EDITORIAL

WHY A PUBLICATION ON ORIGINS?

Another new journal? Why? The presentation of a new publication can evoke a multitude of reactions ranging from admiration to disdain. It may raise questions regarding purpose, philosophy and usefulness. It can create a degree of suspicion which may be mingled with the fear that man’s already vast fund of information is being recast into a different but biased mold. Why add to the confusion?

The purpose of this publication is of much greater significance than the important reactions suggested above. Our attempts here arise from several deep-seated concerns — concerns for a correct knowledge of God, concerns for truth, concerns for humanity, concerns that man may be making very wrong decisions because of misinformation. More about this later.

Let me introduce this periodical as a publication of the Geoscience Research Institute, an Institute established by the Seventh-day Adventist Church to study the matter of origins. The periodical is designed mainly for the Seventh-day Adventist educator, especially the science educator. He, more than most other individuals, must face in his classroom and elsewhere the question of origins. His responsibility to students who study strongly conflicting philosophies regarding the past is great. This periodical is an attempt to help him by giving information about recent developments in this area of study. These developments may be scientific, cultural, political and philosophical. The journal addresses itself to various levels of educators from the elementary to the university level. Such a broad spectrum of readers has the disadvantage of requiring presentation at various levels. We hope our readers will be understanding here.

We mentioned above that our reason for publishing was because of certain deep concerns we have. One of these concerns is for truth. We want the Seventh-day Adventist youth to have the most correct information that is available. To obtain this information a thorough and broad approach is necessary, for we must not limit our search for truth to only one traditional segment of information. To do so is unnecessarily restrictive and may introduce biases that could be avoided. As an example we would have more confidence in a conclusion regarding origins which is based on science, history and revelation combined than one based on history alone. While this type of broad approach in this age of specialization is not traditional
we feel it is essential and academically superior. One of the purposes of this periodical is to approach truth from this broader perspective. More information is better than less.

A second and related area of concern is for man’s image of God. The matter of origins and past history as it relates to God’s revelation is particularly significant here. Modern science claims significant differences when compared to revelation. The implications can be serious. For instance, a God who would create by a process of evolution does not appear to be the powerful, personal and compassionate God described in the Bible. Man’s response to these two types of Gods will be quite different. We suspect that man’s concept of God and his relation to his fellow men are related. Our concern extends from here to the debauched condition of humanity. As we look at the evil prevalent around us we know something is wrong. We think that a proper concept of God will help here. It should also help man to relate better to his Creator and thus bring some peace to his troubled soul.

In summary we can say that our earnest desire in publishing this journal is to give a correct view of the Creator. This we propose to do by a careful study of His creation as well as His revelation. This is information that is very much needed by man today.

Ariel A. Roth
INTRODUCTION

A succinct statement of the general theory of creation has long been needed to provide the basis for its discussion and development. An attempt is made herein to provide such a statement. Creation theory is presented as a series of postulates derived from the Creator’s revelation as presented in nature, the Bible and the writings of Ellen G. White. No attempt is made, on this occasion, to document the various points of the theory either from revelation or nature. It seems desirable to have available a clear statement of a creation theory so that subsequent effort can address itself to specific refinement, reinforcement or refutation of the theory.

The latter sections of this paper briefly discuss the scientific method and the relevance of creation theory to science and to the church.

THE THEORY

“...the Lord made heaven and earth, the sea and all that is in them...” — Exodus 20:11.

POSTULATE 1. The physical substance of the observable universe and the laws of their interactions were brought into existence by an infinitely wise Creator, and their continued existence is dependent upon His maintenance.

POSTULATE 2. In the relatively recent past a creative event(s) occurred on earth. By this act the earth was organized and/or created to provide a suitable substrate for living organisms, and organisms were created to live upon that earth.

POSTULATE 3. The events of Postulate 2 occupied an extremely short period of time (six literal days).

POSTULATE 4. The biological world was created so as to relate intimately with the physical world. There was a balanced fauna
and flora present including the major categories of plants and animals now living.

POSTULATE 5. Man was endowed with characteristics unique in the creation. These included: 1) higher intelligence, 2) the exercise of dominion over the animals, 3) a knowledge of the Creator, and 4) free will.

POSTULATE 6. The initial creation was perfect. It was designed for mankind by a Creator whose character is love. As such it provided for man a completely adequate opportunity for physical occupation and sustenance and met fully his aesthetic and spiritual needs.

POSTULATE 7. The initial creation was modified, subsequently, in such a way that it became progressively less “perfect.” Death became the lot of all organisms.

POSTULATE 8. The crust of the earth provides a record, albeit incomplete, of the past history of the earth. In particular, the upper layers contain the remains of organisms destroyed in a major post-creation event — the flood (see also note 3).

POSTULATE 9. The organisms existing today are the descendants of those brought into being during the initial creation period. There have been no subsequent creations.

POSTULATE 10. The present characteristics and distribution of organisms are the result of the dynamic interactions between the organisms and the ecological history of the earth. The biological world as we know it is well-described as “descent with modification.”

POSTULATE 11. The Creator is not capricious in His actions and thus the biological and physical universe can, most often, when adequately understood, be described in mathematical terms.

THE GAME

“They (scientists) know — often to their despair as human beings — that science is an endless opening of sealed boxes which turn out to have more sealed boxes inside. The more one learns, the more there is to learn. There is never a last word.”

Science may be likened unto a game. A game played by little boys grown old. As with any game the game of science is played according to its rules. While there are many variations on the game of science, there are certain basic rules that all players observe. These basic rules are the
“scientific method,” and an understanding of the “method” is basic to an understanding of science and how it operates. Very generally, the “method” works as follows: In the natural world, observations are made. In an attempt to explain and account for these observations one or more hypotheses or theories are developed. These make certain predictions about the expected results of additional observations, and their success or failure results in increased confidence in, selection among or modification of the hypotheses. If two, or more, competing theories seem to explain the observations equally well, the simplest one is adopted on the basis of the rule known as “Occam’s Razor.” A phenomenon sufficiently well-studied will usually have a single, generally accepted theory to explain it. It is helpful to think of the hypothesis and theory as tools of science. Their usefulness as tools is evaluated on the basis of how well they work. The better the tool the better it a) predicts correctly the outcome of untried experiments, b) suggests novel and informative experiments and c) integrates diverse data into a more understandable whole.

It is interesting to note that a theory is not evaluated on its correctness, for that cannot be known. A scientist hopes, of course, that his particular theory is true, and he tends to talk about it as though it were. The underlying reason for playing the game is the belief that the “method” — observation, hypothesis, additional observation, theory — will lead to a more adequate explanation of natural phenomena and ultimately to a correct understanding thereof. Whether such a faith is justifiable cannot be tested; however the game thus far has proved so productive and so interesting that it will continue to attract eager players for a long time to come.

AND SO THE GAME WAS PLAYED

The question “Where did I come from?” has fascinated most men, particularly men of science who are accustomed to asking and trying to obtain answers to difficult questions. Since the question deals with an historical event(s), it is not directly amenable to science which studies things that currently exist, are presently occurring, or are repeating or repeatable events. But the question is of such basic interest that it is dealt with anyway. It is possible to do this because most theories of origins make many predictions as to the state of things at present, and so the reasonableness of such a theory of origins can be evaluated.

In Western science it was long believed that both the living and non-living aspects of the universe originated by the command of God, who was their Creator. Christianity pointed to the account of creation and the
deluge as providing a basis for the understanding of earth history. To the limited information given in the Biblical literature was added the interpretation of the theological scholars. Many of these interpretations achieved the rank of dogma.⁹

As the game was played it became increasingly obvious that certain aspects of the revelation-plus-dogma were at variance with observation. This growing incompatibility led to the development of alternative theories which would more adequately account for the facts of the natural world.¹⁰ The Darwinian synthesis of 1859 represented a significant milestone in the articulation of an alternative theory for the origin of living things. It was free of reliance on theological information, and it accounted for non-fixity of the species — a readily made observation in direct conflict with the existing revelation-plus-dogma.

There were many factors important to the subsequent establishment of the evolutionary theory. For one, believers in the revelation-plus-dogma viewed the theory with horror. They seemed incapable of seeing their concept as a two-part entity and thus capable of development and modification. Rather than providing an explanation for Darwin’s data in terms of their view of earth history they responded by casting dispersion upon the new theory and its promulgators. They pointed to the weaknesses of the evolutionary theory rather than to the strengths of their own. Their negative response contrasted with the articulate and active promotion of evolutionary concepts which appeared more adequate than the revelation-plus-dogma of the day and almost guaranteed the new theory’s acceptance by the scientific community as their tool for doing science.

Another factor that was probably important in the establishment of the evolutionary theory was that the theory removed the Creator from one’s worldview. The great conflict between Christ and Satan that has embroiled this planet cannot be ignored. A theory which eliminates the Creator also eliminates a responsibility to the Creator. It is hard to evaluate the influence of this factor in the establishment of the evolution concept, but the difficulty individuals have today in surrendering their lives to Christ makes it seem that it may have been (and still is) considerable.

Finally, the evolutionary theory met the three requirements of a good theory adequately and well. Many of the adherents to the theory believed it to be true, but ultimately this probably was not the basis of its acceptance. IT DID SCIENCE BETTER! It was, therefore, a better theory and, by the rules of the game, adopted as the current theory.
“... GO FORTH ...”

“... Go forth therefore and make all nations my disciples” — Matthew 28:19.²

Is it possible that an adequate theory of origins can make a contribution to the fulfillment of this commission? If so, what might that contribution be?

At the very heart of Seventh-day Adventist theology is the concept of the Creator. Seventh-day Adventist, a name chosen with care to emphasize two of the important aspects of the church’s message, illustrates the point. “Seventh-day” refers to the Sabbath, the memorial of God’s creation, a weekly celebration of His creatorship. “Adventist” points to Christ’s return to this earth and to His promise of re-creation. The whole concept of salvation seems to hinge on the existence of an initially perfect state. With Christ’s creatorship so central to the gospel, what, then, is the most effective means for communication of this aspect of Himself? This question is of particular importance when speaking of Christ to those who understand the natural world to have originated by strictly mechanistic processes. As such a person becomes acquainted with Christ and His mission to earth, he comes to realize that an acceptance of Christ for what He claims to be is an acceptance of Christ as his Creator. Such an acceptance must present a real intellectual challenge to one whose background is evolutionary theory.

What information would be useful to a person caught on the horns of the dilemma of what he “knows” to be true and what Christ claims? Perhaps a long list of the areas of science in which the evolutionary concepts are currently inadequate? Perhaps a recitation of the errors made by evolution-oriented scientists in more than a century of research? Perhaps a list of hoaxes perpetuated in the name of evolutionary science? Perhaps all of these? Nay! These suggestions seem inadequate in the extreme — yet unfortunately they summarize to great extent what has been and is being offered by believers in the Creator.

Much better, it would seem, would be a calm, reasonable presentation of the concepts of creation — what revelation says happened and how this correlates with observation of the natural world. The sincere seeker after truth cannot arbitrarily rule out the possibility of a Creator. In recent years the discoveries of science, particularly in the areas of genetics and molecular biology, have made it increasingly clear that the Creator cannot be ruled out on scientific grounds either. Indeed, the creation concept
provides a simplifying and unifying principle for many of the hard facts of science. Creation theory suggests exciting new vistas into nature that hold real promise in science’s eternal quest for truth. To the player seeking an edge in the game of science, creation theory offers fascinating possibilities.

It is useful to distinguish between what can be called creation theory and creation theology. Creation theology is defined as the sum total of all revelatory information having to do with the origin of the earth and subsequent developments thereon. This record is characterized by its incompleteness and sometimes by its irrelevance (to science). The fact is that its details are designed solely to contribute towards God’s revelation of His character: the nature of His government. Many of these details, interesting or even significant from a theological point of view, may be quite trivial from a scientific point of view.

That some aspects of creation theology make no apparent contribution to creation theory is no reason to depreciate their value or to question their accuracy. They just simply make little or no contribution to the game of science as it is being played at the present time. They illustrate the important point that creation theology and creation theory are fundamentally different. Creation theory takes those elements of creation theology which suggest experimentally testable insights and integrates these with the vast amount of information about nature available through the present and past efforts of science in an effort to develop a reasonable understanding of the natural world as we see it today.

Creation theory, then, is a tool to be used in playing the game of science.

CREATION THEORY: A VIABLE AND VALUABLE CONCEPT

“God has permitted a flood of light to be poured upon the world, in both science and art; but when professedly scientific men treat upon these subjects from a merely human point of view, they will assuredly come to wrong conclusions.”

Modern creation theory can make a valuable contribution in two areas — to the Christian church and its mission of presenting the good news of Jesus Christ and to science and its goal of understanding nature.

In the first instance, it helps individuals to be intellectually honest with themselves as they accept Christ as their Savior. There must be millions for whom the acceptance of the creatorship of Christ would be most difficult because of their orientation to the evolutionary theory. Yet
such difficulty is not inherent in the overwhelming adequacy or correctness of the evolutionary theory. Nor is it inherent in the fundamental inadequacy or falseness of creation theory. The difficulty exists because of a general failure on the part of creation-oriented scientists to use the suggestions of revelation in the development of a comprehensive creation theory.

To science, a general theory of creation could provide the insights of a basically more accurate understanding of the origin of life and earth history. There are many areas of nature where the evolutionary and creationary models make similar predictions, and creation theory would be expected to add little to our understanding in such areas. Also, much day-to-day science concentrates itself on such small aspects of nature that no general theory of origins makes substantial contribution to the experimental design or to the interpretation of the data obtained. However, there are areas of nature where the two views make fundamentally different predictions. Using the unique suggestions of creation theory a scientist should be able to make, on the average, more frequent and/or significant advances in the understanding of the natural world than a scientist not using such insights. He should be able to play the game of science more successfully. He should be able to DO BETTER SCIENCE!

ACKNOWLEDGMENTS

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ENDNOTES

1. Also Visiting Associate (1973-1974), California Institute of Technology.
2. New English Bible.
3. Shortly after creation mankind was caught up in the controversy raging in the universe. A being of high rank we know as Lucifer (Satan) had challenged the concept that the Creator was love and His government just. Mankind sided with Lucifer, and modifications of the creation ensued. One class of changes is called “the flood.” The flood was a world-wide disaster which invoked great hydrologic and tectonic upheavals. Another class of changes is described as curses. Whether they represented creative acts of God, explosive genetic adaptations to changed environmental conditions, genetic, and/or physical manipulations of Lucifer, or a combination of these is not clear. But, the result is — the creation no longer is “very good.”
4. See note 3 for a possible important exception to this rule.
5. Mechanisms built into living systems to provide for variation within the created types coupled with the effects of postulate 7 have produced the great variety that we now see in living systems. The original organisms were adapted to their ecological setting. As conditions changed, the plants and animals became adapted to their new environments.

6. The Creator is a being of order. Although He “invented” and established the rules by which the universe operates and is quite capable of changing those rules at any time, He normally does not do so. Miracles may be those rare occasions where He has changed some of His rules for a limited period of time and perhaps over a limited area of the creation. A miracle, even though its occurrence was carefully monitored by the best of observational science, might defy “normal” explanation. It is a unique occurrence and as such its explanation lies outside the realm of the scientific method and normal science.


8. As used here observations might better be called the “discoveries of the prepared mind.” Observations are the “data” of science. They are often obtainable only through the use of complex apparatus and sophisticated experimentation.

9. Dogma is used here to describe ideas not explicitly stated in revelation but believed to be implicit therein and accepted as equally true with the Biblical information itself.


RATIONALISM, EMPIRICISM AND CHRISTIANISM AS PHILOSOPHICAL SYSTEMS FOR ARRIVING AT TRUTH

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Two philosophical systems — rationalism and empiricism — established as methods for arriving at truth have vied for favor during the past 2500 years. Sense perception is the ultimate authority in empiricism. Reasoning is mainly inductive and knowledge is conceived of as probable but not certain. Rationalism, on the other hand, maintains that there is a special domain of knowledge acquired by means of a capacity called reason and this knowledge is inaccessible through sense perceptions. Reality transcends observable phenomena and empirically obtained knowledge is only a poor substitute for the reality obtainable by mental vision alone. In rationalism mathematics is considered the ideal form of knowledge and reason is the ultimate authority. Reasoning is deductive and knowledge is conceived of as certain.

According to the internationally known science philosopher Hans Reichenbach, rationalism is the philosophy of a man dissatisfied with sense experience and who wishes something beyond. It is the emotional bias toward a world of imagination on which religion has thrived. Whether or not his criticism of rationalism as a psychological crutch of philosophers disgruntled with life is valid, his reluctance in placing ultimate authority in human reason is warranted. Never are the conclusions of rationalism superior to the axioms and postulates on which they are based. Fallacious conclusions in rationalism may result from untrue premises, imperfections in language (its ambiguousness), fallible human reasoning ability, and defective human attitudes (prejudices, unfairness etc.). Therefore Ellen G. White cautions against speculative philosophies and exaltation of human reasoning above its true value. Rationalism, she states, idolizes reason and sets aside the Bible while exalting human wisdom as the source of religious truth.

