with George Howe's review of the book, *Challenge and Response*, in the June 1984 issue of the *Quarterly*. I think there is a proper time and place for evangelism, and science reports are not the place. This becomes apparent if we imagine evolution authors concluding their reports with references to the Humanist Manifesto. Although they may be writing with the Manifesto in mind, they are smart enough not to reveal it.

Years ago I wrote to Howe and stated that I thought creationists should, or at least I intended to, take the position of de facto creation—creation by default of evolution. This is an offensive, not an apologetic position. What I have learned since then has convinced me all the more that evolutionary theorists should be the ones on the defensive position. I think we should work to establish the concept that in this world, creation must be a given unless evolutionists can provide a testable, on-going mechanism for the origin of life.

After all, they are the ones making extravagant claims of being scientific.

It just occurred to me that, although, in my opinion, it is important not to evangelize in science reports, there is some danger in it. There is a strong tendency for science to be humanistic. For example, should an atheist investigator discover a new law of nature or a new species, it is often named after the discoverer and he in effect becomes the creator, in the eyes of his peers, of that law or new species; there is no point in giving credit to the cosmos. A creationist investigator must guard against that type of egoism and, like Kepler, know that he is "thinking thoughts after God" and has discovered something of the handiwork of God.

I would like to close by posing the following questions that have long concerned me: Is there a point at which science, even from a creation point of view, can become an offense to God? Would not that point be reached when science in its humanistic bent attempts to validate the inspired word of God above and beyond what is required to combat evolutionism? At that point would not the situation be rather like the fellow who has given his word to a friend concerning a certain incident, but the friend insists upon double checking? It seems to me that creation should not be reduced to the level of a mere scientific theory nor should evolution be up-graded to the status of legitimate science unless its proponents can provide a testable, on-going mechanism for the origin of life.

Randall Hedtke
Route 1
Clearwater, MN 55320

NOW AVAILABLE FROM CREATION RESEARCH SOCIETY BOOKS

5093 Williamsport Drive, Norcross, Georgia 30092

THE MOON

by Whitcomb and DeYoung
\$6.95 prepaid and postpaid.

SPECIAL OFFERS

VARIATION AND FIXITY IN NATURE

@ \$4.95

— and —

WHY NOT CREATION?

@ \$6.95

A \$11.90 value for \$9.00
prepaid and postpaid.

THE MOON

@ \$6.95

— and —

WHY NOT CREATION?

@ \$6.95

A \$13.90 value for \$10.00
prepaid and postpaid.

CREATION RESEARCH SOCIETY

ORDER BLANK FOR PAST PUBLICATIONS

Mail to: W. H. Rusch, Membership Secretary
Creation Research Society
2717 Cranbrook Road
Ann Arbor, MI 48104

Enclosed is my check or money order (please do NOT send cash) in the amount of \$_____ in payment for the checked publications of the Creation Research Society (if still available). Please send to me at the address given below.

Cost in dollars

- Volume 1, (1964-65) (out of print)
- () Volume 2, (1965-66) (annual & 2 quarterlies—\$5.50)
- Volume 3, (1966-67) (out of print)
- Volume 4, (1967-68) (out of print)
- () Volume 5, (1968-69) (3 quarterlies—\$6.50—limited)
- () Volume 6, (1969-70) (2 quarterlies—\$4.50)
- Volume 7, (1970-71) (out of print)
- Volume 8, (1971-72) (annual only—\$5.00)
- () Volume 9, (1972-73) (complete)
- () Volume 10, (1973-74) (complete)
- () Volume 11, (1974-75) (complete)
- () Volume 12, (1975-76) (complete)
- () Volume 13, (1976-77) (June, Sept. & March—\$9.00)
- () Volume 14, (1977-78) (complete)
- () Volume 15, (1978-79) (complete)
- () Volume 16, (1979-80) (complete)
- () Volume 17, (1980-81) (complete)
- () Volume 18, (1981-82) (complete)
- () Volume 19, (1982-83) (complete)

\$_____ Total

Please make check payable to Creation Research Society

The cost of these publications, unless otherwise noted, is the same as the current subscription rates. e.g.—Members (voting or sustaining) \$15.00 per volume; non-members \$17.00 per volume; libraries, colleges and other groups \$18.00 per volume; students \$10.00 per volume. Where incomplete volumes are shown, price is prorated as shown. Outside the U. S. and Canada, add \$2.00 to the above rates. *Drafts must be on U. S. banks in U. S. funds.*

Send to:

Name_____

Address_____

City_____ State_____ Zip_____

CREATION RESEARCH SOCIETY

History The Creation Research Society was first 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 1500 non-voting members. The *Creation Research Society Quarterly* has been gradually enlarged and improved and now is recognized as probably 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.

Membership Voting membership is limited to scientists having at least an earned graduate degree in a natural or applied science. Dues are \$15.00 (\$17.00 U.S. for overseas) per year and may be sent to Wilbert H. Rusch, Sr., Membership Secretary, 2717 Cranbrook Road, Ann Arbor, Michigan 48104. 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 \$15.00 (\$17.00 U.S. for overseas) per year and includes subscription to the Annual Issue and Quarterlies. All others interested in receiving copies of all these publications may do so at the rate of the subscription price for all issues for one year: \$18.00 (\$20.00 U.S. for overseas).

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. Subsequently a Revised Edition (1974), a Teachers' Guide and both Teachers' and Students' Laboratory Manuals have been published by Zondervan Publishing House. 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 man, 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 an historic event worldwide in its extent and effect.

