JOURNAL OF THE
AMERICAN
SCIENTIFIC
AFFILIATION

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"The fear of the Lord is the beginning of Wisdom." Psalm 111:10

VOLUME 22 NUMBER 3 SEPTEMBER 1970

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JOURNAL OF THE AMERICAN SCIENTIFIC AFFILIATION

SEPTEMBER 1970 PRINTED IN THE UNITED STATES OF AMERICA VOLUME 22, NUMBER 3

New Facets of the Evolution Controversy

This September issue of the *Journal ASA* is devoted primarily to a series of discussions related to the issues of the classical evolution controversy. Although this controversy in its usual forms has not contributed greatly to a Christian position in the modern world, the concepts involved are basic to an understanding of modern thought and we have received numerous requests by readers of the *Journal ASA* to continue in an instructive role on this subject.

It can probably be predicted in advance that no reader of the *Journal ASA* will be completely happy with this issue. The approval of a large fraction of its readers could have been gained by publishing an issue which was exclusively either pro-evolution or anti-evolution. By choosing to present a series of apparently conflicting papers, we have reconciled ourselves to displeasing all partisans. On the other hand, we hope that this issue will serve as a stimulus for readers to set right the wrongs that they feel exist in this kind of presentation.

There *is* a structure to the world that can be described in scientific terms. Whether this structure is detected by assuming the validity of evolutionary theory as a description of the development of more complex from less complex forms, or by analyzing the structure presently observable by starting with the complexities of human society and breaking down into successively smaller components until we arrive at the "elementary" particles, the result is similar. And the question that must be faced is similar: "When we have at our disposal a scientific description of the structure of the world, do we have any need or any room for a religious description?"

That is the question the December issue of the *Journal ASA* faces.

Evolution: Required or Optional in a Science Course?

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Students, teachers, and parents encounter emphatic presentation of organic evolution as fact. *An objective pattern of opposition, based on scientific work, to this type of teaching of organic evolution is provided. Two theories of evolution: the general and the special, are explicated. Each theory of evolution is examined with regard to reasonable predictions that can be stated within limits of the normal scientific viewpoint. Conclusions are reached that the fossil record (the historical record) cannot be used to support the general theory of evolution; there are* no *intermediate or transitional forms in the fossil record. Data of the so-called fossil "series", gene combinations and recombinations, hybrization, mutation, migration, isolation, distribution, and selection may be interpreted from the viewpoint of gradual evolutionism or instantaneous creationism. The general theory of evolution should, at most, be optional for a science course, while the special theory of evolution is an appropriately required area of study to exemplify characteristic scientific procedures and findings.*

INTRODUCTION

Many Christian parents are asking these days, should evolution be required or optional in a science course? A corollary question might be raised: Is there any basis in scientific work for an objective answer to this question? Across the nation parental attention has mounted regarding methods of teaching evolution in science courses. Such increased attention has been a result of increased adoptions of the BSCS textbooks produced under the direction of leaders of the American Institute of Biological Sciences.

Actually criticisms of the teaching of evolution have been heard for a long time in many lands. Scholars criticized application of Darwin's ideas in his day, professors pointed out fallacies in Haeckel's reasoning, and so likewise for social Darwinists. Many sources of documentation are available to substantiate this statement.

And within the last few years, even biologists themselves have been highly critical and have written expressly in opposition to monophyletic evolutionary thought. Wistar Institute in Philadelphia published a Symposium Monograph in 1967 entitled, "Mathematical Challenges to the Neo-Darwinian Interpretation of Evolution". And McGraw-Hill, Inc., has published in a house organ, *Scientific Research,* two such articles: "Heresy in the halls of biology: mathematicians question Darwinism" (November, 1967) and "Thinking the unthinkable: are evolutionists wrong?" (September 1, 1969).

I mention these few references simply to point out that evolution is under criticism once more (I should say *still* under criticism, since criticisms by scientists of evolution and natural selection in every decade since Darwin's day can be documented thoroughly). In point of fact, of course, evolution should be criticized in accordance with the tenets of scientific attitude and operative scientific methodologies.

Especially apropos the question whether evolution should be required or optional in a science course, I want to aver that this question may be answered on scientific grounds, as should be the case for a subject so much discussed by men who call themselves scientists. That this question may be resolved on a scientific basis is a crucial fact which opponents of the so-called theory of evolution should affirm loudly, to be followed out in practice. To set a possible pattern of opposition to the teaching of evolution is the purpose of this position paper.

I feel that evolution should not be taught as if *it were observable, or as if someone had actually seen one animal form change into another animal form.*

One brief interjection as added introduction. Ideas expressed in this paper should not be confused with the position maintained by those who would try to prevent the teaching of evolution. I do not support censorship. I do not support removal of the teaching of evolution from school curricula. Rather I assert that evolution must be mentioned since it is such an ancient idea of men, but I maintain that the important question is, "How should evolution be taught?" The manner of teaching is all important. I feel that evolution should

not be taught *as if* it were observable, or as if someone had actually seen one animal form change into another animal form.

DEFINITIONS

Although this is a general position paper, without extensive documentation, some attention must be given to definition of terms, at least briefly. In the following discussion I will use definitions which were proposed by British physiologist G. A. Kerkut in his book, *Implications of Evolution*, published by Pergamon Press (1960). These definitions are now recognized by responsible critics of theories of evolution.

First, a definition of the General Theory of Evolution, which is the amoeba-to-man thesis. According to this theory, all living forms in the world have risen from a single source which itself came from an inorganic beginning. Thus the first living cell "evolved" into complex multicellular forms of life; these gave rise to all forms of invertebrates; in turn, invertebrates "evolved" into vertebrates; fish into amphibia, amphibia into reptiles, reptiles into birds and mammals, early mammals into primates, and finally primates "evolved" into man. Unmistakably this is the basic meaning of the term evolution.

Second, I would define, as does Kerkut, the Special Theory of Evolution, which states that many living animals (and plants) can be observed, over the course of time, to undergo changes so that new varieties are formed. This *can be* demonstrated in certain cases by experiments, controlled experiments. Yet it is not clear at all whether such limited changes that bring about modified speciation are of the same nature as those involved in the appearance of new phyla, new classes, new orders, new families, new genera, and on the invertebrate level, appearance of new species. Is it possible that so-called "speciation" is actually "genetic variation"? If so, let us say so. In short, scientists know of no broad transition from species to species, but most specifically only variation to variation.

And the question might be asked, what is science? The word "science" comes from the Latin for knowledge. A formal definition of science from the Oxford Dictionary reads as follows:

> A branch of study which is concerned either with a connected body of demonstrated truths or with observed facts systematically classified and more or less colligated by being brought under general laws, and which includes trustworthy methods for the discovery of new truth within its own domain.

Scientific activity involves, *from this definition*, facts which can be observed or demonstrated and laws, which have been demonstrated also, by means of *trustworthy* methods for discovery. At the core of scientific method or methods is experimental repeatability or reproducibility. Other synonyms for this core idea are predictability and control. Of course, it is true that scientific method is built upon basic assumptions of all scientists, such as uniformity of nature or cause and effect; and one can recognize theoretical assumptions and even experimental assumptions involved in experimental repeatability. Nevertheless, the heart of scientific method is the problem–hypothesis–test process. The purpose of all this activity is knowledge, explanation, or understanding of phenomena under investigation.

Scientific method necessarily involves predictions. Predictions, to be useful in scientific methodology, must be subject to test empirically. The pertinent question to ask, therefore, is whether this is the case with regard to the General Theory of Evoluion? Or with regard to the Special Theory of Evolution? In sum: Do *any* experiments designed to show "evolution" yield predictable consequences?

FOSSIL RECORD CONSIDERED

The fossil record is *the prime source* of so-called evidence for the General Theory of Evolution. The fossil record is interpreted as the record of what *has existed*, of what *has happened*. Many authorities agree *the decisive* "evidence" for the General Theory of Evolution must be based upon what they consider to be historical, that is, the fossil record.

The very essence of evolutionary thinking is slow change. Therefore, I would *expect* to find, I would *predict*, that investigators would find in the fossil record a *gradual* transition from the simplest to the most complex. This is the *major prediction* from the general theory. In fact, if the General Theory of Evolution is to have any empirical basis whatsoever, such a gradual transition in the fossil record *must* be found.

In other words, systematic or regular gaps must be *absent* from the fossil record, and transitional forms at some stage between all phyla, classes, orders, families, genera, and species *must* be found. Such transitional forms must be found if the General Theory of Evolution, defined already as amoeba-to-man, has occurred. Of course I must admit that some sporadic gaps might be expected in the fossil record. The geological record is not complete. However, there must be *no regular or systematic gaps* in the fossil record. Is this actually the case? How do predictions of the existence of transitional forms survive tests of observation?

EARLIEST INVERTEBRATES IN CAMBRIAN STRATA

The earliest or most ancient geological period in which *indisputable* fossils are found is known as the Cambrian Period according to the generally adopted geological time scale. Noteworthy is the fact that every major invertebrate form of life is found in Cambrian strata. In fact, billions and billions of fossils are found in Cambrian strata. Yet not a single indisputable fossil *prior* to the Cambrian Period has been found! Not a trace of any record of pre-Cambrian life can be found of indisputable ancestry to the well-identified Cambrian invertebrate forms. Paleontologist G. G. Simpson terms the absence of pre-Cambrian fossils "the major mystery of the history of life".

Further, no single-celled organism is considered simple anymore as a result of analysis through the electron microscope. Actually the fossil record contains remains of life which ranged from the *less complex* to the *more complex*, not from the simple to the complex!

If there is a "mystery" about the absence of evidence of ancestors of Cambrian life, there is still another even greater difficulty which arises when the prediction about the presence of transitional forms

in the fossil record is tested. There is a systematic and universal absence of any transitional forms between all higher categories of life, that is, between all phyla, all classes, all orders, and almost all families. Just where the fossil record is needed the most, the evidence does not support the claims of proponents of gradual evolution.

Transitions would have required thousands of generations and millions of years, according to the General Theory of Evolution, and the fossil record should reveal an abundance of transitional forms. However such transitional forms *cannot be found!* Actually sudden appearance of different kinds of animals is indicated by the fossil record! In point of fact, transitional forms between the invertebrate phyla, which appear suddenly in the Cambrian Period strata, have never been found.

Furthermore, since vertebrates appear supposedly in the fossil record more recently than invertebrates and are more complex in organization, proponents of the General Theory of Evolution claim that vertebrates "evolved" from invertebrates. *Then* transitions from the invertebrate, either from animals which had hard outer shells and soft inner bodies or those which were simple soft-bodied forms, to vertebrates with a soft outer body and hard inner parts or skeleton would have been a tremendous transition, indeed, and should be abundantly documented in the fossil record, *if* such transitions actually took place. However, not a single such transitional form has ever been found.

The earliest vertebrate fish is found in the fossil record as 100% vertebrate. Amphibia appear more "recently" in the fossil record than fish. But the amphibia appear 100% as amphibians, and no one would confuse them with fish. Not a single transitional form has ever been found! And the same flat assertion may be made in summary of other vital transitions, such as amphibia to reptile, reptile to birds, and reptile to mammals.

For instance, not a single fossil in which forelimbs are "evolving" into wings, or scales into feathers, has ever been found. These and other necessary transitions, such as hind feet into perching feet, and heavy reptilian bones into light avian bones, must be found in transitional forms, *if* the General Theory of Evolution is to be presented as part of significant scientific knowledge.

No one has produced yet a single fossil with half-way wings or a fossil of an animal showing a transition half-way between the cold-blooded, scaled reptile and the warm blooded, feathered bird. If reptiles "evolved" into birds, thousands of such bizarre transitional forms should be found in the fossil record without difficulty. And not even the fossil *Archaeopterix* can qualify as a transitional form, because it apparently had a bird-like skull, perching feet and fully developed wings with feathers. It was in the fullest sense a bird. It was no more a connecting form between reptile and bird than the bat is between mammal and bird. As Simpson has confirmed, every other fossil bird ever found was a completely bird-like form.

EVOLUTION PROPONENTS MIGHT ARGUE

Proponents of evolutionary theory in the general sense may want to argue at this point that successful predictions have been made with respect to the fossil record. Some might be inclined to argue that because of the concept of evolution men have been aided in seeking fossil remains in-between those already located and identified. For instance the so-called horse "series" or different elephant specimens might be pointed to by evolutionary proponents as results of successful predictions regarding the fossil record. Because some specimens were located, then proponents of evolutionary theory are wont to claim that researchers were aided by evolutionary theory to go to specific rock layers and look for possible in-between specimens.

However, the horse "series" does not display evolution; the so-called horse series does not serve as an example of the General Theory of Evolution. I concede that men have *thought* they were using the General Theory of Evolution when they looked at specific rock layers for in-between specimens of horse or horse-like remains. But careful analysis of their work and reports brings out that the so-called series of horses from possible dog-size and five toes, on through supposed changes to three toes, and then large horses with one toe only of functional use, exemplify *only* variational change within one kind or form of complex organism, namely *horses*. The so-called five, three and present one-toed horses are *all* horses when the discussion is concluded. Therefore no evidence, either direct or circumstantial, has been presented for the General Theory of Evolution, which requires change from one form into another form.

The fossil record reveals (1) *absence of types considered to be most primitive and ancestral to invertebrate life,* (2) *sudden appearance of the major taxonomic groups, and* (3) *an amazing absence of the many transitional forms required by the major prediction from the general theory.*

No change from one animal form into another recognizable animal form has been shown or reported. Only a constancy of form or kind has been displayed if we accept the so-called fossil evidence as reliable for horse ancestry of the present form. Thus evolutionary proponents have not made any successful predictions regarding the fossil record, as far as the General Theory of Evolution is concerned.

DOCUMENTATION OF NO TRANSITIONAL FORMS

Clear documentation for this position is available in a recent publication in England. I refer to *The Fossil Record* (A Symposium with Documentation), jointly sponsored by the Geological Society of London and the Palaeontological Association of England, published in 1967 by the Geological Society of London (Burlington House, London, W1). I am indebted to Professor Father Vincent J. O'Brien, science master at Castlenock College, County Dublin, Ireland and chairman of the Association of Irish Teachers of Science, for calling my attention to this thorough scientific work.

In this research volume, some 120 scientists, all

specialists, prepared 30 chapters in a monumental work of over 800 pages to present the fossil record for plants and animals divided into about 2,500 groups. Also these specialists prepared 71 highly instructive and authoritative charts which are included throughout the chapters of the book. The conclusive generalization which may be drawn from these charts is as follows: *Each type of plant and animal is shown to have a separate and distinct history from all the other types.*

Groups of both plants and animals *appear suddenly* in the fossil record. For example, mammals appear in the so-called Eocene division and are as diverse then as researchers find them to be today. Whales, bats, horses, primates, elephants, hares, squirrels, etc., all are as distinct at their first appearance as they are now. There is not a trace of a common ancestor, much less of a link with any reptile, the supposed progenitor. And the same is true of the *sudden* appearance of about 50 families of flowering plants in the so-called Cretaceous division of the accepted geological time scale.

Many paragraphs could be used to summarize the scientifically documented information about plants and animals in the fossil record. But I want to make the point that knowledge of the content of the above cited book published in 1967 is not recent. Specialists in the proper fields have possessed most of these facts for decades. And proponents of the General Theory of Evolution, who are familiar with the facts of paleontology, admit existence of gaps between *all* higher categories. They admit that this is an undeniable fact of the fossil record.

AUTHORITIES RECOGNIZE GAPS

Simpson has said, "It is a feature of the known fossil record that most taxa appear abruptly . . . . . Gaps among known orders, classes, and phyla are systematic and almost always large." This is a very important statement by this specialist. Simpson said the gaps are *systematic.* But this is precisely what cannot be allowed *if* the General Theory of Evolution is to be supported empirically.

The careful critic is able to assert quite accurately that there is no empirical evidence in existence to support the General Theory of Evolution.

Prof. Alfred S. Romer of Harvard University has said, "Links are missing just where we most fervently desire them and it is all too probable that many links will continue to be missing," in the book *Genetics, Paleontology and Evolution* (p. 11). And the late Dr. R. B. Goldschmidt, a geneticist, spoke of the paleontological record by writing, "When a new phylum, class or order appears, there follows a quick, explosive (in terms of geological time) diversification so that practically all orders or families known appear suddenly and without apparent transitions." ("Evolution as Viewed by One Geneticist", *American Scientist,* Vol. 40, 1952, p. 97)

These men are authorities in their fields and each has recognized that gaps appear in the fossil record, *systematic* gaps; links are *missing,* and groups of organisms appear *suddenly* and *without* apparent transitions. Thus with regard to the General Theory of Evolution, instead of a transition from lowest to highest, the fossil record reveals:

(1) absence of types considered to be most primitive and ancestral to invertebrate life.

(2) sudden appearance of the major taxonomic groups, and

(3) an amazing absence of the many transitional forms required by *the major prediction* from the general theory. The historical record, rather than supporting the General Theory of Evolution, is actually incompatible with the theory.

Is the General Theory of Evolution really part of scientific activity? Scientific activity involves facts which can be observed or demonstrated by means of trustworthy methods of discovery. There is no question about the discovery of remains of plants and animals which are identified as fossils. Thus the discovery of fossils and the organization of the remains based on similarities to living organisms is all part of solid scientific activity. But the core of scientific work is experimental repeatability which, as already noted, is synonymous with predictability and control.

Where are the demonstrated or observed experiments on relationship among or between fossils, or for that matter among or between fossils and living things? Such control of events is totally impossible. There are breeding gaps in addition to the already recognized gaps in the fossil groups. *No predictions* of breeding results are possible with fossils. And *no predictable* transitional forms according to the General Theory of Evolution may be found in the fossil record.

Thus the careful critic is able to assert quite accurately that there is no empirical evidence in existence to support the General Theory of Evolution, when it is understood to mean the amoeba-to-man thesis, or the change of one animal form into another animal form, or one plant form into another plant form.

Should evolution be required or optional in a science course? As far as scientific activity is concerned, the General Theory of Evolution should *not* be part of a science course. The General Theory of Evolution should at most be optional for a science course.

Is the General Theory of Evolution more properly a part of the subject area of Philosophy? Yes. The impact of the General Theory of Evolution on philosophy and other academic disciplines has been multiple in dimension and kind. Any treatment of such impact is really a study of *Evolutionism* and goes beyond the scope of this paper.

SPECIAL THEORY OF EVOLUTION

A briefer examination of the Special Theory of Evolution is possible. Many reports of experimental studies in "evolution" are available. For example, in 1955, W. H. Dowdeswell published a book on *The Mechanism of Evolution,* with the first Harper Torchbook edition appearing in 1960. That title should have been about mechanisms of micro-evolution, but more on this concept later. In 1960, W. S. Boyle published "Studies in Experimental Evolution" as part of the *Faculty Honor Lecture Series* of Utah State University.

And in 1966, Prof. E. B. Ford of Oxford University spoke at Michigan State University on the subject, "The Experimental Study of Evolution".

Are these studies designed to test predictions of the General Theory of Evolution or Special Theory of Evolution? Studies with violets, bacteria, butterflies, or moths can be shown to involve organisms which always remain fully recognizable as violets, bacteria, butterflies, or moths. These studies are *not* experimental studies within the frame of reference of the General Theory of Evolution, which requires change of one form into another form of organism.

All the experimental studies known have been tests of predictions or consequences of the Special Theory of Evolution, which stated that many living animals (or plants) can be observed, over the course of time, to undergo changes so that new varieties are formed. This is the type of "evolution" which *can be demonstrated* in the laboratory or in the field. Does "evolution" here mean "genetic variation"?

It would be quite correct to interpret tests of the Special Theory of Evolution as tests of micro-evolution. But in no way have laboratory scientists come close to demonstrating the type of change in living forms required by the General Theory of Evolution. It is true that proponents of the General Theory of Evolution have the hope, the desire, and the faith that the mechanism or mechanisms of micro-evolution provide understanding of the mode of surmised general evolutionary change. (See *The Process of Evolution* by Paul R. Ehrlich and Richard W. Holm. New York: McGraw-Hill Book Company, 1963, pp. 308 through 312.)

But tests of the Special Theory of Evolution, or micro-evolution, are no more than studies of genetic variation. This was clearly admitted by Prof. Ford during his presentation. All of his data related to variations, primarily genetic, of organisms such as butterflies and moths, which he and his colleagues had studied over the past 40 years. At no time did Prof. Ford, or do any other published reports of so-called studies of experimental evolution, show any change of one animal form into another animal form, or one plant form into another plant form.

EQUIVOCATION OF TERMS REJECTED

The laboratory experimenter, or the field investigator for that matter, only studies genetic variation within limits. In other words, empirical scientists produce tests of predictions and consequences of the Special Theory of Evolution, or micro-evolution, and *no more*. In point of fact, unless someone forces an equivocation of the term "evolution" with "genetic variation", such experimentation is simply irrelevant (*non sequitur*) to the discussion of any rise of new forms of life out of old forms.

Should the Special Theory of Evolution be required or optional in a science course? The Special Theory of Evolution amounts to another expression of the concept of genetic variation, or micro-evolution. Since studies of genetic variation are excellent examples of the core of scientific activity, that is, controlled experimental tests of repeatability and predictability, then such studies should definitely be required as part of a science course.

The net effect of this brief attention to the Special Theory of Evolution has been a lesson in semantics. If by "evolution" one means to commit an equivocation with "genetic variation", then such a person is speaking about discovery of observable and demonstrable facts obtained through trustworthy methods, which is excellent scientific activity. But equivocation of terms does not speak well for rigorous use of terms and should be avoided. Thus I support studies of genetic variation in science courses for that purpose alone, i.e., studies of genetic variation as excellent examples of scientific activity. Such studies should be totally devoid of reference to the General Theory of Evolution. Furthermore, there is absolutely no *need* for mention of the Special Theory of Evolution and/or micro-evolution since to all intents and purposes the concepts involved are essentially the same as those involved with studies of genetic variation.

PROPRIETY OF CRITICISMS OF EVOLUTION

Critics of theories of evolution have no quarrel with the Special Theory of Evolution as such, or with micro-evolution, when one actually means genetic variation. The *fact* of genetic variation, and the fact of changes of animal and plant forms *within* limits is readily admitted. The problem is that critics of theories of evolution are puzzled as to why some scientists use the term "evolution" when "genetic variation" may be used without equivocation, with greater rigor of meaning, and with actual physical referents.

Debate and criticism of organic evolution is focused upon the General Theory of Evolution. There also is much serious criticism of seemingly unrestrained, enthusiastic extensions of the general theory to other disciplines, far removed from the field of biology.

It is proper in scientific endeavor to criticize theory, and empirical work as well. Criticism is the very essence of the scientific attitude. Most scientists will readily admit that theories and ideas of laboratory scientists are always open to re-evaluation. Doubt is always needed for the so-called self-correctiveness of scientific activity.

Ideas about the General Theory of Evolution . . . actually are speculations derived from the philosophy of naturalism extended far beyond the limits of testability, repeatability, and predictability.

Propriety of criticisms of theories of evolution has been brought out by many scholars, among whom is W. R. Thompson, Fellow of the Royal Society of England, and former director of the Biological Institute of Control in Ottawa, Canada, who wrote:

> As we know, there is a great divergence of opinion among biologists, not only about the causes of evolution but even about the actual process. This divergence exists because the evidence is unsatisfactory and does not permit any certain conclusion. It is therefore right and proper to draw attention of the non-scientific public to the disagreements about evolution. But some recent remarks of evolutionists show that they think this unreasonable. This situation, where scientific men rally to the defence of a doctrine they are unable to define scientifically, much less demonstrate with scientific rigour, attempting to maintain its credit with the public

> by the suppression of criticism and the elimination of difficulties, is abnormal and undesirable in science. (Introduction to *The Origin of Species*. New York: Dutton Everyman's Library Edition, No. 811, 1956, p. xxii)

Also W. R. Thompson has written in a recently republished book, *Science and Common Sense* (Magi Books, Inc., Albany, N. Y., 1965):

> But as has been shown in previous chapters, the development of Science, as an autonomous discipline, seems to entail the rigorous elimination of philosophical notions. . . . . (Yet) evolutionary speculation is (full) of philosophical principles and suppositions. The concept of organic evolution is very highly prized by biologists, for many of whom it is an object of genuinely religious devotion, because they regard it as a supreme integrative principle. This is probably the reason why the severe methodological criticism employed in other departments of biology has not yet been brought to bear against evolutionary speculation. (p. 229)

And Errol Harris makes clear in his 1965 book on *The Foundations of Metaphysics in Science*, that organic evolution is based upon the "argument from improbability". He uses eight pages to relate many examples of "coherently integrated systems that the evolutionary process must produce", which are in apparent contradition to the Second Law of Thermodynamics.

