SHOULD EVOLUTION BE TAUGHT?"

JOHN N. MOORE**

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.

Breeding experiments with plants and animals afford extensive data, usable in support of the special theory of evolution; however, to avoid equivocation of terms the phenomena involved might just as well be called "genetic variation." ALL known, observable changes of living things are always WITHIN recognizable limits of variation of major groups of plants and animals. Thus there is empirical support for the special theory of evolution only.

The general theory of evolution, at most, should 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

All across this nation parents with children in non-parochial schools, and also parents whose children attend parochial schools, are asking, should evolution be taught? In state after state, parental attention is increasing regarding science courses that include the teaching of evolution *as fact.* Criticisms of the teaching of evolution have appeared in newspapers in Arizona, Arkansas, Delaware, Idaho, Indiana, Kentucky, Michigan, Mississippi, Tennessee, Texas, and Washington. And as the 1970's began, new impetus for parental criticism came with public discussion in California of guidelines for writing elementary science textbooks.

Such parental attention to methods of teaching evolution in science courses has increased as a result of increased adoptions of the BSCS textbooks produced under the leadership of the American Institute of Biological Sciences, and so conveniently labeled the Green, Yellow, and Blue Versions of Biology. Early criticism of these BSCS textbooks, with regard to treatment of evolution *as fact,* began when a few ardent parents testified in 1964 at the Texas Textbook Review Committee hearings.

Of course 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 likewise for social Darwinism. And within the last few years, certain biologists and mathematicians have expressed critical 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."[1] And McGraw-Hill, Inc., published two such articles: "Heresy in the halls of biology: mathematicians question Darwinism"[2] and "Thinking the unthinkable: are evolutionists wrong?"[3], in a company publication, *Scientific Research.*

These few references are mentioned simply to point out that evolution is under scholarly criticism once more (really *still* under criticism, since criticisms of evolution and natural selection *by scientists* 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 very tenets of scientific attitude and operative scientific methodologies.

And especially apropos to the question whether evolution should be taught in a science course, the following assertion is pertinent at the outset; namely, that this question can 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 can be resolved on a scientific basis is a crucial fact that opponents of evolution in high school textbooks often have failed to affirm. To make explicit the scientific grounds for much of the parental opposition to the teaching of evolution as fact is the purpose of this article.

One brief interjection as added introduction. Ideas expressed in this article should not be confused with the position of censorship. No support is intended for removal of the teaching of evolution from school curricula. Rather the author asserts that evolution must be mentioned since it is such an ancient idea of men, but the manner in which evolution is taught is all im-

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portant. Evolution should *not* be taught as fact, that is, *as if* it were observable, or that someone had actually seen one animal form change into another animal form.

Background: Definitions and Assumptions

As background, an explication of the meaning of the word "science" or an answer to the question, what is science?, is required. Of course the word "science" comes from the Latin for knowledge; and, according to a common dictionary definition, a student will find that science is knowledge attained through study or practice. These give a static meaning for science.

A more dynamic definition was provided by John Somerville[4]: "Any body of doctrine or collection of truths is scientific to the extent that it yields the power to predict in relation to the subject matter of its choice." And a decade later in 1951 James B. Conant offered the definition that—

> Science is an interconnected series of concepts and conceptual schemes that have developed as a result of experimentation and observation and are fruitful of further experimentation and observation.[5]

And the Oxford Dictionary contains a formal definition 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.

Thus, from these last three definitions, scientific activity involves dynamically facts that can be observed or demonstrated and laws, which have been demonstrated also, by means of *trustworthy* methods for discovery. Then at the core of scientific method or methods is experimental repeatability or reproducibility. Other synonyms for this core idea are predictability and/or control. As G. G. Simpson has pointed out:

> The important distinction between science and those other systematizations (i.e., the arts, philosophy, and theology—J. N. M.) is that science is self-testing and self-correcting. The testing and correcting are done by means of observations that can be repeated with essentially the same results by normal persons operating by the same methods and with the same approach.[6]

Therefore, the heart of scientific method is the problem — hypothesis — test process. And, necessarily, the scientific method involves predictions. And 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 theory of evolution? But before that question can be met, some consideration of presuppositions or assumptions of scientists is in order.