Reason is also recognized as an indispensable tool in empiricism. Reichenbach notes that “Observation informs us about the past and the
present; reason foretells the future.”

It has a predictive function. Empiricism retains the methods of rationalism but verifies its conclusions (predictions) by observation. Basic then to the empiricist philosophy are the two assumptions: 1) sense perceptions are a reliable guide to reality and 2) reality is uniform and consistent. If these assumptions are considered self-evident, empiricism — using a combination of sense perception and reason — represents a more efficient method of arriving at truth. The final authority or test of truth resides in the sense perceptions. The reason — with its predictive functions — serves in a subordinate role. That empiricism is probably the superior of the two philosophical systems in at least a pragmatic or utilitarian sense is indicated by the significant advances in communication, transportation, synthetic intelligence, medical science and agriculture that it has nurtured.

**EMPIRICISM: ITS LIMITATIONS AND FAILURES**

The weaknesses of empiricism are in three directions: 1) its apparent failure to solve moral and ethical questions, 2) the probabilistic nature of knowledge obtained by the empirical approach and 3) from relying on rationalism in dealing with past and future events and in all interpretation.

The success of empiricism has been ambiguous. While this success in improving the physical and material condition of man has been significant, neither directly (through psychology and the social sciences) or indirectly (as a byproduct of its success in the material world) has it made significant advances in improving man’s spiritual (non-material and non-physical) condition (measured in terms of happiness, peace of mind, security, human behavior and interpersonal relations). This may be regarded either as only a temporary failure (advances forthcoming) or as a basic inability of empirical philosophy to tackle this type of problem.

Empiricism contains no absolute statements on the nature of good or bad; therefore empirical conclusions in themselves can only be amoral, always answering questions of “what is?” rather than “what ought to be?” Nonetheless (perhaps unfortunately) scientists commonly use the empirically derived knowledge and the practice (by scientists) of the empirical method as directives for establishing general moral and ethical values. These efforts always must start with the assumption that the principles of tolerance, fairness, justice and freedom — as practiced by the scientific community — are desirable and good. From this basis they then show that these principles will lead to the improvement of man’s spiritual condition. The failure then is seen not as the failure of empiricism
or of its practice but rather the failure of the governments, the statesmen, and the non-scientific community in general to accept the guiding principles of the scientific community as moral directives in everyday life.\textsuperscript{13}

The probabilistic nature of empiricism derives from the two assumptions on which it is based. The uniformity of nature has been regarded as both the basis of the validity of induction (as a method for arriving at truth) and as a conclusion from applying the inductive method. Ordinarily the uniformity of nature is considered self-evident and is then made the axiom on which the validity of inductive reasoning is established.\textsuperscript{14} In any case the inductive reasoning of empiricism never leads to certainty. Conclusions can only become more probable.\textsuperscript{15}

The uncertainty of empirical knowledge also results from the fallibility of sense perception. That this sense perception is not always a reliable guide to reality is demonstrated easily by the occurrence of optical illusions. Perhaps though, a more serious problem involves the misinterpretation of correctly perceived objects or events. The obvious initial interpretation of sense perceptions are often incorrect. Thus the earth does appear flat, matter does appear continuous and the sun does appear to circle the earth. (In fact, regarding the heliocentric system Galileo states: “I cannot express strongly enough my unbounded admiration for the greatness of mind of these men who conceived and held it to be true..., in violent opposition to the evidence of their senses.”\textsuperscript{16}) It is at this stage that the advantage of empiricism is most easily observed, for reinterpretation and verification of sense perception always awaits the next observation — possibly in a form not yet thought of and on instrumentation not yet available. This advantage, though, is ambiguous. Truth is always being approached but never reached. Knowledge is uncertain and theories are unstable. Further observation and improved instrumentation inevitably lead to scientific revolution.\textsuperscript{17}

Both in the interpretation of sense perceptions and in the extrapolation of present sense observations to historical or future events (a form of interpretation), empiricism relies on reason and the methods of rationalism. In the realm of interpretation, then, empiricism is liable to the same sources of error that occur in rationalism. Interpretation — though a valid scientific pursuit — must be done with appropriate caution and an awareness of its fallibility.
EMPIRICISM: THE SECULARIZATION OF CHRISTIANITY

The schoolmen of the Middle Ages approached truth via the rationalistic philosophy. This fact, though, hardly warrants Reichenbach’s conclusion that rationalism is the philosophy of religion, because Luther, as a religious leader of that time, attacked the rationalistic philosophy of schoolmen.7 Both philosophical systems are better considered as either areligious — neither supporting nor denying the validity of Christianity — or more likely as religions in themselves — separate from Christianity. Adulteration of Christianity with the false tenets of either of these “religions” might give Christianity the appearance of depending on or based in one of the respective philosophical systems. It may have been rationalism during the Middle Ages but would probably be empiricism today. Pure Christianity, however, belongs to neither philosophical system. It contains elements of both but goes beyond either.

The religious nature and structure of rationalism and empiricism are well-defined. They have their gods (reason and the sense perception of nature) and their laws (laws of logic and laws of nature). The parallels between the nature and structure of empiricism and Christianity are fully developed by the noted contemporary scientific philosopher Karl Popper23 and C. F. Weizsacker.18 Weizsacker shows that the religion of scientism (or empiricism, to use our terminology) is a product of the secularization of Christianity. Thus the structure retains the principles of justice, tolerance, honesty, etc. as a basis for the moral action of the scientific community. The concepts of freedom and authority in empiricism19 are closely allied to but are an adulteration of their Christian counterparts. The function of problems (as unfulfilled expectations) and experience (or experiment) in Christianity find their parallel in empiricism,23 and the nature of scientific discovery can be considered analogous to the nature of conversion — the discovery of God. The Christian structure of empiricism has thus remained more or less intact, but the purpose has shifted from that of seeking spiritual success to the seeking of material success.

Empiricism is a religion in its own right but has borrowed heavily from Christianity. The validity of its existence depends on whether it has made any additional contributions of its own or whether on the contrary it has merely usurped Christian authority and apostatized.

CHRISTIANISM

Christianism refers to the religious system, tenets and practices of Christians. The basis and uniqueness of Christianity is reconciliation with
God — the reestablishment of a relationship with God. Here the term christianism is specifically used in referring to a third philosophical system. Although this system places value in both reason and sense perception, it maintains that there exists knowledge that is inaccessible to either human reason or sense perception. Truth is arrived at by utilizing special revelation as well as reason and sense perception. Revelation is considered the ideal form of knowledge and the ultimate authority is God.

Revelation is being told what truth is by someone that has special information. Since it is truth direct from the source of all truth, in a sense, it should be the most efficient method of arriving at truth. Nonetheless in christianism as in the previous philosophical systems there are apparent problems. As in empiricism they come from three sources: 1) apparent failure to improve the spiritual condition of man, 2) assumptions on which christianism is based and 3) the nature of truth as conceived by christianism.

Revealed truth is not of such a nature that it can be readily incorporated. Thus it cannot be obtained by the mere memorization of facts or the committing of certain Biblical passages to memory (although this may be necessary). In christianism truth is conceived of as important only as it becomes impressed on the mind and becomes an integral part of the individual and thereby facilitating change. It requires not only an act of revelation on God’s part but a creative act or acts on the part of the receiver.

The assumptions of christianism are: 1) that God exists and 2) that His revelations are trustworthy. To observe their parallel structure the two assumptions of empiricism can be stated here as: 1) uniformity in nature exists and 2) the revelation of nature through sense perception is trustworthy. As faith in inductive reasoning leads to verification of the latter set of assumptions, so faith in the revelation of God leads to the verification of the assumptions of christianism. The conclusions in both cases are based on circular reasoning, and they are not considered in either case as logically foolproof. The attempt here is only to show the parallelism (at this one level) of empiricism and christianism. Progress in either system requires an initial act of faith.

Along with empiricism, christianism is confronted with an apparent failure (actually anticipated by christianism) in its attempts to improve the spiritual condition of men. Christianity has claimed too that it had special power and knowledge in this area. As in empiricism, though, this failure is seen not as a failure of christianism but rather the failure of the world community to accept its principles as directives in everyday life. However,
for two reasons, the prognosis for the ultimate success of christianism in areas of moral values and ethics is infinitely more encouraging than it is for empiricism. Christianism provides people with a special power (unavailable in empiricism) for bringing about improvements in their spiritual condition. It also provides an absolute standard of morality. By this provision good and evil in christianism becomes analogous to the true and false of empiricism, thus making the rightness of an action amenable to the experimental method. It is ironic that moral action not amenable to the experimental method in the philosophical system of empiricism (which relies so heavily on the experimental method) becomes experimentally verifiable in christianism (where the ultimate authority is revelation).

While experiment (or experience) does not hold the dominant role in christianism, it does serve important subsidiary functions. Ellen G. White states that the spread of Christianity (in recent times) became most rapid when “Men became dissatisfied with the results of rationalism and realized the necessity of divine revelation and experimental religion.” It is each individual’s personal responsibility to test for himself the trustworthiness of special revelation through experimental knowledge. Further, the correct understanding of revelation can only be approached through the experimental application of the revealed principles to real-life situations. These two applications of the experimental method lead to growth in faith and action respectively.

In christianism the source of knowledge is a triumvirate of reason, sense perception and special revelation. Final authority resides with infallible revelation. Sanctified reason and sense perception are the tools for correctly applying revealed principles.

SUMMARY

Christianism has the potential for success in improving the spiritual condition of man, and, in addition, it provides a matrix within which to develop the concepts of past, present and future material and physical phenomena. Empirical science finds its proper position only within the context of christianism. Here it functions in the capacity of general revelation. The scientific method (in the restricted sense as used by most scientists) is the application of the general philosophy of christianism to the study of natural phenomena. Viewed in this way it becomes meaningless to speak of applying the scientific method to Christianity, since the scientific method is part of christianism, and it has always been inherent (if not always applied because of emphasis on spiritual values) in the philosophy of christianism.
The use of the scientific method in the context of the philosophical system of christianism has advantages over its use in empiricism. The unity of truth makes the position of the scientific method within a system which encompasses all truth the more reasonable and reliable alternative. Further, revelation provides in christianism a source of information (available for use in the scientific method) unavailable in empiricism. In this context revelation is viewed as a precious source of knowledge to be used to its fullest extent in the pursuit of truth and not as a restriction to freedom. Revelation is an authority (similar but not identical to the general authority of Polanyi)\textsuperscript{22} providing guidelines for the most fruitful activity.

\textbf{ENDNOTES}

2. Ibid., p 74, 76, 252, 253.
3. Ibid., p 253, 254.
5. Ibid., p 102-104.
8. Reichenbach, p 80.
20. Ibid., p 34, 35.
22. Polanyi, p 57.
ARTICLES

FOSSIL TREE ORIENTATION
IN THE CHINLE FORMATION

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The Chinle formation in the Southwestern United States offers interesting opportunities to do research important to the interpretation of the past. The project reported here was first conceived during an institute for secondary biology teachers conducted by the Loma Linda University Biology Department in 1970. At that time Harold G. Coffin of the Geoscience Research Institute conducted a paleontological field trip and suggested that a study on fossil tree orientation may enhance a better understanding of the events associated with the deposition of the Chinle formation. The orientation of fossil trees and other fossils can provide information on the direction of flow of water during deposition. Such information should be useful in constructing models of geologic action during the Genesis flood and subsequent geologic events.

The following is a preliminary report describing the intent, nature and extent of the initial work on this project, conducted during the past two years by staff and graduate students of Loma Linda University and secondary-school teachers.

The Chinle formation outcrops frequently in Utah and Arizona. It is best known from the Painted Desert region where its striking displays of reds, greys, tans, yellows and lavender are prominently displayed. Better known than the formation itself are the countless petrified trees found within it, primarily in the lower Petrified Forest member. This member is perhaps best characterized as a shaly marl which weathers into mounds exposed as sparsely vegetated badlands.

There is little question that the deposition of the Chinle formation resulted from flowing water on a grand scale. Almost all of the features described in the Chinle are interpreted as features compatible with a broad flood plain. The trees are generally described as having been transported...
in by flood conditions from source areas outside of the sedimentary basin. Signs of water wear are frequently described in connection with the logs. In some areas leaf-twig compressions are found and occasionally fossil twigs and branches replaced with iron pyrite can be found. At present the fossil flora consists of about 50 species of 41 genera.

Most of these are known from scattered occurrences. Only a single species (Araucarioxylon arizonicum), a gymnosperm tree, is found in great abundance as well-preserved specimens. It is this species which comprises most of the petrified logs of the Chinle.

Occasionally reports have been made of tree stumps in “position of growth” within the formation. The earliest reports recorded by Ward describe an area northeast of Cameron, Arizona, in which twenty stumps are so positioned. Other areas within the Petrified Forest National Park also contain upright stumps, although these are generally smaller in diameter. We recently relocated the area described by Ward and found several apparently upright. These stumps have created somewhat of a problem for the traditional explanation of Chinle deposition but have generally either been ignored or considered as occasional trees which took root in sand bars on flood plains. Seldom is great effort expended to determine whether trees which appear to be upright grew in position, since no other explanation is apparent. It is a little known fact that tree trunks, particularly the bases of trees, float in upright position in water after a period of time. Under the right conditions these could easily become buried in that position. We partially excavated two of these trees to the apparent root level. There was no stratigraphic break associated with the base of these trees which could be interpreted as “soil.” This suggests that they may be of allochthonous origin (transported to the site of deposition), rather than in position of growth.

Regarding the allochthonous origin of the prostrate logs, there is little dispute. However, very often the logs are interpreted as being borne in rivers and streams to their present position, but other explanations are also possible. A model has been developed which could account for the allochthonous origin for the petrified logs without doing violence to the evidence of uniform sedimentary emplacement. This model involves the sedimentation of tremendous quantities of volcanic ash (of which the Petrified Forest member is largely composed) in a body of water resulting from the Genesis flood. Trees rafted in from a forest devastated by the flood became stranded in the volcanic mud as the waters ebbed and flowed in the basin. Subsequent deposition completed the process of emplacement. Data on tree orientation in many localities will be useful in developing this
FIGURES 1-4. Plots of orientation of horizontal logs at locations 1-4 respectively. Length of bars indicates the number of logs in each 10 degrees of arc. See Figure 1 for scale.
FIGURES 5-8. Plots of orientation of horizontal logs at locations 5-8 respectively. Length of bars indicates the number of logs in each 10 degrees of arc. See Figure 5 for scale.
model. It is well known that objects in flowing water align themselves in
the direction of least resistance to flow. For elongate objects such as tree
trunks this means they will tend to orient parallel with the prevailing current.
Thus the general alignment of logs should represent the average direction
of the depositing current. Uniform orientation at each site would indicate
flowing water, whereas random orientation would more likely result from
logs sinking in a standing body of water. Strong correlation in orientation
at different sites would indicate uniform flow of water over a large area,
but differences in orientation from one site to another would suggest that
local factors were important in directing current flow.

Trees were measured at nine locations in two general areas in Arizona
and Utah with occasional scattered data points from other areas. Some
attempts were made to determine the base end of the tree but very often
this was not possible. In some studies lengths were recorded as an indicator
of relative reliability. Longer trees tended to present a more parallel
orientation pattern, although this was not always the case. Data points
were obtained at the following locations (Fig. 9):

1. 15 miles NW of Tuba City — 36 trees
2. 6 miles NNW of Cameron — 45 trees
3. 3 miles E of Cameron — 80 trees
4. Petrified Forest National Park — 176 trees
5. Black Forest and NW of Crystal Forest (data combined) —
   176 trees
6. NE of Cameron ½ mile N of site 3 — 27 trees
7. Capitol Reef National Monument on Chimney Rock trail —
   138 trees
8. Wolverine petrified wood area — 61 trees

The orientation of 739 trees has been determined in 8 locations. The
most variant data were obtained at the site 3 miles NE of Cameron. Here
unusual difficulty was encountered in attempting to assign the logs to a
particular stratigraphic horizon. It is felt that at least part of the variance at
this site results from lumping the data from more than one stratum. At
other locations, this was not a problem, since most logs were exposed at
the surface in one horizon.

These preliminary data show very strong orientation of logs at most
sites (Figs. 1-8). It is evident that before any far-reaching conclusions
can be drawn, more data are needed. When these data become available,
FIGURE 9. Map of Northern Arizona and Southern Utah, illustrating localities where orientation of fossil trees has been determined.
Tree orientation may allow correlation with certain Paleozoic directional indicators in the same basin.\textsuperscript{7,8}

Although this report deals primarily with the Chinle formation of the Southwestern United States, similar analyses need to be done in other areas on such phenomena as grain orientation, fossil orientation, ripple marks and other directional indicators.