4. We are an organization of Christian men 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 Saviour for all mankind. Therefore, salvation can come only through accepting Jesus Christ as our Saviour.

Board of Directors *Biochemistry*: Duane T. Gish, Ph.D., Institute for Creation Research, 2100 Greenfield Drive, El Cajon, CA 92021; Glen W. Wolfrom, Ph.D., International Minerals and Chemical Corporation, P.O. Box 207, Terre Haute, IN 47808; *Biological Sciences*: Wayne Frair, Ph.D., Secretary, The King's College, Briarcliff Manor, NY 10510; George F. Howe, Ph.D., Vice-President and Director, Grand Canyon Experiment Station, Los Angeles Baptist College, Newhall, CA 91321; John R. Meyer, Ph.D., Baptist Bible College, 538 Venard Road, Clarks Summit, PA 18411; Wilbert H. Rusch, Sr., M.S., LL.D., President and Membership Secretary, 2717 Cranbrook Road, Ann Arbor, MI 48104; E. Norbert Smith, Ph.D., Director, Grasslands Experiment Station, RR5, Box 217, Weatherford, OK 73096; Paul A. Zimmerman, Ph.D., Concordia Junior College, River Forest, IL 60305; David A. Kaufman, Ph.D., University of Florida, Gainesville, FL 32611; *Engineering*: D. R. Boylan, Ph.D., Iowa State University, Ames, IA 50011; Emmett L. Williams, Ph.D., Editor, Lockheed-Georgia Company, Marietta, GA 30063; *Genetics*: John W. Klotz, Ph.D., Concordia Seminary, St. Louis, MO 63105; *Geology*: Clifford L. Burdick, M.S., D.Sc., 924 N. 6th Avenue, Tucson, AZ 85705; *Geophysics*: Harold Slusher, M.S., D.Sc., University of Texas at El Paso, TX 79902; *Physical Sciences*: Harold Armstrong, M.S., Queens University, Kingston, Ontario, Canada; Richard G. Korthals, M.S., Treasurer, P.O. Box 135, Arcadia, MI 49613; George Mulfinger, M.S., Bob Jones University, Greenville, SC 29614; *Science Education*: John N. Moore, Ed.D., Origins Educational Service, 1158 Marigold, East Lansing, MI 48823.

REMEMBER

The Creation Research Society Laboratory Project

Send donation to: C.R.S. Laboratory Project
5093 Williamsport Drive
Norcross, GA 30092

tax deductible

Information available at the same address

HELP US ESTABLISH THE CREATION MODEL OF SCIENCE

CREATION RESEARCH SOCIETY BOOKS

Available At:

5093 Williamsport Drive, Norcross, Ga. 30092

All Prices Prepaid and Postpaid



Why Not Creation?

Edited by

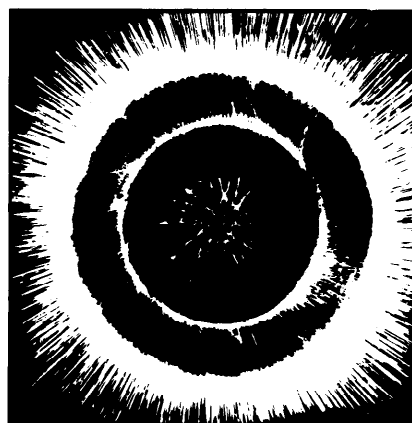
WALTER E. LAMMERTS

Selected Articles from the Creation Research Society Quarterly (Volumes I-V, 1964 - 1968).

ISBN: 0-8010-5528-8

388 Pgs.

\$6.95



Thermodynamics and the Development of Order

Edited by Emmett L. Williams

A Definitive Creationist Study on the Implications of Thermodynamics in the Creation/Evolution Controversy.

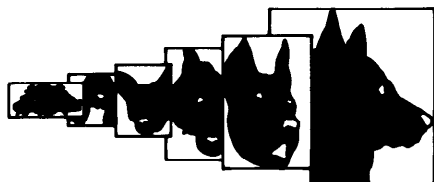
ISBN: 0-940384-01-9

141 Pgs.

\$4.95

VARIATION AND FIXITY IN NATURE

FRANK L. MARSH, PH.D.

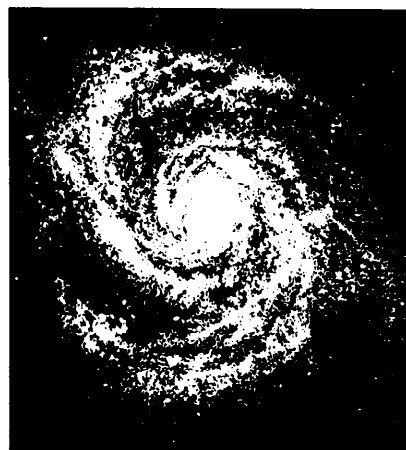


THE MEANING OF DIVERSITY
AND DISCONTINUITY IN
THE WORLD OF LIVING THINGS,
AND THEIR BEARING ON
CREATION AND EVOLUTION

ISBN: 0-940384-02-7

150 Pgs.

\$4.95



Design and Origins in Astronomy

Edited by George Mulfinger, Jr.

The Latest Creationist Thinking on the Origin of the Universe — A Challenge to Modern Materialistic Thought.

ISBN: 0-940384-03-5

152 Pgs.

\$7.50