Scientific activity is built upon certain basic assumptions that are accepted implicitly or explicitly by all scientists. The scientist begins by supposing that there is a real world. Then he assumes that there is a discoverable uniformity or dependability about his natural environment, that the unfamiliar is explainable in terms of the familiar through analogy, that there are simple explanations of things and events, and that his statements should be subject to criticism and correction. From the latter assumptions the scientist develops details of interaction of empirical and theoretical processes covered in the Conant and Oxford Dictionary definition of science.

One more basic assumption or presupposition of the scientist is very important and can be connected with the pertinent question about predictions from the theory of evolution; that is, an assumption of causality whereby natural events involve a network of causes and effects. On the basis of knowledge of regular and predictable changes the scientist detects an association between events and he infers a cause-effect relation. At first the scientist assumes that the same causes are associated with the same effects in time. Sometimes he finds that different causes produce the same effect and he studies the situation further for some more initial possible cause.

If the scientist follows through a network of causes, partial causes and effects, he may find himself searching for a beginning, that is, he finds he is faced with searching for the first cause. However, most scientists recognize their limitations and the limitations of methods of scientific activity and do not press for a first cause, as scientists. Most scholars will agree that first causes extend the searcher beyond the realm of scientific activity; first causes, then, become the primary concern of theologians, metaphysicians, and philosophers.

However, at just this point of searching for first causes, many men in numerous sub-fields of scientific activity want to press on to discuss possible "origins." Faced with a vast array of data from controlled experiments and tested predictions of some theories, many biologists particularly, though this is also true of many physical scientists, want to ask questions of "origin" of the universe and matter, of the "origin" of life in animal and plant forms, of the "origin" of man, and of the "origin" of man's language and culture. In these modern times, an all encompassing, total evolutionary point of view, or world view, or theory has been proposed as the answer to the questions of "origins."

Of course critics of the theory of evolution have found with G. A. Kerkut[7] that a General Theory of Evolution and a Special Theory of Evolution must be distinguished.

A proponent of the General Theory of Evolution, which is the amoeba to man thesis, would state that all living things in the world have arisen from a single source that came from an inorganic beginning. Thus, according to the General Theory of Evolution, 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" for most people.

And a proponent of the Special Theory of Evolution would state that many living plants and animals can be observed, over the course of time, to undergo changes so that new varieties are formed.

Now to the question: Can predictions be made with regard to the General Theory of Evolution *and* the Special Theory of Evolution that are subject to test empirically? Only the major prediction associated with each theory will be given attention. Since no theory can be tested directly, tests of predictions based upon a theory afford the only means of confirming or discrediting a theory.

Fossil Record Considered

Examination of the General Theory of Evolution is based on consideration of the fossil record. The fossil record is *the prime source* of so-called evidence for the General Theory of Evolution because it is interpreted as the record of what *has existed*, of what *has happened.* Many authorities agree that the *decisive* "evidence" for the General Theory of Evolution must be based upon what they consider to be historical, that is, the fossil record. Charles Darwin and many, many other scientists have recognized this fact.

The very essence of evolutionary thinking is slow change. Therefore, a major prediction from the General Theory of Evolution would be that researchers would expect to find a record of *gradual transition* from the least complex to the complex. This is the major prediction from the general theory. In fact, if the General Theory of Evolution ever has any empirical basis, such a gradual transition of fossils *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, to be fair, one 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 the test of observation? (The importance of predictions with regard to the theory of evolution has been well worked out by Prof. Earl D. Hanson[8] of Wesleyan University.)

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 is reported to have considered the absence of Pre-Cambrian fossils as the major mystery of the history of life.

Noteworthy at this point is the fact that 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 *complex* to the *complex*, not from the simple to the complex!