It is important that individuals with training in science and a commitment to God’s Word utilize that training in developing the necessary data input for evaluating a workable flood model. It is hoped that this initial effort will stimulate others to put forth reliable, careful efforts towards this goal.

\textbf{ACKNOWLEDGMENTS}

The authors wish to acknowledge the help of James Anderson, Harold Coffin, Gottfried Fritz, Art Kanna, Lanny Fisk, Berney Neufeld, Lance Hodges, Phil DeBord, and David Steen in gathering data on the trees.

\textbf{ENDNOTES}

3. Ibid., p 43.
NEWS AND COMMENTS

CALIFORNIA SCIENCE TEXTBOOK CONTROVERSY

Three years ago when the California Board of Education approved new guidelines for science textbooks, it called for the inclusion of theories that life may have been created by a “designer.” Since this term has generally been interpreted to mean a supreme being in a religious sense, a battle between science and religion evolved.

BOOKS SCREENED

Some publishers, in an effort to comply with the Board’s ruling, submitted special books for adoption in California which included the creation theory, but the Curriculum Development and Supplemental Materials Commission screened them out. Board members favoring insertion of the creation theory then vowed to make editorial changes conform to their view in the adopted books. Legal clearance was obtained to bypass the Curriculum Commission to include the creation theory — alongside the customary theory of evolution. This was made possible when chief counsel Thomas M. Griffin of the California Department of Education reversed an earlier ruling by other staff lawyers that had legally prohibited the Board from adopting any book not recommended by the Commission.

His decision set the stage for what many writers termed another Scopes Trial. The controversy was debated by scientists all over the United States and Europe.

SCIENTISTS PROTEST

When the scientific community learned what the Board was trying to do, there was a storm of protest. The British scientific magazine Nature (Oct. 20, 1972) called the Board’s consideration of creation “an especially foolish course.” It went on to say, “The issue is, of course, absurd. Even religious scientists no longer find it necessary to their position to deny the essence of the doctrine of evolution.”

Scientific American (Aug., 1972) reported in its Science and the Citizen section, “The stage is set for the mandatory teaching of divine creation as

EDITOR’S NOTE: Original pagination for this article was p 29-34.
a scientific theory on the same footing as evolution in the public schools of California.”

William Bevan editorialized in the Sept. 29, 1972 issue of Science magazine, “…if the state can dictate the content of a science, it makes little difference that its motivation is religious rather than political. The consequences will be the same. Many will recall the condition of Russian genetics during the heyday of Lysenko when Russian biologists defended an erroneous theory on the grounds that it must be true because it was Marxist.”

Nineteen California Nobel Prize winners asked the Board to keep religion’s story of creation out of science textbooks.

TEACHERS UNITE

The National Association of Biology Teachers (NABT) used its annual meeting to examine the issue. The meeting was held one week before a Board of Education public hearing on the textbooks (see separate story on meeting) and teachers were urged to attend the hearing and testify. Legal counsel was retained by the NABT to assist California teachers whose academic freedom was endangered by the adoption of a science framework requiring textbooks to include the creation theory. The Fund for Freedom of Science Teaching was established in an attempt to blunt concerted attacks on the rights of teachers to instruct from a scientific point of view.

The Biological Sciences Curriculum Study’s November, 1972, Newsletter was devoted to the crisis. The BSCS Executive Committee felt that interest in the situation had been deliberately fanned by distortion and rumor. Noted evolutionists Bruce Wallace of Cornell University, G. Ledyard Stebbins of the University of California at Davis and William V. Mayer of the University of Colorado contributed articles to the Newsletter damning creation.

NATIONAL ACADEMY OF SCIENCES ACTS

In an unprecedented move, the National Academy of Sciences (October 17, 1972) urged that the religious creation concept of the origin of life be kept out of California’s proposed new science textbooks. The action was taken, a spokesman said, because of the “national implications” if the State Board of Education goes along with proposals to include the creation concept with the scientific theory of evolution in school books. The resolution by the Academy stated that religion and science are “…separate
and mutually exclusive realms of both scientific theory and proper segregation of the teaching and understanding of science and religion nationwide.”

The Commission on Science Education of the American Association for the Advancement of Science adopted a resolution saying it “is vigorously opposed to attempts by some boards of education, and other groups, to require that religious accounts of creation be taught in science classes.” Creationists tried to show that evolutionists were being close-minded in their position, and that creation could be the basis for a valid scientific theory. Vice-Chairman of the Board of Education John R. Ford, M.D., a graduate of Loma Linda University, led the crusade for including creation in California’s textbooks.

ACADEMY CHARGED WITH PREJUDICE

The Los Angeles Times ran an opinion article (Nov. 15, 1972) by Arlie J. Hoover, Professor of History at Pepperdine University, which charged science with joining religion in the ranks of the prejudice. “Many observers on the Western intellectual scene have been saying that we are coming out of the period of aggressive scientism that we have been in since the last century, but if this resolution (by the National Academy of Sciences) is any indication, scientism has just launched a counterattack,” he said. “If the academy is trying to tell us that science can’t deal with the nonempirical, or spiritual, that’s fine. But if it is suggesting that rational men, in their comprehensive efforts to understand the total universe, can’t postulate nonempirical explanations for things in their experience that can’t be accounted for on empirical grounds, then the academy is being unscientific itself.”

During the triennial assembly of the National Council of Churches in Texas, December, 1972, evolutionists came under fire by anthropologist Margaret Mead and theologian Rev. Dr. David Hubbard, president of Fuller Theological Seminary.

“Some scientists are as dogmatic about evolution as some preachers are about religion,” said Margaret Mead. “I don’t approve of the dogmatism of either.”

While declaring that Darwin’s theory frequently is presented as an unquestionable absolute despite many loopholes and contradictions in it, Dr. Hubbard said, “It’s not Christians who have caused the problem, but the scientific writing that goes beyond real knowledge.”
CREATIONISTS SPEAK OUT

The correspondence to *Nature* put the issue right on the line. A. T. J. Hayward said in a letter printed Dec. 29, 1972, “The majority of biologists accept the prevailing views uncritically — just as a great many competent Russian biologists were once brainwashed into accepting Lysenko’s quackery. Others have thought for themselves and come to realize the flaws in contemporary Darwinism. But for them to speak out would be to invite ridicule, and probably ruin their careers. Can you blame them for keeping silent?” Hayward also told *Nature* that not all Bible-believers think the Earth was created in six literal days a few thousand years ago. “Such fundamentalists are right at one end of a long spectrum of belief,” he said. “Others — probably a much larger number — accept the facts of geology, but think that the idea of many successive creative acts over the ages fits those facts better than the theory of natural evolution.”

Public interest grew as the issue became hotter. Creationists were suddenly in demand for speaking engagements, especially to academic groups. Duane T. Gish, of the Institute for Creation Research in San Diego, addressed the National Association of Biology Teachers in San Francisco. He gave seminars on college campuses. A class entitled “Creation: A Scientific Alternative” was begun in the free university on the University of California’s Irvine campus. Biologists at Loma Linda University gave lectures at the University of California’s Riverside campus and at local public schools. Efforts were begun in Washington, D.C. to get government funding for research on creation. California’s newspapers reflected the interest. Papers such as the *Los Angeles Times* and the *Santa Ana Register* carried two and three page spreads on the issue.

Other states were also looking into the creation issue. In Michigan a bill was passed by the State Legislature which decreed that public school children should be exposed to various religious and evolutionary theories. The Legislature passed the measure Dec. 12, 1972, but the bill died when the Senate failed to act on it before the year was out. Three similar bills have been introduced since then.

The Texas Education Association had ruled that life science textbooks must contain a statement on an introductory page that any material on evolution included in such books is presented as theory rather than fact.

The city school board of Columbus, Ohio, passed a resolution which called for the proper treatment of the creation view of origins along with evolution. The State of Tennessee has ruled the same thing.
STATE BOARD HEARING

In November, 1972, the California State Board of Education held a public hearing on the matter. Testimony at the hearing was about evenly divided between evolutionists and creationists.

Ariel A. Roth of the Geoscience Research Institute and Professor of Biology at Loma Linda University told the Board, “Good science is an open-ended search for truth with reevaluation as new information comes forth. To say that one will exclude the creation model because it can be associated with religion is unnecessarily restrictive and imposes a bias that should be avoided.”

Loma Linda University’s Department of Biology chairman, Leonard R. Brand, was also at the Sacramento hearing. During Brand’s five minutes before the Board he said, “When we deal with the past history of life, creation and evolution are on the same philosophical basis, since the farther we go back in time, the less satisfactory is the evidence for any theory of origins. Since this is so, how can the state presume to dictate which theory will be taught in the public schools?”

Members on the Board of Education were split over the issue. Board Vice-Chairman Ford again led the fight for creation. When the Board met to vote on the issue in December, the proposition to include creation theory into the textbooks missed by one vote. Nature called it a remarkable, if partial, victory for the creationists, because the Board did adopt a requirement that the textbooks should qualify all statements about evolution, relegating them to theory and not fact.

A Board committee was created to make revisions in the books which had been formally adopted by the Board without any mention of creation. These revisions downgraded evolution. The matter of origins was considered to be beyond the scope of these science textbooks. Later the Board did approve unanimously a resolution stating that the philosophy of origins should be dealt with in social science textbooks, causing some observers to say another uproar would develop if this were tried.

So the creation theory continues to be considered. No matter what happens it will continue to be discussed, whether or not it is included in science textbooks.

Bonnie L. Dwyer
NEWS AND COMMENTS

BIBLE-SCIENCE ASSOCIATION MEETS IN MILWAUKEE

The first large, public creationist convention ever held in the United States convened in the Holiday Inn Central in Milwaukee, Wisconsin, October 10-13, 1972. The object of this gathering was to strengthen belief in the Genesis account of creation through scientific disciplines.

The convention was sponsored by the East Wisconsin Chapter of the Bible-Science Association (Lutheran-Missouri Synod). This chapter consists of a group of believers in special creation from many different scientific organizations, schools and churches. Through the careful planning of Paul Freeman, Andrews University alumnus chemist, and that of his fellow officers, and with the enthusiastic and complete backing of Rev. Walter Lang, executive director of the Bible-Science Association, a most interesting group of over 400 Protestants, Catholics and Jews came together and participated freely in lively, open discussion.


Various topics included thermodynamics, the Genesis flood, the virgin birth, scientific accuracy of the Scriptures, origin of human speech, chromosome and mutation tests of ethnic history, need for the teaching of creation in public schools, history of evolution, the scientific method, our degenerating universe, the geologic column, radioactive dating, creation — a challenge for youth, early man, the Genesis kinds in our modern world, mutations, and the fossil evidence.

A. G. Tilney, who came from England for the convention, is the honorable secretary of the British Evolution Protest Movement which has chapters around the world.

An amazing amount of creationist literature was displayed at this convention and was purchased quite readily. Among the books selected and displayed by the Bible-Science Association were Harold W. Clark’s Wonders of Creation and Fossils, Flood, and Fire; and Frank L. Marsh’s Life, Man, and Time and Evolution or Special Creation?

Before the convention each speaker prepared a 20-page essay on his assigned topic, then at the convention presented a broadened abstract of
this material. Each presentation was followed by a lively discussion period well-managed by Reverend Lang. The seventeen complete essays were published in a 96-page brochure entitled *A Challenge to Education* and furnished to each registrant at the convention. This brochure is available at $5 each from the Bible-Science Association, Inc., Box 1016, Caldwell, Idaho 83605.

A changing attitude toward the doctrine of special creation was manifested in a favorable session between scientists and representatives of the press, and likewise in the friendly and objective accounts of these reporters in the local papers.

A unique feature of the gathering was the repeated sessions of scientists with lawyers who were arming themselves with creationist information for forthcoming court cases. More and more, parents with children in public schools are preparing to sue their states because only the viewpoint of evolution is taught. All such activity serves as an indicator of the rapidly widening interest in special creation across our country.

Frank L. Marsh
NEWS AND COMMENTS

FLOOD MODELS STUDIED

The Bible-Science Subcommittee of the Biblical Research Committee of the General Conference of Seventh-day Adventists met a year ago to begin the development of an adequate flood model. Such a model proposes to correlate the Biblical description of the flood with geological and paleontological evidence.

Topics presented included a reevaluation of the flood-related information found in the Bible and in the writings of Ellen G. White. Harold G. Coffin of the Geoscience Research Institute presented the available evidence and brought it to bear upon the geological and biological problems. He quoted from Ellen G. White, “Relics found in the earth do give evidence of conditions differing in many respects from the present; but the time when these conditions existed can be learned only from the Inspired Record. In the history of the Flood, inspiration has explained that which geology alone could never fathom.” (White EG. 1958. The story of patriarchs and prophets. Mountain View, CA: Pacific Press Publishing Assn., p 112). Dr. Coffin related that in his own experience an understanding of the Genesis flood had enhanced his ability to understand the “secrets of the past.”

Ariel A. Roth, chairman of the Subcommittee, presented several possible earth models as they could be related to a worldwide flood. Included were considerations of a static-continent model, an expanding earth model and continental drift. None of these models a priori mitigated against a universal flood, and because of the current uncertainty in earth modeling, no model was considered preferable over others. The interesting model of an expanding earth caught the imagination of several present and seemed to fit well with some of the current evidence. Whichever model one chooses, the distribution of continental sediments can suggest a flood model that includes most of the geological column.

In his presentation based on extensive data, Lester Harris, then chairman of the Department of Biology, Columbia Union College, associated a large part of orogenic activity, volcanism, and glaciation with the complex interdigitated events during and following the flood. Recognition of the temporal relationships of these events plays an important part in developing an accurate flood model.
Another Geoscience Research Institute member, Harold E. James, Jr., acquainted the group with some of the sedimentology of flysch deposits, which are thick deposits consisting of sequential thin layers of fine sediment. Parts of these deposits display clear evidences of very rapid sediment accumulation during high energy conditions. The widespread distribution of these deposits in the geological record makes it important that we better understand the forces and circumstances necessary for their formation so that they can be correctly related to a flood model.

Some interesting observations from paleobotany as they relate to a flood model were presented by Arthur V. Chadwick, Assistant Professor of Biology, Loma Linda University. Important considerations were the presence of algae in the Precambrian; the sudden appearance of almost all plant types in the Devonian, with the notable exception of angiosperms; the massive coal deposits of the Carboniferous consisting mostly of extinct plant types; the sudden appearance of the angiosperms as a mature flora in the Cretaceous. These events which generally favor a catastrophic model require some additional development and refinement regarding causes. Dr. Chadwick also presented a report on some recent research being done in palynology and paleobotany in the laboratories at Loma Linda University.

Preliminary data on the distribution of trilobites was presented by Conrad D. Clausen, Assistant Professor of Biology, Loma Linda University. This distribution matches an ecological interpretation of the fossil record as well as, or better than, an evolutionary explanation.

Dr. Roth presented some preliminary results of his survey of clastic dikes and the implications of these findings on classical geochronological interpretations of earth history. He pointed out that clastic dikes, which are cases of softer sediment being intruded from below into cracks in overlying hardened sediments, pose constraints on a long chronology model, and support a short chronology.

By postulating greater atmospheric pressure, a warmer and more uniform temperature distribution, stronger magnetic field, and a smaller radiocarbon production rate, Ray Hefferlin, of the Physics Department at Southern Missionary College, introduced a flood model that accounts for a pre-flood life environment differing considerably from that of the present.

At a subsequent meeting of this Subcommittee last May, further consideration was given to details of a flood model. Matters dealing with Biblical interpretation were presented by Gerhard F. Hasel, Associate Professor of Old Testament and Biblical Theology, Andrews University.
Leonard R. Brand, chairman of the Biology Department of Loma Linda University, discussed the philosophical rationale in an approach to a flood model, and Dr. Coffin presented data relating the ecological distribution of living foraminifera to their relative location in parts of the fossil record.

Much interest has been engendered by the work of this committee. It is apparent that much more work remains to be done.

Arthur V. Chadwick
THE EMERGENCE OF MAN SERIES. Vol. II: THE MISSING LINK.

Reviewed by Edward N. Lugenbeal, Geoscience Research Institute

The Missing Link is volume two of Time-Life’s new series, The Emergence of Man. The title is the kind that has long been associated with flights of science fiction; yet this is a book that purports to be reporting sober science fact. Implicit in the title is the claim that the Missing Link has in fact been found; that the Australopithecines (used in the widest possible sense of the term) are intermediate forms linking man and ape. This may seem an audacious claim. But it can’t be dismissed as simply another example of sensationalism in scientific popularizations. Actually, the cool confidence of the title simply reflects the consensus opinion of today’s paleoanthropologists.

In a way, what is disturbing about this book for creationists is its very excellence. Because the book is so attractive, it is all the more effective as an ambassador of the evolutionary view of human origins. Even the creationist critic must grant grudging kudos to Time-Life for producing a book with many laudable qualities:

1. The book is attractive. The visual impact of the book is probably more important than what is said in it, since more people will look at the pictures and illustrations than will read the text. Particularly impressive are the reconstructions of Australopithecines superimposed on actual photographs of African landscapes. The result is striking realism. It is interesting to note how the pendulum has shifted in reconstructions of fossil hominids. The Australopithecines of this volume look far more man-like than the Neanderthals of a generation ago!

