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ABSTRACT

Provided in this document are reviews of 31 creationist publications. The reviews, written by Iowa teachers and scientists, were conceived in 1982 during a drive by Iowa creationists to install their books and other materials in the schools of 60 Iowa communities. Introductory comments on the format of the reviews and several generalizations are included in a preface. (JN)

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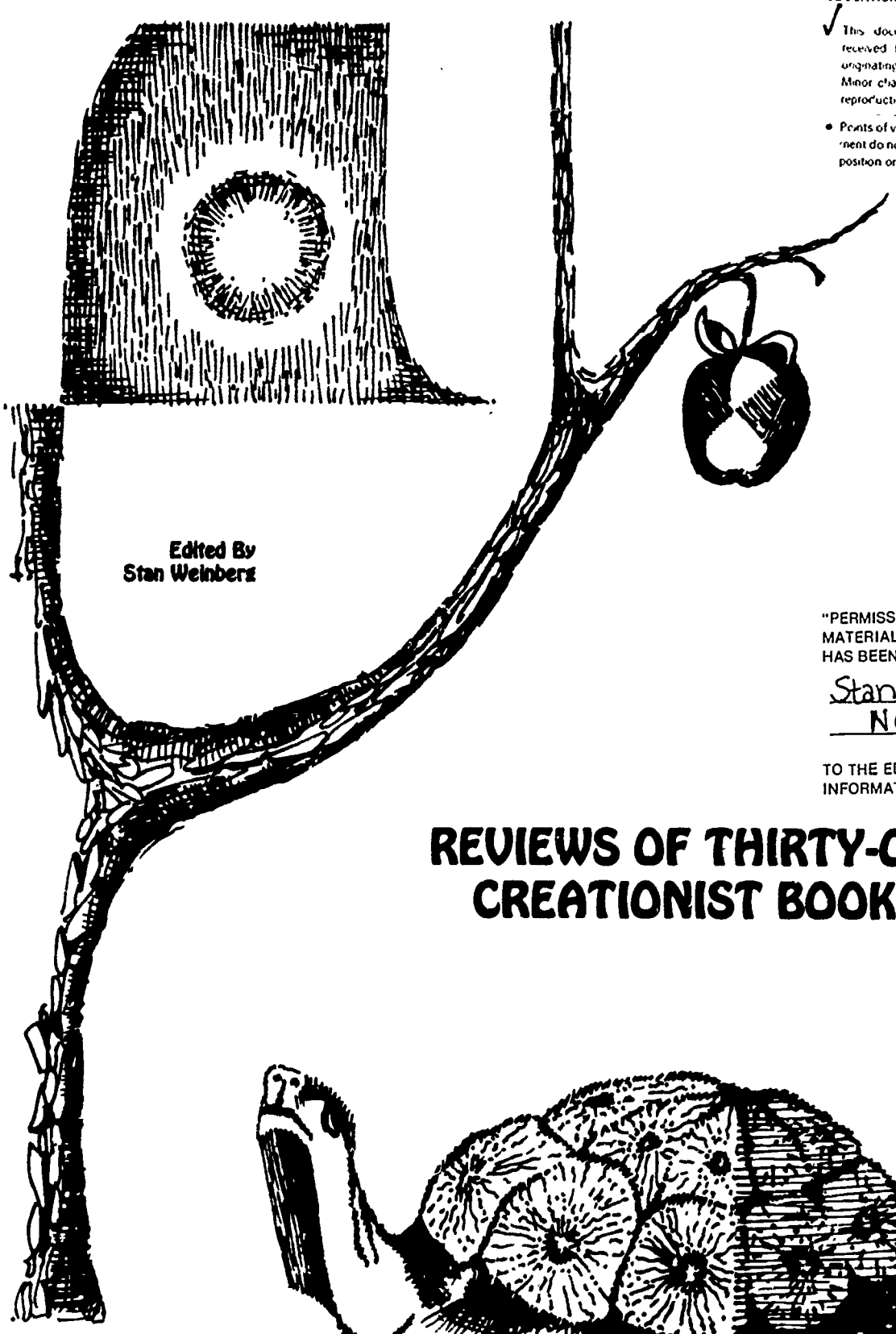

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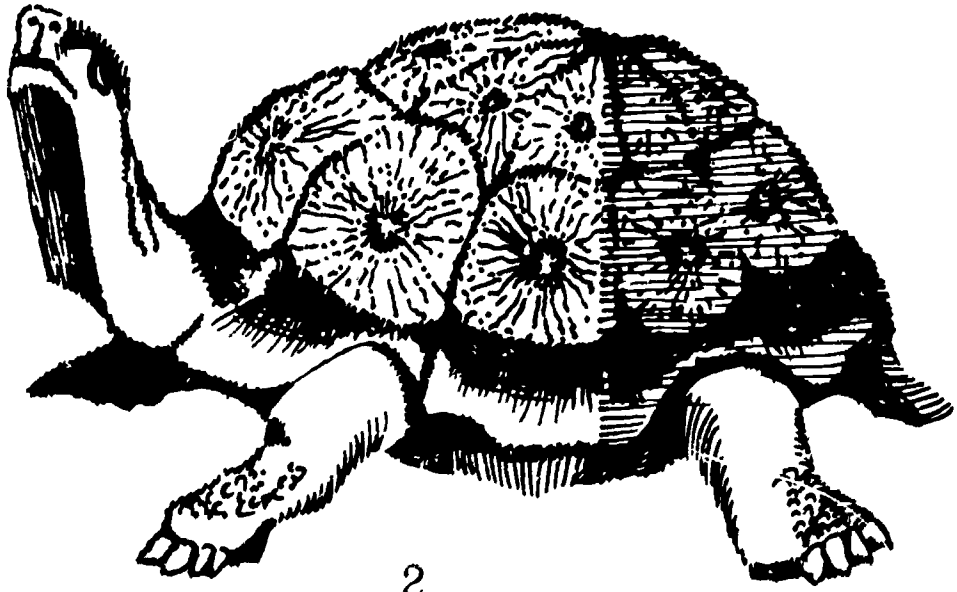
REVIEWS OF THIRTY-ONE CREATIONIST BOOKS



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C O N T E N T S

REVIEWS OF THIRTY-ONE CREATIONIST BOOKS. Edited by Stan Weinberg with the assistance of Paul Joslin. Published by the National Center for Science Education, Inc., (The Committees of Correspondence), Syosset, New York 11791; with support from the Iowa Academy of Science. Copyright 1984.

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Opinions expressed in the reviews contained herein do not necessarily represent the views of the Iowa Academy of Science or of its Board of Directors and should be taken only as the views of the writers.

P R E F A C E

The reviews in this book were conceived in 1982 during a drive by Iowa creationists to install their books and other materials in the schools of sixty Iowa communities. Some of the targeted school districts turned to two local, cooperating, pro-science groups for evaluations of the books that were being pressed on them. The two groups were the Iowa Committee of Correspondence (C/C), and the Iowa Academy of Science Panel on Controversial Issues. (The latter group is now dissolved.) In response to the appeals, six of the reviews included here were written and distributed under the editorship of Paul Joslin. The reviews were welcomed, and they proved useful to school boards, administrators, teachers, and librarians. Thereafter, various factors caused the list of books under review to grow: Ten titles comprised the rest of the immediate list that creationists were promoting; when Bert Thompson came from Alabama to conduct a pro-creationist "crusade" in Iowa, his book was added to the list; and so on. In the end the creationist drive was frustated; not one of the sixty targeted communities actually adopted the creationist materials for its school libraries or classrooms. Indeed, the creationists abandoned their effort after failing to gain a foothold in about twenty-five communities where they had tried.

The reviews in the book differ among themselves. In length they vary from one page to six pages. Two reviews are illustrated, the rest are not. Some of the evaluations are cursory, others are quite detailed. A number of reviews are thoroughly documented while others list no references at all. The editors provided minimum guidance while encouraging the authors to express their individual viewpoints. Thus the variability in the book is to a degree intentional. For example, since creationist literature is highly repetitious, it seemed redundant to provide a reference list with every paper.

On the whole the reviews are unfavorable. This is necessarily so since the literature of "scientific creationism", as the book abundantly illustrates, tends to be meretricious pseudoscience. Yet the reviewers took pains to offer kind words whenever this was possible. At least two of the books -- Aw, Chemical Evolution, and Young, Christianity and the Age of the Earth -- while criticized, are nevertheless treated with respect because of their honest tone and the substantial amounts of accurate science that they contain.

Besides the named authors, thanks are due to many who contributed to the production of the final work. Paul Joslin generously assisted the principal editor, besides doing some of the editing himself, as noted above. Lee DeMoss is responsible for the cover as well as for the art work inside the book. (The circular design in the upper left hand corner of the cover design is the artist's symbol for the infinity of nature and the continuity of life.) Lawrence P. Staunton, Leland Johnson, Harlo Hadow, Donald M. Huffman, Clifford J. McCollum, Donald H. Shepherd, Thomas E. Fenton, Donald L. Biggs, Erik P. Scully, and Robert W. Hanson refereed the papers; most of the referees also contributed manuscripts of their own. Philip Kitcher, Richard Bovbjerg, and Gerald Skoog were valued consultants. Our gratitude for the typing of the shooting copy is due to Doris Mitchell, Dorothea Gamel, Elaine Steinger, Bonnie Nath, the Iowa Freedom Foundation, and the Community Relations Commission of the Jewish Federation of Des Moines. The book was put together on a lean budget with substantial volunteer help, as noted here; but the task was eased by a most generous grant from the Iowa Academy of Science. We trust our readers will find that the product is worth the effort.

STAN WEINBERG

CHEMICAL EVOLUTION

by S. E Aw
Master Books Division of
Creation Life Publishers
San Diego CA (1982)

Chemical Evolution is unusual among creationist books in that S.E. Aw is inclined to treat his own speciality, biochemistry, in a thorough and scholarly way. Unfortunately, the last third of the book deteriorates so badly that it cannot be recommended even to confirmed creationists looking for support from a qualified scientist.

The most serious errors in the better parts of the book lie in Aw's failure to understand the significance of data which he usually presents accurately. These misunderstandings afflict both the large scope and the details of his book.

Aw fails to understand that the current scientific inquiry into the origin of life is largely irrelevant to the theory of evolution. The theory of evolution rests on geology, paleontology, and various parts of modern biology. The success of evolution as a theory in these fields leads us to inquire about the origin of life. Science is only at the point of producing suggestive experiments that make it easier to imagine that life originated by natural processes. Our success in producing encouraging results is amply documented in Chemical Evolution.

Even if we accepted every detail of Aw's argument, we would only conclude that science is just beginning to understand how life began. The conclusion that evolution is "directed" by other than natural processes is unwarranted. Aw's arguments are technical but they are still "God of the gaps" arguments. Of course science doesn't understand everything; if it did, we'd stop investigating. Little more than a century ago science had not recreated a single biochemical reaction, and it was widely held that all of biology was "directed." But the gaps are constantly filled. Within the last year one of the most famous of the "gaps" in the fossil record (between land mammals and whales) has been filled.

Aw begins his book by trying to demonstrate that the ancient, reducing atmosphere needed for most (but not all) theories of the origin of life could not have lasted long enough for life to appear. By page 13 he concludes: "A period of 2 billion years or so, thought to be available for chemical evolution, has now retracted to less than a billion years. This poses an acute problem as to whether a type of organism such as that found in the Onverwacht chert, could have evolved within the time available." Never mind that he has just finished telling us the Onverwacht Series "were of relatively inconsistent morphology and their biogenic nature is as yet uncertain." Biologists are delighted to see the origins of life pushed back in time. No evolutionist would suggest that the difference between 1 and 2 billion years is significant. Suppose we even encourage Aw to rest his case on the highly questionable suggestion (based on Brinkman) that the earth had an oxidizing atmosphere through "99% of its history." One percent of its history is still 45 million years. Although the formation of organic compounds in the ancient, reducing atmosphere was probably not as efficient as it is in the laboratory, it is possible that lightning alone could discharge enough energy to cover the surface of the earth with a layer of organic compounds 1 meter thick in only 100,000 years. We have no record of it, but it is conceivable that the formation of more or less living material coincided with the formation of the earth.

To attack the theory of evolution through origin-of-life arguments it is necessary to prove, not that we're uncertain how it began, but that life could not have begun by natural processes at all. Aw comes closest to attempting such a proof when he tries to show that an enzyme could not have been assembled from its amino acids by random processes.

It is true that enzymes, and especially enzyme systems, are complex, but complexity is not a sign of "directed" assembly. Complexity can be found in chaos even more quickly than in order. If the protein structures that are found in living things were the only structures that would serve their functions, if they were even the simplest, Aw would have a point. However, catalytic substances, enzymes included, tend to catalyze a large variety of reactions. The evolutionary problem is not to produce the enzyme but to make it more specific and the organism more efficient. A look at the absurd complexity of the blood clotting system makes it clear that this is a system that was selected out of chaos using common properties of proteins, not something that was directed.

Aw's probability arguments are exactly analagous to this: Suppose I tell you Iowa won the basketball game last night. Aw says, "Oh, what was the score?" It was 80 to 76, so Aw says, "The probability of a basketball game ending at 80 to 76 is only one in 10,000. Therefore, Iowa didn't win the game last night." There are lots of ways to make an enzyme just as there are lots of ways to beat Purdue.

Further into the book I was unpleasantly surprised when Aw dredged up the creationists' old argument about the second law of thermodynamics. "...some physicists... are unable to explain to their own satisfaction the apparent contravention of the second law of thermodynamics in living things...." Twenty pages later Aw returns to thermodynamics and clearly states that he knows better. "It used to be thought that living things do not obey the second law until it was realized that they are open systems." I don't know who, other than creationists, thought it. A living cell no more violates the second law than a General Motors assembly plant does. An assembly plant increases the order in the parts of a car by putting them together. It does so by using energy from the outside in conformity with the second law. A living plant increases its own order by using energy from outside the living plant.

Aw then ducks into a description of irreversible thermodynamics "as a branch of classical thermodynamics." Apparently we are to hope, as he must, that irreversible thermodynamics might do for creationism what classical thermodynamics fails to do. His description is high sounding but only reveals that irreversible thermodynamics is a subject he hasn't studied. It does not contain laws that limit the kind of universe we live in. Rather it is a set of phenomenological equations whose parameters may be adjusted to fit any universe.

As the book wears on we find misleading, out-of-context quotes, misrepresentations of the conventional view of evolutionists, and arguments against straw men. By page 165 Aw resorts to red-baiting, strongly suggesting that evolutionists are atheists and often-times communists. Such scurrilous material alone, in what is presumed to be a book of science, makes the book unacceptable for school use.

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ORIGIN AND DESTINY OF THE EARTH'S MAGNETIC FIELD

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by Thomas G. Barnes
Institute for Creation Research
Technical Monograph No. 4
Institute for Creation Research
El Cajon, California (2nd ed., 1983)

In this book, Barnes claims to show that the Earth can be no older than 10,000 years. His hypothesis is based on the undisputed observation that the strength of the Earth's magnetic dipole field has decreased approximately 6 percent since 1835. Barnes asserts that the field is decreasing because the source of the field is freely decaying currents circulating in the fluid iron-nickel core. He claims that these currents originated by unknown processes when the Earth was created and that the decay of the resulting magnetic field is irreversible and exponential, with a half-life of 1400 years. He calculates that the Earth's magnetic field would have been impossibly large in 8000 B.C. and concludes that the Earth must be less than 10,000 years old.

Barnes disregards most of what is known about the behavior and history of the Earth's magnetic field. For example, Barnes' calculations are based on observatory measurements indicating that the Earth's dipole-field strength has decreased since 1835. These same measurements, however, also show a corresponding increase in the strength of the nondipole field (which constitutes about 15 percent of the total field), so that the total-field energy external to the core has remained about constant--a fact that Barnes ignores. Barnes consistently errs in equating the dipole field, which is only one idealized component of the real field, with the total field and with the total-field energy. In doing so, he neglects all of the higher order harmonics, collectively called the nondipole field, as well as the probability of a toroidal component internal to the core.

Barnes also attempts to discredit paleomagnetic measurements, which have shown not only that the Earth's field has existed for more than 3 billion years but also that the dipole field both fluctuates in strength and irregularly reverses polarity. In attacking paleomagnetism, however, he fails to cite the extensive literature that clearly demonstrates the validity of this widely used geophysical technique. Barnes denies that there is any source of energy within the Earth to sustain dynamo maintenance of the Earth's field; he seemingly is unaware that radioactivity, gravitational energy, tidal friction, and meteoritic impact during the early history of the Earth provide a more than ample supply of energy for a dynamo within the Earth's iron-nickel core.

Barnes frequently misrepresents the work of others that he cites. For example, he attributes his geomagnetic field-decay hypothesis to Sir Horace Lamb, stating that "In 1883 Sir Horace Lamb proved theoretically that the earth's magnetic field could be due to an original event (creation) from which it has been decaying ever since." Lamb's 1883 and 1884 papers on this subject, however, were concerned with the theoretical behavior of electrical currents (and their associated magnetic fields) in a spherical conductor; Lamb

mentioned neither the Earth's field nor creation. Similarly, Barnes claims that Cowling's theorem precludes a dynamo in the Earth's core. Cowling's theorem, however, only restricts the types of fluid motions that are permissible in the Earth's dynamo--a point clearly stated by Cowling but ignored by Barnes.

These are only a few examples of the gross factual errors and distortions that pervade this book. For those interested in learning more about the scientific shortcomings of Barnes' hypothesis, it has been thoroughly refuted in the articles by Stephen Brush (Journal of Geological Education, vol. 30, p. 34-58, January 1982) and myself (Journal of Geological Education, vol. 31, p. 124-133, March 1983).

Although the book's cover proclaims that this is a "revised and expanded edition", it is actually little different from Barnes' first (1973) effort. The only revisions include some minor changes in the brief introduction and the addition of two short sections to the end; one in which Barnes claims confirmation of his "theory" and issues a nonsensical challenge to "skeptics", and another in which he unconvincingly replies to some of his critics.

It is a pity that Barnes made no effort to reorganize his prose for this second edition. The main body of the text still consists of four separate articles, three of which were published previously in the Creation Research Society Quarterly. The result is that the book is uneven, inconsistent, and highly repetitive. The level of treatment varies from the elementary ("The poles of a magnet are called the north pole and the south pole") to the abstruse ("Expanding the Laplacian of vector A in spherical coordinates...."), so that it is not at all clear to whom the book is directed. The introduction proclaims that the book is "...intended to be useful to the layman as well as the scientist." The layman, however, will find large parts of it confusing and incomprehensible, and will be misled by the myriad of errors in both fact and logic; the knowledgeable scientist will find the book either amusing, outrageous, or both.

In summary, this book is so permeated with scientific errors, omissions, misrepresentations, and distorted logic, and is so poorly organized and written, that I can conceive of no legitimate educational or scientific use to which it could profitably be put.

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3

ORIGINS: TWO MODELS

by Richard B. Bliss
Creation-Life Publishers
San Diego CA (1976)

This is an attractively designed, two-color, paperback textbook designated for use in the secondary grades eight through twelve. The book is simply written and is adequately illustrated by charts, diagrams, drawings, and photos. It was written while the author was science supervisor for the Racine, Wisconsin school system and was test-taught in a comparative study conducted within that system. On the basis of this rather questionable study, Bliss asserts that students learn evolution better when it is taught along with creationism in a two-model mode rather than when evolution is taught by itself.

Bliss submitted his study to the University of Sarasota as a doctoral dissertation. According to David McCalley (1982), the instrumental design used in the research was faulty, and in his interpretation of the data Bliss contradicts himself.

The book consists of an introduction and two chapters, the first chapter devoted to the "evolution model", the second to the "creation model." The introduction explains that these two "scientific models" of "first origins" are based on scientific data, while ultimate causes and meanings involve religious feelings. The two models are divided into "submodels"--thus evolution may be "atheistic", "theistic", or "deistic", while creation is characterized only as "creative design." There is no explanation of what is meant by "origins", or what is "scientific" about a "scientific model", or how the submodels of evolution can still be scientific while defined in religious terms, or what is meant by "creative design", or whether the "creation model" is scientific, religious, both, or neither. Thus the book begins with the never-justified assumption that there are two and only two "models" (theories?) of "origins" which are vaguely scientific but also have some religious content. Certainly the book begins with a confusing conceptual hodge-podge.

Each chapter begins by setting up behavioral objectives. Chapter One then defines evolution as an idea that explains how life developed on Planet Earth; it started as simple organisms and then evolved into complex forms. (Biologists would consider this a very inadequate definition of evolution.)

The text now plunges into the evolutionary topics of diversity, isolation, recombination, natural selection, and adaptive radiation. Each is named but is not described or explained with any degree of adequacy, and the various topics are not tied together into a coherent account of the theory of evolution. All evidence for evolution is said to be indirect. The heterotroph hypothesis is described better than earlier topics. Three brief paragraphs take the course of evolution from unicells to birds.