Criticisms of the General Theory of Evolution are set in focus by attention given to "scientism" by Isidor Chein in his April, 1966 article in *American Psychologist*. Scientism can be defined as that belief that the only knowledge worthy of being called such is obtained through the scientific method. This is of course a prejudice in favor of naturalism, a particular form of philosophy. Chein wrote:

> The most extreme expressions of scientism involve doctrinaire views on the nature of science and on proper rules of scientific conduct and expression. By strict application of some of these rules, a considerable array of sciences, from anatomy to zoology, would be *ruled out of the domain of science* because they are, in the main not experimental, not quantitative, not concerned with prediction, and/or not hypothetico-deductive in structure. (p. 337) (Emphasis added)

Chein continued, "A work like Darwin's *Origin of Species* would similarly not be expected to make the grade since it promulgates as a theory presuppositions that can only be applied on a post hoc basis and do not serve the ends of prediction."

In the face of this analysis, what empirical scientist can seriously consider "origins" of life as an empirical scientist? What student of so-called historical geology can give serious thought to supposed empirical study of Paleozoic or Mesozoic divisions of accepted geological time scale? Certainly discussions of "origins" and so-called historical geology are to be considered qualitative, speculative imaginations of philosophically oriented men, rather than the type of scientific research work in which we have rightly become accustomed to putting our trust.

SUMMARY AND CONCLUSIONS

Criticisms have been formulated against theories of evolution in terms of the question asked by many Christian parents, "Should evolution be required or optional in a science course?" I conclude that the General Theory of Evolution should *not* be required in a science course because it is unrelated to any direct study of scientific activity. Of course, the General Theory of Evolution might be used as a prime example of philosophial speculation by believers in naturalism.

The Special Theory of Evolution should be required in a science course. However, expression of the Special Theory of Evolution and discussion around it might just as well be in terms of studies of genetic variation, which is all that proper scientific activity can demonstrate in the laboraory or in the field.

Full use of the methods of experimental science is *not* applicable to the General Theory of Evolution at all. The fossil record does not support the claims of proponents of the General Theory of Evolution. There are many scientists today who attest to this condition, and many who have written on this point over the decades since 1859 when Darwin's book first appeared. Parents are quite properly asking, "Why haven't my children heard of and read these critics in their elementary, secondary, or college level studies?"

Experimental studies that are reported, and those that can be conducted properly within the frame of reference of empirical science, support *only* the Special Theory of Evolution, micro-evolution or genetic variation. There is *absolutely no* experimental evidence for any change of one animal form into another animal form, or for any change of one plant form into another plant form, as demanded according to the General Theory of Evolution.

The *only* evidence of change which can be classed properly as the result of scientific method is the evidence of genetic variation *within* limits of kinds of forms of animals, or *within* limits of kinds or forms of plants. A dog-kind, horse-kind, and man-kind exist; a moss-kind, fern-kind, and flowering plant-kind exist. There is *absolutely no* empirical, repeatable, reproducible, predictable evidence from breeding experiments for connections between these kinds, and *no evidence* in the prime historical source, the fossil record, for any actual connection in sequence of these kinds.

No transitional forms have been found in the fossil record very probably because no transitional forms exist in fossil stage at all. Very likely, transitions between animal kinds and/or transitions between plant kinds have never occurred. This conclusion may be expressed another way: The data of the so-called fossil "series", gene combinations and recombinations, hybridization, mutation, migration, isolation, distribution, and selection may be interpreted from the viewpoint of *either* the philosophy of gradual evolutionism *or* the philosophy of instantaneous creationism. Specific choice depends upon presuppositions of the interpreter.

The acceptance of interpretation of empirical data within the frame of reference of instantaneous creationism may be made as the least complex, and as one unemcumbered with the serious consequences of acceptance of the philosophy of evolutionism as a basis for interpretation. Ideas about the General Theory of Evolution, about the past, such as ideas about the "origin" of life, are *not* based upon empirical science, but actually are speculations derived from the philosophy of naturalism *extended far beyond* the limits of testability, repeatability, and predictability.

Adam and Anthropology: A Proposed Solution

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The perspectives of 20th century anthropology are incompatible with the acceptance of the literal historicity of Genesis 2 and 3. Anthropology's first man must be dated before Neolithic times; the literal man of Genesis 2 and 3 must be dated in Neolithic times. The legitimate use of anthropology resolves the conflict by leading to the recognition that Adam is a figurative person, who harmonizes with both anthropology and biblical theology.

Introduction

The Bible says (Luke 3:38; Romans 5:12,14; I Corinthians 15:21, 22, 45, 57) that Adam was the first man. Literally interpreted, his culture was Neolithic: he lived no earlier than 10,000 B.C. Anthropology says the first man's culture was Paleolithic: he lived far earlier than 10,000 B.C.[1]

The Christian anthropologist, James O. Buswell III, writes:

> Few authors of conservative evangelical stripe even so much as acknowledge the problem. One either has a recent Adam contemporary with the Neolithic-type culture found in Genesis 4, or else one is labeled as sliding toward liberalism.[2]

We propose a solution to the problem that is not liberal: Adam is not every man; Genesis 3 is not a myth. We propose a solution that does not muzzle or frown on anthropology. We propose a solution that arises naturally when we relate anthropology to the Bible via the principles of standard hermeneutics. But first let us look more closely at the problem.

A Literal Adam Must Be Neolithic

The technique of dating Adam by dating the facets of culture that the Bible associates with him is basic in standard dating procedure. Ezra and Nehemiah are dated in the middle of the fifth century B.C. because the Bible associates them with the achaemenids, which archaeologists date in the middle of the fifth century B.C. Rehoboam is dated c. 925 B.C. because the Bible associates him with Sheshonq I, whom archaeologists date c. 925 B.C. The patriarchs are dated in the second millenium B.C. because the Bible associates them with a culture that archaeologists date in the second millenium B.C. Consistency demands that Adam also be dated by the culture that the Bible associates with him.

The Bible, literally interpreted, associates Adam with a Neolithic culture. So, one who wishes to use standard dating procedure is bound to date Adam in Neolithic times.

In attempting to avoid this Neolithic dating, T. C. Mitchell argued that the culture of Genesis 4 could have been Paleolithic rather than Neolithic. But finally he was forced to admit,

> While most of the features might belong to a period from Upper Paleolithic to the Iron Age, two features, agriculture and animal husbandry, would seem to point to a period after the "Neolithic Revolution" in Western Asia.[3]

Mitchell finally suggested that we wait in hope that a Neolithic-type culture might turn up in Paleolithic times. We agree with James Buswell's assessment of this possibility:

> Of course archaeological discoveries have surprised us before, but from the present outlook it seems very unlikely that the Neolithic culture pattern will turn up on any horizon whose antiquity is radically different.[4]

Buswell's suggested solution is that Cain and Abel might only *appear* to be domesticators of plants and animals. But Moses could write of *hunting* (Genesis 25:27; 27:3, 30) and *gathering* (Exodus 16:16, 17, 21; Numbers 15:32). Couldn't he have described the *hunting and gathering* economy of Paleolithic times? If Genesis 2-4 is literal history, why should Moses make a Paleolithic culture look so very Neolithic?

Christian anthropologists are in agreement that men, who were truly human, existed in Paleolithic times before a Neolithic Adam.

Of course Cain and Abel only date Adam as Neolithic if Genesis 4 is immediately historically continuous with Genesis 2 and 3. We will show, however, that Genesis 4 is not immediately historically continuous. Nevertheless, if Genesis 2 and 3 are taken literally (Genesis 2:8, 9, 15, 19, 20; 3:2, 23) Adam is still a domesticator of plants and animals: he still must be dated in Neolithic times.

True Men Existed Before Neolithic Times

Christian anthropologists are in agreement that men,

who were truly human, existed in Paleolithic times before a Neolithic Adam.[5] It is quite difficult to refer to a ceature as just an animal when he buries his dead on laboriously collected mounds of flowers.[6]

In addition to the existence of fully human men in Upper Paleolithic times, there are true men in today's world who descended from Paleolithic ancestors. Their physical and cultural descent has not been interrupted. There is no place in their historical descent to insert a Neolithic Adam as their Father.

Men were in America, for example, 10,000 years before the times of a Neolithic Adam. There is no marked hiatus or discontinuity in racial type or cultural sequences in the Americas such as would exist if the Americas had been repopulated between 20,000 B.C. and the present.

Similarly, there is in the Shanidar Valley "an almost continuous sequence of human history dating from the times of the Neanderthals."[7] Thus, Buswell writes:

> I believe that Adam has to antedate the Neanderthals. This seems warranted by the continuity at Shanidar as well as the American entrance date.[8]

Jan Lever adds that the Australian natives go back to *Neanderthal* or even *Pithecanthropus* in features, and tribes like the African Bushmen and the Eskimos have probably lived very much longer in their present isolated biotype than 10,000 years.[9]

All over the world anthropologists find living men who have descended directly from Paleolithic ancestors, not from a Neolithic Adam. These men are true men. They have a culture; they have a language; they can be won to Christ. And when we look at their Paleolithic ancestors via fossils and associated artifacts, we find reason to believe that they were true men also.[10] So, uninterrupted descent of various lines of true men from Paleolithic times to the present prevents us from saying that all true men descended from a Neolithic Adam.[11]

The Solution

We propose that this Adam-anthropology dilemma may be resolved if we recognize that:

1) Genesis 2 and 3 are not literal history; the Neolithic culture there is figurative and cannot date Adam.

2) Genesis 4 is not historically immediately continuous after Genesis 3; its Neolithic culture is irrelevant for dating Adam.

3) Adam is a symbol for the actual first man.

We see Genesis 2 and 3 as purely symbolic and figurative. In the words of Albertus Pieters,

> The purely symbolical view . . . looks upon the story as a whole, and accepts the underlying teaching as historical, but does not accept the form of portrayal as setting forth precisely what occurred. Most of the details are then considered to be pictorial and imaginary. It is then believed that there were, in all probability, no actual serpent, aprons, fruit, conversation, *etc.* as here recorded, but that something supremely important did really happen, which is here set forth in symbolical form.[12]

We see Genesis 2 and 3 as figurative because standard hermeneutics interprets any passage as figurative that (1) *is not* a literal account of a miracle, but (2) *is* contrary to scientific evidence. (Cf. Jeremiah 48:11, 12; Ezekial 1:4-14; Daniel 7:7, 8; Zechariah 6:1; *et al.*) That is, a passage must be taken figuratively if there is no legitimate way to take it literally.

Proposed resolution of the Adam-anthropology dilemma: (1) Genesis 2 and 3 not literal history, (2) Genesis 4 not historically immediately continuous after Genesis 3, (3) Adam a symbol for the actual first man.

First, Genesis 2 and 3 are not a literal account of a miracle. At the points where supernaturalism enters the narrative (2:7, 8, 15, 19, 21, 22; 3:8, 21, 24), the language is anthropomorphic. Literal interpretation would reduce the Creator to a creature with hands, lungs, and legs. As for the talking serpent, there is no more reason to accept this literally than to accept the talking fish and animals of Revelation 5:13 literally.

Second, if Genesis 2 and 3 are taken literally, the first man must have lived in Neolithic times. This is contrary to the scientific evidence of anthropology. We must conclude that since there is no legitimate way to take Genesis 2 and 3 literally; it must be interpreted figuratively.[13]

We also see Genesis 2 and 3 as figurative because other passages that look at first like literal history are found to be figurative upon further investigation. The *prima facie* impression of literal history is given up when investigation shows that the true genre of the passage is figurative. (Cf. Genesis 1; Ezekial 4; Zechariah 2:1-5; Matthew 4:8; Luke 16:19-31; Revelation 21:10-27)

Investigation shows that the true genre of Genesis 2 and 3 is figurative. Its beautiful garden, magical trees, and river are found again in the figurative account of Revelation 22:1-3. Its creation of man from a clay figure and of woman from a rib cry out for figurative interpretation. Its name for the first man, "Mr. Man", also suggests a figurative account. Its cherubim, lion-eagle-man creatures, must be taken figuratively.[14] As for its literally historical rivers, the Tigris and the Euphrates, they no more prove that Genesis 2 and 3 are literal history than the literally historical Arabah and Dead Sea of Ezekial 47:8 prove that the narrative in Ezekial 47 should be interpreted literally.

Standard hermeneutics forces us to give up the naive literal interpretation of Genesis 2 and 3. Genesis 2 and 3 are purely symbolic. The underlying history really happened; but the form in which that history is portrayed is purely imaginary. Genesis 2 and 3 tell us that God made the first man and this man sinned.[15] The Adam of these chapters (and 5:2) is symbolic for the first man whoever, whenever, and wherever he was. The Bible gives us theological revelation. It is up to anthropology to supply the literal historical details.[16]

The Relation of Genesis 4 to Genesis 2 and 3

The "parabolic" or purely symbolic genre of Genesis 2 and 3 is in contrast to the rather straight-forward historical genre of Genesis 4. This contrast gives us reason to separate the narrative in Genesis 2 and 3 from Genesis 4. But the narrative in Genesis 4 seems immediately to follow the Adam and Eve of Genesis

The interpretation of Genesis 2-4 as consecutive literal history is a prejudice of our times.

2 and 3. If Genesis 4 is Neolithic, isn't the Adam of Genesis 3 Neolithic?

Isn't the Adam of Genesis 3 found in Genesis 4 as the father of the Neolithic Cain, Abel, and Seth? Our proposed solution gives a "yes and no" answer to this question. We propose that the "Adam" of Genesis 4 and 5:3 is the Adam of Genesis 3 and 5:2 *in name only*. The Adam of Genesis 3 and 5:2 is the *forefather* of the Neolithic "Adam" who actually fathered Cain, Abel, and Seth. The Neolithic "Adam" of Genesis 4 and 5:3 is so unimportant in comparison to his forefather, the first man, that he is called by the name of his illustrious forefather.

This sort of slighting of the actual father is not unusual in Hebrew historiography. "Sons of Asaph" live about 500 years after the death of the famous Asaph (Ezra 3:10). Shem is "the father of all the children of Eber" (Genesis 10:21). Moab is "the father of the Moabites unto this day" (Genesis 19:7). Josiah (c. 600 B.C.) walked in all the ways of David his father (c. 1000 B.C.) (II Kings 22:2). Illustrious forefathers are often credited with the paternity of lesser descendants who are the actual fathers.

There is of course some difference between the cases just cited and the parts of Genesis 4 which speak of Adam *knowing* his wife and Eve *naming* her son Seth. But such language is only consistent; it is just the giving of a few details. Even this detailed historiography is not unique in the Bible. In Exodus 6:20 (Cf. Numbers 26:59) where "Amram *took* Jochebed his father's sister to wife and she *bare* him Aaron and Moses", there is good reason to believe that Amram and Jochebed are really Moses' distant ancestors.[17] This is a very close historiographical parallel to the *knowing* and *naming* of Genesis 4.[18]

Judging by Hebrew historiography Genesis 4 *can* be separated in time from Genesis 3. The difference in genre between the two chapters suggests that they *should* be separated. And, there is another reason to separate them: Genesis 4:14, 15, and 25 indicate that a number of people lived outside of Cain and Abel's immediate family. It seems very natural to take these people as descendants of a Paleolithic Adam, but not of the Neolithic "Adam". From these people (to answer an old question) Cain got his wife. (Genesis 4:17)

Finally, it is not impossible for a symbolic account (Genesis 3) to blend into a more literal, historical account (Genesis 4). At the end of the Bible, where John is shown "the things which must shortly come to pass" (literal history), the things shown are symbolic (Revelation 1:1; 4:1ff). Biblical *history* both begins and ends with a *symbolic* garden (Genesis 2:8-17; Revelation 22:1-5).

Conclusion

It seems that the interpretation of Genesis 2-4 as consecutive literal history is a prejudice of our times, a reading of our ideal historiography into the Hebraic historiography of the Bible. We have to give up our prejudice and accept the Bible as it is. We cannot insist that revelation from the true God would surely use the historiography of *our* times and culture! As for Adam, the first man, let us accept the narrative for what it is: a purely symbolic history bearing theological truth. In this way we appropriate the message of Genesis 2 and 3 without negating the truth found in anthropology.

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[1]See "The Age of Man", *Journal ASA*, March, 1966; and the letter of Dr. Custance, *Journal ASA*, September, 1968.

[2]James O. Buswell III, "Adam and Neolithic Man", *Eternity*, February, 1967, p.29

[3]T. C. Mitchell, "Archaeology and Genesis I-XI", *Faith and Thought*, Summer, 1959, p. 42

[4]Buswell, *op. cit.*, p. 48

[5]James Murk, "Evidence for a Late Pleistocene Creation of Man", *Journal ASA*, June, 1965; Smalley and Fetzer, "A Christian View of Anthropology", *Modern Science and Christian Faith*, rev. ed., 1950

[6]"Neanderthal Burial", *Collier's Year Book*, 1969, p.108

[7]Ralph S. Solecki, "Prehistory in Shanidar Valley, Northern Iraq", *Science*, January 18, 1963, p. 179

[8]Buswell, *op. cit.*, p.50

[9]Jan Lever, *Creation and Evolution* (Amsterdam: Free University), p.171

[10]Murk, *op. cit.*; Smalley and Fetzer, *op. cit.*

[11]Both our problem and solution are dependent upon the essential correctness of modern anthropology—which some would write off in order to protect a theological tradition. But, anthropology, like any other science, has a Biblical basis. It is commissioned by God (Genesis 1:28). It is undertaken in a world of essential uniformity (Genesis 1:14,28). It is not a delusion of sinful minds, but a product of men in God's image functioning by common grace (Genesis 9:6; Matthew 16:3). There is no reason to write off modern anthropology in order to protect orthodoxy: the loss of a traditionally literal Adam and Eve is theologically of no importance whatsoever, so long as the fall of man is retained.

[12]Albertus Pieters, *Notes on Genesis* (Grand Rapids: Eerdmans, 1954), p.95

[13]It once was traditional to interpret the parts of the Bible literally that said the earth did not move, but the sun did. The trained scientist, however, said the earth moved around a stationary sun. The theologian looked and looked but could not see the earth move; he could see the sun move. So, he clung for awhile to traditional interpretation. When the scientific facts became widely known, the theologian took those same parts of the Bible figuratively. Today it is traditional in Evangelical circles to take Genesis 2 and 3 literally. But the trained anthropologist says a Neolithic first man is impossible. The theologian looks and looks, but all he sees in anthropology is a "box of bones". When the scientific facts of anthropology become common knowledge, however, Evangelicals will, no doubt, take Genesis 2 and 3 figuratively.

[14]Cf. Bernard Ramm, "Science vs Theology—the Battle Isn't Over Yet", *Eternity*, October, 1965; Pieters, *op cit.*

[15]For a fuller discussion of the theological content of Genesis 2 and 3 see Helmut Thielicke, *How the World Began* (Philadelphia: Fortress Press, 1961)

[16]Except for the fact that Adam was the first sinner, the New Testament writers never depend upon the literal historicity of Genesis 2 and 3. As with Jesus' parables, the moral points made are valid regardless of the literal historicity of the story.

[17]Keil and Delitzsch, *Biblical Commentary on the Old Testament*, Vol. 1 (Grand Rapids: Eerdmans, 1949), p.420

[18]Similarly in Genesis 46:18 we see that the great grandsons of Zilpah are included among "these she *bare* unto Jacob." Also in Isaiah 51:2 we read that Israel should look back over 1200 years to "Abraham your father and to Sarah who *bare* you."

The Dying of the Giants

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Introduction

There are numerous mysteries that plague the searching minds of men engaged in science. One of these is the rather sudden, geologically speaking, demise of all the land and sea dinosaurs. This mystery has been called "the dying of the giants." But such a title might more appropriately be given to the much more sudden extinction of giant mammals at the close of the Pleistocene age. This article accordingly will be devoted to the discussion of the nature and possible causes of such great dying.

The Pleistocene epoch is the most recent of the geological ages and yet it has proved the most puzzling and most controversial. Its length, cause, and nature are all subject to widespread differences of interpretation. It has been dated all the way from three million years to three hundred thousand years and less. There have been at least fifty different theories presented as to its possible cause and scientists are not agreed on the number of glacials occurring during its span of time. Most scientists are agreed however that it was a time of dynamic change.

Jerome Wyckoff points out "rarely if ever in the geologic past has there been a period of layer making to match the Pleistocene."[1] Earlier he writes, "The Pleistocene ice did perhaps the greatest bulldozing operation of all time."[2] Ericson and Wellin note: "Today it is generally accepted that the relatively short span of the Pleistocene brought greater changes to the face of the earth than any that had occurred during the previous seventy million years of the Cenozoic Era."[3] Loren Eisley is quoted by Dunbar as writing of "that series of ryhthmic and overwhelming catastrophes which we call the Ice Age."[4] Objective appraisal of the nature of the Pleistocene, of necessity, must modify any undeviating quietistic views of uniformitarianism.

Three Unusual Events

At least three unusual events occurred during the last geological epoch called the Pleistocene or Ice Age. The most familiar event was that of continental glaciation in the northern hemisphere and of increased pluvials elsewhere. This dramatic change in climate was thus worldwide in its scope.

Second and lesser known was a great amount of land rise and mountain building. Hallam L. Movius, Jr., elaborates: "From the beginning the Pleistocene was a period of climatic instability and crustal movements of considerable magnitude."[5] Elsewhere Movius asserts: "Second only in importance to climate are the diastrophic events connected with mountain building movements."[6] Ericson and Wellin write: "The Pleistocene was a time of exceptional mountain building and volcanic activity."[7] Richard Flint in similar vein says: "Mountain uplifts amounting to many, many thousands of feet have occurred within the Pleistocene epoch itself."[8]

Third, and perhaps still lesser known was the sudden extinction of a great number of large animals. In the preface of their significant work entitled "Pleistocene Extinctions", Paul S. Martin and H. E. Wright state: "Together glaciers and extinct large vertebrates characterize dramatically the Quarternary".[9] Elsewhere in the work Martin states: "A sudden wave of large animal extinction, involving at least 200 genera, most of them lost without phyletic replacement, characterized the late Pleistocene."[10]

At least three unusual events occurred during the Pleistocene: (1) continental glaciation in the northern hemisphere and increased pluvials elsewhere, (2) great amount of land rise and mountain building, (3) sudden extinction of a great number of large animals.

The cause of such widespread and enormous extinction of life has occupied the attention of scientists since the time of Darwin, Wallace and Lyell. A variety of explanations have been offered. Among them are extreme climate, overkill by hunters, the use of fire, prolonged drought, disease, etc. No doubt each of these were partial factors in causing death. N. J. Berrill for example points out: "All these extinctions coincided with the presence of man."[11] Wm. Howells also notes: "With the end of the Ice Age the hunting people were pressing into every part of the habitable world."[12]

The Soviet scientist Kazimierz speaks of the climate as a factor: "The Wurm glaciation brought a great extinction of the Scandinavian ice sheet and the total destruction of the fauna of northern Europe."[13]

It should be pointed out that most of the extinctions occurred, according to the present fossil record, among larger mammals. Wright and Frey have noted: "Generic extinction is not seen in the late Pleistocene record of plants, invertebrates or small vertebrates: these endured in fact."[14]

The fossil record however is confessedly not as complete as paleontologists would like it to be. Fossil records of birds are very meager, as are those of snakes and insects. The records of most island faunas are very poor. Australia's and Madagascar's pre-Pleistocene records are yet quite incomplete.

