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An Investigation of Some Recent Literature on the Subject of Creation and Evolution

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AN INVESTIGATION OF SOME RECENT LITERATURE ON THE SUBJECT OF
CREATION AND EVOLUTION

A Thesis
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the Faculty of the
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by
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CHAPTER I

INTRODUCTION

I. THE PROBLEM

Statement of the Problem

The problem of this study was to ascertain and analyze the recent trends of thought among certain selected scholars concerning the subject of creation and evolution with a view to determining the scientific and Scriptural validity of those views in the light of the traditional conservative evangelical position of instantaneous creation.

Justification of the Problem

First of all, almost everyone is aware of the early reaction of Christianity to Darwin's theory of evolution in particular and science in general. Ramm has pointed out that, "Too frequently orthodoxy fought the critic with sarcasm or villification or denunciation. This too often involved a similar treatment of the facts of science."¹ To many, Christianity clearly came out the loser in this initial encounter, and therefore was to be dismissed from any serious consideration. Ramm again notes that, "Evangelicals in science are considered by scientists

¹Bernard Ramm, The Christian View of Science and Scripture (Grand Rapids: Wm. B. Eerdmans Publishing Company, 1954), p. 21.

as anachronisms or unnecessary perpetuations of the medieval mentality into the modern period."²

Secondly, the rapid advances in the field of natural science since the time of Darwin, and the phenomenal results of the application of these advances in "practical" fields has served to convince man of the importance of science. The strides in the applied sciences have convinced many that science is of primary importance and religion at best is only secondarily important. Because of the early showing of Christianity in the question of evolution, many have passed it off as being anti-intellectual and unreasonable.

Thirdly, Christians, no less than anyone else, can witness the wonderful achievements of the scientific world. For the most part, these achievements are accepted and enjoyed, and yet the Christian is also convinced of the reality of his own Christian experience. When these two factors are brought together in many Christians' minds, there is bewilderment, confusion, and frustration, for to many Christians, Christianity was the loser in that confrontation with early Darwinians, the theory of evolution was vindicated by the advance of science, and nothing has been done to erase that early "defeat" or to settle the doubts and questions raised by it.

Fourthly, many Christians and nonchristians alike have been laboring under the misconception that Christian scholarship has remained

²Ibid., p. 23.

static while secular scholarship has been making rapid advances. There are, however, many Christians writing on creation and evolution and related subjects who have excellent qualifications in the sciences.

Again, the subject of creation versus evolution is important because it has become a focal point in the conflict (real or otherwise) between the Bible and science. While a great deal has been written on this subject from a professedly Christian point of view, it must be remembered that much which claims to be "Christian" in modern theology cannot be considered as such by Scriptural standards. Therefore it is necessary for the Christian to analyze the various trends of thought even among those who claim to be Christian before he can determine a valid Christian point of view.

Finally, the researcher had a personal interest in the problem. While working toward his baccalaureate degree in biology at the University of Oregon, he became very much aware of the extremely weak foundation for the theory of evolution, yet he also was aware that much of the Christian reaction to the theory of evolution was neither scientifically nor Scripturally valid.

II. METHOD OF PROCEDURE

The method of solution was to compile evidence through an investigation of some recent literature on the subject of creation and evolution. The evidence was then classified and analyzed and

finally interpreted with a view to demonstrating the basis and the validity of the various positions on this subject. In Chapter II, the subject of evolution was critically examined from scientific points of view primarily on the basis of secular scholarship. Chapter III was a study of current Christian approaches to the subject of creation and evolution.

III. DEFINITION OF TERMS USED

For the sake of clarity, certain definitions must be given at the outset.

Recent Literature. "Recent literature" refers to literature from the year 1945 to the present.

Creation. "Creation" refers to the concept that ". . . the worlds have been framed by the word of God, so that what is seen hath not been made out of things which appear" (Hebrews 11:3). The concept of creation includes the idea that God is directly and immediately responsible for bringing into being every "kind" of creature on the earth.

Evolution. "Evolution" refers to the concept that all present forms of life are here as a result of descent with modification from a single primitive form of life which itself had an inorganic origin.

Both "evolution" and "creation" take on slightly different meanings according to the modifying words used with them, but these

were the basic meanings of the words as used in this study. Therefore, the subject of creation and evolution involves a variety of views including modifications between "creation" on the one hand and "evolution" on the other.

IV. DELIMITATION OF STUDY

This study was limited to the literature of Protestant, and virtually evangelical, authors where Christian viewpoints were studied. While the bulk of the source material came from Christian scholars, a limited amount of secular scholarship was studied--primarily for the purpose of a more effective analysis of Christian scholarship by providing non-religious evidence as to the scientific validity of the various positions taken by Christians.

No attempt was made to trace the historical development of this subject.

CHAPTER II

EVOLUTION AND SECULAR SCIENCE

I. INTRODUCTION

The acceptance of the theory of evolution has been widespread among secular scientists, and yet in recent years, there has been at least the beginning of a re-examination of the scientific value of the theory of evolution. This re-examination cannot be charged to religious motivation, but rather to the desire among many scientists to be as completely objective as possible.

It is not the purpose of this chapter to show that the theory of organic evolution is rapidly losing its popularity in the scientific world, for this would be far from the truth. The theory of organic evolution is held in high regard and is generally accepted as the unifying principle of biology. What this research has uncovered, however, is that there are some serious questions being raised concerning various aspects of the theory of evolution by those who do not have any particular religious axe to grind.

It should be made clear at the outset that the researcher does not wish to infer that those who are cited as questioning certain aspects and uses of the theory of evolution or certain attitudes on the part of the scientific community towards the theory of evolution are rejecting or repudiating the theory in general. On the contrary, they want it understood that they consider themselves evolutionists.