The geological column is discussed with emphasis on index fossils. The method of dating strata in the column is stated in this grossly incorrect manner: "An index fossil that is supposed to be relatively simple in structure, such as a sponge, would be considered very old, and thus the strata in which it is found would be considered very old also." Of course rock strata are dated absolutely by radiometric and other methods; fossils are used for relative dating.

Geochronology, human evolution, and homology are mentioned, and relevant specimens are named and illustrated. But there is no serious attempt to explain any of these areas. It is impossible to see how a student could gain any adequate notion of what evolution is about from this fragmented and inadequate chapter.

Chapter Two opens by stating that the "creation model" was "....developed scientifically by trained scientists that interpret present scientific data about life as the result of original design." Beyond repetition of the term "scientific", it is not explained what is scientific about the "creation model", about creationist interpretation of data, or about the creationist assumption of original design. Separately created basic kinds are assumed, and it is stated categorically that changes in basic kinds are never seen and there is no fossil evidence for such changes.

The flood hypothesis is explained in some depth (no pun intended). The deposition of fossils in existing strata is explained as due to settling during the flood according to relative density and ecological niche -- an inference that is rejected by sedimentologists and hydraulic scientists as utterly ridiculous and totally unsupported by any credible evidence.

A long list of assertions purports to be evidence for creation: there is genetic variation only within "kinds", there are no "transitional forms", there are systematic gaps in the fossil record, no organisms ever change into another "kind." These assertions, even if valid, would be evidence against evolution, not for creation. Bliss goes on the unstated assumption that creation can be validated by discrediting evolution -- a rationale that is acceptable neither to science nor to logic.

The creationists' standard -- and absurd -- arguments from thermodynamics and probability are set forth, as are the thoroughly discredited arguments based on purported secular decay of the Earth's magnetic field and on purported systematic errors in radiometric dating. As science all this is pretty shoddy stuff.

The text concludes by telling the reader to choose between the two models, since "You have now heard both models in their general terms." Finally there is a "two-model" bibliography that lists precisely seven evolutionary and seven creationist titles.

No reader would find in this book any basis for making the reasoned choice between two "models" that the author calls for. The information on evolution is inadequate, incomplete, largely erroneous, and unintegrated -- a major value of evolution theory is that it integrates biological knowledge. The information bearing on creationism, as science, is absurd.

The book's assumption that its two "models" are equivalent and alternative scientific theories is unsupported and unacceptable. The text improperly confuses scientific and religious concepts. It fails to define science as a discipline concerned only with the natural world and not with the supernatural -- as leaving religious ideas and questions to religion and theology. It fails to recognize that science deals only with defined, limited, testable problems in the natural world. Thus "origins" are too vague to be a scientific problem. On the other hand, the origin of species is an acceptable scientific problem that is addressed by evolution theory.

Thus the book fails to teach science in any meaningful way. Most fundamentally, it befuddles the basic distinction -- enunciated publicly, explicitly, and even forcefully by Federal Judge William Overton in Arkansas --

between evolution as an authentic scientific theory and creation as a religious doctrine masquerading as science. Its numerous and glaring deficiencies make Origins: Two Models totally unacceptable for use in any school that proposes to teach twentieth century science.

REFERENCE

McCalley, David, "The Two-Model Approach: A Critique." Paper read at National Association of Biology Teachers Convention, Las Vegas NV, October, 1982, and submitted to American Biology Teacher

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4

FOSSILS: KEY TO THE PRESENT

by Richard B. Bliss, Gary E. Parker, and Duane T. Gish
Creation-Life Publishers
San Diego CA (1980)

This nicely designed, easily read paperback is part of a series of modular, two-model textbooks prepared by Institute for Creation Research staff members for secondary school use. The two-color illustrations, mostly drawings, are attractive. Numerous questions are dispersed through the book, and a two-model bibliography is included.

The text begins by categorizing fossils as the only evidence we have that bears on life in the past, and as helpful in choosing between evolution and creation models. (It is not clear at this point what the models are supposed to explain.) There are brief, clear, simple accounts of some of the methods by which fossils are formed. However, geologists would take exception to the statement that "most scientists agree that flooding provides the best way to start forming fossils." The only geologists likely to agree to this bizarre statement are the tiny company of creationist partisans of Noah's geological role.

Twelve major geological systems are described. They are said to be identified by means of index fossils, and are described as "often, but not always....found in a certain vertical order" called the geological column. In accordance with creationist young-earth presuppositions, no dates or temporal designations (eras, periods, epochs) are given for the systems making up the column. Thus the text says, "Dinosaurs are found in only three systems. These systems are lumped together as the Mesozoic or reptile group" (not the Mesozoic era -- SW). Similarly, the Paleozoic is defined as the "trilobite group", not the Paleozoic Era.

One of two models, evolutionary-gradualism or creation-catastrophe, can enable us to interpret correctly the incomplete fossil evidence. We can then choose between the models on the basis of which best fits the data. The reasoning here seems circular in that we are asked a priori to choose a model to interpret the fossil evidence, and then to use the evidence to confirm or reject our choice. This rationale is not accepted by evolutionary biologists and geologists, beginning with Darwin. To these scientists, fossils are valuable in elucidating the course of evolution, but they do not provide the major evidence upon which rests acceptance of the factual occurrence of evolution.

Chapter Two proceeds to carry out a program of checking the two models against the fossil evidence. The method used is to compare actual fossils with fossils whose occurrence would be predicted by each model. A problem here is that prediction is useful in discriminating between two alternative scientific hypotheses, theories, or models only when it is exclusive -- that is, when one alternative supports the prediction while the other does not. So the creationist prediction of systematic gaps in the fossil record has no value in validating the creationist model, since evolution theory makes precisely the same prediction.

In any event, various groups of fossil organisms -- invertebrates, plants, fish, amphibia, reptiles, dinosaurs, flying reptiles, birds, mammals -- are described. In each group, text and illustrations stress the sudden appearance of the group in the geological column and the absence of ancestors, transitional forms, or links to the past. Among vertebrates, classical transitional forms such as crossopterygians, Ichthyostega, Seymouria, Archeopteryx, and therapsids are discussed at some length. In each instance the absence of certain homologies and similarities is cited to refute the notion -- not the certainty -- that the transitional forms indicate evolutionary relationships. The text continually emphasizes the sudden appearance of each major kind early in the Cambrian. Yet it overlooks two glaring omissions: two major groups, flowering plants and vertebrates, do not appear at this time. Were there then several creations rather than one? The book does not speak to this crucial point.

The central Chapter Two of Fossils: Key to the Present very aptly illustrates some standard features of creationist dialectic. One gets the strong impression of an adversarial situation, with the authors stressing selected arguments that support a preconceived belief rather than withholding judgment until all relevant evidence has been judiciously evaluated. The authors urge readers to "search and compare all of the data", yet the book does not do this. It stresses what is missing from the fossil record rather than the enormous amount of material that is there. Fossils do not provide the best supportive evidence for evolution; the fields of biochemical genetics, comparative anatomy, comparative biochemistry, embryology, and biogeography provide much stronger evidence. An interesting point that this book does not make is how closely the other, stronger evidential areas correlate with the fossil evidence.

Numerous points in Chapter Two are supported by references to evolutionist authors. Yet the references tend to be out of date, out of context, or misinterpreted. Thus a quotation from a 1958 paper by Axelrod stresses the absence of Precambrian fossils; more recent reports by Barghoorn, Schopf, Glaessner, and others, of extensive Precambrian fossil finds are ignored. Gould and Eldredge's concept of punctuated equilibrium does not include Goldschmidt's notion of "hopeful monsters", as the book incorrectly states.

The last, or summary, chapter gives brief evolutionist and creationist scenarios of biosphere history based on the fossil evidence. The evolutionist summary gives a reasonable account of the course of evolution (the fact of evolution) without going into the underlying mechanism (the theory of evolution). The creationist summation stresses the argument from design -- that a complex structure such as the eye must have been created by design and could not have evolved by natural processes. Some of the evidence from Chapter Two that contradicts evolution is repeated, and a little new and scientifically unsound evidence of this nature is supplied -- the non-existent human footprints in dinosaur beds at Glen Rose, Texas, and some bizarre "flood geology." Concerning the last, the text says in a majestic understatement: "However, much work needs to be done to refine the flood model."

The special pleading in Fossils: Key to the Present is so glaring that the book does not qualify as a science textbook but as creationist propaganda. It is in fact a tract carrying the message of Genesis in the trappings of pseudo-science. The reviewer believes that an overt study of Genesis would be an asset to any curriculum. But this book is neither straight science nor straight religion nor straight Bible study. It does not belong in any American public school science classroom.

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5

ORIGIN OF LIFE/EVOLUTION: CREATION

by Richard B. Bliss and Gary E. Parker
Creation-Life Publishers
San Diego CA (1979)

In this little paperback module, Bliss and Parker use what they call a two-model approach, contrasting assumptions and interpretations while encouraging the student to decide which model (evolution or creation) fits the data best. The authors specifically concentrate on chemical evolution to the level of the cell, breaking down the model of pre-cellular evolution into five stages: (1) the early atmosphere (reducing); (2) abiotic synthesis of micromolecules; (3) abiotic synthesis of macromolecules from micromolecules; (4) formation of protocells from the macromolecules; and (5) evolution of phototrophic cells and alteration of the earth's early reducing atmosphere into an oxidizing one. They then look at each of these stages, providing what they consider to be holes in the data, flaws in logical interpretation and extrapolation, and problems with the model (as they have presented it). The major problems they present are: not enough time for chance events to have led to synthesis of cells (or macromolecules, for that matter), increased order of macromolecules over their precursors, defying the second law of thermodynamics, the complexity of macromolecules and cells being of a nature that requires the existence of a creator. In the final pages of the book one is led subtly to the conclusion that the creation model is the model best supported by the data that they present.

In my opinion, the most important aspect of this book is its contention that one can deduce the preexistence of a creator from the type of complexity of the product created. This is important because creation requires a creator, and almost all scientists believe that the scientific method is not suitable for proving the existence of God: of testing the hypothesis that God exists. If deducing the designer from the design is logically sound, then examination of current knowledge of abiotic synthesis might not only reveal problems with an evolutionary model, but also be used to prove the existence of a creator to bring about the alternative: Divine Creation.

Bliss and Parker's logic can be seen clearly from this quotation:

> "How can we gather scientific data in favor of a creation model? The most natural and reasonable approach is to determine how an object created by man could be identified apart from an object produced by natural processes. Consider a television set, a landscape painting, and an automobile as examples. We know that these objects could not make themselves, no matter what amount of time was involved. Scientists can likewise look for evidence of creation in the kind of design found in living things." (Page 2 in the reviewed book)

They apply this logic to molecules important to living things, concluding that these molecules are of a degree and type of complexity that precludes their synthesis abiotically through natural processes, and thus requires--and proves--the existence of a Creator.

Archaeologists and anthropologists do deduce the presence of primitive man from the presence of artifacts in geological strata, and thus use the "deducing the designer from the design" method of logic used by Bliss and Parker. That method works scientifically, though, because we can objectively study how people create now, and see if things suspected of being created by primitive humans carry these same "tooling marks." An anthropologist examining a sharp-edged rock

suspected of being used as a knife, for instance, can examine the sharp edge for evidence of fracturing caused by blows from other rocks or compression applied near the edge. Microscopic examination of edges produced by various techniques reveals fracture patterns which are specific to a particular tooling technique and are different from "natural" weathering processes. The anthropologist then tools the same type of rock in the way he suspects primitive man did and microscopically compares the edge he created with that on the suspected artifact. If the patterns match, and differ from those produced by other techniques or by natural processes, the anthropologist can conclude that the evidence supports the hypothesis that the rock was tooled by primitive people using techniques that can be replicated in the laboratory. The case becomes stronger if bones of animals associated with the artifact reveal the presence of marks made by the stone knife and if the type of rock contained in the artifact does not occur in the immediate vicinity of the artifact. Other artifacts from the same area make the case even stronger, and so on. Anthropologists can verify the creation of human-made objects by humans because we can study how humans create and then seek objective signs that those creative techniques were used. We are not left saying only, "this is too complex to have happened naturally, so it must have been made by a person;" we can say exactly how and why it is too complex.

Obviously we cannot do the same for creative acts of the sort that might have led to complex macromolecules. If there was a Creator, he left no "tooling marks" on the molecules which have been distinguished from those left by natural processes. More importantly, we cannot observe the Creator at work in pre-living times or even place Him in a laboratory and have Him demonstrate His creating technique so that we can see what "tooling marks" to seek, or how "tooling marks," if they exist on natural molecules, differ from those produced by natural processes. While deducing the presence of designers from the designed artifact leads to testable hypotheses when dealing with human artifacts, then, the situation is not analogous when applied to cells and macromolecules which Bliss and Parker believe are Divine Artifacts. Thus they argue from false analogy, the falseness of which might have eluded them, and would surely elude high school-age readers. Divine Creation <u>is not</u> a testable hypothesis and is outside the realm of science; this book brings us no closer to making it testable.

Since a major argument of this book is an argument by false analogy, I cannot recommend the book for use in science classrooms. There are other less substantial reasons for this recommendation as well.

This book does not demonstrate the way that practitioners of science proceed to do science. Since the Divine Creation hypothesis is untestable, those students of the origin of life who were not satisfied with evidence for the existence of a primordial atmosphere of ammonia and methane did not turn to creation as THE alternative, but instead sought a different primordial atmosphere. Amino acids have been formed in rich abundance from experimental atmospheres containing cyanide and water, substances found in the gases escaping from volcanos. Presumably conditions inside the core of the earth have been less altered by the aging of the earth than have conditions on its surface, and thus more accurately reflect the condition of the primordial earth. These gases are thus thought to have been produced by volcanos in early times as well. We now have two different sets of gases whose alteration by energy sources of the primordial earth might have led to small molecules which could be synthesized into macromolecules. Both have yielded the building blocks of macromolecules under laboratory conditions. Other scientists now are seeking additional support for these models by examining the composition of the earliest of the earth's rocks and by other techniques.

Perhaps evidence will build which will lead to acceptance of one or the other of these hypotheses. Perhaps new hypothetical atmospheres will be proposed and exposed to scientific scrutiny, and both current hypotheses will be rejected. That is the way science works. It is not forced to accept an untestable "because God made it that way" hypothesis by default, when experimental results or observations from the outside world call a favored hypothesis into question. It instead turns to new testable hypotheses.

Experiments with gas combinations found in volcanos, alluded to in the preceding paragraph, are not mentioned in Bliss and Parker's book. Indeed, there are no journal articles cited in their bibliography which are more recent than 1970 and none from reputable scientific journals more recent than 1969. The most recent book cited under "Evolution books" is 1974. Much has happened since 1974 which is pertinent to the development of pre-cellular evolutionary theory. The microfossils obtained by Barghoorn, Schopf, and others (said to be indistinguishable from laboratory protocells) are now included in General Biology texts as evidence for the existence of protocells before cells evolved. Many laboratory experiments have shown that warming of mixtures of amino acids under several sets of conditions hypothesized for the early earth yield "thermal proteins," which have enzymatic activity, aggregate into protocells, have electrical activity like nerve or muscle cells, and have a primitive ability to reproduce. Protocells are able to make, simultaneously, other small compounds such as small proteins and DNA, thus suggesting the origin of a genetic code. Amino acids order themselves in thermal proteins, indicating that genes did not need to precede proteins. This material is present in current General Biology texts for college classes, and even in up-to-date high school texts, but none of it is included in Bliss and Parker's book. Their book is thus out of date.

In summary, then, I find Bliss and Parker's Origin of Life/Evolution: Creation to be out of date, inaccurate in depicting the way scientific knowledge grows, and significantly based on argument by false analogy. I see nothing to recommend its use in public school science classes.

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6

THE WATERS ABOVE
Earth's Pre-Flood Vapor Canopy

by Joseph C. Dillow
Moody Press, Chicago (1981)

This book purports to answer the question, "Did a vapor canopy exist over the earth prior to the forty-day flood in the time of Noah?". The foreward by Henry M. Morris, foremost "Flood authority" among the creationists, praises the book as "scientific creationism at its best", and concludes that..." at long last, the Lord has raised up Joseph Dillow....(to produce)....this tremendously important study of the great canopy....."

Dillow's introductory chapter addresses science and the Bible. Recognizing that..."The Bible is not a textbook of modern science"...he then says that this usually implies that..."Therefore the Bible contains scientific errors." He quite correctly sees this as an example of the logical fallacy of false obversion, and follows with examples of the non sequitur. He then proceeds to employ the non sequitur liberally in the pages to follow. For example, he raises the question, "In what sense, then, is the Bible a 'textbook of modern science?' In this way: the Bible gives the modern scientist a framework within which to perform his research into the geophysics of the ancient earth." This statement is an obvious non sequitur to traditional scientists, who avoid presuppositions or frameworks which bias any observations that might be made in performing research. Scientific method rejects all a priori "faith assumptions" , and this of course is the chief distinction between science and creationism; a fact recognized and stated clearly by Federal Judge William Overton in the Arkansas "creationism/evolutionism" trial.

Fortified by his "framework", Dillow goes to great lengths to examine the nature of scriptural language, "extracting scientific truth" thereby. By inference, biblical scholars should share both his exegesis of Genesis and his belief in errancy of the Bible; yet the majority of biblical scholars, while finding his exegesis accurate, would reject his attempts at "...extracting scientific truth" from scripture, and would reject as well his insistence that the metaphorical statements of Genesis 1-9 are to be considered scientifically factual. His "faith assumptions" permit him to view other myths of cosmogony (i.e. Babylonian, Egyptian, Sumerian, Canaanite) as purely metaphorical, while accepting the strikingly similar Genesis metaphor as unique and scientifically factual.

Throughout the book Dillow rejects the scientifically accepted datings for the age of the earth by astronomical or geological methods, and rejects radiometric dating of fossil strata despite the overwhelming evidence favoring them. He feels the factual interpretation of the Noachian Flood derived from the chronology of genealogies in Gen. 10 suggests the "date of the Flood was around 2,500 BC". This remarkable statement is made in the fact of many independent, replicated studies using several different isotopes, well documented material, and in the case of ^{14}C dating, an almost foolproof check by means of dendrochronological studies. Furthermore, there is no compelling geological evidence of a global flood or of fossil deposits in a "flood stratum."

Dillow launches into his "scientific evidence for the vapor canopy model" (Chapter 5) in a fashion familiar to all who have followed creationist didactics. The factitious "model", the creationist variant on a scientific theory, is presented with "evidence" from the aerodynamics of the giant flying reptile

Pteradodon ingens, shielding from cosmic radiation, the declining life expectancy of man from the time of Noah, ^{14}C levels, and many other "might have beens, could have beens, possibles" and similar sorts of wishful thinking. One example will suffice to indicate the nature of Dillow's evidence. He presents a "semi-log plot of declining longevity of postdiluvian patriarchs" (p. 161, Fig. 5) as proof of a steady, sharp decline in the age of men following the collapse of the water canopy, thus from the time of the Flood. Working from genealogies in Genesis 11, the "data", ages at death of post-Flood patriarchs show decline in life expectancy at a constant rate -- a straight-line relationship -- from Noah's 950 years to the 70 year average at the time of Moses. However, most Biblical scholars who have examined historical records recognize that the ages ascribed to patriarchs in all the Middle Eastern cultures of that period are primarily statements of honor: the greater the ascribed age, the greater the honor conferred. Sumerian "king lists" place their earliest patriarchs at several thousands years of age at death, and other examples are known that make the Noachian lineage look like a group of children. It is well established that Hebrew-Biblical practices of "age inflation" make the use of chronological-genealogical dates in Genesis shaky material for scientific inferences.

Despite its lack of scientific validity, Dillow seems satisfied with his "evidence". "Seen in this light, the widespread evidence of rickets in antediluvian man is evidence of the curse.... While living in obedience to God in the protection of the Garden, God provided for all of man's vitamin needs." This quotation refers to Dillow's belief that pre-Flood man's diet change resulted from God's curse. Dillow continues: "It appears that all 'fossil men' are merely degenerate forms of Adam". The author concludes the section from which these citations come with a self-evaluation of his efforts: "Surely any model of pre-history that can correlate such seemingly unrelated things as the flight of the pteranodon, the ancient greenhouse, volcanic ash in tundra muck, and rickets in Neanderthal Man, is worthy of serious consideration". This statement qualifies as a blue-ribbon candidate for non sequitur of the year.

For whom is this book written? This question can only be answered by Mr. Dillow, for The Waters Above is obviously not a scientific book. No school presuming to teach modern science would find it suitable for use in library or classroom. And theologians would likely criticize both the theology, and the misuse of metaphorical language as statements of scientific fact; thus the book will not be suitable for religion libraries. Like many of the creationist books before it, The Waters Above seems to be one more millstone around the neck of a discredited pseudoscience.

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7

FOSSILS/HARD FACTS FROM THE EARTH

by Norman Fox
Creation-Life Publishers
San Diego CA 92115 (1981)

As a scientist, I view with alarm the continued decline in science education in the United States and strongly support an increased emphasis on science at all grade levels. Such instruction should stress development of the student's ability to think critically rather than simple regurgitation of facts from memory. One way of reaching this goal is to present conflicting scientific hypotheses for discussion, but it is imperative that both hypotheses be viable scientific alternatives. Such is not the case in Fossils/Hard Facts from the Earth. The book is designed for use in grades 5-8. I will first address some, but not all, of its inaccuracies and deficiencies, and will conclude by considering three major areas of concern regarding the book.