The extinction of large mammals was exceedingly numerous. Norman V. Newell says: "Quite recently, therefore, roughly three quarters of the North American herbivores disappeared and most of the ecological niches . . . were vacated."[15] Bryan Patterson states: "The dramatic extinctions, involving whole groups of mammals of both northern and southern ancestry . . . took place at the end of Pleistocene times."[16] Later he writes: "The late Pleistocene extinction left South America shorn of nearly all its really large mammals."[17] George G. Simpson speaks of Australia as suffering "a marked decline and mass extinction from Pleistocene, probably late Pleistocene, to now."[18] Daniel Cohen declares "Some 70% of all native North American mammals with an adult body weight of 100 lbs. or more died out during a 1,000 year period at the end of the Pleistocene."[19] Leon Croizat writes: "Madagascar suffered marked biological depletion from Pleistocene to recent in the wake of climate changes of general scope attending the Glacial Ages."[20]

Significantly many of these larger mammals are represented by smaller mammals at present. Bjorn Kurten elaborates: "A number of the animals are now considerably smaller, on the average, than their ancestors at the end of the Pleistocene."[21] John B. Chervaise says of Australia: "Most present marsupials possessed gigantic relations in that voluminous (Pleistocene) time."[22] Teilhard De Chardin, the French Paleontologist wrote: "Once constituted at the beginning of the Quarternary the Pleistocene fauna hardly changes any more up to the Holocene era."[23]

The following authors describe some of the giants: Wright and Frey, "These (Bison Latifrons) were truly giants."[24] William E. Scheel describes the wooly rhinoceros as being 14 to 16 feet long, of beavers nearly 10 feet in length, of glyptodonts fourteen feet long and five and one half feet high."[25] A. S. Romer states that "Madagascar lemurs included forms as large as the great apes."[26] Martin and Wright speak of the giant grey kangaroos of Australia, giant birds of Madagascar, giant baboons of East Africa and giant browsing ground sloths as tall as giraffes. It was as far as mammals are concerned, a world of giants indeed.

Animal Migration

The tendency of animals to migrate has filled the pages of numerous books. J. L. Cloudsley-Thompson notes that "Migratory behavior is instinctive" and observes that "the origin of migration is little understood, although the habit may have evolved at the time of the retreat of the last ice age."[27] Richard Foster Flint observes "comparatively few forms of life appeared during the Pleistocene Epoch which was characterized rather by repeated migrations of entire floras and faunas."[28] Alfred Wallace pointed out long ago: "All animals are capable of multiplying so rapidly, that, if a single pair were placed in a continent with abundance of food and no enemies, they might fully stock it in a very short time."[29]

It has been the special research of Biogeographers and Zoogeographers to attempt to account for the appearance of various similar kinds of fauna and flora in different parts of the world. Animal life that multiplies and migrates the fastest would of course be birds, winged insects, and amphibians. Water barriers would not be as great for them as for others. George Lacock tells us that "Insects are notorious for their unwelcome invasions of new lands."[30] Locusts and cicada migrate in enormous numbers. Butterflies have been observed far out at sea. Bats have early invaded areas like Australia, New Guinea and New Zealand. Many wingless insects are blown by the winds for hundreds of miles.

The reduction in size of the large herbivores was very likely the result of the impoverishment of their ecological habitats following the flood.

The emigration of invertebrates to other lands is likewise known. Walter Heape writes: "Mass emigration amongst species of invertebrate animals is no less common than amongst vertebrates, and when it occurs the numbers of individuals concerned may frequently be reckoned, not in millions, but in hundreds or thousands of millions."[31] The prolific increase and invasion of bees, ants, rodents, and rabbits is well known.

Land Bridges

When water exists between land bodies, how do the biogeographers account for similarity of species in both lands? The answer in great measure is that of land bridges. Authority for the existence of land bridges in the past should be noted: "The North Sea . . . lay dry as far as the Dogger Bank at the transition Pleistocene-Holocene."[32] Malcom S. Rogers says: "During the terminal Pleistocene, the Bering Strait, now a fifty six mile wide strip of water . . . was a plain a thousand miles or more in width."[33] H. R. Van Heekaren feels that "Also during the Pleistocene Java must have been connected repeatedly by land bridges with the Malay Penninsula."[34]

It is felt by many of these who espouse land bridge connections that many occurred at the close of the Pleistocene time. Walter and Sisson write of the British Isles: "From the early post-glacial times when northern Ireland was actually joined with Scotland . . ."[35] Geoffrey Bibby says concerning a land bridge connection of Africa to Europe: "Only at the end of the ice age was the bridge across the Mediterranean down."[36] Birket and Smith speak of Indonesia: "As late as in the Ice Age, it was possible to walk through the valleys of Indochina to Indonesia and perhaps across New Guinea to Australia and Tasmania."[37] David Bergamini is very specific: "By 4700 B.C. Australia was once more cut off."[38]

The shallowness of the ocean between continents and continental islands is a matter of knowledge. The Shahul shelf between Australia and New Guinea; the Dogger Bank between England and France; the Bering Straits between Siberia and North America; and the shallow seas between Ceylon and India, Japan and China, Malaya, Sumatra, Java and Borneo are well known.

The relative timing for land bridges less than ten

thousand years ago is numerous. Irving Rouse states that Trinidad was attached to the mainland about 6,000 B.C."[39] D. J. Mulvaney says "In the north the shallow seas which separated Australia from New Guinea and submerged Carpentia may be as recent as 6,000 B.C."[40] Sherwin Carlquist says Great Britain was separated from the main land only about seven thousand years ago."[41] A geological treatment of the Japanese islands states: "The Holocene (last 10,000 years) is the age when the Japanese Islands finally separated from each other."[42] Wright and Frey write of Beringia: "The land bridge clearly was in existence during most of the Wisconsin glaciation . . ."[43]

It may be observed that any rise of the ocean waters would occur simultaneously around the world. Land bridges would be covered at approximately the same time. Beringia, the Gulf of Gibralter, the China Sea, the Java Sea, the British Channel, and the Tasman Sea were covered virtually at the same time.

Giant Mammal Disappearance

It is important also to note that the giant mammals disappeared at a corresponding time. Bob H. Slaughter thus says, "The staggering fact that about 95% of the North American megafauna became extinct during a short period some 8,000 years ago."[44] Hester in the same work notes: "It has been demonstrated that many of them became extinct within a short time between 8,000 and 6,000 B.C."[45] John H. Guilday elaborates on Europe and Asia: "The Eurasian continent lost elephants, rhinoceri, hippopotami, many bovids, and the large beaver *trogon therism Agein.*"[46]

Wright and Frey refrain a repeated question: "Why did the most conspicuous extinctions occur so late and after the last glaciation?"[47] Writing of islands Carlquist observed: "A number of island creatures did not survive the Pleistocene."[48] The most are mentioned as disappearing at this time. R. A. Stirton notes of Australia: "The first Australian aborigines appear in the record before some of the large marsupials died out."[49]

CRITIQUE

of "The Dying of the Giants"

The detailed findings of a science are known mostly by long training and experience in that science, and therefore are known fully only by the professionals in that science. Consequently, when the professional scientist then criticizes this conclusion, the untrained person (and many others like him, all basically sympathetic to his position rather than to the professional's ideas) does not appreciate the force of the scientist's criticisms but instead feels that the professional has "sold out" and can no longer recognize truth when it is presented to him. I hope that pointing this out now will enable all concerned to read the following comments on "The Dying of the Giants," in a more objective manner. I have not documented these comments with quotations, partly because of lack of time, but more because most readers would not be able to tell from the quotes themselves that they came much closer to reality than do the implications drawn from the quotes in the manuscript here under review.

To some extent at least, the author quotes passages out of context in order to support his ideas. Because he presumably does not agree with the overall views of the writers of those passages, such is unavoidable in some cases; however, to my own mind, there seems to be an excessive amount of this. Also, many of the passages quoted are more in the nature of literary exaggerations than accurate scientific statements (like Eiseley's quote). One feels that, if an author uses statements like these, there probably aren't corresponding careful scientific statements and therefore the scientific facts don't really support the author's contentions; in this particular case, I think that that is is a justified inference. Finally, some of the passages quoted indicate that the author is not aware of basic geologic data, and his use of such passages as support weakens his overall case. For example, he implies that continental shelves are quite a recent development, whereas in fact they have been around for many millions of years (since the Jurassic, about 150 million years ago, in the case of the U. S. East Coast).

The main thesis of the article depends upon the large-scale extinctions which took place at the end of the Pleistocene. There is a great deal of misunderstanding about these extinctions. This misunderstanding is in part due to lack of detailed familiarity with the situation on the part of both popular-science writers (like Cohen) and geological writers who have not worked themselves with the situation firsthand (like Newell). Several points should be made in this regard.

This paper is a good example of how an honestly sincere person, untrained in a particular science, can read extensively in that science, collect numerous quotations from his readings, and put these together into a scientifically objectionable conclusion.

First, the Late Pleistocene extinctions were no more extensive than those at many other times when some groups of organisms died out. Compared with the extinctions occurring at the end of the Devonian, Permian, Cretaceous, and Oligocene, the Pleistocene extinctions in fact seem rather minor in the number of organisms affected. Are we then going to postulate world-wide deluges at frequent intervals throughout past geologic history, with the Biblical Deluge being the last one? The historical development of the science of earth history did exactly this, because it is logically inescapable; and this solution worked, for awhile—until increased knowledge forced all scientists concerned with the problems to abandon the notion of world-wide catastrophes as being untenable explanations for past geologic events.

Second, the Late Pleistocene extinctions affected mostly those large mammals which other evidence indicates were involved with early man as food sources, enemies, or environmental competitors. Admittedly the fossil record is not as complete as we'd like, but it certainly is adequately enough known already to show clearly that small vertebrates, invertebrates, and plants were not significantly affected. (By the way, rodents

McGowen and Hester say of North America: "Mastodon, Columbian Mammoth, Dire Wolf, Camels, Horse, Bison *occidentalis*, all existing here till past 9,000 years ago."[50] Hopkins says of Beringia, "The abrupt extinction of much of the mammal fauna about 10,000 years ago is as mysterious an event in Beringia as it is in other parts of the world."[51] Martin, referring to Carbon 14 dating notes: "More dates support the view that extinction in South America coincides with or slightly post-dates that in North America."[52]

The Biblical Flood

All dating is of course relative, not absolute. The proximity therefore of the time of the land bridges and the world wide extinctions of giant mammals is very close. Is there a plausible answer that an unbudging uniformitarianism may have discountenanced too long? Is it possible that a world wide climatical change such as the Genesis deluge might be the most satisfactory explanation? Dr. Merrill Unger in his Bible Handbook says the deluge probably took place before 5,000 B.C. or over 7,000 years ago.[53] Such a time therefore is close to that postulated for that of both land bridges and animal extinctions.

Genesis 7:23 states that as a result of the severity of the flood: "every living thing was destroyed upon the earth, both of fowl, and of cattle, and of beast, and of every creeping thing that creepeth upon the earth." According to Genesis the one notable exception was the wide variety of life in the ark and in the ocean waters. Besides Noah and his family, Genesis 7:14 reads: "They and every beast after his kind, and all cattle after his kind, and everything that creepeth upon the earth after his kind, and every fowl after his kind, every bird of every sort," all went into the ark.

It may be pointed out that the flood itself was of very brief duration. (Genesis 7:11-12, 17, 24, and 8:3-6, 13-14). Following a deluge of approximately a year's length, God said to Noah, "Bring forth with thee every living thing that is with thee, of all flesh, both of fowl and of cattle, and of every creeping thing that creepeth upon the earth; that they may breed abundantly in the earth and be fruitful and multiply upon the earth." Life was thus preserved to multiply once again in the earth and to migrate over the earth.

The reduction in size of the large herbivores was very likely the result of the impoverishment of their ecological habitats following the flood. Geographical areas, such as the Great Sahara and the continent of Australia were once areas of brimming rivers and abounding vegetation and well within the Holocene period. The past 7 or 8 millenia have seen continuing dessication and impoverishment of vegetation. The larger mammals, such as elephants, hippopotomi and others require abundance of food and water to maintain themselves in the wild.

The vast majority of scientists however are so wedded to a Lyellian quietism that they would strenuously object to such a cause of extinction as a world-wide flood. It should be reemphasized therefore that both the extinctions and the change of weather were most severe. Frank Hibben writes "It has been estimated that forty million animals died out at this time."[54] Hopkins notes that "The great end-Pleistocene extinction coincides with a time of rapid change."[55] In the preface of their book Martin and Wright raise the searching question: "Are meteorologists prepared to recognize the possibility of a climatic shock wave of unprecedented dimension within the last 15,000 years?"[56]

Source of Flood Water

The problem of sufficient water to cover the earth may not be as difficult as some have imagined. One factor to be considered is the recent elevation of many of our highest mountains. M. M. Strakhov elaborates: "The Alps, the Caucuses, the Central Asiatic ranges, the Altai, the Salair-Saymir ranges, the mountains of eastern Siberia and the mountainous structures acquired their present geomorphological heights during the Quarternary."[57] Richard J. Russell says of the Pleistocene that it: "witnessed what may have been an unprecendented rapidity of mountain uplift in many parts of the earth."[58] R. W. VanBemmelen notes: "The Pleistocene in Indonesia was a period of powerful mountain building," and again, "in many parts they continued into Holocene times."[59] Augusto Gansser in his geology of the Himalayas writes of his belief, "The main elevation of the Himalayas was an event witnessed by the earliest men."[60] Ericson and Wellin postulate that during this time "the heights of the Himalaya increased

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and rabbits are not invertebrates.)

Third, the Late Pleistocene extinctions took place gradually, over a period of many thousands of years, and not all at the very end of Pleistocene times. Some of the groups involved (such as the various elephants) had actually reached their evolutionary climax back in the Pliocene (5-10 million years ago), and were already in a state of decline, with only a few members like the mastodon and mammoth around by the end of the Pleistocene. Some species disappear from the record back in the midst of the fourth glacial (Würm or Wisconsinan) 30,000 years ago, others disappeared as the glaciers were in full retreat 15,000 years ago, still others survive into post-glacial (Recent or Holocene) times only to die out about 8,000 years ago, or 4,000 years ago, or even (like the moribund American bison) 100 years ago. Geologic age dating techniques have a small "plus-or-minus" margin of error, but this is small enough that there is no doubt that the Late Pleistocene extinction episode spread over many years and was not sudden at all in terms of human chronology (as a flood would have been). But note that this still is relatively rapid geologically, so that one can find sentences in geologic literature which refer to "sudden" or "rapid" extinctions, and quote them to give the impression that geologists' data could be explained by a very sudden flood which none of those geologists would accept.

Fourth, the Late Pleistocene extinctions occur at a time when significant climatic and geographic changes (due to the retreat and melting of the glaciers) and significant ecologic changes (due to advances in the way of life of early man) were gradually taking place. Times of change in the geologic past have always put organisms under considerable environmental-evolutionary pressure, and have always resulted in some animals becoming extinct. Consequently, there is nothing unique or special about Late Pleistocene events which makes desirable the suggestion of a world-wide deluge as an agency for extinction, particularly since

Rhodes W. Fairbridge: "The last great upsurge apparently culminated in the deluge described in the Old Testament."

by some two thousand meters."[61] These are but a few of the catastrophic changes in mountain rise during the Ice Age. Augusto Gansser states that "In most mountain ranges more catastrophic events than is generally believed occurred during the Pleistocene to recent glacial phases."[62]

The extent of water necessary to cover the earth with mountain ranges of lesser height is perhaps difficult to ascertain. But the following facts may be noted. Water covers 71% of the earth's surface already. The Pacific ocean is nearly three miles in average depth. The Atlantic is over two miles. Alfred Wallace observed that "the total cubical contents of the land above sea level would be only 1/36th that of the waters which are below that level."[63]

One fifth of dry land is flat desert area easily inundated by rising water. The continent of Australia has less than five percent of its land over 2,000 feet above the level of the sea.[64] Western Siberia is larger by two thirds than the United States and is one of the most level areas on earth. The Yucatan Peninsula has only a very small area in the north centre which rises to about 200 feet in height.[65] "The depression of Europe by six hundred feet would destroy two-thirds of its landed surface" according to James Bonwick.[66] Lorus T. Milne and Margery Milne have observed that "If the ocean rose 3,000 feet, three fourths of the present land area would be under water."[67] What would it take for a much lower land area of the past?

Has There Been a World-Wide Flood?

Has there been a time when the world oceans arose simultaneously to inundate the land? Scientific evidence would point to the time following the melting of continental glaciers as a time of unprecedented sea rise. C. C. Reeves Jr., in correspondence from R. F. Dill points out that "widespread submerged cliffs, terraces and Pleistocene fossils now indicate a Wisconsin lowering (of the ocean) of about 600 ft."[68] The melting of the continental ice thus formed on the continents would release catastrophic volumes of water. Whitmore, Jr., Emery and Swift point out that "the present continental shelf is not older than the Wisconsin glaciation."[69] According to M. T. Mirov, "a sea occupied a considerable area of western Siberia," during the Quarternary period.[70] Levin and Potapov have recently pointed out "Fundamental new studies by A. I. Popov radically changed the known facts of the Ice Age in Western Siberia. The dominant observable phenomena of the Quarternary was one extensive marine transgression, not a glaciation."[71] Milne and Milne point out that "geologists go back a few thousand years farther to find clear proof that the level of the ocean has risen more than four hundred feet along most coasts."[72]

The existence of a world-wide flood has of course many complex problems for modern science. How modern marsupials returned to Australia from the Biblical land site of the ark in Armenia is a problem that cannot be answered at this time. How modern Lemurs returned to Madagascar is another. Perhaps more will be uncovered from the ever increasing knowledge of multiple sciences to answer such questions.

In spite of unavailable solutions to present problems the ability to explain world wide extinctions of enormous numbers of mammals within a very short time remains unanswered by other explanations. Neither human agency, nor disease, nor gradual ecological impoverishment can be the overlying cause or causes. This author thus suggests that a world-wide flood needs to be reevaluated by objective men of science as a possible cause in the light of the evidences here set forth. The existence of contemporary land bridges connecting oceanic islands with nearby continents and of continents connecting each other or larger land bodies, provides the possibility of animals migrating back to former habitats. The effects of both unprecendented pluvials and much lower mountain ranges would conceivably allow for major and even complete submergence of the earth. The effect of melting glaciation would in turn account for the submergence of former land bridges. The recency of continental shelves witness to the former extension of dry land on all continents.

Of necessity this article must have a terminus. It is, however, interesting to note that a few present day

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a combination of these already-known, gradual environmental changes can in fact (contrary to the author's assertions) adequately explain the observed changes in the large-mammal fauna.

The mountain uplifts which occurred during the Pleistocene were not at all sudden or catastrophic, as the author implies. Throughout the Pleistocene, a man living in even the most actively uplifting areas would not, in his lifetime, have noticed any significant changes whatever, because the uplift went on at such a slow, gradual pace. The uplift was not restricted to Pleistocene times, moreover; these uplifts generally began back during the Miocene (15-20 million years ago), and have continued right up until today. They are still proceeding in many parts of the world; from this, it can more readily be appreciated how non-catastrophic such geological events really are.

Changes in sea level and in the configurations of land and sea, due to the melting of the Pleistocene ice sheets, likewise have been quite gradual and non-catastrophic in nature. At the height of the last glaciation (15-20,000 years ago), sea level throughout the world was lower than at present by about 600 feet. This exposed many shallow sea floors as dry land, and therefore many "land bridges" existed at that time. As soon as the glaciers began to retreat (by melting) from this maximum extent, sea level began to rise gradually, leaving a series of beaches, bars, terraces, cliffs, and other coastal features (many containing accurately datable materials) across the shallow sea

The Late Pleistocene extinctions (1) were no more extensive than those at many other times, (2) affected mostly those large mammals involved with early man, and (3) took place gradually over a period of many thousands of years, (4) occur at a time when significant climatic and geographic changes were gradually taking place.

scientists acknowledge the existence of the Genesis Deluge. William Foxwell Albright, America's leading Palestinian archaeologist has written: "I see no reason any longer for refusing to connect the traditions of the Great Flood in most regions of the Eurasia and America including particularly Mesopotamia and Israel with the tremendous floods accompanying and following the critical melting of the glaciers about 9,000 B.C."[73]

Rhodes W. Fairbridge, another eminent scientist, has written: "The greatest and fastest rise yet discovered in the geological record reached its crest about 6,000 years ago. The cumulative incursion of the sea flooded low-lying coastal lands in every part of the world. This was the deluge that drowned the homes and troubled the legends of the ancients." Elsewhere he specifies: "The last great upsurge apparently culminated in the deluge described in the Old Testament."[74] To be sure a world-wide deluge is not yet acknowledged by the present generation of scientists. But ever accumulating evidence may compel serious reappraisal of such a catastrophe in the coming years. Old theories have a way of being renewed and even made respectable.

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bottoms of our present-day continental shelves. By carefully studying and mapping these now-submerged coastal features, we can trace the gradual rise in sea level from about 15,000 years ago till about 6,000 years ago, when sea level reached essentially its present position. Again it is well worth stressing that this rise was gradual, non-catastrophic, and thoroughly uniformitarian in character, in spite of numerous quotations which give an erroneous impression of the possibility of a sudden catastrophic flood. I think it needs to be pointed out that there is *no physical or geomorphologic evidence for a world-wide deluge*, although there is such evidence for much less world-shaking floodings in various places. One of the most interesting of these, in connection with the Biblical Flood, is that (as shown by careful studies of sediment layers and their datable contents) there was about 4,000 B.C., a somewhat more rapid rise than average as sea level was rising to near its present level. This episode was a rise of 20 feet in sea level over a period of about 60 years, a rise which would have been observable within a man's lifetime and which would have inundated large areas of the relatively low-lying coastal plains inhabited by early civilizations. Some geologists think that this conceivably could be the basis for the flood recorded in Genesis.

Some of the Pleistocene animals were in fact giants compared to their present-day descentants. However, at least as many groups are represented today by larger-sized individuals than were their Pleistocene predecessors. Moreover, the Pleistocene giants were outnumbered considerably by "normal-sized" cousins living alongside them. Because the giant animals are more spectacular both for writing books and for making museum displays, one can easily get the unintenionally biased and inaccurate impression that Pleistocene faunas were composed of giants.

I think it needs to be pointed out there is no physical or geomorphologic evidence for a world-wide deluge.

The author reveals his feelings that only a catastrophic view of geologic history can adequately explain the observed events of the Pleistocene record; he makes unfavorable asides about uniformitarianism's faults as a scientific way of operating. Van de Fliert's article in the September 1969 *Journal ASA* adequately rebuts this anti-uniformitarianism so widely accepted among evangelical scholars; consequently, I see no need to further comment on this erroneous view of earth science. Also, please note my earlier comments here stressing the gradualness of Late Pleistocene events, in contrast to the catastrophic suddenness incorrectly implied by many of the author's quotations.

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"After a little more evolution, mankind will no longer be so violent."

The Biblical Calendar of History

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Introduction

Chapters 5 and 11 of the book of Genesis have long been a seemingly insurmountable obstacle to students of the Bible. Inasmuch as they begin with Adam and end with Abraham, they have their roots in creation and their out-reach into the era of the great civilizations of Babylon and Egypt which flourished during Abraham's day. They, therefore, tantalize the scholar who is trying to reconstruct past history. Unfortunately, because a solution to an understanding of these chapters has not been forthcoming, the events embraced within their scope—creation, the fall of man, the Noachian flood—are likewise often looked upon as accounts impervious to clear understanding.

Bishop Ussher's attempt to understand these chronological notices has only worsened matters. His conclusions that Adam's date was 4004 B.C., the flood date was 2349 B.C. and that the Israelites spent 215 years in Egypt, agree neither with the Biblical nor the secular evidence.

But these chapters of Genesis are a part of the Word of God and, therefore, they must be true and dependable if only they can be rightly understood. I would be so presumptuous as to suggest a solution to these chronologies. This solution will be compared with some of the pertinent archeological evidence.