II. A QUESTIONING VOICE

In the preface to his book Implications of Evolution, G. A. Kerkut explains that he is primarily interested in examining certain basic assumptions and implications involved in the modern concept of evolutionary relationships in the animal kingdom. His concern in this area was stimulated by the fact that

the majority of books on Evolution either blatantly treat these assumptions as part of an old (and concluded) historic argument or else they avoid discussing the assumptions and instead deal with the more scientific and mathematical parts of Evolution.¹

A statement by G. Ledyard Stebbins in his recent textbook on the subject of organic evolution indicates that Kerkut's concern was justified.

Since Darwin developed his theory of evolution more than a century ago, biologists have studied this subject in two different ways. Some have been interested in the course of evolution. By comparing a multitude of different kinds of animals or plants, they have tried to work out the evolutionary family tree of some particular group, such as the horses, the cone bearing trees, or mankind. Other biologists have asked themselves the question: "What makes evolution go?" By means of observations and experiments of various sorts on populations of living organisms, they are learning about the processes of evolution and the mechanisms responsible for them. The present book will consider only this second approach to the study of evolution.²

This very apparent disregard of the basic assumptions and implications

¹G. A. Kerkut, Implications of Evolution (Oxford: Pergamon Press, 1960), p. vii.

²G. Ledyard Stebbins, Processes of Organic Evolution (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1966), p. 2.

of the theory of organic evolution in a textbook on evolution lends very definite support to the thesis of Clark and Bales that "evolution was not proved by scientific evidence but that it was rather the inevitable result of an a priori decision"3

George C. Kent, in the preface of his text on comparative anatomy, likewise indicates this disregard for basic assumptions and implications when he explains that there will be

. . . emphasis placed on the basic patterns of structure and development and the treatment of recent forms as modifications of these patterns. This is the theme of comparative anatomy. It provokes examination of the concept of organic evolution which, shorn of explanations of how, in which direction, or why, may be reduced to the axiom that the organisms of the world have been changing.⁴

Here, on the one hand, the basic assumptions and implications of the concept of organic evolution have been dismissed as axiomatic, and on the other hand, he equates the acceptance of the fact that organisms have been changing with the acceptance of the concept of organic evolution.

Kerkut is not satisfied to gloss over the basic assumptions of the theory of organic evolution. He has seen that "too often the theory is applied to, say, the development of the horse and then because it is held to be applicable there it is extended to the rest of the

³Robert T. Clark and James D. Bales, Why Scientists Accept Evolution (Grand Rapids: Baker Book House, 1966), p. 6. See discussion of this book on pp.

⁴George C. Kent, Comparative Anatomy of the Vertebrates (Saint Louis: The C. V. Mosby Company, 1965), p. v.

animal kingdom with little or no further evidence."⁵ Because of this, he lists seven assumptions which are not often mentioned in discussions of evolution--the first two being basic assumptions and the last five following from the second.

(1) The first assumption is that non-living things gave rise to living material, i.e. spontaneous generation occurred.

(2) The second assumption is that spontaneous generation occurred only once.⁶

Concerning the first assumption, he concludes that,

There is, however, little evidence in favour of biogenesis and as yet we have no indication that it can be performed. There are many schemes by which biogenesis could have occurred but these are still suggestive schemes and nothing more. They may indicate experiments that can be performed, but they tell us nothing about what actually happened some 1,000 million years ago. It is therefore a matter of faith on the part of the biologist that biogenesis did occur and he can choose whatever method of biogenesis happens to suit him personally; the evidence for what did happen is not available.⁷

Concerning the second assumption, Kerkut concludes that this also is a matter for belief rather than proof and spends the greater portion of the book in presenting evidence for the point of view that there are many discrete groups of animals about which there is no knowledge as to how they have evolved nor how they are interrelated.⁸ Kerkut holds that

There are two ways of considering the multiple origin of life. The first is to consider that life is continuously being

⁵Kerkut, op. cit., p. 6.

⁶Ibid.

⁷Ibid., p. 150.

⁸Ibid., et. passim.

created all the time, i.e. that spontaneous generation is always occurring. The second view is that spontaneous generation occurred at some finite time in the past but that it is no longer occurring.⁹

To Kerkut, writing from a strictly secular point of view, the two ways of considering the multiple origin of life both involved spontaneous generation. To the scientist who is committed to God's Word, a third explanation for the evidence indicating the multiple origin of life is found in the opening chapter of the Bible.

Kerkut is careful to point out that the seven basic assumptions of what he calls the "General Theory of Evolution," i.e. the concept that all present forms of life have evolved from a unique source, have not and cannot be verified experimentally.

The first point that I should like to make is that these seven assumptions by their nature are not capable of experimental verification. They assume that a certain series of events has occurred in the past. Thus though it may be possible to mimic some of these events under present-day conditions, this does not mean that these events must therefore have taken place in the past. All that it shows is that it is possible for such a change to take place. Thus to change a present-day reptile into a mammal, though of great interest, would not show the way in which the mammals did arise. Unfortunately we cannot bring about even this change; instead we have to depend upon limited circumstantial evidence for our assumptions¹⁰

In addition to pointing out the widespread lack of study and concern in the area of the basic assumptions and implications of the theory of organic evolution, Kerkut speaks out against the problem

⁹Ibid., pp. 13-14.