Fox's definition (p. 2) of evolution as life growing "more complicated" is a poor one. "Change through time" or "descent with modification" would be better. As organisms adapt to different environments and lifestyles, they may become either more complex or more simple. Examples of the latter are the many thousands of species that are parasitic. This type of adaptation often entails reduction in size, as well as loss of wings, appendages, eyes, digestive systems, or other structures that were present in the parasites' ancestors.

The author's understanding of Precambrian paleontology appears to be severely limited. His source on the Precambrian fossil record is a paper published in 1958. Since that time our knowledge of Precambrian life has greatly increased, and the major evolutionary events are now well known (see Barghoorn 1971). Did Fox even look at the scientific literature on Precambrian life published during the last twenty years?

I take strong exception to the statement that fossil man tracks have been found with dinosaur tracks. Such "human tracks" have never been described in any legitimate scientific journal. Tracks that creationists claim are the best always seem to be "eroded away" before they can be collected. In citing an article by Roland Bird as evidence for the authenticity of certain tracks, Fox grossly misrepresents Bird's position. Nowhere in the paper does Bird state that real human footprints were discovered; he does state, however, that several of the local townspeople admitted to carving the human tracks for sale to tourists. Other creationists such as Neufeld 1975) regard these "human tracks" as forgeries and discount them. The tracks are actually eroded dinosaur tracks, erosional features, or forgeries (see Godfrey 1981, Weber 1981). In light of all this negative evidence, it is ridiculous to present these so-called human tracks as fact; and the clear misrepresentation of Bird's paper is deplorable.

Fox says (p. 8) that flooding is the most likely way for animals to be come buried. This is basically incorrect. An examination both of the fossil record and of today's biological world will quickly show that much of the earth's biota are marine invertebrates. These aquatic animals cannot be "flooded" as they already live in water. In actual fact, marine invertebrates normally become fossilized through being buried by sediments derived from the eroding continents. Water-lain deposits do indeed often contain terrestrial vertebrates; but these deposits, with their contained fossils, were laid down by freshwater rivers, ponds, and lakes, and

not by a flood. The "graveyard of fossils" which Fox eloquently describes, containing millions or billions of varied life forms, does not exist. There simply is no evidence for such a statement, and Schadewald (1982) has exposed the fraudulent nature of the claim.

Fox's description of the famous Agate Springs quarry is blatantly incorrect. The accompanying illustration shows a slab of fossil bones from an exhibit at the American Museum of Natural History. The slab, according to Fox, "contains bones of animals that would live in many different zones" (p. 12). (This assertion is intended to justify the creationist contention that the arrangement of fossils in the geological column results from hydrological and ecological sorting and mixing caused by flood waters.) Alas for the creationist case! Nearly 100% of the fossils in Fox's illustrative slab represent a single species of small rhinoceros.

Fossils/Hard Facts from the Earth states that "real strata always have gaps or reversals" in "order" (p. 13). From what we know of modern depositional environments, gaps in the geologic record are to be expected. The sedimentary record at any one spot results from normal shifting patterns of erosion and deposition. But to say that "reversals" are always present is not true. Overturned sequences do occur, but only in areas of great compressional forces such as mountain-building areas: e.g., the Alps. In sequences here, a wide variety of geologic evidence--footprints, cross bedding, graded bedding, load casts, mudcracks, etc.--will show which direction is up, and thus make the overturned nature of the sequence clear. This is quite a different matter from claiming, as Fox does, that the sequences are deposited out of order. Further, large scale thrust faulting can push older sediments over younger ones. This phenomenon is associated with large compressional forces during mountain building, and is not a reversed sequence of deposition. All this is basic physical and historical geology.

Fox states (p. 22) that "present processes do not form life from non-living things." This is true, as far as we know. However, the environment of the early earth, and the conditions under which life presumably arose, were very different from those of the present day. Thus Fox's statement is irrelevant to the discussion. Based on the geochemistry of Precambrian rock, and on what we know of planetary atmospheres, the environment of the early earth can be roughly recreated in laboratories. Under such conditions the chemical precursors of life have been produced by natural processes. For a discussion of the chemical evolution of life see Cloud (1976).

Invertebrates do not appear, as Fox suggests (p. 23), "complete and complex" at the beginning of the Cambrian. Their precursors, some quite complex, occur in Precambrian strata. Also, Cambrian invertebrate fauna are far from complete, since many higher taxonomic groups are unknown from these strata. Contrary to Fox's statements concerning vertebrate fossils, intermediate forms are known that connect the major classes of vertebrates. Examples of intermediates, and the classes that they connect, include Ichthyostega (fish-amphibians), Seymouria (amphibians-reptiles), Archaeopteryx (reptiles-birds), Tritylodon (reptiles-mammals).

Fox takes the classic creationist position that Archaeopteryx is not an intermediate or transitional form but is unquestionably a bird. Fox supports his argument with figures (p. 23) of Archaeopteryx and of a recently described "modern" contemporary. The "modern" form is apparently avian, but not even its discoverer claims that it is a modern bird--only that it could fly. The remains are diagnostic but fragmentary, consisting of a limb bone and a partial pelvis (Fig. 1). Fox, however, chose to illustrate this fossil with a drawing of the complete skeleton of a modern pigeon. By captioning the pigeon "NEW FIND", Fox deceives his readers.

Fox suggests (p. 23) that some fossils "look like transitional forms" because they were created to look that way. Such reasoning conveniently explains away any evidence that contradicts the creation model; this is not scientific thinking. Fox says further that "no one has seen an organism change to a whole new kind." The argument is ludicrous. No evolutionary biologist is ever going to sit up nights hoping to get a flash shot of such an event the instant it occurs. Evolution does not involve a single organism changing into another kind of single organism. Evolution involves a whole group or a whole gene pool slowly changing into a different group or gene pool.

A "great flood" weighs heavily in Fox's defense of creationist earth history. As one line of evidence for the great flood, Fox cites (p. 24) "tall fossils extending through several layers." All such examples that I know of are trees, and the explanation is simple. Mud flows, or air-blown volcanic ash, can suddenly cover an entire forest and bury it upright. The roots are fossilized in the old soil and the trunks in the newly deposited sediments. The trees "extend through several layers." The most spectacular example of this phenomenon is in Yellowstone National Park, where twenty-seven fossilized forests are preserved, recording the repeated burial and regrowth of the Yellowstone forests (Fig. 2).

Aside from the specific technical deficiencies discussed above, I have three general objections to the supposedly fair presentation of the creation-evolution dispute in the book under review. First, the treatise offers as science a theory --special creation-- which has been under exhaustive examination for well over a hundred years. It has already been falsified by basic biology and geology, and has been rejected for good cause by substantially the entire world scientific community. As noted above, a universal flood--i.e., one which totally covered the earth--is central to the "creation model" as elaborated by Fox and by the Institute for Creation Research. However, the flood hypothesis is clearly falsified by a large body of geologic and biologic data. For an extended discussion of this question see publications by Gould (1982), Schadewald (1982), and Weber (1980).

A second general objection to this book is its failure to discuss radiometric dating. Indeed, the very existence of this invaluable technique for geochronology is denied on page 24, where the author writes, "No one can really measure the age of fossils for sure." Reliable dating bears directly on many of the questions raised in this book, and provides critical evidence against the creation model. If the entire fossil record is the result of a single flood, then all rock layers should give the same radiometric date. Tens of thousands of radiometric dates have been obtained throughout the geologic column, and they show clearly that all deposits are not the same age.

My third general objection to Fossils/Hard Facts is its misrepresentation of the contents of scientific papers and its presentation of numerous unsubstantiated "facts". As a professional paleontologist I am familiar with much of the scientific literature in my specialty. In several instances Fox cites references which do not support his assertions; either he did not read the papers he cites, he misunderstood them, or he simply misrepresents them. In other instances there is absolutely no evidence for Fox's "facts". Thus readers who are not familiar with the literature can be misled by Fox's references to it. This is reprehensible.

A science text which stimulates critical thinking would be admirable; unfortunately Fossils/Hard Facts from the Earth is not such a text. The flood model which it supports has been decisively falsified, radiometric dating is omitted and its validity denied, scientific publications are misrepresented, and unsubstantiated

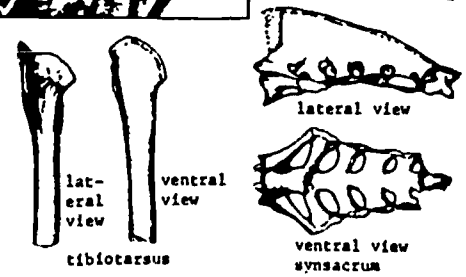

Figure 1. Actual views of Palaeopteryx, the "modern" bird that coexisted with Archaeopteryx. Compare with skeleton marked "NEW FIND" in Fox's book, p. 23. Photo (top) from BYU TODAY, March 1982, p. 30. Drawings (bottom) from J.A. Jensen, ENCYCLIA, 58: 109, 1982. By permission.

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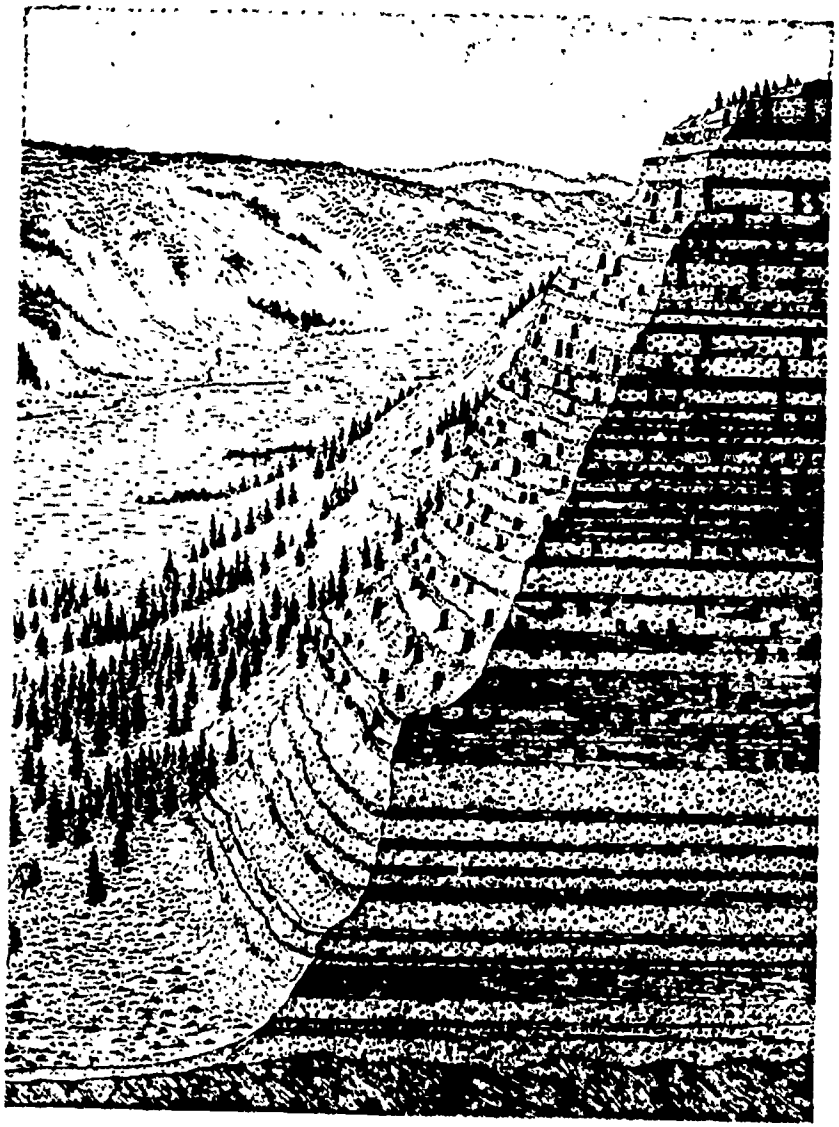

Figure 2. Dorf, "The petrified forests of Yellowstone Park," SCIENTIFIC AMERICAN, April 1964, p. 107. By permission.

CUTAWAY VIEW of a cliff in the Fossil Forest region of northeastern Yellowstone Park reveals the 27 layers of volcanic sediment that contain fossilized plant remains of Eocene forests. Petrified tree trunks are in color. The fossil-bearing beds total about 1,200 feet in depth. In this idealized landscape the cliff overlooks a portion of Lamar River valley (left background).

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"facts" are presented as valid scientific evidence. Thus the book would not contribute usefully to an acceptable scientific curriculum and I cannot recommend its use or adoption by public schools.

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8

APE-MAN: FACT OR FALLACY?
2nd Edition

by M. Bowden
Sovereign Publications
Bromley, Kent (1981)

Ape-Man: Fact or Fallacy? is written to cast doubt on the evolutionary interpretation of the human fossil record. The author, M. Bowden, uses two approaches: 1) questioning the fossil evidence, and 2) questioning the honesty of human paleontologists.

1. Questions of Evidence

Bowden barely describes or illustrates the fossils for the reader. He does not give an adequate reference, such as (6), where the reader might obtain further information. These unfortunate omissions greatly reduce the value of the book. Nevertheless, Bowden claims that "the layman's judgment can be as valid as that of the expert" in this "presentation of all the relevant evidence" (p. 1).

Bowden states that "Neanderthal man was a degenerate form of existing Homo sapiens, suffering from malnutrition and rickets, possibly living promiscuously" (p. 173). This unwarranted assertion contradicts the important paper by C. L. Brace (1), who thoroughly reviews the many Neanderthal fossils.

Bowden claims that Australopithecus "did not walk upright" (p. 176). He disputes D. C. Johanson and M. Taieb's (4) description of the fossil knee joint discovered in the Hadar region of Ethiopia. Bowden insists "I could find no evidence in print which proves that this knee joint exhibited bipedalism" (p. 220). Yet the paper by Johanson and Taieb lists well-known biomechanical research showing that the fossil knee matches a modern knee (3, 5). The author's error of fact illustrates his tendency to ignore or distort any evidence he does not agree with.

2. Questions of Honesty

Bowden believes that human paleontologists conspire to conceal the "truth of creationism." He shows no comprehension of the self-correcting nature of scientific work, which regularly causes scientists to expose the errors of other scientists. An outstanding example of this procedure is the famous Piltdown hoax. Bowden cites the affair to draw suspicion towards human paleontologists. He might as well claim that modern medicine is suspect because physicians once prescribed "bleeding by leeches" to cure illness. In fact, the Piltdown hoax was exposed by paleontologists, showing that conspiracy and error in science cannot be concealed forever.

Bowden makes other false charges. On page 244 he accuses scientists of plotting with journalists for harsh treatment of dissidents; on the next page he accuses paleontologists of using "evidence which has been wilfully misconstrued." He accuses Eugene Dubois of withholding information on the 'Java man' skulls (pp. 141-142), and charges Marcellin Boule with being "unconvinced that Sinanthropus was other than a monkey" (p. 105). However, a scholarly review (2) of the work of these authors demonstrates the falsity of the charges. Bowden's persistent attack upon Fr. Pierre Tielhard de Chardin constitutes almost 40% of the book (pp. 3-55, 90-137)! Personal attacks and vendettas are not the material of scientific discussion.

This book is typical of the creationist brand of science. It offers no new facts, only disputes the work of others, attacks scientists personally, and supports the irrational view that conspiracies are everywhere in science. The book concludes with familiar apologetics and the contrived dualism (7) of modern creationism. Unlike scientists, the creationists not only answer all present-day questions, but they already know the answers to all future questions.

In grossly misrepresenting the nature of scientific discussion, Bowden's book does a disservice to good science education. It does not deserve a place in any modern science classroom, where coming to understand the nature of the scientific enterprise is regarded as far more important than absorbing any particular subject content.

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9

THE RISE OF THE EVOLUTION FRAUD

by M. Bowden
with an introduction by Henry M. Morris
Creation-Life Publishers
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The main point of this book seems to be that the theory of evolution by natural selection resulted from a conspiracy by devious, mean-spirited men whose intent was to bring down Christian religion. Rather than a discussion of evolution, the book is an ad hominem attack on character. The book begins by setting up a straw man to shoot at. According to Bowden:

> It is commonly thought that Charles Darwin was responsible for conceiving the basic idea of "Evolution". Those who study the matter further usually agree that Darwin first had doubts about the "fixity of species" as a result of examining the variety of finches on the Galapagos Islands. It is then thought that it was this basic idea which he later developed and expounded in his book The Origin of Species, first published in 1859. This idea has been so well publicized over a considerable period of time that it is now the most popular interpretation of these events. However, like many other popular and highly-publicized notions, it is quite false.

Bowden is quite right; the notion is false, or at least misleading. After I read that statement, I looked in the indexes of 22 different college-level introductory biology texts and found only one that did not have an entry for Lamarck or Lamarckism. Even moderately well-informed nonscientists will know that Darwin certainly was not the first to have had evolutionary ideas. In addition, the theory of natural selection emerged slowly over the years during and after the voyage of the Beagle, rather than by the flash of inspiration that the passage implies. Finally, it was David Lack's careful study that was mainly responsible for indicating the importance of "Darwin's finches" in evolutionary biology. It is unclear to me how these "facts" detract from Darwin's genius.

In his introduction Bowden also tells the reader that he relied heavily upon a biography of Darwin by Gertrude Himmelfarb, published in 1959 and now lamentably out of print. It is, however, still in university libraries, and it turns out that Dr. Himmelfarb is equally uncomfortable with the theory of natural selection, and can hardly be classified as an unbiased source of information. Furthermore, the inadequacy of her scholarship is thoroughly demonstrated in a review of her book by Anthony West (1). I suggest that the interested reader peruse his examples of Himmelfarb's slanted presentation before attaching too much reliability to this source, or before expending too much effort in trying to locate a copy.

Much of the first part of Bowden's book is an attempt to discredit Darwin's intellect and to make him look like the tool of Lyell and Huxley in their supposed efforts to subvert Christianity. In reality Darwin did spend time worrying about the implications of his theory for religion, and it was for this reason, in part, that he delayed nearly 20 years from the time he wrote his first outline of the theory until the publication of The Origin (2).

There can be no doubt that Darwin and his colleagues were human. Darwin was interested in the fame that his work would bring him, and for that reason he was distraught when Alfred Russell Wallace sent him a copy of a manuscript outlining his own theory. But a human interest in recognition is quite a different matter

from intellectual dishonesty and willful perversion of scientific accuracy, dispite Bowden's strenuous efforts to translate one type of trait into the other.

The book is filled with innuendos and suggestions that are later referred to as established facts. One example will serve to make the point. On page 158 the author discusses the age of comets. He asserts, without reference, that someone named Oort has developed a theory involving a reservoir in the universe of comets that stars occasionally trap into orbits. He then asserts that there is not the slightest evidence in favor of this theory, and he cites a religious publication to support the assertion. Still later he refers to this discussion as having established that the universe is young. In this sense the book is great propaganda, especially if it were to be presented to a reader who was inclined to attach truth to everything that appears in print. In short, despite extensive footnotes, the scholarship falls short.

The real reason for writing the book finally appears in a discussion of the evils that evolution has supposedly thrust upon society. The author argues that evolutionary theory is anti-Christian -- a scurrilous charge that millions of devout Christians indignantly reject (3). Bowden is afraid that evolutionary theory can somehow destroy belief in God, and he fears this because "Once God has been eliminated, then any basis of absolute moral standards is destroyed, and all behavior becomes 'relative'" (emphasis his). I have seldom seen such an explicit statement concerning the motivation of the creationists. Such inaccurate and defamatory statements have no place in a discussion of science.

Toward the end of the book there are some brief summaries of the "evidences" against evolution and the "evidences" for creationism, all of which are hopelessly amateurish and erroneous. New to me was a statement that the speed of light has been decaying since the beginning of time, and therefore all radiometric dating techniques are incorrect and the universe turns out to have been formed around 4004 B.C. The source of this information is, of course, a creationist publication.

In summary, this is a rather crudely done religious tract, and it should be viewed as such. The view of history represented by the author is patently unsupportable on objective grounds. The only reason even to be concerned with it is that a novice might be misled into thinking that it represents the "facts" about the development of evolutionary theory, when in fact it is outright propaganda. The book's intent is well summarized by a statement made by Anthony West in his review of Gertrude Himmelfarb's biography:

> The truth is that [it] represents an advanced case of Darwinitis, a complaint that afflicts those...with strong attachments to pre-scientific culture, who find in the theory of evolution a disturbing and mysterious challenge to their values. It is in some obscure way helpful to anyone who is menaced with loss of status by the theory to denigrate and diminish the man who formulated it.

To that I can only add that the people who developed and are developing the theory of natural selection were and are probing for correct understanding of scientific laws governing the universe. To suggest, as this book does, that they are conspirators in a Satanic plot could not be farther from the truth. Because of both the malice of its tone and the inaccuracy of its content, the book is entirely unsuitable for use in schools.