The Clue Phrase "Called His Name"

In Genesis 4 and 5 we read of the birth of Enosh to Seth. Why did God use different language in describing this event in Genesis 4 than in Genesis 5? In Gen. 4 we read, "Seth . . . . . *called his name* Enosh" (Gen. 4:26). But in chapter 5 the Bible says, Seth *begat* Enosh" (Gen. 5:6). Why did God use the phrase "called his name" (ASV) in connection with Enosh's birth in Gen. 4 when he did not in Gen. 5? It is obvious that the phrase "Seth begat Enosh", or "Methuselah begat Lamech" did not insure that Enosh was the immediate son of Seth or Lamech or Methuselah. Many instances can be found where a father-son relationship appears to be indicated and yet other Scriptural evidence points to a more distant ancestry. Matthew 1:1, where Jesus is referred to as the son of David, and David, the son of Abraham, is illustrative.

A more careful examination of the Scriptures reveals why the phrase *"called his name"* which is the Hebrew *qara'*, was used. In every place where this phrase is employed, there can be no doubt of the existing relationship; invariably it is indicative of parent and child. Thus, the Bible says for example, "Abraham *called the name of his son* . . . . .Isaac" (Gen. 21:3), ". . . . . so they *called his name* Esau" (Gen. 25:25), "a virgin shall conceive and shall *call his name* Immanuel" (Isa. 7:14). In every instance where this "clue" phrase appears one may be certain that an immediate son is being described and not a more remote descendant.

God's use of this "clue" phrase thus assures one that Seth was the immediate son of Adam (Gen. 4:24), Enosh of Seth (Gen. 4:26), and Noah of his father, Lamech (Gen. 5:29).

But what about the rest of the names appearing in these genealogies under discussion? Two are decipherable. Other Biblical evidence shows clearly that Shem was the immediate son of Noah, even though the phrase "called his name" is not used.[1] The Bible shows, too, by other information that when Terah was 130 he became the father of Abram.[2] But in the case of all of the other names listed in these chapters there is no Biblical evidence of any kind that points to an immediate father-son relationship. In fact, there is internal evidence within these accounts that points to other than immediate father-son relationships.[3]

God has given us the key that unlocks the hitherto perplexing genealogies of Genesis 5 and 11. These chapters are a calendar.

An Ancient Calendar

In further reflection upon this situation, two Biblical notices should be examined. The first is that of Genesis 7 and 8 where the dates of the flood events are referenced to the age of Noah. Thus, Gen. 8:13 records, "in the six hundred and first year, in the first month, the first day of the month, the waters, etc. . . . . ." Gen. 7:6 indicates to us that the six hundred years was the age of Noah when the flood came. Could the calendars of ancient peoples have been tied to the life spans of certain individuals?

The second notice is that of the New Testament where Christ declared "this generation will not pass away until all these things take place" (Matt. 24:34) In this reference Christ is speaking of events that would take place just before His return. He is therefore, insisting "this generation" would continue at least for almost two thousand years, for this much time

has now elapsed and all of the events of which he was prophesying in Matthew 24 have not yet happened. As a matter of fact, this is the generation of Jesus Christ. This is 1970 A.D.—the year of our Lord.[4] The events of today are dated exactly as they were in Noah's day; by reference to the birth day of a person.

Since this method of dating events was practiced in Noah's day, was suggested by Jesus himself, and is actually the practice used today, could not this have been the method described in Genesis 5 and 11? Isn't it possible that these accounts are a calendar giving the name of the patriarch whose life span was the reference point at his period or generation in history? This would make abundant sense for this would provide for continuity and clarity in historical reckoning.

Calendar Confirmation from Egypt

God gives additional evidence to support this reasoning. In Exodus 6 God gives genealogical information concerning some of the descendants of Jacob. The information given does not appear very meaningful to our present day and age. But hidden amongst these verses are three numbers. The first is found in verse 16 where it is stated that Levi's three sons were Gershon, Kohath, and Merari, and the years of Levi's life were 137. The second is in the next verse where it says Kohath's four sons were Amram, Ighar, Hebron, and Uzziel, and the years of Kohath's life were 133. The third is in verse 20 where it says Amram was married to Jochebed and she bore him Moses and Aaron, and the years of Amram's life were 137. At first reading, it appears that Levi was the great grandfather, Kohath, the grandfather, Amram, the father, and Moses and Aaron, the sons. But is this so? There is no other Biblical evidence that indicates this is the case, and there is no use anywhere in the Bible of the phrase "called his name" in reference to these men which would point to an immediate father-son relationship. But why would God give the life spans of only three individuals amongst so many?

To solve this puzzle, let us assume that God is giving us the calendar for the Israelitish sojourn in Egypt. One might recall that Jacob came to Egypt with his sons including Levi, and that the Israelites went out of Egypt under the leadership of Moses and Aaron. Both Levi and Aaron are mentioned in Exodus 6 and the age of Aaron at the time of Israel's departure from Egypt is given as 83 (Exodus 7:7). It can be shown from the Biblical references that when Levi entered Egypt he was 60±3 years of age with the burden of the evidence pointing to 60 years.[5] Since he died at the age of 137, he lived 77 years in Egypt. If this is a calendar giving the names of the reference patriarchs or generations, we would expect that Kohath was a descendant of Levi and was born the year of Levi's death; that Amram was a descendant of Kohath, and that he was born the year of Kohath's death. Aaron in turn was born the year of Amram's death, and was descended from Amram. Let us add these time spans together:

Levi	77	years in Egypt
Kohath	137	years in Egypt
Amram	133	years in Egypt
Aaron	83	years in Egypt
	430	years – Total Time

Turning now to the Biblical record, we discover the following interesting information. "Now the time that the children of Israel dwelt in Egypt was *four hundred and thirty years.* And it came to pass at the end of *four hundred and thirty years,* even the selfsame day it came to pass, that all the hosts of Jehovah went out from the land of Egypt." (Exodus 12:40, 41).

God thus shows us clearly that the calendar used to record the passage of time during the Egyptian sojourn was based on the lives of Levi and his descendants, Kohath, Amram and Aaron. This explains, too, the prophecy given to Abraham in Gen. 15:13-16 where he is told his descendants would be oppressed 400 years in a land that was not theirs, and that they would return to their own land in the *fourth* generation.

CRITIQUE I

of "The Biblical Calendar of History"

Mr. Harold Camping, the author of "The Biblical Calendar of History," is to be commended for his attempt to solve some very difficult chronological problems in the early chapters of Genesis. Indeed, the chronological problems of the pre-patriarchal age are so complex that they even deter specialists. Mr. Camping makes some intriguing suggestions. His layman's background, however, has unfortunately resulted in "tunnel vision." That is, in using reference works in support of his thesis, he is unaware of evidence which contradicts his construction.

First of all, it is his contention that whereas the formula "A Begat B" or "B was the son of A" does not necessarily mean a father-son relationship, the formula "A called his name B" does mean this. This certainly must have been the case in some genealogies which are selective rather than comprehensive. His second, more controversial suggestion is that the biblical account used the lives of certain individuals as "ancient calendars."

Mr. Camping's layman's background has unfortunately resulted in "tunnel vision."

According to Camping's reconstruction of Exodus 6:16-20, the passage would not mean, as it would seem to appear, that Levi was the father of Kohath, who was the father of Amram, who was the father of Aaron and Moses. He understands this passage to mean that when Levi died at 137, a descendant who was born that same year, namely Kohath, was chosen to be the next reference person for the assumed biblical calendar. When Kohath died, another descendant who was born in the year of Kohath's death, namely Amram, was then chosen, etc. As a result of some other computations, the author is able to come up with the exact figure of 430 years, which was the duration of Israel's stay in Egypt (Exodus 12:40).

There are several objections to this reconstruction:

(1) His figure of Levi's age as 60 at the time of his entry into Egypt is based on the conjecture that

Aaron's was the fourth generation.

I believe that God in His wonderful wisdom has given us the key that unlocks the hitherto perplexing genealogies of Genesis 5 and 11. These chapters are a calendar. The time was divided into patriarchal periods or generations even as the New Testament period is the generation of Jesus Christ and as the Egyptian sojourn was so divided. Thus, for example, when Methuselah died bringing to an end his generation, a man who was born in the year of Methuselah's death was selected to be the next reigning patriarch or at least the next man for calendar reference. After Methuselah, this was Lamech. None of the conditions of his selection are given except that he had to be a descendant of Methuselah. The Bible indicates that Methuselah was 187 years old when he begat Lamech; i.e., when he was 187 the forefather of Lamech was born to Methuselah (Gen. 5:25). This notice establishes the certainty of Lamech's blood descent from Methuselah by showing where his forefather tied into the life of Methuselah.

The selection of the next patriarch had to include a birth date coinciding with Methuselah's death date to insure a rational history. Had he been born one or more years earlier an overlap would have occurred which would have blurred history. If Lamech had been born one or more years later than Methuselah's death, a gap would have occurred which would have confused history. Therefore, when a citizen of the world of that day spoke of an event occurring in the year Methuselah 950, only one year in history answered to this date. Again, if he spoke of the year Lamech 2 only one year answered to this date and he knew precisely how many years transpired from Methuselah 950 and Lamech 2.

The chronology of history established by Biblical reckoning agrees rather satisfactorily with the archeological evidence of the earliest civilizations.

At the beginning men were comparatively scarce. Thus it seems apparent that when Adam died, there was no one born that year who was qualified to become the next reference patriarch. When Seth died 112 years later the same situation prevailed. But when Enosh, the grandson of Adam died 98 years after Seth, a child who was a descendant of Enosh, was born in the same year and this child was eventually named as the next reference patriarch. This was Kenan. Kenan's life span thus became the calendar reference for that period of history. The calendar was continued in this fashion until Methuselah died and Lamech

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Levi was 21 years older than Joseph.

(2) His system of a "biblical calendar" based on the choice of an individual who was born in the year of a predecessor's death is unattested in any ancient calendaric system.[1] One may argue, to be sure, that the biblical system was unique, but the later calendaric reckoning of the period of Israelite kings can be coordinated with the regnal systems of the Near East.

(3) His application of the system is not consistent. The assumed mode of dating, according to Camping, does not apply during the period of the patriarchs, Abraham, Isaac, and Jacob.

(4) The systematic application of his system yields results which are difficult to integrate with the known archaeological and historical data.

(a) Camping's chronology results in the dating of Adam to 11,013 B.C. This would place Adam in what is the early Mesolithic or Middle Stone Age in the Near East, that is, the period in which men were making the transition from food-gathering tribes to food-raising communities.

The dates for the Mesolithic cultures have been established by radio-carbon dates. Radio-carbon dates may be subject to reappraisal but cannot be dismissed because of minor discrepancies.[2] Unless one is prepared to dismiss all pre-Mesolithic or even pre-Neolithic individuals, as some are willing to do,[3] as pre-Adamic hominids, the late date for Adam of 11,013 B.C. is not acceptable.[4]

(b) Camping's chronology places the Flood at 4990-4989 B.C. It is well known that Leonard Wolley found a thick deposit of flood-borne sediment at Ur in the Obeid level *c.* 4,000 B.C. Further investigation, however, demonstrated that there were other flood deposits from Kish, Fara, and Nineveh, but these did not all come from the same period.[5] Mallowan has recently suggested that the Flood should be identified with the flood deposit at Tell Fara (ancient Shuruppak, home of Ziusudra) which is dated *c.* 2700 B.C.[6] Ziusudra was the hero of the Sumerian story of the Flood, as Utnapishtim was the hero of the Babylonian story of the Flood contained in the Gilgamesh Epic.[7] Since almost all scholars agree that the Babylonian and the biblical accounts are so similar that they must refer to the same deluge, one of the arguments for a date of 2700 B.C. would be the link with Gilgamesh, who was the king of Uruk about this time. The flood episode, however, is not integrally bonded to the Gilgamesh Epic and may have come from a much older period.

The numerous flood stories collected by James Frazer from the Near East, from Greece, from South Asia, from the Pacific, from North and South America, etc. seem to point to a deluge of great antiquity. Albright believes that the Flood story goes back to the last Ice Age. "in one form or another, at least ten or twelve thousand years and, for all we know, much further."[8]

(c) The rest of Camping's chronology which places Abraham in the 21st cent., the entrance into Egypt in the 19th cent., and the Exodus in the 15th cent. does not differ from the chronology adopted by most conservative evangelicals in America. There are, however, problems in correlating this scheme with archaeological data. See the article on "Chronology of the Old Testament," by K. A. Kitchen and T. C. Mitchell in the *New Bible Dictionary*, ed. J. D. Douglas (Grand Rapids. 1962).

(d) Camping quotes Albright and Rowton to suggest that the first civilization after the Flood was established in Mesopotamia about 3700-3500 B.C. To say, "Thus the archeological evidence appears to indicate that prior to about 3700 B.C. there was no substantial culture anywhere in the world," is to view "culture" in a very narow sense. The earliest Neolithic settlement in the world at Jericho, dated to 7,000 B.C.,

was born.

When Lamech was born he was the one to whom the calendar was referenced. But his descendant who was born the year of Lamech's death and who should have become the next patriarch died in the flood. This can easily be known for Lamech died 5 years before the flood and only Noah and his immediate family survived the flood. Noah, who was an immediate son of Lamech, of necessity became a substitute calendar reference even though he was not born the year of Lamech's death. Thus, the flood events are all dated by the life span of Noah. (Gen. 7:6. 11; Gen. 8:4, 5, 13, 14).

When Noah died 350 years after the flood the same situation prevailed that existed when Adam died. Few people lived upon the earth and no one met the conditions required to become the next reference patriarch. When Shem died 152 years after Noah, the child Arpachshad, a descendant of Shem, was born in the same year and he became the next patriarch. The calendar was then continued in this same fashion until Terah was born.

When Terah was born he was the reference patriarch. But during his life span God brought into being the nation of Israel through Terah's immediate son, Abram. Thus, the descendant of Terah who was born the year of Terah's death, was outside the Messianic line and outside of God's chronological purposes. God effectively had narrowed men down to the family of Abram. The normal method of calendar keeping was set aside in the absence of patriarchs who qualified When Abraham died, no descendant of his was born the year of his death. When Isaac, the immediate son of Abraham, died, the same situation prevailed. This was repeated when Jacob, the immediate son of Isaac, died. But in the year that Levi, the immediate son of Jacob died, a descendant of Levi was born whose name was Kohath and he apparently met the qualifications of a reference patriarch. Thus, he continued the calendar line as we have seen. Amram followed Kohath, and Aaron followed Amram. Interestingly it can be shown that in a real sense Aaron's generation continued until Christ's began 1970 years ago.[6] God has thus given in His Word a complete calendar from creation to Christ.

A chronology beginning with Adam may now be set forth. To tie this genealogical table to our present calendar, synchronization between the Biblical and secular histories should be found. Because so much work has been done in recent times, particularly in relationship to the dating of the kings of Israel, this can be done rather readily. Edwin R. Thiele, in his book, *The Mysterious Numbers of the Hebrew Kings* established the date of the death of Solomon and the

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yielded various elements of "culture": vessels, ornaments, cult objects, figurines, a defensive wall, a massive tower 9 meters in diameter with an interior staircase, sickles, etc.[9]

The Obeid (or Ubaid) phase *c.* 4000-3500 and the Uruk (Erech, Warka) phase *c.* 3500-3200 were preceded by the Halaf, Samarra, and Hassuna cultures back to 5000 B.C. with considerable continuity.[10]

e) Camping would date the confusion of tongues at the building of the tower of Babel *c.* 3150. As he observes, this is about the date that writing was invented by the Sumerians. He is also correct in noting that scholars believe that Mesopotamia provided the stimulus for the development of writing in Egypt. His assumption that writing was invented only after the confusion of tongues at Babel, since it would not be necessary before this, may appear attractive at first sight, but must be rejected upon examination. The fact that there are over 2,000 tribes today speaking as many dialects, yet without writing, indicates that men may have spoken various languages long before the invention of writing. Place names in Sumerian, the oldest written language, are non-Sumerian and presumably pre-Sumerian (cf. American Indian names for some of our states).[11] Glotto-chronological indications which extrapolate differences in related languages back to their common proto-language also indicate a great antiquity for many of our languages.[12]

For those who are interested in a well-informed attempt to deal with the complex chronological problems of the pre-patriarchal period, I would suggest K. A. Kitchen, *Ancient Orient and Old Testament* (Chicago, 1966), pp. 35-41.

Footnotes

[1]Richard Parker, *The Calendars of Ancient Egypt* (Chicago, 1950); Richard Parker and W. H. Dubberstein, *Babylonian Chronology* 626 B.C.–A.D. 75 (Providence, 1956); Jack Finegan, *Handbook of Biblical Chronology* (Princeton, 1964); W. C. Hayes, M. B. Rowton, Frank H. Stubbings, *Chronology* [*Cambridge Ancient History*, revised edition, fascicle 4] (Cambridge, 1962); P. van der Meer, *The Chronology of Ancient Western Asia and Egypt* (Leiden, 1963); Robert W. Ehrich (ed.), *Chronologies in Old World Archaeology* (Chicago, 1965).

[2]W. F. Libby, "The Accuracy of Radiocarbon Dates," *Antiquity*, 37 (1963). 213-19; H. S. Smith, "Egypt and C-14 Dating," *Antiquity*, 38 (1964), 32-37.

[3]Cf. Stanley D. Walters, "The Development of Civilization in Ancient Mesopotamia," *JASA*, 17 (1965), 68-73; cf. the letters in *JASA*, 18 (1966), 31-32.

[4]For the earliest possible date of Adam, see James O. Buswell III, "*Homo habilis*: Implications for the Creationist," *JASA*, 17 (1965), 88-92.

[5]John Bright "Has Archaeology Found Evidence of the Flood?" *Biblical Archaeologist*, 5 (1942), 55-62.

[6]M. Mallowan, "Noah's Flood Reconsidered," *Iraq*, 26 (1964), 62-82; R. Raikes, "The Physical Evidence for Noah's Flood," *Iraq*, 28 (1966), 52-63, argues that more systematic soundings are necessary to correlate flood deposits from the several Mesopotamian sites. *Christianity Today*, (Sept. 12, 1969), p. 48, reports the recovery of wood dated *c.* 2,000 B.C. from a glacier on Mount Ararat.

[7]Cf. Alexander Heidel, *The Gilgamesh Epic and Old Testament Parallels* (Chicago, 1963).

[8]W. F. Albright, *Yahweh and the Gods of Canaan* (Garden City, N.Y., 1968), p. 99.

[9]Kathleen M. Kenyon, *Digging up Jericho* (N.Y., 1957). Cf. Robert J. Braidwood, *The Near East and the Foundations for Civilization* (Eugene, Ore., 1962).

[10]Cf. Ann Perkins, *The Comparative Archeology of Early Mesopotamia* (Chicago, 1959); Jacquetta Hawkes, *Prehistory: The Beginnings of Civilization* (N.Y., 1962); J. Mellaart, *The Earliest Settlements in Western Asia* [*Cambridge Ancient History*, revised edition, fascicle 59] (Cambridge, 1967); M. E. L. Mallowan, *The Development of Cities* [*Cambridge Ancient History*, revised edition, fascicle 58, parts 1 and 2] (Cambridge, 1967).

[11]S. N. Kramer, *The Sumerians* (Chicago, 1963).

[12]W .F. Albright and T. O. Lambdin, *The Evidence of Language* [*Cambridge Ancient History*, revised edition, fascicle 54] (Cambridge, 1966).

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division of the kingdom as 931 B.C.[7] Since Solomon reigned 40 years (I Kings 11:42) and began building the temple in the fourth year of his reign (I Kings 6:1) this building began in the year 967 B.C. This date in turn can be related to the Exodus because in at least two places God gives a time bridge from the Exodus to the building of the temple. The first is recorded in I Kings 6:1 where 480 years is indicated as the time span between these events. The second can be shown from the chronology of the Hebrew Judges.[8]

A time span of 480 years brings us to 1447 B.C. as the date of the Exodus. If we work back from this date to Adam, we arrive at the date for Adam as 11013 B.C. The key dates are as follows:

Creation of Adam	11013 B.C.
Seth born	10883 B.C.
Enosh's generation	10778-9873 B.C.
Kenan's generation	9873-8963 B.C.
Mahalel's generation	8963-8068 B.C.
Jared's generation	8068-7106 B.C.
Enoch's generation	7106-6741 B.C.
Methuselah's generation	6741-5772 B.C.
Lamech born	5772 B.C.
Noah born	5590 B.C.
Flood	4990-4989 B.C.
Arpachshad's generation	4488-4050 B.C.
Shelah's generation	4050-3617 B.C.
Eber's generation	3617-3153 B.C.
Peleg's generation	3153-2914 B.C.
Reu's generation	2914-2675 B.C.
Serug's generation	2675-2445 B.C.
Nahor's generation	2445-2297 B.C.
Terah born	2297 B.C.
Abram born	2167 B.C.
Isaac born	2067 B.C.
Jacob born	2007 B.C.
Entrance into Egypt	1877 B.C.
Exodus	1447 B.C.
Foundation of temple laid	967 B.C.
Division of Kingdom	931 B.C.

The First Civilization

The development of a Biblical chronology beginning with Adam is interesting, but will it hold up when compared with the known facts of secular history? To ascertain this, the earliest cilivization of antiquity will next be examined to determine its location and the time of its emergence.

The threshold of history appears to be located in the area of the present nation of Iraq. Albright writes:[9]

> "Archeologocial research has established that there is no focus of civilization in the earth that can begin to compete in antiquity and activity with the basin of the Eastern Mediterranean and the region immediately to the east of it. . . . The Obeidan is the earliest clearly defined culture of Babylonia, where we find its remains underlying nearly all the oldest cities of the country, such as, Ur, Erch, Lagash, Eridu, etc. This proves that the occupation of the marshlands of Babylonia by human settlers came rather late in history of the irrigation culture, probably not far from 3700 B.C."

Thus the archeological evidence shows that the location of the first civilization after the flood was in the Mesopotamia Valley, and this agrees exactly with the Bible for it reports the first cities were Babylon, Erech, Nineveh, etc. (Gen. 10:10, 11).

The date of 3700 B.C. suggested by Albright is apparently satisfactory to most archeologists. M. B. Rowton writes that in Uruk, one of the most ancient Mesopotamia sites, the earliest level of monumental buildings is that of the level known as Uruk V. He concludes[10] "the beginning of Uruk V can plausibly be dated 3500 B.C." These dates of 3500 or 3700 B.C. are estimates arrived at by starting at a more clearly defined historical point and allowing a reasonable period of time for each level of occupation prior to this. Thus, the archeological evidence appears to indicate that prior to about 3700 B.C. there was no substantial culture anywhere in the world. About 3700-3500 B.C. the first great civilization began to be formed in the plains of Sumer in the land of Babylon, Erech, Ur, etc.

How does this time compare with the Biblical chronology? In Genesis 10 the notice is given that the first building activity after the flood is that of Nimrod the beginning of whose kingdom was Babel, Erech, and Accad, all of them in the land of Shinar (Genesis 10:10). But when did Nimrod come upon the scene? His genealogical descent in that of Noah, Ham, Cush, Nimrod. (Gen. 10:1, 6, 8). The Bible offers no timetable for this side of the family tree but it does offer precise information regarding another branch, that of Noah, Shem, Arpachshad, and Shelah. If the genealogical statements of the Bible are studied one might

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CRITIQUE II

of "The Biblical Calendar of History"

A priori assumptions . . . obstruct and confuse. The chronology of antiquity is still indecisively known.

Mr. Camping shows commendable effort in his comments relative to the chronology of antiquity as set out in the book of Genesis. That his solution does not settle the vexing problem may be said to be somewhat obvious since he follows in a long succession of those in both the liberal and conservative camps of Biblical scholarship. In my proposed commentary on Genesis, I, too, must acknowledge that the Biblical, archaeological and scientific data do not provide a conclusive answer.

Is chronology important for its own sake? I have concluded that such is not so, that there are other more important reasons involved for including the time notes. I feel, therefore, that time spent in consideration of Genesis should be put upon other subjects such as the message itself.

