

Creation Research Society Quarterly

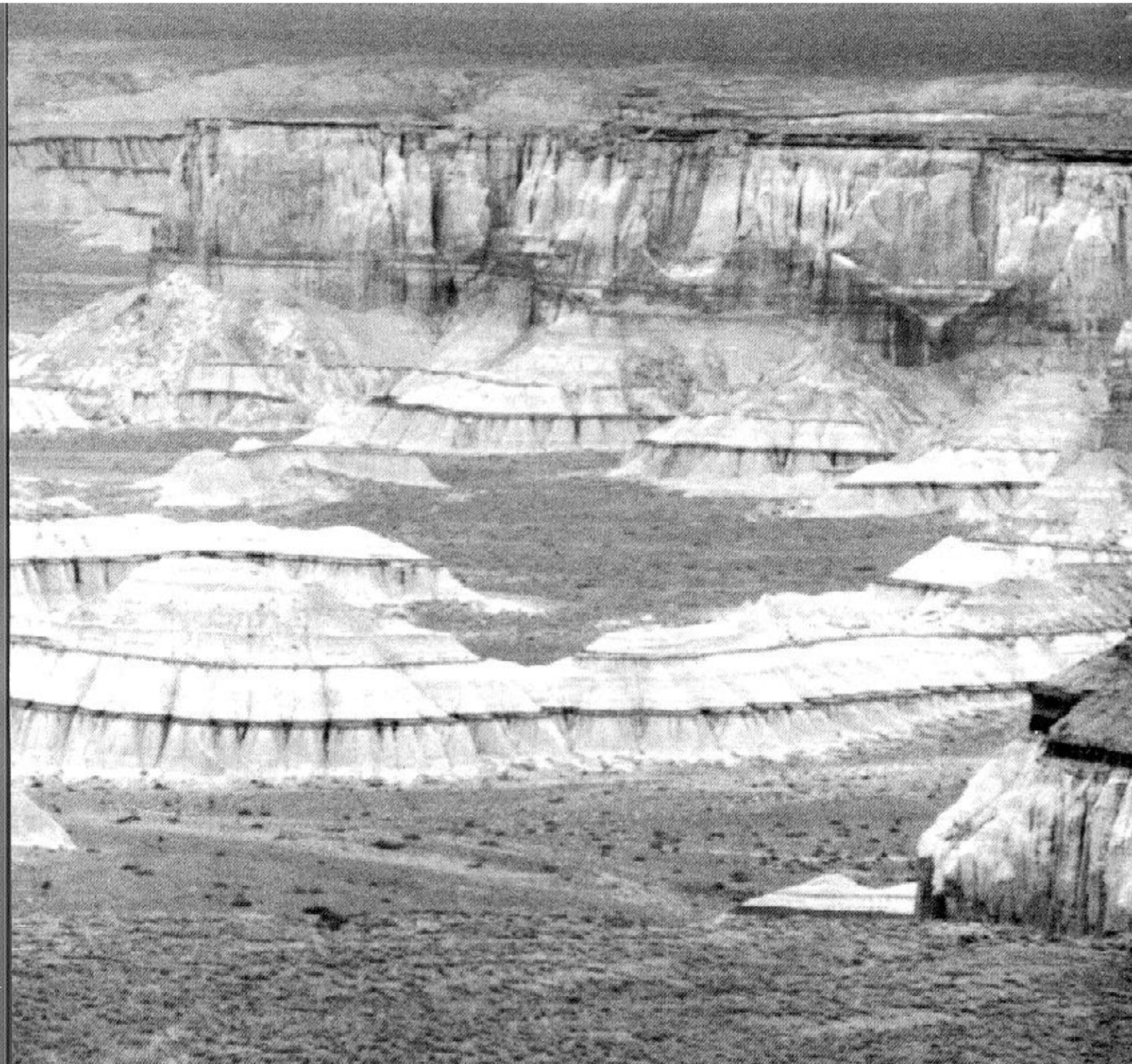
Haec credimus:

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

VOLUME 29

MARCH 1993

NUMBER 4



CREATION RESEARCH SOCIETY

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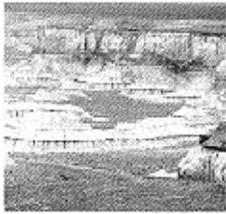
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Cover Photograph

Coalmine Canyon Overlook, Route 264, 16 miles southeast of Tuba City, Arizona near town of Coalmine Mesa, Arizona. This photograph illustrates volcanic activity (ash falls) in the western United States in the past-evidence of catastrophism. It also shows evidence

of considerable erosion. Interestingly it is a "barren land" that in post-Flood times could have had abundant rainfall and a temperate climate. Caption by Emmett L. Williams, photograph by Glen W. Wolfrom

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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 1100 non-voting members. The *Creation Research Society Quarterly* has been gradually enlarged and improved and now is recognized as the outstanding publication in the field.

Activities The society is solely a research and publication society. It does not hold meetings or engage in other promotional activities, and has no affiliation with any other scientific or religious organizations. Its members conduct research on problems related to its purposes, and a research fund is maintained to assist in such projects. Contributions to the research fund for these purposes are tax deductible. The Society operates two Experiment Stations, the Grand Canyon Experiment Station in Paulden, Arizona and the Grasslands Experiment Station in Weatherford, Oklahoma.

Membership Voting membership is limited to scientists having at least an earned graduate degree in a natural or applied science. Dues are \$18.00 (\$22.00 foreign) per year and may be sent to Glen W. Wolfrom, Membership Secretary, P.O. Box 28473, Kansas City, MO 64118. 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 \$18.00 (\$22.00 foreign) per year and includes a subscription to the Quarterlies. All others interested in receiving copies of all these publications may do so at the rate of the subscription price for all issues for one year: \$21.00 (\$25.00 foreign).

Statement of Belief Members of the Creation Research Society, which include research scientists representing various fields of successful scientific accomplishment, are committed to full belief in the Biblical record of creation and early history, and thus to a concept of dynamic special creation (as opposed to evolution), both of the universe and the earth with its complexity of living forms. We propose to re-evaluate science from this viewpoint, and since 1964 have published a quarterly of research articles in this field. In 1970 the Society published a textbook, *Biology: A Search for Order in Complexity*, through Zondervan Publishing House, Grand Rapids, Michigan 49506. All members of the Society subscribe to the following statement of belief:

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

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

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

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

CREATIONIST RESEARCH (1964-1988)

By Duane T. Gish

Research done by creationists and reported in the *Creation Research Society Quarterly* is abstracted. Geological research, genetic research, natural selection studies, taxonomy, other biological research, thermodynamic efforts as well as other physical science research are covered. Creationists have performed excellent laboratory and field work without any support by government funds.

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Editor's Comments

This issue marks the completion of volume 29 of the *Creation Research Society Quarterly*. It seems amazing that a creationist journal of this nature has had such a long life span in a world filled with materialistic and naturalistic philosophies. Over the years articles have been published ranging from philosophical treatises to scientific data-based studies. We appreciate our members and readers who faithfully subscribe to the *Quarterly*. Please continue to help us with your support and input. Also the *Quarterly* needs to be in college libraries throughout the country. Please be instrumental in encouraging university libraries to subscribe to the *Quarterly*. Please write either articles, technical notes, book reviews or letters to the editor and submit them to me.

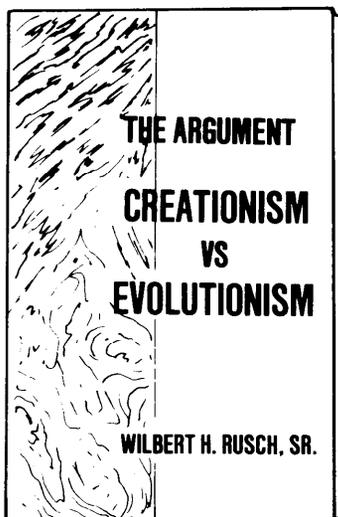
Don B. DeYoung

Special Thanks

The *Patron* category of CRS supporters is based on special financial support of the Society (see membership form in front cover). We would like to acknowledge Mr. Michael Degman, El Centro, California, as a Patron. Thank you!

Erratum

September 1992 *Quarterly*, page 95, caption of Figure 5, line 3 should read . . . in Figures 1 and 2 . . .



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RADIOCARBON DATING AFTER FORTY YEARS: DO CREATIONISTS SEE IT AS SUPPORTING THE BIBLICAL CREATION AND FLOOD? A Review and Critique of Pertinent Creationist Writing, 1950-1990

ROBERT L. WHITELAW*

Received 27 January 1992; Revised 7 July 1992

Abstract

Some 30 papers by creationists on various aspects of radiocarbon dating have appeared since the definitive work by Willard F. Libby appeared 40 years ago. During that time over 50,000 published dates, using the Libby Method have appeared in the annual journal Radiocarbon. This paper surveys and compares the views expressed by creationist in these papers, mostly in CRSQ, and summarizes the points on which they agree and differ. The objective is two fold, (1) to show that a substantial body of creationists perceive that the radiocarbon dating method, properly screened and corrected, dramatically supports both the biblical Creation and Flood, and (2) to establish a basis for harmony among creationists in asserting such support so as to confront evolutionists with this biblical witness and evoke a response.

By biblical creation is meant a sudden appearance of the entire natural universe by divine fiat within six Earth days; and by the biblical Flood is meant worldwide catastrophic inundation and destruction of all terrestrial life as described in Genesis 6-8.

Introduction

The radiocarbon dating method was conceived about 1950 and published by Willard F. Libby in 1952. It provided a completely new tool by which to measure the age (i.e. death-date) of ancient wooden artifacts, carbon-bearing fossils, and buried vegetation of all kinds. Here was a tool totally unlike the earlier methods attempted for radiometric dating of rock strata, a tool that goes to the heart of the creation vs. evolution question "When did life begin?". Furthermore, Libby verified that the method, applied to specimens of known age (cathedral arches, old barges, etc.) gave consistent answers within a probable error smaller than many prior methods used in archeology.

In the 40 years that have elapsed since Libby's initial work, it has generated three kinds of response in the world of science, as follows:

(1) Over 50,000 radiocarbon dates of specimens of all kinds from all parts of the earth, determined by over 100 leading laboratories worldwide, have been published, first in *Science* until 1958, and since then in the annual journal *Radiocarbon*.

(2) The body of scientist and publications generally committed to acceptance and defense of evolution and the geological ages proposed by Lyell in 1830, have used the dates sparingly. None appear to question their first amazing result, namely that every valid specimen, whether of human, animal, or vegetable origin, yields a death-date compatible with fiat creation some 7,000 years ago (as will be shown), whereas Lyellian geology, if true, should have resulted in 99 percent of all primeval specimens being "too old to date" since radiocarbon cannot detect reliable death-dates older than about 35,000 years.

(3) A significant number of scientists committed to the trustworthiness of Scripture, have reported that C-14 dating gives us a tool which can verify (and vindicate) Scripture at the two critical points in ancient history which leave no room for the presuppositions of

evolution, namely, (a) the first appearance of all biological life some 7,000 years ago, beginning with vegetation on the third day of God's creative work, and (b) the total destruction of all animal life (except for eight humans and representative pairs of animals preserved in a small ship), and worldwide inundation of the land mass in a span of a few months some 5,000 years ago, based on biblical chronology.

It is fitting therefore that we choose the fortieth anniversary of the radiocarbon dating method to survey the scientific publications of creationists pertinent to radiocarbon dating, and to show how remarkably they support the historical truth of both the biblical Creation and Flood.

Some Facts about Dating Prehistoric Events, Artifacts, Life, and Strata

Archeological papers describing events and artifacts before the Christian era use such phrases as "These are dated at XXX B.C. . . .," or "These belong to the XXX Dynasty of Egypt in the reign of YYY . . ."; or pertaining to a new geological or fossil discovery, "This has been dated XXX million years ago . . ."

If such a paper pertains to an artifact or event in ancient history reported in a prestigious scientific journal, or engraved upon a plaque at a famous museum, one assumes that the investigator who assigned such dates employed a proven chronology, such as a sequence of regnal years linked to a known date in the modern calendar. If it pertains to a prehistoric fossil or rock strata, one assumes that the reporting scientist likewise employed a reliable means of dating the fossil or rock capable of spanning many thousands (or millions) of years with fair accuracy. It is unthinkable to most readers that such statements would originate from assumptions never proved, and become "scientifically accepted" largely by constant repetition. Even more amazing is it to find geologists and paleontologists adhering to Lyell's table of geological ages which was invented over 150 years ago and never yet substantiated.

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In approaching all such literature, the Bible-believer therefore needs to know three important facts about "dating" any event, fossil, or artifact that existed before the Christian era, i.e. before events were reliably recorded using the western calendar (or in parts of the world whose calendars can be synchronized with ours). These three facts are:

(1) It is not possible to establish the date of any event in human history prior to Christ apart from biblical chronology. Following Anstey et al, one begins with Daniel 9:23-27 to establish the first regnal year of Cyrus at the Fall of Babylon 486.5 years before Christ's crucifixion. To date an event prior to that, one must be able to tie it to some event in Hebrew history linked to biblical chronology. The dates for OT events printed in some Bibles (usually from Ussher) are based on Ptolemy's spurious canon of Assyrian and Persian kings, or on supposed dates of Olympiads or solar eclipses, never fully verified. The more ancient dates of Egyptian dynasties based on Manetho et al, or of paleo-Babylonian dynasties based on Berossus, etc., are even less reliable by as much as thousands of years.

(2) No fossil, organic residue, or ancient artifact can be dated reliably unless it contains carbon uncontaminated by its environment. Radiocarbon dating in that case is best provided one measures its present specific decay rate, SDR, and calculates its SDR when it died by knowing the specific production rate of radiocarbon in the world carbon cycle (Note 1).

(3) The date of origin or formation of rock-strata of any kind, igneous, metamorphic or sedimentary, cannot be established by any method proposed to date without knowledge of conditions or events (atmospheric, magnetic, or geological) when it was formed. Hence such "clocks" require "pre-setting the hands" in order to read them.

Since Libby's definitive work of 1952, some 30 papers by creationists on radiocarbon dating have appeared. Beginning with Libby, these writings are numbered and reviewed below.

Terms and Definitions

Author: The word "author" always refers to the author of the paper being surveyed.

Reviewer: The writer of this review.

SPR: Specific Production Rate of C-14 atoms in the earth's atmosphere by cosmic radiation, in atoms per minute per gram of total carbon in the earth's active carbon inventory. This inventory is defined as all carbon in the cycle from atmospheric CO₂ to living things and back again, i.e. carbon that passes from the air to anything in the biosphere while living, and then after death restores that same carbon to the atmosphere while decaying. The only carbon on earth excluded from this cycle is that so buried in strata or the ocean floor as to be inaccessible to oxidation by the atmosphere. See Paper #1 for one estimate of this inventory today.

SDR: Specific Decay Rate of C-14 atoms in any specimen of a living or once-living thing, in atoms per minute per gm of total carbon in the specimen. For living things on earth today SDR is approximately 16 disintegrations/min per gm of total carbon, which corresponds to approximately 1.4 atoms of C-14 per trillion atoms of total carbon.

BP: Before Present, on a radiocarbon date, where "Present" has been chosen as 1950, in order to correct for abnormally "old" atmospheric CO₂ in the modern era. See Paper #5.

Review of Creationist Papers on Radiocarbon Dating, 1950-1990

The papers are numbered and reviewed in chronological order, beginning with the definitive work of Willard Libby. Though Libby was not a creationist, he himself perceived that here was a clock that indicated a "recent turning-on" of C-14 in the earth's atmospheric carbon dioxide, a fact he promptly dismissed because of its creationist implications.

Paper 1. Libby, W. F. *Radiocarbon Dating*. 1952, 1955. University of Chicago Press. Chicago.

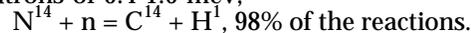
Libby begins by describing his method step-by-step as follows:

(1) Cosmic radiation bombards the earth's atmosphere with energetic particles of 1 to 2 billion electron-volts;

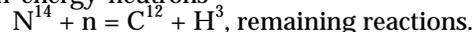
(2) These generate neutrons of 5 to 10 million electron-volts (mev) at all altitudes, with maximum at about 40,000 feet.

(3) This flux of free neutrons, most of it slowed to lower energy (below 1 mev) by scattering, collides with atmospheric nitrogen in two concurrent nuclear reactions:

With neutrons of 0.4-1.6 mev,



With high energy neutrons



(4) The C¹⁴ atoms produced in the first reaction oxidize to radioactive carbon dioxide and diffuse to produce a fairly uniform C¹⁴/C¹² oxide ratio throughout the world atmosphere.

(5) The average neutron intensity at which the first reaction occurs is 2.6 n/cm²-sec.

(6) Knowing the "carbon inventory" of the earth in gm/cm², (given as 7.25 in ocean carbonates, 0.59 in dissolved ocean organics, 0.33 in the biosphere, 0.12 in the atmosphere; total = 8.3 gm/cm²), this yields a value for Specific Production Rate (SPR) of C-14 = 2.6 x 60/8.3 = 18.8 atoms/gm-min.

(7) But the Specific Decay Rate (SDR) of C-14 in living matter was measured to be 16.1 ± 0.5 disintegrations/gm-min based on the 1950 half-life of 5568 yrs for C-14. This puzzled Libby because if Lyellian geology were true, and the world millions of years old, the SDR should have long since come to equilibrium with the SPR, the half-life of C-14 being short compared to such great age. He decided that 18.8 and 16.1 were "sufficiently within the experimental errors involved" because if not it would bring into question the "constancy in intensity of cosmic radiation over the past several thousand years." Libby then makes the following astounding statement, evidently unaware how exactly it agrees with the biblical record of a recent creation by divine fiat (p. 7):

If one were to imagine that the cosmic radiation had been turned off until a short while ago, the enormous amount of radiocarbon necessary to the equilibrium state would not have been manufactured and the specific radioactivity (SDR) of

living matter would be much less than the rate of production (SPR) calculated from the neutron intensity.

(8) Ignoring the above disparity between the SPR and SDR of C-14 (which the biblical record would lead one to expect), Libby assumed the two numbers equal, and assumed that the specific activity (SDR) of C-14 in the earth's biosphere, at least for the last 20,000 to 30,000 years, had an SDR the same as found today. Libby computed this SDR in the biosphere today as 15.3 dis/gm-min, after correcting the earlier figure of 16.1 for the ratio of C-13/C-12 in inorganic carbon (seashells, etc) which dominates the earth's carbon inventory (Libby's Table 1, p. 6).

Because of the two unwarranted assumptions, Libby's method is referred to hereafter as the Uncorrected Libby Method. The Corrected Radiocarbon Dating Method, described in Paper #10 and agreed to by other creationist papers reviewed, derives the value of SDR at the death of a specimen from the SDR/SPR ratio measured today, using the exponential build-up curve.

(9) Libby then showed that living specimens of all kinds, over a wide range of latitude and longitude, have the same SDR = 15.3 dis/gm-min. This was expected since all plant life acquires the atmospheric ratio of C-14/C-12 by photosynthesis and underlies the food chains of all animals.

(10) The Libby Method then follows from the fact that, from the moment of death, anything in the biosphere would cease to "take up" C-14 from the atmosphere (or the CO₂ in water) and would decay to half the value of SDR in its tissue every 5568 yrs (*now 5730 yrs*) if *uncontaminated by living matter or atmospheric carbon dioxide*. thus a simple measure of the SDR (in dis/gm of total carbon) in an *uncontaminated* specimen of ancient life should yield its death date, *assuming one knows the SDR in its tissue at the moment of death*.

(11) In order to vindicate his dating method, Libby selected a large number of uncontaminated carbon samples of known historical ages and compared them with their "radiocarbon age" determined by his method. The results dramatically supported his C-14 dating method within reasonable error for specimens dying within the last 4500 years. Five examples from Libby follow (Fig. 1, p. 9):

Tree ring (1370 BP) dated at 1260 BP = Before 1950)

Egyptian specimen of Ptolemy's era (2150 ± 150 BP) dated at 2200 BP

Redwood specimen (2930 ± 50 BP) dated at 2880 BP

Egyptian specimen, tomb of Sesostris (3750 BP) dated at 3650 BP

Egyptian specimen, tomb of Sneferu (4525 ± 75 BP) dated at 4475 BP

2. Morris, H. M. and J. C. Whitcomb. 1961. *The Genesis Flood*. Presbyterian and Reformed. Philadelphia pp. 43-44, 370-378.

On pp. 42-44 Morris and Whitcomb contend against objections by Bernard Ramm to a universal Flood. While Morris and Whitcomb adhere to the biblical six-

day Creation and world-wide Flood, they do not see the genealogies of Genesis 5 and 11 as father-son relationships, and allow a much longer period from Creation to Flood to Abraham if necessary.

The authors also dismiss radiocarbon dating as unreliable, based on some cases presented at the 1959 C-14 Symposium at Groningen. On p. 44 they make the categorical statement, "... the radiocarbon method cannot be applied to periods in the remote past, because the biblical doctrine of a universal deluge calls for a non-uniformitarian history of the earth's atmosphere and thus of cosmic-ray activity and radiocarbon concentrations." No grounds are supplied for this latter statement.

On pp. 370-374 Morris and Whitcomb address "Radiocarbon Dating of Recent Deposits." On p. 371-372 they list some seven assumptions in the method, of which they state "every one of these assumptions is highly questionable in the context of the events of Creation and the Deluge." The seventh assumption they list as faulty is "that the rate of formation (SPR) and the rate of decay (SDR) of radiocarbon atoms have been in equilibrium throughout the period of applicability." They fail to note however that Libby discovered that the SDR and SPR were not in equilibrium, and that he merely assumed they were to avoid the implications of a "recent beginning."

The authors then cite further authorities to discredit the validity of radiocarbon dating, stating that "any genuine correlation of the radiocarbon method with definite historical chronologies is limited only to some time after the Flood and Dispersion."

Finally, on pp. 374-377 under "Carbon-14 and the Deluge" Morris and Whitcomb disclose the basis for their rejection of any validity in radiocarbon dating prior to (and for some time after) the Flood, this being their attachment to the canopy theory. On p. 377 Morris and Whitcomb do however cite the pivotal statement by Libby (quoted earlier) about cosmic radiation being "turned off until a short while ago." Here they agree that this would automatically reduce the published radiocarbon dates.

3a. Armstrong, H. L. 1966. An attempt to correct C-14 dating. *CRSQ* 2(4):31-32.

b. Wiant, H. V. and Lester Harris. 1966. How reliable is carbon 14 dating. *CRSQ* 2(4):31-32

a. The paper examines the possible errors, especially in dating specimens buried at or before the Flood resulting from (a) contamination by admixture with fossil fuel, or with younger carbon-bearing material in the sedimentary turmoil at the Flood. The author also recognizes the error of assuming constant SDR in living matter (as Libby did) rather than buildup from Creation. Armstrong supports his thesis partly by use of a biblical chronology about 100 years longer than Ussher's.

b. The article by Wiant and Harris, in the same issue of the Quarterly, contains excerpts from longer papers. Wiant points out two possible sources of error in radiocarbon dating: (1) assuming constant cosmic radiation incident on the earth (for all time past); (2) assuming constant carbon dioxide in the earth's atmosphere. The second source mentioned by Wiant senses the importance of the carbon cycle inventory before and after the Flood.