But, if there is a "mystery" about the absence of evidence of ancestors of Cambrian life, there is still another even greater difficulty or mystery 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 claims of proponents of gradual evolution are not supported by the necessary evidence.

Transitions would have required thousands of generations and millions of years, according to the General Theory of Evolution, and an abundance of transitional forms should be found in the fossil record. However such transitional forms *cannot be found!* Actually sudden appearance of different kinds of animals is the logical deduction from 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 just 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 as 100% amphibians, and no one would confuse them with fish. Not a single transitional form has ever been found! And the same flat assertion can 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.

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 want 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; that is, the so-called horse series does not serve as an example of the General Theory of Evolution. True, 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 changes 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. Ergo no evidence, absolutely no direct or indirect evidence, has been presented for the General Theory of Evolution, which requires change from one form into another form. It is likewise possible that these fossil creatures represent four or five distinct types that are unrelated organically to the modern horse.

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 the 1967 publication, *The Fossil Record* (A Symposium with Documentation), jointly sponsored by the Geological Society of London and the Palaeontological Association of England[9]. Attention to this thorough scientific work resulted from the suggestion of Father Vincent J. O'Brien, science master at Castlenock College, County Dublin, Ireland and chairman of the Association of Irish Teachers of Science.*

In this research volume, some 120 scientists, all specialists, prepared 30 chapters in a monu-

*Editor's Note: V. J. O'Brien, C.M., Castlenock College, County Dublin, Ireland, has published independently a helpful anti-evolutionary treatise entitled, "Evolution: The Minority View." He effectively presents the problem of the gaps in the study of fossil men, horses, and birds.