2. It is reasonably accurate and current. Fossils found as recently as 1971 are included and one does not find gross errors or misrepresentations. Certainly the scientific credentials of the consulting editors, Sherwood Washburn of the University of
California at Berkeley and Bernard Campbell of the University of California at Los Angeles, are impeccable.

3. It is balanced. Devoting an entire volume to the Australopithecines gives Time-Life the chance to introduce more of the various lines of evidence that are used by paleoanthropologists. Thus the book deals with the artifactual evidence and inferences derived from the study of living primates as well as the fossil evidence. It devotes considerable space to behavioral as well as physical evolution. (There is an entire chapter on the social life of the Australopithecines.) And a chapter is also devoted to recent efforts to develop “objective” standardized means of calculating how closely related various species are and at the same time calibrate how rapidly evolutionary changes have occurred by measuring differences in the DNA or the differences in the blood protein molecules of species.

4. It is relatively honest in acknowledging the limited nature of the direct evidence paleoanthropology works with and the welter of conflicting interpretations present in the discipline. One of the most valuable features of this book is an inventory complete through 1971 of all Australopithecine finds. Although over 1400 specimens have been found, most are only scraps of bone or isolated teeth. No complete skeleton of one individual exists. The final picture essay of the book is also an inspired exercise in honesty. It features photographs of 15 paleoanthropologists together with brief statements by each expert. It is hard to find any two statements that agree!

For the creationist the most important sections of this volume are those dealing with the “hard evidence” — the fossil bones, the artifacts, the geological strata. Those portions describing the behavior of the Australopithecines and how they evolved from ape to hominid are of lesser value because they are almost purely speculative reconstructions based on current anthropological theory and inferences drawn from the behavior of living primates or other animals with supposedly similar ecological relationships. Even if one accepts the validity of what Washburn calls the “evolution game,” it is clear that these tales are still primarily science fiction. The problem is that they are based mainly on inferences drawn from indirect sources of information whose relevance is suspect.
or are based on a body of evolutionary theory the creationist may not accept. One can be reasonably confident that 10 years from now new and quite different stories will be told.

The creationist who does not feel constrained to play the evolution game in the same manner must still come to terms with the direct, historical evidence: the fossils, the thousands of artifacts, other types of archeological evidence, and the geological context. This evidence raises certain questions:

1) Are current interpretations of the Australopithecines as erect bipeds with closer affinities morphologically to man than apes correct?

2) What is the meaning of the variability present in the Australopithecine fossils? Some experts identify as many as 4 distinct forms in Africa, and a few put the differences at the generic level.

3) Is the association of Australopithecine fossils and artifacts valid? This question is particularly critical if one assumes that the presence of artifact traditions, as opposed to simple opportunistic tool-use, is indicative of the presence of distinctly human cultural capabilities.

4) Also vital is the geological question concerning the relative age of these fossils.

Creationists could wish that Time-Life would give “equal time” to creationistic interpretations of origins in books of this sort that reach such a large public and are widely used as supplementary sources in schools. Such a wish could conceivably come true someday, particularly if current efforts in the textbook realm are successful. Time-Life is a commercial enterprise, of course. If there is a sufficient demand the day could come when one of the consulting editors in a series of this sort would be a creationist. It could come, that is, if creationists produce a demand; if there is a supply of creationistic paleoanthropologists with creditable scientific credentials; and if persuasive alternative interpretations are at hand.

Reviewed by Harold G. Coffin, Geoscience Research Institute

This paperback is a surprising little book. Surprising because one does not usually expect to find a treatment of the book of Genesis from so conservative a standpoint. The author’s thesis is that the earth, the creation story and other events related in Genesis are clearly part of the flow of Biblical history. No volume that I have read shows as clearly the opinion of other Bible authors and Jesus Himself toward the historicity of Genesis. He who denies that the creation account is a propositional statement of historical events is out of harmony with the rest of the Bible.

Schaeffer is a theologian whose writing has the style and to some degree the vocabulary of theology, but as a scientist I found the book to be stimulating and inspiring. There is an atmosphere of reverence and devotion to God as Creator that uplifts the reader. In addition, the insights and further understandings of these first events in earth history are valuable, especially to those who have occasion to teach or speak on the subject of origins.

This book will not convince the skeptic regarding the accuracy of the Genesis account, but to the individual who values the Bible as an authoritative source of information, this book will provide interesting elucidations of the account of origins as given in Genesis.

There are a few paragraphs where I find it necessary to take exception with the author. Most of these are of minor consequence. There is one, however, of rather serious import. On page 57, Schaeffer discusses the meaning of the word “day.” Although no dogmatic position is taken, he allows for a non-literal creation day. He has taken so literal an interpretation throughout most of the rest of his book, that this deviation comes unexpected. He does not employ the traditional strong arguments for literal creation days. To anyone who bases his observance of the Sabbath on a literal interpretation of the creation week, this is a serious variation in interpretation. However, only one paragraph is devoted to
this topic. Despite this fault, *Genesis in Space and Time* is valuable reading for anyone searching for greater understanding of the first book of the Bible.
GENERAL SCIENCE NOTES

UNUSUAL FOSSILS FROM A MOUNTAINTOP*

Harold G. Coffin
Geoscience Research Institute

What are sea bottom animals doing 8000 ft. high in the mountains of British Columbia, Canada? When the sheets of rock are split apart, outlines of unusual animals are seen on the surfaces of the slabs. The imprints are so clear that even the soft parts are visible, like small x-ray films.

The array of animals that has come to light high on the mountains in Yoho National Park, eastern British Columbia, are strange. A marine biologist, if confronted with these animals in a modern ocean, would recognize almost nothing, many creatures would be unfamiliar. There in the distance would be an animal with long arms sporting large pinchers. But the body and mouth are very different from that of a crab. Anomalocaris could be the largest Cambrian animal — nearly a yard long. And here is a nondescript creature with worm-like legs and sticks on its back. Whoever first described it thought it so bizarre that he named it Hallucigenia! Another animal attracts attention by its wineglass shape. Various crab and shrimp-like creatures (but significantly different from modern crabs and shrimp) are swimming around. Further observation, and exploration in the muddy bottom reveal many others unfamiliar creatures.

The rocks in which these creatures are buried are considered Middle Cambrian, 540,000,000 years ago according to the evolutionary time scale. Early in the 20th century, Dr. Charles Walcott discovered the main quarry while riding a horse over the mountain pass. Major excavations were carried on from 1909 to 1914, and again in 1966 and 1967. More recently as the uniqueness of these fossils has become better understood, more exploration and digging has been done.

Dr. Walcott placed the animals into modern classification units. Consequently their strangeness was overlooked until recently when restudy of the Burgess Shale fossils has surprised researchers by their unusual body types. Not only are they new species but some of them even are new phyla. Others are new classes and orders. Major new classifications have had to be created to accommodate them.

*Updated October 1999
According to the theory of evolution, living organisms have changed gradually over millions of years. Finding such unusual sea animals in the Cambrian might appear to support this theory. But there are two major problems. According to the theory of evolution, life started out with one or only a few simple forms. Living organisms that were buried and preserved as fossils back in the Middle Cambrian should be a few simple types if the theory of evolution is correct. That is not what paleontologists are finding. Although there are more species of animals and plants living today, Cambrian fossils, including those in Burgess Shale, represent a greater variety of basic body forms. We thus have to conclude that in the prediction, based on the theory of Evolution, that life started out with one or a few simple forms is not born out by the fossils of the Burgess Shale. Evolution has not been increasing the major categories of organisms. They were more numerous in the past than now.

Secondly, these dwellers in the Cambrian seas were anything but simple. They are just as complex as their nearest modern relatives if they have any modern relatives. Those that are new cannot be considered simple any more than modern crabs, worms, starfish, etc. can be called simple. This also is contrary to the predictions from the theory of evolution. These animals from the Middle Cambrian should be more simple than modern sea animals but they are not. Where are the simple ancestors that should have led up to the complexity of modern organisms? They are not found in the Burgess Shale. Nor can they be found in rocks considered older than the Burgess shale.

Modern sea bottom animals burrow through the mud, or reside in a hole in the bottom sediments. This movement and digging in the bottom sand and mud causes disturbance to the sediments (bioturbation). It is a common feature of modern ocean bottom sediments and also can be seen in many sediments deposited in the past that have now hardened to rock. The Burgess Shale contains no bioturbation. Apparently the organisms were dead when they were buried. And the burial must have been rapid enough to prevent decay. The usual explanation for this situation is that the animals fell (were washed) into a basin of water low in oxygen where they quickly died and were preserved without decay. Recent research suggests that this is not a satisfactory answer. Note this quotation: “Soft-bodied organisms must be protected from the attention of scavengers; this usually comes about through a lack of oxygen or by rapid burial. Although anaerobic [devoid of oxygen] conditions may eliminate scavengers, they do not prevent decay. Indeed, anaerobic decay is the norm, and can consume soft tissues in a few weeks” (Allison 1998).
Organisms similar to the Burgess Shale animals, are being found in other parts of the world. Thus these fossils in British Columbia are not an isolated situation but are part of a cosmopolitan array of great variety and complexity. The picture emerging clearly fits better into a Creation/Catastrophism model than into an Evolution/Uniformitarian model.

Looking down from the Walcott Quarry to Emerald Lake over 3000 feet below.

Snow bank in the Walcott Quarry high on the mountains of British Columbia, Canada.

Trilobites are numerous from the Burgess Shale of Mt. Stephen.

Ottoia, a priapulid worm, one of many interesting sea bottom creatures found in this location.
EDITORIAL

SCIENCE AGAINST GOD?

Many scientists sincerely feel that there is a serious conflict between scientific methodology involving ideas of natural cause and effect, repeatability and predictability, and the concept of a God who can overrule in nature and thus negate these ideas. This conflict is considered so serious that at times the statement is made that a scientist cannot pursue serious study in his discipline while believing in a God who can interfere with the course of nature. It is felt that the consistency and predictability of science disappear in the presence of an unpredictable God. This, no doubt, is part of the reason why some scientists reject the concept of God, while others define Him as an impersonal organizing force or entity. We would like to propose that this apparent conflict has a reasonable solution.

Let us suppose, as we believe, that God established the laws of nature by which science analyzes and operates. Does this necessitate a conflict between God and science? It would seem not. The conflict seems a little more probable when one considers miracles, such as those described in the Bible, where it appears that God interferes with the normal course of nature. These do not exclude scientific analysis as long as some of the laws we understand are still operating. To state it differently: even when something we do not fully comprehend takes place, the event should be amenable to some scientific analysis, as long as one of the laws of nature is still in operation and provided the tools of science are sufficiently adequate.

In addition to this, some philosophers, including Alfred North Whitehead (1950, p 8-19), have pointed out that science developed in the Western world in part because of the Judeo-Christian concept of a rational and reasonable God. Science did not develop, or developed very poorly, in other civilizations, because the concepts of capricious gods precluded the development of science. The very stable civilizations, such as those of India and China, certainly provided the environment for intellectual pursuits; nevertheless science advanced in the Western world, probably because of the idea of a rational God in conjunction with the disciplined concepts of the Judeo-Christian tradition. Emphasizing this, Whitehead (1950, p 19) states: “My explanation is that the faith in the possibility of science, generated antecedently to the development of modern scientific theory, is
an unconscious derivative from medieval theology.” Thus one can conclude that there is a conflict between science and a capricious God, but there is good agreement between science and a God who is the author of the laws of science. The two kinds of gods must not be confused.

Another accusation leveled by some scientists against those believing in a God who is active in the affairs of nature is that whenever one runs into an unsolved problem, he only has to invoke the power of God to answer the problem. However, that a God can act at a level beyond man’s understanding does not seem to be a sound reason to reject Him. Also, the same type of criticism can be leveled at a non-theistic scientific approach which relies on time to answer improbable events. This is implied in the statement by the noted physiologist George Wald (1954): “Given so much time, the ‘impossible’ becomes possible, the possible probable, and the probable virtually certain. One has only to wait: time itself performs the miracles.”

A problem has developed in modern evolutionary theory due to reliance on time for improbable events. Given enough time, anything could happen; hence no matter what has been interpreted as the past history for life, it could have occurred. And since anything could have occurred, there is no way to show that it did not. In particular, evolution has models for advancing, for regressing, for jumping gaps, for annihilation, etc. For all types of data there is a model to explain it. The problem has been well stated by two evolutionary biologists, Birch & Ehrlich (1967): “Our theory of evolution has become . . . one which cannot be refuted by any possible observations. Any conceivable observation can be fitted into it. It is thus ‘outside of empirical science’ but not necessarily false. No one can think of ways in which to test it.”

Reliance on time for improbable events has also run into some difficulty when quantitatively evaluated. For instance, Eden (1967), in the book Mathematical Challenges to the Neo-Darwinian Interpretation of Evolution, has calculated that in 5 billion years (an assumed age of the Earth) one would expect to get only 2 genes in the right order in the common bacterium Escherichia coli if the organism were spread over the surface of the earth in a layer 2 centimeters thick. This does not include time for evolving the genes, a much more complex process, or for putting other genes in order; and one also wonders where there would be enough space for several hundred thousand other organisms which would also be evolving. This study and a number of others (Hull 1960; Eden 1967;
Schützenberger 1967; Salisbury 1969 and 1971, etc.) strongly indicate that the amount of time that the geological time scale allows is totally inadequate for the improbable events required by modern evolutionary theory.

It would seem that the concept of arriving at truth through science in combination with a rational God is most reasonable. This is preferable to relegating all questions to a capricious and unpredictable God, since there appears to be a conflict between that type of a God and the degree of orderliness one sees in nature. This also seems preferable to trying to answer all questions through a scientific process which excludes God. Not only does this appear arbitrary, but as pointed out above, the godless system is quite inadequate to explain many questions, especially those of origins. One could argue that since God can be used to answer all questions, to employ Him weakens one’s objectivity. But objectivity points to a God and the argument loses further significance in view of the type of God described in the Bible, a reasonable and rational God who is usually predictable, yet who is powerful enough to answer the problems which science by itself cannot answer. This appears to be the best approach to truth.

Ariel A. Roth

LITERATURE CITED


EDITOR’S NOTE: Readers are invited and urged to react to the articles in this journal. We were surprised that our first issue did not induce the propulsion of a few darts or brickbats in our direction. We have facetiously considered making a few errors on purpose to stimulate discussion, but we are confident that this will not be necessary. We do not at all intend that this column be a sustained echo of compliments, but we had no choice this time. We are sufficiently insecure to publish the following. We hope for more serious criticisms next time. Please address contributions to: ORIGINS, Geoscience Research Institute, 11060 Campus St., Loma Linda, California 92350 USA.

Origins fulfils a need

Last evening I read the first issue of Origins. I would express enthusiastic response to the entire effort and more particularly the two articles, one by Dr. Neufeld entitled “Towards the Development of a General Theory of Creation” which I found profoundly satisfying to me, and for Dr. Clausen’s article “Rationalism, Empiricism and Christianism as Philosophical Systems for Arriving at Truth.”

The whole endeavor smacks of careful thought and I want to commend you men for doing it. It’s about time something like this is produced. Please keep me on the mailing list or subscription list, whichever. I don’t want to miss an issue.

William Loveless
Pastor, University Church
Loma Linda, California

Congratulations! You have done an excellent job. It is high time that something of this kind was started. I am very happy to see it.

I am particularly pleased with the general attitude of the articles toward creation problems. There seems to be an honest effort to orient scientific discoveries with a Biblical viewpoint. It looks as if Geoscience is taking a new lease on life.

Please give my sincere respects to all of your men who have been so active in working on some of the perplexing questions. If science had taken this positive approach for the past 150 years instead of following the impossible doctrine of uniformitarianism, we might have had a real creationist science by now.

Harold W. Clark
Life Origins Foundation, Inc.
Calistoga, California
Congratulations! I just received the first number of Volume 1 of your magazine, *Origins*. I’ve been waiting a long time for this and I’m really enthusiastic. When I received my mail this morning, *Origins* was there, and even though I have not had an opportunity to read all the articles, I have read a number of them. If the rest are equivalent to the sampling which I have done, this is one of the greatest contributions that ever could be made to creationism.

Samuel V. Gramlich, Jr.
*Educational Secretary,*
*Nebraska Conference*
*Lincoln, Nebraska*

I applaud the new publication ORIGINS. I would like to be kept on the mailing list and if there is a subscription price, kindly inform me. Although I have spent the last seven years as dean, I have managed to continue to teach the philosophy course — it helps me keep in touch. Best wishes to you in this new venture.