Harris looks into errors resulting from transient variations in atmospheric C-14 caused by volcanic activity, and by the great increase in fossil fuel combustion and by atomic bomb testing. He also questions the assumption of constant cosmic radiation incident on earth's atmosphere.

4. Whitelaw, R. L. 1968. Radiocarbon confirms biblical Creation. *CRSQ* 5:78-83.

This paper focuses on the significance of the disparity between Specific Production Rate (SPR) and Specific Decay Rate (SDR) of C-14 in Libby's dating method and computes the resulting date of the "recent turning on" of cosmic radiation which Libby refused to entertain. Using the Libby values of 16.1 dis/gm-min for SDR in living matter today, and 18.8 for SPR in the atmosphere, assumed constant, the resulting buildup curve leads back to a Creation date about 15,000 B.P. Whitelaw points out that W. W. Rubey in 1950 claimed a cosmic radiation 35 percent higher than Libby, and a carbon exchange inventory 6 percent less than Libby, which gives an SPR of 27 atoms/gm-min, instead of Libby's 18.8. The author then shows that values of SPR = 27 and SDR = 16.1 would give a buildup curve for SDR starting from zero at a creation date of about 7,000 B.P. This would fit biblical chronology using values in Genesis chapters 5 and 11 based upon ancient codices used in the New Testament and now available.

5. Brown, R. H. 1968. Radiocarbon dating. *CRSQ* 5:65-68.

The author begins by reviewing the radiocarbon dating method established by Libby, and adds the fact that the method is based on adhering to a half-life of 5568 yrs, rather than the more precise value of 5730 yrs agreed upon since 1970. He reminds us that all published death-dates of specimens are also by agreement based on "today" = 1950, i.e. a specimen with a Specific Decay Rate (dis/gm-min) equal to one-half the 95 percent of the SDR of the NBS oxalic acid standard which is assigned a "radiocarbon age" of 5568 years, so that its death-date assuming no contamination with "younger" C-14 since death, is published as 1950 - 5568, or 3618 B.C. This standard was adopted because 95 percent of the SDR of standard oxalic acid is considered to be equivalent to the SDR expected from living wood in 1950 growing in an 1850 atmosphere.

Even with the above, Brown points out that there remains an uncertainty of ± 100 yrs in any radiocarbon date because of local fluctuations in C-14 in the atmosphere. In addition he grants it to be a pure assumption by Libby that the SDR in an ancient specimen when it dried was the same as found in today's atmosphere. The author does not appear to recognize, however, that the disparity between SPR and SDR today points clearly to a "recent beginning" which might thereby be calculated.

Brown then compares radiocarbon dates and tree-ring dates, and discusses radiocarbon dating and Genesis. He shows that we should expect the pre-Flood atmosphere (and therefore shells, coal, vegetation, etc.) to have an SDR between .001 and .01 of today's value, and that there is a noticeable "scarcity of objects associated with human activity" having radiocarbon ages exceeding 12,000 years, suggesting that

"human population has grown from a small beginning in a short period of time," the oldest dates being found in "material from the Middle East . . . and the Mediterranean basin."

The author concludes with the topic "Radiocarbon Age and Farming" in which he postulates that, to bring the SDR of the carbon reservoir up to its present level there would need to be a much *higher* value of SPR in the earth's atmosphere before the Flood, either by increased cosmic radiation or by "a reduction in the . . . nonradioactive carbon in the atmosphere." He then shows that studies of cosmic ray effects in meteorites show that cosmic radiation has been close to its present level over a period of time many orders of magnitude greater than that with which radioactive dating is concerned. He also states that even a complete disappearance of the Earth's magnetic field would no more than double the present C-14 production rate. Thus he contends that the inventory in the pre-Flood carbon cycle must have been much less than today.

6. Cook, Melvin. 1968. Do radiocarbon clocks need repair. *CRSQ* 5:69-77

The author begins by addressing the non-equilibrium between SDR and SPR which Libby discovered and discounted. He cites Libby's ratio, SDR/SPR = 15.3/18.8 = 0.81 (for the living biosphere), and compares it with that found by Lingenfelter and Suess, SDR/SPR = 13.3/18.4 = 0.72, and gives reasons to support the latter.

Cook then verifies that either of the above ratios (compared to SDR/SPR = 1.0 for an earth age of infinity) points to a recently created earth, "which is why scientists avoid it so tenaciously," says Cook. He then shows that the ratio SDR/SPR = 0.72 "telescopes all results by this (radiocarbon dating) method to about 10,000 years or less!" This he displays dramatically in his Figure 1 graph.

The author then addresses the assumptions and weaknesses of the radiological "long-time" clocks, uranium - thorium - lead, potassium/argon, and rubidium - strontium, and returns to further considerations of radiocarbon dating under the headings: (1) Radiocarbon dating of a global sea level cycle, confirmation of ancient shoreline predictions, and global extent of ancient land mass adjustments implied; (2) Radiocarbon and biblical dates associated with above sea-level changes, with The Genesis Flood, and with the (assumed) geological "division" of the earth in the days of Peleg; (3) Radiocarbon dating of ancient civilizations; and (4) Unwarranted claims of accuracy in radiocarbon dating.

7. Whitelaw, R. L. 1969. Radiocarbon and K-Ar dating in light of new discoveries in cosmic rays. *CRSQ* 6:71-73

In this short paper Whitelaw reviews again the assumptions underlying both the above dating methods, and then presents new findings regarding cosmic radiation reported by Stephen Rosen as follows:

. . . we are still not certain where cosmic rays come from, nor precisely how they travel here . . . Until the 1930's they were thought to be electrons . . . The curve in Figure 1 (of Rosen's paper) suggests that something is happening on a galactic

scale, the sources of the cosmic rays may be changing or . . . coming from different 'storage regions,' The highest energy of a cosmic ray observed, 10^{20} eV, is more than a billion times the energy obtainable at present in the most powerful accelerators on earth. . . . There is no doubt however that the great majority of all cosmic-ray particles are (bundles of) protons with nuclei about 13 times heavier than helium (i.e. alpha particles) . . . helium nuclei amount to perhaps 8 percent of the total . . .

Rosen also makes the pointed statement that spectroscopic analysis of the sun, stars, and fallen meteorites leads to the clear conclusion that "intensity of cosmic ray protons has been constant, within a factor of 2 for a thousand to a million years."

8. Howe, George F. 1970. Carbon-14 and other radioactive dating methods. *Bible-Science Newsletter*. 8(9):1-3.

Howe begins with a simple description of the Libby Method. On p. 5 Howe addresses the production of C-14 atoms from cosmic radiation which "fluctuates moment by moment, day by day, and week by week" being influenced by solar activity and other factors. He then assumes that there could have been fluctuations in past history greater than those we see today. This assumption counters prior conclusions by Libby, Brown, etc., based on meteorites, that cosmic radiation has been remarkably constant during the earth's history. It also omits the distinction between production rate of C-14 in the atmosphere, and "specific production rate" (SPR) per gm of carbon in the exchange inventory, which is the real criterion which affects buildup or decay of the "specific activity" (SDR) in the atmosphere at any time.

Howe then postulates the canopy theory and assumes it would greatly attenuate the diffusion of cosmic-ray produced neutrons and consequent production of C-14, and its oxidation to CO₂ followed by diffusion in accordance with kinetic theory of gases. How this attenuation results from the Canopy Theory is not explained.

With this postulate, the author comes to three conclusions:

(1) a vapor canopy might have reduced the amount of radiation reaching the atmosphere, thus reducing the amount of C-14 before the Flood; (2) there might have been much more C-12 in the atmosphere before the Flood, grossly changing the C-14/C-12 ratio; and (3) there are no accurate methods of dating ancient remains by carbon 14 . . . so that there is no need to challenge the biblical young-earth view on the basis of C-14 studies.

Howe does not touch on the disparity between SPR and SDR found by Libby and others, or the creationist implications of this disparity and how it would shorten the published C-14 ages. But he does then describe the method of dendrochronology suggesting that tree-ring dating might be used to give corrections to radiocarbon dates, where a complete sequence of rings in living and nearby dead trees could be found, as in bristlecone pines and Sequoias in the mountains of California. But here he overlooks the fact, demonstrated in later papers,

that a tree-ring is *not* impervious to contamination from adjacent rings or groundwater in a log which is what a valid C-14 date requires. Finally he states that ring dating by bristlecone pines goes back 4,000 years which "fits with a biblical date for the Flood."

9. Cook, Melvin. 1970. Carbon-14 and the age of the atmosphere. *CRSQ* 7:53-56

In this second paper by Cook (see Paper 6) he first gives strong support to radiocarbon dating "if due regard is taken of the *non-equilibrium* of carbon-14 in the earth as a whole" which he says "leads to a radiocarbon age of less than 10,000 years for the atmosphere itself!" He then speculates that the beginning of radiocarbon in the atmosphere "seems not to be the beginning of the earth, but rather in the Flood, perhaps only 4,500 years ago. The whole atmosphere seems to have been . . . cleansed of radiocarbon during the Flood."

His 1968 paper is then updated by discussion of Libby's attempt to reconcile the disparity between the SDR of radiocarbon in the world inventory and its SPR in the atmosphere, since the difference points to a young earth. Libby attempted to explain it by postulating that 3.4 gm/cm² of total carbon worldwide must be lost "by irreversible and irretrievable deposition of CaCO₃ every 8300 years (the mean life of a C-14 nucleus)." Cook shows the problems raised by Libby's assumption, and then offers a "generous alternate interpretation" for Libby's dilemma, but one which has three "serious implications for historical geology and uniformitarianism."

Cook's timely conclusion is that there is no solution at present in the uniformitarian view "to the discrepancy between the rate of C-14 formation (2.5 atoms/cm²-sec) and the rate of its decay (1.9 atoms/cm²-sec)" but that "this discrepancy vanishes if one assumes (as the Bible indicates) that the earth and its atmosphere have both been created quite recently." On this view, he points out, "one would expect formation of C-14 to exceed its decay" as the earth's inventory would still be in the "build-up" phase for C-14.

10. Whitelaw, R. L. 1970. Time, life, and history in the light of 15,000 radiocarbon dates. *CRSQ* 7:56-71, 83.

Whitelaw begins with a review of Libby's radiocarbon dating method and of his painstaking steps to verify (1) the worldwide near-uniformity of C-14 specific production rate (SPR) in the atmosphere, (2) the similar near-uniformity of C-14 activity (SDR) in all living things, and (3) the fair accuracy with which the method yields dates of specimens of known age. Then follows a list of the 96 scientific laboratories worldwide engaged in gathering and dating radiocarbon specimens of all kinds. The wide variety of specimens dated so far are listed in Table 2 (p. 59) by geography (continent and country).

In his Table 4 (pp. 60-61) Whitelaw then displays a selection of 67 dated specimens taken from some 15,000 published to date in *Science* (1951 to 1958) and *Radiocarbon* (1959 to 1969), specimens of flora and fauna that would have been destroyed by the Genesis Flood if it were the worldwide catastrophe described in the Bible.

He then describes "ten amazing facts" pertaining to all published dates, even though all such dates are raw

or uncorrected, in that they were computed by the various laboratories ignoring the disparity between SPR and SDR which demands a correction factor. The most significant of these facts are: (1) almost every specimen of once-living matter had a date within 40,000 years, as against the evolutionary presupposition that living matter has been on earth for many millions of years, so that a major fraction of specimens, taken at random, should have been "too old to date" (the C-14 method is only able to date back to about six half-lives); (2) specimens of fossil fuel (coal, oil, and gas) were found datable within 50,000 years; (3) all supposedly prehistoric human remains and man-made artifacts were datable within the last 30,000 years, including specimens from the same strata (or older) as Leakey's *Zinjanthropus*, and the Omo Valley finds reported to be "two to four million years old"; (4) the mastodon, mylodon, sabre-tooth tiger, etc. were reported at 10,000 to 30,000 years; and (5) deep ocean deposits and cores, containing detritus of the most primeval life on earth, dated within 40,000 years.

Whitelaw then selected the 9671 "good" dates—those with small probable error—out of the 15,000 published at that time, and divided them into three major categories, (1) man and animals in the Afro- Eurasian landmass, (2) man and animals in the western hemisphere, and (3) trees. All specimens of marine life, sediments, shells, peat, pollen, clay, and vegetation other than tree trunks, were excluded. In short, only such living things as would have been destroyed by the Flood were counted. To each date in these three categories he then applied the correction factor (which Libby should have applied) derived by the well-known equations for radioactive build-up and decay. This factor arises from the fact that each specimen died at a time when its C-14 activity (SDR) was less than today, being lower down on the build-up curve from zero at Creation to the present value of 15.5 dis/gm-min.

Having applied these factors which reduce every published age, all dates in each category were then accumulated in a histogram or bar-chart of 14 vertical bars, each bar 500 years wide, spanning the years from the present back to Creation. The height of each bar is proportional to the number of "good" death dates found in that 500 year span.

The purpose of the histogram was to reveal, if possible, an important consequence of the Flood, if it happened as described in Genesis 7-8. If so, we should find a 500 year period in human history when *very little life* was left on earth, preceded by one with a *great excess of deaths*. We should find this occurring in all three categories (men and animals in the eastern hemisphere, in the western hemisphere, and of trees worldwide); and we should find it at the same point in each of the three bar-charts, at the boundary between the 4th and 5th bars, approximately 3,000 B.C.

This in fact is precisely what the histogram displayed. A further examination of death-dates in each 500 year span, and their geographic location, revealed nine important additional facts in agreement with the biblical record.

It was recognized that, with only some 9700 dates distributed into 42 bars, the older dates having a probable error of ± 100 yrs or more, and with some

uncertainty at the bar boundaries in which bar a date belongs, the amount of data may be statistically insufficient to draw firm conclusions. Nevertheless, the coincidence of a massive number of deaths of men, animals, and trees, followed by a great dearth of life, simultaneously on all continents at about 3000 B.C. was a conclusion that could scarcely be denied.

Having thus verified the accuracy of the biblical date of the Flood, Whitelaw then determined the unknown Specific Production Rate (SPR) of radiocarbon in the atmosphere before the Flood by the recognized procedure as follows: (a) if the build-up of Specific Decay (SDR) used to correct all dates yields a Flood-date in agreement with the Bible, which it does, then (b) we are warranted in assuming a Creation Date based on the same biblical chronology. Using that date Whitelaw derived a value of $SPR = 64$ dis/gm-min (rather than the present value of 18.8 found by Libby) as the value prevailing before the Flood. Using this pre-Flood value of SPR one can determine the correct build-up of SDR in living matter before the Flood, and thereby a more accurate correction factor for each date.

The mathematical procedure for doing this is given in an Appendix to the paper, along with a discussion of how and why the Flood catastrophe would greatly *increase* the inventory in the carbon cycle after the Flood, in agreement with the pre-Flood SPR of 64 as derived. It is noted that an increase in pre-Flood SPR had already been deduced by Brown in Paper 5, without deriving a numerical value for it.

11. Hefferlin, Ray. 1972. A mathematical formulation of a creationist-Flood interpretation of radiocarbon dating. *CRSQ* 9:68-71

This paper, as stated by the author, "develops a mathematical statement of the C-14/C-12 ratio under a specific, simple, Creation-Flood model." Four parameters are defined which need to be determined from empirical data before the model can be used. These are: The rate of formation of C-14 in the atmosphere before the Flood; The rate of formation of atmospheric radiocarbon during the Flood; The production rate of atmospheric radiocarbon since the Flood (assumed constant); and the number of C-12 nuclei in the biosphere after creation. Given these, the model would then need to be tested against experimental facts.

12. White, A. J. 1972. Radiocarbon dating. *CRSQ* 9: 155-158.

The author begins by reviewing Libby's radiocarbon dating method and its assumptions. He fails to mention the fact that Libby found that the SPR and the SDR of radiocarbon were *not* in equilibrium, but differ by 17 percent. Nor does he note the biblical significance of this disparity. He then evaluates each of Libby's assumptions, on which the accuracy of the method depends, but regarding SPR and SDR states that Libby "has shown that the rate of formation and the rate of decay of C-14 were in equilibrium in the late 1940's."

Under a heading "Radiocarbon Dating and the Flood" the author then attempts to support his opinion why the method has unlikely validity for dates older

than 5,000 years because of the different terrestrial and atmospheric conditions which prevailed before the Flood, the principal factor being the assumed vapor canopy which enveloped the earth and the global semi-tropical climate it produced. There are many assertions regarding this canopy citing Genesis 1:6-8 as proof of its existence, but with no examination of its physical implications, or of other possible means God might have used for the climate of the pre-Flood world.

13. Long, Ronald D. 1973. The Bible, radiocarbon dating and ancient Egypt. *CRSQ* 10:19-30

The author begins by comparing the three different dates obtained for each of over 150 ancient Egyptian materials, of which he publishes 46 (7 of them given below). The three different dates obtained in each case are based on (1) a historical date "accepted" by Egyptologists based on supposed correlations between ancient papyri, astronomical events and pharaonic dynasties, which the author shows to be doubtful or worthless; (2) a biblical date based on correlating Scripture with ancient history, using Hoeh's *Compendium of World History*; and (3) a published radiocarbon date using Libby's uncorrected method, i.e. using the modern value of SDR = 15.3 dis/gm-min as the SDR in the specimen when it died, uncorrected for C-14 buildup.

The following table compares these dates for a few of the 46 cases in the author's paper:

Specimen description	Historical Date, B.C.	Biblical Date, B.C.	Libby C-14 Date, B.C.
Acacia beam from tomb of Zoser at Sakkara	2700	1718	(avg) 2020
Wood from a brick mastaba at Sakkara	3008	2050	2150
Acacia wood from tomb at Hemaka	3008	2050	2497
Cedar from outer sarcophagus of Aha-nakht	1858	1680	1760
Wood from lid of mummy-form coffin from Deir	1000-750	750	800
Linen in mastaba, Tarkhan (Petrie, 1914)	3100-2900	2254-1993	2315
Charcoal from burial, reign of Amenophis III	1408-1372	870	1137

The table (and all other cases examined by the author) shows the Libby date younger than the historical date and usually older than the biblical date. If he had corrected the Libby date for the SDR/SPR ratio, he would have found the true radiocarbon date to be younger and even closer to the biblical date.

On the basis of the 150 dates compared by Long (the above table being typical) he concludes that radiocarbon dates, even though uncorrected, corroborate the Bible and "absolutely negate the accepted or evolutionary interpretation of Egyptian history." At the same time the author is concerned about the disparity between Libby dates and biblical dates, and devotes the next five pages to dendrochronology (tree-ring dating) and the Suess curve based on the

bristlecone pine in hopes of finding a way to bring the Libby dates closer to his biblical dates. He then discovers two facts about dendrochronology world-wide by comparing tree-ring dating on the bristlecone pine with results from New Zealand, Japanese, and Swiss trees, namely, (1) the Suess curve gives inconsistent results, not reconcilable with dates obtained from New Zealand and Japan, and (2) the radiocarbon (Libby) date of a tree-ring specimen always gives a younger age than counting the rings.

Long attributes the inconsistent Suess corrections to random variations of C-14 and CO₂ concentrations in the atmosphere from year to year, and at different locations. Libby had shown this to be most unlikely by the laws of neutron scattering and of diffusion of gases in air. As to the consistently younger C-14 date of a tree-ring compared to the ring-count, Long appears unaware that some diffusion of live sap from the outer cambium into rings of previous years is bound to occur, so that the decaying C-14 content of an inner ring will almost always be offset by some diffusion of fresh C-14 diffusing inwards from younger rings, depending on the porosity of the wood.

In conclusion, Long notes (1) that there are no trees in Egypt which began growth in ancient times (i.e. to permit correlation of ring patterns with bristle-cone pine or other species), and (2) biblical chronology before the Flood is not in agreement with C-14 dating, nor should it be expected because of the assumed vapor canopy.

14. Clementson, S. P. 1974. A critical examination of radiocarbon dating in the light of radiocarbon data. *CRSQ* 10:229-236

Clementson begins by describing Libby's radiocarbon dating method and the values Libby derived for SPR, 18.8 dis/gm-min, and for SDR, 16.1 dis/gm-min. He appears to accept Libby's assumption that the two values are close enough to be assumed in equilibrium, and hence does not address the possibility that the SDR in the biosphere follows the expected build-up curve from zero at Creation due to this disparity.

Clementson does reject Libby's assumption of rapid diffusion of the neutron production in the atmosphere, and equally rapid diffusion of the radioactive carbon dioxide produced by neutron collision with nitrogen atoms, which one would expect from diffusion theory.

He then postulates that wide variations are to be expected in the radiocarbon content of the outer cambium in living trees—variations with altitude, latitude and longitude—because of the poor diffusion of atmospheric C-14 claimed above. He further states that radial transfer of organic matter from ring to ring in a tree has never been observed, so that a radiocarbon dating sample taken in one ring could not be contaminated by sap from a younger outer ring.

On pp. 230-232 Clementson presents arguments and data to show that it is now "widely accepted" that the activity level (SDR) in the biosphere "has been decreasing" for some 5,000 years, based upon radiocarbon analysis of tree-rings of known age, i.e. supposedly known by a sequence of living and dead trees (or fallen logs) with overlapping ring series. His graph of Figure 2 appears to substantiate a decrease in SDR from 15.0 dis/gm-min 4500 years ago to 13.8

at present, measured in bristlecone pines in Inyo National Forest and Sequoia trees in Sequoia National Park.

He then postulates a production rate (SPR) of C-14 in the atmosphere over the same 4500 years as lower than specific activity (SDR) in the biosphere and essentially constant at about 12.4 dis/gm-min. Such a value is greatly below Libby's value of 18.8. The author attempts to explain this on p. 233 as "due to an increase of the mixing of the atmosphere." At the same time he does not seem aware that radioactive dating of tree rings whose SDR at death was greater than present could not be done by the Libby method without applying a correction for the fall-off in SDR with time. Clementson then speculates on pre-Flood conditions and the vapor canopy that might account for values of SDR higher than SPR after the Flood.

15. Brown, R. H. 1975. Can we believe radiocarbon dating? *CRSQ* 12:66-68; with further remarks by Brown regarding Rampart Cave in *CRSQ* 12:219

This short monograph describes the apparently anomalous radiocarbon dates of bat guano and sloth dung in Rampart Cave, 650 ft above the lower Colorado River near the Arizona-Nevada state line. The guano and dung layer was 4.5 ft deep and the bottom 1 ft layer gave dates between infinity and 40,000 years. The next 4 inches yielded ages from 40,000 to 18,500 years, and the upper 3 ft of the deposit dated from 18,500 to 10,500. All these dates were obtained by the uncorrected Libby method and published in *Radiocarbon*. The correction for SPR/SDR disparity of Paper 10 would put them in the pre-Flood era, which leaves further questions.

Brown finds that these anomalous dates tax the credibility of the Libby radiocarbon dating method, since it is evident that the first deposits in the cave began to accumulate a few years after the Flood, perhaps even when the Colorado was close to cave level, still draining the vast inland sea trapped upstream by the Flood. First, the large bat and bird population necessary to build the deposit to such a depth must have propagated from the few carried on the Ark. Second, how does one account for the almost zero C-14 (infinite age) in the lowest layer, since it appears impossible that the deposits in this cave, far down the canyon wall, could have survived the Flood undisturbed.

Brown also describes similar phenomena (near-infinite radiocarbon dates) in buried driftwood in Stanton's Cave some 200 miles upstream on the Colorado and 138 ft above the river. Here were found coniferous and cottonwood logs, some with as many as 150 growth rings buried in sediment.