¹⁰Ibid., p. 7.

of scientific dogmatism especially as it relates to the attitude of the student and the nature of education where evolution is concerned. He has no love for the method of education fostered by the Church in the Dark and Middle Ages. What disturbs him is that he feels that many of the "Church's worst features" are still present in the modern academic world. In relation to this he says,

Thus the serious undergraduate of the previous centuries was brought up on a theological diet from which he would learn to have faith and to quote authorities when he was in doubt. Intelligent understanding was the last thing required. The undergraduate of today is just as bad; he is still the same opinion-swallowing grub. He will gladly devour opinions and views that he does not properly understand in the hope that he may later regurgitate them during one of his examinations. Regardless of his subject, be it Engineering, Physics, English or Biology, he will have faith in theories that he only dimly follows and will call upon various authorities to support what he does not understand. In this he differs not one bit from the irrational theology student of the bygone age who would mumble his dogma and hurry through his studies in order to reach the peace and plenty of the comfortable living in the world outside. But that is worse, the present-day student claims to be different from his predecessor in that he thinks scientifically and despises dogma, and when challenged he says in defence, "After all, one has to accept something, or else it takes a very long time to get anywhere."¹¹

Not all of the blame, of course, can be placed upon the student, for educators seem to encourage this type of situation. The preface of a standard general biology text states that,

throughout the text, organic evolution is presented as a primary integrating principle in biology It is our conviction that the primary focus on the great generalizations of heredity,

¹¹Ibid., p. 3.

evolution, and ecology can best be made after the student has formed a wide acquaintance with a number of different kinds of organisms.¹²

If the above statement meant that the student would not be presented with the theory of evolution until he had become familiar with the various kinds of organisms apart from an evolutionary interpretation of the facts it would be an objective presentation. The statement itself, however, hints that this is not the case when it says that "throughout the text, organic evolution is presented as a primary integrating principle in biology." The text bears this suspicion out in that whereas the "evidences" of evolution are not presented until Chapter 33, the student is in reality asked to accept the theory of organic evolution without any evidence throughout the text. For example,

The cartiliaginous fishes, or, as they are often called, the elasmobranchs, are characterized primarily by their cartilaginous skeletons. This must be regarded, however, as a specialization because there is evidence that the group has evolved from primitive fishes with bony skeletons They evolved from freshwater ancestors and the success of the group seems to be tied up, in part at least, with their adaptations for life in the sea.

.
The bony fishes arose in the Devonian from ancestral forms known as placoderms (to be discussed later) The early osteichthyans gave rise to three main lines of bony fishes There is evidence that most of the primitive osteichthyans had both lungs and gills From the standpoint of the evolution of land vertebrates, the lobe-finned fish are the most important

¹²Willis H. Johnson, Richard A. Laubengayer, and Louis E. DeLanney, General Biology (New York: Holt, Rinehart and Winston, 1961), p. vi.

of the bony fishes. The evidence is rather convincing that some of the ancient members of this group gave rise to the amphibians.

.....
 The amphibians were the first land-dwelling vertebrates but their adaptations for land life were not complete.

.....
 The reptiles should be regarded as the first completely terrestrial vertebrates and they evolved from primitive amphibian ancestors. . . . Reptiles were the first to evolve a penis and, in general, fertilization is internal. . . . During this long period at least fourteen different orders of reptiles evolved. . . . The snakes were derived rather late in the evolution of reptiles from limbless lizards.¹³

In some of these statements evidence is mentioned, but it is not presented for examination and consideration, and therefore the student is in effect being asked to accept organic evolution on the basis of appeal to authority. The authors finally get around to presenting the "evidences" of evolution on page 560, but by this time the student has been introduced to the entire field of biology in the above manner, assuming and accepting the theory of organic evolution as true and factual. This hardly fosters objectivity on the part of the student as he examines the presented "evidences."

When one begins to examine the "evidences," he finds that the fabric of the argument has been woven of strands of both fact and interpretation. If the facts are made to stand alone without the support of supposition, speculation, and evolutionary interpretation, the argument becomes very thin indeed. The authors have stated that,

¹³Ibid., pp. 128-132.

In a study of organic evolution, it is necessary to distinguish between two aspects of the study---the fact and the explanation. The many evidences of evolution constitute the fact; man's ideas about the mechanisms involved in the process, which include the various theories of evolution, constitute the explanation, or attempted explanation.¹⁴

The circuitry of the argument should be clear. Organic evolution is assumed rather than being proven. The "evidences of evolution" constitute the "fact," and the "fact" is the "evidences of evolution" by definition and not by demonstration. It is true that a distinction must be made between fact and explanation or interpretation. This is necessary for the sake of the objectivity which is so important to any scientific endeavor. The problem is that this distinction is often overlooked by the proponents of the theory of organic evolution. A statement was made in the general biology text cited above that "Studies in comparative anatomy afford many evidences of evolution."¹⁵ Comparative anatomy yields evolutionary evidence, however, only to those who are interpreting the evidence within an evolutionary framework. The theory of organic evolution could be one possible explanation for the general similarity seen in the arrangement of the parts of the forelimbs of many different vertebrates, but the fact that the forelimbs of many vertebrates show a general similarity by no means dictates the necessity of the theory of organic evolution. An equally

¹⁴Ibid., p. 560.

¹⁵Ibid., p. 564.

valid explanation could be that the various vertebrates were created according to a basic architectural pattern. From this interpretive framework, studies in comparative anatomy afford many evidences of special creation. Kent has indicated that this architectural pattern is seen even by evolutionists when he stated that

The premise that the vertebrate species have been changing is strengthened by the observation that all vertebrates, past and present, are constituted in accordance with a basic architectural pattern [italics not in the original].¹⁶

The fact, then, which comparative anatomy supplies is "a basic architectural pattern," and not "evolution." Organic evolution is merely one explanation or interpretation of that fact and not fact in itself.

The student can hardly be blamed for his lack of objectivity when the textbooks encourage it by statements such as the following. "The amount of the evidence for organic evolution is tremendous and those who have studied the evidence agree that all organisms, past and present, are products of this process."¹⁷ Here the beginning student in biology is dogmatically told that only those who have failed to study the evidence disagree with the concept of organic evolution. The student who finds himself questioning the concept of organic evolution is told on the basis of "authority" that if he

¹⁶Kent, op. cit., p. 1.