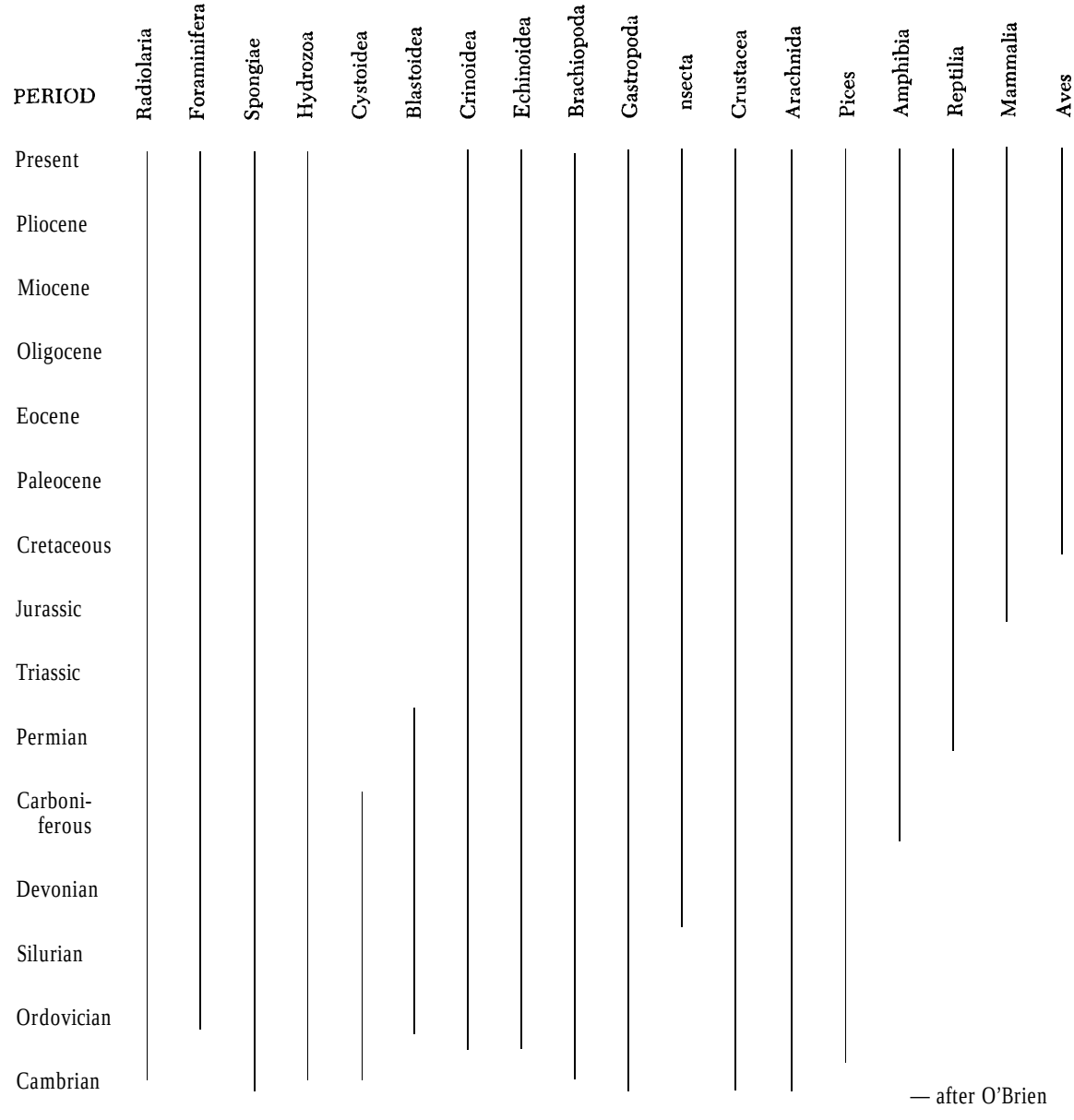

Chart l-Generalized Geological Record of Animals. Vertical lines represent duration of existence in each animal group. No common ancestors are known. (Based on Harland, W. B. and Others (Editors). The fossil record. London: Geological Society, 1967.)

mental 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 that are included throughout the chapters of the book (See Charts 1 and 2). Acknowledgement should be made of the fact that some zoological specialists attempted to indicate possible limited "connections," but such tenuous relationships always involve possible "connections" WITHIN major divisions of animals, *viz.* Porifera, Brachiopoda, Mollusca, Agnatha, Amphibia, Aves, Mammalia. No such limited "connections" were recorded by any botanical specialist.

However, a conclusive generalization drawn from these charts is as follows: **Each major form or kind of plant and animal is shown to have a separate and distinct history from all the other forms or kinds!!!**

Groups of both plants and animals *appear suddenly* in the fossil record. For example, most mammals appear in the so-called Eocene division and are as diverse then as researchers find them to be today. Whales, bats, horses, primates, ele-