16. Whitelaw, R. L. 1975. The testimony of radiocarbon to the Genesis Flood. Symposium on Creation V. (D. Patten, editor.) Baker. Grand Rapids. pp. 39-50

The first part of this paper (pp. 39-46) repeats the facts and data of Paper 10, the statistical analysis of terrestrial radiocarbon dates published to date.

There are minor changes in text to suit a more general audience. But in addition and for the first time, Whitelaw presents a new table and bar chart of corrected radiocarbon dates published to date in *Radio-*

carbon, of oceanic marine life. the purpose of this new chart was to discover whether the numerous and vast "fossil fish-beds" found far inland and often at high altitude were a consequence of the Genesis Flood, rather than a result of frequent subsidence and rise of the land masses over geological time, as evolutionary geology postulates.

The 1,587 marine dates selected (none of them included in the 9,671 dates used in Paper 10) were divided into two categories, (1) 955 "good" dates (i.e. small probable error) of dead marine fauna taken from ocean bottoms and beaches below high tide, these constituting the "control group"; (2) 632 specimens of ocean marine life found far inland or buried in shore cliffs well above highest tides, which would therefore testify to some catastrophic inundation such as by upheaval of the ocean floor or subsidence of the continents (see Paper 26).

The results are quite dramatic. Specimens in category (1), the control group, had death dates distributed fairly uniformly (average about 70) in every 500-yr span from Creation to the present, with two minor anomalies, (a) a larger than average number in the box that included the Flood, and (b) much smaller than average (25 dates) in the 500-yr box following the Flood. Each of these anomalies are explained in the Flood scenario proposed in Paper 25.

In category (2), marine life in the inland vast fossil fish-beds of the world were all (except for a very few within reach of estuaries floodable by abnormal hurricane or tsunami) found to have died at or before the Genesis Flood. Those dying before the Flood would support the scenario of Paper 25 that the Flood was accompanied by vast upheavals (tectonic and volcanic) of the ocean-floor, transporting its detritus of once-living sea-life far inland and leaving it there.

17. Hanson, James N. 1976. Some mathematical considerations in radiocarbon dating. *CRSQ* 13(1): 50-56

Hanson's paper is in two parts. First he examines the mathematics of radioactive decay as a stochastic (probabilistic) process with random variations in effective half-life from sample to sample of a given specimen, and determines the "Sensitivity Equations" for such a case (Note 2).

In the latter half of the paper, under the heading "Global Radiocarbon," Hanson develops the equations for buildup of activity (SDR) in the biosphere where the SPR is constant. Using a value of $SDR = 12.4$ dis/gm-min today, from studies more recent than Libby, and Libby's $SPR = 18.8$ (giving a ratio $R = SDR/SPR = .66$), Hanson's equation gives a value of $R = .42$ for a Flood date of 4322 B.P. based on Ozanne's chronology. He then extrapolates back to Creation at 5978 B.P., accepting the Masoretic Text chronology of Genesis 5, and concludes that the SDR would need to exceed the SPR in the pre-Flood world, which he thinks possible by a "denser pre-Flood atmosphere," i.e. a variation of the canopy theory. In this Hanson does not address the question of what would start the world with a high value of SDR in the biosphere, other than divine fiat (Note 3).

18a. Tyler, David J. 1977. The crisis in radiocarbon calibration. *CRSQ* 14:92-99

- b. Tyler, David J. 1978. Radiocarbon calibration-revised. *CRSQ* 15:16-23.

In the first of these two papers, Tyler addresses problems similar to those reviewed in Paper 13, but without tables of supporting data, namely how to calibrate radiocarbon dates against established tree-ring sequences and then how to reconcile radiocarbon dates of Egyptian archeological samples, so corrected, to the (supposedly) known historical dates. The paper would benefit from more precise definition of terms, and of procedures recommended (Note 4).

Tyler's second paper addresses the non-equilibrium between SDR and SPR in the carbon cycle, which Libby found but dismissed, and discusses various evolutionary hypotheses to account for it. In a chapter entitled "The Non-Equilibrium Model and Biblical History" he then compares creationist (biblical) views but does not appear to recognize that the SDR/SPR ratio today establishes a buildup curve giving values of SDR in the biosphere at any time in previous history (as Paper 10 shows), and thus gives a correction factor for every published Libby date.

The author then discusses again the calibration of radiocarbon dates against tree-rings, assuming an unbroken and uncontaminated ring sequence, and comparison with "accepted dates" of Egyptian specimens going back to about 500 B.C., but again using uncorrected Libby dates. A graph of such dates, calibrated by tree-rings, shows a decline in SDR which he could have calculated directly by the build-up curve corrections. From this Tyler concludes that a revised chronology of ancient Egypt is necessary. He then compares his findings with those of Courville (a creationist) and Velikovskiy (a non-creationist but catastrophist).

The two papers give us no actual C-14 calibration against "good" tree-rings, nor one for archeological C-14 dates. His two general conclusions are simple: (1) "Creation and catastrophism are independent; one does not imply the other"; and (2) there is "a sequential association of events: Creation to catastrophism to variation (limited)." Other conclusions for secularists and uniformitarians are also given, but are irrelevant to our purpose here.

19. DeYoung, Donald B. 1978. Creationist predictions involving C-14 dating. *CRSQ* 15:14-16.

The author begins by noting two mechanisms for the variability of cosmic ray flux through the earth's atmosphere which creationists have promoted. By this he presumably means the rate of production of C-14 atoms which has two independent variables, (1) the cosmic radiation flux itself (mostly ultra-high energy proton bundles, per Paper 7) and, (2) its rate of attenuation in the atmosphere before it produces the neutrons which initiate the neutron — N_2 — C^{14} — CO_2 sequence by which radiocarbon dating works.

The two mechanisms he lists are, (1) "the existence of a pre-Flood water vapor canopy surrounding the early earth," and (2) a "quenching" of incident cosmic radiation by the earth's magnetic field, presumed to have been much stronger at Creation and decaying ever since, as proposed by creationist Thomas Barnes (Note 5).

DeYoung then addresses the disparity between SPR and SDR discovered by Libby (calling them "forma-

tion and decay rates of C-14 in the atmosphere"), but does not note that it is precisely this disparity which Libby recognized as pointing to a recent "turning on" of radiation. The author then alludes to Kelvin's rejection of radioactivity as a spontaneous process (i.e. stochastic) holding to the idea that it was a property of the atom, rather than of the nucleus, and therefore a chemical phenomenon, subject to temperature, pressure, etc. The author is also of the opinion that natural processes can produce variable enrichment from site to site in the various isotopes of an atom, accounting for some present problems in radioactive dating (Note 6).

The paper ends with five interesting predictions re C-14 dating, and with the conclusion that "the many variables present in radiocarbon dating . . . rule out calibration of the method beyond short-term possibly absolute dendrochronology of bristlecone pines." But the author also states that "predictions concerning C-14 dating show that the future holds tremendous possibilities for evidence of a recent Creation."

20. Gladwin, H. S. 1978. Dendrochronology, radiocarbon, and bristlecones. *CRSQ* 15:24-26.

The author begins with a short history of his early studies in dendrochronology under Douglass at the Tree Ring Laboratory of the University of Arizona at Gila Pueblo, beginning in 1930. He then reviews problems in correlating a tree ring's age by ring number with its age by radiocarbon dating, as follows:

(1) Only a few species of trees are useful for a reliable ring-count; most deciduous trees are of little value because the rings are difficult to decipher, except for a few oaks. Among the conifers, junipers are often quite misleading because the trunk may be partly dead while the living part may add no ring at all or often multiple rings in the same year, and the bristle cone pine (*Pinus aristata*) is most undependable because the living cambium in a tree of 100-inch girth might only have an arc of 8 inches.

(2) Nevertheless for ring-counts to great age in a single tree (to avoid dependence on finding an overlapping sequences in adjacent dead trees or fallen logs) we are dependent today on the bristlecone pine, often living 3,000 to 4,000 years [6,000 years claimed by Renfrow in his 1974 book, *Before Civilization*]. Also cited is the *Sequoia gigantea* in California, and a rare species in Japan and another in New Zealand, not mentioned by Gladwin.

(3) With respect to radiocarbon dating, Gladwin describes a 1949 visit to Libby's early laboratory at the University of Chicago, and discusses the serious problems distinguishing the radiation count from a small or very old sample [often as low as 50 counts per minute (cpm)] when the background natural radioactivity may be as much as 600 cpm.

It is strange that Gladwin fails to note here that shielding and electronic discrimination techniques available since 1950 can easily make such a low sample count. In addition, counting the C-14/C-12 ratio in a sample by mass spectrometry is now well-developed, and was being done in 1976 when the above paper was written.

21. Brown, R. H. 1979. Interpretation of C-14 age data. *Proceedings, 15th Anniversary Convention of Bible Science Association, Anaheim, CA.* pp. 45-52.

Brown begins by describing the Libby radiocarbon dating method but makes no mention of the disparity between SPR and SDR which Libby found, or of its implications. Using the term "C-14 concentration level" or "radiocarbon content" for specific decay rate (SDR), he presents Figure 1 purporting to show a one-to-one correspondence between C-14 age and historical age. He does not mention the fact that his C-14 ages are derived by the Libby uncorrected method.

He then sees this correspondence as proof of "an essentially constant C-14 concentration in the upper biosphere . . . over a time span of at least 3500 years." All the data points in Figure 1 beyond 2000 years are for Egyptian specimens dated by an assumed Egyptian chronology which has been shown elsewhere to be greatly inflated when checked against tree-ring dating. Hence the author's Figure 1 shows that *correct* Egyptian dates will better fit *corrected* Libby dates, which one should expect.

The author's Figure 2 shows uncorrected C-14 dates vs. "Dendro-dates." It is offered to confirm constant SDR over the past 3500 years, but Brown does not mention that the "Dendro-dates" entail several sequence-matching regions from living tree to dead tree to logs, with serious probable errors as noted by Gladwin in Paper 20.

The author's section "Equilibrium in the Upper Biosphere: True or Quasi?" also raises questions on the definition of "upper biosphere being air, land, fresh water, ocean surface and organisms living therein" (p. 46). It is assumed that equilibrium between SDR and SPR is meant, or constancy of SDR in the biosphere. But such an arbitrary division between upper and lower ocean is dubious in view of the constant transfer between ocean strata, both of dissolved carbon dioxide and of organic. The effects of ocean currents and of the large change of CO₂ solubility with temperature are not mentioned. Nor is the fact that ocean-borne carbon dioxide is the dominant part of C-14 in the carbon-exchange cycle.

Brown's final section on "Biblical Chronology Correlation" examines four factors, cosmic ray intensity, geomagnetic field intensity, water content of the outer atmosphere, and world carbon inventory.

(1) As to cosmic ray intensity, he uses supporting references to conclude that it has been constant since the Creation.

(2) On geomagnetic field intensity, he indulges in phrases such as "it has been estimated," "it seems reasonable to presume," "one can postulate that," but gives no convincing evidence either that the earth's magnetic field has greatly changed in Bible time, or that it would significantly affect the production rate of C-14 atoms by cosmic radiation. On this point also, Brown does not mention the facts reported in Paper 7 ten years earlier, that cosmic radiation consists largely of proton bundles of atomic weight near 50 and over a billion times the energy in our most powerful accelerators, hence not easily deflected by the earth's magnetic field or by any likely increase in that field.

(3) As to the water content of the outer atmosphere, the author weighs various views regarding a pre-Flood water vapor canopy shrouding the earth and concludes that "any reasonable proposal in the pre-Flood stratosphere is ineffective" toward harmonizing C-14 dating with biblical chronology.

(4) Finally, as to the world carbon inventory, Brown estimates the inventory in his Table I, in which items 1-11 are what he calls the "total contemporary biosphere." Libby called this the "carbon exchange inventory," i.e. carbon participating in the great cycle from atmospheric C-14 to CO₂ to vegetation and ocean back to the atmosphere, this carbon being the denominator used in comparing SPR and SDR. Brown then estimates the remaining fixed or non-cyclic carbon in the world such as in fossil fuel (prior to industrial era), buried fossil vegetation (not commercially useful and sedimentary carbonates in earth's crust and ocean floor, and finds it to be some 550 times greater than the active carbon inventory. He does not address the question of how the active inventory (and therefore SDR/SPR ratio) was changed during the Flood.

Brown then lists in Table II what he calls "C-14 Time Scale Adjustment Factors" possible from each of the above four phenomena, and attempts to graph in his Figure 6 the C-14 production (SPR) and "relative concentration" changes associated with the Flood. Finally he reviews some evidence in dates of mammoths, musk-ox and mastodon taken from *Radiocarbon* indicating a post-Flood increase in SDR.

His general conclusion is that "data now available . . . provide ample assurance that the C-14 concentration (of) the biosphere over the past 3500 years could have accumulated since the Flood within a time period allowed by Biblical chronologic date."

22. Whitelaw, R. L. 1979. The biblical record of Creation, Flood and history in light of 30,000 radiocarbon dates. *Proceedings, 15th Anniversary Convention of Bible Science Association*, pp. 197-202.

This paper is an update of Paper 10, this time based on a review of over 30,000 dates published by *Radiocarbon* through 1979, of which Group I consists of 20,297 dates pertaining to man, animals and trees, and Group II, 3,090 dates pertaining to ocean creatures found in the ocean or buried on land. Analysis of dates in Group I reinforced the dramatic conclusions of the bar-charts in Paper 10, and the bar-chart distribution of the second group (marine dates) further substantiated the first report on marine dates given in Paper 16, namely that all marine life found buried on land and beyond reach of coastal waters (tides and highest waves) died either during the Flood or before the Flood and must have been transported there during the Flood, even where found at high altitudes on all five continents.

23. Whitelaw, R. L. 1982. Radiometric dating and the quest for an absolute geochronology. Baltimore Creation Convention. June 1982. GAM Printers. Sterling, VA.

In this paper Whitelaw addresses seven questions: (1) Is there an absolute geochronology available, and where is it found? (2) What is the proof that the biblical record brings us an absolute standard both for the

origin and age of the earth, and does it satisfy the accepted canons of scientific evidence? (3) What is the number of years since creation given us by the biblical record? (4) Is any known fact of history or geology in conflict with the biblical chronology, or with a sudden complete creation of a mature Earth? (5) What are the new radiometric “clocks” or techniques now available for estimating the age of the earth, and how well-proven are they? (6) Are any of these radiometric methods in conflict with the geochronology of the Bible? (7) Are any of them in agreement with the genealogies in the Bible by which the years from Creation to Christ can be determined (Note 7)?

The paper includes a Category A list of “clocks” pertaining to the biosphere (such as radiocarbon dating), and a Category B list of clocks pertaining to the geosphere, solar system or cosmic events.

24. Lee, Robert E. 1982. Radiocarbon: ages in error. *CRSQ* 19(2):117-127.

The author begins with the pessimistic assertion that “the troubles of the radiocarbon dating method are undeniably deep and serious . . . Continuing use of the method depends on a “fix-it-as-we-go” approach . . . and that “fully half of the dates are rejected.”

He then reviews Libby’s method and assumptions but fails to note that Libby refused to accept the evidence from the SDR/SPR ratio pointing to a recent beginning, and the obvious correction in dates this requires, as Paper 10 and others show. Author Lee then discusses various facts that have brought radiocarbon dates (meaning uncorrected Libby dates) into question: (1) calibration by dendrochronology, (2) magnetic field effects, (3) solar cycle influence, (4) atmospheric and ocean mixing effects on the local C-14 inventory, (5) fractionation between C-12 and C-14 in living things, (6) contamination of samples in the ground, (7) other contamination factors in charcoal, peat, bone, shell, and in the hands of the collector.

Lee then addresses the *statistical* uncertainty of the C-14 age of a given specimen and examples of widespread disagreement and even mis-statements by authorities. But he fails to note that they employ the uncorrected Libby method. His conclusion then begins with the statement that “radiocarbon dating has somehow avoided collapse onto its own battered foundation, and now lurches onward with feigned consistency.”

25. Whitelaw, R. L. 1983. The fountains of the great deep and windows of heaven. *Proceedings, National Creation Conference*, Minneapolis. pp. 95-104

This paper, though not touching on radiocarbon dating, is pertinent here because it provides an in-depth analysis of the weaknesses of the canopy theory, which has dominated much creationist thinking on radiocarbon dating. Whitelaw first shows that the canopy theory is untenable on a number of counts, besides having no real biblical support. He then unfolds a probable scenario for the Flood catastrophe beginning with the significant phrase of Genesis 7:11 and 8:2 “the fountains of the great deep and the windows of heaven.” The sequence proposed accounts for almost all the geophysical evidences of the Flood, both terrestrial and submarine, not otherwise explicable, few of which can

be explained by the canopy theory. Included for the first time in this Flood scenario are such facts as the global ocean-floor maps with their abundant evidence of massive vulcanism and ocean-floor upheaval in the geologically recent past, the pre-historic maps of Antarctica by “ancient sea-kings,” and evidence of massive continental shifts during the Flood, triggered by the great mid-Atlantic and Indian-Antarctic rifts, with residual motion continuing to this day.

26. Lammerts, Walter E. 1983. Are the bristlecone pine trees really so old? *CRSQ* 20:108-115

This notable paper appears to have been missed by subsequent creationist writers on dendrochronology. Lammerts reports dramatic results of actual experiments on bristlecone pine seedlings subjected to the pattern of rainfall in the White Mountains of California, where bristlecone pine tree-ring counts have been used to calibrate—and usually discredit—the C-14 date of a given ring in a sequence of living and dead trees.

The author shows conclusively that 8-month-old seedlings which received a typical (21-day) drought stress developed an extra growth ring (4 instead of 3) compared to the control group of seedlings. Also, a similar drought stress later in the season produced an extra growth ring (now making 6 instead of 4).

Lammerts concludes that

The *San Francisco* type of spring and fall rainfall, with a relatively dry period in the summer, the young forests on the White Mountains would have grown an extra ring per year quite often. Accordingly . . . the presumed 7100 year age postulated for these trees by Ferguson would be reduced to about 5600 years, on the assumption that extra rings would be formed by stress during 50% of the years between the end of the Flood and about 1200 AD.

27. Morton, Glenn R. 1984. The carbon problem. *CRSQ* 20:212-219

This paper, though not focused on radiocarbon dating, raises an important question about the earth’s total carbon inventory at Creation, evidently not considered by other creationist writers to date.

Physicist Morton shows that the quantity of carbon in the earth’s known oil reservoirs is 666 times greater than the carbon found in all plants and animals on the face of the earth today; and that earth’s total coal resources contain 50 times more organic carbon than the entire biosphere. Morton concludes that the usual creationist assumption that oil and coal in the earth’s crust are the remains of plants and animals killed in the Genesis Flood, then requires that the pre-Flood earth must have been 716 times more lush than at present.

This last number being highly improbable, Morton goes on to consider other solutions, as (1) an abiogenic origin of much of the carbon in the earth’s crust, (2) post-Flood deposition of carbon and (3) an abiogenic origin of the limestone carbonates in the ocean.

28. Vaninger, Stan F. 1985. Archeology and the antiquity of ancient civilization: a conflict with biblical chronology?—Part II *CRSQ* 22:64-67.

Author Vaninger first exposes what he calls "The Carbon 14 Coverup" in dealing with the history of ancient Egypt. In brief, prior to Libby's C-14 dating method, Egyptian chronology had been 'anchored' to several crucial dates, the earliest being 1872 B.C., the 7th year of Sesostrius III. Fixing this point established the year 1786 B.C. for the end of the Middle Kingdom, a date based largely on astronomical methods. By 1960 these dates had become so crucial to 'orthodox' Egyptologists, that Velikovsky confronted a "scholastic/bureaucratic logjam" when seeking permission to test New Kingdom material by C-14 dating. He was bluntly told that "if a C-14 date supports our theories, we put it in the main text; if it does not entirely contradict them, we put it in a footnote; and if it is completely 'out of date,' we just drop it."

Vaninger shows that since those days C-14 dating, even by those using the uncorrected dates of Libby's Method, has radically reduced accepted Egyptian chronology by over 500 years, has forced a rethinking of astronomical methods previously used, and most of all has brought 'orthodox' Egyptian history into fair accord with the date of the Flood based on biblical chronology. All this is shown by Vaninger with fascinating personal details about the scientists involved.

Vaninger goes on to discuss reconciliation of C-14 dates with previous archeological (and evolutionary) estimates for the age of Mesolithic and Paleolithic Man. Here the uncorrected Libby dates give exaggerated ages, especially pre-Flood, which are compatible with the usual evolutionary bias when non-creationists write about "pre-historic man." Vaninger considers the immediate post-Flood C-14 dates to be inflated because "the Flood greatly upset the equilibrium of the C-14/C-12 ratio in the atmosphere . . ." This, of course is an assumption probably based on the canopy theory which he apparently holds. The natural buildup of the SDR/SPR ratio from the moment of Creation, and the sudden change in Carbon-cycle inventory caused by the Flood gives a better answer.

Vaninger concludes his paper by stating that "there no longer appears to be any problem . . . regarding the antiquity of human civilization conflicting with the Biblical record of the Flood and the chronology implied by Genesis 11."

In commenting on Vaninger's paper in *CRSQ* 23:37, Warren H. Johns of Andrews University lists three major problems in the C-14 dating of Egyptian materials:

(1) Contamination by "modern" carbon; e.g. reeds from Theban tombs, growing from mud bricks close to the surface could be as much as 1500 years younger.

(2) Re-use of ancient wood for funerary artifacts; e.g. a papyrus in the British Museum alleges that a piece of wood stolen from the necropolis of Rameses II (19th Dynasty) was re-used in coffins of the late 20th Dynasty, accounting for a coffin board date 1300 yrs older than the coffin joints.

(3) Damage to valuable artifacts caused by early carbon-dating sample-taking; e.g. early samples required removal of 10 to 20 grams of uncontaminated specimen to get a good date, so that few Egyptian artifacts were made available by museum curators. With the

mass spectrometer method of counting C-14 and C-12 ions, used since 1985, a sample of 10 to 20 milligrams is adequate if uncontaminated.

29. Brown, R. H. 1986. Radiometric dating from the perspective of biblical chronology. *Proceedings First International Conference on Creationism*. Pittsburgh. pp. 31-56.

This paper attempts to reconcile biblical chronology with all radiometric dating methods attempted to date. Radiocarbon dating, though it alone points us to when life began, is only addressed in pp. 42-48. Brown appears to accept the uncorrected Libby method and the published dates in *Radiocarbon*. There is no mention of the need to correct their most egregious error, the SDR/SPR disparity. Instead, he focuses upon other factors that might bring C-14 dates into line with biblical chronology, these being: (1) use of dendrochronology to obtain local correction factors; (2) C-14 equilibrium in the upper atmosphere; (3) valid age limits for C-14 dates for different laboratory techniques, and probable errors due to such techniques as well as contamination of samples; (4) cosmic ray intensity effects on local values of SPR; (5) effect of geomagnetic field intensity on SPR; (6) effect of stratospheric moisture content.

The author closes with a "biblical C-14 transient model" and an estimate of the world carbon inventory (his Table 5), but proposes no satisfactory method of bringing uncorrected Libby dates into line with biblical chronology.

An Appendix lists 88 references of which some 24 pertain to radiocarbon dating, but none of the creationist papers reviewed here are listed except those by Brown himself.