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10

EVOLUTION: THE FOSSILS SAY NO!

by Duane T. Gish
Creation-Life Publishers
San Diego CA (1978)

In publishing two identical books which differ only in the addition or subtraction of Biblical references and explicit sectarian notes, Gish seems to concede a major point: This is religion, not science. A revised Bible which used phrases such as "In the beginning what's-his-name created heaven and earth" would not disguise its religious nature. Gish's book(s) represents religion in the trappings of science, to the detriment of both religion and science.

Gish systematically misleads readers. He says evolution has not been observed and thus is not scientific. It has been observed directly and via fossil data; but more importantly, his definition of science is artificial. We have not seen electrons or gravity, yet they can be studied scientifically. Gish accepts "microevolution" or small genetic changes, to the consternation of some creationists, but because he believes in an extremely young earth (6-10,000 years), he sees no way for small changes to add up to major changes. He is trapped by his prejudice for a young earth.

Gish claims transitional fossil forms are unknown and debunks Archaeopteryx, one of the best cases, because it has traits of birds and reptiles. He laughs off the human fossil record which actually provides an outstanding series of transitions. More basically, he ignores the fact that transitional forms above the species level are very well established. (Early mammals look alike, for example, and they diverge over millions of years.) To deny this is to deceive, or perversely to ignore, mountains of data. The widely noted shortage of transitional fossils between species is misinterepreted as evidence against evolution rather than as possible evidence against gradualism.

Leading evolutionists such as Stephen Jay Gould and David Raup, who criticize gradualistic models in favor of rapid bursts of change, or punctuationalism, are quoted in support of anti-evolutionism. Gish quotes liberally from such scientists, who actually advocate positions diametrically opposed to creationism. Selective quotation is used in detail. Cole (1981) highlights some of these tactics of selective quotation and misreading of evolutionist writings such as those of Leakey, Oxnard, Zuckerman, Gould, and others.

Geochronology is misrepresented. The ages of the earth, moon, various life forms, and human prehistory are consistently determined by multiple techniques. There are professional quibbles with particular dates, but they are unrelated to Gish's case: If the earth is 4 billion or 4.7 billion years old instead of 4.5 billion, this would not be anti-evolutionary or proof that 10,000 is the better date! Multiple dating facts agree: Gish is wrong.

Trying to convince others that black is white, as he has convinced himself, Gish has written an excellent example of pseudoscience. His book appeals to emotions ("They laughed at Galileo, too"); and with many footnotes, it may appear to be documented and scholarly, but it is simply a tortured argument to justify nonsense. They laughed at Galileo, but they also laughed at the Three Stooges. Being laughable is not a strong case for one's position.

Some of the author's errors are noted in the reference cited. He harps on long discredited errors and frauds, ignoring or disparaging modern evolutionary arguments and all arguments which discredit his own a priori beliefs. The book is not a suitable science textbook.

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11

HANDY DANDY EVOLUTION REFUTER

by Robert E. Kofahl, Ph. D.
Beta Books
San Diego CA (1980)

> The real purpose of this book is stated in an appendix which concludes: "The Handy Dandy Evolution Refuter provides logic and scientific evidence to show that materialistic evolutionary theories are really not science, and that there is actually no scientifically based reason for ignoring or refusing the gracious offer of God to save those who believe in His Son Jesus Christ. It is our hope that our readers will come to faith, or to stronger faith in the Bible and in the God of the Bible Who is Creator, Lord, and Judge of the world."

This conclusion is not the only religious statement to be found in the book. The authors have a two-fold purpose: to deprecate the concept of evolution as a network of valid scientific theories, and to offer evidence for a putatively literal interpretation of the biblical account of creation.

The Refuter is organized in what many will recognize as a catechism format. Each section is a sequence of questions or statements that are highlighted in bold print, each such question or statement followed by a brief discussion or answer. The book is therefore a kind of guide to responding concisely and critically to almost every aspect of evolutionary theory. The topics treated cover the broad range typical of "creation science" books. One by one, each topic, from the limitations of science to estimates of the age of the earth, is redefined and distorted in such a way as to make the evolutionary explanation look foolish, or to offer divine creation as an equally likely explanation.

The limits of science are redefined so that only observable, repeatable, and experimentally verifiable phenomena can be valid scientific subjects. Thus, since no one witnessed the origin of the universe or of life, theories of their origin are matters of faith. Furthermore, even should a scientist be able to form a living organism from nonliving materials, this success would actually confirm the validity of creationism, since the experiment would have required an intelligent designer -- the basic assertion of the "creation model" concerning the origin of life.

The book is essentially a listing of the common "scientific creationist" attacks on evolutionary theory. The spontaneous origin of life is shown by probability theory to be "impossible", using the analogy of flipping a coin and having it come up heads a large number of times. Evolution, which is incorrectly described as implying an inevitable increase in order and complexity, is said to violate the Second Law of Thermodynamics, which is here renamed the Natural Law of Degeneration. The fossil record is said to be devoid of transitional forms, and such examples as ancestral horses and archaeopteryx are dismissed as the result of the atheistic philosophical biases of evolutionary biologists.

Physics, astronomy, and oceanography are not spared criticism, because these fields have also been permeated by evolutionary philosophy. All forms of radioactive dating are disposed of as being based on questionable or unproven assumptions. Kofahl cites several references (almost all from "creation science" sources) which indicate that an unbiased understanding of astrophysics would lead to the conclusion that the solar system and the universe are only several thousand years

old. Similarly, the salinity of the ocean, the depth of its sediments, and even the mass of the Mississippi delta indicate that this planet is much younger than most scientists accept.

The truly interesting parts of the book are the sections in which the "creation model" is discussed in detail. For example, the biblical account of Eve's creation from Adam's rib is said to make sense in the light of modern genetics because, if it had been the other way round, with Adam made from Eve's rib, how could Adam have acquired a Y chromosome? The entire human species could easily have descended from Noah's family of eight persons if each subsequent couple produced an average of 2.3 children. In his discussion of inbreeding the author is self-contradictory: at one point he states that the intensive inbreeding that early population growth would have required was not detrimental because Adam, Eve, and Noah had not yet acquired the high genetic load of modern humans; elsewhere he speculates that some presumptive pre-human ancestors were actually full human beings who had degenerated due to inbreeding in isolated populations after the flood. Of course, not the slightest evidential basis is given for any of these wild pseudo-scientific speculations.

Many of the erroneous statements in this book are made to seem accurate by references to scientific literature, whether apt or not. Also, each major section ends with a few "quotable quotes." Abundant scientific quotation is a standard creationist ploy, and it is doubtful that many of the book's readers will bother to check sources in order to see if the quotations are appropriate or have been lifted out of context.

A final point worth mentioning is Dr. Kofahl's implication in several places that evolutionary theory is supported by some vast conspiracy. Not only are scientists depicted as blinded by their evolutionary preconceptions, but they have worked to ignore or suppress evidence in favor of creation. Cited as examples of such unseemly behavior are the Paluxy River tracks, which are claimed to show human and dinosaur footprints in the same strata; and the Castenedolo and Calaveras fossil specimens, which are described as in the "wrong place" to demonstrate human evolution. Piltdown Man is cited as an evolutionary fraud, but it is not mentioned that evolution-oriented paleontologists uncovered the fraud. Perhaps the most interesting claim in the book is the dismissal of the Scopes Trial with the statement that "the ACLU, long noted for its defense of left-wing causes, perpetrated a fraud on the court and on the public" because Scopes never actually taught the lesson on evolution with which he was charged. The last statement is probably true; was the lawsuit then a fraud?

In summation, this book is devoid of any scientific or pedagogical value. Its intent is primarily religious, and its approach is to restructure scientific knowledge in order to fit a particular religious tradition. Its sole useful function -- and here its value no doubt is great -- is to serve as a handy-dandy sourcebook for creationist debaters and special pleaders.

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12

THE CREATION EXPLANATION
A Scientific Alternative to Evolution

by Robert E. Kofahl and Kelly L. Segraves
Harold Shaw Publishers, Wheaton IL (1975)

There are several things to be said in praise of this book and many in criticism.

PRO:

1. The Creation Explanation, despite its subtitle, clearly establishes that it represents a religious position and is written for a religious purpose. In this respect it differs from some creationist literature that disguises its religious origin and purpose.

2. The book contains clearly written accounts of certain aspects of scientific knowledge and understanding, much of it quite accurate.

3. The authors are more cautious in insulting scientists than is much creationist writing. This book only implies that scientists are dishonest and incompetent rather than saying so directly.

CONTRA:

1. The Creation Explanation represents the views of a particular, very vocal, very conservative group of religious denominations. Yet it gives the incorrect impression that its religious position is the normative Christian viewpoint, in fact, the only defensible one.

2. In the preface the authors make a straightforward statement that they are religiously committed "to accept the opening chapters of Genesis . . . as true to scientific fact." They make it equally clear that for them this means that all evolutionary theories are necessarily wrong, no matter what the evidence might seem to indicate. It is certainly their right so to believe. But this rigid, a priori position is not compatible with the book's declared intention to examine and compare creation and evolution as alternative explanations of origins.

The authors' approach surely is not a fruitful way to search for understanding. They have left themselves no room for compromise and no hope of finding harmony between the ideas of creation and of evolution. They are convinced to start with that evolution is wrong and that creation as they see it is absolutely right, whether or not their particular arguments are valid. The tunnel vision of such an approach would seem to offer the general reader little likelihood of enlightment.

3. To religious thinkers not of the authors' persuasion, this book may appear seriously to distort the religious issue. First, many religious believers are quite comfortable with evolutionary ideas (1). More than this, various other believers who do not fully accept evolutionary ideas for themselves--for example, some Catholics--still do not see evolution as a major religious problem (2). But the exhortations and scriptural quotations in The Creation Explanation leave the impression that all such religious expressions are anti-evolutionary, and that the fight against evolution is near the center of religious concern. Such views are unacceptable to many Christian and Jewish scholars. For example, Langdon B.

Gilkey has said: "The best kept secret in the American Christian Church is that no mainline denomination has any problem with evolution" (3).

4. The Creation Explanation is full of distortions, half-truths, and various questionable statements, mixed in with considerable amounts of acceptable material. The mixture makes the mistakes harder to spot and more likely to mislead the reader. When I began this review, I started to list its errors and distortions and to correct each one. But it is easier to identify a half-truth than to say just what is wrong with it, so it soon became clear that a point by point critique of The Creation Explanation would itself be a book longer than the original. It seems more practical here just to point out the major kinds of errors and to illustrate them with a few examples.

5. Throughout the book, the authors disparage all explanations that draw on evolution, and find flaws in any data that support such explanations. Predictably, they always conclude that the creation explanation better fits the evidence. Further, they assert that the "evolutionary model of the world" is not science but is part of the "religion of materialism." They are quick to seize on any discrepancy between evolutionary theory and the data as a decisive refutation of that theory, and to interpret any weak or disputed point as proof that the whole theory is in error.

Chapter 1 includes descriptions, generally accurate as far as I know, of fascinating, little-known plants and animals that cope with their problems in amazing and often charming ways. Each such adaptation is presented as something which could not possibly have evolved, and therefore as a refutation of evolution. Again and again the authors assert that no scenario of evolutionary change can be imagined to account for some marvelous adaptation, even though quite plausible schemes, supported by strong evidence, have been proposed for some of the examples. For these authors, any difficulty is enough to make them reject evolution, and no success is enough to make them accept it.

6. The authors' explanation for every hard-to-explain phenomenon is simply, "God did it!" Now this can be a meaningful religious statement, but it does not "explain" anything in the sense that scientific hypotheses seek to explain things. It never shows how one puzzling observation may be related to another puzzling observation, perhaps in a way that makes them both less puzzling. It does not give any account of how things came to be one way rather than another, and so it cannot be tested and possibly refuted. This is why many people who want to make the religious assertions implied by creationism, and to benefit from the scientific understanding offered by evolution, find no difficulty in affirming both, often by saying that evolution is a description of how God went about His work of creation.

7. The "creation model" as described in the book specifies just what it is that God did. One assumption of the "model" (perhaps "claim" would be a better term) is that all "kinds" of organisms were created separately but almost simultaneously only a few thousand years ago. Another claim is that somewhat more recently a worldwide flood covered the land, and the only land animals that survived were those rescued in Noah's Ark. The authors' description of the "creation model" is rather vague, yet its specific claims can in some degree be tested against concrete evidence from the rocks and their contained fossils, and from living organisms. The authors proceed to apply such tests, principally using evidence gathered by evolutionist investigators. In each case the authors triumphantly proclaim that the evidence fits the "creation model" better than the "evolution model." In evaluating the evidence the authors' tactics are curious. When considering evolutionary claims the standards of proof are rigorous. But any evidence

that might plausibly be fitted into the "creation model" is hailed as decisive, and any discrepancy between the model and the data is explained away.

Treatment of the fossil record illustrates this double standard. Paleontologists agree that many fossil sequences show very small changes from lower and older strata to higher and more recent ones--until the fossil sequence suddenly disappears from the rock record and markedly different fossils take its place. Contemporary evolutionists differ in their interpretations of this phenomenon. Some "Neo-Darwinists" emphasize the small differences as indicating that evolution is basically a slow and gradual process, while the "punctuated equilibrium" people stress the breaks in the sequences as suggesting that speciation takes place rather rapidly. Both schools agree completely that the factual occurrence of evolution is well established. Yet creationists such as Kofahl and Segraves interpret the healthy and normal scientific dispute between the two schools over the rate of evolution to mean that some of the scientists had abandoned the concept of evolution--which is not at all the case. The authors systematically ignore the most glaring and critical evidence with which the rock record confronts us: that fossils in recent strata are most like living organisms, that recent fossils differ markedly from the flora and fauna of early strata, and that connections and interrelations between early and recent fossils are abundant. Despite gaps in the record, the evidence is overwhelming that in the history of life, inherited change --evolution--has occurred, and that the "creation model" does not fit the facts.

8. Throughout the book the authors attack any branch of science that conflicts with their interpretation of the Bible. Various reasons are given for rejecting non-Biblical viewpoints, but it seems apparent that the rejections came first and the reasons were found later. Much of biology, geology, astronomy, and anthropology is thus rejected. Furthermore, when scientific findings conflict with the authors' religious posture, the assumption is generally made that such findings must be motivated by anti-religious bias. This is why The Creation Explanation is a hatchet job against much of modern scholarship, not a thoughtful critique of the study of origins.

CONCLUSIONS AND RECOMMENDATIONS

1. This book presents an extreme position in support of creationism as the only possible religious posture. Books on religion belong in school libraries, but in a pluralistic society with freedom of religion and separation of church and state, not all religious books are suitable. Tactful expository books, those that talk about the beliefs and practices of a variety of faiths, are clearly suitable. Informative books that discuss one particular religious persuasion, saying, "This is what we believe and why we believe it," but not attacking other faiths, are also appropriate. But argumentative books, especially those that are harshly critical of alien or putatively heretical beliefs, would seem not to belong in a school library, except perhaps as part of a collection specifically chosen to display the strains in our society. The Creation Explanation would be appropriate only in the latter type of collection.

2. This book is seriously misleading. Its most conspicuous strength--the fact that it contains a good deal of appropriate science--makes it especially misleading when the acceptable material is mixed in with an abundance of false statements or implications. School libraries do not need books whose major effect is to mislead, unless in a collection of horrible examples to be subjected to critical analysis.

3. The Creation Explanation attacks much of modern understanding--much of

what the schools are in the business of teaching. It does not merely criticize specific details which the authors fe[illegible]e in error (always a necessary and useful practice), but it denies any pos[illegible]ble validity to whole branches of science and implies that their pursuit is "materialistic" and ungodly. Such a book has a constitutional right to be published, sold, and read, but it does not have an inherent right to be stocked and promoted by a school system. Public education need not give library space, classroom time, or financial support to any book that broadly attacks so much of what education is about. The Creation Explanation is totally unsuitable for school libraries or public school classes except specifically as a bad example.

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13

THE CASE FOR CREATIONISM: FALLACIES OF EVOLUTION

by Arlie J. Hoover
Baker Book House, Grand Rapids MI (1977)

Fallacies of Evolution repeatedly claims to treat in a nonemotional manner the fallacies of teaching only evolution. In the introduction Hoover, who is Dean of Columbia Christian College in Portland, Oregon, states that he has "written a 'little book' in hopes that the public will rise up and demand equality in the teaching of origins"--meaning equality between evolution and creationism. The author labels educators who fail to accept alternatives to evolution as "no better than (educators in) Nazi Germany or Soviet Russia in their educational philosophy."

Hoover says that evolutionists are guilty of a great number of fallacies, which he proceeds to list and describe. The fallacy of scientism, he says, springs from assuming "that all true knowledge is empirical, that all judgements are merely factual." Instead, Hoover believes that teachers and scientists should embrace the unseen spiritual and metaphysical world in their quest for evolutionary answers.

The chapter on special pleading by evolutionists uses emotional and inflammatory phrases to point out the shortfalls of evolution. The section on comparative anatomy is heavy with emotional terms and short, nonsensical analogies that have no real relationship to the study of anatomy. The author describes how for a long time evolutionists have been drawing charts of "similar features" of animals, for example, skeletons. "The evolutionists have constructed impressive 'ladders of life' to show the alleged orderly progression from simple to complex." But Hoover professes to use the features of a platypus as more than enough evidence to refute the use of comparative anatomy as evidence of evolution. In the section on comparative embryology the argument centers on the fact that gill pouches in the human embryo never become functioning gills, and therefore recapitulation is invalid. Ridicule of these ancient arguments is the basis of Hoover's attack on evolution.

A chapter called "What Should We Teach" presents arguments for teaching creationism in public schools. The principal argument is the syllogism:

"If creation occured we would be here.
We are here.
Therefore creation has occurred."

This gem approximately indicates the depth of Hoover's logical and scientific profundity.

The most objectionable part of Hoover's "little book" is a chapter called "Social Darwinism and the Genetic Fallacy," in which evolution and those who subscribe to the theory become whipping boys for all of society's ills. Thus laissez-faire capitalism and imperialism are partially attributed to acceptance of Darwinism both by governments and by the earlier financial community. Also, according to Hoover, proponents of war depend on social Darwinism to justify military struggles among nations, and racists depend on it to justify the "gospel" of racial and ethnic superiority. Hoover quotes Spencer, Nietzsche, and Hitler to make these points. The view that Hoover describes did indeed at one time have some scientific support; but social Darwinism has long been discarded by competent evolutionary biologists and anthropologists as a gross and false distortion of Darwin's ideas.

Hoover concludes his work with a plea to taxpayers to rise up against "Scientific Humanism" with its purported exclusive, prejudiced, anti-religious view of origins. Throughout, he deprecates evolution, but he never gives any concrete, rational, or in-depth reasons for the rejection of evolution and the acceptance of the Biblical concept of origins. Hoover's work is full of meaningless anecdotes, emotionalism, and defamatory phraseology. The work is indeed, as the author calls it, a "little book," especially in its scientific value. Because of both its tone and its content, the book is unsuitable for public school use.

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QUESTIONS AND ANSWERS ON CREATION/EVOLUTION

14

by John N. Moore
Baker Book House
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The book begins with what appears to be a rather logical treatment of the nature of science and the aims of those who profess themselves to be scientists. Even the careful reader may not be aware of all the traps that are laid in this innocent appearing chapter. Some revelations come later. The sense of Moore's approach to the problem comes in his answer to the question, "Are there any Limiting Principles for scientific work?" In part his answer reads:

"Because modern science was begun as a venture to 'think God's thoughts after Him' (as Kepler expressed it), created men were limited in their abilities. In hindsight we can accurately say that these early scientists limited themselves by emphasizing their scientific work as . . ."

A list of limitations such as that scientific activity should be restricted to empirical, quantitative, mechanical, and corrective efforts follows. In short, it is the proper place of science to watch phenomena, catalogue and enumerate them; but accounting for the phenomena should be forbidden. Scientists, then, as willing handmaidens to the religious establishments, are to be encouraged only so long as they never ask the ultimate question of origin. The operative word in all the above is "created." Men who were CREATED probably cannot, and most certainly should not, think any thought not previously entertained by the Creator.

Moore makes a great play on the necessity of careful observation of an event as the most important part of scientific accounting. Most scientists would agree that the careful collection of data of the highest possible accuracy is necessary to any accounting of a scientific nature. It is not at all clear, however, that most scientists would insist, as Moore does, that all events must be observed and made subjects of data collection for their courses to be predicted. It seems possible that Moore would permit prediction in the sense that if one observes a phenomenon, say the flight of an arrow of given mass loosed from a bow of known strength at a given angle to the horizontal in a no-wind condition, to produce a given length of flight, then one might suppose that other arrows of equal flight characteristics would have similar flights. His insistence that such scientific determinations precede postdictions would surely limit Moore's ability to postdict occurrence.