¹⁷Johnson, Laubengayer, and DeLemney, op. cit., p. 606.

is not convinced, it is only because he has not really studied the evidence. This type of presentation tends to discourage rather than stimulate objective scientific investigation.

When one begins to examine the proffered evidences for the theory of organic evolution, he is struck with the tentative, speculative character of the language used in the presentation. Johnson, Laubengayer, and DeLanney have stated regarding the supposed adaptation of appendages in the trilobites,

All of the appendages were essentially alike in the trilobite, with the head appendages somewhat smaller. These probably functioned in mastication. The endopodite seems to have been used for walking, while the exopodite is believed to have been used for both respiration and swimming.

According to Heegaard, an authority on trilobites, the arthropods should presumably be regarded as having a single origin with one branch of trilobitelike forms giving rise to the crustaceans and insects and another branch giving rise to the horseshoe crab and the arachnids. If we accept this position, then it is worthwhile asking, what has happened to these biramous appendages during this long evolution italics not in the original?¹³

The material above tends to enforce the statement of Kerkut when he says that

Most students become acquainted with many of the current concepts in biology whilst still at school and at an age when most people are, on the whole, uncritical. Then when they come to study the subject in more detail, they have in their minds several half truths and misconceptions which tend to prevent them from coming to a fresh appraisal of the situation. In addition, with a uniform pattern of education most students tend to have the same sort of

¹³Ibid., pp. 560-561. A more expanded illustration of this type of presentation is found in the appendix. The material was taken from a recent text on evolution used by the researcher in a course on evolution at the University of Oregon in 1966.

educational background and so in conversation and discussion they accept common fallacies and agree on matters based on these fallacies.

It would seem a good principle to encourage the study of "scientific heresies." There is always the danger that a reader might be seduced by one of these heresies but the danger is neither as great nor as serious as the danger of having scientists brought up in a type of mental strait-jacket or of taking them so quickly through a subject that they have no time to analyse and digest the material they have "studied." A careful perusal of the heresies will also indicate the facts in favour of the currently accepted doctrines, and if the evidence against a theory is overwhelming and if there is no other satisfactory theory to take its place we shall just have to say that we do not yet know the answer.¹⁹

In his concluding statement, Kerkut says that

There is a theory which states that many living animals can be observed over the course of time to undergo changes so that new species are formed. This can be called the "Special Theory of Evolution" and can be demonstrated in certain cases by experiments. On the other hand there is the theory that all the living forms in the world have arisen from a single source which itself came from an inorganic form. This theory can be called the "General Theory of Evolution" and the evidence that supports it is not sufficiently strong to allow us to consider it as anything more than a working hypothesis. It is not clear whether the changes that bring about speciation are of the same nature as those that brought about the development of new phyla. The answer will be found by future experimental work and not by dogmatic assertions that the General Theory of Evolution must be correct because there is nothing else that will satisfactorily take its place.²⁰

It should be stated once again that Kerkut is not writing from a religious point of view, nor is he at all "anti-evolution." He is merely questioning the scientific integrity of dogmatically asserting a theory based upon a high proportion of assumption and speculation

¹⁹Kerkut, op. cit., pp. 156-157.

²⁰Ibid., p. 157.

to demonstrable fact. He also questions the scientific value of this type of assertion.

III. EVOLUTION AND TAXONOMY

Taxonomy, the theoretical study of the principles and procedures of classification (the ordering of organisms into groups on the basis of their relationships), is a very important part of biology. In writing on the importance of taxonomy to the field of biology, Davis and Heywood have said that

The role of taxonomy in the teaching of biology is an important one. At a symposium on the subject held in Birmingham (England) recently, it was forcibly stated that taxonomy remains the principal agency through which the student may gain acquaintance with the diversity of organisms, the patterns of variation in the living world and of the evolutionary mechanisms which have brought these patterns about.²¹

One can immediately see that evolution and taxonomy have been brought together. This relationship is indicated once again in their discussion of the aims of taxonomy.

Among the many declared aims put forward for modern taxonomy, the following three seem widely accepted:

1. To provide a convenient method of identification and communication.
2. To provide a classification which as far as possible expresses the natural relationships of organisms (see p. 5).
3. To detect evolution at work, discovering its processes and interpreting its results.²²

²¹P. H. Davis and V. H. Heywood, Principles of Angiosperm Taxonomy (Princeton: D. Van Nostrand Company, Inc., 1963), pp. xix-xx.

²²Ibid., p. 2.

Although Davis and Heywood do bring evolution and taxonomy together, they indicate that the relationship is somewhat nebulous, as they continue,

Although these aims are complementary, they are not always easily reconciled. The first two mainly involve an empirical approach, while the third is concerned with phylogenetic²³ interpretation. Taxonomists have gone a long way towards achieving the first and second aim; but the third has only been achieved in a few groups and there mainly at the species level. At the higher levels of the hierarchy there is virtually no direct evidence for phylogeny *italics not in the original*. When one has hacked one's way through the verbiage, one has gone considerably less far on the third road than the forest of phylogenetic trees might lead one to expect.²⁴

When one compares this statement with the one quoted at the opening of this section, he sees that while taxonomy is the principal agency through which students may gain acquaintance with evolutionary mechanisms, taxonomy has had very little, if any, success at detecting evolution at work. Here also, the tenuous basis for the evolutionary theory is clearly evident.

The Defects of Modern Taxonomy

One of the greatest defects in modern taxonomy is its preoccupation with phylogenetic considerations. Davis and Heywood have observed that

A characteristic of post-Darwinian taxonomy has been the construction of phylogenetic trees on extremely dubious evidence.