30. Chaffin, Eugene F. 1987. A young earth?—A survey of dating methods. *CRSQ* 24:109-117.

The author first gives a brief survey of radiometric dating methods proposed to date. He then surveys the work done on radiocarbon dating since Libby, primarily that in the creationist papers reviewed above plus related creationist writings. The author then discusses the decay of the earth's magnetic field, indirect evidence from astronomy that implies a young age for the planet earth, and other dating procedures such as fission track dating, and stalactites and stalagmites that also point to a young earth.

Chaffin's list of 154 references is the most comprehensive seen to date. All but 22 are by creationists, most of them published in *CRSQ*. The author concludes with the statement that "there are still educated people alive today who are willing to defend biblical authority on the subject of the age of the earth and that very reasonable defenses can be made."

31. Brown, R. H. 1990. Correlation of C-14 age with the biblical time scale. *Origins*. 17:56-65.

Brown begins by supporting the Septuagint as a better basis than the Masoretic text for biblical chronology. For the date of the Flood he uses 5350 B.P. or 3360 B.C. He then considers what he calls "carbon-14 constraints," based upon results of bristlecone pine dating by Ferguson, and concludes that at the beginning of the Flood the biosphere had no more than 1 percent of the C-14/C-12 ratio "that has characterized

it over the past 3500 years.” No basis is given for assuming a constant ratio since the Flood.

The author then assumes an atmospheric buildup of C-14 specific activity, A , during the Flood by the equation, $A = A_1[1 - \exp(-at)]$, and proceeds to calculate the value of the parameter “ a ,” where A_1 is the equilibrium level” of specific activity of C-14 in the atmosphere, which he does not specify. With this equation he then calculates a radiocarbon age, R , vs a Biblical Model Real Time age, T , and concludes his paper with reasons supporting it.

32. Aardsma, Gerald E. 1990. Radiocarbon, dendrochronology, and the date of the Flood. *Proceedings Second International Conference on Creationism*. Pittsburgh. pp. 1-10.

In this paper Aardsma evaluates radiocarbon and tree-ring data “in light of current creationist understanding of the impact of the Flood on global geophysical systems to deduce a most probable date for the Flood.”

He claims to have found a Flood date “within a few thousand years of 12,000 BC,” i.e. about 14,000 B.P. Using this date, he derives a “creationist model for the increase in global C-14 specific activity following the Flood, and claims that the model “readily explains the long-term past behavior of atmospheric C-14 recorded by approximately 9,000 year continuous tree-ring sequences in Europe and America.”

Aardsma does not make use of the classic work of Lammerts in 1983 (Paper 26 above), showing that climatic conditions can produce multiple tree rings per year. Rather he appears to assume that a reliable 9,000-year sequence of living and dead tree-rings is possible, and that C-14 specimens of such rings are uncontaminated.

Aardsma claims “strong support for the validity of the model (and hence the approximate date for the Flood upon which it is based) as well as the legitimacy of these long dendrochronologies.” The reasoning used to support this claim appears circular in that an assumed date of the Flood is used to validate an assumed analytical model.

The author concedes that his model “implies that conventional radiocarbon dates” (i.e. those computed by the uncorrected Libby method as published in *Radiocarbon*) “in excess of about 11,000 B.P. greatly exceed true dates”; and concludes his abstract with the claim that his model “provides a rational basis for calibrating conventional C-14 dates, thus providing creationists with an objective and universal radiometric chronometer for determining the chronology of earth history from the Flood to the present.”

Aardsma’s discovery that C-14 published dates in excess of 11,000 B.P. greatly exceed true dates is of course in complete agreement with the findings of Paper 10 and others above, findings based on the SDR/SPR disparity which Libby dismissed. Aardsma however comes to this conclusion independently by correcting Libby dates of tree-rings to fit his 9,000-yr tree-ring sequence. In doing so he must assume that, (1) the C-14 specimens taken from his tree-rings are uncontaminated, (2) the vast majority of the rings in his sequence were annual, and (3) the ring patterns used to compare rings from living trees to older fallen

logs and snags all give perfect matches. The reader may judge for himself whether this set of assumptions gives a better method of correcting uncorrected Libby dates than using the well-established exponential buildup curve based on the SDR/SPR ratio.

Most remarkable in this paper is the assertion of a Flood date of 12,000 B.C. (+/- a few thousand) since it challenges the strict biblical chronologies of Genesis 5 and Genesis 11. The widest variation in the date of the Flood among many Bible scholars who have studied it is about 600 years. Here however we have a theory by Aardsma that all such scholars are in error by some 9,000 years, based on a model that makes no use of Scripture (Note 8).

Summary of Views Pertaining to Validity of Radiocarbon Dating and Associated Questions

- A. VIEWS ON PUBLISHED RADIOCARBON DATES (i.e. By the uncorrected Libby method)
1. Papers that appear to accept them as reliable with minor correction: 1, 3, 5, 8, 12, 14, 20, 29
 2. Papers that view them as supporting the biblical Flood and/or Creation: 30
 3. Papers that view them as destroying evolution and Lyellian geology: 10, 16
 4. Papers that consider them unreliable or having little relevance to creationism: 1, 2, 10, 16, 20, 24
 5. Papers expressing other views on relevance of C-14 dates: 3, 7
- B. VIEWS ON NEED FOR CORRECTING RADIOCARBON DATES
1. Papers that view published dates as a strong witness to a biblical Creation when corrected by buildup curve of SDR/SPR Ratio: 4, 6, 8, 9, 10, 22, 23
 2. Papers that view published dates, corrected as above, as a strong witness to *both* the biblical Flood and Creation 10, 16, 22
 3. Papers that perceive the need to correct published dates when SDR/SPR < 1, but are not aware that such corrected dates would confirm the biblical Flood or Creation: 2, 3, 17, 31
 4. Papers that view C-14 dates as valueless unless corrected by dendrochronology: 5, 32
 5. Papers that view C-14 dates as needing many corrections, not all known, before being of significance to biblical creationism: 15, 19, 21, 24, 29, 30, 32
- C. VIEWS ON QUESTIONS ASSOCIATED WITH RADIOCARBON DATING
1. *Production Rate of C-14 in the Atmosphere:*
 - A: Papers that accept it as essentially constant since Creation: 1, 5, 7, 10, 16, 22
 - B: Papers that reject assumption of constant production rate: 3
 2. *Specific Production Rate (SPR) of C-14, dis/gm-min in Carbon Cycle:*
 - A: Papers accepting constant SPR since Creation: 1, 10, 16, 17, 22
 - B: Papers accepting constant SPR since the Flood, and greater between Creation and the Flood: 5, 10, 17, 22
 - C: Papers that deny ability to know SPR variation in past: 27

3. *Specific Decay Rate (SDR) of C-14, dis/gm-min in specimen:*
 - A: Papers that agree with Libby in assuming constant SDR in past, i.e. in equilibrium with SPR, therefore accepting published C-14 dates: 1
 - B: Papers that endorse buildup of SDR as required by SDR/SPR ratio: 4, 9, 10, 16, 21, 22, 31
 - C: Papers that assume no C-14 in biosphere before the Flood (due to canopy): 5, 31
 - D: Papers that propose biosphere SDR > atmospheric SPR: (a) before the Flood: 17 (b) since the Flood: 13
 - E: Papers that assume SDR in biosphere random in time and location: 13, 14
4. *Canopy Theory:*
Papers assuming some form of vapor canopy before the Flood, and need of interpreting all C-14 dates accordingly: 2, 8, 12, 13, 14, 17, 19, 28
5. *Dendrochronology (Tree-ring Dating):*
 - A: Papers that doubt its reliability for correcting C-14 specimen dates: 20, 26
 - B: Papers that see it as reliable wherever an unbroken sequence is found: 8, 13, 18, 32
6. *Archeological Dates:*
Papers that view C-14 dates as superseding traditional methods of archeology;
 - A: Even when using published Libby dates: 13, 28
 - B: Only using corrected dates and uncontaminated specimens: 18
7. *Views on Other Sources of Error in C-14 Dating:*
Papers that view unknown factors (e.g. earth's magnetic field, etc.) as nullifying confidence in C-14 dates: 19, 24
8. *Views on Biblical Genealogies:*
 - A: Papers that accept Genesis 5 and 11 (best mss) as basis for reliable chronology back to the Flood and Creation: 4, 10, 16, 22, 23, 29, 31
 - B: Papers that reject Genesis 5 and 11 as basis for chronology prior to Abraham: 2, 32
9. *Papers Proposing Other Mathematical Methods for Evaluating C-14 Dates:* 11, 17

End-Notes

NOTE 1: Other than using radiocarbon dating, it is possible to arrive at the death-date or birth-date of a standing or fallen dead tree by measuring a large set of its growth rings, where visible, and by finding a perfect match of wide and narrow rings in a nearby living tree. This is called dendrochronology. Such a date is only

valid however if the number of rings per year are known. Nor does such a date tell us the death-date of a fossil in the same area unless one can correlate the radiocarbon date of both ring and fossil and prove that both have not been contaminated by infusion of later carbon.

NOTE 2: But consider a once-living specimen of, say, 1.2 gm total carbon, containing 6×10^{22} atoms of which 56 billion would have C-14 nuclei. Such a large number would have insignificant variations in effective half-life from the "effective" constant statistical value of 5730 years used today (or from the 5568 years used in the Libby Method) and a specimen with less carbon than this would rarely be acceptable. Nevertheless, for very small specimens (e.g. bones or teeth which contain very little carbon) and very low specific activity at death, i.e. between Creation and Flood, Hanson's "sensitivity analysis" might give a better measure of probable error.

NOTE 3: In estimating radiocarbon buildup after creation, a better approach might be to assume SDR = 0 at creation and solve for the pre-Flood SPR that would bring SDR up to the necessary ratio R at the Flood. With this approach Hanson would obtain a pre-Flood SPR close to 64, as found in Paper 10, and would have no need of the canopy theory to account for it. SPR is specific to the inventory in the carbon cycle, so that with nearly constant cosmic radiation one need only show the reasons why the inventory in the world's carbon cycle was much less before the Flood.

NOTE 4: For readers wishing to implement the method described by Tyler in Paper 18a this reviewer has prepared a sequence of nine mathematical steps by which to take account of the probable errors in going from tree rings to archeological dates. These may be obtained from the reviewer on request; or author Tyler may have a similar calculational sequence to offer.

NOTE 5: Author DeYoung does not mention a third hypothesis, described in Paper 25 and presented at the 1983 Minneapolis Conference. This would account for a step-change in the *specific* production rate (SPR) of C-14 without need of either vapor canopy or vast increase in primordial magnetic field.

NOTE 6: So far as known to date, the two naturally-occurring stable isotopes of carbon (C-12 and C-13) occur everywhere on earth in the same ratio of abundance, 98.89 and 1.11 percent. This is also true of the isotopes of argon in the atmosphere, and of the three long-life radioactive isotopes of uranium, U-234, U-235, and U-238, where ore is found.

NOTE 7: By "biblical genealogies" in Paper 23 is meant the numbers in the original autographs of Scripture, especially of Genesis 5 and 11. Of these at least four different versions are extant, by which to deduce a fairly reliable original chronology, putting the Flood close to 3,000 years before the Cross, and Creation some 2,000 years earlier.

NOTE 8: In Paper 32, the possibility of a Flood-date some 9,000 years earlier than allowed by the strict chronology of Genesis 11 was also contemplated (if not exactly endorsed) by Appendix II (pp. 483-489) of *The Genesis Flood*, (Paper 2), a book viewed by many as the definitive creationist position on biblical chronology. In the above pages the authors reject Genesis 5 and Genesis 11 as genealogies and suggest that Genesis 11 alone (the generations from the Flood to Abraham) might be "stretched" to 5,000 years. They do concede that assuming a period of 100,000 years here would be "very hazardous."

Adhering to Genesis 11 as father-son genealogies, the period from the Flood to Abraham's departure from Haran is 365 to 447 years, based on various versions of the Hebrew text, while versions of the Greek Septuagint allow up to 1150 years.

QUOTE

The jarring element in our life, which makes us inhospitable to the religiousness of the East, is peculiarly modern and peculiarly Western: it is the scientific spirit. The scientific drive in the West is but little more than three centuries old, but in that time we have more and more deeply abandoned ourselves to it. It is now our theoretical scientists, our applied scientists, and our practical men of affairs, who mostly decide the conduct of our intellectual life.

Ransom, John C. 1965. *God Without Thunder*. Archon Books, Hamden, CT p. 27.

TREE-RING DATING AND MULTIPLE RING GROWTH PER YEAR

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Abstract

There presently exist several long dendrochronologies, each comprised of about 10,000 individual growth-rings. These are examined for the possibility of multiple ring growth per year in their earliest portions due to unusual climatic conditions following the Flood. It is found that the tree-ring/radiocarbon data are contrary to the suggestion of multiple ring growth. Since it seems that the Flood must have occurred before the oldest rings of these series grew, the implication is that the Flood must have occurred more than 10,000 years ago.

Introduction

In recent decades dendrochronological (i.e. tree-ring dating) research has produced two, long, continuous tree-ring series, each containing about 10,000 individual growth-rings (Ferguson and Graybill, 1983; Pilcher, et al., 1984).** The first of these derives from the White Mountains of California and is constructed from living trees and dead remnants of bristlecone pine. The second derives from Europe and is composed of oak. A third long dendrochronology is currently under construction from Tasmania (Barbetti et al., 1990). This will be the first long tree-ring series from the Southern hemisphere.

These tree-ring chronologies are of considerable interest to creation scientists attempting to accurately reconstruct a detailed history of the earth from Creation to the present. If they have been correctly assembled, and if each ring represents a single year's growth, then the oldest rings (from the longest series constructed to the present time (Becker, et al., 1991)) date to near 9300 B.C. This would, obviously, seem to restrict the date of Creation to something strictly greater than 11,000 years ago. More pressing, however, is the potential impact of these dendrochronologies on our concept of the Genesis Flood. The existence of such long, continuous tree-ring series, if valid, implies that either: 1. the Genesis Flood was a relatively tranquil affair which did not disrupt tree growth significantly in at least three widely separated geographical regions, or 2. that the Genesis Flood occurred more than 11,300 years ago, before the oldest tree-ring, not 4,500 years ago as traditional Biblical chronology might suggest.

Historical Background

In 1968 C. W. Ferguson published a report on the bristlecone pine chronology in *Science* (Ferguson, 1968). At that time this chronology was comprised of a continuous series of 7,100 tree-rings. Walter E. Lammerts discussed this dendrochronology in 1983 in a paper entitled "Are Bristlecone Pine Trees Really So Old?" (Lammerts, 1983). Lammerts showed in a series of experiments in which the growth environment was artificially controlled that bristlecone pine seedlings could be induced to grow an extra ring by subjecting them to a two or three week drought late in the growing season followed by a resumption of normal water-

ing. He suggested that such climatic conditions may actually have occurred 50% of the time in the White Mountains for the first 3000 years following the Flood and noted that, on this basis, "the presumed 7100 years of age postulated for these trees by Ferguson would be reduced to about 5600 years" (Lammerts, 1983, p. 115).

Recent creationists were not the only ones to have questioned the results of this long dendrochronology, however. In fact, no less eminent a scientist than the Nobelist, W. F. Libby, had raised similar concerns to those of Lammerts 20 years earlier (Libby, 1963). Libby's concern had stemmed from the discrepancy between radiocarbon and tree-ring dates in the approximate range 1000 to 1600 B.C. In 1963 there were no tree-ring dates available earlier than about 1600 B.C. Libby suggested this discrepancy might result from multiple ring growth per year and a consequent inaccuracy in tree-ring dating. Libby, however, was only trying to explain an apparent three percent discrepancy; he was not suggesting that the trees might grow three rings every two years as Lammerts later did.

Libby's concerns were taken seriously by tree-ring dating scientists and deliberate research was initiated to objectively test the postulate of multiple ring growth per year. The results appeared a decade later in a paper entitled "Accuracy of Tree Ring Dating of Bristlecone Pine for Calibration of the Radiocarbon Time Scale" by LaMarche and Harlan (1973). This meticulous and elaborate study demonstrated in a number of different ways including direct observation of bristlecone pine ring growth in their native habitat in the White Mountains over an 18 year interval that these trees were not growing multiple rings per year under modern climatic conditions.

My investigation of the radiocarbon dating methodology and the recent calibration of radiocarbon dates using the long dendrochronologies led me to suggest in 1990 that these long tree-ring chronologies were valid and that the Flood should be dated prior to their oldest rings (Aardsma, 1990). Humphreys (1990) responded by reiterating Lammerts' suggestion (1983) that climatic conditions *soon after the Flood* may have given rise to multiple ring growth per year in the earliest portions of these dendrochronologies, thus significantly shortening the actual number of years which they span. Also see Wiant (1977). This is an important suggestion, unique to creationist theorizing, and it deserves careful consideration. If it is correct, then major adjustments to conventional thinking about

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**Editor's Note: Normally these continuous series of rings are pieced together from several different tree specimens to construct the entire sequence.

the validity and extent of these long dendrochronologies are mandated. If it is incorrect, then it appears that one of the two implications for the Flood mentioned above must inevitably follow.

Testing the Hypothesis

It is possible to test the hypothesis of multiple ring growth per year in the earliest portions of these long dendrochronologies by exploiting the radiocarbon measurements which have been made on them. Very precise measurements of the radiocarbon content of decade or bi-decade tree-ring samples have been made over the entire length of these long tree-ring series for the purpose of providing a calibration for radiocarbon dating. Figure 1 shows the results of one such set of measurements on tree-rings from the long European oak dendrochronology (Stuiver and Kra, 1986). It can be seen that the radiocarbon age does not agree with the tree-ring age over most of the calibration. The measured radiocarbon 'age' is systematically too young relative to the tree-ring count for all times prior to about 1000 B.C. (i.e. for all tree-ring numbers greater than 3000). I have discussed the possible significance of this long-term trend to the Flood model of earth history elsewhere (Aardsma, 1991). For our present purposes it is only the small, short-term, century-long fluctuations discernable on this graph which are of interest. The well-defined inverted peak apparent near ring number 2700 is an example of the sort of short-term structure which is of interest here.

In Figure 2 I have caused this short-term structure to be more clearly displayed by subtracting a least squares fit, degree six polynomial from the data of Figure 1. This effectively removes the long-term trend in the data. What is left is the residual radiocarbon

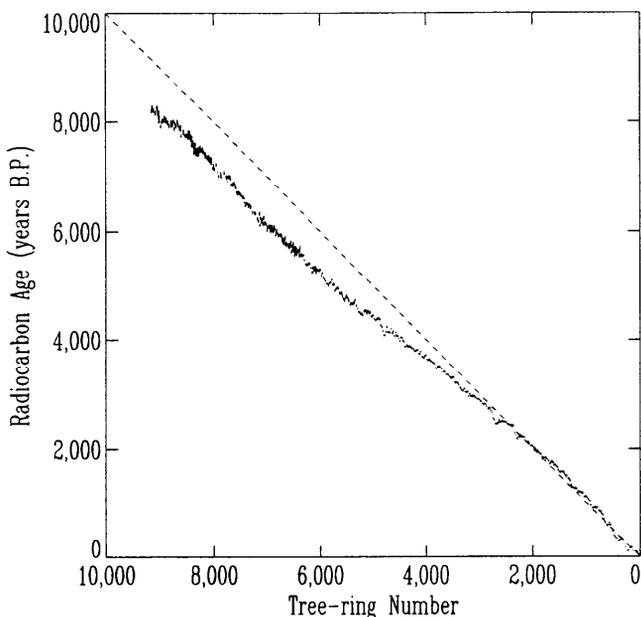


Figure 1. Radiocarbon measurements on tree-rings. The dashed line corresponds to the case of exact agreement between radiocarbon and dendrochronology. The radiocarbon age of each tree-ring sample measured is plotted as a vertical line indicating its one sigma range of error.

age.* It is seen that these short-term fluctuations cause radiocarbon dates to diverge from the long-term radiocarbon behavior by as much as ± 200 (radiocarbon) years. Visual analysis of this figure reveals a number of inverted peaks. I selected 13 of these for detailed analysis. These 13 peaks are numbered on the figure. These particular peaks were selected because they are the largest and most clearly defined peaks in Figure 2. Only one large peak (midway between peak #9 and peak #10) was not included in this selection. It was excluded only because its baseline was difficult to determine from the available data making it difficult to analyze reliably.

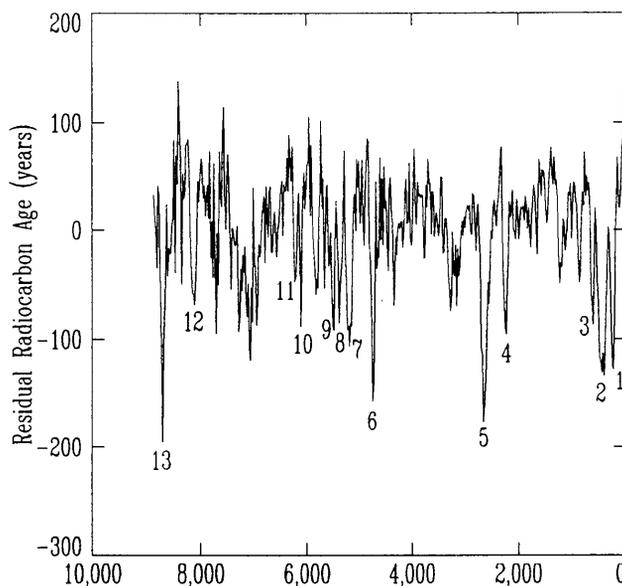


Figure 2. Short-term deviations in radiocarbon age showing numerous inverted peaks due to periods of relative solar quiescence.

These peaks are not due to random measurement fluctuations. They are much larger than the errors in the measurements which comprise them, as is illustrated for peak #5 in Figure 3. Also, the same peaks can be demonstrated from both of the long dendrochronologies. Figure 4 shows a comparison of radiocarbon measurements on North American Douglas fir and Sequoia trees with Irish oaks for the period A.D. 1400 to A.D. 1850. These results from separate continents and different tree species were obtained by independent research groups using two different measurement techniques (liquid scintillation versus gas counting) (Stuiver, 1982, p. 14). More recently, at the 14th International Radiocarbon Conference, Stuiver reported in an oral session that no significant difference in radiocarbon age is discernable between the long dendrochronologies back to 6000 B.C. Thus, it is apparent that these inverted peaks are not due to

*Editor's Note: Young earth creationists generally differentiate between the equilibrium method of obtaining radiocarbon ages and the nonequilibrium method or a radiocarbon age vs. real time. The latter yields ages to a maximum of approximately 5400 years. See Brown, R. H. 1992, "Correlation of C-14 age with real time," *CRSQ* 29:45-47. Also for a further discussion of past creationist work on radiocarbon dating, see the review by Robert Whitelaw in this issue.