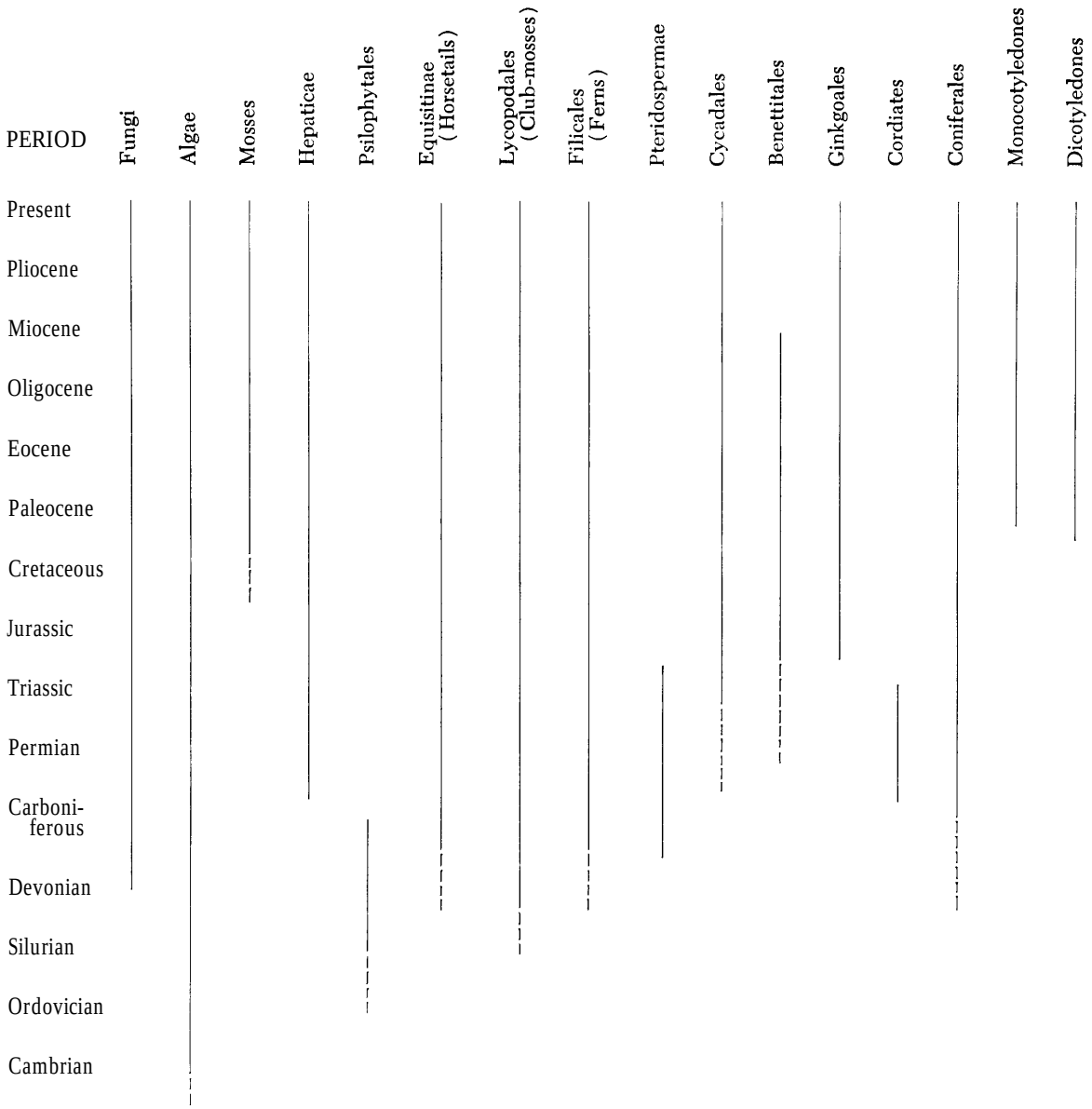

Chart 2—Generalized Geological Record of Plants. Solid vertical lines represent duration of existence of each plant group. Broken line portions indicate some doubts as to earliest appearance of some groups. No common ancestors are known. (Based on Harland, W. B. and Others (Editors). The fossil record. London: Geological Society, 1967.)

phants, 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 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 summary paragraphs could be included here on the outstanding scientifically documented information about plants and animals in the fossil record. But the important point to make is that knowledge of the content of the above cited book 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 asserted[10], "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.

Prof. Alfred S. Romer[11] of Harvard University has recognized, "Links are missing just where we most fervently desire them and it is all too probable that many links will continue to be missing." And the late geneticist Dr. R. B. Goldschmidt[12] wrote of the paleontological record, "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."

Thus, these scientists have recognized that gaps appear in the fossil record, *systematic* gaps; links are *missing,* and groups of organisms appear *suddenly* and *without* transitions. Thus with regard to the General Theory of Evolution (which means all present forms came from past existing forms), one must conclude that, instead of a transition from lowest to highest, study of the fossil record reveals:

(1) absence, that is total absence, of forms considered 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, as its proponents claim, is actually incompatible with the theory!

Therefore, one could reasonably ask, is the General Theory of Evolution really part of true scientific activity? Scientific activity involves facts that 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 that are identified as fossils. Thus the plain 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 is synonymous with predictability and/or control, as already noted.