If, in the above analogy, one considers an arrow of given weight and flight characteristics to have flown a given distance when fired at a given angle, the scientist would feel perfectly free to postdict that the arrow was discharged from a bow of given strength. Moore would disallow this, for he would claim that we did not observe the actual discharge and flight. Moore is quite specific on this point in the latter part of chapter one, where he asks twin questions: "Is the Genesis account of creation scientific?" and "Is evolution scientific?" His answer is as follows:

"According to specific characteristics of scientific thinking and writing, neither the Genesis account of creation nor evolution ('molecules to man') are (sic) scientific.... No observations by a professionally trained scientist were ever made of either the events contained in the Genesis account of creation or (of those contained in) written expressions about grand scale evolution. Therefore modern scientists are in the same position as Job with regard to first origins"--

a position of total ignorance.

"The beginning of the universe, the start of life on earth, and the appearance of the first human being cannot be repeated. Yet repeated observations, made directly or indirectly, are the very basis of scientific work. Human beings would know nothing about first origins in any unchanging form if they did not have revelation from the Creator as provided in Genesis. Evolutionary thinking is essentially offered, consciously or unconsciously, as a substitute for answers on first origins given in the Genesis account. Generally, evolutionists have invented their schemes because they will not accept answers contained in Genesis. . ."

In the foregoing we have the crux of Moore's argument. Science is a very present-day activity. It may, perhaps, be projected into the future. But, according to Moore, each given event must be observed and the observations replicated; generalization to past events is forbidden. The description of science he attributes to Kepler neatly summarizes Moore's attitude: "The scientist thinks God's thoughts after him." In this it seems that we, thinkers of all sorts, are relegated only to following through some rather poorly expressed ideas and never questioning their validity or interrelations, only trying to quantify them. Dr. Moore wants no part for himself, and would deny any part for the rest of us, of the notion that men and molecules have anything in common, or that the lump of brain tissue between the ears of Homo sapiens can have any original thought.

Moore's discussion of evolution is primarily concerned with what he calls "total" or "grand scale" evolution--more commonly referred to as macroevolution* --which is bad, presumably because it encapsulates the notion of "molecules to man;"; as well as microevolution, a process which permits variation within "kinds" of living things. I'm not sure that Moore really approves of microevolution, but he will accept it. Yet he is quite emphatic that macroevolution is without any foundation in observation and hence is not correct and is not science.

Concerning creation Dr. Moore is quite authoritative and predictably devoted to Genesis. His definition of the creation "model" is so brief, complete, and typical that it must be quoted: "The creation model is an explanatory belief system based upon the existence of an eternal Creator who established a complete, finished, and functional universe in all respects regarding elements, galaxies, stars, and planets (especially the earth with mutually exclusive groups of plants and animals)." Here again we have the familiar retreat into authoritarianism. No evidence is given, no argument stated, only revelation (presumably divine) is handed down to us. This may be satisfactory to some, but to this reviewer it seems not only inhumane but inhuman.

In his discussions of thermodynamics, radiometric dating, and other scientific contributions to human knowledge, Moore is either naive or deliberately slanted. Thus his statement that the First Law of Thermodynamics requires that nothing is now being created or destroyed suggests a very shallow interpretation of events on this planet. Though the First Law may be naively considered to mean that matter can be neither created or destroyed, it certainly cannot be construed to deny that different combinations of matter can and do form. Should this latter construction be valid, our metabolism would be in dire straits. In the simple processes of mining iron oxides, reducing them to metallic iron, converting the iron to steel, fabricating various industrial and household objects, and finally watching the

*"Megaevolution is changes BETWEEN kinds of organisms, compared to microevolution, which is changes within kinds of organisms" (sic).

objects rust back to iron oxide, we create and destroy several things (as Moore uses the concept of "things") without adding to or subtracting from the total energy and matter of the universe.

It is in Chapter 4, "What About Changes of the Earth's Surface," that some of the book's greatest failings appear. Beginning with a discussion of the geologic column, a series of strange statements leads to the discussion of how many animals could have been crowded into Noah's Ark. The reader is left amused and amazed. To begin with, the geologic column is dismissed with the observation that it is found intact nowhere on earth. Moreover, there are gaps in it. Yet Moore fails to note that the gaps are not in the same columnar positions in all localities. Perhaps the most interesting aspect of his treatment is the statement that the column was formed by the Noachian Flood. Just why such a supposedly worldwide phenomenon should have left only fragmentary and nonidentical geologic columns at many different places on earth is not explained.

Moreover, creationist geologists (if that not be a contradiction in terms) contend that at the time of the Flood some organisms lived in water habitats, some in semi-land (sic) habitats, and others on land; and that the creatures died in order of coverage by the Flood waters. This bizarre assertion fails to explain why flooding should have killed off creatures that already lived in water; or how it comes to be that rock strata bearing fossil, water-dwelling fauna often overlie strata containing land-dwelling organisms. Indeed, the creationists simply say that a naturalistic explanation of these things is impossible; they are not disturbed about this since the Flood was, after all, a supernatural event.

From his further discussion of changes on the earth's surface, I am not sure that the author know why rivers are commonly muddy, that the wind blows sand, or that volcanoes erupt. His earlier statement that the Creator provided us with a complete, finished, and functional universe would seem to deny the possibility of erosion of even one grain of sand from the landmass. Having been present at a number of very active changes in the earth's surface, this evolutionary geologist might well have preferred Moore's pristine, unchanging planet for a restful period of time.

In his discussion of life other than that of human beings, Moore stoutly denies any possibility of change of one "kind" of organism into another "kind." But he does show a geologic range chart for 16 kinds of plants and 18 kinds of animals. Interestingly, the types he mentions have been shorn of their taxonomic rank; cystoidea, blastoidea, crinoidea, and echinoides are given equal status with brachiopoda; related groups are ignored. The range chart clearly displays extinctions and first appearances as late as the Paleocene. These things are simply not explained.

Moore's speculations on the domestic economy of the Ark must be read to be believed. In responding to the question: "How did Noah fit all the animals into the Ark?" Moore relies on an unnamed biologist who estimated that only 2000 "kinds" of animals were aboard. Moore continues: "Representatives of all the major kinds were taken on board, including all birds, all land-dwelling reptiles and mammals, and possibly some terrestrial amphibians. No water-dwelling groups were included as no instructions were given for them." To have only 2000 "kinds" of animals eligible for Ark transportation is nothing short of astonishing. If this be true, there has been a veritable explosion of "kinds" of animals since the Flood. Yet, as we have seen, Moore's creationism does not permit of new "kinds" evolving from those already in existence.

To a further question concerning how the animals were guided to their point of embarkation, Moore responds: "Evidently God directed the animals to come to the Ark." Still another question "What about the problems of food supply and waste removal?" leads to an interesting speculation and confession: First it is observed that the problems of food and waste would have been simplified had God caused some sort of hibernation or slowdown of bodily functions on the Ark. It is then confessed that such attempted rationalizations are irrelevant, since the Biblical account of the Flood is consistently supernatural. This, of course, is not science.

Three chapters deal with the origins of the earth, life, and humanity respectively. Each topic is disposed of in less than ten pages of very flimsy straw men, obliterated by the resounding blast of I BELIEVE, without the benefit of reasoned argument, and without even the support of chapter-and-verse scriptural citation.

The book's last chapter is devoted to a discussion of the broader impact of evolution, which is characterized as both major and deplorable. Moore implies that this is largely due to the malevolent proselytizing of evil men such as Marx and Engels, who were possibly satanically inspired. There is a degree of denigration in the statement that only Christian creationism need be taught in the public schools, since "beliefs on origins among other people have been derived from the Israelite-Hebrew tradition, passed orally for many generations and presented by Moses in Genesis. . ." It is nowise clear that proponents of other creation myths would agree with this stand. To Moore, however, his position is irrefutable.

In conclusion, I find the scientific content of this book rather sadly out of date. What there is of it represents the concepts of the early 1960's, and the scientific ideas are heavily slanted. Though the book deals with some very important questions, the treatment is shallow throughout. As brought out in the body of this review, treatment of scientific notions is as brief as possible and lacks any real explanations. Though I do not know any titles, I feel there must be a better reasoned book covering Moore's topics and viewpoint. This book is not acceptable for use in any intellectual activity. It is a tract, not a treatise. Moore fails to give a rational exposition of the creationist viewpoint, and his presentation of the evolutionist case is totally inadequate.

All in all I think this work is both bad science and bad religion. It is bad science since science is concerned with how the physical and biological worlds work, what forces brought them into being, and what forces cause change within them. Science seeks rational explanations for problems within the natural world. Religion, on the other hand, is concerned with how we respond to the world; it seeks human and humane responses to the universe in which we all live. Somehow our responses must be in the context of mutual respect, rationality, and candor. Moore, calling on people of all faiths to accept the Judeo-Christian origins myth as authoritative, does not meet these criteria. Therefore his book would be a poor choice for a public school reference work or textbook.

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15

EVOLUTION AND THE MODERN CHRISTIAN

by Henry M. Morris
Baker Book House
Grand Rapids MI (1967)

The stated intent of this book is to "open the minds and hearts of young people to the true Biblical cosmology." The author's method of attempting to accomplish this objective requires the reader to accept without question Biblical revelation as actual recorded history. He fails to tell his reader that today many Christians accept that a number of different literary genres are used in the Bible. Throughout the book, he relates the theory of evolution to "Bad News" and delusions of Satan, while associating creation theory with the "Good News."

Science, including the First and Second Laws of Thermodynamics, is used and misused in attempts to discredit evolution and support creationism. However, by the end of Chapter 1, the author has already concluded that "the entire question of origins (whether by creation or evolution) is really outside the domain of science, not being susceptible to scientific experimentation and analysis. Knowledge of origins must come from outside of science--it is, therefore, not really a scientific question at all."

The reasons for attempting to place the entire question of origin outside of science soon become apparent. The author accepts the Ussher date of 4004 B.C. for creation. However, he would accept an upper limit of 10,000 to 15,000 before present for creation of the Earth. Thus his three great events of history--Creation, the Fall, and the Flood--must have taken place within a maximum time of 15,000 years. In order to accept these dates, he must ignore or discredit the evergrowing lines of evidence from paleontology, stratigraphy, and radiocarbon dating that show the Earth is much, much older than 15,000 years.

The author would like science to be restricted to those areas where experiments or measurement can be performed at different times and the same results obtained. Since we do not know and cannot control the different factors involved in the origin of life or the universe, experimental reproducibility cannot be documented. Thus evolution cannot be documented using "true science", and according to Morris, evolution is a matter of faith and not science. Fortunately for those of us involved in earth science and related areas, not everyone accepts Morris's narrow view of science. He attempts to use science to confuse his readers so that both evolution and creation become matters of faith rather than of fact.

The scientific value of the book is nil, since the author selectively chooses the areas of science that he accepts, and rejects other areas of generally acceptable science. The latter he chooses to ignore, or attempts to discredit in a very biased manner. Science is systematized knowledge, and this is certainly absent from Morris's book. According to the author, much accepted knowledge is outside the field of science and is a matter of faith. Therefore his book may be suitable for a philosophy or religion course, but it should not be used in a public school science class.

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16

THE SCIENTIFIC CASE FOR CREATION

by Henry M. Morris
Creation-Life Publishers
San Diego CA (1977)

If you find James Hutton's two-hundred-year-old axiom of geology that "the present is a key to the past" plausible, you may have difficulty with The Scientific Case for Creation. In this book the past must conform to a model of the universe created with perfect order, but then undergoing a universal disintegrative process.

Thousands of extinct mammoths have been found along the shore of the Arctic Ocean. A few of these woolly mammoths have been found in a surprisingly well-preserved condition imbedded in ice. None of these fossils occur in marine deposits. The Scientific Case for Creation requires that all of these animals were drowned as the result of a single, universal Flood.

Visitors to the Grand Canyon are able to view directly the exposed sequence of fossiliferous strata that forms a panorama several thousand feet thick in which the fossils all belong to extinct species. Each geological division has its own species not found above or below. The Scientific Case for Creation explains these observations as the result of the same single, universal Flood.

The Scientific Case for Creation provides no supporting evidence for this statement on page 36: "There seems really no objective reason why the entire range of organic life preserved in the fossils could not have been living concurrently in one age." Fossils do provide different evidence:

1. Fossils generally can be identified and classified by detailed comparisons with other fossils and with living animals and plants.

2. Fossils are found where they are buried. Some are within layers of sedimentary strata. Some are in sandstone. Some are in hardened mud.

3. Fossils reflect varied environmental conditions, often unlike those existing today at the sites. The undisturbed debris of fresh-water swamp vegetation may alternate with seashells of marine life. Tropical palm leaves and crocodile bones are found at many places in the rocks of Arctic regions.

4. Fossils usually belong to extinct species. Only the shallowly buried examples are identical with or most like living species.

5. Fossil species are usually restricted to a limited part of the stratigraphic sequence. A few are longer lived. No species ranges throughout the whole sequence of strata. Specific species seldom disappear at one level and reappear at another layer.

The standard international stratigraphic system now in use by geologists was established in broad outline and was widely used by practical men searching for natural resources by 1840, nearly two decades before the publication of Darwin's theory of evolution. The fossil sequence was not established to aid the argument for evolution. Independent genetic evidence verifies relationships between species and provides supporting evidence for evolution. The fossil sequence and

evolution reinforce each other but do not depend on each other. The Scientific Case for Creation portrays the fossil sequence and evolution as being mutually dependent, with geologists and biologists engaged in pure circular reasoning.

Radiometric dating is cross-checked by independent laboratories, with different samples, by using more than one isotype pair. Highly concordant data differing by only one percent are not at all unusual. In spite of this high state of refinement of present day radiometric dating, The Scientific Case for Creation incorrectly asserts that evolutionists pick the age they want in the first place and then modify assumptions until the apparent age agrees with their wishes.

The Scientific Case for Creation is written by Henry M. Morris, author of seventeen books in the fields of scientific creationism and Christian apologetics. Its purpose is to support the belief that all Biblical assertions are historically and scientifically true, that the account of origins in Genesis is a factual presentation of simple historical truths, that all basic types of living things, including man, were made by direct creative acts by God during Creation Week as described in Genesis, that the great Flood in Genesis was a historical event, worldwide in its extent and effect. It claims to support this belief by scientific evidence.

If there is a scientific case for creation it should be presented to the scientific community in one of the recognized scientific journals or at one of the regularly scheduled scientific meetings. Sworn testimony by Creationists at the recent Arkansas creationist/evolution trial produced no evidence that any attempt had ever been made to pursue this well established process within the scientific community.

The Scientific Case for Creation is a book of Christian apologetics. It is not a reference book of science. It is on this basis that a determination for inclusion or exclusion in our public school book shelves should be made.

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17

SCIENTIFIC CREATIONISM

by Henry M. Morris
(Public School Edition)
Creation-Life Publishers
San Diego CA (1974)

This book repeatedly claims "to treat the subject of origins with no references to the Bible or to religious doctrine. The treatment is positive, rather than negative, showing that the creation model of origins and history may be used to correlate the facts of science at least as effectively as the evolution model."

As a physics teacher, I have been teaching the law of inertia to be the assertion, first made by Galileo, that "any velocity once imparted to a body will be rigidly maintained as long as there are no causes of acceleration or retardation, a condition which is approached only on horizontal planes where the force of friction has been minimized." Scientific Creationism makes a statement on page twenty-one that contrasts with Galileo's nearly four hundred year old discovery. "The universe is not static; everywhere in space and time occur phenomena and processes. These manifest omnipresent energy perpetually generating motion. Even matter is composed of particles in constant motion. This fact argues for an omnipotent Cause in such energies and motion, and also for a completed creation in the past, in accord with the creation model." Plainly stated, the law of inertia has been replaced in the creation model with the law of an "omnipotent Cause," and creationists claim that this can be taught to students with no reference to religious doctrine.

The conservation of mass was a belief held by the Greeks as early as the fifth century B.C. James Joule laboriously worked out our modern concept of the conservation of energy more than 140 years ago. Quite a number of scientists contributed to the discovery of the laws of thermodynamics, and yet I was astounded to read on pages twenty-one, twenty-two, and twenty-three that "any conservation principle, especially conservation of energy, confirms a specific prediction from the creation model. "The creation model predicts it! (The Second Law of Thermodynamics.)" If all these foundational laws of science were predicted by the creation model, why were so much time, energy, and resourcefulness required to discover them? Even if the assumption is made that these predictions are found in the Bible and were available before the discoveries were made, the predictions were certainly hidden from the discoverers. To claim to make predictions is to claim to declare in advance. Scientific Creationism fails to show that any specific prediction drawn from the creation model was directly responsible for leading any scientist to design an experiment or make an observation that made a contribution to the discovery of these very significant scientific concepts.

Scientific Creationism includes the excellent statement on page twenty-two that "the universe is dynamic, forces are interacting, processes are taking place, events are happening, energy is being utilized and work is being done." Consistent with this statement, the book states on page twenty-five, "the fact that the universe is not yet dead is clear evidence that it is not infinitely old. Since it will die, in time, if present processes continue, time canot have been of infinite duration." However, page twenty-five also carries an assertion showing clearly that the author of Scientific Creationism has not comprehended either of these statements: "Therefore, the creationist would predict from the creation model that the stars and galaxies would not change, certainly not in any manner which would enable them to advance to higher levels in the hierarchy of stars. And the actual fact is that they have not so changed, thus conforming perfectly

to the expectation of the creation model." This assertion of the unchanging stars is a medieval dogma that was shattered less than three years after Galileo first looked at the stars through a telescope. He discovered that the sun had spots that moved and changed. The sun is a star, but it is not an unchanging star. Galileo also discovered a nova, a star that suddenly becomes brighter. Clearly here was a star that changed. Stars are moving toward earth, stars are moving away from earth. Galaxies rotate in space. Many stars have variable brightness. To state as a fact that stars have not changed demonstrates a tremendous void in knowledge of astronomical observations made since Galileo, as well as meager insight into the meaning of the phrase, "The universe is dynamic."

On page twenty-six the statement appears: "It is obvious by definition that neither the big-bang theory nor the steady-state theory has any observational basis. In fact they contradict both Laws of Thermodynamics." While I can accept this assertion about the steady-state theory, the assertion is clearly false about the big-bang theory. Astronomers, thanks to the work of Edwin Powell Hubble, have been aware for fifty years that we live in an expanding universe. Thirty years ago Ralph Alpher and Robert Herman predicted the existence of a residual radiation from the initial big bang, and fourteen years ago Arno Penzias and Robert Wilson accidentally discovered the diffuse glow of this ancient radiation dating back to the birth of the universe some fifteen or twenty billion years ago. This specific discovery should not trouble creationists since it clearly substantiates the previously quoted creationist statement that the universe is not infinitely old.

An interesting study of how Scientific Creationism deals with phenomena is their treatment of the earth's magnetism. On page 142 it is stated: "Phenomena such as these (accelerated radioactive decay rates) could be generated by such events as the reversal of the earth's magnetic field or super nova explosions in nearby stars. Since such phenomena are commonly accepted now as having occurred in the past, even by uniformitarian astronomers and geologists, there is a very real possibility that radioactive decay rates were much higher at various intervals in the past than they are at present. On page 158, however, this statement appears: "Thus 10,000 years seems to be an outside limit for the age of the earth, based on the present decay of its magnetic field." How can the very well established periodic reversal of the earth's magnetic field be cited as a possible cause for accelerated radioactive decay and then a limit be placed on the earth's age based upon the decline of the field as observed during the past 135 years? Perhaps the field is preparing to reverse itself again in the near future! The quotation from page 142 raises three additional questions: Are there experimental data to verify modification of radioactive decay rates through exposure to magnetic fields? How is it that the unchanging stars explode? And finally, have geologists observed any evidence of the enormous release of energy that would have accompanied dramatically increased radioactive decay rates?

Another phenomenon that Scientific Creationism uses as evidence for a young earth is the influx of meteoritic material from space. On page 152 the datum is presented that fourteen million tons of meteoritic dust settle on the earth's surface every year. Hans Pettersson is credited with announcing this measurement in an article that appeared in Scientific American in February 1960. Not having access to that issue of Scientific American, I checked with my 1967 edition of World Book encyclopedia and with the 1974 edition of Encyclopedia Britannica. Both placed an upper limit for meteoritic dust at one thousand tons per day. Certainly this limit is speculative and not supported by good observation. But this upper limit is approximately 2.5% of the quantity cited on page 152 of Scientific

Creationism. Instead of two inches every five million years, less than one sixteenth of an inch of dust every five million years would have settled on the earth. This is not very convincing evidence to support the recent creation of the earth!

I teach physics. I expect the textbook I choose to aid me in teaching physics. I expect the textbook I choose to provide a reasonably accurate description of our modern era of science initiated primarily by Galileo. If contradictory material is introduced, this should be very clearly acknowledged. Highly speculative material should also be very clearly identified. Scientific Creationism fails to meet these very basic expectations. I have served on several textbook committees evaluating physics textbooks. Each time I have served I have chosen one textbook. Each time I have rejected several textbooks. Some of the rejected textbooks were nearly as good as the textbook selected. Every textbook I have rejected contained better physics than Scientific Creationism.