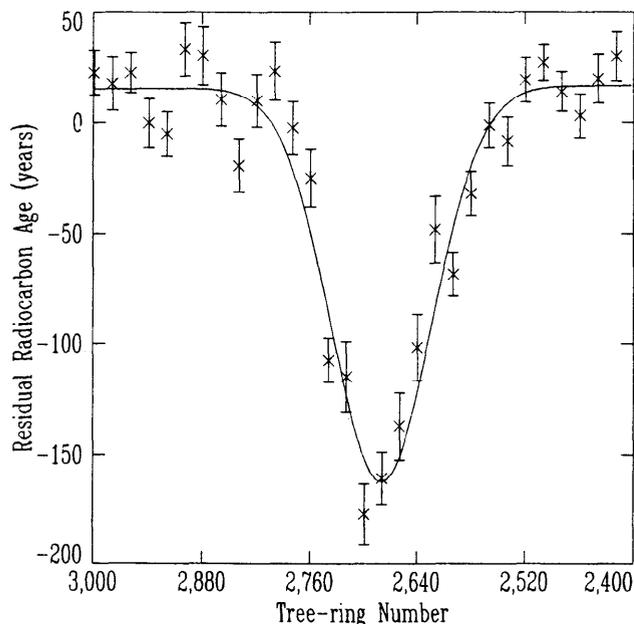


Figure 3. Radiocarbon measurements on tree-rings spanning growth-rings between numbers 2,400 and 3,000. The inverted peak corresponds to peak #5 of Figure 2. The solid line is the result of a least squares fit of a Gaussian plus linear background.

random measurement uncertainty, but must be due to some globally active physical phenomenon which impacts the atmospheric concentration of radiocarbon from time to time.

The explanation of these peaks (Stuiver and Quay, 1980) is as follows. From time to time the sun goes into a relatively quiescent mode of operation for a number of decades. During such periods few sunspots are seen and the intensity of the solar wind surrounding the sun is reduced. This allows a greater flux of cosmic rays to penetrate the solar system with the result that a greater amount of radiocarbon is produced by cosmic rays in the earth's upper atmosphere. Organisms such as trees which are living during such episodes will incorporate this larger than normal amount of radiocarbon in their tissues. Because of this excess initial radiocarbon, such organisms will yield a younger radiocarbon date than they should when analyzed subsequently. This is why the peaks in Figure 2 are inverted, indicating radiocarbon ages for these specific tree-rings which are relatively too young.

The best known of such solar episodes is the historically delineated so-called "Maunder minimum" in solar output between about A.D. 1645 and A.D. 1715 (Eddy, 1976). During this period sightings of sunspots and the related phenomenon of aurora were rare. The Maunder minimum corresponds to the most recent inverted peak in the radiocarbon calibration data (i.e. peak #1 of Figure 2). It is also clearly seen in Figure 4. The next most recent inverted peak (i.e. peak #2) corresponds to another historically discernable minimum in solar activity known as the "Spörer minimum." It lasted somewhat longer than the Maunder minimum. It can also be seen in Figure 4 as the rapid decline in radiocarbon age near A.D. 1500.

Method

This brings us to the main purpose of this paper—

how one might objectively test the hypothesis of multiple tree-ring growth in the earliest portions of these long dendrochronologies.

All recent-creationist scientists of which I am aware grant the general validity of dendrochronology and radiocarbon back to 1000 B.C. Biblical and secular data of all kinds bearing on chronology seem to harmonize very well in this time period. In Figure 2 five inverted peaks are easily distinguished in this most recent 3000 year time span. Figure 5 shows a plot of the full-width at half-maximum of these five inverted peaks versus time. (These widths were obtained by fitting a Gaussian plus linear background to the radiocarbon calibration data at each of the inverted peaks using least squares procedures. An example of such a fit is shown by the solid line in Figure 3. While the physical processes which give rise to these peaks imply that a Gaussian does not model their behavior precisely, Figure 3 certainly demonstrates that a Gaussian is a satisfactory choice for the present study which requires only a reasonably accurate, objective measure of the width of these peaks.)

The data of Figure 5, while somewhat sparse, suggest nevertheless that there are two types of inverted peaks. We can classify these as Spörer-like (wide) peaks having half-widths of about 100 years and Maunder-like (narrow) peaks having half-widths of about 50 years. The existence of these two types of solar oscillations having different periods has been previously noted by other researchers (e.g. Stuiver and Braziunas, 1989).

It seems highly probable that the characteristic periods of the solar oscillations which give rise to these peaks should have remained constant since the time of the Flood. There is no theoretical motivation for assuming otherwise of which I am aware. Another example of a solar oscillation is the well-known 11 year sunspot cycle. Direct observational data covering the past few hundred years shows no significant alteration in this 11

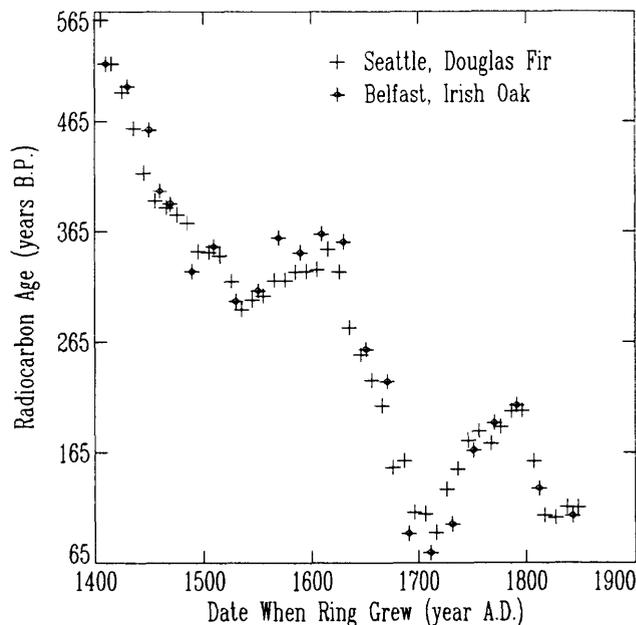


Figure 4. Comparisons of radiocarbon measurements on tree-rings which grew between A.D. 1400 and A.D. 1900 from independent American and European dendrochronologies (After Stuiver, 1982, p. 14).

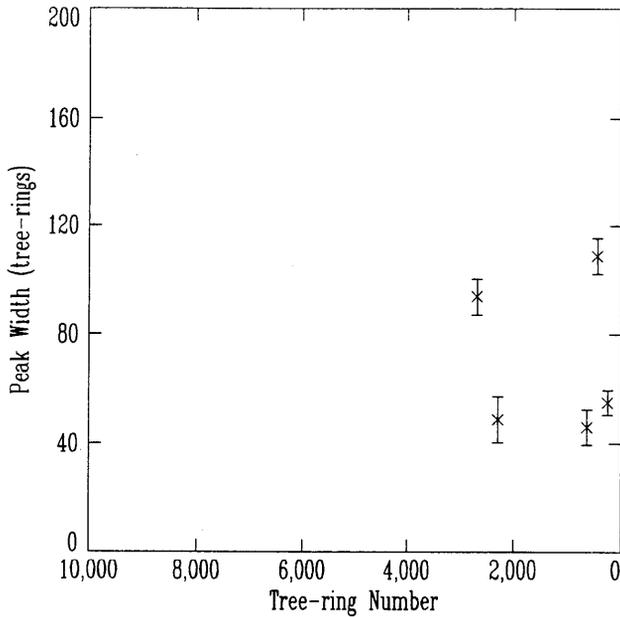


Figure 5. Peak widths of the five most recent peaks in Figure 2 spanning the interval from 1000 B.C. to the present.

year solar period. Furthermore, the data of Figure 5 are obviously not consistent with any significant alteration in the periods of these two types of solar oscillations for the past 3000 years.

Given the constancy of these two periods since the Flood it follows that multiple ring growth per year at any time prior to 1000 B.C. should be discernable as a broadening of these inverted peaks. To illustrate this quantitatively consider the Maunder-like events—the narrow peaks which have a characteristic half-width of about 50 years. If a Maunder-like event were to occur on the sun and thereby give rise to a terrestrial depression in radiocarbon age having a characteristic duration (i.e. half-width) of 50 years during a period of time in which terrestrial trees were growing 2 rings per year on average, then the radiocarbon/tree-ring record of this event would have a half-width of 100 rings. Since it is the number of counted tree-rings which serves as the ordinate in Figure 2 (not counted solar years), it follows that multiple ring growth per year should be discernable as systematically wider peaks in Figure 2 during any periods of multiple ring growth. A plot of the width of these peaks versus tree-ring number should show a distinct trend.

Figure 6 helps to clarify and quantify these ideas. The data plotted in this figure is the same as that which is shown in Figure 5. The dashed lines shown are theoretical predictions of how the peak widths should behave given the various hypothetical Flood dates shown in the figure. These predictions result from the following assumptions:

1. Continuous tree-ring series containing up to 11,300 growth rings (Becker, et al., 1991) do exist.
2. Unusual climatic conditions following the Flood gave rise to multiple ring growth per year in these tree-ring series.
3. The average number of growth rings per year decreased exponentially after the Flood toward an asymptote of 1 ring/year.

4. By 3000 BP these trees were adding only one extra ring per century.

5. The inverted peaks observed in Figure 2 are due to solar oscillations of constant (i.e. time independent) average period. (The average width of the five peaks shown is 70.5 years. This is drawn as a horizontal solid line in Figure 6.)

While it is possible to construct other theoretical models by making alternate assumptions, the assumptions which I have made above seem to me to be the most plausible ones. I have deliberately chosen them in such a way as to allow the most recent Flood date possible. The resulting theoretical curves shown in Figure 6 should be fairly representative of other possible recent creation models.

Results and Discussion

All 13 peaks are plotted in Figure 7. From this figure it is apparent that the measured peak width data does not support any chronologically significant multiple tree-ring growth per year. Rather, this data seems only supportive of single ring growth per year back at least as far as 9,000 BP (c. 7000 B.C.).

It might be argued that these long dendrochronologies have not been pieced together correctly from the individual tree specimens of which they are comprised, so that a significant fraction of the rings simply grew in the same year on different trees. One could imagine, for example, that two separate trees which actually grew concurrently were mistakenly incorporated into the dendrochronology one after the other, thus lengthening the tree-ring series as a result of assembly error. However, given the length, number, and degree of overlap of the individual tree specimens available for constructing the bristlecone chronology, it does not seem possible that it could be incorrectly assembled. (I have in my possession a very typical bristlecone pine

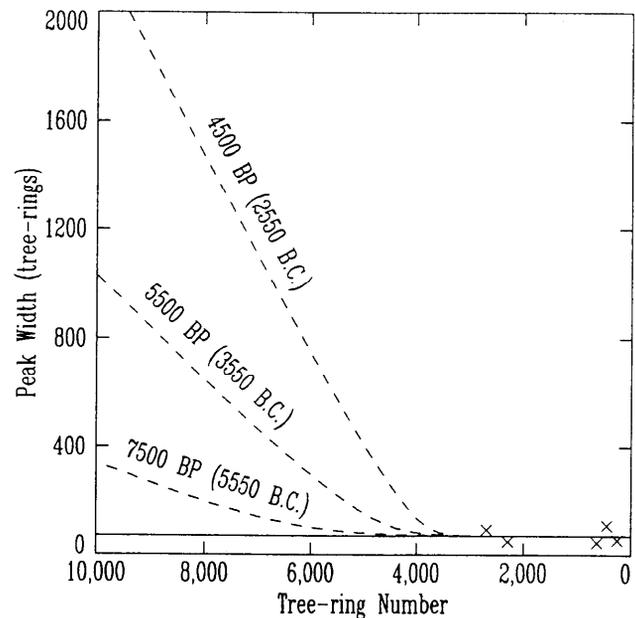


Figure 6. Peak widths of the five most recent peaks in Figure 2 together with the theoretical predictions from a multiple ring growth per year model at various hypothetical Flood dates. The solid horizontal line shows the average of the five data points.

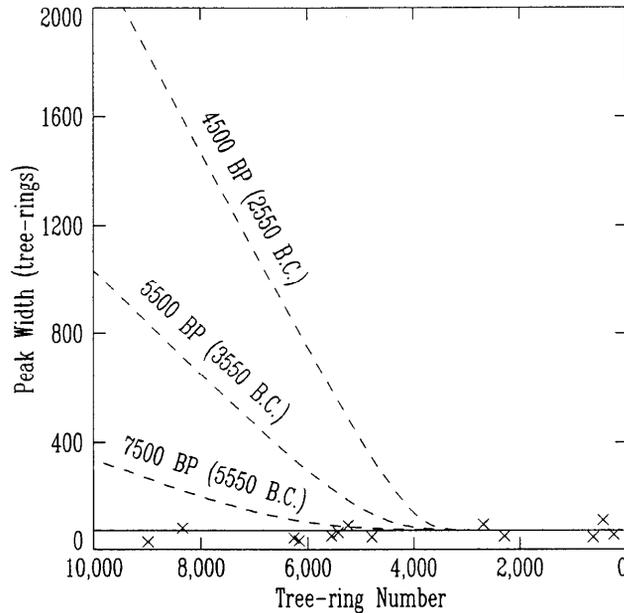


Figure 7. Peak widths of all 13 peaks indicated in Figure 2 together with the theoretical predictions from a multiple ring growth per year model at various hypothetical Flood dates. The solid horizontal line shows the average of the most recent five peaks only.

core which is 26 cm long and contains 597 rings. I have seen a bristlecone pine slab which was over a meter long and contained approximately 3500 individual rings. I have heard reports from a reliable source (Henry N. Michael, personal communication, 1991) of a second specimen from a single dead tree which contains approximately 6000 rings.) Furthermore, the fact that the radiocarbon calibration curve changes more or less monotonically with time (i.e. the radiocarbon ages of Figure 1 do not suddenly repeat themselves or show any discontinuities) and the detailed correlation of even the short-term radiocarbon structure from independent dendrochronologies on separate continents (e.g. Figure 4) seem to me to completely rule out this possibility. It appears that the growth-rings comprising these long dendrochronologies really did grow in succession.

Thus, these long dendrochronologies appear to consist of true annual rings for at least the past 9000 years. This is an extremely important result which, in my opinion, warrants critical scrutiny by all recent-creationist scientists. As pointed out above, it implies that either: 1. the Genesis Flood was a relatively tranquil affair which did not disrupt tree growth significantly in at least three widely separated geographical regions, or 2. the Genesis Flood occurred probably more than 10,000 years ago, not 4,500 years ago as traditional Biblical chronology might suggest. Given the explicit statements affirming the global nature and year-long duration of the Flood in the Biblical narrative (Genesis 7-8), the first of these options seems extremely improbable. It seems certainly much less probable than the second option. But the second option—lengthening the chronology back to the Flood—poses significant challenges of its own. The most obvious is how to integrate the additional time required with the numerical information provided in Genesis 11 in association with the genealogy from Noah to Abraham. The specific numbers given in this chapter for the age of begetting

of the next patriarch in line vary in different Old Testament manuscripts, but add to only about 1500 years in the most extreme case. This is considerably shorter than the four or five thousand years absolute minimum for this same time period implied by the current analysis.

Green (Newman, 1977, pp. 105-123) argued persuasively over a century ago, using principally Biblical data, that there were probably generations missing from the genealogy of Genesis 11, so that the sum of these numbers should only be regarded as a minimum figure for the elapsed time from the Flood to Abraham. Green's arguments are certainly buttressed by the foregoing tree-ring results. However, the implied gap or gaps in this genealogy are surprisingly large. Furthermore, one is left with two looming questions. First, where exactly do these gaps fall in this genealogy? Secondly, what is the significance of the numerical information given in Genesis 11 if it is not to be used for direct chronological reckoning?

However, the magnitude of these questions does not negate the fact that continuous tree-ring series containing on the order of 10,000 growth-rings do exist, and any credible model of earth history must be able to give a reasonable account of why this should be the case. For myself, the explanation which seems least objectionable is that the Flood probably occurred at a much more remote date than traditional Biblical chronology has led me to believe, and that there must exist some other legitimate way of understanding the Biblical numerical data in Genesis 11 which has yet to be discovered. I have previously been driven to the same conclusion in the process of constructing a quantitatively functional model for radiocarbon within a Flood model of earth history (Aardsma, 1991). In this previous work I found that both the extent of the long dendrochronologies and the presently observed global radiocarbon disequilibrium seem to suggest that the Flood occurred within a few thousand years of 12,000 B.C. (Aardsma, 1990), a result which is consistent with the present findings. If this approximate date is correct, then current secular dates within the Holocene can probably be accepted as generally reliable, and efforts to model any dynamical process from the Flood to the present (such as post-Flood climate stabilization, or sub-species diversification) should meet with considerably more success if the Flood is assumed to be closer to 15,000 than 5,000 years ago.

Conclusion

The extent of the presently available long dendrochronologies argues forcefully for a Flood date in excess of 10,000 years ago. Efforts to overturn these long tree-ring chronologies and thereby allow for a more traditional Flood date have not proven successful when examined quantitatively. By far the most hopeful suggestion was that unusual climatic conditions soon after the Flood may have given rise to multiple ring growth per year in the trees comprising these long dendrochronologies. This suggestion has, in the present paper, been shown to be contrary to the evidence provided by the small amplitude, century scale fluctuations in the atmospheric radiocarbon concentration recorded by the individual tree-rings when they grew. The failure of this suggestion seems to

imply that the Flood must, in fact, have occurred more than 10,000 years ago.*

*Readers may be interested in other C-14 dating-dendrochronology articles (as well as more bristlecone pine studies) in the Quarterly other than the Lammerts and Wiant papers. Problems with the dendrochronology method can be noted in Armstrong, H. L. 1980. Insects can affect tree rings. *CRSQ* 16:228; Clementson, S. P. 1974. A critical examination of radiocarbon dating in the light of dendrochronological data. *CRSQ* 10:229-236; Gladwin, H. S. 1978. Dendrochronology, radiocarbon and bristlecones. *CRSQ* 15:24-26.

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THE MUMMIFIED FORESTS OF THE CANADIAN ARCTIC

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Abstract

Large accumulations of desiccated wood exist in Tertiary age sediments of the Canadian Arctic islands. It would have been physiologically impossible for such forests to survive under present polar environmental conditions, and plate tectonics is considered an explanation for the existence of such forests. However, the preservation and the type of plant populations suggest a catastrophic origin for such deposits.

Introduction

There still exist many geologically exciting areas that invite speculation and investigation, and in recent years the renewed interest in origins has also brought a new interest in aspects of uniformitarianism and catastrophism. Creationists have been especially sensitive to catastrophic occurrences in geology. Examples exist of geological models that remain somewhat enigmatic, yet perhaps supportive of those who feel uncomfortable with the usual uniformitarianism examples for most geological events. Any discussion of evidence for a universal Flood must involve these principles.

Field Studies

The writer encountered such circumstances while conducting field studies in the Canadian Arctic regions, where an interesting geological problem was encountered. In working across the Arctic and making surface rock collections for reference purposes on Ellef Ringnes, Amund Ringnes, Axel Heiberg, and Ellesmere islands (Figure 1), accumulations of fossil wood were encountered at nearly every collecting site in an area roughly between 70° and 80° north latitude. Assuming these to be the fossilized remnants of forests once

blanketing this frozen land during warmer climates, the collections included apparent *in situ* trees. Surprisingly these specimens burned readily, and examination of the collections revealed that they were not fossilized in any traditional sense of petrification or replacement. They were simply dried, and "mummified" might best explain their condition. Lemonick (1986) noted that the Canadian geologist, James Basinger used "mummified" to describe similar wood on Axel Heiberg Island that burned and which he was able to saw. The major area of this study has been on Ellef Ringnes Island (Figure 1) and the specimens collected from the Beaufort Formation at surface exposures on Reindeer Peninsula on the northwestern coast of the island.

Wood-Bearing Sediments in the Arctic

The presence of unconsolidated, wood-bearing, alluvial sediments containing plants of temperate climates has been recognized for many years by students of the Arctic. Hills and Ogilvie (1970) of the Canadian Geological Survey have reviewed such occurrences in the Arctic islands, the characteristics of the sediments, and the fossil floras. The presence of similar accumulations of plant material has been long known in northern Siberia, where references have been made to the coastal bluffs of the island of New Siberia as the "Wooden

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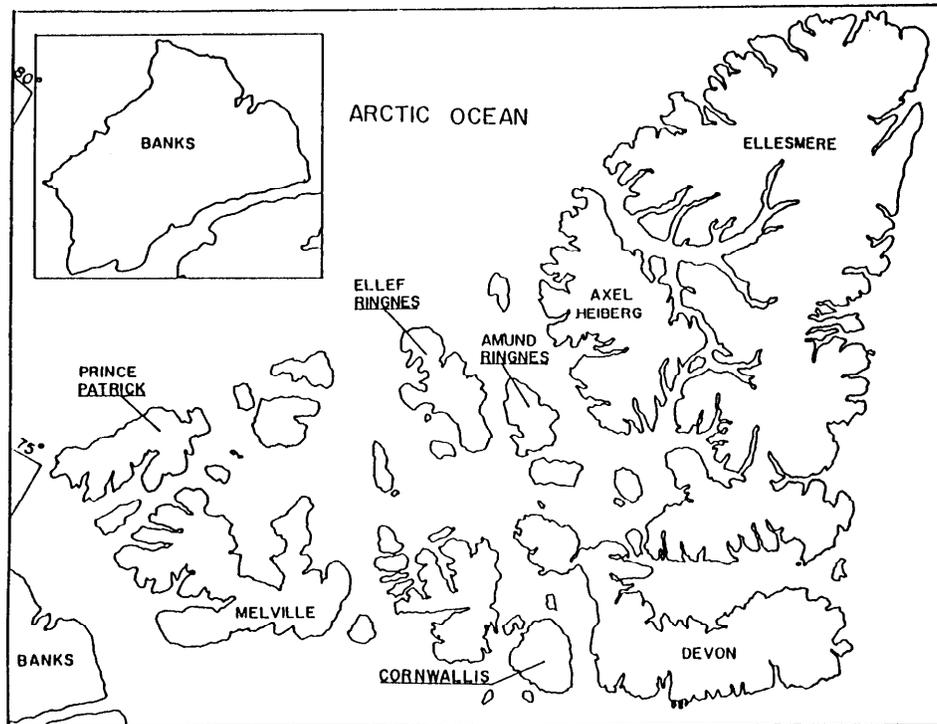


Figure 1. Index Map of the Canadian Arctic Islands.

Hills." In the Canadian Arctic most of these plant bearing beds are dated late Tertiary to Quaternary in age. Some of the more prominent of these alluvial sediments are assigned to the Beaufort Formation, which includes extensive terrain of the Arctic coastal plain from Banks Island and isolated deposits on Prince Patrick, Ellef Ringnes, Melville Islands and on western Ellesmere Island. Canadian geologists have noted the abundance of wood in the Beaufort Formation and the fact that it still burns and has not been subjected to diagenesis. Lemonick (1986) has reported on the work of the Canadian geologist, James Basinger, who has unearthed up to 19 layers of such mummified wood on Axel Heiberg Island. On Banks Island the Beaufort Formation ranges up to 135 meters in thickness and consists of unconsolidated cross-bedded sand, gravel, and silt. The sands are well sorted and quartzose. Geologists in the area of study commonly regard the wood as being driftwood and derived from distant sources to the east and southeast. However, a driftwood origin is not substantiated for all occurrences since many specimens are upright stumps with apparent undisturbed root structures. Basinger (Lemonick 1986) reported hundreds of such stumps apparently in place on Axel Heiberg Island. No attempt was made to determine the percentage of trees upright. But, it was a common occurrence to find stumps with roots apparently intact, and Basinger reported apparently in-place specimens as being numerous. The age is still debated with probable Pliocene or early Pleistocene most widely accepted, but in any event it is considered to be preglacial. However, Hills (in Hills and Ogilvie 1970) is of the opinion that the Beaufort Formation on Banks Island is most probably late Miocene or early Pliocene in age.