One might ask, where are the demonstrated or observed experiments on relationship among or between fossils, or for that matter among or between fossils and living things? But such control of events is totally impossible. Thus 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 can be found in the fossil record.

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

As a consequence of discussion to this point, should evolution be taught in a science course? As far as true scientific activity is concerned the General Theory of Evolution is *not* a required part of a science course. The General Theory of Evolution at best should be optional for a science course.

Then is the General Theory of Evolution more properly a part of the subject area of various social sciences? The answer is affirmative. The General Theory of Evolution is a core part of a study of world-views, or of points of view in history and humanities and so-called social science. Impact of the General Theory of Evolution in philosophy and other areas of man's academic disciplines has been multiple in dimension and kind. (See diagram of Impact of Modern Evolutionary Thought) Full treatment of such impact is really a study of Evolutionism and goes beyond the scope of this article. However, excellent explanations and further references will be found in Conner[13], Henkin[14], Loewenberg[15], Persons[16], Roppen[17], Selsam[18], Stevenson[19], and Zirkle[20].

Special Theory of Evolution

The question, should evolution be taught, with regard to the Special Theory of Evolution, can be disposed of more briefly. A **major prediction** from the Special Theory of Evolution, as defined earlier, would be that researchers would expect to find different degrees of variability WITHIN presumably basic forms or kinds of animals and plants.

Many reports of experimental studies in "evolution" are available. For example, in 1955 W. H. Dowdeswell[21] published *The Mechanism of Evolution.* That title should have been "Mechanisms of Micro-evolution," but more on this later. In 1960 W. S. Boyle[22] 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

IMPACT OF MODERN EVOLUTIONARY THOUGHT

IF research in the history of ideas can substantiate that the position of

1. MARX and KEYNES in economics and social studies,
2. FREUD in psychology and psychiatry,
3. DEWEY in modern education,
4. FOSDICK and "higher" Biblical critics in modern theology,
5. NIETZSCHE, JAMES, and Positivists in modern philosophy,
6. BEARD in American history,
7. FRANKFURTER in modern jurisprudence,
8. LONDON and SHAW in modern novels,
9. CAMUS, SARTRE, and HEIDEGGER in existential thought,
10. WHITE in sociology,
11. SIMPSON and DOBZHANSKY in paleontology and modern genetics,
12. HUXLEY in evolutionary humanism

depends upon Darwinism, neo-Darwinism, and/or Modern Synthetic Evolutionary World View,

THEN selected indoctrination has been, and is, the lot of many modern intelligentsia, since circa 1860 to the present.

POSITIVE AFFIRMATION of each of the antecedents in the above complex material implication is gained through full examination of the history of ideas.

THEREFORE, modern secular educational content results in selected indoctrination of many of the intelligentsia of the United States, and of Western Civilization, in general.

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of the General Theory of Evolution or the Special Theory of Evolution? At this point close criticism is needed. ONLY the major prediction from the Special Theory of Evolution is relevant to these studies. The prediction of different degrees of variability WITHIN presumably basic forms or kinds of animals and plants is the *only* prediction confirmed by breeding experiments, of controlled nature, both in the laboratory and in the field anywhere on the surface of the globe. Bacteria give rise to bacteria, moss to moss, ferns to ferns, protozoa to protozoa, earthworms to earthworms, and dogs to dogs. From these experiments come observations that are in total agreement with the Law of Biogenesis. Then 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 involves the thesis 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" that *can be demonstrated* in the laboratory, or in the field. And the question can be asked, does "evolution" here mean "genetic variation?" If so, then the term "evolution" has been equivocated.

Now one would be quite correct to interpret tests of predictions from the Special Theory of Evolution as tests of the concept of microevolution. They are that, 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 Evo-

lution have the hope, the desire, and in many cases actually admitted in print, 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.[23])

But tests of predictions from 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. The entire sum 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 whatsoever did Prof. Ford, or do any other published reports of so-called studies of experimental evolution, show any changes of one animal form into another animal form, or one plant form into another plant form.