But there are certain things contained in Mr. Camping's presentation which can and need be considered.

1. The interpretation of *qara'* made in the early part of his article, that its use relative to children connotes an actual son, not a distant descendant, cannot be sustained from Scripture. He repudiates the use in Matthew of the designation of son being applied to grandsons. But in the geneology of Christ, Ahaziah, Joash and Amaziah are omitted between Joram and Uzziah, but Joram is said to have "begotten" Uzziah. Now this structuring and use of "begotten" may be

note that very often two branches of the tree are offered. One is that of the descendants leading eventually to Christ and about which precise timetables are given as we have seen. The second is the genealogical descent of that side of the family which turned away from God. It can be shown that the timetable of these two lines run roughly parallel.[11]

It thus may be assumed that Ham and Shem were contemporaries (they obviously were inasmuch as they were brothers), that Arpachshad and Cush were nearly contemporaries, and that Shelah and Nimrod were probably men of the same period of history. Thus, if Shelah's date is known, it may be surmised that Nimrod's was close to the same date.

Shelah's date by Biblical reckoning was that of 4050 B.C. to 3617 B.C. Nimrod then must have lived about this time. The Bible would thus suggest a date of about 3900 to 3617 for the founding of the great cities of the Mesopotamia Valley. Thus the date suggested by the evidence of archeology (3700-3500) accords very well with the Biblical statement.

It is of more than passing interest in this connection that the name *Nimrod* has left its mark on the Mesopotamia Valley. The great archeologist George Rawlinson writes:[12]

> "The remarkable ruin generally called Ahkerhuf, which lies a little to the south-west of Baghdad, is known to many as the "Tel-Nimrod"; the great dam across the Tigris below Mosul is the 'Suhr-el-Nimrud'; one of the chief of the buried cities in the same neighborhood is called 'Nimrud' simply; and the name of 'Birs-Nimrud' attaches to the grandest mass of ruins in the lower country".

The Confusion of Tongues

The next bit of history that should be interesting to investigate is the event of the tower of Babel. Is there any secular evidence that relates to the account of this confusion of tongues as set forth in Genesis 11? There is, indeed.

It might first of all be noted that the account of Genesis 11 indicates that prior to this time in history all men spoke one language. Moreover, the leading civilization was that of these people who dwelt in the plains of Shinar or Sumer. Their desire to be the one great civilization of the world prompted the building of this great tower which in turn brought on God's interference with their plans so that they were forced to separate into various nations.

A perspective of history has been set forth that shows that answers are potentially forthcoming when we begin with the Biblical framework.

As has already been shown, the first great civilization of the world as revealed by secular evidence was that which sprang forth in the Mesopotamia Valley. The time of the beginning of the second important civilization of antiquity could be of real significance. Presumably, it would have begun very shortly after the tower of Babel. The event of the tower of Babel can be known to have occurred during the generation of Peleg's for in his days the earth was divided. (Gen. 10:25). Peleg's generation was dated 3153 B.C. to 2914 B.C. Therefore, one would expect no important civilizations other than Babylonia to have an antiquity greater than about 3150 B.C.

Egypt Becomes a Great Civilization

All archeological evidence points to Egypt as the second great civilization to appear. While there was a primitive culture in Egypt prior to the first Dynasty, the uniting of all of Egypt under Pharoah Menes to form the First Dynasty was the signal for a major burst in the arts of civilization. Albright writes:[13]

> "It is now certain that the level of Egyptian culture remained considerably below that of Mesopotamia until the First Dynasty, when under strong indirect influence from the Euphrates Valley, it forged ahead of the latter in a breath taking spurt".

Interestingly, the new civilization of Egypt beginning with the First Dynasty was patterned after the Babylonia (Mesopotamia) culture. Albright continues:[14]

> "The close of the predynastic Age and the beginning of the Thinite (period of first two dynasties) period witnessed a sudden burst in the arts of civilization. This seems to have been connected in some way with an

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objected to because this is in the New Testament and not in chapters 5 and 11 of Genesis under discussion by Camping. But God is the *author* of the *whole* Bible, and the word, "beget," whether Old Testament or New Testament, must be understood in the same way. The word does indeed, then, show a usage to which Mr. Camping objects.

But the proof of the New Testament usage may be had from Genesis itself. Gen. 46:12 describes the sons of Judah; these as well as the sons of Levi, Simeon, Reuben, Issachar, and Zebulun are called (v 15) the sons of Leah, but only these six are her actual sons (Gen. 29:32-35; 30:18-20). Facts and language seem to be at variance here, but let us remember that cultural and mental images differ from one people to another, yet not so much that one cannot understand what is meant. Gen. 46:15 must mean that descendants (Heb. *sons*) are designated, actual grandsons, connoted under the designation *sons*.

The significance of all this for Gen. 5, 11 respecting *qara'* is that it has nothing at all to do with begetting, only naming a child. To imbue *qara'* with a technical meaning as Camping does, goes against history and language usage, which appears from any investigation of the use of *qara'* in any concordance. Exegesis here is quite faulty. In his footnote three there seems to be an admission that *qara'* cannot be interpreted as Mr. Camping would hold, since non-son descendants are called sons of Shem. The position Camping advances then is to be rejected, as well as the use of it as the basis for constructing a calendar.

2. The use made of dating time by the years of an individual is pressed too far by Mr. Camping. This is his "calendar" based on his special interpretation of *qara'*. Now it is not denied that dating was done by regnal years of the kings in Mesopotamia and Egypt as well as in Palestine in the days of the kings of Israel and Judah. But what *is* denied is that the Bible requires us to hold that this is true of the persons of Gen. 5, 11 or chapter 10. Nor can we know that these were kings in any way, or even if any of these are to be included in the Sumerian King List or by

> increase of cultural influence from Asia, since there are numerous exact parallels between Mesopotamia and Egyptian culture at this time, the former being demonstrably older and more original in nearly every instance."

The date of the beginning of the First Dynasty under Menes is calculated to be somewhere between 2800 B.C. and 3100 B.C. The early archeologists such as Breasted dated his reign at about 3400 B.C. As new archeological evidence was uncovered this date was moved forward to about 3000 B.C. Albright believes 2850 B.C. is a good estimate.[15] William C. Hayes suggests 3100 B.C. is the best date presently available.[16]

Considering the above information one is struck by the fact that prior to about 3100 B.C. to 2850 B.C. only one civilization of consequence existed in the world. That was the nation of Babylonia on the plains of Shinar. Then at that time in a sudden burst of progress Egypt grew to become a second great civilization, a civilization patterned after the first. And these dates are in almost exact agreement with the Biblical date for the Tower of Babel. Surely, the confusion of tongues as recorded in Genesis 11 sent thousands of people skilled in all the arts and crafts of Mesopotamia to Egypt and elsewhere. Thus, accord can be seen between the sacred and the secular records by this indirect evidence of the timetable of the civilizations of antiquity.

Writing and the Tower of Babel

It might be noted, too, that writing had its beginning in Mesopotamia and may be related to the confusion of tongues. Sir Leonard Wooley writes:[17] "All the archeological evidence seems to prove that true writing was first developed in southern Mesopotamia". The timing for this event is given as 3500 to 3000 B.C. Gelb concludes:[18] "the date of the earliest Sumarian writing should be set tentatively at about 3100 B.C."

The confusion of tongues in Sumer some time in the period between 3150-2900 B.C. could well have been the catalyst that produced writing. Before this dramatic civilization-splitting event all was secure. Only one language was spoken in all the world. Verbal communication was adequate and dependable. But then came this fearful event that shook the very foundations of this great civilization. Men could no longer understand each other. There must be a better way. The application of the spoken word to clay tablets would provide insurance that this kind of a happening would never totally destroy a culture again. The clay tablets would always prove to be the reference point. One surely can see the possibility if not the probability of this connection between writing and the Tower of Babel.

Conclusion

We thus see that the chronology of history established by Biblical reckoning agrees rather satisfactorily with the archeological evidence of the earliest civilizations. The Biblical timetable is, of course, the most reliable for it is God's Word. If we have properly interpreted it, it should make possible a far more definitive analysis of the secular evidence than ever

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Berossos.[1]

It cannot be a support to his calendrical view to advance Jesus' words in Matt. 24.34 regarding "this generation." Buswell[2] has shown that "generation," from the Greek *genea*, does not in Jesus' vocabulary mean "generation," but "race," "people," so that not chronology but an enduring people is in view. Again, exegesis is not correct.

3. Respecting the construction of his calendar as based on the chronological data of the descendants of Levi in Egypt (Ex. 6), the time of 430 years is artificial, and erroneous in the assumption that the parent died the year the successor was born. For this to happen three times is quite odd indeed! Such a construction likewise does not fit the pattern of chapter 5 of Genesis. Mr. Camping does not explain this switch. His construction indicates only that these years do add up to the total of 430 years. As a variant view, some have held that the 430 years of Ex. 12:40-41 include the "sojourn" of the patriarchs in Canaan, and construct it on textual evidence[3] including the fact Jochebed would have to be over 250 years old, if the stop in Egypt were 430 years.[4]

It may be said, then, that no such calendar as is proposed exists in Scripture.

4. Mr. Camping proceeds to construct a chronology on this interpretation. Can it be justified on the basis of present Biblical, archaeological, anthropological and scientific knowledge? This writer does not believe it can, on the following criteria:

a. An examination of his time table indicates a creation date of 11,013 B.C. for the origin of Adam, arrived at by adding together the lengths of the lives of the prediluvians of chapter 5 but starting with the 130 years of Adam's age when Seth was born. This is an inconsistency, so his creation date is here in error. But if his idea of "successor" is correct, why does Camping not use the age of the parent at the birth of the child? A gratuitous use of his data gleaned from Ex. 6 has forced him to do so, when it can be shown that such meaning as he derives is not absolute.

b. Archaeological and anthropological data to date do not in any way support so late a date as 4990-4989 B.C. for the Biblical flood. No scholar competent in study of the Mesopotamian flood data will adopt such a view. It is quite common knowledge that Woolley's deep flood strata at Ur came in the course of cultural data existing both *before* and after it, so that this must be construed as a local flood.

c. Anthropology itself is not conclusive. There must be a definite change in the fauna and flora of the world subsequent to the flood. This writer was informed by a colleague more knowledgeable than he concerning the positing by anthropologists of a significant change around the world in the fauna as occurring c. 40,000 - 38,000 B.C. The thing lacking, he stated, to form a possible, conclusive proof, was citation of a world-wide change in the flora at the same period. But no anthropologist would possibly place Adam's creation as late as is done by Camping.

d. Science itself cannot agree that the flood could occur at the late date suggested. Carbon 14 dates are receiving wide-spread acceptance, and although there is scepticism in some quarters regarding their accuracy, yet there is good harmony for the past which is datable by actual chronology systems of Egypt and Mesopotamia. Therefore, where carbon 14 dates have been obtained for dates earlier than 3000 B.C., which is

before. It should also provide a dependable framework in which to understand dating evidence such as that offered by radiometric isotopes like carbon 14.

Hopefully, a perspective of history has been set forth that shows that answers are potentially forthcoming when we begin with the Biblical framework. The concept of a 13000 year old world, which began to be repopulated again after the flood some 7000 years ago, and which 1500 years later had grown to a point which allowed the spawning of the first great cities, surely makes much more sense than that of mankind being around for hundreds or even thousands of milleniums, and then becoming a cohesive city civilization only in the last 5500 years. Furthermore, the apparent possibility of the end of the age occurring in our time also accords far better with the shorter timetable.

Admittedly, the first purpose of the Bible is not to be a textbook of science or history. It is fundamentally a presentation of God's grace revealed through Jesus Christ. But when the Bible does speak in any field of learning, it does so with great care, accuracy, and authority. Three reasons might be advanced for this: (1) these subjects are often an integral part of the plan of salvation; (2) they are part of God's message to man; and (3) by reason of His very nature God is accurate when He speaks. Therefore, it possibly has much more to offer than many have supposed. I hope that others will be encouraged to build upon the suggestions offered in this presentation.

REFERENCES

[1]Compare Genesis 7:13, 9:18 and I Peter 3:20.
[2]Compare Genesis 11:27 ff, Gen. 12:4 and Acts 7:4
[3]For example: Gen. 10:21 describes Shem as "the father of all children of Eber", though Eber is removed from Shem by several generations. (cf. Gen. 11:10-16)
[4]The fact that Jesus was born a few years earlier (probably 7 B.C.) does not diminish the force of this argument, for 1970 A.D. is in principle related only to Christ's birth date and not to any other.
[5]Camping, Harold. *Adam, When* (Not yet published) Ch. 3
[6]*Ibid.*, ch. 6
[7]Thiele, Edwin R., *The Mysterious Numbers of the Hebrew Kings*, Eerdmans, Rev. edition 1965, pg. 53, 54. Much additional support can be given to the accuracy of this date from the reigns of three of the greatest of the Egyptian Pharoahs – Sesostris III, Tuthmosis III and Rameses II. A discussion of this is, of course, beyond the scope of this article.
[8]Camping, Harold; ch. 5
[9]Albright, William Foxwell; *From the Stone Age to Christianity*, Doubleday & Co. Inc. 1957, pg. 32
[10]Rowton, M. B., in *The Cambridge Ancient History*, Cambridge University Press, 1964, pg. 57, 58.
[11]Camping, Harold, ch. 7
[12]Rawlinson, George, Egypt and Babylon, John W. Lovell Co., pg. 9.
[13]Albright, pg. 142
[14]*Ibid.*, pg. 157
[15]*Ibid.*
[16]Hayes, William C., *The Cambridge Ancient History*, 1964, pg. 4
[17]Woolley, Sir Leonard, *The Beginnings of Civilization*, The New York American Library, 1965, pg. 364
[18]Gelb, *A Study of Writing*, pg. 63

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more or less the beginning of datable history, we may accept with reasonable credibility these dates for earlier happenings not otherwise datable.

e. Archaeological data for the Mesopotamian area show a continuous occupation for that area from before the date posited for the flood by Camping. It is not merely spots here and there but *spots in many areas*, with more coming to light, in Mesopotamia, Anatolia, Transcaucasia, India, Egypt and Europe.

f. The correlation with the emergence of civilization can be no proof of his calendar because none of the names of Bible history emerge in a datable historical context of Mesopotamia, where civilization emerged first. Any appeal to authorities establishes only that such civilizations appeared. If one should date the Tower of Babel of Gen. 11 at 3153 B.C., when civilization using writing was already advanced and the Sumerian language was already one of an untold number, this latter fact alone invalidates placing Babel at this time. His usage of archaeological data is contrary to fact, and he is forcing it into an *a priori* mold. This is not good scholarship.

Regarding Egypt, archaeological data do not fit his date of the tower of Babel. Upper Egypt had received Mesopotamian influences earlier than this, as well as Lower Egypt (The Delta) from Palestine. Since Mesopotamia-Iran was the origin of peoples and the diffusion is from there through Palestine to Egypt, and since it can be shown there was a time lag of about a thousand years in the spread of early culture up the Nile, to place the Tower of Babel so late is erroneous. Thus again there is to be seen that there is a forcing of a system into a previous opinion, and thus the calendar of Mr. Camping must be rejected.

In summary one can say that efforts need to be made to correlate all data, to give due weight to each part, but that *a priori* assumptions and forced constructions do not advance knowledge. Rather they obstruct and confuse. The chronology of antiquity is still indecisively known.

Footnotes

[1]Cf. J. Finegan, *Light From the Ancient Past* (Princeton: 1963), pp. 29, 30.
[2]J. O. Buswell, Jr., *A Systematic Theology of the Christian Religion* (Grand Rapids: 1963) Vol. 2, p. 399, 400.
[3]Jas. Fergusson, *An Exposition of the Epistles of Paul* (Evansville, Ind.: no date), p. 58.
[4]Chas. J. Ellicott, *St. Paul's Epistle to the Galatians* (London: 1863), p. 61.

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REBUTTAL

by the Author

To attempt to present in one paper a subject as potentially controversial as a solution to the Biblical chronologies is difficult enough. To do so as a layman makes it well nigh impossible. The comments of the reviewers are deeply appreciated. Their questions, as well as many more, are expected, for it is impossible to analyze all of the implications of this subject in one article. Even in trying to answer the questions which have been so fairly raised, space limitations require much summarizing and will of necessity raise many new questions.

1. The conjecture that Levi was 21 years older than Joseph is not without Biblical warrant. The following timetable is the result of careful analysis of the Biblical evidence. It should satisfy all the requirements of the language of Genesis 29 to 47. It also fits the Biblical Calendar under discussion.

Jacob arrived in Haran when he was	60 years old
He worked 7 years for Rachel and was then married to Rachel and Leah. He was then	67 years old
Reuben was born to Leah the following year when Jacob was	68 years old
Simeon was born next to Leah when Jacob was	69 years old
Levi was born next to Leah when Jacob was	70 years old
Jacob finished his second seven year contract for Rachel when he was	74 years old
He worked for wages for 20 years. In the 17th year of this period Joseph was born. Jacob was	91 years old
At the end of this 20 year period Joseph was weaned[1] and Jacob wished to leave Haran. He was	94 years old
He worked six years longer for his flocks and left Haran when he was	100 years old

2. Consistency in Biblical Calendar keeping is not to be necessarily looked for in a rigid system but in the provision of adequate truth. The Bible provides the only ancient account of history that has all mankind in view. God tied his timetable to believers, probably because believers (and how to become one) and their relationship to God is the major theme of the Bible. (The historical setting in which the spiritual record is cast is also God's Word and is, therefore, equally trustworthy.)

Therefore, there had to be exceptions in the timekeeping detail to accommodate God's dealings with the believers. This was the situation during the days of the patriarchs. Later on, after the exodus, and especially when Israel became a monarchy, the new nation of Israel adopted customs from other nations which included timekeeping methods. These became a part of the Biblical record. Thus, the need for the earlier method of calendar keeping was no longer required.

God did provide the notice that 480 years transpired from the exodus to the beginning of temple building under Solomon (I Kings 6:1). Thus, the rather chaotic, confused time period of the Judges was not allowed to contribute to a breakdown in chronology.

3. Correlating the "Biblical Calendar" with secular evidence of early man appears impossible for the period before the days of written history. This is due to the fact that the Carbon 14 dating method provides the dominant means of dating this early period.

But Carbon 14 dating exists virtually in a vacuum prior to the advent of written history. There is no other reliable record presently available by which the accuracy of this method can be ascertained prior to the last 5000 years of earth's history. (That is, except for the Biblical record.) And the Carbon 14 method has within it at least one condition that suggests the possibility of serious errors in timekeeping.

The Carbon 14 method assumes that on a world-wide basis the rate at which new C14 atoms are formed equals the rate at which existing C14 atoms disintegrate. Thus, the world-wide inventory of C14 atoms should be relatively constant in quantity. Since it is assumed that C14 production has continued without major change for a duration of time many times longer than the half life of these atoms, it appears reasonable to expect such equilibrium.

But the evidence suggests otherwise. R. E. Lingenfelter sums up this puzzle rather well when he writes that there is a strong indication that the present natural production rate of C14 atoms exceeds the natural decay rate by as much as 25%.[2] The implications of this conclusion are too complex for this present discussion. It might be pointed out, however, that this could indicate that the present worldwide C14 inventory of C14 atoms is only about 75% full and is still increasing. This in turn could require that radio-carbon dates of apparent great antiquity should be sharply reduced (even though the evidence appears to indicate the reverse is true for the first couple of milleniums prior to 250 B.C.[3]).

It might be noted, too, that other secular information is available that appears to correlate with the Biblical Calendar. For example, nineteen of the elements in ocean solution are found in such minute quantities that it is estimated that they have a residency of less than 1000 years.[4] That is, they are found in the oceans in total amounts that would have obtained if presently calculated continental weathering rates had continued for less than 1000 years. This is precisely what might be expected if differential weathering had occurred for a longer period (say, 13000 years).

4. In the light of the worldwide, mountain height, characteristics of the Noachian flood (Genesis 6 & 7) we would hardly be looking for evidence of the flood in the Mesopotamia Valley. Rather, should not far greater correlation be seen between the flood and such evidence as that, for example, which might relate to the sediments found on the continental shelves? K. O. Emery writes that "sediments on about 70% of the world's continental shelves have been laid down in the past 15000 years"[5] (Shouldn't these radiocarbon years be adjusted to 7000 actual years?) The paucity of sediments on the ocean floor also becomes especially interesting in view of a possible 13000 year timetable. Albright's suggestion that the flood story goes back to at least ten or twelve thousand years looks quite valid since these are radio-carbon years.

5. The use of the phrase "substantial culture" in this discussion is indeed assuming too restrictive a view of "culture". It would be better to use some other

phrase such as "kingdom of cities". In any event, prior to about 3700 B.C. there was no civilization that even approached the Sumerian's ability to build a cohesive nation such as they developed in Mesopotamia.

6. The existence of non-Sumerian place names in the Sumerian language and the existence of more than two thousand languages today without any written language is not contrary to the suggestion of a tower of Babel-induced confusion of languages. If God introduced many languages at that time, probably only the most highly civilized people, those remaining in Mesopotamia (the Sumerians), would have had the ability to invent writing. They surely could have used non-Sumerian names as they made contact with peoples speaking other languages.

Footnotes

[1]The book of Maccabees (2 Mac. 7:27) suggests the Jewish child was weaned at the age of three years.

[2]Review of Geophysics, 1963, pg. 51 by R. E. Lingenfelter. See also Libby, W. F., "Radio Carbon Dating", 1955, p. 7. H. E. Suess also writes about this in the Journal of Geophysical Research, Vol. 70, 1965, pg. 5946.

[3]Radiocarbon – Published by the American Journal of Science, Yale University, New Haven, Conn. Vol. 8-1966, pg. 539.

[4]Chemical Oceanography, Edited by J. P. Riley & G Skirrow, Vol. 1, pg. 164 Academic Press, London and New York, 1965.

[5]"The Continental Shelves" by K. O. Emery in Scientific American, Sept. 1969, pg. 112.

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Charles Lyell and the Noachian Deluge

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Sir Charles Lyell was not only the most influential and prolific of nineteenth century geologists, but was also the cause of a great storm of controversy over the nature and extent of the Noachian Deluge. Understanding theological response to Lyell and his work as an episode in "the history of the warfare of science with theology" is valuable both as a warning to avoid repeat performances and as an aid to better understanding of the present debate.

Scientists and theologians who are Christians too often neglect history to their own intellectual impoverishment. What appear to them to be major modern issues on which turns the perspicuous truth of biblical revelation are often problems which were long ago laid to rest. They realize too late that their labored polemics and hastily-written tracts are often entirely anachronistic, exuberant rehashes of what was once stated and contravened either definitively or conclusively. The unforgivable fact is that without historical sense they commit the same kind of mistakes, which once discredited their scientific and theological forebears. Since "all have sinned," we also are prone to follow this ignoble tradition unless we maintain a clear-minded historical perspective on contemporary relations between science and theology. Moreover, without this perspective we shall have no appreciation for important contributions which have been made by way of solution to controversies which still engage us.

In this study I have chosen to discuss the great "high-priest of uniformitarianism," the flood-furor his work induced in theological circles, and the harmonizing efforts of nineteenth century Christian scholarship. The lessons to be learned from this history are at least two in number. For my part I consider the drama of dogmatic theology-attacking learned science well worth pondering in order to recognize repeat performances and treat them remedially. Also, because the Genesis Flood and the philosophy of uniformitarianism have recently been so much in debate among modern evangelicals, I think an understanding of the seminal work of Charles Lyell in relation to its harmonizers with biblical teaching may incidentally

A Discussion of Nineteenth Century Theological Response to Geological Uniformitarianism.

illuminate the technical side of this somewhat dated controversy.