It is generally accepted by many geologists that these plant remains represent species that grew in what is now a barren, treeless land, and the pollen assemblages indicate a climate much warmer than that of the present. Palynomorphs I have identified in these deposits from northern Ellef Ringnes Island are pollen of *Pinus*, *Picea*, *Tsuga*, *Alnus*, *Betula*, *Salix*, *Acer*, and various *Ericaceae*. Hills and Ogilvie (1970) described *Picea banksii* from the Beaufort Formation and noted some 300 spruce cones in such excellent preservational state as to be moist when collected and dispersing their seeds upon drying. Oard (1990) has indicated a much warmer climate in the area right after the Flood and brought on by the removal of the sea icecap of the Arctic Ocean. This would help explain the many temperate entities occurring in the pollen populations.

Light Requirements

The plants do create some problems, however, for if the present physical arrangement of the islands had been established for the Arctic by the time the Beaufort Formation was deposited, such forests as presently lie in ruins could not have existed. We must assume an earth oriented much as at present, and today it would be physiologically impossible for any forest flora to exist in the northern regions, regardless of temperature. As photosynthetic organisms, problems exist for plants in the Arctic. For instance, at Resolute on Cornwallis Island, where most expeditions outfit, the long winter night begins on November 4, when the sun does not rise, and ends February 5, when the sun again rises over the horizon. The first thawing temperatures normally occur in mid-May in the southern islands and early June in the northern

islands. The Arctic summer begins about mid-June and continues until late August. It certainly is not conducive to any plant growth.

Plants also vary in their light requirements. Consequently, three continuous months of sunlight would not necessarily compensate for the deficiency of the long night, but might actually have a deleterious effect on some plants. Light is one of the most potent factors in plant growth, and light sensitiveness varies greatly between species. Light has different effects on seed germination and flowering, while temperatures combined with light are often intricately related. The effect of photoperiodism is varied in any explanation of circum-polar, temperate-flora. The photoperiodic categories of long-day, short-day, long-short-day, day-neutral, and cold-requirement plants considered in reconstructing a fossil flora must be considered in any explanation. How then, does one explain the existence of complex light requirements in plants and how they existed at the polar latitudes?

Catastrophism

If the plant remains were fossilized in a more temperate situation and moved to their present frigid environment, how do we account for the mummified condition? If death and subsequent preservation occurred in a more temperate climate, then decay and varying degrees of fossilization such as mineralization, compression/impression, and cast/mold, would be expected. However, their condition is one of desiccation only. Plate tectonics would appear to satisfactorily explain this evidence of temperate vegetation in the harsh environments of the Arctic. The plants simply grew elsewhere and were moved to their present localities, but plate tectonics does not provide satisfactory answers. It is generally regarded, in theorizing on plate movements, that in the Cenozoic the continents had drifted to the positions occupied today, with the mid-Atlantic rift propagating into the Arctic Basin. It would appear that the Arctic islands have been in their present positions since well before Beaufort Formation time.

If conditions leading to fossilization would prevent the type of preservation presently found in the Arctic, then one must assume that the land movement oc-

curred while the plants were alive. However, the desiccated state suggests that death may have occurred uniformly, even very quickly. Palynology studies have revealed exceptional preservation of pollen in other areas as well as the Beaufort Formation, in sediments where such good preservation was not anticipated. Such deposits were composed of sorted, quartz grains, all well rounded. These deposits would be subject to water percolation and weathering, conditions that normally contribute to decay and degradation. Such deterioration of the plant materials is not evident and the evidence again is of a rapid suspension of the natural deterioration processes before traditional fossilization occurred.

Whether or not one accepts the idea, there is some evidence for a catastrophic termination of the abundant temperate forests that once covered areas that are now the barren Arctic plains. If the destruction of the forests was the result of Pleistocene glaciations and conditions too cold to support plant life, the desiccated unfossilized preservational state would not be expected. A gradual, progressive destruction should have destroyed these forests, not preserved them in their present mummified state. The unconsolidated, well sorted, fluvial deposits should have permitted oxidation of the palynomorphs, not the exquisite preservation now present in the unconsolidated sands. The most apparent explanation is that the cold preserved them, but such floras could not have thrived in such temperature and light conditions as characterizes present polar latitudes. Of considerable importance is the time of this deposition, that is, whether these remains represent Flood deposits or are post-Flood in origin. The evidence thus far tends to best support a post-Flood occurrence. However, most importantly, these unique forests demonstrate the occurrence of a catastrophic event of the magnitude of a universal Flood.

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QUOTE

Beginning with the self, Gnosticism teaches that the form of man is essentially insight or enlightenment, for to be truly man is to be gnostic. And it of course follows from this axiom that only those who are in a state of enlightenment are truly human, that those who are not fail of the very definition of man. Hence the unborn, who cannot have had any significant experience of illumination, and the very old, who are beyond it, lose their claim to be considered persons. Furthermore, since a real being is one that experiences and can be experienced and is therefore a collection of impressions, the unborn fail of personhood on a second ground. They die in the darkness of the mother's womb, and though their parts and pieces are seen as these are recovered or discharged, they are not experienced as persons. Indeed young animals, seals with soulful brown eyes, succeed in the gnostic definition that to be is to be experienced and to experience better than the unborn. Citizens of modernity cannot perform that task which the vulgar of the Middle Ages routinely accomplished: we can seldom rise above the realm of accidents to see that a newly fertilized egg is a person in essence and by nature, as are the defective and the old. If a person is those experiences we consider valuable, the terminally ill and the defective, as well as children in the womb, fail of any claim to existence. Their fate is sealed.

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PANORAMA NOTES

Mammal-Like Reptile Found in Upper Paleocene of Alberta

The mammal-like reptiles are a large group of animals that are assumed missing links leading to mammals. This is in spite of these animals meeting the main diagnostic property of reptiles—that is one ear bone and multiple jaw bones. According to evolutionary belief, mammals developed in the late Triassic, while their ancestors, the mammal-like reptiles, became extinct in the middle Jurassic, 160 million years ago. Now a group of researchers has found a jaw bone containing three teeth from a mammal-like reptile in an upper Paleocene Formation near Calgary, Alberta, Canada (Fox, Youzwyshyn, and Krause, 1992). This doubles the range of these unique creatures and makes them 100 million years younger, according to the evolutionary time frame. An accompanying news and views article in *Nature* described this time extension as extraordinary, highly unexpected, remarkable, and attracting lively debate (Novacek, 1992).

Fox, Youzwyshyn, and Krause (1992) have anticipated the uplifted eyebrows within the evolutionary community. They seem to have done their anatomical homework. The fossil was found among numerous mammals diagnostic of the Paleocene Period. This poses a very serious question to the evolutionary establishment: Why have not mammal-like reptiles been found for the intervening 100 million years, especially in the age of the reptiles? Fox, Youzwyshyn, and Krause suggest four reasons for this anomaly: 1) their rarity, 2) their small size, 3) their possible presence in only northern localities, 4) limited sampling of small terrestrial vertebrate fauna. For a 100 million year time gap of a once prosperous group of animals, the first three suggestions are far-fetched. The fourth is of interest as far as what else has been overlooked. I would suggest a fifth possibility: The 100 million years never existed.

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Deep Water Taphonomy

Studies of the process of fossilization have demonstrated repeatedly the high probability of destruction of animal and plant remains. Most research to date has been with accessible terrestrial and shallow-marine ecosystems. The discovery of a whale skeleton in 1,240 meters of water in the Santa Catalina Basin, off California, has extended the range of modern-day depositional environments investigated (Allison et al., 1991).

The whale, thought to have died between 3 and 34 years ago, has already undergone considerable change. No soft tissues remain, and all the bones are disarticulated. Many bones are corroded so that the inner "spongy" texture is visible. Despite low oxygen levels, a variety of encrusting organisms are attached to the

bones—bivalves, limpets, gastropods, and worms. Plenty of evidence is seen for microbial activity, as well. Those surfaces which are covered by sediment have some protection, but all exposed bone is being steadily scavenged.

The report serves to reinforce the thesis that animal and plant remains are rarely preserved because there are so many influences which tend to their destruction and loss. Rapid or catastrophic burial appears to be an essential first step in the fossilization process, deserving a much higher profile in all palaeoenvironmental reconstructions involving fossiliferous sediments.

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Conodonts Identified as Vertebrates

Conodonts are tooth-shaped fossils, usually less than a couple of millimeters in size, which have been used by paleontologists as index fossils. For example, Harris and Miller (1958), in studies needed to construct their geologic map of the Duffield quadrangle, southwest Virginia, relied on professional opinions of U.S. Geological Survey paleontologists W. H. Hass and A. J. Boucot. Hass studied conodont fauna as well as brachiopod fauna to identify rocks north of the Hunter Valley thrust fault as part of the early to middle late Devonian system.

The Hunter Valley thrust, pictured on the cover of the June, 1990, *Creation Research Society Quarterly (CRSQ)*, is part of a whole family of supposed thrust faults in southwest Virginia. These involve rock sheets supposedly shoved for miles from southeast to northwest (Chaffin, 1990). Thus, the Hunter Valley contact involves Cambrian strata on top of Devonian strata.

In spite of these hypothetical massive movements, the contacts between the sheets show no breccia (broken-up and re-cemented rock), gouge, slickensides, or other indications of the large, grinding forces that would have been involved. This is evident in the June, 1990, *CRSQ* cover photographs of the Hunter Valley contact line.

This line is identified as a thrust contact merely because of the fossil studies which indicate that the older strata are situated above the supposedly younger strata. Thus, these field data, which are inconsistent with uniformitarian geology, are rather more consistent with the idea of ecological zones being responsible for the various deposits during the Genesis Flood.

Now an article has appeared (Sansom, et al., 1992) reporting microstructure studies which have identified tissue types in conodont fossils. Sansom, et al. state that these studies of conodonts provide "unequivocal evidence for their vertebrate affinities." This identification of fully developed vertebrates in Cambrian rocks, some 40 million years older (in the evolutionary time

scale) than the earliest previously known vertebrates, exposes yet another gap in the fossil record. Furthermore, the hard tissues of the conodonts were highly specialized, containing "cellular bone, enamel-like tissues, and cartilage but no dentine." Since dentine is usually regarded by evolutionists as more primitive than cellular bone, these findings cast "doubt upon the assumed evolutionary primacy and functional origin of dentine."

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Tool-use by Aquatic Snails

Having neglected my aquarium too long, a significant level of acidity had built up. I changed charcoal and filter, and stirred the gravel in the bottom, getting the tank back into shape. My son was interested in the snails in the tank, so I took a couple of them out for him to see closely. One had a shell which had presumably been thinned by the high acidity of the water. During handling, a piece of shell was damaged, clinging partially to the remainder of the shell and also to the snail's flesh. Some reddish discoloration of the water was visible immediately around the wound for a short time after I dropped the snail back into the tank.

The snail did not right itself, but "picked up" two pieces of rock/coral from the bottom of the tank and remained lying on its side. The pieces were manipulated by the snail's foot until they were on each side of the broken shell fragment. I watched as the snail (at the proverbial snail's pace, of course) performed clockwise rotations of the rocks holding the shell fragment, stopping several times to rearrange the rocks, or to stretch, evidently trying to break the fragment loose. On the fifth turn, at the end of a long stretching motion, the snail finally worked the fragment free, righted itself, and went about its normal activity. Immediately I retrieved the two small pieces of rock from the tank and found the shell fragment stuck to them by "slime." Total time was about 11 minutes.

Since it appeared that the snail utilized the rocks in a deliberate fashion as tools, I decided to experiment with several other snails to determine if this is indeed a repeatable incident. If so, tool usage by so small a creature is certainly an indication of the design of God in His natural world. Snails displayed a variety of repair techniques when small portions of their shells were damaged. One snail "picked up" one small coral/rock from the bottom and manipulated it to the area of the injured shell. With only a few movements, the shell fragment was severed when the snail used its fleshy foot to deliberately pull it across the rock. Another snail dragged its broken shell fragment along the rough, rocky bottom of the aquarium. Soon the broken piece of shell was left attached to a bottom rock.

Morris (1990, p. 146) lists only two invertebrates that exhibit significant tool usage, the weaver ant and the digger wasp. He seems to determine tool usage to be a manipulation of a "tool" as an extension of the animal's body. Scott, 1972 contains a reference to tool usage by a wasp (*Ammophila urinaria*), and by an unspecified spider that draws back the center of its elastic web, then releases it to ensnare a passing insect. The author tries to downplay the significance of tool use in lower animals by writing, "However, in both these cases there is every indication that tool using is simply an extension of regular patterns of behavior of the species rather than arising as a solution to a problem" (p. 166). One could take exception to Scott's attempt to "sweep under the rug" the significance and complexity of tool usage among his examples. The snail's use of stones/ coral described above is certainly not an extension of "regular patterns of behavior" and is clearly a solution to a problem that occurs only to a small percentage of any snail population. Perhaps a creationist biologist could further investigate and more thoroughly document this apparent usage of tools by a most unlikely creature.

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Buckyballs

Some of you who were college students in the late sixties and early seventies, when the modern environmental movement was born, may remember the name R. Buckminster Fuller ("Bucky"), the late architect and engineer who designed the geodesic dome. His name has become associated with a new class of similarly symmetrical, soccerball-shaped, large carbon compounds (C60, C70), the fullerenes.

Discovered in the mid-1980's, the C60 molecule, aptly termed buckminsterfullerene or buckyball, was named 1991 "Molecule of the Year" by *Science* (Koshland, 1991). During that year, its unique structure and physical properties opened up whole new fields of chemistry and materials science as described in numerous journal articles.

What is it about this new class of chemicals which resulted in 175 research papers during the first six months of 1991, and packed scientific sessions which sometimes lasted into the early morning hours (Woods, 1992)? Structurally, the soccer ball-like appearance of buckyball or buckminsterfullerene (C60) results from a cluster of 60 or more carbon atoms "joined with a mixture of single and double bonds arranged in 20 hexagons and 12 pentagons" (Koshland, 1991). It represents the third major form of pure carbon; the other two being graphite and diamond. Chemically, it is extremely versatile, reacting with alkali metals, halogens, free radicals, and Grignard reagents. It is soluble in organic solvents, but the addition of amino acid adducts makes it soluble in water. Physically, it has lubricating and superconducting properties. Theoretical calculations predict that C60 is stiffer and more resistant to compression than diamond. Expectations are that this is only the beginning.

Until recently, the fullerenes were known only in the laboratory. Now they have been discovered in nature in shiny black rock associated with Precambrian strata in northeastern Russia near Finland (Busek, et al., 1992; Amato, 1992; Pennisi, 1992). Pennisi (1992) also described the discovery of fullerenes in microscopic debris from the collision of a small meteorite with a satellite, but none of the other references mention such a finding.

Why should such a discovery "puzzle," "surprise" or "baffle" scientists? It seems that uniquely specific conditions are needed to synthesize fullerenes in the laboratory; conditions which are not known to have occurred on earth. For example, temperatures are required which exceed those found in natural environments, except under extreme conditions such as lightning strikes and the interiors of stars. Furthermore, oxygen, nitrogen and other non-inert gases in the atmosphere appear to inhibit the synthesis of fullerenes. One would not in any case expect to find fullerenes in such abundance and in such a pure crystalline form.

Are there as yet undiscovered geological processes which may have been responsible for synthesis of the fullerenes? Or, are there other, "natural" means to produce buckyballs which scientists may then apply to their laboratory methods? We shall anxiously await the outcome.

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Ph.D. Theses Feature "Creation"

The creation movement has provided research material for a vast number of graduate theses. Few are particularly friendly to the creation cause. Some studies show good insight, while others are an embarrassment to the author and the degree-granting institution.

I have surveyed theses on the creation theme using the database services of University Microfilms International. Some of the secular studies are intriguing. For example, in an M.A. thesis, Stacey (1989) investigated whether support for creation among teachers resulted from deficiencies in the teachers' scientific training. No such correlation was found!

The following representative dissertations are listed for interested readers. All are U.S. doctoral theses from the 1980's and 1990's.

Cavanaugh, M. A. 1983. A sociological account of scientific creationism: Science, true science, pseudoscience. University of Pittsburgh.

Duke, W. C. 1982. The American Scientific Affiliation and the Creation Research Society. Southwestern Baptist Theological Seminary.

Eglin, P. G. 1983. Creationism versus evolution: A study of the opinions of Georgia science teachers. Georgia State University.

Grine, J. D. 1985. A study of creationist pressure: Strategies against evolution instruction in the public schools. University of Pittsburgh.

Klope, D. C. 1991. The rhetorical constitution of the creationist movement. University of Utah.

Larson, E. J. 1984. Public science versus popular opinion: The creation-evolution legal controversy. University of Wisconsin, Madison.

McIver, T. A. 1989. Creationism: intellectual origins, cultural context, and theological diversity. University of California, Los Angeles. [See DeYoung (1992) for a review of this thesis.]

Morgan, E. W. 1983. A biblical and theological critique of scientific creationism. Southern Baptist Theological Seminary.

Prince, R. W. 1985. An examination of Henry M. Morris' interpretation of biblical creation. Southern Baptist Theological Seminary.

Sparks, L. 1982. A study of major court cases and the implications for teaching the origin of man 1925-1982. East Texas State University.

Tourney, C. P. 1987. The social context of scientific creationism. University of North Carolina, Chapel Hill.

There are many foreign, M.A., M.S., and Ed.D. studies which are also interesting, but they are so numerous that their titles alone would fill this entire Quarterly. A private compilation of theses on creation, including those from the Institute for Creation Research, is also available (Lazar, 1988).

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 Stacey, W. A. 1989. The effects of education on creationist beliefs among high school science teachers. M.A. Thesis. University of Texas, Arlington.

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Double Standard

A recent advertisement for a DNA/RNA synthesizer (*Science*, 1992, p. 170) compares it to the hummingbird: rapid and efficient in handling liquids, extremely flexible in operation. Pictured in the ad is a beautiful hummingbird hovering near a flower. High-speed photography has captured the bird in magnificent detail. Although the hummingbird is infinitely more complex and awesomely designed than the laboratory instrument featured in the ad, many people seeing the ad would attribute the synthesizer's design to an intelligent maker, and that of the hummingbird to an accident; a random, purposeless process called evolution. The contradiction in logic should be apparent to any thoughtful person.

Reference

- Science*. 1992. 257:170. For an interesting short article on the remarkable design of hummingbirds see Keithley, Willis E. 1977. Hotrod helicopter. *Creation Research Society Quarterly* 14:3-4

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The Evolution of the Eye-Fact or Fiction?

The visual sense in organisms ranges from those with a primitive light response to the superb acuity of the eagle's eye. In most cases this faculty plays a dominant role over the other senses. In humans about 38 percent of the total sensory input comes through the eyes (Bruesch and Arey, pp. 631-635).

In some animals, for example reptiles, other senses do overshadow that of vision. In snakes, Jacobson's organ in the roof of the mouth interprets odoriferous particles from the air or ground brought to it by the flicking tongue. Nocturnal snakes which have particularly good olfactory powers can follow and strike their prey without using their vision, which, in snakes generally, is not very acute. The Kiwi, with small myopic eyes, is an exception among birds, in that it is dependent more on smell than vision. Its nostrils are situated near the end of its long probing beak instead of at the base.

In fish generally, visual acuity is probably poor but there are exceptions. Organs of tactile sense and hearing of high acuity are present in most species, with a row of vibratory receptors arranged in a line along each side of the fish's body. These several senses are of particular importance in turbid water or at depths where light is minimal or absent. Two curious fish anomalies are anableps and the archer fish. The former, with eyes on the top of its head, skims along just under the calm surface of the water. The eyes are half above the surface and half below, which permits air and water vision at the same time. This is achieved by two most intricate anatomical and refractive systems in the same eye.

The archer fish exhibits an amazing ability to judge distance. While swimming it can eject a stream of water at an insect flying up to three feet above the surface, bringing it down to water level and devouring it. Good spatial judgments are observed in schools of fish which, in their darting movements, do not collide with one another.

Birds and mammals have the most highly organized eyes of all, with the former exceeding the human eye in acuity. It is only because of the great complexity, organization and function of a three-pound brain that the total visual faculty in humans excels. Duke-Elder writes (1958, p. 256):

The eye of man cannot be considered as representing the acme of efficiency as an optical instrument; it is to the unique and transcendent development of the associated cerebral centres that it owes its functional predominance.

When evolutionists survey the range of eyes in nature they have a formidable problem in trying to fit them into comprehensive theories. It is not surprising therefore that there is a paucity of evolutionary speculation and writing on this subject. Charles Darwin was equally puzzled when he acknowledged that evolution of the eye was contrary to common sense, but nevertheless he managed to convince himself that it could happen by natural selection over long ages (1979, p. 217):

To suppose that the eye, with all its inimitable contrivances for adjusting the focus to different distances, for admitting different amounts of light,

and for the correction of spherical and chromatic aberration, could have formed by natural selection, seems, I freely admit, absurd in the highest possible degree. Yet reason tells me, that if numerous gradations from a perfect and complex eye to one very imperfect and simple, each grade being useful to its possessor, can be shown to exist; if further, the eye does vary ever so slightly, and the variations be inherited, which is certainly the case; and if any variation or modification in the organ be ever useful to an animal under changing conditions of life, then the difficulty of believing that a perfect and complex eye could be formed by natural selection, though insuperable by our imagination, can hardly be considered real.

It is interesting that in the sixth and final edition of *On the Origin of Species* in 1872, Darwin appeared to give up his belief in the power of natural selection by reverting to a kind of Lamarckism (Hedke, pp. 34-38).

Lipson wrote in *New Scientist* (1981, p. 452):

Darwin's book — *On the Origin of Species* — I find quite unsatisfactory: it says nothing about the origin of species; it is written very tentatively, with a special chapter on "Difficulties on Theory"; and it includes a great deal of discussion on why evidence for natural selection does not exist in the fossil record.

The nearly infinite variety of eyes in nature can be considered in two great divisions, invertebrates and vertebrates. In the first class, the range of eyes with different design and function is almost limitless. Included are the simplest organisms where a few nerve cells enable light perception only, followed by a range of more organized though simple structures. Compound eyes as in insects, and the highest group of which the octopi are representative, where the eyes somewhat resemble those of vertebrates, although quite inferior overall, complete the picture. Of this great assemblage, Duke-Elder says (p. 178):

The curious thing, however, is that in their distribution the eyes of invertebrates form no series of contiguity and succession. Without obvious phylogenetic sequence, their occurrence seems haphazard; analogous photoreceptors appear in unrelated species, an elaborate organ in a primitive species or an elementary structure high in the evolutionary scale, and the same animal may be provided with two different mechanisms with different spectral sensitivities subserving different types of behaviour.

The eyes of vertebrates almost without exception resemble a camera in structure and they function in a similar manner. Focusing mechanisms differ somewhat but they direct light to the retina which registers the image. The retina is a highly differentiated nervous layer which changes light to electrical impulses which reach the brain via the optic nerves. Here perception and interpretation of the environment take place.