NOTE: All material quoted, except Galileo's definition of inertia, is from Scientific Creationism (Public School Edition) 1974, Creation-Life Publishers, San Diego, California. Galileo's definition is quoted from page 224 PSSC Physics, Fourth Edition, 1976, D. C. Heath and Company.

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THE TWILIGHT OF EVOLUTION

by Henry M. Morris, Ph. D.
Baker Book House, Grand Rapids MI
Twenty-second printing (1982)

This book contends that evolution contradicts both Biblical truth and scientific principles. Several standard creationist themes are presented, including (1) how evolution has permeated and perverted modern life, (2) why evolution cannot be proven, (3) how evolution violates the laws of thermodynamics, and (4) why geologic findings cannot support evolution. The author's perspective is Protestant fundamentalism, and to support his preconceptions he completely skews thermodynamics, simplifies and thus distorts geology and scientific method, and does not hesitate to resort to sophistry in his arguments. Though the book has gone through numerous printings, the contents have not been updated.

Morris begins by pitting "Bible-centered Christianity" against "philosophical evolution":

> Probably the most important single issue confronting Biblical Christianity in these days is the question of origins. The remaining strongholds of virile, Bible-centered Christian witness in the world seem everywhere to be in imminent and serious danger of capitulation to the forces of philosophical evolution.

And:

> If evolution can explain the origin and development of this universe and its inhabitants, then there is no need for any kind of personal God at all.

Of course, "Bible-centered Christianity" is ambiguous because it could mean "all Christians who take the Bible seriously" (almost everyone, I suspect), or alternatively, "Christians who take the Bible literally" (fundamentalists). This ambiguity could mislead the reader into thinking that there are more people whose religious faith is at stake than is the case. Langdon Gilkey, distinguished theologian at the University of Chicago, has said that the best kept secret in American Christendom is that the mainline churches have never had any problem with evolution.

Note also that "philosophical evolution" has a much broader meaning for Morris than "evolution." The latter term refers solely to a process postulated in biological science, while the former ties together for Morris all that is wrong in contemporary life: "Evolutionary philosophy has all but universally captured modern thought," and therefore permeates "sociology, psychology, economics, educational theory, and religion, as well as the natural sciences, both physical and biological," and all works of writers of a "'liberal' persuasion." The rubric "philosophical evolution" brings together ideas of the most diverse sort which in reality have as their only connection the fears of fundamentalists.

Hence it is important to see that Morris is not only concerned with what goes on in biology classes; he is after a complete restructuring of education and modern consciousness. One wonders if his loose use of language, which must be grappled with before all else, is required by his attempts to retain the good will

of his fundamentalist followers while he woos other, larger Christian sects. If Morris's anti-intellectualism and anti-modernism were made obvious, he might lose the ear of many otherwise potential allies.

Morris gives two reasons for calling his book The Twilight of Evolution. First, he sees evolution in the twilight of its life, on its deathbed as it were; not in regard to the work of most scientists, but in regard to the beliefs of Bible-centered Christians: "...evolution is rapidly declining with men whose presuppositions are Bible-centered." Here "evolution" carries its broadest meaning, while "Bible-centered" must refer to Christians who, though they are serious ones, are not fundamentalists. Evolution never has had any status to lose among fundamentalists.

The second reason given for the title is the claim that evolution exists in a twilight zone between true science and divine revelation. Here Morris is giving evolution a narrower meaning, limiting it to the natural sciences. He says that once exposed to the light of scientific fact, scientific methodology, and scripture, evolution will wither away and die. A good portion of the book, therefore, is devoted to such irradiation. Inasmuch as the present reviewer is not a physical scientist, and because Morris's use of thermodynamics and the geologic column has been refuted elsewhere and shown to be silly, I will not add my condemnation to this attempt of Morris to refute evolution. But, since Morris also cites scientific methodology to show that evolution cannot stand up to the criteria that science imposes on theories and supposed discoveries, here I will comment, since my expertise is in the philosophy of science.

Morris's review of scientific methodology covers two pages, and I shudder to think that this subtle exposition could be done so rapidly. Morris claims that since present day species originated in the distant past, since there were no human witnesses, we have no records, and "the events are nonreproducible;" therefore the origins of these species cannot be the subject of science. Consequently, according to Morris, if one wishes to discuss origins, one cannot use experimentation and research--the heart of the scientific method. Note that if Morris were correct, any work dealing with entities that are not directly observable--for example, atoms and subatomic particles--could not claim to be scientific. By this strange logic, much of physics, chemistry, and geology is not science.

Furthermore, says Morris, any scientist studying the origins of species "cannot use the inductive method, attempting to build up a historical record on the basis of bits and pieces of evidence he may be able to find in the present world." Morris gives no reason for this obiter dictum; but accepting his restriction would limit to deductive reasoning alone, all scientific investigations into the origin of species--thus abandoning modern science for a return to medieval logic-chopping. To carry Morris's sophistry still further: in deductive arguments the initial premises must be assumptions, and there are only two possible assumptions on which to approach the question of origins--either that "God is the Creator and Author of history," or that earth history "can be explained without Him." Morris settles the question of the investigation of origins by begging it; it is on this basis that the creationists offer their two-model approach.

But the two-model tactic is only pretense, because Morris continues to load the rhetorical dice against evolution. He goes on to say that as assumptions, creation and evolution are not equally valid: since despite earlier claims concerning the lack of evidence bearing on origins, certain facts are available after all. "The

Biblical framework involves three major facts of history, each of tremendous importance with respect to the scientific study of the data bearing on these problems... (1) a real Creation; (2) the Fall of man and the resultant Curse on the earth; (3) the universal Deluge in the days of Noah." Morris is not quite clear if these are facts for everyone to reckon with, or "facts" only for the fundamentalists, who read the Bible as a book of science. In any event, Morris goes on to argue the case for his "facts." This strikes me as extremely odd; I would think that one might argue for a conclusion, a value judgment, or an interpretation, but not for what one claims to have already established as irrefutable fact.

Toward the end of his book Morris asks, "If evolution is basically impossible from a scientific view...and untrue from a historical point of view, ...then how can we explain the well-nigh universal insistence that all things must have come about by evolution?" Given the context this is an appropriate question, and Morris unflinchingly answers: "The 'great dragon...that old serpent, called the Devil, and Satan, who deceiveth the whole world' (Revelation 12:9), must without doubt be the one who has fathered this monstrous lie of evolution, for he is the father of lies." and, "When one recognizes the Satanic origins of evolution, then many other confusing issues begin to come into focus."

Thus "creation science" becomes demonology. For when God is a factor in natural science and the Bible is a book of scientific fact, then it becomes equally reasonable for the Devil to become a scientific concept. In The Twilight of Evolution, "the Devil made me do it" rises from the buffoonery of a comedy routine to the heights of scientific theory. Morris's condemnation of evolution is thus presented as theological doctrine. His doctrine, and his book, belong in an American public school only if we are prepared to abandon our basic constitutional principle of nonestablishment of religion, and instead introduce theology into our science curriculum.

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WHAT IS CREATION SCIENCE?

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by Henry M. Morris and Gary E. Parker
Creation-Life Publishers
San Diego CA (1982)

This book contains the usual creationist coverage of the creation/evolution issue. The biological concerns are discussed first by Parker, who covers the supposed evidence for creation in living systems, followed by chapters on Darwin and the fossil record. In the next three chapters Henry Morris delivers the same materials (in the same manner and with the same evidence) as he has in innumerable other books and brochures. I found nothing new in his discussion of thermodynamics, geological catastrophism, or the earth's origins. The writing level, as well as the background necessary to understand the science concepts, vary from section to section, making the book inappropriate for any particular educational level. The illustrations are neither clear nor artfully done. One has to wonder why the

Institute for Creation Research and its publisher decided to publish yet another book on this subject, when so much of this material, by the same authors, is already available in their other publications.

The stated purpose of this book is "to show that the concept of creation is every bit as scientific as" ... evolution. As this thesis is developed, ideas on vitalism and catastrophism, which were in vogue in the 19th century, are resurrected and applied in support of the creation viewpoint. The reader is led to think that these ideas have been suppressed by the science community because they are inconsistent with evolution. Evolutionary scientists are painted as intellectually and spiritually deprived persons by using such terms as "bigoted" and "atheistic." These innuendos are not well supported.

Throughout the book we are given personal insights into the authors' beliefs. Parker offers witness that he was once an evolutionist but that he now feels better as a creationist. We are told how evolutionists, their liberal philosophies aside, are bright but misguided persons who have confused reason and imagination. Morris explains that he became a creationist because the concept of a Creator as the explanation for much available scientific evidence was intellectually and emotionally satisfying. Morris would have us believe that his interpretations of physical laws and their application to biology rule out the possibility of evolution, but these interpretations are entirely consistent with creation by supernatural means. Morris, therefore, declares himself an expert in the application of natural law to supernatural phenomena. Many scientists would argue with his interpretation of the former; but few would care to discuss the latter, since science does not look for supernatural explanations of natural phenomena.

A short review cannot possibly attempt to refute all the errors in this book. I would be remiss, however, if I did not call attention to some of its deplorable content. The discussion of DNA-RNA-protein synthesis is, without qualification, the worst I have seen in print. The discussion of Darwin would not be accepted by any scholar competent in the field. The Creator is portrayed as a master engineer who invariably chooses designs that the creationists happen to approve; a rather presumptuous posture for a devout group of theists. On fossils we are introduced to the all-encompassing notion of "kinds," created with variability in order to withstand the test of natural selection. Therefore any intermediate forms that appear are not truly intermediate, but instead represent variations on the basic created kinds. The ideas on sedimentary rocks and on the age of the earth are too absurd to be discussed seriously. In the thermodynamics chapter, the calculations of Nobel laureates are accepted, but the consequent implications for energy flux are not. References from scholarly journals are rarely used to support major points. Most citations are from magazines or other literature produced at Christian Heritage College. Such special pleading argumentation, plus selective use of references and edited quotations, characterize the authors' approach. It is neither balanced nor scholarly.

In summary, this book is no different from many others produced by these authors. I found no new experimental evidence to support their viewpoints, and no compelling arguments as to why creationism should be considered a science. Despite the authors' assurances that here the reader would at last be shown the truth, the book is simply a rehash of what is available in many other sources. It would add nothing of value to a science classroom.

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WALK THE DINOSAUR TRAIL/
BOOK 1, TRAIL'S BEGINNING

by Barbara Sauer
Creation-Life Publishers
San Diego CA 92115 (1981)

INTRODUCTION:

The Teacher's Guide for this book states that there are two goals for the publication: 1) introduce the study of dinosaurs, and 2) expose the student to the creation/evolution controversy. I will review this book along these two lines. The book is an attractive paperback that appears to be at approximately the third or fourth grade level.

AS AN INTRODUCTION TO THE STUDY OF DINOSAURS:

The last fifteen years have been times of great change for students of dinosaurs. New discoveries and new methods of analysis call for replacement of the traditional view of these creatures as dull-witted brutes. The following are some of the areas in which advances in dinosaurian biology have been made:

1. Physiology: Classically viewed as sluggish, dinosaurs are now seen as very active organisms. Bone histology, predator/prey ratios, and functional anatomy of their locomotor systems indicate mammalian or avian activity levels (Bakker 1968, 1971a, 1972, 1980). This view is corroborated by speed analyses of trackways which indicate speeds of up to 50 miles per hour (Alexander 1976, Coombs 1978).

2. Intelligence: New analytic methods show that dinosaurs did not have exceedingly small brains. The ratio of brain size to body weight for most dinosaurs is the same as that for living crocodilians; and for some dinosaurs were at least as complex behaviorally as crocodilians and birds (Hopson 1977, 1980). Modern crocodilians have a wide behavioral repertoire, including advanced maternal and paternal care.

3. Social Behavior: New discoveries, and restudy of known trackway sites, show that herbivorous dinosaurs traveled in herds of at least 25 individuals, and that the youngest individuals were in the center of this herd (Bakker 1971b, Langston 1974). Other localities indicate that some carnivorous dinosaurs hunted in packs of 3-4 individuals.

   The study of newly discovered breeding grounds in Montana shows that dinosaurs returned year after year to the same areas to lay eggs, and that they nested communally (Gorman 1981, Horner and Makela 1979). Evidence from these sites also suggests extended parental care.

Even this short review shows that scientists now look at dinosaurs as highly active, intelligent organisms with complex social structure. In fact, the various dinosaur groups are better compared to large mammal (in terms of ecology) such as elephants, giraffes, etc., rather than crocodilians or lizards. This "new image" of dinosaurs has received quite wide publicity in magazines, books, and television. One book, Desmond 1976, was a Book-of-the-Month Club selection.

Thus it is surprising to me that none of this information appears in Trail's Beginning. The discussion on page 15 of the text is flatly erroneous. No scientist has claimed that the dinosaurs were mammals, but rather that they had a mammalian level of activity. This is an important difference, and it indicates to me, along with the lack of the dinosaur's new image in this book, that Sauer did not carefully research her topic.

If the goal of this book is to introduce the student to the study of dinosaurs, then it clearly fails in its mission. It does not present up-to-date scientific information but rather a rehash of outdated material. By presenting the old and new models of dinosaurs, students could be shown how new discoveries and techniques lead to increased scientific knowledge. Sauer's book teaches neither how science functions nor what we now know about dinosaurs. Because of these failures I cannot recommend it for a science curriculum.

PRESENTING THE CREATION/EVOLUTION CONTROVERSY:

If this is the goal of the book, then all of the text is irrelevant. The text discusses dinosaur biology, none of which has anything to do with this controversy. Presenting this controversy would discuss such topics as: What is science? What rules do scientists follow? Is each model scientific? What predictions does each model make? Which model is falsified by the evidence?

Unfortunately, Sauer simply states that these two models exist and then drops the topic. To say that the creation model is scientific does not make it so. This book actually avoids the controversy which it purports to present.

SUMMARY:

This book fails to meet either of its stated goals and I cannot recommend its adoption for school use.

I have not had an opportunity to review either Book 2 or Book 3 in the "Walk The Dinosaur Trail" series. If in these other books, evidence for one model over the other is presented, then the scientific quality of such evidence must be assessed. However, if Book 1 is any indication of the quality of Sauer's research for her publications, then I would be very suspicious of any book she has written on scientific topics.

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CRITIQUE OF RADIOMETRIC DATING

By Harold S. Slusher
Institute for Creation Research
Technical Monograph No. 2 (2nd ed.)
Creation-Life Publishers
San Diego CA (1981)

The title of this booklet is quite appropriate for what the author attempts to do in its writing. It is obvious to the reader from the start that the author is taking a strong stance on creationist faith. He is obviously bothered by the laws of radioactive decay, since these laws have led scientists to estimate the age of the earth to be billions of years.

The Critique of Radiometric Dating is actually an attack on evolutionary theory. The author states, "the evolutionist needs vast spans of time in the history of the earth". If one assumes that the earth has had a very short global history, "4000 to 10,000 years at most", then evolution could not have occurred. Hence, the radioactive decay laws, from which geological and historical dating have been done, must be shown to be in error. It appears that the author's purpose is to negate all the methods of radiometric dating so that his faith in creationism is not shaken.

The author does give an excellent description of the physics of radioactive decay. He clearly explains to lay readers the methods used to date geological and historical items. I would recommend this book to one looking for a brief description of radioactive decay chains and the mathematical equations used in converting half lives and isotopic ratios to years and ages. The Uranium-Thorium-Lead, Potassium-Argon, Rubidium-Strontium methods are given special attention. Carbon-14 dating is also discussed as a method of dating historical events. One wonders how the author could present these clear descriptions without accepting their validity.

Instead of recognizing the accuracy within limits of the methods he describes, the author makes a feeble attempt to discredit them. He does this by exaggerating the experimental limitations of the dating methods, or by inventing or quoting other inventors of imaginary phenomena that may have caused the radioactive decay laws to be invalid. Such phenomena as a "vapour canopy", "shielding by a magnetic field", or "changes in atmospheric or cosmic ray condition" are suggested as reason why the radio time clocks cannot be relied upon.

In general, the author's criticism of dating methods consists of three main arguments.

1. No one now living observed conditions in the past, therefore we cannot know that the presently observed radioactive decay laws really hold over long periods of time. This argument cannot be refuted. However, the position would expect one to discard all truth deduced from observation of data. It discards the scientific method.

2. A second argument dwells on the uncertainty in the data, and uncertainty of the laws governing radioactive decay and geological aging. True, every measurement has an uncertainty. Every law is based on observation and there is always some uncertainty of the wholeness of the data. The

author, however, fails to point out the correlation of the many methods of geologic dating. The author fails to state that carbon-14 dating was calibrated with known historical dates. True, extrapolation back in time is done, but the uncertainties in the dates are not such that one cannot distinguish between a billion or even a few million years and the mere "4000 to 10,000" years as claimed for the age of the earth by the author and some whom he cites.

3. A third argument is based on imagined or speculative possible environmental behavior that may have changed the rate laws for radioactive decay. A "shielding magnetic field", or "unusual cosmic rays" or "atmospheric changes" may have made the radioactive decay rates different in other ages. In fact, no known natural phenomena have been observed to change the decay rate, with the possible exception of K-capture. Vapour changes and electromagnetic changes occur in the 10 to 1000 electron volt energy range, whereas nuclear change requires the million electron volt energies. Of course some cosmic ray energies are that high, but there is no known evidence for great cosmic ray fluctuation in the past few thousand years.

In summary, the Critique of Radiometric Dating by Harold Slusher is a feeble attempt to make the reader believe that radioactive decay constants are not constant. He completely fails in his attempt to prove that the earth is only 4 to 10 thousand years old, dates that seem to satisfy his creationist faith. This book is clearly not appropriate for use in a contemporary science class.

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THE ORIGIN OF THE UNIVERSE

An examination of the big bang
and steady state cosmogonies

by Harold S. Slusher
Institute for Creation Research
Technical Monograph No. 8
Creation-Life Publishers
San Diego CA (1978)

I find this book of absolutely no pedagogical value whatsoever.

Much of the author's argument is based upon the Second Law of Thermodynamics, which, unfortunately, he does not understand. He argues that a young universe at high matter/energy density is in a state of disorder, while the present expanded universe is highly ordered. In this supposed transition from disorder to order he cites a violation of the Second Law. In fact the opposite is the case. A large container divided into two parts, with a gas filling one part while the other is empty, is a highly ordered system of low entropy. When the division is removed, the gas expands naturally to fill the container, moving to a state of greater disorder and of lower density, but of higher entropy.

If the author were simply incorrect in many of his arguments, then he might deserve kind treatment for his effort. However, I was shocked to discover many, many instances of apparent intellectual dishonesty. For example, he lists as a dilemma of cosmology the observation that the recessional velocity of clusters of galaxies increases with increasing distance. He remarks that this must indicate that we are located at the center of expansion. Now as someone who has at least read widely on the subject, he must be aware that the standard interpretation is one of uniform expansion, with no particular center. Not to mention this interpretation, but only to list the observation as a dilemma, is not candid.

As a second and final example I will cite, out of many possibilities, the author's statement that in the standard theory, many massive stars should already have evolved to white dwarfs; yet no massive white dwarfs have been found. Again, the author must be aware that the formation of planetary nebulae is just one of many mass loss mechanisms which explain why white dwarfs have substantially less mass than the stars from which they have evolved -- a discussion which appears in any elementary astronomy text.

This author is guilty of selective rhetoric rather than rational discussion. Hence his book is not appropriate for use in science classes.

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THE AGE OF THE EARTH

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by Harold S. Slusher and Thomas P. Gamwell
Institute for Creation Research
Technical Monograph No. 7
Creation-Life Publishers
San Diego CA (1973)

I have reviewed this book which is being proposed for placement in public school libraries and classrooms. My conclusions are as follows.

1. The authors infer from their calculations that "the earth is vastly younger than the old earth demanded by the evolutionists" (page 75). This statement is based on a very hypothetical model of the earth, which ignores several important factors that would significantly affect the result. Moreover, even if one accepts the model and the authors' calculations, their conclusion does not follow; instead, their own graph indicates that the age of the earth must be at least 30 to 85 million years. Thus the book is not scientifically valid, but could be quite misleading to a reader who does not have advanced training in mathematics and geophysics.

2. Presumably the justification for making this book available to students and teachers is to present the "other side" of the creation-evolution controversy. Even if one accepts this rationale, the Slusher-Gamwell book does not accomplish the purpose. The demand for "equal time" has come primarily from those who believe that the earth was created quite recently, less than 10,000 years ago, according to their interpretation of Genesis. (See for example the recently-overturned Arkansas statute, or the book Scientific Creationism by Henry Morris.) But the only valid conclusion that can be drawn from the results presented by Slusher and Gamwell, if one accepts their hypotheses, is that the earth is older than 30 million years, thus refuting "young-earth" creationism. So I conclude that this book is not only scientifically invalid, it is also offensive to the religious beliefs of many creationists despite the fact that it is published by the Institute for Creation Research. It will not be useful to either side of the controversy.

3. The mathematical level of the main part of the book is so high as to make it incomprehensible to nearly all high school students and probably to many high school biology teachers. The complicated equations may or may not be correct, but in this context their main purpose seems to be to "snow" the unsophisticated reader and persuade him to accept uncritically the authors' conclusions.