²³"Phylogenetic" has to do with ancestry or race history.

²⁴Davis and Heywood, op. cit., pp. 2-3.

The evolution of organs has been mistaken for the evolution of taxonomic groups, and a vast amount of time has been spent in constructing hypothetical trees that might (it seems to us) have been better spent in building up a natural system based on overall resemblances.²⁵

Robert Sokal and Peter Sneath likewise criticise modern taxonomy at the point of phylogenetic considerations.

The difficulty with the use of a phylogenetic approach in systematics emerged after the first wave of enthusiasm for it had subsided and has remained apparent to perceptive observers ever since. We cannot make use of phylogeny for classification, since in the vast majority of cases phylogenies are unknown. This is one of the statements most commonly heard at meetings of taxonomists, yet it is most consistently ignored. Let us restate it in other words for emphasis. The theoretical principle of descent with modification--phylogenetics--is clearly responsible for the existence and structure of a natural system of classification; we may even agree with Tschulok (1922) that the natural system can be considered as proof of the theory of evolution. However, since we have only an infinitesimal portion of phylogenetic history in the fossil record, it is almost impossible to establish natural taxa on a phylogenetic basis. Conversely, it is unsound to derive a definitive phylogeny from a tentative natural classification.²⁶

The fact that these men can criticise phylogenetic considerations in taxonomy and nevertheless maintain their belief in the theory of evolution will be examined in the next section. The fact that should be noted at this juncture, however, is that they are pointing out that phylogenies are not a valid basis for classification because of the highly speculative nature of phylogeny.²⁷ They continue in their

²⁵Ibid., p. 32.

²⁶Robert R. Sokal and Peter H. A. Sneath, Principles of Numerical Taxonomy (San Francisco: W. H. Freeman and Company, 1963), p. 21.

²⁷See appendix for example of current speculation in phylogeny.

criticism when they show that,

As soon as phylogenetic considerations were added to systematics, three new questions arose. What are the phylogenetic relationships, or which stem branched off where? When in geological or relative evolutionary time did a given branching take place? How rapid was the evolutionary rate of a given line in a given time period? Classificatory theory and procedure, already inadequate, could not simultaneously accommodate these differing aspects of the problem.

The first of the new questions raised was emphasized the most. Undoubtedly more utter rubbish has been written since the time of Haeckel on supposed phylogenies than on any other biological topic. The fact is that we have a reasonably correct picture of the phylogenies of only a very few taxa and these entirely on the basis of paleontological evidence. Even in paleontology the proportion of fact to speculation is not too high.²⁸

Quoting Challinor, they say that

"Works which refer to the fossil evidence of evolution usually cite a few of the well-known cases of evolutionary series as if they were merely representatives of a host that might have been quoted, instead of stressing the fact that records of such cases are rare."²⁹

Davis and Heywood have likewise emphasized the problem of the speculative nature of phylogenetic considerations when they stated that

The phylogenetic systems proposed in post-Darwinian times have been based on erroneous or very dubious assumptions, and we have no means of telling when they are right or wrong. It is an ironical paradox that the attempts at a natural system produced by de Candolle and by Bentham and Hooker (though the product of pre-evolutionary thought) rest, with all their shortcomings, on a firmer theoretical basis than scores of post-Darwinian "phylogenetic" systems.³⁰

Very closely related to the defect of speculation in phylogenetic considerations is the defect of circular reasoning. Sokal and

²⁸Sokal and Sneath, op. cit., p. 24.

²⁹Ibid.

³⁰Davis and Heywood, op. cit., p. 67.

Sneath have pointed this defect out in one of the leading American evolutionists when they said that

Simpson (1961) thinks that taxonomy is an evolutionary science, and he attempts to outline a series of phylogenetic principles on the basis of which taxonomic evidence should be examined to yield evolutionary interpretations and classifications However, Simpson nowhere in his book is able to present a logical and consistent defense for the circularity of reasoning inherent in such procedures. By calling the process of classification an art, rather than a science, he defines the problem out of existence.³¹

They describe this circular reasoning when they state that

The taxonomist will recognize and define taxa on three kinds of evidence, which are not often clearly separated either in his mind or in publication. (1) Resemblance--those entities which phenetically resemble each other more than they do others for a taxon.³² (2) Homologous characters--a taxon is formed by entities sharing characters of common origin. (3) Common line of descent--membership in a common line of descent will define a taxon. Since (3) is rarely if ever known, it is usually inferred from (1) or (2). Conclusions on homologies (evidence of type 2) are often deducted from phylogenetic speculations (evidence of type 3). Thus taxonomists often reason facilely back and forth among these criteria without stopping to think how slender the evidence is on which their arguments are based. Their sound knowledge is usually restricted to an estimate of resemblance of a number of organisms without any knowledge of phylogeny and hence the common origin of their characters. Their estimates are usually based on few characters and thus do not reflect the overall similarity which could be obtained when more of the phenotype is considered. Once it is looked at critically, it becomes evident how much of taxonomic procedure is circular reasoning and extrapolation.

Phylogenetic interpretations of systematic relationships have remained in fashion ever since Haeckel. Modern emphasis on

³¹Sokal and Sneath, op. cit., p. 21.