What does Duke-Elder say about the evolution of the vertebrate eye? In summation he writes (p. 247):

It would seem therefore, that despite the considerable amount of thought expended on the question,

the emergence of the vertebrate eye with its inverted retina of neural origin and its elaborate dioptric mechanism derived from the surface ectoderm, is a problem as yet unsolved. Indeed, appearing as it does fully formed in the most primitive species extant today, and in the absence of transitional forms with which it can be associated unless by speculative hypotheses with little factual foundation, there seems little likelihood of finding a satisfying and pragmatic solution to the puzzle presented by its evolutionary development.

He writes further (p. 238):

The apposite remark of the great German anatomist Froriep (1906) that the vertebrate eye sprang into existence fully formed, like Athena from the forehead of Zeus, expressed the frustration of the scientists of half a century ago to account for its appearance; today we are little the wiser.

Belief in the evolution of the eye in nature is based on faith with little or no evidence to support an empirical succession from simple to complex. What is found in organisms is that their visual requirements are exquisitely satisfied by the design of their ocular equipment in each case. In fact, in some examples the efficiency seems to be in advance of their needs as far as we can know. This is another factor which mitigates the effectiveness of natural selection in evolutionary theory as no change in excess of that required for a small improvement would be expected.

The whole panorama is the expression of the ideal design and manifestation of the visual organs in his creation by an omnipotent and omniscient Creator.*

*Several other articles on vision have been written by Dr. Hamilton from a creationist perspective. Consult the following bibliography: Hamilton, H. S. 1985. The retina of the eye—an evolutionary road block. *CRSQ* 22:59-64. [Errata 22:101].

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Nature has perfections, in order to show that she is the image of God; and defects to show that she is only his image.

Blaise Pascal

Reprinted CRSQ Volume 11

Introduction

The *Creation Research Society Quarterly* has been published since 1964 (29 complete volumes). In an effort to make these volumes available many of the missing issues have been reprinted. Brief synopses have been written on volumes 1-10 and have appeared in the previous 10 Quarterlies. In each synopsis, major articles are reviewed to give a person interested in scientific creationism a general idea of the contents of that volume. Many of the articles are of continuing interest and value.

Philosophy

The June 1974 Quarterly began with a series of philosophical articles on the relation of Christianity and science. John Moore (1974, pp. 3-5) presented a collection of definitional formulations to initiate the series. Throughout his career, Dr. Moore attempted to precisely define terms often employed in the creation-evolution origins debate. He realized that many people used terms that meant different things to other individuals and tried to cure the problem. T. Robert Ingram (1974, pp. 6-8) showed how there could not be true science without true religion. Part of his conclusions are (p. 8):

Christian thinkers, then, should agree generally that philosophy may be understood to be the activity of right reason, and science may be said to be the knowledge of things knowable to sensory perception (direct or indirect), and that these cannot be studied without reference to religion, but must serve religion which is Christian truth and life. "In Christ are hid all the treasures of wisdom and knowledge." (Colossians 2:3)

Harold Armstrong, (1974, pp. 10-13) in a much needed discussion, distinguished between religion, philosophy, science, and history. Note his summary (p. 10):

Philosophy involves one in the study of all things, and creation and origins would rank only as one area of study among many. Science is organized knowledge and methods of investigation of the natural environment. Therefore, creation, origins, and evolution cannot be studied scientifically. History is developed from written records. The "fossil record," then, cannot be considered as history.

In a more practical vein, Emmett Williams and George Mulfinger (1974, pp. 8-10) outlined a biblical framework for a course in physical science. These men explained how the limitations of science and teleology could be woven into the subject matter. The discussion of origins (creation vs. evolution) could be introduced in the classroom as well as brief biographies of Christian men of science. This discussion centered about the textbook, *Physical Science for Christian Schools* that they authored. In a later Quarterly, Tilney (1974, pp. 104-107) wrote a theological essay on beginnings. The origin of the world and humanity were two of his topics.

Young Earth

An extensive selection entitled "Time Upside Down" by von Fange (1974, pp. 13-27) considered data that could be offered in favor of the young earth hypothesis.

Some interesting points covered include the rapid origin and influx of life on Surtsey Island, decay of the earth's magnetic field, the rapid formation of stalagmites and stalactites under certain conditions and the possible rapid petrification of wood. Camping (1974, pp. 39-45), in defending a young earth position, used the amounts of various minerals dissolved in sea water and the time it would have taken them to accumulate. Knowing the present rate of mineral influx into the oceans and using the venerated "present is the key to the past" principle, he showed that the oceans could not be as old as is claimed.

Biology

General

Moshe Trop (1975, pp. 183-187) asked, "Was evolution really possible?" and then answered in the negative in his article. The impossibility of life from non-life was discussed. Supposed different atmospheric conditions in the ancient world and natural selection were reviewed with the conclusion that there is no substitute for creation by God. Evidence for the existence of an intelligible genetic code was presented by Quinn (1975, pp. 188-198). Discussing the DNA and RNA research to that time, he carefully noted many teleological circumstances as well as built-in safeguards against evolution in the genetic system. Also included were sections on protein synthesis as well as Kendrew wire models of polypeptides. The latter illustrated the complexity of molecules in living organisms.

Glen Wolfrom (1975, pp. 198-201) examined the recapitulation myth. Even though it is rejected by many biologists, it is still presented in textbooks. For instance, some authors refer to fish-like gill slits in mammalian embryos. An interesting article (Cairney, 1975, pp. 211-213) featured lichens as a dilemma for the evolutionary model. Naturalistic theories fail to explain the origin of the association between a fungus and an alga. Variation and fixity in nature was a topic explored by Frank Marsh (1974, pp. 60-68). He was an expert in this field. Advocates of Darwinism would predict unlimited variation, but Dr. Marsh showed that this was not true. Using paleontology and DNA research, he noted that stability, not unlimited change, can be verified in living organisms which is a tenet of the creation model.

Botany

Corn was used by William Tinkle (1974, pp. 37-39) to discuss hybridization and heterosis. He claimed that hybrid corn was developed employing human intelligence and the limitations of hybridization were explained. He mentioned Darwin's mistake in thinking that hybridization involved natural events. Using botanical examples Tinkle (1974, pp. 139-141) speculated that God's personality is revealed by nature. This article is typical of many short selections written by this very thoughtful Christian geneticist.

Zoology

The ear size in male and female frogs in relation to the origins debate was discussed by Smith (1974, pp. 46-47). He considered the larger ear size in the male is needed to detect the territorial call of other males and this acts as an intrinsic population control mechanism. Kaufmann (1974, pp. 91-94) employed physics concepts to show design in the human body. The complex

muscle and joint systems in the human body never could have evolved by brute natural processes. Siegler (1974, pp. 94-97), exploring the kind concept in the creation model of science, used the family Canidae as an illustration. Interesting discussions of dogs, jackals, wolves and foxes were provided before the author summarized the data.

Anthropology and Archaeology

Harold Clark (1974, pp. 115-120), in discussing fossil men, concluded that the Genesis account of creation and the Flood are a better interpretative framework for "ancient" man. Certain ancient "races" are not evolutionary in nature, but actually degenerative. This article contains many interesting insights. Some possible construction features of the Ark were briefly noted by Schmich (1974, pp. 120-122).

Employing the Lebzelter principle, Custance (1974, pp. 157-159) claimed that early human remains reflect conditions faced immediately after the Flood by man in his subsequent rapid dispersal throughout the earth. The fascinating subject of Egyptian chronology was explored by Courville (1975, pp. 202-210). Errors in the pottery dating scheme, reports of Jericho, Ai, Schem and Samaria were weaved into the arguments. The author supported biblical archaeological dates as opposed to the so-called astronomically fixed dates. The same author (Courville, 1974, pp. 47-56) claimed:

The first few hundred years after the Flood are critical years for anyone who believes in a young earth; for in that time populations had to increase and disperse, and the arts and crafts of civilization had to be taken up again after the destruction of the former order (p. 47).

He gave evidence that the time between the Flood and the dynastic period in Egypt could have been no more than 200 years. Also he noted that there was a milder, wetter climate in the predynastic era which is in line with a post-Flood ice age with greater precipitation in certain places on earth. The author's conclusions deserve serious consideration. Strickling (1974, pp. 97-101) presented some legendary evidence for the confusion of tongues at the tower of Babel from non-biblical accounts, Josephus and various Indian tribes.

Geology

Clifford Burdick (1974, pp. 56-60) discussed field work and evidence for and against overthrusting at the Lewis thrust-fault in a follow-up to a previous study (Burdick 1969, pp. 96-106). Walter Lammerts (1974, pp. 101-103) performed a small-scale study on the formation of beaches and rounded (eroded) stones at San Luis Reservoir in California where strong winds can generate waves five feet high. Based on the field evidence at this site, he noted that beaches and terraces have formed rapidly. Johnson (1974, pp. 108-110) claimed that during the Flood God stayed within the boundaries of natural law that he had established at creation.

Three possible models for the origin of the fossil record were compared by Grimm (1974, pp. 111-115). He reached the conclusion that the creation model is superior to the other two although each has to be accepted by faith. In a brief note Wiant (1974, p. 142)

made a quantitative comparison of the carbon in the biomass and in the coal beds of the world. Daly (1974, pp. 213-217) continued his series on the ice age as a result of the Flood.

Chemistry and Physics

Probability arguments were employed by Trop and Shaki (1974, pp. 28-29) to illustrate that the molecular evolution of a protein chain of 100 amino acids is unlikely in the extreme. There was not enough amino acids or time available for the postulated natural event to occur. Don DeYoung (1974, pp. 32-36) reviewed the geochemistry of some stable isotopes and presented some creationist applications. Radiocarbon dating errors, the origin of evaporites, continental drift and isotopes of the moon and meteorites were examined from this perspective.

Much media hype about the comet Kohoutek and the subsequent "flop" elicited a paper from Steveson (1974, pp. 68-71) entitled "Kohoutek, Comets and Christianity." Supplying some general information on comets, the author noted that the continued existence of comets is an embarrassment to the old-earth position. The late Roger St. Peter (1974, pp. 143-155) examined the big bang hypothesis. His Newtonian calculations indicated that the "so-called primordial fireball would vigorously collapse rather than violently explode" (p. 143). Thus this popular hypothesis cannot explain the supposed expansion of the universe. More opinions on whether the degenerating effects of the second law of thermodynamics operated before the Fall of man were expressed in this volume (pp. 175-179).

Conclusions

Besides the various subjects mentioned previously, there were 48 technical notes, 18 book reviews and 11 letters to the editor dealing with several scientific disciplines in this volume. The diversity of creationist opinion can be studied as it developed from the pages of this volume of the Quarterly.

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Quotes

Jerusalem is shown to possess a unique climate on earth in the sense that it has the highest normal rainfall among stations with an abundance . . . of solar radiation as well as the highest value of annual sunshine hours among the stations with similar or higher normal rainfall . . . This characteristic of having both copious amounts of solar radiation as in subtropical deserts but still have enough rainfall to be quite far from desert or semi-arid conditions is related to Jerusalem's special blessing by the author of the book of Psalms.

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I think that after the story's told, when the history of our time is written, we will see that the theory of evolution—which has invaded every single discipline within the whole structure of Western thought which is itself based upon this theory—was one of the most brilliant coups of the devil's. Of course it's complete nonsense, but it has captivated the Western mind. The belief that this theory is absolutely true is so borne in upon the educated that you can't reach them. I find it incredible.

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NEANDERTAL MAN: PRE-ADAMITE, CO-ADAMITE, OR ADAMITE?

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Abstract

There are currently two competing theories concerning the evolution of "anatomically modern man" called popularly the Candelabra Theory and Noah's Ark Theory. This paper examines whether it is possible to accommodate either or both of these theories to the biblical account of Adam and Eve.

Candelabra and Noah's Ark Theories

There are currently two competing evolutionary theories concerning the origin of modern humans, called the Candelabra and the Noah's Ark theories. I would like to examine in this paper if it is possible to accommodate either or both of these theories to the biblical account of Adam and Eve. Brian Fagan (1990, p. 20) summarizes the Candelabra Theory:

The Candelabra model argues that *Homo erectus* populations, once having radiated out of Africa, evolved gradually and independently in different parts of the world into early, or archaic, *Homo sapiens*, then into anatomically modern humans, *Homo sapiens sapiens*. Modern humans thus emerged having very deep genetic roots, for they separated one from another at least 700,000 years ago, and probably earlier . . .

Milford Wolpoff of the University of Michigan, one of the main Candelabra model proponents, believes . . . that there is a regional continuity in Europe, particularly as evidenced by the Neandertals — *Homo sapiens neandertalensis*. The Neandertals appeared on the scene before 100,000 years ago, and are on the direct ancestral line to modern humans according to the regionalists.

In the Candelabra Theory then there is no particular Adam and Eve, but thousands of them, from whom we are all descended. This is technically what is known as polygenism, many first parents, as opposed to monogenism, a single pair. It is impossible to accommodate this theory to Christian teaching, because it involves an implicit denial of the doctrine of original sin which we all inherit from our common father, Adam. But many so-called theistic evolutionists have attempted an accommodation. One such, T. Kitahara-Frisch (1990, p. 6) of Sophia University in Tokyo, writes:

In their study of Middle Pleistocene evidence from East Asia, Wolpoff, Wu Xin Zhi and Thorne regard ancestral populations within a dispersing genus *Homo* as "having had decreased genetic and morphological variability." This new evolutionary pattern was to endure and even to become better marked. The more we learn about human evolution from Middle Pleistocene times until present, the better we realize that humans evolved as a single species, interbreeding on a worldwide scale. As a matter of fact, "through the late Pleistocene we notice increasing amounts of gene flow from the more central areas, reflecting the late Pleistocene improvements in human adaptation and the consequent population expansion" (p. 471).

Frisch's brand of theistic evolutionism is cautious, and he does not mention Adam and Eve or original sin. Not so his mentor, Teilhard de Chardin, who said (1959, p. 185): "Thus in the eyes of science, which in the long range can only see things in bulk, the 'first man' is and can only be a *crowd*, and his infancy is made up of thousands and thousands of years." Another disciple of Teilhard, Robert Faricy (1967, p. 158), presents his teaching on original sin:

In Teilhard's theory original sin cannot be localized in time or space; it is not an event in a historical chain of events. Rather it is a global modality of evolution . . . The acceptance of his hypothesis would incidentally free us from the obligation heavier every day, of paradoxically making the whole human race derive from one couple. In Teilhard's theory, Adam is "universalized." Strictly speaking there is no Adam . . . In Teilhard's view Adam is a symbol that all men are born fallen, that all are marked by original sin the instant they become members of mankind. But men are not born in sin because of some aboriginal sin of a primitive Adam. Men are born in original sin because this is the law of the universe, the cosmic condition of a world in evolution.

These ideas were condemned in 1950 by Pope Pius XII in the encyclical *Humani Generis* (Denzinger, 1965, p. 366):

There are other conjectures, about polygenism (as it is called), which leave the faithful no such freedom of choice. Christians cannot lend their support to a theory which involves the existence, after Adam's time, of some earthly race of men, truly so called, who were not descended from him, or else suppose that Adam was the name given to some group of our primordial ancestors. It does not appear how such views can be reconciled with the doctrine of original sin, as this is guaranteed to us by Scripture and tradition, and proposed to us by the Church. Original sin is the result of a sin committed, in actual historical fact, by an individual man named Adam, and it is a quality native to all of us, only because it has been handed down by descent from him (see Romans 5:12-19).

The Candelabra Theory then, cannot be harmonized with the Scriptural account of Adam and Eve, but what about the rival Noah's Ark Theory? With its biblical terminology, "Noah's Ark," "mitochondrial Eve," etc., it would seem to be more promising. Brian Fagan (p. 21) summarizes this model:

The Noah's Ark hypothesis (or "Garden of Eden" theory according to taste) argues that fully modern

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humans (*Homo sapiens sapiens*) evolved relatively recently from a primeval African population, and spread from Africa into all corners of the world quite late in the Ice Age. The superficial biological differences between different "races" of *Homo sapiens*, such as skin color, hair form, build, and so on, then developed as adaptations to different environments. Under this theory, modern geographic populations have shallow genetic roots that are derived from species formation relatively recently.

The Candelabra hypothesis is espoused by the majority of paleontologists, while the Noah's Ark model is upheld primarily by geneticists. It was discovered that the DNA in the mitochondria, a little organelle in the cytoplasm of the cell, was inherited exclusively from the mother. Fagan (p. 26) continues:

Mitochondrial DNA . . . is inherited only from the mother. Some experts believe that this is because only the nucleus of the sperm makes its way into the egg during fertilization. As the egg contributes all the cytoplasm to a fertilized zygote, only the mother contributes mitochondrial DNA to the next generation. Thus, only the egg's mitochondrial DNA is reproduced in the offspring, and mitochondrial DNA is immune to change by sexual recombination of genes from each parent.

Rebecca Caan of the University of California studied the mutation rate of the mitochondrial DNA in women from all over the world. She says (Groom, 1986, p. 24):

Our major conclusion was that the human species, the group that gave rise to us whether we call them anatomically modern humans *Homo sapiens sapiens*, or whatever, that population contained a woman, an . . . Eve, if you want to call her that, and she was in Africa. She belonged to a group which spread throughout all areas of the world, and we're all descended from her.

Neandertal Man

Although Caan et al. are saying that we are all descended from one woman, they are not really espousing monogenism, since they maintain that there were true men before and after "mitochondrial Eve" who were not descended from her. Especially important in both the Candelabra and Noah's Ark theories is the position of Neandertal Man. In the Candelabra model he is hybridized by more modern appearing men such as Cro-Magnon Man, whereas in the Noah's Ark theory he is simply replaced. Anthony Zimmerman of the Japan Family Life Association in Tokyo attempts to accommodate the Noah's Ark Theory to the biblical story of our first parents. He claims that Neandertal Man was not truly human because he lacked the physical capacity for proper speech (1988, p. 42):

This is not to deny that Neandertal Man and other hominids had some kind of speech ability. But they could not have had the rapid speaking ability which we have. If we tried to fit our speech organs into Neandertal Man, the larynx would be located in his chest, an impossible situation never observed among primates . . . Lieberman mentions a speaking ability with perhaps one-tenth of the

speed at which we speak, as attributable to the non-*Homo sapiens* supralaryngeal airway. Therefore only short sentences could be spoken. Anything longer would be lost to the short-term memory because the time lapse is too long . . . Hence, I believe, people without our type of speech organs would not qualify for the Eden events.

Zimmerman writes as if this were a proven scientific fact, but such is far from the case according to M. Bowden (1977, pp. 156, 157):

Constable admits that the Lieberman-Crelin hypothesis has been "vigorously disputed" and "widely challenged," which is understandable, for to attempt to reconstruct a voice box, which has disappeared, by examining the adjacent bones, must clearly involve a very large number of unprovable assumptions . . .

These theories have been heavily criticized as there is little real supporting evidence which would allow them to become "proven facts." Unfortunately, some hypotheses tend to become accepted as "facts" after a time, and the speculative nature of the evidence makes them difficult to disprove.

One outstanding fact in the study of languages, namely, the more primitive the people, the more complex the language, presents a tremendous problem for evolutionary theory concerning the origin of language. Even so doctrinaire an evolutionist as George Gaylord Simpson (Keane, 1991, p. 149) admits:

Many other attempts have been made to determine the evolutionary origin of language, and all have failed . . . Even the people with the least complex cultures have highly sophisticated languages, with complex grammar and large vocabularies, capable of naming and discussing anything that occurs in the sphere occupied by the speakers . . . The oldest language that can reasonably be reconstructed is already modern, sophisticated, complete from an evolutionary point of view.

One of the most famous Neandertal sites is the Shanidar cave in northern Iraq which was excavated in the 1950's by the American archaeologist, Ralph Solecki. This dig was described in some detail in a TV program in the *Nova* series entitled "Children of Eve" (Groom, p. 12):

After several feet of painstaking work, they discovered a grave, many thousands of years old. In it were the bones of a Neandertal man.

Around the bones the soil contained large amounts of pollen. It was pollen from the local flowers and it has been assumed that these had been buried along with his body, a gesture that transcends time and belies the image of Neandertals as brutal primitive people.

Many other Neandertal graves have been found throughout Europe and Western Asia. From this data, it is assumed that they buried their dead, something that earlier peoples appear not to have done.

Other important information from this find is that the Shanidar male, who was about 40 years of age, old for those days, had been for years a

walking text book of ailments . . . The implication is that he had been taken care of for many years . . . despite the fact that he was not very economically useful to a group of hunter gatherers.

Neandertal Man in Art

The defense of the Bible against the pretensions of evolutionism has been carried on for the most part by Protestant creationists, who only recently have been joined in the fight by some of their Catholic counterparts. One of the Catholic pioneers in this effort was Patrick O'Connell, whose now classic *Science of Today and the Problems of Genesis* first appeared in 1959 (p. 93):

The Neandertal Man is still represented in illustrations in books and statues in museums as having a short neck with the head bent forward. This idea, however, has long been abandoned by the experts. It is clear from the skeletons that the spinal column was perfectly normal, and that the head fitted on it straight and not at an angle, as in the case of the apes.

In a 1991 issue of *Science News* there is a perfect illustration of O'Connell's complaint. In the lead article there is a very technical discussion of the hybridization or non-hybridization of Neandertal Man and so-called Archaic *Homo sapiens* as found at sites in Israel (Bower, 1991). Yet the cover of this supposedly scientific magazine features the completely unscientific diorama by Charles Knight at the Museum of Natural History, representing Neandertal Man as the familiar stooped, brutish looking ape-man.

Neandertal Man has prominent brow ridges and a receding chin, and it is easy for an artist to make him appear ape-like. It is amusing to note that even some scientists have become brainwashed by these artistic creations. For example, Alexander Marshack of Harvard's Peabody Museum conducted an extensive microscopic analysis of an ox rib covered with symbolic engravings, which was dated by their questionable methods to 135,000 B.C., well before the appearance of Neandertal Man. Marshack concluded that it was a form of "prewriting" (1975, p. 89):

What seems to be emerging from these new studies is a view of early man's way of thinking as being exceedingly complex and surprisingly modern. In this culture of early *Homo sapiens* the real and the symbolic worlds were intertwined, and there was a continuity and sequence in man's ritual and ceremonial relationship to that world. Art, image, and notation were means of expressing that complex reality, of recognizing and participating in it.

These are all human actions that require intelligence and a use of language. Moreover, they are aspects of man's early life that cannot be deduced merely from stone tools, for they are what anthropologists refer to as cognitive—that is, they are a result of recognitions, abstractions, and solutions to problems, all of which take place in the brain.

On the cover of a 1988 issue of *National Geographic Magazine* there is a beautiful photograph of a small bust carved in ivory of a Neandertal Man (Marshack,

1988). It had been found near Dolni Vestonice in Czechoslovakia, which is supposed to be a Cro-Magnon site, but is near Brno, a Neandertal site. Marshack's initial reaction was that it was too good to be true. As he examined the carving under a microscope, he expected to establish that it was a fake. Some forger must have used a Neandertal skull from Brno as a model, he thought. His problem was that although the carving, even to a layman, was that of a classic Neandertal with the high brow ridges, etc., it in no way looked ape-like, but was clearly that of a rugged, but handsome, completely human being.