An Equivocation of Terms

Therefore the laboratory experimenter, or the field investigator for that matter, only studies genetic variations within limits; or, 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 discussion of any rise of new forms of life out of old forms.

At this point the question can be asked, should the Special Theory of Evolution be taught in a science course? Essentially 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.

Of 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 a scientific explanation and should be avoided.

This author states a clear affirmation for studies of genetic variation in science courses for that purpose alone, namely, studies of genetic variation as excellent examples of solid scientific activity. And students should not be confused about such studies with references to the General Theory of Evolution. And further there is absolutely no need for the labels, "Special Theory of Evolution" and/or "micro-evolution" after all, since to all intents and purposes the concepts involved are mostly the same as those involved in studies of genetic variation.

Propriety of Criticisms of Evolution

A few remarks about the propriety of criticisms of theories of evolution are in order at this point. Critics of theories of evolution have no quarrel with the Special Theory of Evolution as such, or micro-evolution, when one actually means genetic variation. The *fact* of genetic variation, and the fact of changes of animals 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 the term "genetic variation" can be used without equivocation, and with greater rigor of meaning, and with actual physicalistic referents.

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

Of course 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. Attention is called to this by expression of the fact that doubt is always needed for the so-called self-correctiveness of scientific activity.

And 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, 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 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 defense of a doctrine they are unable to define scientifically, much less demonstrate with scientific rigor, attempting to maintain its credit with the public by suppression of criticism and the elimination of difficulties, is abnormal and undesirable in science.[24]

Also W. R. Thompson has written in his republished book, *Science and Common Sense:*

> 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.[25]

And Errol Harris[26] makes clear in *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 contradiction to the fundamental law in physics, namely, the Second Law of Thermodynamics. Harris relates further important criticisms by biologists H. Graham Cannon and Ludwig von Bertalanffy.

In sum, criticisms of the General Theory of Evolution are set in focus by attention given to "scientism" by Isidor Chein in his 1966 *American Psychologist* article. 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 part of an extreme naturalistic viewpoint. 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 hypothetico-deductive in structure.[27] (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." This is important. "Do not serve the ends of prediction," indeed. "Post hoc," indeed. Yet prediction is associated with repeatability, with reproducibility, with control of observable objects and events at the very core of solid scientific activity.

In the face of this analysis, which empirical scientist can seriously consider "origins" of life, as an empirical scientist? Which 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 more to be considered as qualitative, speculative imaginations of naturalistically oriented men, rather than the type of work which we have rightly become accustomed to putting our trust in when the result of application of true scientific research principles.

Summary and Conclusions

In keeping with the stated purpose of this article, the scientific basis was made explicit for criticisms that have been formulated against theories of evolution by many parents in terms of the question, should evolution be taught in a science course? The conclusion was reached that the General Theory of Evolution need *not* be taught 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 imaginative speculation by believers in naturalism.

The Special Theory of Evolution should be taught 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 laboratory or in the field.

Actually full use of the methods of experimental science is *not* applicable to the General Theory of Evolution at all. Also, the fossil record cannot be used to support the claims of proponents of the General Theory of Evolution. There are many, many scientists today who attest to this condition; and many, many scientists who have written on this point over the decades since 1859 when Darwin's book first appeared. And parents of this nation can quite properly ask why their children have not 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* genetic variation. There is *absolutely no* experimental evidence for any change of one animal form into another animal form; or for that matter, any change of one plant form into another plant form—such changes being those demanded according to the General Theory of Evolution.

The *only* evidence of change that can be classed properly as the result of sound scientific method is the evidence of genetic variation WITHIN limits of kinds or 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.

To reiterate, 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.

Epilogue

As a consequence of November, 1969, action by California State Board of Education members, questions about the "origin" of man are to be considered from the point of view of evolution *and* the point of view of creation in elementary science textbooks used in California. Some scientists have expressed great consternation at such action. Yet, according to the definition provided in the Background section and quoted from John Somerville, theories of evolution *and* the Genesis account of creation can be classified as scientific to the extent "that it yields the power to predict in relation to the subject matter of its choice."