SETTING THE STAGE

During the seventeenth and eighteenth centuries the problems connected with the Noachian Deluge did not so much concern its historicity as they did its universality. One problem arose from the absence in America of some Old World animals and by the presence of new varieties (viz., How did they find their way from Mount Ararat?). Together with the obstacle of insufficient water for a universal Deluge, these complications eventually compelled some scholars to put forth a "local flood" theory.[1] In response, those who held the universal view advanced theories of the earth to explain its composition and to account for the waters of the Deluge without invoking a miraculous creation of water (thus rightly hesitating to lavish miraculous props on systems which ought, as far as possible, to stand on the "providential use of natural causation"). Patrick Cockburn's *An Enquiry into the Truth and Certainty of the Mosaic Deluge* and Alexander Catcott's *A Treatise on the Deluge*, together with the theories of Burnet, Whiston and Woodward[2] were "so far successful as to establish for many decades the orthodoxy of the doctrine that the Noachian deluge was universal rather than limited in extent."[3] In fact, that doctrine outlived the geophysical theories which attempted to account for the waters of the Deluge and the constitution of the earth.[4]

By the turn of the nineteenth century a new enthusiasm for the Flood theory of geology had swept Europe. Fossils, the rock strata in which they were found, and the major geologic formations of the earth were considered to be the result of the worldwide Deluge.[5] But with its increasing sophistication the science of geology began to replace armchair theories of the globe; geologists frankly suspected that the Genesis Flood was being overworked. It seemed to them incredible that the year-long inundation could have done the earthmoving task to which it had been assigned.

In the process of second-guessing the mechanisms of geological formation, a heated controversy developed. The Neptunists, led by Abraham Gottlob Werner, and the Vulcanists (or Plutonists), the followers of James Hutton, were struggling to account for geological phenomena apart from the Flood.[6] The Neptunists held that all rock formations precipitated from a primeval, mineral-laden ocean. The water then receded and the continents appeared as they are today. The universal flood of Noah was assigned a later date. Unfortunately their ideas were formulated in a day when "indoor discussion of theories was far more popular than field study."[7] Werner's conclusions were based on a woefully inadequate foundation of induction which stemmed only from observations made in his immediate German neighborhood. His was a theory that left much to the imagination in moving from the very particular to the general.

In contrast James Hutton published his *Theory of the Earth* in 1795 when he was nearly seventy years old. It was a mature work based on a lifetime of wide-ranging field observations. Instead of diluvialism or mineral precipitation, Hutton advanced a reasonable though unorthodox interpretation of geological phenomena.

For my part I consider the drama of dogmatic theology attacking learned science well worth pondering in order to recognize repeat performances and treat them remedially.

> . . . he contended that dynamic forces in the crust of the earth created tensions and stresses which, in the course of time, elevated new lands from the ocean bed even as other exposed surfaces were in the process of erosion. There had never been a universal flood. There was observable in the buried shell beds of the continents, which had long been taken as evidences of the Deluge, only the signs of subsidence and renewed uplift which were part of the eternal youth of the world.[8]

The key word here is "time." Hutton contended that the forces of nature he observed, in shaping the crust of the earth at the rates he observed, could only have produced the observed geologic formations by operating for many millennia.

Hutton's friend, John Playfair, apparently thought that the book would not sell because of its ponderous, abstruse style. In 1802 he took it upon himself to elucidate Hutton's writing in a popular edition entitled *Illustrations of the Huttonian Theory*. William Thornbury shows the eminent position of these volumes in his 1954 publication, *Principles of Geomorphology*:

> *Concept* 1 The same physical processes and laws that operate today operated throughout geologic time, although not necessarily with the same intensity as now.
>
> This is the great underlying principle of modern geology and is known as the principle of uniformitarianism. It was first enunciated by Hutton in 1785, beautifully restated by Playfair in 1802, and popularized by Lyell in the numerous editions of his *Principles of Geology*.
>
> Without the principle of uniformitarianism there could hardly be a science of geology that was more than pure description.[9]

Hutton's postulation of excessive time rankled the religiously orthodox. If anything was certain in their minds, it was that the earth could not be more than about 6000 years old. Bishop Ussher's "received chronology" must be inspired, since it was, they thought, unerringly deduced from Scripture. But thanks to Baron Cuvier, they were able to advance what seemed for the time being unanswerable criticisms of Hutton's uniformitarian time scale. Cuvier posited a series of aqueous catastrophes to account for the major rock strata. The last of these, the Noachian Deluge, was held to account for the superficial deposits of fossils in upper strata.[10] Theologians easily found time for Cuvier's catastrophes between the original creation of the cosmos in Genesis 1:1 and the restoration described in the six day account. Or the days of creation were understood to be ages of organic development interrupted by Cuvier's catastrophes (a notion generally considered to be heterodox, however). These theories found wide acceptance, especially among the leading English geologists, Sedgwick, Murchison and Buckland.

William Buckland, Professor of Geology at Oxford, was a distinguished teacher, a committed Christian and the foremost English geologist prior to Sir Charles Lyell. Buckland literally uncovered many important

geological facts which were considered to fit perfectly into the framework of Cuvier's multiple catastrophism. With Cuvier he maintained that the major rock strata and virtually all fossils owe their existence to a series of catastrophies that occurred in antiquity. He gave the name "alluvium" to the superficial beds of bone and rock deposited by streams in recent years. The title "diluvium" was reserved, for example, for the bones of elephants, tigers and other uncommon, tropical animals he found jumbled together in a Yorkshire cave. This diluvium he took to be direct and irrefutable evidence of the Genesis Flood.

Buckland announced the theory in his inaugural lecture at Oxford and, in 1823, secured his fame by publishing it in, *Reliquiae Diluvianae.*

> The treatise was of such a high scientific calibre, in spite of its fallacious premises, that it firmly implanted the actuality of the Deluge in the minds of geologists as well as non-geologists, not only in Britain but throughout Europe and America.[11]

Baron Cuvier happily adopted Buckland's conclusions and in 1826 wrote that they "now form, in the eyes of all geologists, the fullest proof to the senses, of that immense inundation (the Noachian flood) which came last in the catastrophes of our globe."[12] Theologians regarded *Reliquiae Diluvianae* as a great, scholarly victory for the testimony of Moses, and belief in a universal Noachian Deluge was more firmly established than ever before.

THE PROTAGONIST

In a typically acidulous article on science and theology, Thomas Huxley spoke of the atmosphere surrounding scientists during the twenties and thirties of his century:

> At that time, geologists and biologists could hardly follow to the end any path of inquiry without finding the way blocked by Noah and his ark . . . and it was a serious matter, in this country at any rate, for a man to be suspected of doubting the literal truth of the Diluvial or any other Pentateuchal history.[13]

Into this tense climate came the inquiring mind of Charles Lyell. Lyell had grown up with an unusual interest in nature. From the day he read *Bakewell's Geology* his life was marked for further geological study. He left law school and the promise of a lucrative profession to study with William Buckland and to read James Hutton. During his geological education he travelled extensively in England and on the continent, everywhere collecting rocks and fossils and making detailed notes on formations. Lyell, "with full knowledge of what had been said on both sides, became a convinced Uniformitarian."[14] In 1829, six months before the first of his epoch-making three volumes, *Principles of Geology,* was published, Lyell outlined his ideas in a letter to a friend:

> My work is in part written, and all planned. It will not pretend to give even an abstract of all that is known in geology, but it will endeavor to establish the *principle of reasoning* in the science; and all my geology will come in as illustration of my views of those principles, and as evidence strengthening the system necessarily arising out of the admission of such principles, which, as you know, are neither more nor less than that *no causes whatever* have from the earliest time to which we can look back, to the present, ever acted, but those *now acting;* and that they never acted with different degrees of energy from that which they now exert.[15]

The substance of Lyell's great work is summed up in its subtitle: "Being an attempt to explain the former changes in the earth's surface by reference to causes now in operation."

It must be pointed out in passing that Lyell was a child of his times. The Newtonian, "cosmic-machine" syndrome which pervaded scientific thought during his era was evidenced and endorsed in his *Principles of Geology.* Lyell asserted that "the enigmas of the moral and spiritual world . . . are found to depend on fixed and invariable laws" and that "the philosopher at last becomes convinced of the undeviating uniformity of secondary causes, and . . . determines that probability of accounts transmitted to him of former occurrences, and often rejects the fabulous tales of former ages, on the ground of their being irreconcilable with the experience of more enlightened ages."[16] However despite a mechanistic world-view, Lyell had definite religious leanings. His biographer, Thomas Bonney, points out that Lyell was a member of the Church of England, though one more enamored with its music and architecture than with its doctrine. Thus he failed to understand why nonconformity or free inquiry should entail ecclesiastical censure.

> His mind was essentially undogmatic; feeling that certainty was impossible in questions where the ordinary means of verification could not be employed, he abstained from speculation . . . he was content, however, to believe where he could not prove . . . he worked on in calm confidence that the honest seeker after truth would never go astray . . ."[17]

Lyell's writings epitomized his intellectual and spiritual outlook. Anyone who has read his *Principles* will agree with Andrew Dickson White who said that "nothing could have been more cautious." It merely gave a well-documented account of the main discoveries which he and others had made up to that time. Then from his legal training he imported clear and convincing logic to tie the facts together in illustration of the uniformitarian principle.[18]

Since Lyell must have been painfully aware that the Noachian Deluge was a major barrier to the promulgation and acceptance of his ideas, "he impugned the deluge explicitly in only one passage. . . . Generally he preferred the method of draining the flood of its influence incidentally to the development of his larger interpretation."[19] Said Lyell,

> For our own part, we have always considered the flood, if we are to admit its universality in the strictest sense of the term, as a preternatural event far beyond the reach of philosophical inquiry, whether as to the secondary causes employed to produce it or the effects most likely to result from it.[20]

With characteristic reservation, Lyell instead advanced an interpretation of the flood diametrically opposed to catastrophist geology:

> It is the opinion of some writers, that the earth's surface underwent no great modification at the era of the Mosaic deluge, and that the strictest interpretation of the scriptural narrative does not warrant us in expecting to find *any geological monuments of the catastrophe.*[21]

Lyell found it geologically necessary to minimize the effects of the Flood. "Draining the flood of its influence" meant for him that the universal Flood must have been far too tranquil a phenomenon to leave any

observable geologic effects. This was the so-called "tranquil-theory" which gained vogue with many geologists soon after Lyell's work came off the press.[22] Lyell even took pains to show that Scripture itself permitted this interpretation. He said that

> in the narrative of Moses there are no terms employed that indicate the impetuous rushing of the waters, either as they rose or when they retreated, upon the restraining of the rain and the passing of a wind over the earth.

And with a touch of irony, he signalized "so remarkable a fact as that the olive remained standing while the waters were abating." [23]

Sir Charles Lyell was by no means a villain. He was rather an honest, nominally-religious seeker after scientific truth who had no desire to agitate the Christian community. While viewing miraculous intervention in the course of nature with a distinctly sceptical eye, his naturalistic uniformitarianism did not prevent him from accepting the historicity of the Noachian Deluge.

AGGRAVATION AND ALTERCATION

Lyell's work was immensely popular and widely read both by professional geologists and, surprisingly enough, "by the cultivated public whose curiosity about the secrets of the earth was growing."[24] However, as one might expect, laymen were confused by Lyell's relatively technical and irregular interpretation of the Deluge. Since orthodox biblical scholarship seemingly held the upper hand in theological circles at the time, laymen expected a refutation or synthesis of Lyell's tranquil, uniformitarian interpretation from Christian biblical scholars. But, much to their consternation, the Archbishop of Canterbury, the Bishop of London and the Bishop of Llandaff in 1831 invited Charles Lyell to be professor of geology at King's College of the Church of England. In a letter Lyell related their attitude toward his work:

> They considered some of my doctrines startling enough, but could not find that they were come by otherwise than in a straightforward manner, and (as I appeared to think) logically deducible from the facts . . . there was no reason to infer that I had made my theory from any hostile feeling toward revelation.[25]

This seemed outrageous to the orthodox. In fact Lyell's perceptive friend, Poulett Scrope, quipped:

> If the news be true, and your opinions are to be taken at once into the bosom of the Church, instead of contending against that party for half a century, then, indeed, shall we make a step at once of fifty years in the science—in such a miracle will I believe when I see it performed.[26]

Another factor which induced a flood-furor among the biblically orthodox was the humble recantation of William Buckland. In the sixth of the series of "Bridgewater Treatises" delivered in 1836, Buckland repudiated his earlier conviction that certain "diluvium" may be accounted for by the Noachian Flood. He rejected Ussher's chronology and agreed with Lyell's tranquil interpretation, asserting that the waters of the Deluge "produced comparatively little change on the surface of the country they overflowed."[27] The orthodox were confused and irritated by the progressive-mindedness of some of their brethren and by the defection of their Flood-Champion. With regard to the latter, Bishop Shuttleworth said, "Some doubts were once expressed about the Flood; Buckland arose, and all was clear as mud."[28] But at the bottom of the mud was Charles Lyell. It was his work in fact which popularized and ultimately established the uniformitarian interpretation of geological phenomena and the tranquil flood theory.

War was declared. The ideological struggle to harmonize geology and Genesis began almost immediately after the publication of the third volume of Lyell's *Principles* in 1834. One author has described the conflict in this fashion:

> Attempts [at harmonization] have been variously classified, but the fact regarding them all is that each mixes up more or less of science with more or less of Scripture, and produces a result more or less absurd.[29]

Sir Charles Lyell was by no means a villain. He was rather an honest, nominally-religious seeker after scientific truth who had no desire to agitate the Christian community.

Although the underlying supposition of the absurdity of mingling science and Scripture may be itself absurd, many of the concoctions which boiled on the back burners of "fundamentalist" brains were served up too hot to swallow even if they had been palatable.[30]

Robert Blakewell wrote to the famous American geologist, Benjamin Silliman, that

> geology is in a rather strange state in England at present; the rich clergy begin to tremble for their incomes, and seek to avert their fate by a revived zeal for orthodoxy, and are making a great clamor against geology as opposed to Genesis.[31]

It seems however of little consequence for our purposes whether clergymen were motivated financially or spiritually. The fact is that they often violated the canons of social decency, to say nothing of Christian propriety, in denigrating geology and geologists. When it was found that Lyell did not attribute the fossil remains to the Deluge, and when it was shown by him that the earth is older than six millennia, "orthodox indignation burst forth violently; eminent dignitaries of the Church attacked him without mercy. . . ."[32] In reflecting on Lyell's final public address given before the Geological Club in 1875, Huxley mentioned that Lyell "spoke with his wonted clearness and vigour of the social ostracism which pursued him after the publication of the *Principles of Geology*, in 1830. . . ."[33]

Some clergy were motivated by more noble ends than financial gain. They took up the literary sword in defense of Scripture against the perverters of Divine Truth and published volume upon laborious volume of ignorant pseudo-science.[34] It is a significant and understandable fact that few of these books are today extant. Since they enjoyed relatively little currency in their day and have been by and large trampled underfoot in the march of history, one must necessarily rely on the observations and quotations of those who had immediate access to them.

Hugh Miller, a prominent and popular nineteenth-

century geologist, wrote a chapter important in this regard, "The Geology of the Anti-Geologists," in his book, *The Testimony of the Rocks*. There he relates a striking example of obscurantist reaction to Lyellian uniformitarianism.[35] On the supposition that all geologic processes in the past proceeded at the present observed rates, Lyell calculated the erosion taking place at Niagara Falls and concluded that 10,000 years ago the falls were located as far downstream as the present location of Queenston. This conclusion elicited from a certain Scottish minister a fulmination typical of orthodox reaction to many of Lyell's tenets. After denouncing the calculation as a "stab at the Christian religion" in that Lyell alleged "the Falls were actually at Queenston four thousand years before the creation of the world according to Moses . . ." the anti-geologist exultingly exclaimed,

> It is on grounds such as these that the most learned and voluminous among English geologists disputes the Mosaic history of the Creation and Deluge, a strong proof that even men of argument on other subjects often reason in the most childish and ridiculous manner, and on grounds totally false, when they undertake to deny the truth of the Holy Scriptures.[36]

In 1838, two years after Buckland's recantation, L. Vernon Harcourt published a book dedicated to his father, the Archbishop of York. *On the Doctrine of the Deluge*, a "grave book" according to Huxley, was an attempt to reply to Buckland and Lyell. Although apparently succeeding at one or two points,[37] Huxley refused to reproduce several of the arguments on the ground that it would be cruel to do so. He quotes Harcourt as impugning the scholarly motives of Buckland and Lyell by insisting that they were merely dodging the scriptural account of the Flood.[38] In the same year Reverend George Young, D. D. (author of *A Geological Survey of the Yorkshire Coast*), published his *Scriptural Geology*, a work "devoted principally to an attack upon the rising uniformitarian and evolutionary theories of geology." Advocating full-blown Flood geology, Reverend Young "vigorously attacked the works of Lyell," especially in regard to their "unwarranted [sic] assumptions" regarding uniformitarianism.[39]

Of the scores of books published in the nineteenth century attempting to harmonize geology and Genesis, one stands in stark contrast with all others. Though it cannot quite be classified with anti-geology works, one cannot resist using it to bridge the gap between the rancorous and the responsible reactions to Lyellian uniformitarianism. In *Omphalos* Philip Henry Gosse thought he had developed the panacea for all geological problems related to the age of the world and the effects of the Noachian Deluge. "Never was a book cast upon the waters with greater anticipation of success than was this curious, this obstinate, this fanatical volume," wrote the younger Gosse in his book *Father and Son*.[40] Gosse believed the life of the universe follows a cyclical pattern and that it was brought into existence by Divine fiat at a particular point in its cycle. The appearances of development in matter at the moment of its creation he called *prochronic* because time was not an element in them. The changes of appearance which have taken place in the life cycle of the universe since the time matter was created he called *diachronic*.

> Admit for a moment, as a hypothesis, that the Creator had before his mind a projection of the whole life-history of the globe, commencing with any point which the geologist may imagine to have been a fitting commencing point, and ending with some unimaginable acme in the indefinitely distant future. He determines to call this idea into actual existence, not at the supposed commencing point, but at some stage or other of its course. It is clear, then, that at the selected stage it appears, exactly as it would have appeared at that moment of its history, if all the preceeding eras of its history had been real.[41]

In this simple way Gosse attempted to explain away geology, uniformitarianism, and its attending controversies. What he did not realize was that his "apparent-age thesis" was compatible with an infinite number of parallel assertions to the effect, "the universe was created *n* number of years (or minutes!) ago with built-in history." Gosse's son wrote, ". . . atheists and Christians alike looked at it and laughed, and threw it away. . . ." Yet for those who reflected on the one "enormous and superfluous lie" which God had perpetrated (inevitably recalling Descartes' "evil genius"), he added, ". . . a gloom, cold and dismal, descended upon our morning tea cups."[42]

DENOUEMENT

With other reactionary sentiments left unexamined[43] we move on to consider the first and apparently final intellectually responsible harmony of geology and the Deluge produced in the nineteenth century. In 1840 John Pye Smith, Principal of London's Homerton Divinity College, published a book entitled *On the Relation Between the Holy Scriptures and Some Parts of Geological Science*. The book was an edited compilation of lectures prepared and delivered by appointment of the Committee of the Congregational Lecture. It represented a total shift of emphasis in the harmonizing movement in that Smith generalized the Mosaic history of creation and the Deluge without attempting to find exact parallels between the geological and biblical records.[44]

Smith began by explaining his point of view as a spokesman for the Christian community and by outlining his level-headed approach to scientific and biblical truth. In science and Christianity, he averred, "Truth . . . is our object," "All truth must be consistent," and "The criterion of truth is evidence."[45] He argued cogently for unlavished miracles in the sense of events ". . . which, supposing a given connexion of time, place, and persons, would not have come to pass in the ordinary course of things; but for the instrumental causality of which *the divine plan had* fixed the provision. . . ."[46] Smith also held to the infallible truth of Scripture when taken in "its own genuine sense," that is, with rules of interpretation derived from the text itself through careful grammatical and philological analysis.[47]

From this point Smith

> went straight down the geological line, arguing forcibly the Lyellian position, and in effect conceding all the points that his theological partners had expected him to refute. Instead of defending traditional theology, Smith called for a new interpretation of it.[48]

Indeed, his unabashed acceptance of uniformitarianism is evident throughout the work. He said of Lyell's *Principles of Geology* that it "stands forth among the books of our day, very signally distinguished,"[49] and in an appendix to the volume he highly recommended

the volumes as "an admirable collection of facts, and which carefully separates facts from hypotheses. Mr. L. makes you acquainted with the former, without urging your assent to the latter."[50]

What was Smith's "new interpretation?" After carefully reviewing past blunders in interpreting the Deluge *vis-à-vis* geology, Smith gave new currency and intellectual weight to what is known as the "partial-deluge theory." Smith examined meticulously the physical and geological problems connected with a universal Deluge. The origin of the water, the affect of the water on the earth's diurnal rotation, the size of the ark, the animals, rock strata, fossil remains, and a host of other objections, problems, and proposed solutions were reviewed and found to be best resolved by limiting the Flood to a small region on the earth's surface. While in accord with Genesis, Smith understood the Flood to have been geographically local, he believed it had also been anthropologically universal in order to fulfil the purpose for which it was ordained by God.[51]

Smith's work is still considered the basic text on the partial-deluge interpretation.[52] In his day he was soundly criticized, not for faulty scholarship, but for iconoclasm. Nevertheless he stood firm in his commitment both to Lyellian geology and to Genesis, and in so doing his concerned, scholarly honesty commands our respect today:

> It is a painful position in which I stand. I seem to be taking the part of an enemy, adducing materials for skepticism . . . The apparent discrepancies between the facts of science and the words of Scripture, must be *understood,* before we can make any attempt at their removal.[53]

He was however fully convinced that an apparent discrepancy "vanishes before careful and sincere examination."[54]

If Cuvier's multiple catastrophism distinguished attempts to harmonize geology and the Noachian Deluge prior to the time of Lyell, then it may be safely said that John Pye Smith's partial-deluge theory keynoted theological thought on the subject after the *Principles of Geology* had been in circulation for a decade. Most extant works from about 1850 to the turn of the century which evidence a significant degree of scholarship in dealing with the Deluge problem adopt Smith's theory in some form.[55] Three of these are noteworthy.

The Genesis of the Earth and Man is an anonymous work by a Protestant author which focuses on the problems connected with the antiquity of the earth and historical ethnology. Its author wrote with the conviction that God's natural and revealed truths are one, and that "we have not sufficiently emancipated our minds if we cannot accept the revelations of science as well as those of the Bible and avail ourselves of the former to explain the *ambiguities* in the latter."[56] Likewise in *Geology and Revelation,* a first-rate, scholarly account of geological findings, Professor Molloy of the Royal College of St. Patrick wrote from a Roman Catholic perspective that "truth cannot be at variance with truth. If God has recorded the history of our Globe, as geologists maintain, on imperishable monuments within the Crust of the Earth, we may be quite sure that He has not contradicted that Record in His Written Word."[57] Both books are marked by a high respect for the work of Lyell. The first author speaks of Lyell's "characteristic comprehensiveness and perspecuity" and, in the same context, argues for a Deluge limited both geographically and anthropologically.[58] Molloy disparages catastrophist geology as the "old theory which has gradually given way," a fact for which, he says, ". . . we are mainly indebted to the unwearied researches and great ability of Sir Charles Lyell."[59]

The Testimony of the Rocks was Hugh Miller's major contribution to the Deluge discussion. Miller, a capable field geologist and one of the greatest harmonizers of Genesis and geology that Christendom has ever known,[60] observed that ". . . in every instance in which they [plain men] have sought to deduce from it [Scripture] what it was *not* intended to teach, the truths of physical science, they have fallen into extravagant error."[61] Miller, following Smith, advanced vigorous arguments against the universal Deluge. He believed that "the deluge was but coextensive with the moral purpose which it served. . . ," namely, that it was a local phenomenon, caused by God to annihilate those of the human race who fell under his judgment.[62]

Gosse (1857) believed the life of the universe follows a cyclical pattern and that is was brought into existence by Divine fiat at a particular point in its cycle.