Neil W. Rowland
*Dean, Union College*
*Lincoln, Nebraska*

**Re: Chadwick and Brand: Fossil tree orientation in the Chinle formation (Origins 1:22-28).**

I would expect many logs to settle in positions contrary to the main line of flow. After all, the water has to stop flowing sometime, and in any location it would seem to me that logs showing both general flow and settling or stagnation period would be found.

Walter Lammerts
*Creation Research Society*
*Freedom, California*
AN EVALUATION OF THE USE OF GROWTH LINES IN GEOCHRONOMETRY, GEOPHYSICS, AND PALEOECOLOGY

Conrad D. Clausen
Assistant Professor of Biology
Loma Linda University

Growth lines found in several invertebrates show promise of serving as a basis for many avenues of investigation. Their value as an independent method for geochronometry is presently questioned, while other methods of using them are being developed.

INTRODUCTION

Periodic growth structures (lines, bands, and rings) are preserved in the skeletons or hard parts of many organisms. Although the best known example is the annual tree rings (not further considered in this paper), periodic growth structures have also been long observed and studied in other organisms (Orton 1923, 1926; Ma 1937; Davenport 1938; Stevenson & Dickie 1954; Sakai 1960). Most current interest, however, was initiated by Wells (1963) when he described “daily” growth lines in living and fossil corals and used these in conjunction with annual growth structures in proposing the growth-line method of “absolute” age-dating (geochronometry). Shortly thereafter, Wells’ data was used in studies on the origin of the earth-moon system and the rotational history of the earth (MacDonald 1964; Runcorn 1964). Most recent papers (including Newton 1969; Runcorn 1970; Lamar et al. 1970; Pannella 1972; Scrutton & Hipkin 1973) have used growth lines in this way, rather than as a geochronometric technique. A third application of growth lines, antedating Wells’ (1963) paper, is in life history, ecology, and paleoecology studies (e.g., Orton 1926; Ma 1937, 1938; Davenport 1938). This application has been made more recently by Rhoads & Pannella (1970), Farrow (1971, 1972), and Tevesz (1972).

Although all three applications of growth lines have philosophical significance, it was their use in geochronometry that caused greatest perplexity to those believing in the Biblical creation account and a short
chronology. According to Wells (1963) the importance of the growth-line method was its apparent independence from radiometric age-dating methods and its capability of directly dating fossils. (Radiometric methods for older samples can usually date only certain rocks surrounding the fossils). If this clock independently gave ages similar to the radiometric ages, the confidence in these ages would be increased. Although recent research does not support its use as an independent geochronometric method, preliminary results were in partial agreement with radiometric ages.

In this paper, I will first describe the growth-line method, then discuss problems in its application. Finally, consideration will be given to geophysical and paleoecological implications of periodic growth structures that might have positive use in creation theory and in construction of a flood model.

GROWTH-LINE METHOD OF GEOCHRONOMETRY

To understand the method, the periodic growth structures and a phenomenon called tidal friction need explanation. Periodic growth structures are produced by a living organism and are a record of cyclic changes that occur in growth rate and/or density and composition of growth material. The growth structures used in geochronometry are preserved in coral skeletons, clam and brachiopod shells, fish otoliths (earbones), and stromatolites (algae). They are observed in both living and fossil forms.

The simplest component of these periodic growth structures consists of a dark band, high in organic content, alternating with a light band of mainly inorganic material, usually CaCO$_3$. This simplest component will here be considered as a circadian (approximately daily) line, although often two or more of these single components are produced each day (Barker 1964). The circadian line is usually from 5 to 60 microns wide. Other growth structures or patterns are constructed by cyclic fluctuations in the width, density, or composition of the circadian lines. Fortnightly, monthly, and annual patterns occur this way. These patterns are correlated with, and are presumably a response of, the organism to various physical environmental factors such as the light-dark cycle, tidal fluctuations, temperature, and sedimentation.

Although sophisticated mathematics is required for a complete treatment of tidal friction and its effects, the basic concept can be understood intuitively. As the earth rotates, the moon, through gravitational attraction,
continuously raises tidal bulges on the earth. Due to tidal friction, the bulges lag in time and are carried forward by the rotation of the earth, causing a misalignment of the tidal bulges with respect to the line of centers of moon and earth. (Tidal friction is mainly friction in the tidal currents between water molecules and between the water and the coastline or ocean bottom.) This misalignment produces a torque between the earth and moon causing a deceleration of the earth’s rotation and an increase in the moon’s angular momentum. The result is a slight increase in day length and a slight decrease in the number of days per month and days per year. (See Goldreich 1972 for a detailed but non-mathematical treatment of the effects of tidal friction.)

The increase in day length is estimated at two thousandths of a second per century (2 msec/century). This is based on observed perturbations in the orbits of artificial satellites and from comparing reported with expected times of ancient eclipses or other astronomical events (Newton 1969; Scrutton & Hipkin 1973). Although the magnitude of change seems insignificant and undetectable, it would be significant in two instances. First, since the increase in day length is additive, the cumulative time shift would be significant even in historical time. For example, the time shift would be 36 seconds in a century, one hour in a millennium, and about 6 hours in 2500 years. An eclipse 2500 years ago would then be reported as occurring 6 hours earlier than expected from present observations and calculations. This type of information was used originally to establish the 2 msec/century value.

The second instance where the change in day length would be significant occurs when the geologic (radiometric) time scale is accepted. One hundred million years ago the day would have been 0.55 hours (2 msec/century × 1,000,000 centuries = 2,000,000 msec = 0.55 hours) shorter than the present day, giving 374 days/year (8766 hours/day ÷ 23.45 hours/day = 374 days/year). At 600 million years (the oldest radioactive dated material where abundant well-defined fossils occur), the day would have been 3.3 hours shorter, giving 424 days/year. It is on this basis that the growth-line method was proposed.

Wells (1963) suggested that if both daily and yearly growth structures could be identified in fossils, the fossil’s age could be determined by counting the number of daily bands per yearly band. Thus, from our previous example, a fossil containing 374 daily bands per yearly band would be 100 million years old, and one containing 424 daily bands per
yearly band would be 600 million years old. Other ages could be obtained in the same way from other daily bands per yearly band values.

Using fossil coral specimens from the Devonian and Pennsylvanian geologic strata, Wells (1963) counted respectively 385 to 410 and 385 to 390 daily bands per yearly band. From the radiometric dates assigned these strata, the expected number of daily bands would have been 399 and 392 respectively. Approximately 360 daily bands per yearly band were counted in one species of living West Indian coral. Although interesting, this data is inconclusive because of the small number of specimens used and the large range in values.

Since this initial paper, most work has been done on clams and results are expressed in terms of changes in days per month rather than days per year, since complete monthly sequences are more commonly preserved in the fossil record. This data is summarized by Pannella (1972). While some of the growth-line ages agree with the radiometric ages, there are
two serious anomalies in the present data. One of these is apparent in Figure 1 where the slope of the computer-fitted curve often deviates from the predicted trend. A more striking, but less well substantiated, anomaly based on Precambrian stromatolite data (Pannella 1972) suggests a great reduction of the 2 msec/century value in Archeozoic time if the radiometric ages are correct. These anomalies indicate that either the deceleration of the earth’s rotation rate has not always been constant (i.e., it has deviated from 2 msec/century), the radioactive dates are not correct, or insufficient data has been collected. Pannella maintains that while more data is necessary to establish the exact shape of the curve, the present data do strongly support a non-uniform deceleration rate. Implicitly, the radiometric dates are accepted as correct and the growth lines are not used as a geochronometric technique.

**PROBLEMS WITH THE GROWTH-LINE METHOD**

Already alluded to, the most serious problem in applying the growth-line method concerns the magnitude and constancy of the deceleration of the earth’s rotation rate. The ancient astronomical records on which the historical deceleration values (2 msec/century) are based are not easily interpreted. Some are definitely not reliable. Newton (1969) discusses this problem at some length. The evidence does indicate, though, that the deceleration of the earth’s rotation rate has not been constant even within relatively recent historic time. Newton states that “ancient astronomical data show with high confidence that the amount of tidal friction ten centuries ago was twice what it is now.” No method exists for independently (i.e., independent from growth lines) determining the magnitude of tidal friction or deceleration prior to the ancient astronomical observations. Geophysicists are now using the growth-line data to obtain prehistoric deceleration rates (Newton 1969; Runcorn 1970). However, if the growth-line data is used to determine deceleration values, it cannot be used as an independent geochronometric method as this would involve circular reasoning. It could be used in geochronometry by calibration with radiometric dates, but then the independence between the two methods is lost and the value of the method greatly reduced.

The use of daily bands per monthly band in most of the recent work poses a second problem. While the rate of revolution of the earth around the sun is assumed to have remained constant, the rate of revolution of the moon around the earth has probably not remained constant. Exactly
how it has changed is not known. This introduces a second variable and the possibility of confusion of variables.

Presently insufficient data is available on growth lines in living organisms to properly evaluate their meaning in fossil species. It is not always simple to determine of what a daily, monthly, or yearly band consists. Subdaily bands often occur. These may be confused with daily bands. Apparently lines are at times missing; thus some researchers urge the use of maximum line counts rather than average counts (Clark 1968; Mazzullo 1971). However, this has problems since in one recent species anywhere from 283 to 425 circadian bands per yearly band were found (Farrow 1971). Maximum counts would give high values. If large ranges (283 to 425) in values are typical, large sample sizes (many fossils) would be necessary to get sufficiently good resolution for the method to be meaningful (i.e., the inherent variability or range in values within a single species is of the same magnitude as the range expected from changes in deceleration rate in many hundred million years). In fact, sufficiently well-preserved fossils are rare and subjective bias can be introduced in interpreting unclear growth patterns. Objective methods of identifying and counting these bands are not now available. Environmental factors change the nature of the lines in ways that are far from being completely understood. Some of these problems could disappear with future work, others seem insurmountable.

**ALTERNATIVE INTERPRETATIONS OF GROWTH-LINE DATA**

The use of growth lines in geochronometry does not seem feasible and is not advanced as much in recent papers on the subject (Pannella 1972; Scrutton & Hipkin 1973). However, other types of information that they might provide could be useful. The available data on growth lines does need to be interpreted in terms of a flood model, and they may be useful in constructing such. One possible explanation of an increase in number of circadian increments per month or year towards the bottom of the geologic column could be related to the depth at which the preflood living specimen occurred. Although depth is known to have an effect on the nature of the growth line in recent organisms (Rhoads and Pannella 1970), no present evidence is available on the relation between depth and number of lines. If valid, this explanation would fit with Clark’s ecological-zonation model (Clark 1967, p 76-80).

Another possible explanation would be a relatively rapid change in the earth’s rotation rate at about the time of the flood. Changes in the magnitude
of tidal friction are usually explained in terms of changes in the extent of shallow seas or extent of ice cover — particularly in the Antarctic (Goldreich 1972; Newton 1969). Rotation rate could also change by other means than tidal friction, e.g., changes in the moment of inertia could occur through accretion or through redistribution of the earth’s mass. It would be surprising if some such activities did not occur at or following the flood, given the violent nature of the event as recorded in inspired writings. While the present growth-line data is not easily interpreted in terms of this explanation, the anomalies that occur in the data do partially support it.

Another way the growth lines may be useful in the support or construction of a flood model is through their use in paleoecology. Growth lines are often sensitive indicators of environmental conditions. Present research in this area is mainly concerned with gathering sufficient data on growth lines in living organisms to allow interpretation of fossil ones. It is suggested that such information as water temperature, depth, and age and season of death may be contained in the growth-line patterns (Barker 1964; Rhoads & Pannella 1970). Clark (1968) suggests that by comparing the individual growth patterns within a fossil assemblage, the assemblage may be determined as a community with a catastrophic death (growth patterns have same endpoint), as a normal life span community (overlapping growth patterns), or no community, e.g., not in position of growth (no correlation between growth patterns). In a flood-model explanation of the geologic column, the first and third cases should have greatest prevalence.

CONCLUSIONS

Relatively little work has been done with these invertebrate growth lines. Their use in geochronometry, geophysics, or paleoecology is still very much in the initial state; therefore, caution should be used in saying just how they can or cannot be used. Present information does not support their use as an independent geochronometric method (Pannella 1972). They may be useful in developing geophysical theory (regarding movements of the earth and moon), although the precision and resolution of the method has not yet been sufficient for really significant contributions in this way either (Scrutton & Hipkin 1973). Further research is necessary to determine their potential as paleoecological indicators.
LITERATURE CITED


A R T I C L E S

THE FOUNTAINS OF THE GREAT DEEP

Gerhard F. Hasel
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The phrase “fountains of the great deep” as used in the Genesis flood account is both intriguing and significant. The author presents an analysis which gives insights into the original meaning of this expression.

Two passages in the Genesis flood story speak of “fountains (מַעֲיֵנוֹת) of the great deep.” The Hebrew term for “fountains” can be rendered into English either as “fountains”1 or “springs”2 of the “great deep” (Gen 7:11; 8:2). Some recent versions translate the expression “great deep” (תֵהוֹם רבָּה) with “a great abyss.”3 These English translations reflect the oldest translation made from the Old Testament (i.e., the Septuagint), which translated this Hebrew word into Greek with ἄβυσσος, the English equivalent of which is “abyss.” The question has arisen whether the phrase “fountains of the great deep” refers to subterranean water or to the water of oceans. Could it possibly refer to both subterranean water and oceans?4 These questions require careful investigation of the Hebrew terminology and the sentence structure with due consideration of comparative Semitic philology.

The term תֵהוֹם occurs in the Old Testament a total of 35 times of which 21 usages appear in the singular to which also the two passages in the Genesis flood story belong.5 It is noteworthy that this Hebrew word always appears without the article with the exception of two passages (Isa 63:16 [singular]; Psa 106:9 [plural]). תֵהוֹם occurs for the first time in the Old Testament in Genesis 1:2 and is normally translated with “deep.” It refers to the world-ocean, an undifferentiated, unorganized, and passive state of the watery mass.6 Although there are several additional usages of the term תֵהוֹם in the Pentateuch,7 let us consider its first usage in greater detail.

In Genesis 1:2 the word תֵהוֹם “deep,” is the world-ocean. It is used as an expression to indicate that the entire world was covered with water. This agrees with a specific statement in Psalm 104:6: “Thou didst cover it [the earth] with the deep [תֵהוֹם] as with a garment; the waters were standing above the mountains.” It is striking that the phrase “over the face
of the waters [māyim]” at the end of the second half of Genesis 1:2 corresponds and is used parallel to the concluding words of the first half of this verse, “upon the face of the deep.” This points clearly to the direction that in this verse the concepts of “deep” (tĕhôm) and “waters” (māyim) express the same idea.⁸

It seems appropriate at this point to digress for a moment and investigate the cognate Semitic term thm (plural thmt, dual thmtm) in Ugaritic literature from about 1400 B.C.⁹ There are a number of Ugaritic texts in which the term thm, “deep” is found parallel to the term ym, “sea.” There is the parallel expression of the “edge of the sea [yam] and...edge of the ocean [thm].”¹⁰ This text equates “sea” (waters) with “ocean” (thm = yam). The same identification between “water” or “sea” and “deep” is found in Genesis 1:2; Job 28:14; 38:16; Jonah 2:6; Proverbs 8:27, 28. In another Ugaritic text one finds the phrase “as a source of the rivers [nhrm]” in parallelism with the phrase “the channels of the deeps [thmtm].”¹¹ The context of this Ugaritic text indicates that the expression “the source of the rivers” refers to the waters that have their origin primarily from the rains which feed the rivers. The expression “the channels of the deeps” seems to refer to the upwelling of the waters from the earth. Another text from ancient Ugarit speaks of a 7-year drought “without dew, without showers, without the upsurgings of the deeps [thmtm].”¹² The “showers” are the waters from above, namely rain, and correspondingly “the upsurgings of the deeps” refer to the waters from below (thmnt), namely the waters that gush forth from subterranean sources (cf. 2 Sam 1:21). In addition to the two evident meanings of thm in Ugaritic, namely ocean and subterranean waters, there is a third meaning completely unrelated. There is a text in which the term “wilderness” (mdbr) is balanced with “wasteland” (thmt).¹³ According to M. Dahood the same contrast is found in Psalm 78:15 between “wilderness” and “wasteland.” In short, in Ugaritic the term thm can mean 1) ocean, 2) subterranean waters, and 3) wasteland.

Let us turn our attention next to the various usages of the Hebrew term tĕhôm (deep) in order to discover its range of meanings. This term appears in about one fourth of its usages in the Old Testament parallel to the word for “sea” (yam).¹⁴ In these instances the meaning of tĕhôm seems to mean generally “waters” or “ocean” as a designation for a phenomenon in nature. To this particular range of meaning we have to assign also Job 38:30: “Water becomes hard like stone, and the surface of the deep (tĕhôm) is imprisoned.” The idea of the Hebrew verb here translated “imprisoned” means “to become compacted,”¹⁵ i.e., it freezes. This means that “deep” (tĕhôm) is something that is exposed to the elements of nature
and its surface can freeze like water. There seems to be no doubt about the fact that “deep” here means a body of water such as an ocean. Furthermore, the “deep/waters/ocean” is God’s creature which can give praise to Him (Psa 42:8; 148:7), tremble at His command (Hab 3:10), or can lament (Ezek 31:15).