Within the context of this article, can predictions be made with regard to the Genesis account of creation that are subject to test empirically? A proponent of the Genesis account of creation would state that the basic kinds or forms of living plants and animals were placed on the earth by direct action of Almighty God; and state that, during time, created kinds or forms have changed quantitatively and qualitatively; yet, changes have always been WITHIN circumscribed boundaries of the original created kinds (still not clearly discerned) which God created.

A **major prediction** from the Genesis account of creation would be that researchers would expect to find gaps between distinct kinds or forms of living animals and plants, with different degrees of variability WITHIN known kinds of animals and plants. Furthermore, a **corollary prediction** would be that researchers would expect to find gaps in the fossil record between distinct kinds of animals and plants.

Full confirmation for these predictions from the Genesis account of creation can be obtained from careful research and interpretation of data from genetics, paleontology, comparative anatomy, embryology, serology, and biochemistry. In other words, data of the so-called fossil "series," gene combinations and recombinations, hybridization, mutation, migration, isolation, distribution, and selection (artificial and natural) are interpreted meaningfully by means of the Genesis account of creation.

And based on a strict point of view regarding the basic assumption of cause and effect, *no* discussion of "origins" should be included in a science course. A search for "origins" necessarily partakes of a search for first causes, which most scholars will agree is beyond the core aspect of scientific activity as defined by the problem-hypothesis-test process. Therefore, an *empirical* scientist should leave discussions regarding first causes, such as the "origin" of life, or the "origin" of man, to theologians, to metaphysicians, and to philosophers.

However, *since* men do attempt answers to the questions of "origins" of the universe and matter, of life in animal and plant forms, of man, of his language and culture, *and since* science teachers insist upon exploring "origins" and first causes with their students, *then* science teachers seemingly should be duty bound **in academic freedom and responsibility** to present BOTH the theory of evolution (as General and Special Evolution) and the Genesis account of creation. Each conceptual framework is offered by proponents as an explanation of "origins," and each framework can reasonably be labeled scientific if predictions are possible in relation to the subject matter of each conceptual framework.

Of course students should become aware of the difference in success of predictions based upon the General Theory of Evolution and the Genesis account of creation, respectively. This difference has been shown above. In point of fact, the *only unchanging* explanation of "origins" is that found in the Genesis account of creation.

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LETTER TO THE EDITOR

Evolutionists claim that the second law is bypassed by the importation of energy from the sun. Regardless of the amount of energy imported from an outside source into an open system, there could be no consistent ordering effect in the open system if the effect of the energy is perfectly random (as the sun's energy is).

There may be random momentary fluctuations toward order, but there would be no consistent long range development of order such as required for the origin of life. The only way in which such an ordering effect could possibly be imagined would be if the incoming energy were directed to have a specific organizing effect.

Such an argument may appear to be in agreement with the position of theistic evolutionists, but when we consider that theistic evolution exists largely to salve the conscience of Christians who believe that they must keep their feet in both idealogical worlds at once, we are aware that theistic evolutionism would disappear if atheistic evolution should disappear.

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EVOLUTION IS LOGICAL BUT NOT BIOLOGICAL

I hope it will be understood by the student that the evolutionary series presented throughout this book are not to be regarded as demonstrated facts. These series are, instead, logical conclusions held by many botanists based on observation and interpretation of the facts available to us. Additional information about plant structure, together with a re-interpretation of known facts, could lead to different hypotheses in the future.

from Preface of *Plant Diversification* (p. vi) by Theodore Delevoryas, Yale University. Holt, Rinehart and Winston, New York, 1966.

(Continued from page 104)

of the currently postulated evolutionary mechanism). A greater understanding of this matter which is so personal and so vital will come with the realization that an Originator and Designer of sex and sexual attraction exists—that a man and a woman were, after all, made for each other.

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