Similarly writers followed Smith in religious encyclopedias, dictionaries and Bible commentaries. Baden Powell, Savilian Professor of Geometry at Oxford, found support for his divorce of natural and supernatural theology (science and revelation) in Lyell's tranquil theory.[63] If one thinks that the Flood was a miraculous, universal catastrophe, then, said Powell, he ". . . must also suppose that it was not only miraculously terminated also, but every trace and mark of it supernaturally effaced and destroyed."[64] In Kitto's *Cyclopaedia* Powell therefore refused to posit miracles, rejected catastrophism and, without reaching a definite conclusion in his synoptic article, leaned heavily toward the partial-deluge theory.[65] In the 1863 *Dictionary of the Bible,* John Perowne, Examining Chaplain to the Bishop of Norwich, gave up the universal Deluge altogether. Of this article Huxley permitted himself to hope "that a long criticism . . . I supplied him, may have in some degree contributed toward this happy result."[66] Consequently the article clearly evidences Lyellian influence in both its interpretations and citations.[67] In 1871 *The Bible Commentary,* written by the Bishops and Clergy of the Anglican Church, espoused the partial-deluge theory unreservedly. The writer added that even if the Deluge extended to great regions, the rise and subsidence of the waters would not have disturbed the geologic formations. Thus Lyell's tranquil interpretation gained credence with Smith's limited flood.[68]

Finally a look at Lyell's status in America is in order. In an informal book composed of lectures for young men, James Munson Olmstead took pleasure in referring to Lyell's work.[69] He agreed that there was little or no geological evidence for a violent Flood since its effects had been obliterated in the course of time.[70] John Pye Smith's arguments were considered in detail with the hope that young men would, after

carefully examining them, arrive at his universalist position.[71] Writing in 1854, Olmstead was still quite removed from the mainstream of British thought where, as we have seen, the intellectual waters of the partial-deluge were far from tranquil.

Edward Hitchcock was one of America's outstanding uniformitarian apologists. He was in fact an internationally known scholar, and served Amherst College both as President and as Professor of Geology and Natural Theology. Hitchcock wrote, *The Religion of Geology and Its Connected Sciences,* "to exhibit all the religious bearings of geology."[72] After a thorough historical survey of Flood theories which served to point out various excesses and problems in biblical interpretation, he signalized Smith as the foremost of all writers on the subject, declaring that

> no modern writer has treated this subject with so much candour and ability . . . he is accurately acquainted with all branches of the subject . . . fully possessed of all the facts in geology and natural history.[73]

Since Hitchcock thought that there were good reasons for supposing the Deluge to be local, both in natural history and in Scripture,[74] he followed his evaluation of Smith with extensive quotations from Smith's book. While there does not appear to be a direct endorsement of Lyell's work in his book, it should be obvious even to the casual reader that Hitchcock is defending Lyell, whose tranquil Flood theory he adopted without reservation.[75]

Hitchcock made sane and sobering observations on the relation between geology and theology.[76] At the end of his careful review of the dilemma, and with far more penetrating hindsight than this writer's limited historical and scientific perspective can muster, he asserted,

> From the facts that have now been detailed, it appears that on no subject of science connected with religion have men been more positive and dogmatical than in respect to Noah's deluge, and that on no subject has there been greater change of opinion. From a belief in the complete destruction and dissolution of the globe by that event, those best qualified to judge now doubt whether it be possible to identify one mark of that event in nature. . . .[77]

He nevertheless emerged from his study in possession of an orthodox view of Scripture. He was convinced that the genuine facts of science and the results of careful analysis of the biblical text will always blend in harmony. With clear insight he astutely observed that whenever "geology teaches us how to interpret . . . passages respecting the age of the world, and the extent of the deluge, it is illustration and not collision."[78]

Smith (1840) *understood the Flood to have been geographically local, . . . (but) also anthropologically universal in order to fulfil the purpose for which it was ordained by God.*

This statement seems to express the new attitude assumed by nineteenth century Christian scholarship in relation to Charles Lyell and the Noachian Deluge. After John Pye Smith, theologians were prepared to take Lyell seriously and reevaluate interpretations they had often forced on the text of Scripture. After considering the extremes of diluvialists Granville Penn and George Fairholme, Cunningham Geikie wrote in 1886 that "thoughtful men of all shades of religious opinion have . . . come to the opposite conclusion; that the Noachian Deluge was a local one, though sufficiently extensive in its area to destroy all the then existing race of men."[79] In Bernard Ramm's words, this trend was indicative of that "noble tradition of the great and learned evangelical Christians who have been patient, genuine, and kind and who have taken great care to learn the facts of science and Scripture."

Unfortunately Ramm could not avoid the painful fact that the noble tradition "which was in ascendancy in the closing years of the nineteenth century has not been the major tradition in evangelicalism in the twentieth century."[80] In particular it has been American fundamentalism, as J. I. Packer is at pains to point out, which "did not in every respect adorn its doctrine."[81] Perhaps British evangelicals avoid calling themselves fundamentalists because they have seen in their American brethren of that name the same ignoble attitudes which a century ago characterized their treatment of Charles Lyell and the Noachian Deluge. Those who have had closer contact with the atmosphere of the last century and have thus likely learned some important lessons, must witness with dismay the regular and frequent diluvialist publications in American evangelical circles: George F. Wright's *Scientific Confirmation of Old Testament History* (1906); George McCready Price's *Fundamentals of Geology* (1913), *The New Geology* (1923), *Evolutionary Geology and the New Catastrophism* (1926), *The Geological Ages Hoax* (1931), and *The Modern Flood Theory of Geology* (1935); Byron Nelson's *The Deluge Story in Stone* (1931); Harry Rimmer's *The Harmony of Science and Scripture* (3d ed; 1936); Harold W. Clark's *The New Diluvialism* (1946); A. M. Rehwinkel's *The Flood in the Light of the Bible, Geology and Archaeology* (1951); Henry M. Morris and John C. Whitcomb, Jr.'s *The Genesis Flood* (1961); and finally one must mention Donald W. Patten's aberrant catastrophism in *The Biblical Flood and the Ice Epoch* (1966). Who can blame them for feeling uncomfortable with an appelation which has been applied to this diverse (and by no means complete) array?

The primary purpose here is neither to bring wholesale condemnation on biblical catastrophism nor to whitewash Lyellian geology. Rather I shall be satisfied if I have fulfilled the noble calling outlined by Herbert Butterfield:

> Taking things retrospectively and recollecting in tranquility, the historian works over the past to cover the conflicts with understanding, and explains the unlikenesses between men and makes us sensible of their terrible predicaments; until at the finish . . . we are able at last perhaps to be a little sorry for everybody.

But let me suggest that we not stop with pity. If modern evangelicals find their heritage in some of the scientific and theological viewpoints elucidated in this study, they must not content themselves with licking their ancestors' wounds. With Butterfield I must concur that "all the moral verdicts that we may pass on human history are only valid in their applica-

tion as self-judgments, only useful in so far as we bring them home to ourselves."[82]

NOTES

[1]Edward Stillingfleet, *Origines Sacrae: or a Rational Account of the Grounds of Natural and Reveal'd Religion* (London: 1697; and Bishop Robert Clayton, *A Vindication of the Histories of the Old and New Testament in answer to the objections of the late Lord Bolingbroke* (Dublin: 1752).

[2]Thomas Burnet, *A Sacred Theory of the Earth* (2 vols.; London: 1722); William Whiston, *A New Theory of the Earth* (Cambridge: 1708); and John Woodward. *An Essay toward a Natural History of the Earth* (London: 1695).

[3]Katharine Brownell Collier, *Cosmogonies of Our Fathers* (New York: Columbia University Press, 1934), p. 241.

[4]*Ibid.*, pp. 229-30, 241.

[5]Henry M. Morris and John C. Whitcomb, Jr., *The Genesis Flood* (Grand Rapids, Mich.: Baker Book House, 1966), p. 91.

[6]Chester R. Longwell, "Geology," in *The Development of the Sciences*, ed. by L. L. Woodruff (New Haven, Conn.: Yale University Press, 1941), pp. 158-63.

[7]*Ibid.*, p. 161.

[8]Loren Eiseley, *Darwin's Century*, Anchor Books (Garden City, New York: Doubleday & Company, 1958), p. 71. Cf. Stephen Toulmin and June Goodfield, *The Discovery of Time* (London: Hutchinson, 1965), *passim.*

[9]*Principles of Geomorphology* (New York: John Wiley & Sons, 1954), pp. 16-17.

[10]Morris and Whitcomb, *The Genesis Flood*, p. 92. For Cuvier's position in his own words see Charles C. Gillespie's translation of *Recherches sur les ossemens fossils*, I, 8-9, in *Genesis and Geology* (Cambridge, Mass.: Harvard University Press, 1951), pp. 99-100.

[11]Francis H. Haber, *The Age of the World: Moses to Darwin* (Baltimore, Md.: The Johns Hopkins Press, 1959), p. 211.

[12]Georges Cuvier, *Discours sur les Revolutions de la Surface du Globe* (3rd ed.: Paris, 1836), p. 133, cited by Morris and Whitcomb, *The Genesis Flood*, p. 94.

[13]"The Lights of the Church and the Light of Science," *Nineteenth Century*, July, 1890, p. 5. Gillispie observes that this article is "a highly colored account of the influence of the flood and of theological obscurantism in general after 1830 . . ." (*Genesis and Geology*, p. 234). The article however is invaluable for its viewpoint and for the source material to which it makes reference.

[14]Sir Edward Battersby Bailey, *Charles Lyell* (Garden City, New York: Doubleday & Co., 1963), p. 85.

[15]Mrs. [Katharine Murray] Lyell, *Life, Letters and Journals of Sir Charles Lyell* (2 vols.; London: John Murray, 1881), I, 234.

[16]*Principles of Geology* (3 vols.; London: John Murray, 1830-34), I, 76. Note the marked similarity between this view and that of David Hume in his *Enquiry Concerning Human Understanding* (LaSalle, Ill.: The Open Court Press, 1958), pp. 126-27. Gillispie concludes: "Uniformitarian presuppositions, then were simply those of optimistic materialism. . . . Gratuitous Lyell's assumptions may have been, but it opened the way for scientific progress . . ." (*Genesis and Geology*, p. 135).

[17]*Charles Lyell and Modern Geology* (New York: Cassell and Co., 1895), p. 212.

[18]*A History of the Warfare of Science with Theology in Christendom* (2 vols.; New York: Dover Publications, 1960), I, 232, hereafter referred to as *The Warfare of Science with Theology.*

[19]Gillispie, *Genesis and Geology*, p. 129.

[20]*Principles of Geology*, III, 273. Cf. n. 29 below.

[21]*Ibid.*, p. 274 (emphasis mine). Though Lyell evidently objected to a catastrophic flood on philosophical and biblical grounds, he was justifiably discontent with catastrophist system builders. Lyell objected that it is unreasonable "to call the Deity capriciously upon the stage, and to make him work miracles, for the sake of confirming our preconceived hypotheses . . . systems built with their foundations in the air, and cannot be propped up without a miracle" (p. 45).

[22]Morris and Whitcomb, *The Genesis Flood*, p. 97. In reality this theory was proposed by the botanist Carolus Linnaeus and was introduced into England in 1826. However after Lyell's *Principles* was in circulation, it made clear to many men of learning, as evidenced by the consensus of thought in reputable works published during that period, that the tranquil theory was the best device known to harmonize geology and Scripture. More on this later.

[23]Lyell, *Principles of Geology*, III, 271-73. That the latter quotation is a dubious interpretation of the biblical record is demonstrated by Morris and Whitcomb (*The Genesis Flood*, pp. 104-106).

[24]Eiseley, *Darwin's Century*, p. 99. For reaction to the *Principles* in scientific circles, see Robert H. Murray, *Science and Scientists in the Nineteenth Century* (New York: Sheldon Press, 1925), pp. 51-65.

[25]Mrs. Lyell, *Life, Letters and Journals of Sir Charles Lyell*, I, 317. Lyell assurred Bishop Copelston of Llandaff "that there was 'no objection to his drowning as many people as he pleased on such parts as can be shown to be inhabited in the days of Noah' " (Gillispie, *Genesis and Geology*, pp. 140-41).

[26]Mrs. Lyell, *Life, Letters and Journals of Sir Charles Lyell*, I, 317.

[27]Morris and Whitcomb, *The Genesis Flood*, pp. 98-99.

[28]White, *The Warfare of Science with Theology*, p. 232.

[29]*Ibid.*, p. 234. This baleful conclusion—the ancient (and discredited) faith-history dichotomy—mars J. R. Van de Fliert's otherwise superlative analysis of uniformitarianism and *The Genesis Flood* ("Fundamentalism and the Fundamentals of Geology," *Journal of the American Scientific Affiliation*, XXI [September, 1969], 69-81). Note likewise Lyell's tendency to this viewpoint in the quotations corresponding to nn. 20, 21, and in the following: "Sir Charles Lyell himself, who always treats the Scriptures with respect, indicates his sense of their scientific value by studiously excluding them from his 'Principles of Geology,' even from his learned chapter on oriental cosmogony . . ." (Charles Woodruff Shields, *The Final Philosophy* [New York: Scribner, Armstrong & Co., 1877], p. 132).

Perhaps British evangelicals avoid calling themselves fundamentalists because they have seen in their American brethren of that name the same ignoble attributes which a century ago characterized their treatment of Lyell and the Deluge.

[30]The sense in which "fundamentalist" is used here—that described by E. J. Carnell—aptly describes theological reaction to Lyell. Carnell said that fundamentalism is a religious mentality which "draws its distinctiveness from its attempt to maintain status by negation. . . . It is a highly ideological attitude. It is intransigent and inflexible; it expects conformity; it fears academic liberty. It makes no allowance for the inconsistent, and thus partially valid, elements in other positions" ("Fundamentalism," in *A Handbook of Christian Theology*, ed. by Martin Halverson and Arthur A. Cohen, Meridian Books [New York: The World Publishing Company, 1958], p. 142).

[31]John F. Fulton and Elizabeth H. Thomson, *Benjamin Silliman, 1779-1864, Pathfinder in American Science* (New York: 1947). p. 135, cited by Haber, *The Age of the World: Moses to Darwin*, p. 220.

[32]White, *The Warfare of Science with Theology*, p. 233.

[33]"The Lights of the Church and the Light of Science," p. 12. Bonney made a remarkable observation with reference to this issue: "A large number of persons—among whom are the great mass of amateur theologians, together with some experts—are always very prone to assume the meaning of certain fundamental terms to be exactly that which they desire, and then to proceed deductively to a conclusion as if their questionable postulates were axiomatic truths. They further assume, very commonly, that the possession of theological knowledge—scanty and superficial though it may be—enables them to dispense with any study of science, and to pronounce authoritatively on the value of evidence which they are incapable of weighing, and of conclusions which they are too ignorant to test. Being thus, in their own opinion, infallible, a freedom of expression is, for them, more than permissible, which, in most other matters, would be generally held to transgress the limits of courtesy and to trespass on those of vituperation" (*Charles*

Lyell and Modern Geology, pp. 48-49).

[34]Edward Hitchcock correctly reflected that Christian men of good character have examined geological writings, not to understand but for the purpose of finding contradictions and untenable positions. "The next step has been to write a book against geology, abounding, as we might expect from men of warm temperament, of such prejudices, and without a practical knowledge of geology, with striking misapprehensions of facts and opinions, with positive and dogmatic assertions, with severe personal insinuations, great ignorance of correct reasoning in geology, and the substitution of wild and extravagant hypotheses for geological theories" (*The Religion of Geology and Its Connected Sciences* [London: J. Blackwood, 1862?], pp. 26-27, hereafter referred to as *Religion of Geology*).

[35]Hugh Miller, *The Testimony of the Rocks* (9th ed.; New York: John B. Alden, 1892), pp. 421-23.

[36]From the *Scottish Christian Herald*, III (1838), 766, cited by Miller, *ibid.*, p. 422.

[37]Morris and Whitcomb, *The Genesis Flood*, pp. 105-106.

[38]"The Lights of the Church and the Light of Science," p. 12, quoting L. Vernon Harcourt, *On the Doctrine of the Deluge* (London: Longman, *et al.*, 1838), pp. 8-9.

[39]Byron Nelson, *The Deluge Story in Stone* (Minneapolis, Minn.: Bethany Fellowship, 1968), pp. 105-106. The fact that Nelson calls Young's book "excellent" is one of those unforgivable mistakes mentioned earlier which those who refuse to learn from history commit, to their own intellectual loss. Nelson's conclusion betokens this: "Flood geology, based on faith in God's Word and the supernatural, was not the type of thing the world wanted [sic], and henceforth it was ignored or ridiculed" (p. 110).

[40]Quoted by Martin Gardner, *Fads and Fallacies in the Name of Science* (formerly *In the Name of Science*) (New York: Dover Publications, 1957), p. 126.

[41]Philip Henry Gosse, *Omphalos: An Attempt to Untie the Geological Knot* (London: J. Van Voorst, 1857), p. 351. Chateaubriand first gave birth to this idea in the eighteenth century (*Oeuvres complètes de Chateaubriand*, II, 83) and Gosse nursed it back to health in 1857. The notion died with *Omphalos* and, apparently without a careful reading of history, Morris and Whitcomb have disinterred this philosophical corpse in their "apparent-age" thesis. Cf. *The Genesis Flood*, pp. 232-43, 345-69.

[42]From the younger Gosse's work, *Father and Son*, quoted by Gardner, *Fads and Fallacies in the Name of Science*, p. 127.

[43]Works which might profitably be examined but were unavailable to this writer are: *A Brief and Complete Refutation of the Anti-Scriptural Theory of Geologists*, by a Clergyman of the Church of England; *Exposure of the Principles of Modern Geology*, by P. M. M'Farlane; *Popular Geology Subversive of Divine Revelation*, by Reverend Henry Cole; and *Strictures on Geology and Astronomy*, by Reverend R. Wilson. The mere mention of their titles serves the purposes of the present study. And what was Lyell's reaction to all this clamor? He "very seldom spoke of the Biblical geologists, yet evidentally relished the peculiar irony which had made Burnet's 'Sacred Theory of the Earth' a favorite at the Court of Charles II. and pointed Butler's jest in Hudibras:

> 'He knew the seat of Paradise,
> Could tell in what degree it lies;
> And, as he was disposed, could prove it,
> Below the moon or else above it' "

(Shields, *The Final Philosophy*, pp. 62-63).

[44]Haber, *The Age of the World: Moses to Darwin*, p. 236.

[45]John Pye Smith, *On the Relation Between the Holy Scriptures and Some Parts of Geological Science* (New York: D. Appleton & Co., 1840), pp. 26-28, hereafter referred to as *Geology and Scripture*.

[46]*Ibid.*, p. 82.

[47]Smith's explanation of the Genesis revelation as written in terms of "analogical representation," that is, "representative to the senses, chiefly that of sight and in words descriptive of those representations," is a highly tenable phenomenological interpretation of the Creation and Flood accounts.

[48]Haber, *The Age of the World: Moses to Darwin*, p. 234.

[49]Smith, *Geology and Scripture*, p. 195.

[50]*Ibid.*, p. 299.

[51]*Ibid.*, pp. 242-252.

[52]See Bernard Ramm's citations in *The Christian View of Science and Scripture* (Exeter, Devon: Paternoster Press, 1964), *passim*, and Morris and Whitcomb, *The Genesis Flood*, pp. 107-109.

[53]Smith, *Geology and Scripture*, p. 139.

[54]*Ibid.*, p. 20.

[55]Possible exceptions may be: *Facts and Fossils Adduced to Prove the Deluge of Noah and to Modify the Transmutation System of Darwin* (1868), by George Twemlow (major-general in the British army); *Geology and the Flood* (1877), by German Jesuit scholar Athanasius Bosizio; and Henry H. Howorth's *The Mammoth and the Flood* (1887), which attempted to melt the ice ages. However it seems significant that Howorth only is mentioned in George McCready Price's *New Geology* and in Morris and Whitcomb's *Genesis Flood*. White's *Warfare of Science with Theology* mentions Bosizio only, and then simply to illustrate foreign reluctance to part with the Flood as the universal solvent for geological problems. Nowhere have I found reference made to Twemlow except in Nelson's *Deluge Story in Stone* (pp. 113-14).

[56][Edward William Lane], *The Genesis of the Earth and Man*, ed. by Reginald Stuart Poole (Edinburgh: Adam & Charles Black, 1856?), p. 51.

[57]Gerald Molloy, *Geology and Revelation* (New York: G. P. Putnam & Sons, 1870), pp. 26-27.

[58][Lane], *The Genesis of the Earth and Man*, pp. 50-51.

[59]Molloy, *Geology and Revelation*, pp. 220-21.

[60]Ramm, *The Christian View of Science and Scripture*, p. 173.

[61]Miller, *The Testimony of the Rocks*, p. 306.

[62]*Ibid.*, p. 353.

[63]Haber, *The Age of the World: Moses to Darwin*, pp. 241-42.

[64]Baden Powell, "Deluge," *A Cyclopaedia of Biblical Literature*, I, 545.

[65]*Ibid.*, pp. 544-45.

[66]Huxley, "The Lights of the Church and the Light of Science," p. 13.

[67]Rev. John James Stewart Perowne, "Noah," *A Dictionary of the Bible*, II, 570ff.

[68]Bishop of Ely, "Commentary on Genesis," *The Bible Commentary*, I, 77-78.

[69]*Noah and His Times* (Boston: Gould and Lincoln, 1854), pp. 136-37.

[70]*Ibid.*, p. 102.

[71]*Ibid.*, pp. 174, 196-97.

[72]Hitchcock, *Religion of Geology*, p. v.

[73]*Ibid.*, p. 96.

[74]*Ibid.*, p. 90.

[75]*Ibid.*, pp. 87-90, 165-66.

[76]For example see n. 34.

[77]Hitchcock, *Religion of Geology*, p. 87.

[78]*Ibid.*, p. 311.

[79]*Hours With the Bible* (6 vols.; New York: John B. Alden, 1886), 1, 169.

[80]Ramm, *The Christian View of Science and Scripture*, pp. 8-9.

[81]*"Fundamentalism" and the Word of God* (Grand Rapids, Mich.: Wm. B. Eerdmans, 1958), p. 31.

[82]*Christianity and History* (New York: Charles Scribner's Sons, 1950), pp. 92, 62, respectively.

The standing of a nation is decided by its ethics, morals, and by its science, by its gifts to mankind and not by the size of its army. With our science we have achieved a first place among nations from which we are gradually slipping, and we will go on losing that position while we give killing preference over healing.

Albert Szent-Gyorgyi, "Science and Budget Cutting"
Bulletin of the Atomic Scientists, December 1969, p. 16

BOOK REVIEWS

EVOLUTIONARY PHILOSOPHIES AND CONTEMPORARY THEOLOGY by Eric C. Rust. The Westminster Press, Philadelphia, 1969. 256 pp.

According to Rust, the Christian Church today is surrounded by many philosophies each competing with the other and the Church to forge the most complete interpretation of reality. There is no one dominant philosophy; rather science itself is the tool or method by which different philosophies do their work. Hence the situation today is not as it was in past eras, such as in the Augustinian when Neo-Platonism was the dominating philosophy, and the church interpreted reality in idealistic terms or in the Aquinian era when Aristotelianism held sway and the church became empirical in her methodology.

Because of this, various process philosophies lie before the church to which she must listen to hear what, if anything, God is saying through them and to which she must speak if she is to be faithful to her trust. Because of the dominant scientific method, evolution also must be considered and accepted in some form. Any intelligent person today recognizes, and accepts as proven, biological evolution, according to Rust. The excitement that exists is due to the merging of process-philosophies and evolutionary modes of thought and the reflection the church must give these to see if there are any analogies present in these forms of thinking which point to a personal transcendent being who is seen most fully in the Christian revelation.

Rust then proceeds to give an overview of "process" philosophies and philosophers from Hegel to Hartshorne, including A. N. Whitehead, J. C. Smuts, W. Temple, Teilhard de Chardin, and J. B. Cobb, Jr., and tries to show how their thinking can be seen as analogical to Christianity. Rust is to be commended for his effort. While the Church is called to be faithful and to bear witness, yet she is to do this to, in, and for the world in which God has not left Himself without a witness. The children of darkness are wiser in their generation than the children of light. Christ is the light which lightens every man, coming into the world. Church dogmatics and historical theology are replete with men and groups who have spoken the treasure with earthen vessels.