To substantiate the above conclusions, let us consider the following points. If the earth were cooling down from an initial temperature of 5000° with no heat source, then according to the graph on page 63 the cooling time would be between 30 and 85 million years depending on what values of the parameters one chooses. This assumes the authors' calculation is correct.

If one adds a heat source to this model, i.e. radioactive minerals in the crust, then the earth would have to be cooling more slowly since part of the heat lost by conduction into space in Model 1 (no heat source) will be compensated by that which is generated. How much more slowly depends on many factors not included in this model, or not clearly specified, such as the depth of the layer of radioactive material. If one wanted to assume an initially cold earth, warming up to the present temperature (as is done by some modern geophysicists), then the model does not apply at all. In any case such factors as the heat generated by contraction of matter under gravitational forces seem to have been ignored. Also, the authors assume that the entire earth is solid and that heat transfer takes place only by conduction, ignoring the fact that the earth's core is fluid so heat transfer there takes place by convection. Moreover, there is some convection in the "solid" mantle, according to the presently accepted theory of plate tectonics.

Because of the above factors, the heat conduction argument cannot be used to draw any definite conclusions about whether the 4½ billion year age obtained from radiometric dating is valid. However, it seems that inclusion of any of the omitted factors would increase the estimated age. Thus the model can be used, as above, to show that the cooling time is substantially more than 30 to 85 million years.

Finally, it should be noted that I have reviewed in considerable detail all of the major creationist objections to the 4½-billion-year age obtained from radiometric dating and have shown that they are all invalid; also, I have shown that the only calculation presented to justify the 10,000 year estimate (based on the variation in the earth's magnetic field) is fallacious. This analysis was published in the Journal of Geological Education, January 1982 (copy available on request), and has been cited in creationist publications by Henry Morris and Thomas G. Barnes. However, they have not even attempted to answer my critique of their objections to radiometric dating. Thus they must be considered to have lost this argument by default: there is no valid objection to the 4½-billion-year estimate for the age of the earth. In view of the decisive refutation of Barnes' magnetic field theory by G. Brent Dalrymple (Journal of Geological Education 31: 124-33, 1983) we must conclude that the argument for a "young" earth has been completely demolished.

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THE EYE/A LIGHT RECEIVER

by Wilburn B. Sooter
Creation-Life Publishers
San Diego CA 92115 (1981)

This 28-page paperback is intended for elementary school science classes. It was produced as part of a writing project sponsored by the Institute for Creation Research and directed by Richard B. Bliss. An "Introduction to the Student" sets forth the book's objectives: To enable the student-reader to choose between a creationist and an evolutionary interpretation of the function of the eye. The chosen objective appears to be presumptuous and unrealistic; and there is nothing in the book that would help the reader to make an informed judgment as between the two "models" that the Introduction offers.

The Introduction also refers to a 1978 "study" that purports to validate the two-model pedagogical approach. (Presumably the "study" is an investigation that Bliss conducted while science consultant to the Racine school system, and that he submitted to the University of Sarasota in partial fulfillment of the requirements for his Ed. D. degree.) Of course, such vague mention of a "study" is hardly acceptable as a scientific reference. It is also unclear what significance this trivial discussion of pedagogical methodology has for elementary school children.

The two models are discussed explicitly in boxes on page 21. The creation item concludes: "The evidence from observation and facts supported the intelligent creation of the eye" (the familiar 'argument from design'). The evolution item concludes: "This supports the random evolution of the eye." Note in this latter statement the loaded word "random", which only a creationist would use in this context. The two statements add up to slick propaganda for creationism, reinforced by a creationist slant throughout the book.

The descriptive material on the structure and function of the eye is rather pedestrian, but in general acceptable. Some of the language tends to be sloppy: "People are able to see equally in all directions" (p.6). The scientific content is also somewhat marred by heavy personification: a "special light beam named Mr. Light Ray" is pictured on almost every page and gets awfully cute before we reach the end of the book. An appendix gives directions for some simple, standard investigations of visual functions: fusion of visual fields, location of the blind spot, accomodation, pupillary reflex. Pedagogically this is the most valuable section of the book, and it is likely to be the most interesting to students.

A glossary lists key terms with definitions -- many of them very poor: "decode: to give understanding," "evolution: the idea that simple life forms can change to complex ones over long periods of time," "scientist: a person learned in science." A list of "Resource Books" appears more impressive than useful. One wonders how appropriate the Illustrated Medical and Health Encyclopedia by Morris Fishbain (sic) and a tape by an ear, nose, throat, and plastic surgeon are for elementary schools.

Despite the limitations just pointed out, the book would be marginably acceptable except for its heavy bias toward creationism. Use for propaganda purposes of a legitimate study of the eye is not proper. Nor is it good science teaching to ask students to make judgments without adequate information, comprehension, and maturity. Finally, illegally and unconstitutionally teaching religious concepts in the guise of science, as Sooter attempts to do here, makes his book, The Eye, unacceptable for public school use.

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THE MOON: ITS CREATION, FORM, AND SIGNIFICANCE

by J. C. Whitcomb and D. B. DeYoung
BMH Books
Winona Lake IN 46590 (1978)

The Moon is an egregious example of pseudoscience. The book can be rejected out of hand as completely unsuitable for any scientific purpose. It is a hash of dogmatic statements, Biblical quotations, fundamentalist apologetics, misstatements of scientific facts, and erroneous distortions of scientific investigations.

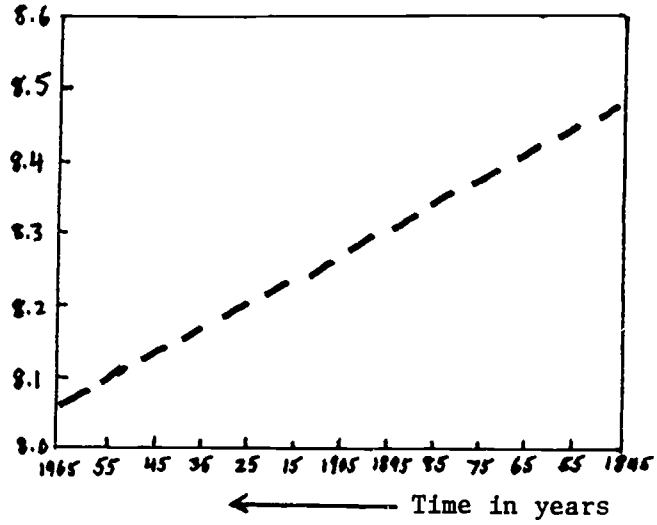
The purposes of the book as stated by the authors are theological, not scientific: First, to reconcile scripture with science by asserting that both are divine constructs and that the moon is evidence of this. Second, to demonstrate that the origin and nature of the moon can only be understood in the light of Genesis 1, and that no scientific inquiry will ever be able to uncover the true nature of objects in the night sky. Thus the authors profess to use fundamentalist, literalist, Christian theology as the guiding motif for natural history. This rationale not only makes a mockery of the scientific enterprise, it makes light of modern schools of theology.

Aside from the theological tone of the book, the science that it does present is handled so poorly that this treatment alone would militate against use of the work as a science textbook or reference book. I am astonished that it carries a "science" reference number. It might be acceptable in a school library if shelved with the Bible, the Koran, the I Ching, and similar religious works -- so long as it is clear that the book is religious in nature, so that students can know what they are getting.

Now as to the science: On page 38 it is stated that the close presence of the moon and the high rotation rate of the Earth demand that the early Earth was molten. Yes, correct; but the authors argue as if this hypothesis were somehow a contradiction of what we understand about geology. As any recent work on historical geology will tell us (1), the continents have grown over the ages. Statements on page 40 that tidal dissipation and acceleration deny the possibility of a time scale permitting evolution are not correct; work on dissipation in the solid earth, and on the evolution of solid friction, falsify the assertions. If anything, we are now able to turn the arguments around and use the rates of acceleration to instruct us about the evolution of the earth's surface.

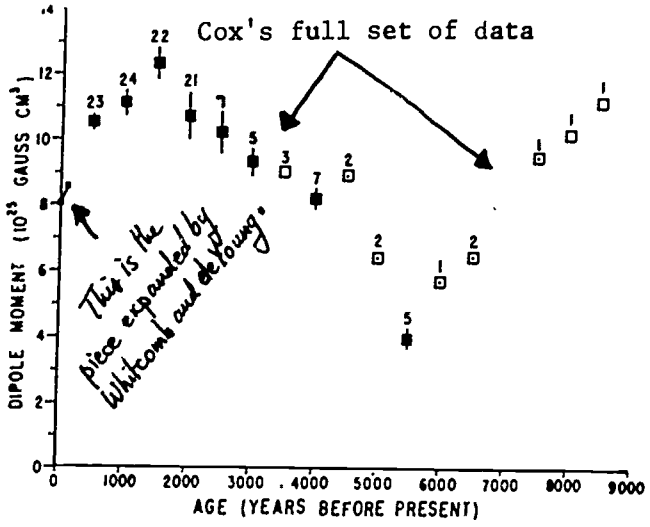
On pages 46 and 47 the nebular hypothesis is said to be contrary to thermodynamics. In fact it is required by thermodynamic considerations. Simulations of the origin of the solar system show that instability that would have partially caused the initial collapse of the protocloud must have resulted from the system's radiative losses to space. Thus the collapse was an expression of the system's open nature and of the action of the Second Law of Thermodynamics (2). The only reference here in support of the author's rejection of this concept is to a scientifically worthless discussion in the creationist literature, not to any refereed journal.

The most serious problem in the first part of the book is the discussion of terrestrial magnetism on pages 59-61. There are many examples in the creationist literature of use of decay of the earth's magnetic field as support for a young Earth. Whitcomb and De Young's Table (sic) III-1 purports to be evidence for secular



Strength of geomagnetic dipole moment, hence strength of field, plotted against time in years. Adapted from Table III-1 in Whitcomb and DeYoung, The Moon, Time runs right to left. No source given for original data. This graph is an expansion of short section at left in Cox's graph, below.

Changes in strength of Earth's magnetic field, based on Whitcomb and DeYoung's data



Earth's magnetic field is unstable, undergoes cyclic reversals. Field does not permanently and steadily decline. Whitcomb and DeYoung expanded tiny segment at left to show steady decline, ignored rest of data shown here. Time line runs here from right to left. From Cox (1975), Plate Tectonics and Geomagnetic Reversals.

Cox's graph

Figure 20-1
Variations in geomagnetic dipole moment (Cox, 1968). Changes during the past 130 years, as determined from observatory measurements, are shown by the slanting bar at left. Other values were determined paleomagnetically (Smith, 1967b, 1967c). The number of data that were averaged is shown above each point, and the standard error of the mean is indicated by the vertical lines (Cox, 1968) except for points (open squares) with too few data to provide meaningful statistics

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decay of the magnetic field. This graph covers a period of about a hundred years, during which time the strength of the field is seen to decline steadily. The authors follow Thomas Barnes in projecting the graph back through time, and inferring from the steady decline of the magnetic field that the Earth must be very young--no older than ten thousand years. If the Earth were much older--say millions or billions of years--then the field strength would have been so great that the Earth could not have contained it or itself remained stable. This argument is not only totally false, it is a hoax.

Whitcomb and DeYoung's graph shows only a small part of the available data--a hundred year's worth. Cox's graph shows more complete data from a historical period of 9,000 years. Note that the geomagnetic field strength changes cyclically. It has been declining for 3,000 years; before that it increased for 8,000 years. I doubt that the creationists, with their persistent scanning of evolutionist literature to look for flaws, are ignorant of Cox's data. Whitcomb and DeYoung, like other creationist polemicists, have selectively chosen a tiny part of the available data to bolster their argument for a young earth. This selective use of scientific evidence to support an a priori erroneous notion constitutes falsification and misrepresentation.

The discussion of radiometric dating methods, another favorite creationist argument, is a complete misrepresentation from start to finish. Age determinations for any particular geological epoch always show a range of dates, due to errors inherent in the measurement technique. For most geological periods for which enough samples are available, dates agree within acceptable ranges. Page 100 in The Moon presents a table that shows the authors to have no understanding of the statistical nature of scientific measurements in general, and of radiometric dating in particular. Indeed it looks as though they have selected for ridicule a relatively good sample. The data in this table have an uncertainty of about 10% --not great, but not all that bad.

Many rock samples from the Earth, the moon, and meteorites have been dated. The findings give a range of ages depending on the time of formation of each sample. However, all ages for these bodies are in accord with an age of 4.6 billion years for the sun. Meteorites are older than the oldest terrestrial or lunar rocks. This difference is understandable if the solar system in its earliest stage was so hot and turbulent that initial conditions were washed out (3). Moreover, ages for bodies in the solar system agree with evolutionary properties of the galaxy as a whole, including increase in abundance of metals in the interstellar medium and the rate of star formation. The authors and other creationists are grossly in error in denying the reliability of dating methods as applied both to the earth and to the universe as a whole. On page 103 it is stated that ^{14}C is used for dating back 50,000 years. Not so; rarely is it used past 9,000 years. The authors accuse scientists of using data selectively; their comments on Ptolemy and Newton would border on libel if these worthies were alive today. It seems to me that Whitcomb and DeYoung are far more guilty of selection and distortion of the data than any they accuse of this scientific sin.

The chapter on lunar transients is designed to show that the moon is not only young, but geologically active. The chapter does not at all represent the real results of lunar exploration and investigation. The substantiated reports of "activity" are due to meteor impacts. Seismographs left on the surface by the Apollo astronauts show that the only seismic activity is tidally induced, not tectonic in nature. The lack of a magnetic field also conforms with the view that the moon is geologically dead. This condition calls for a substantial cooling time

since the moon's formation, unless it was formed miraculously in its present state --the latter is exactly what the authors wish you to conclude. There is no observed vulcanism. The quotation from Sanduleak and Stock concerning "hot spots" or infra-red-bright spots is an outright distortion. The "hot spots" are crater floors, which retain heat longer than most surface features; thus during lunar eclipses they show up in the infrared as bright spots. There is no evidence for any activity on this lovely, but geologically inert, world.

The chapter on lunar distinctives is not even comic relief in an otherwise tedious book. The relative sizes of the sun and moon were planned so that eclipses could occur, according to the authors; the moon is placed where it is in order to give our month the right number of days; the moon is a perfect sphere (sic) for aesthetic reasons. These distortians of astronomical realities in order to develop arguments for design are simply childish. Authors must have terribly limited imaginations if they can see no scientific alternatives to the mythology that this book presents.

This book should not be adopted by any school system except perhaps for a course in mythology and pseudoscience. Read it if you want a feel for the way in which creationists misuse science, but do not mistake it for a work of science, which it is not. It is not the beliefs of the authors that are in question here, but rather their complete mishandling of scientific data and argument. The Moon is totally nonsensical as a work of science, bad as a work of science fiction, and childish as a homily. If you want to learn about the moon, try Beatty et al. (4) or Hartmann (5) instead; you will find them both more accurate and more interesting.

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THE GENESIS FLOOD
The Biblical Record and Its Scientific Implications

by John C. Whitcomb, Jr., and Henry M. Morris
Presbyterian and Reformed Publishing Company
(1961), Twenty-third printing (1979)

The Genesis Flood presents a clear basis for evaluating much of the current interest in "scientific creationism." The publication of The Genesis Flood over two decades ago stirred up a great deal of interest in a group of Christian apologeticists seeking to unite Biblical literalism with evidence from the geological and biological sciences. In this historical context, the publication of The Genesis Flood was one of the catalysts that helped to foster the current creationist movement. Both authors have remained prominent figures in the movement. Morris, who has a Ph.D. in engineering from the University of Minnesota, now serves as Director of the San Diego-based Institute for Creation Research. Whitcomb is a Th.D. from Grace Theological Seminary. In this volume the two have combined their efforts to present a series of scriptural exegeses and scientific conjectures and assertions that focus on the Biblical story of Noah, and the global flood described therein.

The book catalog of the Institute for Creation Research describes The Genesis Flood as "the most comprehensive scientific exposition of creation and the flood, providing the best system for unifying and correlating scientific data bearing on the earth's early history." Although this description suggests that the volume is primarily scientific in scope, much of the text is devoted to scriptural and theological arguments. The authors devoted the greatest portion of text to an exposition of geological ideas that purportedly demonstrate two general themes: 1) most of the earth's sedimentary rock record and its contained fossils were deposited during a single global hydraulic cataclysm several thousand years ago, and 2) virtually all of the major conclusions of the geological sciences are seriously in error. In particular, they suggest that uniformitarian ideas cannot adequately explain the bulk of the geologic record.

Specific geologic examples and quotes are so numerous in The Genesis Flood that a point-by-point rebuttal of the inaccuracies and logical flaws in Whitcomb and Morris' arguments would require hundreds of pages. Therein lies the strength of their book --the "evidence" they present appears overwhelming, and cannot be adequately evaluated by people unfamiliar with geologic methods. However, the reader should remember that no original geologic research was undertaken by either author--all of their "evidence" was borrowed from the work of others, primarily geologists who disagree with virtually all of their conclusions. Whitcomb and Morris suggest that the geological sciences have been blinded by an inflexible dogma of uniformitarianism, and, therefore, geologists have failed to recognize evidence for the great hydraulic cataclysm of Noah's day.

Yet such an analysis is primarily based on a grossly inaccurate presentation of uniformitarian principles used in geology. For example, they claimed that "to be consistent with uniformitarianism the various types of sedimentary rocks must all be interpreted in terms of so-called environments of deposition exactly equivalent to present-day situations." Yet more correctly, uniformitarianism postulates that the same basic processes operate throughout geological history, not that the environments, situations, consequences, and results are necessarily identical at different times. Gross inaccuracies of this sort pervade the volume. The scientific "evidence" presented in the volume is essentially a series of

speculations with little or no factual scientific basis. Where evidence is supplied, it is generally in the form of highly selective quotes from the geological literature.

Although the scientific merits of the volume are limited, the authors of The Genesis Flood deserve credit for clearly presenting the real basis for their creationist interpretations. Many of the more recent books on "scientific creationism" attempt to cloak the real basis for creationist ideas by presenting the Genesis story in scientific jargon without scriptural reference. Whitcomb and Morris openly admit that their interpretations are "founded squarely on full confidence in the Scriptures." With this basis they suggest that "the false presuppositions and implications of organic evolution and geologic uniformitarianism need to be challenged in the name of Holy Scripture." Although the authors attempt to use geologic information to strengthen their story, they admit that:

> "the real issue is not the correctness of the interpretation of various details of the geologic data, but simply what God has revealed in His Word concerning these matters. This is why the first four chapters and the two appendixes are devoted to a detailed exposition and analysis of the Biblical teachings on creation, the Flood, and related topics."

However, in science the issue is the analysis of the details of the geologic data, not the details of scriptural interpretation. Hence, The Genesis Flood is primarily a theological, not a scientific, discourse. The authors' rejection of the major conclusions of the geological sciences is not based on the strength of their scientific arguments, but on their own scriptural framework. Their religious beliefs interface with science when they attempt to

> "build a true science of earth history on the framework revealed in the Bible, rather than on uniformitarian and evolutionary assumptions...letting the Bible speak for itself and then trying to understand the geological data in light of its teachings."

This approach is the antithesis of the scientific method--it is based on the authority of religious dogma and not on multiple working hypotheses. The primary intent of Whitcomb and Morris when they wrote The Genesis Flood was apparently evangelical, as reflected by a quote from the preface to the sixth printing:

> "It is our sincere prayer that God may continue to use this volume for the purpose of restoring His people everywhere to full reliance on the truth of the Biblical doctrine of origins."

In conclusion, I can recommend The Genesis Flood to those interested in the historical development of ideas in the creationist movement. The volume still stands as the lengthiest creationist assault on conventional geological ideas yet published. However, for three reasons I cannot recommend its use in public school science classes: 1) it contains numerous scientific inaccuracies, 2) scientific

methods are not utilized and scriptural interpretations remain preeminent, and 3) numerous scriptural exegeses and evangelical overtones are clearly sectarian and outside the realm of science.

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THE HISTORY OF EVOLUTIONARY THOUGHT

by Bert Thompson, Ph.D.
Apologetics Press
Fort Worth TX (1981)

In scientific circles creationists are well known for re-writing science. Now Bert Thompson has the dubious honor of trying to re-write history. This book presumes to be a brief history of evolutionary thought, but instead it is a biased attack on evolution and on historical figures within the scientific community. When it is descriptive rather than derogatory, it is a boring recitation of dates and names, derived almost exclusively from secondary or tertiary sources. Rather than develop a logically or empirically compelling argument of his own, Thompson consistently adopts the typically creationist ploy of searching the literature for just the right quotations (many of the same ones used by other creationists) to express his viewpoint. In the last chapter Thompson abandons all pretense of writing history and launches a frontal assault on evolution, focusing particularly on the roles therein of mutation and natural selection. The chapter is a "critique" consisting entirely of a long list of quotations, even including Alexander Graham Bell among the sources! All of it, indeed the entire book, reads like a high school term paper.