³²Phenetic relationship is based upon the phenotype of organisms rather than upon phylogeny. The phenotype of an organism is the physical makeup of that organism resulting from the interactions of the characters determined by the genes and the environment.

the "New Systematics" has attempted to embellish such conclusions with speculations on the evolutionary mechanisms likely to have brought about the supposed systematic relationships under study **[italics not in original]**.³³

Both Davis and Heywood, and Sokal and Sneath have seen the dangers inherent in trying to build an empirical, and hence scientific, system of classification upon the subjective foundation of phylogenetic considerations complete with its speculation and circular reasoning. Although these criticisms are directed only at the field of taxonomy, it would be well for scientists to look at their wider implications and take a critical look at the entire question of evolution. Johnson, Laubengayer, and DeLanney have stated that "the evidence of evolution provided by fossils is the most forceful and direct evidence of evolution which we have."³⁴ This statement was made in an introductory text. Writing for a more advanced audience, Davis and Heywood state that

Although in our view phylogeny cannot be correctly constructed (at least above the species level) in the absence of fossil evidence, we can be much more certain of the evolutionary trends that have effected individual organs if we understand their function and adaptive significance (cf. Cain, 1959c). We may therefore be able to estimate the general level of advancement of an organism relative to others, but that does not tell us from which taxon another has been evolved, which is what a study of phylogeny attempts to do.³⁵

That which has been stated to be the "most forceful and direct evi-

³³Ibid., pp. 7-8.

³⁴Johnson, Laubengayer, and DeLanney, op. cit., p. 572.

³⁵Davis and Heywood, op. cit., p. 35.

dence of evolution which we have" cannot even support an objective system of classification because it is virtually non-existent. Even Stebbins has admitted that "the bias inherent in the fossil record is exactly of the wrong kind for evolutionists who wish to learn how the major groups of organisms originated."³⁶ Thus, scientists might be well advised to remove the speculation and circular reasoning from the foundation of organic evolution, re-examine (or possibly examine for the first time) the basic assumptions and implications of organic evolution as Kerkut suggests, and then see if the theory can legitimately support its own weight.

The Position of Critical Taxonomists on Evolution

It has been stated and bears repeating that those who have been cited as criticising modern taxonomy because of its preoccupation with phylogenetic considerations are by no means "anti-evolution" in outlook. Davis and Heywood have stated that

The reader should not be misled into thinking that we suggest ignoring evolution or evolutionary principles. It is in fact precisely because we are impressed by such evolutionary phenomena as convergence and parallelism that we advocate the production of general classifications based on maximum number of attributes and that they be accepted as such, in their own right, and not necessarily as reflections of phylogeny.³⁷

Again they have stated that "taxonomic groups are the product of

³⁶Stebbins, op. cit., p. 134.

³⁷Davis and Heywood, op. cit., p. xix.

evolution, so that any concept that has a non-evolutionary basis may at first sight seem archaic and unacceptable."³⁸ And once again,

Nobody who believes in evolution can doubt that these morphological trends exist, or even that they can be seen in natural groups as they are living today. The bone of contention has been the direction of the trends in the absence of fossil evidence.³⁹

Sokal and Sneath have likewise taken great care to impress upon the reader that they are confirmed evolutionists as they relate that

The separation of phenetic and phyletic considerations in taxonomy is a very drastic step, to which we have not come lightly. Unavoidably, misunderstandings with our colleagues are frequent. It is difficult for all of us to abandon patterns of thought acquired with our early training. Numerical taxonomy is accused of being anti-evolutionary and of dragging taxonomy back into its typological, pre-evolutionary period. The practitioners of the new methods are lumped with the few surviving true anti-evolutionists because the latter also propose classification of organisms on the basis of their visible characters and without phylogenetic considerations. As it happens, all the proponents of numerical taxonomy are evolutionary biologists in their own right. They are firmly convinced that phylogeny is responsible for the existence and structure of the natural system. They are criticizing not evolution or the study of phylogeny but speculation passed off as fact.⁴⁰

They believe that "the majority of taxa are definable because of the discontinuities arising in phyletic lines as by-products of the evolutionary process."⁴¹ This belief in the theory of evolution is attested to once again when they state that,

³⁸Ibid., p. 11.

³⁹Ibid., p. 38.

⁴⁰Sokal and Sneath, op. cit., p. 56.

⁴¹Ibid., p. 10.

The theory of evolution is the most adequate, most unitary, and indeed simplest hypothesis to which a great variety of biological phenomena--geographic distribution, physiological adaptation, morphological similarity, or biocoenotic complexity--can be related.⁴²

It is interesting to note the pains which the authors have taken to affirm their belief in the theory of evolution. Part of the reason for this care is undoubtedly that the authors want to receive a hearing in the scientific community. It is sometimes difficult to receive an objective hearing, in the field of biology at any rate, without the espousal of organic evolution. Sokal and Sneath state that

the authors are familiar with practices in several university departments where "plain" taxonomic theses are not welcomed or recognized for the Ph.D. degree and where a discussion of phylogeny and evolutionary principles illustrated by the revised taxon is mandatory. In the absence of experimental and fossil evidence such accounts are usually purely speculative and involve much tortuous dialectic. It seems to us rather absurd to indulge in speculations of this sort when for most groups the basic facts of phenetic resemblance are still to be obtained. There is, of course, no harm in speculation per se. The points we wish to make are that phylogenetic speculations should not be involved in the classificatory process and that any such speculations should be based upon a sound phenetic classification.⁴³

The type of dogmatic attitude to which they referred can only hinder the development of the biological sciences, for it has the effect of minimizing objectivity--which truly scientific endeavors seek to maximize. It is small wonder that consideration of the

⁴²Ibid., p. 25.

⁴³Ibid., p. 8.

basic assumptions and implications of the general theory of evolution get so little treatment when such pressure is applied.⁴⁴

Sokal and Sneath have stated that there are frequent misunderstandings with their colleagues and that numerical taxonomy is accused of being anti-evolutionary. It is certainly possible that their colleagues have sensed that their criticisms, or at least the implications of their criticisms, are very damaging to the theory of organic evolution and that they are not willing to face that fact or its consequences.