Yet church history also shows that the high points in the theology, confession, and fruitfulness of the church have been those periods when the Scriptural norm has judged all modes of thought and has been received as God's direct revelation in history in rational form. Rust, however, seems to reject the Scriptural voice, when he speaks of creation *ex nihilo* as prehistory and as mythical. It does not teach us of a transcendent, self-existing Creator, who called into existence that which did not formerly exist. Rather it only speaks of a God who is continuously creating, who is what He is because of what He is for man, rather than what He is in Himself. God then means something for process, rather than process having meaning for God. The Scriptural assertion of the beginning of history by the creative power of the self-existing God is reinterpreted in the light of the process movement of reality on an evolutionary scale. If the beginning of history loses its biblical force for Rust, so does the end. The parousia is only a symbol; the Church can only speak mythically here. Here again, the objective, self-existing, transcendent God of Scripture is lost as God gathers the whole universe into His own life. The great redemptive events of biblical history are either ignored or re-interpreted by Rust. The resurrection of Jesus Christ from the dead is avoided. The incarnation enthrones the personal at the heart of the universe rather than invading the world and assuming flesh and blood.

Rust's position then is best summarized as follows: "One thing is certain: the emphasis in our time falls on process, on a dynamic understanding of our world. Static categories are finished with. Our task as Christians is to seek what light evolutionary and process models may throw upon our theological understanding." It is true that the Christianity of the Bible does not deal with static entities, such as an "unmoved mover." The Trinitarian God exists in a mutual fellowship of love between Father, Son, and Spirit. But this living God has done certain things at certain points within history. He created the world; He brought His people out of Egypt; He raised His Son from the dead; He is coming again to consummate history. This does not rule out evolution as one of the ways in which God works. It simply keeps the living God above His creation—free, transcendent, purposive. The degree to which evolution is possible as a way of God's working must be finally grounded in the biblical witness. Evolution is certainly not a rigid, fixed, rule by which God must work. He has chosen to so work generally, but has freely transcended evolution in grace.

Rust, then, has overstated his case, so that the living God of the Bible is hidden within the life processes of this level of existence. And yet the courage he demonstrates is the risk to which the biblical faith calls the Church. She is to be in the world but not of it morally; she is to confess purely her faith in love. She is to speak valiantly for truth, but vicariously for the world. She is to share the world's intellectual and moral anguish. The best way to do this is not to speak from an analogy of being or becoming, but rather to speak from the analogy of faith and the analogy of Scripture. Rust, in the final analysis, has not done this. He has rather reduced the biblical perspectives of the creation, redemption, and eschaton to the level of one general, universal process—philosophy unfolding itself on an evolutionary scale.

Reviewed by Irwin Reist, Associate Professor of Bible and Theology, Houghton College, Houghton, New York.

EVOLUTION AND THE REFORMATION OF BIOLOGY by Hebden Taylor. The Craig Press, Nutley, N.J., 1967, 92 pps.

This monograph is an attempt to show "that only a truly scripturally motivated biological science along the lines already developed by Herman Dooyeweerd and Duyvene de Wit can avoid the problematics and antinomies inherent in modern transformist biology." God's word, alone, puts meaning into the facts uncovered by scientific investigation.

Scholarly in presentation and conservative in outlook, the theology is Reformed. Micro-evolution is conceded, mega-evolution strongly rejected. The author agrees with Schaeffer in placing ultimate blame for the contemporary dichotomy between science and theology on Thomas Aquinas; he disagrees with Teilhard's supposition that the earth was probably born by accident though the universe itself was created by the power of the God of Scripture.

This is recommended reading for anyone concerned with a Christian overview of biological research.

Reviewed by Stephen W. Calhoon, Jr., Department of Chemistry, Houghton College, Houghton, New York.

MAN'S ORIGIN, MAN'S DESTINY by A. E. Wilder-Smith. Harold Shaw, Wheaton, Ill.: 1968. 320 pp., $5.95.

This important book is a strong attempt to convince modern scientists that the Biblical *Weltanschauung* is the simplest, most consistent and most coherent world view, and that it can be applied without contradition to all areas of existence.

The text is generally a reply to the sobering conclusions of the 1957 Moscow Symposium on "Origin of Life on the Earth" that life arose spontaneously from non-living matter. In it Wilder-Smith discusses three questions that are basic to both the Christian and Darwinian world-views: (1) Does Darwinism really render the idea of God superfluous? (2) Has evolution been God's method of building the world of life as we know it? (3) Is a slow, spontaneous evolution of animal and plant life from the simple to the complex by chance, scientifically feasible?

Wilder-Smith immediately sets about answering the last question by attempting to prove that spontaneous evolution defies the Second Law of Thermodynamics. Energy barriers, he asserts, are too great for the complicated decrease in entropy required by chance evolution. In response to the evolutionists' objection that the sun provided the energy necessary for this process, Wilder-Smith replies that the sun's energy can only be used by living organisms. Therefore, non-living matter could not have used the sun's energy to create more complex chemical systems. To account for the presence of highly complex and energized systems, the author postulates God as the Creator-entropy decreaser in the universe.

Wilder-Smith strongly criticizes the obvious scientific problems in evolutionary theory, particularly with reference to the origins of the earth and of men. He shows inadequacies in the C^{14} Dating method, the Index Fossil Theory, and the various prehistoric "links" which have been shown to be either hoaxes or the remains of modern men.

Explanation of Creation *ex nihilo* has its difficulties and Wilder-Smith is aware of this. To make certain his arguments are understood, he includes much extraneous material and uses much repetition which, he hopes, will clarify his point and convince the reader. His arguments have weight, and when he argues from scientific data rather than from subjective interpretation he presents a rather strong case for Creation.

Wilder-Smith takes an intelligent step in stating that if science creates life, God does not become meaningless. The scientists who create life are merely thinking God's thoughts after Him. It is modern science and not religion, or specifically Christianity, which is at present making the most unverified assumptions concerning the nature of the universe. He points out that science is creating a mythology greater than the one Christians are accused of accepting.

Wilder-Smith adds an intriguing thought to the concept of theistic evolution. The principles of Darwin that require nature and men to fight, struggle, and kill for the mere sake of existence, he says, are totally contradictory to the character of Jesus. God does not use chance, is not bound by time, and never relies on injustice to achieve his ends. He follows these excellent thoughts, however, by delving into a political discussion. His wanderings into the Darwinian influences behind the Communist, Fascist, and Nazi states and the spiritual development of Charles Darwin bring Wilder-Smith into a rather subjective realm, and as a result, he suffers a communication loss with the reader.

Wilder-Smith's discussion of man's destiny will probably confuse the non-Christian reader. It is surprising to find him discussing man's future after death rather than his future on earth. In doing so, he trades the sound scientific arguments of the book's first half for the less convincing spiritual arguments concerning *post mortem* eschatology. Wilder-Smith, in an earlier section, rebuked the evolutionists for claiming that certain of their theories were correct even though there was no visible evidence to validate them; he himself, however, then titles a subsection "Lack of Evidence Does Not Prove Nonexistence." Wilder-Smith's analysis of the happenings to the body and person of Christ between the Crucifixion and the Resurrection is an interesting scriptural study but seems irrelevant to the purpose of the text. One wonders why he chose such metaphysical and mystical topics like the Christian metamorphosis to introduce the non-Christian scientist to Christianity. Because of this aspect, *Man's Origin, Man's Destiny* is not likely to be widely accepted in non-Christian circles. Nonetheless, it's sound scientific arguments against evolutionary theory need re-emphasizing. They make the book worthwhile thinking for all interested men of science.

Reviewed by Stephen Coupland, Graduate Student in Chemistry, University of Illinois, Champaign-Urbana, Ill.

BIOCHEMICAL PREDESTINATION: by Dean H. Kenyon and Gary Steinman. McGraw-Hill, New York: 1969. 301 pp. Hard cover—$12.50, Soft cover—$4.95.

Research devoted to investigation of the origin of life question has increased greatly in the past two decades. Today investigators numbering in the hundreds devote at least part of their research time to origin of life studies. Molecular biologist Dean Kenyon and biochemist Gary Steinman have critically drawn together the multi-discipline threads of the work of recent years in providing this comprehensive "state

of the art" report. In addition to a review of the literature the authors elaborate on the pattern which seems to be emerging from these investigations and provide suggestions concerning the nature of future research. This very readable book should do much to stimulate discussion and future investigation.

Chapter 1 places current approaches in a historical perspective in considering the assumptions and methodology employed in attacking the origin of life question. The investigator is frustrated by the fact that he is considering events which occurred in the distant past in an environment whose features are little known but radically different from the present scene. In addition, there appears to be little hope that any record of intermediates involved in chemical evolution can be found, or, if a species is discovered, whether it was related to a life evolving process. For the authors,

> "the most characteristic features on the origin of life problem are associated with the formulation of the problem, the setting up of hypotheses, the criteria of success for a given experiment, and the status of conclusions, and not with individual laboratory operations. What emerges from the results of many kinds of simulation experiments is a very complex and detailed partial picture of slowly increasing plausibility. Proof in the sense in which one thinks of it in chemistry and physics is not attainable in the problem of primordial biogenesis."

Chapter 2 deals with methods employed to estimate the age of the earth and the few fossils which remain from the Precambrian period. Some experimental and mathematical detail is provided and the authors are careful to indicate the hazards involved in dating. The best data indicate that the Earth's crust was consolidated about 4.55 billion years ago and that the earliest forms of life appeared at least 3 billion years ago.

Chapter 3 discusses the largely indirect lines of evidence and reasoning which are employed to support present conceptions of the primitive Earth. However,

> ". . . . . knowledge of the details of Earth history, which will probably remain hidden from us in any case, may not be required for a complete understanding of biochemical origins."

This point is expanded in chapter 4 as the authors review the experimental approaches that have been taken in investigating possible modes of synthesis of biomonomers under primitive Earth conditions. The substance of this work suggests that essentially all classes of a wide variety of required monomers could have appeared under primitive Earth conditions. The next stage in the developmental sequence involves the association (condensation) of the simple biomonomers to form the large molecules of biological significance such as the polypeptides, polysaccharides, and polynucleotides. Chapter 5 considers the results of experiments concerned with dehydration condensation and polymerization reactions structured in terms of the degree of hydration of the enviroment. Emphasis is placed on discussion of such factors as reaction stability, bond specificity, and non-randomness involved in the methods believed to represent primitive Earth phenomena. The authors conclude,

> ". . . . . it appears to be quite evident that dehydration condensations essential for biogenesis could very likely have taken place under the conditions believed to have existed on the primitive Earth. It can be concluded further that the primordial production of essential condensation compounds was a probable occurrence which could have taken place in a variety of environments. It is very difficult to establish which of the models considered represents the most significant contributions to this phase of chemical evolution. To answer this question is really of little importance since what has been demonstrated is that the appearance of these classes of compounds was very likely, in terms of what is considered to be the nature of the primitive Earth."

Chapter 6 details possible ways in which primitive chemical systems become organized into autonomous units-cells. It is within the cell that the essential functions of life take place. This stage of chemical evolution is perhaps the most difficult to study and define. The gap between nonliving and living matter has not yet been experimentally bridged.

> "It is not immediately clear why cellular organization appeared in the first place, or for what reason metabolism evolved. However, since we do observe these phenomena in contemporary biological systems, it can be concluded that these events constituted an essential aspect of primordial biogenesis. Perhaps the most important point to be drawn out of all the experiments discussed in this chapter, whether they be concerned with Jeewanu proteinoid microspheres, coacervates, or even air bubbles in seawater, is that there appears to be an inherent morphogenicity and ability to locally concentrate materials in the types of compounds that may very well have existed on the primitive Earth."

Chapter 7 entitled Conclusions and Prospectus is a superb example of scientific writing aimed at broad audiences. In a dialogue format the authors discuss major points from the preceding chapters and suggest a number of specific problems which need study.

> "One thing that is important for us to realize at this point is that we are certainly a long way from solving the problem of the origin of life. What has been done already is far from synthesizing the simplest living cell. We suspect now that we'll ultimately be able to understand the origin of the first cells on the Earth on the basis of known chemical and physical laws. It is possible that some new physical principles may be discovered that are relevant, but we don't think we need to invoke such things as VITALISM, NEOVITALISM, AND SUPERNATURAL INFLUENCES."

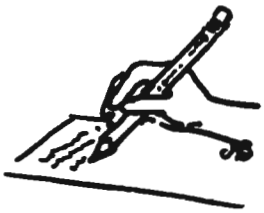
The basic theme of the book is caught in the title—*Biochemical Predestination*

> "By this I mean that the association of units toward the ultimate development of the living cell is determined by the simplest starting compounds from which these systems evolved. In other words the ultimate characteristics of the living cell can be traced back to the nature of the starting compounds from which it was produced. Therefore, we should not look on the appearance and development of the living cell as an improbable phenomenon but rather as one which followed a definite course governed and promoted by the properties of the simple compounds from which the process began."

This book is highly recommended for all persons interested in the subject of origins.

Reviewed by John W. Haas, Jr., Gordon College, Wenham, Massachusetts 01984

Communications



Print December 1969 Issue as Monograph

I am an adult student at the University of Minnesota. If more copies of the December Symposium (*Journal ASA 21,* No. 4, December 1969) are available, I would like to have some. This issue is the closest any organization has arrived at a direct, concise statement of Christian ideology.

The ASA, along with Drs. Ramm, Bass and V. Elving Anderson, have helped me considerably with a serious deistic liberal-fundamental conflict. Dr. Anderson recommended Dr. William Pollard's *Chance and Providence.* Dr. Hatfield's ASA article, "Probability and Providence" (*Journal ASA 17,* 16 (1965)), led to my reading of Pollard's book which helped bridge a materialism-faith gap.

Because of the severe conflict imposed on me by transitional Methodism, dogmatic, forced fundamentalism and controversial liberalism, I have suffered deeply from religious confusion. I have finally arrived at intellectually honest Christian faith. The Self-revealing God, to me, is more the tolerant understanding Scientist-Father than the dogmatic, vindictive Judge of fundamentalism.

My detached experience as a commuting student impresses me that Intervarsity, Campus Crusade and other Christian organizations cannot accommodate commuting student needs. Their approach is too simplistic—too Christ-oriented to meet the more sophisticated student-professional needs. The foreign student—a separate mission opportunity, is a peculiar problem. A recent Minnesota Daily article by an African revealed the defense psychology of foreign students. It could be discussed in the *Journal.*

I have a few ASA monographs, one of them, "The Eye as an Optical Instrument." Monographs dealing with basic Christian issues such as "The Relationship Between the Bible and Science" could serve as inexpensive, immediately available reference material. Monographs for hand-out would be printed on less expensive paper than the *Journal*—could be issued in a catalog available on request. Mass production would allow more non-member contact—and up-dating revision to keep abreast of science.

An earlier imperssion that the ASA is a mutual inter-member admiration medium has been revised. The interchange of science-theology views maintains proper Christian humility. Fundamentalists claim or imply intellectual pride among scientists, even among Christian scientists. I believe that the ASA, with more lay contact, can correct this error and prevent conflict in less informed students and laity. The ASA contact should be broadened to a lay level. The ASA could serve the Intervarsity and other Christian groups with the more sophisticated contact they need.

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Creation and Evolution *are* Antithetical

(Editor's Comment: The quotations interspersed in this letter by Dr. Davidheiser are quotations from his book, Evolution and Christian Faith, *and are quoted here by way of rebuttal by the reviewer.)*

I would like to make a few comments on Dr. Bube's review of my book *Evolution and Christian Faith* (*Journal* ASA 22, 28 (1970)).

He says I reject all such distinctions as (a) changes in living plants and animals, (b) a general theory that proposes a common origin for all living things, and (c) a system of philosophical speculation that views evolutionary processes as basic to all life. He says that because I reject such distinctions my treatment of the problem is a "grave disappointment." But my work may quickly be salvaged from such a fate, for I definitely, and I thought obviously, do recognize these distinctions.

("Every anti-evolutionist who says 'We believe in micro-evolution,' is aiding the evolutionary cause. Micro-evolution *is a misnomer and use of the term should be avoided by everyone who does not accept evolution." . . . (p.* 16)

"According to the theory of evolution, that which the Bible calls sin is merely a remnant of a bestial nature." . . . . (p. 22)

"Evolutionists generally believe that unless man destroys himself or overpopulates the earth, he will improve until wars cease and prosperity is the rule." . . . . (p. 23))

Some things of which he accuses me are true. I would refrain from using the word *evolution* when dealing with any real phenomenon. Using the word *evolution* to describe observable phenomena is comparable to the way gamblers use the word *gambling* to describe such things as risking the chance of an accident by driving on the highway to go to church. Calling this gambling is based upon a phony definition of the word *gambling* and it is done for a purpose: to break down objection to real gambling.

In my historical treatment of evolution Dr. Bube does not like what I say about Charles Darwin, but he does not say that anything of a factual nature which I relate is untrue. The remarks about Darwin's illness and character are from statements made by evolutionists who admire what Darwin accomplished.

He says I admit that the method of using quotations to make a point results in ambiguity because I say of evolutionary writings, ". . . one can find just about every imaginable point of view advanced by someone." But this does not admit that there is anything wrong with the method; it merely illustrates the state of confusion among the evolutionists. He says the same method could be used "to show the evils and shortcomings of the Christian faith as exercised by the church throughout history." This could be true if quotations are taken from writers who express various shades of heresy and apostasy. But I quoted from orthodox evolutionists only, except where otherwise stated. He says that I use "out-of-context spot quotations." I made a special effort not to do this.

For example, if I used a quotation like, "We do not know anything about the ancestry of the pied oyster-catcher. . . ." the rest of the sentence was irrelevant and did not suggest a possible ancestor, as, ". . . but it may have evolved from some unknown primitive starfish-chaser."

I really am misquoted where I am alleged to have said that the case of the Piltdown hoax allows one to speculate about how many other such cases there may be that still are undiscovered. I said nothing of the sort. I said that because the experts overlooked and disregarded so many clues that revealed Piltdown man as a hoax, it shows that the scientists are not objective when it comes to evolution and that they can see what they wish to see and overlook a great deal of what they do not wish to see.

(*"The scientists overlooked a large number of rather obvious clues, any one of which should have given them reason to consider the possibility of fraud. Although this does not necessarily mean that other finds are fraudulent, the Piltdown story does expose a great weakness in the objectivity of evolutionary scientists. It reveals that they can see a great deal of what they wish to see and can overlook a great deal of what they do not wish to see. In the Piltdown case the truth has been revealed; one cannot help wondering how much fantasy may be involved in the interpretations of other cases which cannot be checked."* . . . (*p.* 340))

Dr. Bube attributes to my sense of humor the view that for an animal of the earthworm type to evolve into a vertebrate it would need to roll over on its back and remain that way. I dare not take credit for this, and furthermore, it apparently was not a humorous matter to the evolutionists who used to advocate it. His favorite example of my sense of humor is my remark that if *Zinjanthropus*, as restored in the *National Geographic* for September, 1960, were riding in the New York subway he would not draw a second glance, provided he were wearing a cap to conceal the fact that he had no forehead. Anyone who thinks this may be humorous and is familiar with the New York subways should look at the pictured reconstruction and judge for himself.

Dr. Bube says I came to a saving faith in Christ only after release from the bondage of evolution. This is not true. I was converted first. *Then* I looked at evolution from a different perspective. I already had a PhD in Zoology and could read the scientific journals. I was amazed to find that I could poke holes in the evolutionary writings of the scientists about as easily as I formerly did the same thing to the writings of well-meaning anti-evolutionists who did not have a background knowledge in biological science.

(*"He preached a simple gospel message of salvation by grace, and that evening I found myself saying. 'I believe that,' to everything he said. This surprised me for I had said many times that I could not believe unless someone would first disprove evolution to me. But there I was, agreeing with everything he said and telling myself I believed it. . . . As evolution had been the great stumbling block in my life, I felt a desire to aid others who might have the same problem."* . . . (*p.* 11))

He says I criticize the vocal members of the American Scientific Affiliation because they do not take a strong anti-evolutionary stand and that I say the A.S.A. faulted because *all* the writings of the Association are not anti-evolutionary. Dr. Cassel himself in 1959 made the frequently-quoted statement, "Thus in fifteen years we have seen develop within the A.S.A. a spectrum of belief in evolution that would have shocked all of us at the inception of our organization." It is true that not all articles published by the A.S.A. are evolutionary, but that is no reason to commend it. We do not talk about the pleasant peppermint flavor of a poison just to be able to say something nice about it.

Dr. Bube says that I fail from the beginning to recognize that creation and evolution are not necessarily antithetical. But I rest my whole case upon the premise that, properly defined, they *are* antithetical. He says I hate evolution with a singleness of mind. That would be a great waste of energy. But I do oppose it because I know what it can do and what it has done in promoting apostasy.

Many books have been written of the sort which please Dr. Bube. There is no need for another. My purpose was to write for the Bible-believing laity, many of whom have been misinformed and are confused. It is my desire to encourage them not to compromise with evolution and not to look for assistance and guidance to such people as those who within a period of fifteen years accepted so much evolution that they themselves would have been shocked if they had been told they would do this.

Bolton Davidheiser
13530 *Fonseca Ave.*
La Mirada, California 90638

Mr. Harold Hill and Joshua's Long Day

Though I have no degree in science I have been an interested reader of *Journal ASA* since nearly the beginning. I would be interested to know from the informed and responsible people of the American Scientific Affiliation whether it is an authentic report I have read (source unknown), reported as from Mr. Harold Hill, President of the Curtis Engine Co., in Baltimore, Md., and a consultant in the space program, that computer calculations to plot the positions of the solar bodies 100 and 1000 years from now show a lost day in elapsed time, pointing to Joshua's long day; and that there is a discrepancy of 40 minutes shown by the computer, which corresponds exactly to the 10 degrees of Hezekiah's time.

Could you kindly confirm whether the computer indicated such a lost day in elapsed time? Thank you very much for your trouble.

Marion Doble
Djajapura, West Irian
Indonesia

(*Editor's Comment*: The Editor wrote to Mr. Hill requesting information about this story, seeking authentication of its claims, and offering to publish an account in the *Journal ASA*. Particular inquiry was directed to the question as to how the computer could separate the missing day into one 23 hr 20 min segment, and a second 40 min segment, when no information seemed to be available with which to make this decision. A reply from Mr. Hill was received, dated April 13, 1970, in the form of a duplicated sheet sent out in answer to many inquiries. He says, *"I did not write this article but assume it was adapted from one of the many talks I have made on the subject of Science and the Bible and which is one of my favorite subjects. Since this incident took place about two years ago I have misplaced the source information and so am unable to give you names and places but will send it to you when I locate it. In the meantime I can only tell you that had I not considered the source to be completely reliable I would not have made use of it in the first place."* To date no additional information has been received from Mr. Hill.)

In September, 1941, five scientists of deep Christian conviction met together in Chicago. They found that they shared mutual concerns in the relationship of science and Christian faith. The **American Scientific Affiliation** is an outgrowth of that meeting.

ASSOCIATE MEMBERSHIP is open to anyone with an active interest in the purposes of the Affiliation.

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FELLOWS have a doctoral degree in one of the natural or social sciences, are currently engaged in scientific work, and are elected by the membership.

Members of the Affiliation endorse the following statement of faith: The Holy Scriptures are the inspired Word of God, the only unerring guide of faith and conduct. Jesus Christ is the Son of God and through His Atonement is the one and only Mediator between God and man.

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PUBLICATIONS include the ASA News (sent to all members four to six times each year); two symposia: *Modern Science and Christian Faith,* F. Alton Everest, Editor, Van Kampen, Wheaton, Illinois (1950) (out of print), and *Evolution and Christian Thought Today,* Russell L. Mixter, Editor, Eerdmans, Grand Rapids, Michigan (1960). Individual authors are also encouraged to publish independently when this seems desirable.

LOCAL SECTIONS of the American Scientific Affiliation have been organized to hold meetings and provide an interchange of ideas at the regional level. Information may be obtained from the persons listed below or from the national office.

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