The book opens with short vignettes of historical figures concerned with evolution, running from the Greeks to the early twentieth century. These are followed by chapters on the Scopes trial, on the recent legislative controversies involving creation/evolution, and a final chapter on neo-Darwinism and the "modern synthesis." Exemplary scholarship clearly is not one of the goals of this book. Except for very recent works, primary sources are rarely used. Indeed, the most used sources are writings by other creationists. Judging by the number

of quotations from Henry Morris's The Troubled Waters of Evolution, this must be Thompson's favorite book. There are many excellent and easily accessible studies on the history of evolutionary thought, but Thompson cites none of them.

Typographical and factual errors are too numerous to list in full. The table of contents lists two Chapter Three's. George Gaylord Simpson is not deceased (p. 52). Richard Owen was not "one of Cuvier's most distinguished pupils." The biogenetic law is not in disrepute; only Haeckel's capsule version of it, "ontogeny recapitulates phylogeny," has been replaced. And so on.

What is far more serious, of course, is the way in which Thompson re-writes history to suit his own fundamentalist position, Alfred Russell Wallace's view of evolution, for example, was not rejected in favor of Darwin's because the former had religious beliefs and the latter had none, but because Wallace's science was not as acceptable as Darwin's, and because Wallace was not a member of the Victorian scientific establishment while Darwin was.

To Thompson, those who oppose evolution are "powerful writers," "brilliant," "distinguished," and so forth, while such superlatives are limited when evolutionists are mentioned. Nor does he restrict this method of argumentation to science. Thus in the discussion of the Scopes Trial the prosecution attorneys are "renowned" and he goes on to list their accomplishments; the attorney for the defense, Clarence Darrow, is also "renowned," but only as a "criminal lawyer and agnostic...a favorite defense attorney for known criminals." Mr. Thompson clearly does not like the efforts of the American Civil Liberties Union to establish the constitutional right of freedom of religion, and he expresses that dislike by claiming that the ACLU defended Scopes solely in order to attack the Bible and Christianity. In support of this claim he cites one creationist writer, and one "Christian" newspaper dating from 1925. So much for historical objectivity.

But the most outrageous historical misinterpretation Thompson saves for poor Darwin himself. Using a bit of selective quotation, Thompson tries to make Darwin out a rather mediocre scientist who happened to push an idea (which was wrong, of course) that was accepted only because it fit in with the anti-religious feeling of the day. It is not Darwin's mediocrity that is brought into question here, but Thompson's. The volume and the quality of Darwin's research gained him recognition as a first-rank scientist before he ever published a word on evolution. Darwinism spread because it offered a scientific (i.e., naturalistic) explanation for the diversity of life. To be sure the time was ripe; yet scientists of the day were not rejecting religion, rather they simply were casting off supernaturalism as a basis for scientific explanations. Unlike Thompson and his fellow creationists, these scientists wanted to practice science, not theology.

Ironically, one of Thompson's own creationist quotations provides the appropriate epitaph for this book: "It is unfortunate that the public is more willing to accept an entertaining fictionalization of history than to exert the effort to find out alternate versions for themselves... " (p. 163). How true, Dr. Thompson, how true.

A book as heavily biased and as grossly inaccurate as Thompson's is not calculated to give students any real understanding of the history and nature of science. The book does not belong in any self-respecting school.

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THE NATURAL SCIENCES KNOW NOTHING OF EVOLUTION

by A. E. Wilder-Smith
Creation-Life Publishers
San Diego CA (1977)

This book is one of a long line of works by English authors who consciously strive to be wildly iconoclastic. As with many of these efforts, it ends up not as iconoclasm but as a mixture of arrogance and scientific ignorance.

The title would suggest that the book deals with evolution; however, only one chapter does in fact do so. Most of the book (five of seven chapters) is devoted to the question of spontaneous development of life on earth. While this field of study is related to evolution, they are hardly the same. Most basic knowledge of evolution predates any scientific study of biogenesis, and would be unaffected by any theory concerning the origin of life.

One additional chapter (Chapter Six) is devoted to a critique of certain dating methods, and only Chapter Seven and part of Chapter One and the appendix deal with evolution. Throughout, the author displays a consistent misunderstanding of the topics under consideration. At the start of his discussion he defines science as "...experimental science; that is,...those sciences which deal with definite, experimental, regularly repeatable results...," (page one), thus eliminating not only evolution but astronomy, geography, and many other sciences. Having started with this fundamental misunderstanding of science, his conclusions are hardly surprising.

The most fundamental flaw of the book is an apparent confusion or ignorance (it is hard to tell which) concerning our present understanding of the evolutionary process. The theoretical aspect of evolution is discussed to some extent, but the factual aspect of evolution--the sequential change in organism types--is never dealt with. The latter is simply ignored; yet this is the primary basis of scientific understanding and acceptance of the validity of the evolutionary process. The only nod given to 250 years of accumulated paleontological-phylogenetic evolutionary data is a five-and-a-half-page diatribe against index fossils. It is as though someone writing a 164 page book on medicine should spend most of the book talking about hospital administration and deal with disease for only five and a half pages, devoting this largely to criticism about the methods of using antibiotics.

The second major flaw in the book is a woeful disregard of the basic phenomena and literature in the field discussed. For example, in Wilder-Smith's prolix discussion of the problem of chirality (optical activity by biological molecules), many of the most significant contributions in this field are not cited, while one of Eigen's early studies is discussed at length. The author's apparent ignorance concerning theories of the origin of life is also displayed in his extended attempt to show (page fourteen) that oceans, as they presently exist, could not be the place where life originated. Yet, few if any modern students of biogenesis even consider this possibility. The most fundamental flaw is his heavy emphasis on the impossibility of biogenesis without logos or rules. What he seems not to comprehend is that there has never been any question of the presence of a logos. The only question is where it is encoded. Students of the chemical origin of life feel that it is encoded in the chemicals which made up the primitive earth. Wilder-Smith apparently feels it is encoded elsewhere, although "where" never becomes clear. He also is seemingly unaware that most of the planning of biogenesis experiments is done to mimic conditions which would have occurred on

the primitive earth, and can thus hardly represent a plan in his sense of a preset organization. In his discussion of the second law of thermodynamics it is indeed a revelation to learn that "...The behavior of matter in a thermodynamically open system does not differ much, at least from the standpoint of autoorganization, from that of a closed system..." Such a statement denies the possibility of the growth of a tree or the formation of a galaxy, as well as the spontaneous chemical origin of life.

His critique of dating techniques reveals a serious lack of information. First, in his long discussion of C_{14} dating he ignores the fact that the most recent improvements of the method have produced results only slightly discrepant with those of dendrochonology. He is oblivious to the many other dating methods such as varve analysis, paleomagnetism, etc., and to the fact that all these methods produce data in close agreement with each other and with radiometric methods.

All of these shortcomings shrink into insignificance when, however, the reader becomes aware of Wilder-Smith's astounding lack of knowledge of evolution and biology. First, he is apparently unaware of the host of data from comparative anatomy, embryology, biochemistry and physiology supporting the occurrence of evolution. Second, he is apparently unaware of the distinction between phyletic extinction and species extinction and consistently treats them as one and the same. Third, he seems to subscribe to the long outdated view that evolution is necessarily progressive and "upward moving." No serious student of evolution any longer supports this view. Throughout the book his ignorance of basic biology is impressive. Perhaps the best example of this is his statement that "We know of no intermediate stages between invertebrate octopus and squid types and genuine vertebrates. (Page 131). One could equally well say we know of no intermediates between oak trees and man, but this hardly bears on evolutionary concepts.

In summary this book, while it is occasionally amusing, is science-trash. It does not belong in a science classroom.

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THE CREATION-EVOLUTION CONTROVERSY

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by R. L. Wysong, D. V. M.
Inquiry Press
Midland MI 48640 (1975)

At first glance this work creates the hope of seeing a balanced treatment of the controversy cited; however, a close reading dashes this hope. On page three evolutionary science is equated with complete amorality;

> "To illustrate the relationship between origins and life-philosophy, a student asks a learned group gathered for a discussion: 'Why does man seem to be continually at war?'
>
> 'That's the nature of man,' someone answers.
>
> 'Why?' the student retorts.
>
> Another in the group follows up, 'War is simply a part of social evolution. Why we even see the violent struggles for survival among the animals. War is the means by which the earth's population is kept in check and the weak societies are culled to make room for the more fit. So, you see, war actually serves for the betterment of the human race in the long run.'
>
> Feeling a cold chill, the student replies, 'Isn't that inhuman? Isn't it wrong to kill others? I certainly don't want to be one of those sacrificed for the "betterment of the human race".'
>
> 'Who is to say what is right or wrong? Our primary responsibility is to ourselves and what we feel is right for the occasion.' pops back another in the group."

Neither the source of these quotations nor the identity of the "learned group" is given. A little later evolution is correlated with both Nazism and Communism. It is clear that what we are about to read will hardly be a dispassionate analysis of the issue. We are not to be disappointed in this expectation. For example, on page 19, in dealing with the use of expert testimony, Wysong says:

> "Evolutionists agree to the historicity, actuality, reality, and fact of evolution. There is, however, no consensus on the exact mechanism by which the process took place. Thus we will find evolutionary expert vying with evolutionary expert on all facets of the proposed evolutionary scheme."

He then proceeds to discuss in some detail the areas of disagreement, but never again mentions the agreement or the reasons for such agreement. This can hardly be considered balanced treatment. This work is not really a treatment of the controversy between creationism and evolution, but rather a long defense of creationist views decked out as a balanced treatment. Wysong achieves his result by organizing a series of false confrontations and by using a large number of references from scientific literature.

The first technique is shown, for example, on page 43, where he attempts to show that evolution is not science but philosophy.

> "If the materialist's proposition is a scientific hypothesis, then it must be based upon observed phenomena -- according to definition. Are scientists observing the spontaneous generation of life today in test tubes, swamps, or mud puddles? Or are organisms observed evolving into new and different organisms? No, they are not! If that be the case, and evolution is still considered a scientific hypothesis, then a trained scientist must have observed and recorded the original formation of life. Likewise, scientists must have observed evolution through the hundreds of millions of years it is said to have taken place."

He here concentrates on the origin of life, ignoring the fact that while this question is an outgrowth of evolutionary thought, it has nothing directly to do either with the factual occurrence of evolution or with explanations of its mechanism.

He sets up a second false confrontation by asserting that a scientific hypothesis can only deal with directly observed phenomena. This view eliminates from science most of modern physics and chemistry; no one has yet observed electrons moving in orbit. Wysong also ignores the fact that biological chemists are doing test-tube studies of many aspects of the origin of life.

The extensive use of quotations is at first impressive; but when one examines the works quoted, one finds that they are either: (a) from creationist sources, or (b) taken out of context and twisted to fit the author's presuppositions. For example, C. A. Reed is quoted to show the invalidity of ^{14}C dating:

> "C. A. Reed writes similarly regarding the ^{14}C method:
>
> 'Although it was hailed as the answer to the prehistorian's prayer when it was first announced, there has been increasing disillusion with the method because of the chronological uncertainties, in some cases absurdities, that would follow a strict adherence to ^{14}C dates. . . . What bids to become a classic example of "^{14}C irresponsibility" is the 6000 year spread of eleven determinations for Jarmo, a prehistoric village in northeastern Iraq, which, on the basis of archaeological evidence, was not occupied for more than 500 consecutive years'."

Below I reprint the deleted section represented by the ellipsis in Wysong's above quotation:

> "This is not a question of the physical laws underlying the principle used, or the accuracy of the counters now in operation around the world; the unsolved problem, instead, seems to lie in the difficulty of securing samples completely free from either older or younger adherent carbon. At least to the present, no kind or degree of chemical cleaning can guarantee one-age carbon, typical only of the time of the site from which it was excavated."

A second argument against the validity of ^{14}C dating is Wysong's interpretation of a 1963 article by Keith and Anderson (2):

> "Living mollusks (snails, etc.) have had their shells (misdated) by the ^{14}C method up to 2,300 years."

Following is the authors' summary of this article:

> "Abstract. Evidence is presented to show that modern mollusk shells from rivers can have anomalous radiocarbon ages, owing mainly to incorporation of inactive (carbon-14 deficient) carbon from humus, probably through the food web, as well as by the pathway of carbon dioxide from humus decay. The resultant effect, in addition to the variable contributions of atmospheric carbon dioxide, fermentative carbon dioxide from bottom muds, and, locally, of carbonate carbon from dissolving limestones, makes the initial carbon-14 activity of ancient fresh-water shells indeterminate, but within limits. Consequent errors of shell radiocarbon dates may be as large as several thousand years for river shells."

The authors here point out a special circumstance -- the recycling of older biological carbon -- which makes ^{14}C dating inapplicable to riverine mollusk shells. Such self correction and identification of sources of error give validity to scientific results. Wysong improperly uses correction of error to invalidate the dating method. Such distortion is general throughout the work.

Some of the problems with the book may stem from simple ignorance. For example, when in Chapter Three he attempts to establish the existence of only two views of the origin of life -- the creationist model and the scientific evolutionist model -- his failure to note the cyclic religious evolutionist views of the Hindu and Buddhist religions may result from ignorance. Similarly, when he states on page 164 that dendrochronology has produced no ages older than 5,000 years, or when he ignores such independent dating mechanisms as varve counting or obsidian aging, these errors may also be due to ignorance. It is almost certainly ignorance which leads him to conclude erroneously (on page 327), that plants which botanists consider advanced should be more flourishing than those which display "primative" (sic) features. But it is more difficult to accept the idea that he really thinks that

> "We are also faced with the clear evidence that about two-thirds of the earth's geological record, the 'Pre-Cambrian period,' does not contain any significant quantities of indisputable fossils (some contend it contains absolutely none)" (page 362).

when we have large numbers of such fossils. It is also difficult to accept the idea that he is unaware of the fraudulent nature of the Paluxy "human footprint" fossils that he illustrates on page 367.

In summary, this work gives the superficial appearance of being a balanced treatment of the controversy concerning creationism; however, a close reading shows that it is in fact a religious tract aimed at presenting largely distorted or spurious arguments to support a single recent creation. Its biased and misleading nature render the book wholly unsuitable for use in teaching legitimate science.

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CHRISTIANITY AND THE AGE OF THE EARTH
by Davis A. Young
Zondervan Publishing House
Grand Rapids MI (1982)

SCIENCE, SCRIPTURE, AND THE YOUNG EARTH:
An Answer to Current Arguments against
the Biblical Doctrine of Recent Creation
by Henry M. Morris
Institute for Creation Research
El Cajon CA (1983)

If oak trees and humans share a common ancestor, that ancestor had to live very long ago. Henry Morris's literal interpretation of Genesis convinces him that God created the universe less than 10,000 years ago, that he created each "kind" of organism separately, and that he triggered and managed a Flood that lasted a year and covered the entire earth. The evidence in nature, 'rightly interpreted," must point to the same conclusions. And if by scientific reasoning the earth can be shown to be young, what a fine way to discredit evolution! This has been a significant part of the program of "scientific creationism," a movement of which Morris is the acknowledged pioneer and leader.

Davis Young, Associate Professor of Geology at Calvin College, shares Morris's belief in Biblical inerrancy but insists that there are many possible interpretations of God's inerrant word, all of which seem to present some difficulties. Therefore the conclusions of science, which is a separate and distinct way of understanding the universe, should also be considered seriously. Young sees Biblical exegesis and scientific reasoning as separate enterprises, each with its own assumptions and rules, each fallible, and he insists that they not be confused. If they lead to contradictory conclusions, well, these "are not real conflicts between nature and the Bible, but only conflicts between natural science and theological exegesis."

Without elaborating, Young opposes "a materialist evolutionary philosophy" and the "doctrine of the evolution of man," apparently on religious grounds. But in the scientific part of his book, as its title indicates, Young is concerned only to show why "scientific evidence considered as a whole, and as we have it now, compellingly argues for the great antiquity of the Earth." The book as a whole is devoted to showing why "scientific creationism" is bad science (and bad theology). Young shows that it is "based on incomplete information, wishful thinking, ignorance of real geological situations, selective use of data to support the favored hypothesis, and faulty reasoning." His apparent motive: "'Proving' the Bible or Christianity with a spurious scientific hypothesis can only be injurious to the cause of Christ."

Part One of Young's book (55 pages) usefully traces concepts regarding the age of the earth in church history, as influenced more and more in the last few centuries by the developing science of geology. Part Two (61 pages) contains chapters dealing with various kinds of sedimentary deposits, radiometric dating, the earth's magnetic field, and geochemical arguments. For each topic Young reviews creationist arguments and shows why they collapse. Some of this narrative, for example the chapter on radiometric dating, constitute a good primer on the topics discussed. Part Three (30 pages) discusses "philosophical and apologetic

considerations." One chapter discusses creationist misuse of the concepts of uniformitarianism and catastrophism, and the final chapter offers principals, alluded to above, as to how believers in Biblical inerrancy can seek to reconcile their faith and science without doing violence to either one.

Among the faithful Young's book constitutes more of a challenge to "scientific creationism" than a dozen books by nonbelievers, and Morris wasted no time in issuing his response. Science, Scripture, and the Young Earth, a 34-page pamphlet, explicitly aims to discredit Young and his "more important" arguments. Morris is a skillful polemicist; as usual, his arguments are superficially persuasive, especially because he quotes noncreationist scientists in a way that seems to support his arguments. But even readers who, like this reviewer, are not geologists can detect plenty of evidence to support Young's charges of poor (shifty?) scholarship. For example, in describing rubidium-strontium dating by the whole-rock isochron method, Young says that it is most reliable for dating igneous rocks. In challenging a basic assumption of this method, Morris cites papers by his own disciples, none published in refereed journals. Morris also quotes passages from four more reputable sources which seem, at first glance to support his arguments. But one quotation actually implies that the problem Morris cites is not serious for older rocks, that is, for dates that most effectively refute Morris's young-earth hypothesis. All of the three other quotations refer to rocks that are sedimentary or metamorphic, not igneous, a fact easily missed by the casual reader.

The "scientific" argument for a young earth that Morris cites most frequently in his writings and speeches is based on the earth's decaying magnetic field and was developed by his colleague Thomas G. Barnes. Young explains why it is in scientific disrepute. Morris's response is, in part, a testimonial for Barnes. But Barnes's argument has also been debunked by Stephen G. Brush (J. Geol. Educ., 30:53, 1982 -- also see Brush's Chapter 23 in this volume). To illustrate the obsolence of Barnes's argument, Brush noted that in an article published in 1981 Barnes quoted as his clinching evidence a passage from a book by J. A. Jacobs in which evidence for reversals of the earth's magnetic field was questioned. Barnes failed to mention that Jacob's book was published in 1963 and that in the 1975 edition Jacobs reversed his assessment. In 1983 Barnes published a revised edition of his Origin and Destiny of the Earth's Magnetic Field, allegedly with a response to Brush's criticisms. In fact, most of Brush's criticisms are ignored. Indeed, Barnes's 1983 version culminates with the same quotation from Jacob's 1963 edition, and again there is no reference to the date of this quotation or to the 1975 revision.

Morris does neatly pinpoint the difference between his approach and Young's: "Young makes it plain that his real reasons for holding the long-age view are geological rather than Biblical. In so doing, he renders those of us who believe the Biblical record is inerrant, authoritative, and perspicuous a real service. The data of geology, in our view, should be interpreted in light of Scripture, rather than distorting Scripture to accomodate current geological philosophy." Both men agree that the Bible is inerrant, but Morris in claiming that it is also perspicuous, in effect denies that it, like nature, must be interpreted -- a view that he cannot consistently sustain. And in establishing his interpretation of Scripture as a decisive consideration in scientific reasoning he renders his own reasoning unscientific.

Those many Christians who do not regard the Bible as inerrant may be baffled by both Morris and Young. But Young clearly distinguishes between scientific reasoning, in which resort to miracles has no place, and his own evangelical religious commitments. A system of thought should be defined in terms of whatever consensus on assumptions and rules exists among those who recognize one another as practitioners of the system. The world-views of scientists vary widely. The consensus among them is of more limited scope. Therefore science should not be thought of as a world-view. A person's religious beliefs do not exclude him or her from the scientific community so long as these beliefs are not allowed to distort the practice of science.

Young, a believing creationist, accepts the geological evidence for an old earth. He says, "The totality of the evidence just does not point to the Earth being only a few thousand years old, no matter how ardently creationists might wish that it did. No amount of juggling can change the overwhelming weight of the evidence." At the same time, Young apparently does not find the weight of evidence for evolution, and especially for human evolution, equally compelling. He seems to admit the influence of his doctrinal position on this judgment. One wonders whether his standards for evaluation of biological evidence are the same as for his own field of geology.

Nevertheless, one must respect Young's work. If one wishes to give students a book written from the creationist point of view that is timely, candid, and scholarly, this is the book. Young, and others who share his views, can contribute significantly to educating the public, and especially their fellow evangelicals, on the nature of that limited enterprise called science. Morris, on the other hand, clearly does let his religious views distort his attempts to reason scientifically. His enterprise is quite different from science. Much of the creation/evolution controversy would vanish if he and his fellow "scientific creationists" frankly acknowledged this; such a step, however, is tactically impossible for them.

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