There are a number of passages in which the term *têhôm* designates the Red Sea of the Exodus event when the Israelites crossed the sea (Exod 15:5, 8; Isa 51:10; 63:16; Psa 106:9). In these contexts it simply means “deep waters” normally impassable to men and horses (cf. Psa 135:6).\(^\text{16}\)

Finally, we have to discuss the passages in which the word *têhôm* refers to “subterranean water.”\(^\text{17}\) In Deuteronomy 8:7 Moses describes the good land of Canaan as a land of water-brooks, fountains, and springs (literally “deeps” = *têhômôth*) which had their sources in valleys and hills. This is a description of land watered by means of wells which are fed by subterranean water. In Ezekiel 31:4 the picture is drawn of *têhôm* pouring its streams round about the place where the cedar was planted and sending out brooks to all the trees of the field. *Têhôm* is used here to signify the source or starting point of the rivers and channels and seems to refer to the subterranean waters.\(^\text{18}\)

Having surveyed the various meanings of the word *têhôm*, we can now return to our text in Genesis 7:11. The term *têhôm* is here joined with the adjective *rabbâh* which means “great.”\(^\text{19}\) It is the regular adjective applied to *têhôm* in the Old Testament. As examples we may cite the following: Isaiah 51:10: “Was it not Thou who dried up the sea, the waters of the great deep (*têhôm rabbâh*)”; Amos 7:4: “And it consumed the great deep (*têhôm rabbâh*) and began to consume the land”; Psalm 36:6 (Heb 6:7): “Thy judgments are like a great deep (*têhôm rabbâh*)”; cf. Psalm 78:15. It appears that the phrase *têhôm rabbâh* became a compound noun and was stereotyped and therefore always used without the definite article.\(^\text{20}\)

This view finds support by the usage of the verb form *bāqa* which means in the Niphal form in which it appears in Genesis 7:11 “to split, to burst, to break forth.”\(^\text{21}\) This verb is found frequently in Biblical literature in connection with the bringing forth of water. In Psalm 74:15 one reads “Thou didst break open (*bāqa*) springs and torrents.” According to the context this seems to mean that God split open the earth so that waters could come forth which could feed the springs of rivers. In Exodus 14:16 Moses stretched forth his hand over the sea and divided (*bāqa*) it. The idea is a splitting apart of the waters. According to Judges 15:19 God “split open” (*bāqa*) the hollow place and water came from it. In Isaiah
It is stated that He “cleft” (בֹּקַח) the rock and waters gushed out. In these verses the same verb appears as in Genesis 7:11 and has consistently the meaning of bursting forth, dividing, cleaving, splitting open. On the basis of these and other passages, it appears safe to suggest that in Genesis 7:11 the meaning of “burst forth” refers to a breaking open of the crust of the earth to let subterranean waters pour out in unusual quantity. Accordingly the whole clause “all the fountains of the great deep burst forth” may be taken to refer to the fountains, which in normal times furnished sufficient water for the needs of men and animals and the irrigation of the fields. At the beginning of the flood these fountains burst open and poured out such terrific quantities of water which together with the water raining down from the heavens brought about the flood which destroyed all life on earth.

This interpretation, based upon the study of the designation “great deep” and the term “burst forth,” is further supported by the parallelism of the clause in the second part of Genesis 7:11. The writer has used a classic chiastic structure which is well attested in Hebrew literature. It may be translated literally as follows:

*There burst forth all the fountains of the great deep, and the windows of the heavens were opened.*

The words “burst forth” correspond to the words “were opened” and the expression “the fountains of the great deep” corresponds to the “windows of the heavens.” This chiastic parallelism indicates that the waters below the ground came forth as the waters above the ground broke loose.

In short, on the basis of comparative philology and the Hebrew terminology as used in Genesis 7:11 and 8:2 as well as consideration of the literary structure of 7:11, it appears that the bursting forth of the waters from the fountains of the “great deep” refers to the splitting open of springs of subterranean waters with such might and force that together with the torrential down-pouring of waters stored in the atmospheric heavens a worldwide flood comes about.

**ENDNOTES**

2. New English Bible. This is also suggested by: Koehler L, Baumgartner W. 1952. Lexicon in Veteris Testamenti Libros (Leiden), p 547; Holladay W. Jr., editor.


4. This is suggested by E. S. Booth and H. G. Coffin. 1969. Creation: accident or design? (Washington DC), p 52, 55.

5. Genesis 1:2; 7:11; 8:2; 49:25; Deuteronomy 33:15; Job 28:14; 38:16, 30; 41:24; Psalm 36:7; 42:8; 104:6; Proverbs 8:27, 28; Ezekiel 26:19; 31:4, 15; Isaiah 51:10; Amos 7:4; Jonah 2:6; Habakkuk 3:10.


7. Genesis 7:11; 8:2; 49:25; Exodus 15:5, 8; Deuteronomy 8:7; 33:15.


23. Among those who recognize two lines of poetry in the second half of 7:11 are: Jacob B. 1943. Das erste Buch der Tora: Genesis (Berlin), p 205f.; Orlinsky HM. 1969. Notes on the new translation of the Torah (Philadelphia), p 76; Speiser EA. 1964. Genesis (Garden City, NY), p 48; and others.
ARTICLES

A PHILOSOPHIC RATIONALE FOR A CREATION-FLOOD MODEL

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Patterns in the progress of science provide a sound basis for the need to develop new ideas. The application of this principle to the development of a creation-flood model is elucidated.

All too often science is viewed as a collection of objective scientists: cold, calculating appraisers of data like so many animated computers moving steadily upward to higher and higher levels of truth. However, reality is somewhat different from that, for computers and scientists do not analyze data from neutral positions. Both computers and scientists have to be programmed, and this programming process introduces limits to the objectivity of both.

As a scientist progresses through his formal education, he is taught about the data in his field, but it cannot be presented as a mass of unrelated facts. Rather, the data must be organized into a meaningful picture, or theory, that the new scientist can readily understand. Having grasped the meaning of what is already known, he can then move on and challenge the unknown. The problem is that as the scientist learns the accepted theories in his field, he frequently develops a sort of tunnel vision, for he is taught these accepted theories before he is prepared to critically evaluate them. Consequently by the time he is ready to make original contributions of his own, his thinking has already been channeled along certain lines. He has learned what type of questions are considered legitimate scientific questions to ask in his research, and which questions are not.

An astronomy student 2000 years ago would have learned that the problems yet to be solved were the development of improved mathematical models of the movements of the heavenly bodies around the earth. It was not legitimate to ask if the earth really was the center of the universe, as it was already known, with good supporting evidence, that the earth was
indeed stationary. This “fact of nature” was questioned by very few scientists.

The narrowing of acceptable thought patterns is, of course, useful to science. When a field of science is operating within a “paradigm” — a universally accepted scientific principle or theory — the research of all workers in that field will be unified and directed toward common goals. Much more is accomplished than if each worker were left to flounder on his own. Astronomers working under the paradigm of the geocentric universe could agree on the position of the earth and work together plotting the paths of stars and planets within that world view.

This process of solving the relevant problem within a given paradigm is what T. S. Kuhn (1970, p 24) refers to as normal science:

> Closely examined, whether historically or in the contemporary laboratory, that enterprise seems an attempt to force nature into the preformed and relatively inflexible box that the paradigm supplies. No part of the aim of normal science is to call forth new sorts of phenomena: indeed those that will not fit the box are often not seen at all. Nor do scientists normally aim to invent new theories, and they are often intolerant of those invented by others. Instead, normal-scientific research is directed to the articulation of the phenomena and theories that the paradigm already supplies.

A paradigm is thus a useful part of science, but it is at the same time a hazard. Most scientists never escape the restrictions of a well-accepted paradigm, even if it is wrong. A scientist’s paradigm determines what observations he will make, what experiments he will do, and how he will interpret the results of his experiments (Kuhn 1970, p 116, 126). Under the geocentric-universe paradigm, if it was difficult to fit the movements of planets into the system, it was just a challenging problem and was not generally considered as evidence against the theory. For a scientist working under the evolution paradigm, the absence of fossil intermediates between the phyla of plants and animals is not evidence against his theory; it is just a problem to be solved by future research.

A paradigm can be a very pervasive concept, because once it is accepted, prevailing opinion encourages continued acceptance and development. As an example, the San Juan River has generally been interpreted as the result (see Figure 1) of slowly flowing water on a gentle slope. Such a slowly flowing river would take a very long time to carve a trench that deep. Even some conservative Christians who originally believed in a short-earth chronology have considered this erosion pattern as evidence for long ages for life on the earth — far beyond the amount of time allowed by standard Biblical interpretations. This seems to illustrate how the
The popularity of a paradigm can cause it to pervade beyond the limits of rigorous objectivity, since experimental results (Shepherd 1972) propose that a meandering river like the San Juan, which cuts straight down into the sediments, does not form by slowly flowing water, but by flood conditions which keep all the sediments in suspension. His conclusion is that such river courses are cut by periodic flash floods.

Dr. J. W. Provonsha (1973) has a useful concept which he uses in discussing the nature of revelation. I believe it applies to a scientist in the same way. In the study of science, as in the study of religion, we receive new information only through our senses, and the scientist, as well as the religionist, has a “filter” in his mind, with a feed-back mechanism. The concepts developed in his mind determine what observations the filter will allow, and what observations will be filtered out because they are not relevant.

A scientist working within a given paradigm will evaluate all new ideas under the rules of his paradigm — it is a more-or-less closed system. Only the imaginative and daring few ever break out of widely accepted paradigms. The geocentric theory held sway in astronomy for at least 1800 years, and even when it became evident that the theory wasn’t
working, it was not generally abandoned until the creative ideas of Copernicus opened the way for a new interpretation.

Science, like other areas of intellectual endeavor, is slow to accept new ideas. The list of great scientists whose work was not accepted by their contemporaries is frightfully long. Newton, Gauss, Copernicus, Vesalius, Lister, Mendel, and Avogadro are a few examples (Clark 1972, p 99-101; Kuhn 1970, p 150). An idea that doesn’t fit accepted concepts will generally look rather foolish. A. N. Whitehead (1950, p 70) observes that:

*If you have had your attention directed to the novelties in thought in your own lifetime, you will have observed that almost all really new ideas have a certain aspect of foolishness when they are first produced.*

I would suggest that almost any idea which jogs you out of your current abstractions may be better than no exposure to new ideas.

Karl Popper (1963) makes the following comments on the scientific process:

*What is called scientific objectivity consists solely in the critical approach — in the fact that if you are biased in favor of your pet theory, some of your friends and colleagues (or failing these, some workers of the next generation) will be eager to criticize you; that is to say, to refute your pet theories if they can.... it would be a mistake to think that scientists are more ‘objective’ than other people. It is not the objectivity or detachment of the individual scientist but science itself — or what may be called ‘the friendly-hostile cooperation of scientists’, that is, their readiness for mutual criticism — which makes for objectivity.*

*There is even something like a methodological justification for individual scientists to be dogmatic and biased. Since the method of science is that of critical discussion, it is of great importance that the theories criticized should be tenaciously defended. For only in this way can we learn their real power; and only if criticism meets resistance can we learn the full force of a critical argument.*

Thus even though it may seem incongruous, the scientist who gets the most work done may be the one who is personally committed to his paradigm and is determined to prove it correct. It seems to me that this is the kind of commitment necessary to develop a new paradigm to the point where it is acceptable.

If Kuhn (1970) is correct, a new paradigm is likely to arise when an accepted paradigm has reached a crisis — it persistently fails to solve
important problems. This failure may lead one or a few independent-minded scientists to look for a new paradigm which may turn out to be completely incompatible with the old — a different world view, like putting the sun, rather than the earth, in the middle of the solar system. Kuhn points out that new paradigms often attract their first followers for reasons that are not entirely scientific — it may be more aesthetic, “neater,” or “simpler” than the old one. And I would add another reason — it may be supported by revealed information.

A newly proposed paradigm will at first be able to solve only a few of the problems that confront it and will attract only a few followers. The success of the new paradigm may depend on the work of these few, and “ordinarily it is only much later, after the new paradigm has been developed, accepted, and exploited, that apparently decisive arguments ... are developed (Kuhn 1970, p 156). The decision to accept a new paradigm may be primarily based on future promise rather than past achievement (Kuhn 1970, p 158):

The man who embraces a new paradigm at an early stage must often do so in defiance of the evidence provided by problem solving. He must, that is, have faith that the new paradigm will succeed with the many large problems that confront it, knowing only that the older paradigm has failed with a few. A decision of that kind can only be made on faith.

This does not mean that a scientist can ignore evidence; it just means that even a good paradigm will not succeed unless its followers believe in it enough to carry it through its difficult early stage of development.

This analysis of changing paradigms may help us in our consideration of the relation between science and religion. When a prevailing paradigm, such as the geologic paradigm requiring a long history for life on earth, contradicts sacred history, the problem will not be solved by making a few adjustments in current geologic theory. Also a paradigm suggesting an old age for the earth is not necessarily true just because there are many lines of evidence that fit the theory. In the study of astronomy, the inadequacies of the geocentric-universe paradigm could not be remedied by making more adjustments — an entirely different view was required. When a new paradigm was suggested, it was not immediately apparent that it was better than the old one. The data fit the geocentric theory amazingly well — so well that it is still used today in fields such as surveying and navigation (Kuhn 1957, p 373).

I believe that before we can make a fair comparison between the long-ages paradigm of the geologists and the Biblical idea of a short
chronology, we will have to build an entirely new paradigm. This will only happen when enough scientists in various disciplines have sufficient faith in revelation to stake their careers on the effort. In developing a new paradigm, much data will have to be placed on a shelf temporarily; not to be forgotten, however, but to be taken down periodically and reexamined to see if its true explanation can yet be found. Much information cannot be expected to fit until a new theory has been worked out in some detail. I personally do not feel that we are justified in questioning the many direct and pointed statements in the Bible and writings of E. G. White indicating a 6-day creation a short time ago, followed by a worldwide flood, when current geologic theories have never been confronted with a diligent, well-staffed effort to develop an alternative paradigm.

Judging from the history of other scientific paradigms, it would seem that an incorrect geology paradigm will be eventually rejected for a better one. That could take hundreds of years. It took 1800 years for the problems in the geocentric theory to be adequately appreciated. Science moves faster now, but even so, geology, especially radioactive dating, is a young science, and a complex one, and it will take a long time for such theories to be developed to the point where they can be properly analyzed. The process could be greatly speeded up if enough people were working on a competing paradigm now.

When a scientist, who is a Christian, decides after a few years of study in a field of science dominated by a non-Christian paradigm, that he must abandon his religious views, I respect his right to make his own choice, but I can still wish that he had been more cautious in making such a decision, since it will take a huge amount of effort by scientists committed to the Biblical view before that view will have a fair trial. Perhaps a comment by R. E. D. Clark (1972, p 117) is pertinent here:

"... a man who abandons his faith in God may do so in the conscious belief that he is humbly bowing before the facts, while unconsciously he proudly asserts that his intellectual grasp of the universe is such that no complicating factors have escaped his notice."

The geological phenomenon known as turbidity currents is an interesting illustration of the danger of believing currently accepted ideas without question. Tremendous volumes of sedimentary rock with graded bedding were formerly interpreted as gradual accumulations of shallow-water sediments. They were interpreted that way until the concept of turbidity currents was introduced in 1950 (Kuenen & Migliorini 1950). Turbidity currents are rapid underwater mud-or-sand-flows on a large
scale. Since 1950 the supposed “shallow-water sediments” mentioned above have been reinterpreted as the result of turbidity currents. Walker (1973, p 3) states that:

The revolution in thought has affected our ideas of erosion, transport, dispersal, and deposition in modern ocean basins. It has also completely changed our interpretations of sandstones and conglomerates in ancient basins.

The turbidite concept is based on extensive observations and experimental work, and Walker (1973, p 3) maintains that “no other development in clastic sedimentology in this century has caused a complete change in thinking of comparable magnitude.” Graded bedding was routinely observed in these deposits before, but “all authors, however, followed the old geological paradigm which stated that sandstones and conglomerates were shallow-water deposits” (Walker 1973, p 16). The old explanation of gradual accumulation in shallow water was accepted until the phenomenon of turbidity currents was discovered, causing a complete reinterpretation. In how many other fields might there be comparable new discoveries waiting to be found, that will precipitate reinterpretations of comparable scope?

In the study of radioactive dating, certain things are known, at least in an elementary way: the patterns of distribution of the relevant chemicals in certain rocks; general trends through the geologic column; the presence of anomalous dates, including systematic anomalies through geologic “time.” Other factors may affect radio decay products. Some very important factors are not known: were clocks really set to zero in molten rocks; what were conditions in the magma chambers; are those conditions reflected in present distribution of radioactive elements and products; what other factors could have affected it, including possible divine energy influencing the earth at the time of the flood; what causes a given atom to decay (perhaps the most important fact to know); to what extent do scientists’ filters influence them in selection of which data are relevant?