There is a psychological factor involved in this problem which Sokal and Sneath do recognize---at least in part. They have stated that

To ignore phylogenetic considerations while evaluating taxonomic relationships is not an easy mental task for a biologist of this day and age. For almost a century there has been an intimate conceptual association between taxonomic and phylogenetic reasoning, so that terms such as "specialized," "primitive," "homologous," and many others have assumed double meanings whose distinction is rarely attempted. We ourselves find difficulty in keeping apart phyletic and phenetic implications of the terms we use.⁴⁵

Sokal and Sneath have exposed the fact that much current evolutionary thought is based upon the fallacy of circular reasoning, they have shown that phylogenies do not form a valid basis for an objective classification because attempted phylogenies above the

⁴⁴See pp. 7-18 for a discussion of this topic.

⁴⁵Sokal and Sneath, op. cit., p. 57.

species level are based upon speculation and circular reasoning rather than upon valid evidence, and therefore cannot claim to be objective, and yet they can still say that

The theory of evolution is the most adequate, most unitary, and indeed simplest hypothesis to which a great variety of biological phenomena--geographic distribution, physiological adaptation, morphological similarity, or biocoenotic complexity--can be related.⁴⁶

They go on to say that

Phylogeny can thus be seen as the central cause of much biology, yet it cannot be used for an explanatory concept, as it is not known in the vast majority of instances. Hence an empirical classification, although it may not be able to explain the above-mentioned biological phenomena, is at least a self-sufficient, factual procedure and may in most cases be the best classification that we can get.⁴⁷

On the one hand they have shown that phylogeny cannot be the basis of a valid, empirical classification, and on the other hand they accept phylogeny as "the central cause of much biology." The work they have done in pointing out the inadequacy of phylogeny for taxonomy has certainly mitigated against phylogeny as the central cause of much biology.

In another place, they have said that

The approach of numerical taxonomy has been called anti-evolutionary. It seems hardly necessary to disavow such attitudes, because of our own interest in evolution and our employment of evolutionary modes of thought.⁴⁸

⁴⁶Ibid., p. 25.

⁴⁷Ibid.

⁴⁸Ibid., p. 265.

It is certainly possible and highly probable that the "evolutionary modes of thought," fostered by almost one hundred years of the acceptance and dogmatic assertion of the evolutionary hypothesis as discussed earlier, are responsible for the acceptance of the general theory of organic evolution by Sokal and Sneath. It is difficult to measure the effect of indoctrination, but the evidence presented in this chapter has shown that indoctrination is not absent from the sciences, especially where evolution is involved.

Davis and Heywood see a slightly different psychological factor when they state that

It is unfortunate that phylogeny has a strong psychological appeal for herbarium taxonomists---it breaks the monotony of routine taxonomy. Families, without phylogeny, can be dull to teach and harder still to learn, so that phylogeny has become so firmly entrenched in teaching curricula that it is only now beginning to slip into the background and unfortunately taking a knowledge of families with it.⁴⁹

Thus it can be seen once again that the appeal of phylogeny is not necessarily based upon scientific considerations.

Another factor which tends to add to the popularity of the theory of evolution is that, as Sokal and Sneath have stated, "evolution is indeed an all-explanatory principle."⁵⁰ While this may give some sense of satisfaction, the problem is that the explanations are largely untestable. Robert Clark, writing in The Christian Stake in Science,

⁴⁹Davis and Heywood, op. cit., p. 68.

⁵⁰Sokal and Sneath, loc. cit.

has pointed out that "if we are at liberty to invent untestable explanations as and when we please, it is obvious that we can explain everything."⁵¹ He continues, saying that

Evolutionary explanations are almost entirely of the after-the-event kind. The camel has a hump and this like everything else is due to natural selection which we are told offers "a scientific rational mechanistic explanation". Maybe, but if the camel had no hump, the explanation would be the same. The cat has a tail and natural selection tells us why. But if puss had no tail, natural selection would explain that too. If an animal has a feature which seems to confer no obvious advantage, we are told that it must have an advantage or it would not be there. If difficulties are raised we are told that the advantage lies in some other factor with which the first is linked genetically and oléiogenes are invented for the purpose. (These are genes which affect more than one factor in the progeny, with perhaps only one of the factors selected.) If a feature which would be useful to an animal is not there, then of course natural selection explains this too. And so on, whatever the facts to be explained.⁵²

Davis and Heywood indicate that the theory of organic evolution rests in the realm of belief rather than proof when they say that

Nobody who believes in evolution can doubt that these morphological trends exist, or even that they can be seen in natural groups as they are living today. The bone of contention has been the direction of the trends in the absence of fossil evidence.⁵³

Belief in evolution is that which paves the way for the assurance that various morphological trends exist. The fact of morphological variation in itself does not yield this assurance. It is only when morphological facts are examined through evolutionary glasses that

⁵¹Robert E. D. Clark, The Christian Stake in Science (Chicago: Moody Press, 1967), p. 24.

⁵²Ibid.

⁵³Davis and Heywood, op. cit., p. 38.

they yield the assurance that certain morphological trends exist. Because evolution is an interpretation which is believed, any observable phenomenon becomes a "proof" of evolution as long as an evolutionary explanation can be given that particular phenomenon. Circular reasoning is once again in evidence as evolutionary explanations become the "proofs" of evolutionary theory.

Numerical Taxonomy---An Alternative to Evolutionary Taxonomy

The development of numerical taxonomy has its roots in the criticisms of evolutionary taxonomy, some of which are discussed above. According to Sokal and Sneath, "Numerical taxonomy is the evaluation by numerical methods of the affinity or similarity between taxonomic units and the employment of these affinities in erecting a hierarchic order of taxa."⁵⁴ In the preface of their book, they state that

In developing a theoretical foundation for numerical taxonomy we found it necessary to re-examine the theory of taxonomy as a whole, and we found much of the currently professed theory of phylogenetic systematics to be unsound and in need of critical re-evaluation.⁵⁵

They indicate that they are not alone in their criticism when they state that, "The present century has witnessed a re-examination of the validity of the evolutionary basis of natural taxonomies. Empirical classifications have been proposed in several quarters."⁵⁶ Although

⁵⁴Sokal and Sneath, op. cit., p. viii.