Unsuccessful in his microscopic analysis in establishing fraud, Marshack then had the ancient ivory and the carving itself dated by Edward Zeller of the University of Kansas using the alpha-particle spectral analysis method (Marshack, 1988, p. 481):

The scientists envision this Ice Age scenario: Sometime after a mammoth died, someone carved a piece of tusk. The carving became buried in sediment or sand, where it absorbed uranium, iron oxide, and fluoride from the groundwater. The calcium phosphate of the ivory absorbed the minerals, especially the uranium. At the same time, radioactive decay set in, leaving its by-products at levels that require thousands of years to build up to the present reading. If the head had been carved at any time in the past few centuries, the decay products on the surface would have been cut away. Even Madam Curie couldn't fake that effect.

Edward Zeller claims that the carving is 26,000 years old, well within the Neandertal Era, according to the evolutionists, so Marshack is hoist on his own dating petard. But nowhere in the article is he scientist enough to admit that this is what Neandertal Man might have looked like, so much does it go against the evolutionary grain, but he refers to it throughout simply as an "Ice Age" carving.

Replacement or Hybridization?

The new genetic theory proposes that descendants of mitochondrial Eve left Africa about 10,000 years ago and replaced Neandertal Man in Europe and the Near East, and the descendants of Java and Peking Man in Asia. Most paleontologists reject this theory, saying that the fossils tell a different story. An exception however, is the paleontologist, Christopher Stringer of the Natural History Museum in London. Stringer thinks that a new dating technique, thermoluminescence, has established that modern humans, "Proto-Cro-Magnon Man," lived at Mount Carmel (Kebara) in Israel before Neandertal Man (Stringer, 1990, p. 103):

The new dates also support the view of a minority of workers, including myself, who believe that Neandertals may have constituted a separate species (*H. neandertalensis*). Other evidence of clear biological separation of Neandertals and moderns is provided by the persistence of the two populations' separate identities over a long period. The Kebara Neandertal may have lived 40,000 years after the two populations could have come into contact. Yet this specimen shows no signs of hybridization with modern humans—in fact, it is one of the most robust and characteristic of Neandertal

skeletons. By the same token, early modern fossils from Israel and Lebanon dated to between 30,000 and 40,000 years ago show no features that might be ascribed to previous hybridization with Neandertals.

This view is rejected by Milford Wolpoff of the University of Michigan, a leading proponent of the Candelabra Theory, who believes in the hybridization of Neandertal Man rather than his replacement (Putman, 1988, p. 463):

"I'm one of the many who conclude that modern humans originated in areas all over the world—after *Homo erectus* had populated that world and provided the basis for further evolution. And that basically, modern Africans originated in Africa, modern Europeans in Europe. And this happened to some extent because all these populations were interconnected by a flow of genes. People were coming and going. Everywhere you get bigger brains, smaller teeth, all the peculiarities of modern people. How does this happen if there's not an exchange of genes all through human evolution?" . . . In the skulls of the early modern Europeans he was studying, Wolpoff saw no signs of African morphology; he saw instead evidence pointing to a link with Neandertals. There was above all else the nose—"What a schnozzle," Dr. Wolpoff said, "We still see it in the Europeans of today."

We have seen Anthony Zimmerman try to accommodate the Noah's Ark Theory to the story of Adam and Eve, while Kitahara-Frisch attempted to fit the Candelabra Theory into his Teilhardian version of theistic evolutionism. Zimmerman writes (p. 43):

Before Adam and Eve, then, humans may have existed in a condition of pre-adulthood as far as thinking and a sense of responsibility are concerned. When the fullness of time came, that is when Adam and Eve arrived at the threshold of true human maturity, then God took them apart from *the others* and introduced them into Eden.

Frisch summarized his position (1990, p. 12)

Seen through the eyes of the paleontologist, human evolution departs from animal evolution as a whole principally by the way it switched from a polyphyletic and divergent type of evolution to a monophyletic, convergent evolutionary pattern . . .

. . . the spiritual energy of civilization may be said to have become canalized in an ever narrower segment of the human race. Would not such a concentration, in fact, run counter to the longing for universality found in the world great religions? Among these, Christianity, particularly bids us to see God's Spirit at work in *all* cultures and nations. Thus according to the Christian worldview, the stream of spiritual life, far from becoming constrained within an ever narrower channel, is seen to embrace progressively the entire universe.

Neandertal Man is the test, and simply put, in the Candelabra Theory he is what is sometimes called a Pre-Adamite, and in the Noah's Ark Theory, a Co-

Adamite. These opinions have been around for a surprisingly long time. Pre-Adamism was first proposed in 1655 by the French Calvinist, Isaac Peyrere, who later abjured his error before Pope Alexander VII. In 1890 it was revised by Winchell, supposedly in more scientific form, in his *Pre-Adamites or a Demonstration of the Existence of Men Before Adam* (Pohle, 1916, pp. 131-136).

Co-Adamism, the idea that true men existed contemporaneously with Adam who were not descended from him, is a necessary corollary of polygenism. We have seen above, that Pope Pius XII condemned polygenism, and at the same time Co-Adamism (Denzinger, 2328): "Christians cannot lend their support to a theory which involves the existence, after Adam's time of some earthly race of men, truly so called, who were not descended ultimately from him."

Neandertal Man is clearly *Homo sapiens sapiens*, and not a separate species *Homo sapiens neandertalensis*. He is simply one of the many races of men, that is, varieties within the species. Whether the Neandertal race was hybridized or replaced by other races of men is beside the point. Patrick O'Connell (pp. 98-103) speculates that he may have been from the race of Cain which perished in the Deluge, and that the disputed evidence of hybridization between Neandertals and Cro-Magnons in Israel, might be the result of intermarriages between the race of Seth and the race of Cain, mentioned in Genesis 6:2.

Conclusion: Genetics and the Origin of Races

The creationist movement began as a strictly Protestant, American struggle, but now others have entered the fray. There is, for example, the *Cercle Scientifique et Historique* (CESHE), a creationist group based in Belgium which is predominantly Catholic and includes many distinguished scientists, among whom is Maciej Giertych, the Head of the Polish Academy of Science. Concerning the origin of races, such as the Neandertal race, Giertych writes (Keane, 1991, pp. 2, 3):

My primary objection as a geneticist was the claim that the formation of races, of microevolution as it is often referred to, is a small scale example of macroevolution—the origin of species. Race formation is of course very well documented. All it requires is isolation of a part of a population. After a few generations due to natural selection and genetic drift the isolated population will irreversibly lose some genes, and thus, as long as the isolation continues, in some features it will be different from the population it arose from. In fact we do this ourselves all the time when breeding, substituting natural with artificial selection and creating artificial barriers to generative mixing outside the domesticated conditions. The important thing to remember here is that a race is genetically impoverished relative to the whole population. It has fewer alleles (forms of genes). Some of them are arranged into special, interesting, rare combinations. This is particularly achieved by guided recombination of selected forms in breeding work. But these selected forms are less variable (less polymorphic). Thus what is referred to as microevolution represents natural or artificial reduction of the gene pool. You will not get evolution

that way. Evolution means construction of new genes. It means increase in the amount of genetic information and not reduction of it.

The evolutionary value of new races or selected forms should be demonstrable by natural selection. However if allowed to mix with the general breeding population new races will disappear. The select genes they have will disperse again, the domesticated forms will go wild. Thus there is no evidence for evolution here.

I think it is wonderful for God to allow the geneticists by the study of DNA to scientifically demonstrate that we are all descended from a single woman. This, however, is not as claimed, a support for evolutionism, but rather a confirmation of the Bible, and should lead unbelievers of good will to God. Giertych who is a geneticist discusses recent studies in DNA (Keane, 1991, pp. 3, 4):

Currently there are new suggestions that molecular genetics provides evidence for evolution. Analyses of DNA sequences in various species should show similarities between related ones and big differences between systematically far removed species. They do exactly that. Molecular genetics generally confirms the accuracy of taxonomy. But at the same time it does not confirm postulated evolutionary sequences. There are no progressive changes say from fishes to amphibians to reptiles to mammals. Molecular genetics confirms systematics not phylogeny.

No. Genetics has no proofs for evolution. It has trouble explaining it. The closer one looks at the evidence for evolution the less one finds of substance. In fact the theory keeps on postulating evidence, and failing to find it, moves on to other postulates (fossil missing links, natural selection of improved forms, positive mutations, molecular phylogenetic sequences, etc.). This is not science.

We have seen Kitahara-Frisch and Anthony Zimmerman's unsuccessful attempt to harmonize the Candelabra and Noah's Ark theories with the book of Genesis, and have concluded that Neandertal Man is neither a Pre-Adamite nor a Co-Adamite, but to use a new word, an Adamite.* Since God is the Author of both nature

*Editor's Note: If readers enjoyed this article possibly a bibliography of anthropology articles that have appeared in the Quarterly would be of interest for further study—Williams, E. L. 1989. Man and his "ancestors." *CRSQ* 26:54.

and the supernatural, it is easy to harmonize true science and the Bible, but with a false scientific theory it is impossible: Giertych concludes (Keane, 1991, p. 4).

A whole age of scientific endeavor was wasted searching for a phantom. It is time we stopped and looked at the facts. Natural sciences failed to supply any evidence for evolution. Christian philosophy tried to accommodate this unproven postulate of materialist philosophies. Much time and intellectual effort went in vain leading only to negative moral consequences. It is time those working in the humanities were told the truth.

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QUOTE

It is difficult to locate a historical origin for our current rationalistic age. Those who extol the *philosophes* would claim Aristotle in their distant ancestry. Richard Weaver would surely accuse William of Ockham. The Renaissance also was a time of renewed emphasis on natural science and the introduction with Machiavelli of a kind of "value-free" analysis of political relationships placing ends beyond human knowledge. But modern rationalists with their complete skepticism about and animus toward existing social arrangements are most directly the heirs of Francis Bacon and Rene Descartes, who defined knowledge as universal human agreement based on an infallible technique available to all: the scientific method. This narrow theory of knowledge is largely responsible for the prevalence of a mechanistic metaphor for reality and for the modern triumph of moral relativism, a perennial philosophical heresy which only in our age has presumed the robes of sacred truth. Ideas, especially ideas about the nature of knowledge, have consequences.

Henrie, M. C. 1987. Reason, unreason, and the conservative. *Modern Age* 31:332.

BOOK REVIEWS

Weather and the Bible—100 Questions and Answers
by Donald B. DeYoung. 1992. Baker Book House.
Grand Rapids, MI. 162 pages. \$7.95.

Reviewed by Michael J. Oard*

This is a delightful book written for the layman. The book contains 100 questions and answers about the weather that will interest all readers. Dr. DeYoung also discusses many weather references in the Bible, as well as logical climatic inferences based on the worldview of the Bible.

The book is divided into five parts. The first part naturally begins with weather basics. Some of the questions asked are: Is there a creationist view of the weather? Are traditional weather proverbs accurate? What are some weather extremes on the earth? Is the earth closer to the sun during summer? I was amused that 21 out of 23 recent Harvard graduates failed to answer the latter question correctly. You can know the answer yourself by reading this book. As a professional meteorologist, I was pleased to see Question 4: Why are weather predictions uncertain? Hopefully the answer will give the reader more understanding as to why it rained at your picnic when the forecast called for partly cloudy skies. You may not believe it, but we are improving. One reason for my inaccurate weather predictions is indicated in Question 72: Is it okay to pray for rain? Those who successfully pray for a weather modification ruin my verification! I found the weather forecasts for other planets in the solar system delightful (Question 28).

The second part answers basic questions about water, wind, and clouds. Do you know why lakes freeze from the top down and why this is important? Question 32 provides the answer. Do you understand how the wind is like the Holy Spirit, as stated in John 3:8? See Question 36.

The third part is about stormy weather. Questions deal with such subjects as what is Saint Elmo's fire, sudden wind storms on the Sea of Galilee, the cause of rain and snow, acid rain, and much more. This section even gives you the answer as to whether it has ever rained frogs and fish (Question 49). This is a good question to ask your friends.

Part four delves into past weather, mainly what climate we can reasonably infer from the Bible during different periods of earth history. Dr. DeYoung examines the evidence for a pre-Flood vapor canopy and what the resulting weather would be like. He asks questions and provides answers on the source of the Genesis Flood water and where this water went afterwards. Many questions deal with weather after the Flood, for instance the post-Flood Ice Age and how the weather likely conspired to kill off the woolly mammoths and the dinosaurs.

This book does not leave out questions about future climate, the subject of the fifth and final part of the book. Future weather is a concern to many. Will there be a runaway greenhouse warming or an ice age? The section openly includes the speculations on greenhouse warming and nuclear winter. The last two questions

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consider end-time weather and also the weather during the millennium.

The book is well written and easy to understand. A glossary is included for technical terms, which cannot be avoided and are kept to a minimum. Throughout the book, the relation of weather to the Bible is discussed. The uniqueness of the weather, giving strong evidence for design and purpose, is emphasized. The weather and the climate are fine tuned for our survival. Favorable features optimized for life include the tilt of the earth's axis, the gas properties of the atmosphere, the water cycle that purifies the water and air, the unique properties of water, and the spin of the earth's axis. I learned a number of tidbits about the weather from this book, such as why desert people often wear dark clothes (Question 25). This book can be enjoyed by both young and old alike, as stated in the Foreword by Dr. Henry Morris.

The Creationist; The Evolution of Scientific Creation
by Ronald L. Numbers. 1992. Alfred A. Knopf. New York. 458 pp. \$27.50 hardback.

Reviewed by Jerry Bergman*

There are few writers about fundamentalism and particularly creationism who show as much insight and knowledge as Ronald L. Numbers. As Numbers himself notes,

Academics who would have no trouble empathetically studying fifteenth-century astrology, seventeenth-century alchemy, or nineteenth-century phrenology seem to lose their nerve when they approach twentieth-century creationism and its fundamentalist proponents. The prevailing attitude, colorfully expressed at one professional meeting I attended is that, 'We've got to stop the bastards.' . . . Many scholars seem to have no trouble respecting the unconventional beliefs and behaviors of peoples chronologically or geographically removed from us, they substitute condemnation for comprehension when scrutinizing their own neighbors (pp. xvi-xvii).

In short, Numbers stresses "I think it is profitable to get acquainted with the neighbors, especially so if we find them threatening" (p. xvii).

Numbers vividly demonstrates that many common beliefs about both creationists and the history of creationism are wrong. He adequately argues that "creationist conflicts rarely conformed to the battle lines drawn by White" who authored the famous classic *History of the Warfare of Science With Theology and Christendom* (p. xiv). Numbers also accurately shows "the sterility of efforts to demarcate between science and pseudoscience on analytical grounds," quoting researchers such as Larry Laudan who have "gone so far as to dismiss the demarcation problem as a 'pseudo-problem'," a statement that Numbers states he agrees with (p. xiv.).

Numbers documents that the past struggles were far more complex than science versus religion as often

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pictured in the press, and an important part was the creationists who “quarreled with one another over competing scientific and biblical interpretations [and] . . . in virtually every public battle, even when creationists squared off against evolutionists, scientists and preachers could be found on both sides, and sometimes in unexpected numbers” (pp. xvi-xv). In the 1981 Arkansas creation-evolution trial, those who opposed creationism “came overwhelmingly from the ranks of religious organizations, while virtually all of the experts testifying in support of creationism possessed graduate degrees in science.” An example is those testifying at the trial against creationism were “a Methodist bishop, a Catholic priest, a Protestant theologian, and an Evangelical church historian. In contrast, most of the witnesses for the defense (supporting creation science) were well-credentialed, if not all well known, scientists” (p. 251).

My major criticism is not what Numbers says, but what he does *not* talk about. What he presents is incomplete—there are huge areas in the movement which were not covered. This work actually deals primarily with the history of select persons involved in the modern American creation movement and gives one side of American science which, to understand the controversy, requires that one also review the history of American science as a whole. Another Knopf title, *The Launching of American Science* by Robert L. Bruce helps greatly to balance the picture. As Bruce aptly documents, the conflicts that Numbers talks about among creationists often pale in comparison to the battles fought among evolutionary scientists. Although Numbers’ book is not about scientists in general, a proper perspective requires that the reader have a knowledge of the history of science to realize that believers have no monopoly on personal and intellectual conflicts, and that the peccadillos and wars among creationists seem quite tame compared to those fought among secular evolutionists.

To understand the anti-evolutionists, creationists and others, requires detailed discussion of specifically *why* they rejected evolution—and Numbers includes a bare outline only, and few details in this area. A far better review of this issue is Tom McIvers’ Ph.D. thesis (DeYoung, 1992). Although he does not always discuss them in depth, Numbers rarely distorts the motivations of creationists—which is quite in contrast to many, if not most scientists, who write about creationism and creationists.

Although it is far easier to get a handle on those who wrote in scientific, popular and theological journals about evolution, Numbers attempts to evaluate those who did not accept evolutionism, and concludes that “they came from all walks of life and from every region of the country . . . many were not without education” (p. 44). Assessment is difficult, though, because “not all fundamentalists were creationists and many creationists refused to participate in the crusade against evolution” (p. 45). One 1929 survey of theological beliefs of 700 ministers found that the denomination with the most creationists was Lutheran, followed by Baptist, Evangelical, Presbyterian, Methodist, Congregational and Episcopalian.

A third area which is necessary to complement Numbers’ book is a history of the *antirealist* move-

ment — a so far unwritten work which would make fascinating reading. Many of those actively involved in this movement are disgruntled ex-Evangelicals or fundamentalists who are angry, in some cases with good reason, but in many others because of misunderstandings or due to personal problems that they experienced while involved in their religious association.

Numbers himself was reared in a Seventh-Day Adventist family of ministers, and still accepted creationism in college even though he majored in science. He first questioned the creation world view in the late 1960s while studying the history of science at the University of California-Berkeley. He then states that he quickly “though not painlessly” slid down the proverbial “slippery slope towards unbelief” and now concludes the agnostic label “accurately reflects” his theological uncertainty (p. xvi).

While Numbers’ assessment is generally fair, it is far from perfect. Among my criticisms would be statements such as “. . . during the heyday of the anti-evolution movement, the German zoologist Fleischmann remained the only well-credentialed biologist to lend his authority to the creationist attack on evolution (p. 53)” are simply not true unless you eliminate all of the other biologists who were critical of evolution, by claiming that they are not sufficiently “well credentialed.” If one defines well credentialed as having a tenured faculty appointment at a college or university it is clear that a small but significant percent of biologists from then until today have rejected megaevolution, and many more rejected naturalism. If one defines a creationist in the narrow sense of accepting a literal 24-hour creationism, then, as Henry Morris in his *History of Modern Creationism* notes, it could be stated that in the heyday of the early anti-evolution movement hardly any creationists were creationists.

Most of the creationists featured in the work were well known as creationists, often abandoning or neglecting their career in medicine, science, or other areas. The full story of creationism requires an evaluation of those large numbers of creationists, who few people except their family and certain close friends knew that they aligned themselves with this world view. The beliefs of these individuals often come out only occasionally in autobiographies or in comments that they inadvertently made in conversations. Many creationists are such primarily by belief, and their major interest and work is in trilobites, turtles, horse breeding, or toxicology—and this is the area that they research and publish in, not creationism. Their public professional expertise lies in another area, thus one would not identify these persons as part of the movement, even though many may have reviewed the literature carefully and have well thought out beliefs in harmony with the empirical research. My estimate is those in this category are around 20 percent of all scientists and science professors. Many of these also know that revealing their world view could alienate both fellow scientists as well as religionists who may view their opinions as too conservative or not orthodox.

The Creation Research Society chapter is a brief, fair outline, noting that of the original founders, “everyone agreed on the necessity of keeping out evolutionists, but beyond that, there was little consensus” (p. 230). Their final statement of belief “failed to require

the acceptance of flood geology or the recent creation of the universe" (p. 230). Most of the mistakes in this section—such as the inaccuracy in David Wariner's background—are not major.

Numbers also makes many extremely astute observations. He notes that the National Academy of Sciences declared, in contrast with the "unchanging and unsubstantiated conclusions of creationists" that the "examples of events changing scientific thought are legion" and a key aspect of science is that it is provisional and testable, responding that the institute is "unmindful that the same could be said of creationist thought. In fact, creationist opinion probably changed more radically in the half century from 1930 to 1980 than the views of evolution" (p. 248).

In many ways the controversy has not changed—in 1921 William Bateson in an address to the American Association for the Advancement of Science declared that "scientists had *not* discovered 'the actual mode and process of evolution.' [and] As knowledge of living things had multiplied . . . biologists had grown increasingly agnostic about questions of origin" (p. 520). Expectedly "creationists applauded his speech . . . while evolutionists rushed to control the damage" (p. 53).

This reviewer was familiar with most of the incidences and people that Numbers discusses, and concludes that he is generally fair. Nonetheless, Numbers does not always let the people or events speak for themselves, but tends to rely on references and people who are in general hostile to the world view held by the individuals involved in creationism. Interestingly, my information about Rimmer came primarily from creationist sources, and my respect for him actually increased after reading Numbers' account—it surprised me to learn that his respect among the academic community was high enough that he received the invitations for the faculty appointments that Numbers listed. Although a negative bias certainly exists in Numbers' work it is far less than in the majority of works about creationists written by those who are not committed to the creationist world view.

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DeYoung, Don B. 1992. Review of creationism: intellectual origins, cultural context, and theoretical diversity, by Thomas Allen McIver. *CRSQ* 29:98-99.

*Helping Children Understand Genesis and the Dinosaur** by Erich A. von Fange. 1992. Living Word Services. Syracuse, IN. 208 pages. \$12.95 paperback.

Reviewed by Wilbert H. Rusch, Sr.**

This is a well written, popular level book, produced especially for Christian parents and children, as well as pastors and teachers. The book is the result of more than 35 years of study by Erich von Fange of the mysteries and problems relating to Genesis and the dinosaur. The author writes from the standpoint of firsthand observation of fossil skeletal remains of dinosaurs in the field as well as in the museum. He spent a portion of his life in dinosaur country in the badlands

*Editor's note: Dr. Von Fange's first dinosaur book was reviewed by Don DeYoung. 1991. *CRSQ* 28:37.

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of the Red Deer River Valley of Edmonton, Alberta. He also writes from the standpoint of an elementary educator of some 44 years.

Section headings in the book are:

When Dinosaurs Roamed the Earth
Secrets of the Fossils and of Dinosaurs
How Christian Children Can Understand the
Dinosaur Age
Learning More About Genesis and the Dinosaurs
Your Very Own Dinosaur Hunting License

For anyone interested in the subject, I found this volume to contain a wealth of tantalizing and useful information. The author shows a truly humble and scholarly approach to his subject, when for example, he states "of course there are many, many questions which neither science nor the Bible offers answers for the curious mind." Also, "There may well be other and better ways to interpret Bible references quoted in this book" (p. x).

There are additional interesting topics: Where bones and tracks are found; Dinosaur names and what they mean. Are new fossils forming now? What about carbon dating? What can I say to people who do not believe that dinosaurs ever existed?

It would be worthwhile for the reader to travel some parts of this continent (Colorado, Utah, Texas, and Alberta) to get the personal experience, as I have, of sharing the company of these great beasts of the past. I wish I could transfer the feeling one has with 40 feet of dinosaur skeletal remains embedded in sandstone and limestone stretched out before him. The magnitude of the skeleton is awesome and the nature of the concept 'dinosaur' becomes clear.

In summary, I found this work to be a highly informative, scholarly, and lucid summary of many of the key points of the topic. This work fits equally well on the shelves of advanced science students and general readers interested in the Bible-science dialogue, and also in the library of a home, pastor's study, or elementary school. It will be of interest to both the skeptic and the believer.

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