I propose that the pillars of scientific truth are not always as solid as they appear. The solidity may be an illusion, produced by the tendency of a scientist to interpret all data in harmony with currently accepted paradigms. Scientific explanations which we do not agree with should not be ignored, but if we are too quick to embrace them, we may be on as weak a foundation as the astronomers in the days when it was a “known fact” that the earth was the center of the universe. In the words of Karl Popper (1959, p 111):

The empirical basis of objective science has thus nothing ‘absolute’ about it. Science does not rest upon rock-bottom. The bold structure of its theories rises, as it were, above a swamp. It Is like
a building erected on piles. The piles are driven down from above into the swamp, but not down to any natural or ‘given’ base; and when we cease our attempts to drive our piles into a deeper layer, it is not because we have reached firm ground. We simply stop when we are satisfied that they are firm enough to carry the structure, at least for the time being.

In evaluating various scientific theories, we must weigh the reliability of the evidence available for each theory — how much is known, how much is not known, how long the theory has been under study, how good the shaky evidence is. There will be a wide spectrum, from reliable to very shaky speculation.

The theory of gravitation may be close to the upper end of the spectrum of reliability, but I suspect that most theories of interest in a study of science and religion are fairly close to the bottom end of the spectrum, floating on the surface of the “swamp.”

Another factor to consider is the fact that modern science is moving very fast. This leads to a rapid increase of knowledge, but it also may mean that much of our most advanced thought is still on the fringes of reliability.

There was a time when the Bible was used to support the geocentric theory. However, I have not found any statements that “in the beginning God created the earth in the center of the universe, and rested on the seventh day; therefore God blessed the Sabbath day....” However I do find that for certain other ideas related to earth history (length of creation week, world-wide nature of the flood, e.g.), the revealed information is much more explicit, and the scientific information is much less explicit.

We must, however, be careful that we do not read our pet theories into the Bible. Just to mention one example: we sometimes talk as if the flood was a simple event, lasting one year, but all we know from the Bible is that after one year there was at least enough dry land on Ararat for the occupants of the ark to survive.

In summary, I am convinced that the widely accepted concept of the complete objectivity of the individual scientist is naive — an unfortunate twentieth-century myth. A new theory triumphs, not because of the greater objectivity of its adherents, nor because an “objective” person can tell, initially, that it fits the data better, or even as well, as other theories. Eventually it will succeed only if it stands the test of time and criticism. In other words a theory will succeed if the practical world of research shows that it works. No matter how right a new and different idea may be, it is destined to failure unless a group of scientists have the devotion,
determination, and “guts” to put their full energy into developing their hypothesis in spite of criticism.

Those who in the past have worked hard, and often alone, in their efforts to develop concepts of flood geology have provided a valuable launching point for the team effort that has finally become possible in recent years. In many areas of geology and paleontology we have only been able to answer science-based criticisms of Genesis by giving the reasons why the accepted scientific interpretations are not compelling or proven. These reasons are good to know, and are a profitable start, but they are convincing only to a few people. Conventional uniformitarian theories in geology and paleontology are satisfying to many because of the abundance of research data (inconclusive though it may be) that backs it up. In our efforts to aid honest people in gaining confidence in revelation, the one thing that will make the difference is a demonstration that in the practical world of research, flood geology works!

LITERATURE CITED


The Geoscience Research Institute Board of Trustees has designated ten scientists as Fellows of the Institute. These fellowships are the first to be awarded under the Institute’s new sponsored research program. The purpose of this program is to secure greater and more coordinated involvement of scientific capabilities in work that will strengthen witness for Biblical testimony concerning the physical history of planet Earth and the life it supports. Each fellowship carries financial assistance for expense involved in a research project approved by a scientific evaluation committee and the Institute Board.

Seven of the fellowship recipients are associated with Loma Linda University: Dr. Leonard Brand for literature search, field study and laboratory model investigation of fossil vertebrate tracks; Drs. Arthur Chadwick and Berney Neufeld for investigation of evidence for penecontemporaneous origin and erosion of the paleozoic sediments of the Grand Canyon, Arizona.; Dr. Ivan Holmes on the La Sierra campus for x-ray investigation of the mineral composition of the volcanic and “organic” layers of the Yellowstone Fossil Forests; Phillip DeBord and Lanny Fisk for laboratory investigation of Yellowstone Fossil Forest palynology; and (another) for preliminary field investigation of possibilities for research on the formation and paleoecology of fossil fishes in the Green River Formation, S.W. Wyoming.

Dr. Ross Barnes of Walla Walla College was awarded a fellowship for preliminary investigation of possibilities for research on Earth’s carbon exchange system in relation to a flood model. Dr. Dexter Beary of Southwestern Union College has an award for a field study of fossil animal tracks in the Paluxy River bed near Glen Rose, Texas. Dr. Herbert Sorensen of Portland, Oregon, as an Institute Fellow is investigating the dendrochronology of the Yellowstone Fossil Forests with the aid of electronic computer techniques.

The Fellowship Program of the Geoscience Research Institute provides sponsorship for research projects in areas of earth science, life science, and prehistory that have the potential of helping build creation theory, of verifying inspired testimony, and of strengthening the gospel witness to scientifically informed individuals. The program provides for assistance with the costs of conceptual development, literature search, laboratory investigation, or field studies.
Individuals who have suggestions or questions concerning fellowship projects are invited to write the Director, Geoscience Research Institute, Box 161, Berrien Springs, MI 49104.

R. H. Brown
THE TEACHING OF CREATION AND EVOLUTION IN THE STATE OF TENNESSEE

A new Tennessee law states that evolution can only be presented as a theory, and creation accounts must also be taught in the public schools, colleges, and universities. Passed in May 1973, it is scheduled to take effect with the 1975/76 school year. The controversy surrounding the teaching of creation and evolution in the classroom has been long and intense in the State of Tennessee.

THE BUTLER ACT

In 1925 Tennessee passed a law forbidding the teaching of “any theory that denies the story of the divine creation of man as taught in the Bible,” along with the teaching that “man descended from a lower order of animals.” Written and introduced by Rep. John Washington Butler, the “Butler Act” was passed by the House without debate on 28 January 1925. Seventy-one voted in favor of the bill and only 5 dissented. Although a strong majority seemed to back this bill, many had favored the Butler Act solely for political reasons, expecting it to die in the Senate. Using the same reasoning, however, the Senate also approved it, fully expecting the governor to veto it. But in March 1925, pressured by his fellow Baptists, Gov. Austin Peay signed the act, saying, “Nobody believes that it is going to be an active statute.”

THE CHALLENGE

Believing the Butler Act to be unconstitutional, the American Civil Liberties Union (ACLU) placed a classified ad in the Chattanooga Times on 4 April 1925, offering financial backing for the defense in a test case of this law. George Rappleyea, an engineer at Dayton Coal and Iron Company, and also one of the few evolutionists in Dayton, saw this ad and recognized the opportunity to make the little town of Dayton (located in Rhea County in southeastern Tennessee) famous from the publicity of such a trial.

The following day, Rappleyea met with Walter White, superintendent of the Rhea County public schools, and Sue K. Hicks, a young lawyer (named after his mother), both of whom favored the Butler Act. By arguing that this “sporting proposition” would put Dayton on the map, Rappleyea
convinced White and Hicks to aid in challenging the Butler Act, which
was not yet enforced. If the courts found it unconstitutional, it would be
repealed. On the other hand, if the law were upheld, it would be enforced,
and White and Hicks would be the victors.

The next step was finding a likely candidate for this test case, someone
who would be willing to risk losing his job. John Thomas Scopes, a 24-
year-old science teacher at the Dayton High School, believed in evolution
and supported its teaching, especially because the high-school biology
textbooks discussed it. After agreeing to play the “sacrificial role” and
after the ACLU approved the plan, Scopes “confessed” to teaching Darwin’s
theory of evolution, contrary to the state law. Rappleyea swore out a
warrant against Scopes.

Hicks invited William Jennings Bryan, former secretary of state and
three-times presidential candidate, to serve on the prosecution along with
Bryan’s son, William Jennings Bryan, Jr., and A. T. Stewart, attorney
general of the Eighteenth Circuit (which included Rhea County). After
Scopes had already retained two Tennessee lawyers for his defense,
Clarence Darrow, “the master jury-pleader and noted agnostic,” offered
his services along with those of Dudley Field Malone, a well-known divorce
lawyer. They were joined by Arthur Garfield Hays, ACLU counsel.

THE SCOPES TRIAL

Immediate publicity brought a swarm of spectators and journalists to
Dayton for the trial, which began on July 10.

Although the defense had summoned scientists and Biblical scholars
to serve as expert witnesses showing that evolutionary theory did not
conflict with an allegorical interpretation of the Bible, Judge John T. Raulston
ruled out their testimony as irrelevant. Hays was finally permitted to
summarize the experts’ position in the absence of the jury in order to lay
the foundation for an appeal.

When Raulston feared the floor of the old courthouse building would
not be able to support the weight of the spectators, the trial was moved to
the courthouse lawn. On July 20 Hays called a startled Bryan to the stand
to testify as an expert witness on the Bible. Bryan agreed, despite the
objections raised by other members of the prosecution. For an hour and a
half, in the stifling heat, Darrow grilled Bryan with questions aimed at
attacking his literal interpretation of the Bible. When asked if he believed
that the earth was created in seven days, Bryan conceded that creation
days might possibly have been a span of time longer than 24-hour periods.
The next morning Raulston ruled Bryan’s testimony be stricken from the record. Darrow broadly hinted that he wanted a verdict of guilty in order to make an appeal possible. Never summoned to testify in his own behalf, Scopes was found guilty, and Raulston fined him $100.

Darrow and his associates immediately appealed Scopes’ case to the Tennessee Supreme Court; the verdict came in January 1927. Of the five justices, one disqualified himself, one deemed the Butler Act unconstitutional because of its vagueness, while another held it valid but not violated. The two remaining justices ruled the law constitutional and violated. But Rappleyea’s plan to test the law came to grief, for the court used a technicality in the trial proceedings to dismiss the case and reverse the penalty. Scopes’ fine had been levied by the judge, but the Constitution required any fine of more than $50 to be set by the trial jury. The opinion of the Supreme Court was that:

_We see nothing to be gained by prolonging the life of this bizarre case. On the contrary, we think the peace and dignity of the State, which all criminal prosecutions are brought to redress, will be better conserved by the entry of a nolle prosequi herein._

District Attorney Stewart agreed to drop the charges, leaving the Butler Act intact and valid and Scopes unpunished.

**OPPOSITION RESURGES IN 1960**

During the next 40 years, the Butler Act remained unchallenged. In the 1960s, however, science teachers in Tennessee began urging the restoration of “freedom of thought and speech to the teachers and school-children” of their state. Legislators were petitioned to repeal this law which did “harm to the teaching of science, harm to the ideals of Democracy, and harm to the reputation of Tennessee.” Church leaders were also asked to support repeal measures, for it was argued that religion could not be helped by the suppression of scientific theories. The _Chattanooga Times_ commented that the validity of evolutionary concepts was not the issue; rather it was the freedom to fully examine any argument in the search for truth. Others resisted the repeal measures, believing the Butler Act to already be a dead letter, and argued that bringing up the issue again would call unnecessary and unfavorable attention to Tennessee. Though much was said about eliminating the law, it still remained on the books.
THE LAW REPEALED

In May 1967 the Butler Act faced another serious challenge. Gary L. Scott, a 24-year-old science teacher, was dismissed from the Jacksboro High School for allegedly violating this law by discussing Darwin’s theory of evolution in his classroom.

Aided by the National Science Teachers Association (NSTA), Scott filed an official complaint directly aimed at eliminating the Butler Act. It stated that all should be given the freedom to exercise “the rights guaranteed in the First Amendment to the Constitution of the United States to the freedoms of religion, speech, press, assembly, association, thought and belief, and academic inquiry and study.” In a statement to the press, Addison E. Lee, NSTA president, added:

Society cannot tolerate any obstruction of the process of academic inquiry and the dissemination of information and ideas. These are not local matters. Science and education must be free to investigate, to think, and to evaluate. We cannot stand by without action when these rights are endangered.

Faced with the threat of a second “monkey trial,” the Tennessee Legislature moved to repeal the Butler Act.

CREATIONISTS RESPOND

Realizing that the teaching of evolutionary theory was legalized by the repeal, Russell C. Artist, biology professor at David Lipscomb College in Nashville, and a member of the Creation Research Society (CRS), attempted to include the Biblical version of creation in the textbooks used in the public schools. Meeting with the Tennessee State Textbook Commission in 1970 to promote a CRS textbook entitled Biology: A Search for Order in Complexity, Dr. Artist contrasted this book with those which gave evolution as the “only explanation, not only for the diversity of life upon this earth, but for the history of man.” Dr. Artist concluded his speech by appealing for equal time for creation, stating:

Let me say that the scientists of this state, as well as other interested people, are demanding that evolution be taught as a theory of science, not as a religion or a philosophy. Then both sides will have to be mentioned, both the accomplishments and the difficulties of evolutionary theory.
The creation account will be considered as a thorough-going alternative to evolution! The idea that the theory of evolution is science and creation is just religion is now known to be false, as many men of science are saying today.

Although the Commission gave the CRS the opportunity to submit the text before the date normally open for adoption, this book was eventually rejected.

**THE GENESIS BILL**

Dr. Artist did not let this defeat stop his efforts. He went to see a fellow member of the Church of Christ, Sen. Milton H. Hamilton of Union City. As a result, Senator Hamilton agreed to sponsor a new bill requiring equal time for creation. A similar bill in the House was introduced by House Speaker Ned McWherter, aided by Rep. Tommy Bennett of Jamestown.

The Senate passed the bill by a vote of 28 to 1, in April 1973. There was no debate, perhaps because of the presence of television cameras. Section 1 of the bill reads:

*Any biology textbook used for teaching in the public schools, which expresses an opinion of, or relates to a theory about origins or creation of man and his world shall be prohibited from being used as a textbook in such system unless it specifically states that it is a theory as to the origin and creation of man and his world and is not represented to be scientific fact. Any textbook so used in the public education system which expresses an opinion or relates to a theory or theories shall give in the same text book and under the same subject commensurate attention to, and an equal amount of emphasis on, the origins and creation of man and his world as the same is recorded in other theories, including, but not limited to, the Genesis account in the Bible. The provisions of this Act shall not apply to the use of any textbook now legally in use, until the beginning of the school year of 1975-76....*

The following week on 26 April 1973, the same measure was debated in the House for an hour and 20 minutes. While Rep. W. C. Carter of Rhea County applauded the bill as “a remedy to a bad act” (referring to the repeal of the antievolutionary law in 1967), Rep. John Bragg of Murfreesboro blasted it as “a sacrilege to my religion,” for it “reduces God to
theory.” Before the debate had ended, several amendments were adopted which limited the restrictions placed on the textbooks by allowing teachers to use supplementary materials to meet the requirements, defining the Bible as a reference work rather than a textbook, and prohibiting the inclusion of occult or satanic theories of origins in the texts. Representative Bragg led the opposition: “The people originating this bill will be appalled by what finally appears in the textbooks,” he stated, warning that an author who rejected the Bible could wreck the creation story as presented in the Bible. He continued: “I believe the Biblical account is fact, not theory. If you want to open up a bag of worms, you vote for this bill. This sounds good, but I submit to you this is a vicious bill.” Despite his objections, the Genesis bill was passed by 69 to 15, with 15 not voting.

Although Gov. Winfield Dunn had a 5-day period in which to sign or veto the measure, he withheld his signature, and when the deadline expired, the bill automatically became a law on 8 May 1973. Some people remained unhappy, however, because no theory, including the Biblical account of creation, could be presented as fact.

An editorial in the *Nashville Tennessean*, 9 May 1973, summarized the situation:

> The so-called ‘Genesis bill’ may now be law in Tennessee, but that doesn’t mean they immediately will start teaching the biblical account of creation in the classroom.

> First off, the law does not become effective until the 1975-76 school year. Textbooks for the state’s schools are adopted in five-year cycles and the science textbooks are now in the third year of their current cycle.

> In addition, the law addresses itself only to what textbooks shall be used in biology classes, saying the books shall give ‘equal emphasis’ to the biblical story of man’s origin. The law does not regulate the classroom teacher’s method or style of teaching.

> Those in charge of administering the new law — passed by the 88th General Assembly — acknowledge privately that it is well-nigh impossible to assure that the legislators’ intent will be realized.

> The lawmakers apparently wanted to insure that the Genesis account will be taught in the public schools and
that it will be given as much attention and emphasis as the theory of evolution.

But anything short of stationing a policeman in every classroom is unlikely to accomplish that aim, since teachers are apt to teach what they wish — emphasizing what they will — without regard to what the textbooks might say, some educators believe.

In December 1973 opposition to the new law went into action. Especially locked in battle with the creationists was the National Association of Biology Teachers (NABT), which retained counsel to challenge the new statute in courts, finally filing suit on 29 December 1973. Two zoology professors at the University of Tennessee, Joseph C. Daniel, Jr. and Arthur Jones, and a Knoxville biology teacher, Larry Wilder, were named plaintiffs, along with the NABT.

The lawsuit challenged the Genesis bill, charging it with violation of the free exercise of religion and the freedoms of speech and press. It asked the federal court to block the enforcement of the controversial state law, thus attempting to delete the law before it could be actuated in the classrooms. The lawsuit stated:

The challenged Tennessee statute is an establishment of religion by the state in violation of due process of the 14th Amendment as it incorporates the establishment clause of the 1st Amendment of the U.S. Constitution. The establishment of religion violates the rights of all plaintiffs.

In January 1974 the Nashville Banner reported that bills had been introduced in both houses of the General Assembly to eradicate the 1973 Genesis law. Senator J. H. White of Memphis introduced a bill in the Senate, and Rep. Roy Daniels, also of Memphis, introduced a similar bill in the House. Both had opposed the 1973 law. When the debate arose in the Senate, Senator White stated:

We engage in debate over the origin of man, when we should be addressing ourselves to the future of man and grappling with the problems with which man is beset in the here and now... We should be addressing our efforts towards the problems of disease, affliction, illiteracy, crime, drug abuse, unemployment, overpopulation, corruption in government, and the ultimate blasphemy, the constant warring among the nations of man.
Apparently Senator White does not believe that man’s basic concept of his own origin will influence his philosophical approach to the above-mentioned problems.

At the current time of this writing, the lawsuit is still awaiting action in the courts, and the two bills to repeal the 1973 Genesis law died in the Senate and House.

Katherine Ching
THE DEL NORTE COUNTY SURVEY

According to a survey conducted by the Seventh-day Adventist Church in Crescent City, California, a vast majority of the residents of the Del Norte County in California believe that public schools should include creation in the teaching of origins, along with evolutionary theory.

DESCRIPTION OF THE SURVEY

Through a door-to-door survey and a radio poll, responses were taken to the following questions: “Should evolution be taught in public schools?” “Should creation be taught in public schools?” “How many children in your home are attending public school?” “Do you attend church?” The responses were restricted to a simple “yes,” “no,” or “no opinion.”

To insure privacy and freedom of expression, the names of those who participated in the survey questions were neither asked nor recorded. To avoid unnecessary confusion as to the issue and possible influencing of the answers, “evolution” and “creation” were not restricted to a formal definition. General definitions, however, were provided upon request: “evolution” is the theory that man has developed from lower forms of life over long ages of time; “creation” is the theory that God created man in His own image. Because the survey would involve the children in public schools, the number of children in each house participating in the survey was recorded. Primarily the survey was intended to gather responses of the adult community, but whenever minors offered their opinions, these too were included in the survey.

Louis R. Goodgame, coordinator of the survey, stated: “The survey was not done to arouse controversy and cause discord. It was not done so that our Church, or any Church, could dictate policies to the local school board.” Rather, it was taken “as a public service concerning an issue which we believed to be of vital importance to our community.”

RESULTS OF THE SURVEY

A total of 1518 individuals participated in the survey (1212 by the door-to-door volunteers and 306 by the radio poll). Of these contacts, 58% thought the teaching of evolution should be continued, while 34% opposed it (8% made no comment). Of the same 1518 total, 89% agreed that creation theory should also be taught in the classroom. Only 8% opposed its inclusion in the classroom, and 3% did not express an opinion.
The contacts were then broken down into two further divisions based on church attendance. Of the 919 who attended church (690 by the door-to-door survey and 229 by the radio poll), 54% thought evolution should be taught, 39% thought it should be discontinued, and 7% remained undecided. Of this same group, 91% supported the teaching of creation, while only 6% said no. Three per cent made no comment. Of the 599 not attending church (522 door-to-door, 77 by radio), 64% thought evolution should be taught; 27% said no, while 9% remained undecided. Creation was supported by 85%, 11% said no, and 4% made no comment.

A comparison between the door-to-door contacts and the radio poll showed a difference. While in the door-to-door survey only 60% favored evolution, with 31% opposing its teaching (9% made no comment), those contacted by radio showed 51% for evolution, 46% opposed, and 3% registering no opinion. One possible explanation is that the door-to-door contacts reached people at random (some had no great interest in the issue), while the radio poll drew responses from those interested enough to phone in their views.

Not recorded on this report, but noted by the pollsters, was a genuine concern from the community, not only that creation should be taught, but how it should be presented in the classroom. The final summary merely stated that there was community support for teaching both creation and evolution in the classrooms.

Katherine Ching
LITERATURE REVIEWS

Readers are invited to submit reviews of current literature relating to origins. Mailing address: ORIGINS, Geoscience Research Institute, 11060 Campus St., Loma Linda, California 92350 USA. The Institute does not distribute the publications reviewed; please contact the publisher directly.


Reviewed by Katherine Ching, Geoscience Research Institute

After reading four paperbacks on the subject of evolution, Norman MacBeth, a retired lawyer, did further research into the accepted theories of evolution. He concentrated especially on the aspects answering the how and why of changes in the earth and in living species. His study discloses that classical Darwinism has been supplanted by neo-Darwinism. However, the public has not been informed of this departure.

To show that qualified biologists have rejected classical Darwinism as a valid tenet, MacBeth, utilizing his legal training, places Darwinism on trial, coolly focussing upon the glaring weaknesses within each component of the Darwinian theory. He concludes that its major premises do not contain adequate support. His witnesses against classical Darwinism are the present leading professional advocates of neo-Darwinism, primarily G. G. Simpson, Julian Huxley, and Ernst Mayr.

For example the shibboleth “the struggle for existence” ignores the other aspect of nature, cooperation and harmony; “natural selection” is derived from abstract theorizing, for this process is explained as happening beyond our power of observation (which is another way of saying that no proof exists); “survival of the fittest” has been discarded by biologists, while being used by the public; “adaptation” is challenged by too many exceptions; the micro changes found in the breeding pens are presumptuously extrapolated to validate the idea of macroevolution, which has supposedly occurred over a long period of time; and, finally, unexplained phenomena indicate that this earth’s history has not evolved in a steady, slow, tranquil, and progressive linear path but give evidence, instead, that at least one major catastrophe occurred involving upheaval of the earth and a total breakdown of the climate.

After examining Darwin’s major premises and also the modifications proposed by the synthetic theorists, MacBeth pronounces his judgment upon the court case: since all the basic components used to explain
evolution are sadly decayed, the new synthesis is also decayed and therefore invalid.

MacBeth feels no burden to suggest an alternative theory, neither does he revert back to fundamentalism: “The proponents of a theory, in science or elsewhere, are obligated to support every link in the chain of reasoning, whereas a critic or skeptic may peck at any aspect of the theory, testing it for flaws. He is not obligated to set up any theory of his own or to offer any alternative explanations. He can be purely negative if he so desires.”

As a result of this philosophy, MacBeth is liberated from the accusation of having an axe to grind or of debunking other theories to make room for his; his entire attention is focused on the weaknesses and unsolved problems, the contradictions and illogical contentions within Darwinian philosophy, and especially the tendency to employ tautology (circular reasoning) as a method of arriving at truths. In other words, Darwinism is tried on its own merits, against itself.

While showing the flaws of classical Darwinism, MacBeth also manages to level a strong indictment against the newer synthetic theory, supposedly the perfect answer or solution to all questions regarding the how and why of changes. In his easily readable style, with occasional flashes of dry humor, MacBeth calmly smashes the synthetic explanations for evolution. Extinction, for example, cannot be explained, for to say “He stopped breathing” does not give the real cause, the underlying factor for death; rather, it is a statement of fact, not an explanation of the fact. To say that “…’ultimately their extinction is due to an inability of their genotype to respond to new selection pressures’” is impressive but entirely meaningless, “because the same could be said of every extinct species and of every dead person, including Julius Caesar and Abraham Lincoln”!

Then MacBeth assumes the role of a solicitous advisor, appealing to modern biologists to go beyond the hypotheses worked out by Darwin, whom he qualifies as a lone amateur with very little equipment. These biologists should admit that unresolved problems remain:

> It is my conviction, after examining the literature, that intelligence and integrity are still very much alive among the biologists. In their own circles they speak candidly and express their misgivings freely. Only when they popularize do they become pompous and pontifical. Perhaps they are reluctant to confess error. Perhaps they fear that the fundamentalists will gloat over their discomfiture. These would be human tailings, but just the sort that one must resolutely put aside. I urge the Darwinists to take the public into their confidence by a full
MacBeth does not sound entirely optimistic, for he observes that Darwinism has become just as much an emotional religion as has creationism, for it is carefully cherished and defended by those professionals who are reluctant to yield up their antiquated beliefs in the face of opposition.

As he crushes the evolutionary theories, we are tempted to hail MacBeth as our advocate, only to remember that he also appears to reject creationism as well. But it is encouraging that an apparently impartial examination of classical-and-neo-Darwinism finds it to be definitely non-factual.

Reviewed by R. H. Brown, Director, Geoscience Research Institute

The “Anderson experiment,” which has evoked a great deal of general interest, has also been the subject of special discussions among creationists, because of the problems presented by the carbon-14 dating technique for believers in a short Biblical chronology. An analysis of Dr. Anderson’s report follows.

Under certain circumstances the experimental arrangement used by Dr. Anderson yields data that slightly disagree with what one would expect for random, non-related events such as radioactive disintegrations. If C-14 nuclei in plant and animal tissue are interrelated to the extent which might be suggested by Dr. Anderson’s data, the correction implied is inadequate to bring C-14 ages of 20,000 to 50,000 into harmony with a total elapsed time of less than 10,000 years since creation week. To accomplish this would require the C-14 disintegration rate to be increased approximately 500%. The largest apparent increase reported by Dr. Anderson in this article is less than 1%.

The phenomenon presented by Dr. Anderson is extremely subtle. It is scarcely discernable visually in a graphical presentation of his count data (Figure 1 of cited reference). Only refined, highly-sensitive statistical analysis provides unquestionable evidence that his data does not fully conform to expectation for random, non-related events.

An experimental arrangement such as that used by Dr. Anderson always gives normal count statistics for a bulk sample of material containing C-14. Anomalous behavior is only observed for mono-molecular layers of an organic molecule (stearic acid). The stearic acid used in this experiment has been synthesized so that at least some of the organic molecules contain one or more C-14 atoms. The concentration of C-14 in this stearic acid is so high that a few square centimeters of a mono-molecular layer produce in the order of 2000 times as many C-14 disintegrations per minute as is
produced by one gram of normal contemporary carbon. Since one square centimeter mono-molecular layer of pure carbon would weigh approximately 50 billionths \((5 \times 10^{-8})\) of a gram, the stearic acid used in Dr. Anderson’s experiments has a C-14 concentration in the order of 40 billion \([2000 \div (5 \times 10^{-8})]\) greater than that found in pure carbon from contemporary natural plant and animal tissue. If the anomalous data obtained in Dr. Anderson’s experiments are due to a proximity effect whereby one C-14 atom decay influences other C-14 atoms to decay, this effect would be expected to be much less apparent with the C-14 concentrations that occur in natural material.

It should be emphasized that the experimental arrangement used by Dr. Anderson gives expected counting statistics for the usual multi-molecular layer samples, for samples that are not adsorbed to a substrate, and for mono-molecular adsorbed layers on a metal (aluminum) foil which is either grounded or maintained at a negative potential with respect to the counting apparatus. Anomalous counting data is obtained only for mono-molecular adsorbed samples that are electrically biased with a positive potential or that are insulated to allow attainment of a positive potential as a result of radioactive decay electron loss. None of these specialized circumstances associated with anomalous counting data would be expected in the natural history of an organic or carbonate specimen which one might want to date.

To what may the anomalous counting data provided by the “Anderson experiment” be due? Possibly, probably in the judgment of this reviewer, to a complex effect of electric field configuration on the effective counting geometry for the unique physical arrangement of this experiment, i.e., to subtle effects of the electric field configuration on backscatter electrons and on the paths followed by the lowest energy beta particles emitted by C-14 decay.

Satisfactory accommodation of C-14 data to the requirements of Biblical testimony can probably best be achieved through models based on postulates concerning changes in earth’s magnetic field, atmosphere, and biosphere that may have been a consequence of events associated with the flood.
Along the western edge of the Columbia River Plateau, next to the Cascade Mountains, a unique state park has been created. The Ginkgo Petrified Forest State Park, located in the State of Washington, is found in a panorama of hills and plains gashed by dry canyons and watercourses. The dark basalt that underlies the whole area shows up starkly in the cliffs along the many abandoned water channels. Although the water that rushed through long ago is mostly gone now, the story told by the remains is a fantastic one that speaks of major flooding and erosion by broken glacial dams and swollen rivers draining from the margins of the continental glacier.

Before we describe the Park in greater detail, an explanation of the name is needed. Ginkgo is an unusual type of tree, sometimes called the Maidenhair tree. Its leaves, which resemble a partly opened Chinese folding fan, are completely diagnostic.

Fossil Ginkgo leaves have been found in several places in the world; the wood itself is rare. Many different species and varieties lived in the past, but only one representative still remains — truly a living fossil! Since botanists discovered live Ginkgo trees in China, the trees have been planted in many parts of the world. Because petrified wood of the Ginkgo tree has been found near the area of the State Park, it seemed appropriate to name the Park after this tree. Some pieces of cut-and-polished Ginkgo wood can be seen in the Park museum. But the country around the Park is a treasure house of petrified wood. Collectors have been combing the hills for many years, and wood is still being found in the gulleys and gulches of these barren slopes.

The Park encompasses several hundred acres where no collecting is permitted. Its annex several miles west of the main park area has walking trails along the hillside to a number of petrified trees buried in the basalt but showing no appearance of being burned. How can this be? No one knows for sure; perhaps the explanation is that the trees were submerged in water. The basalt cooled so rapidly that the wood did not burn.
The most remarkable feature of this Park, however, is the great variety of trees and plants represented. Nowhere else in the world are so many kinds of petrified wood found in so small an area. An examination of the approximately 200 species reveals another unusual fact: these trees and plants are not those expected from one climatic zone. They range all the way from tropical jungle trees to trees found today in the northern plains of Canada and Alaska. Some of the tropical trees are teak, breadfruit, cinnamon, and gum. Others more common to temperate zones and cold climates are redwood, fir, cottonwood, and spruce. Note these interesting plants: Chinese walnut, magnolia, madrona, sassafras, mahogany, yew, and witch hazel. Further, this great variety of plants is not all found growing in one part of the world today, but is scattered on different continents.

The explanation presented in the Park museum is that these trees grew in a broad altitudinal range. According to the present interpretation, the trees from high mountains, those from intermediate hills, and those from tropical lowlands all were washed together into low swamps and lakes by streams and rivers. Thus trees of great variety were mixed together in the basalt beds of Ginkgo Petrified Forest State Park.

The region now varies in elevation from about 1000 feet to 3000 feet above sea level. A number of miles to the west, the Cascade Mountains rise several thousand feet higher. Presently the area experiences cold winters and hot summers. Rainfall is light. The number of indigenous tree species is somewhat limited. If all these many kinds of fossil trees lived together originally in this area, the range in elevation must previously have been much greater than it is now, and the lower areas must have experienced tropical growing conditions.

This interpretation is not entirely satisfactory. There is no place in the world today where so great a variety of tree species grows in such close proximity. The length and diameter of the petrified logs would require more than small streams to move such trees down to the lowlands. Several streams currently flow from the Cascade Mountains into the Columbia. Two of them, the Yakima and the Wenatchee, are of moderate size, but are not able to transport large trees many miles. Especially in the upper reaches, the streams are too small to float such trees. There are no evidences in the basalt beds of large ancient river courses, nor are there extensive deposits of sedimentary material which should accompany a broad river. Petrified driftwood is often found; occasionally an upright petrified tree is seen. These are interpreted as having floated in a lake until they sank to the bottom and were eventually buried by lava.
The great variety of trees from widely varying climatic conditions buried in ash, cinders, and basalt is strongly suggestive of catastrophic conditions as described in the book of Genesis in the Bible. Apparently trees from extensive geographical and climatic areas floated together and were trapped and buried by the volcanic materials. The absence of burning of the wood might indicate rapid cooling by water. The volcanic material is often in the form of pillow basalts which are understood to be produced when volcanic matter flows under water.

Although much has yet to be learned about this amazing petrified forest, a flood interpretation appears to be as scientifically reasonable as that now portrayed by the museum. In these dry coulees and semi-deserts of eastern Washington, a glimpse of the preflood forests and the dynamic processes that buried them has been exposed. It tells a story more of catastrophism than of uniformity.