⁵⁵Ibid., p. ix.

⁵⁶Ibid., p. 18.

they give several examples to document this statement, we will call upon Davis and Heywood once again as evidence that this problem does not exist just in the minds of Sokal and Sneath. They (Davis and Heywood) state that

As an initial procedural step, classification must be based on overall resemblances, and though it may then be interpreted in phylogenetic terms it cannot itself be based on phylogeny because too little evidence exists. Indeed, the whole conception of phylogenetic classification is, we maintain, a mistake except around the species level in favourable and well-studied groups; and even there phyletic relationship often conflicts with genetic relationship as expressed by phenotypic resemblances. . . . A classification based on overall resemblances is, however, more likely to be serviceable for more purposes than one based on known or assumed "phylogenetic" evidence.⁵⁷

Sokal and Sneath do more, however, than criticize--they offer an alternative.

In our view, a major difficulty in which the critics of the phylogenetic method have found themselves in the past is that though being able to criticize the position of the phylogeneticist on valid grounds, they have been unable to suggest a consistent and workable alternative procedure. Such a goal is now within reach, as we hope to demonstrate in the chapters that follow.⁵⁸

It is beyond the scope of this thesis to present a detailed examination of numerical taxonomy, but a general overview will be given and the interested reader should consult Sokal and Sneath for a detailed presentation of numerical taxonomy.

Numerical taxonomy differs from evolutionary taxonomy in that classification is based upon overall similarity or affinity of

⁵⁷Davis and Heywood, op. cit., p. xviii.

⁵⁸Sokal and Sneath, op. cit., p. 30.

organisms rather than supposed or assumed ancestry. A key to the validity of a classification based upon affinity is the number of characters used in determining the similarity. In looking at a pear, a tomato, and a raw beefsteak, and trying to classify them according to one character only--the character of redness--one would end up classifying the tomato and the beefsteak together, and this can readily be seen to be an "artificial" rather than a "natural" classification, for in overall similarity, the tomato much more closely resembles the pear than it does the raw beefsteak. Ideally, numerical taxonomy makes use of every possible character and therefore can give a classification based on overall similarity.

The computer is of primary importance to the numerical taxonomist. Although numerical taxonomy would have been valid in theory before the age of computers, in practice it would not have been feasible. In numerical taxonomy, the taxonomist would choose his specimens, discover, measure, and code the characters (morphological, chemical, genetic, etc.), and using valid mathematical and statistical techniques, the computer would calculate the affinity between specimens. Using other valid statistical techniques, the computer would then cluster the specimens into taxonomic groups. According to Davis and Heywood, ". . . a satisfactory classification depends upon the interpretation of as many facts as possible."⁵⁹ The use of computers enables the taxonomist to work effectively with as many characters

⁵⁹Davis and Heywood, op. cit., p. 183.

as he is able to discover and measure, thus giving him an empirical classification without any reliance upon speculation and circular reasoning. Although the process is highly objective, Sokal and Sneath point out that the danger

. . . that one may imagine that one is achieving some sort of "objective reality," is quite real. This danger is indeed pertinent from a philosophic point of view. We do not claim that numerical taxonomies are "objective realities"; the fact that a number of slightly differing taxonomies may be obtained by different statistical methods is clear evidence that they are not. Nevertheless, having defined precisely what is pertinent to biological classification and what are the best statistics for achieving a given end, we can obtain taxonomies which fulfill the needs for which they are devised, in the same way that we can agree that the arithmetic mean is a valid measure of the central tendency of a frequency distribution, for a given purpose we have in mind.⁶⁰

Sokal and Sneath maintain that "a major benefit of programming taxonomy for a machine is that the taxonomist has to think through the logic of the taxonomic process rather than simply follow his taxonomic intuition."⁶¹ Another benefit of numerical taxonomy is that it should stimulate biological research. The need of numerical taxonomy for the comparison of as many characters as possible should stimulate biologists to search for and measure new characters of every conceivable kind.

Of course the establishment of a new system of classification will not come easily--especially when that new system excludes evolutionary consideration from its foundation. This problem is brought

⁶⁰Sokal and Sneath, op. cit., pp. 263-269.

⁶¹Ibid., p. 270.

to light by Sokal and Sneath when they say that

If a classification by numerical taxonomy yields results similar to those previously shown by orthodox methods, it is argued that numerical taxonomy is unnecessary since the results are after all similar. If, on the other hand, numerical taxonomy yields radically different results, then the new method is "clearly wrong," because the results differ from the established ones, which "obviously" must be right.⁶²

The authors believe that this problem can only be solved by consistently basing classifications on numerical techniques. Given the speculative nature of orthodox methods, this is the only logical, scientific direction to take.

IV. SUMMARY

Although the general theory of organic evolution--the theory that holds that all living forms have arisen from a single ancestor and that the ancestor came from an inorganic form--is widely held among modern biologists, the evidence indicates the following:

(1) For the most part, biologists have ignored the basic assumptions and implications of the general theory of organic evolution.

(2) While there is evidence that living organisms can undergo changes in the course of time so that new species are formed, there is no clearcut evidence that all life has arisen from a single source which itself arose from an inorganic source.

⁶²Ibid., p. 269.

(3) Even though there is a pronounced lack of evidence for the general theory of organic evolution, it remains as the integrating principle around which biology is taught and is dogmatically asserted. The manner in which it is presented does very little to encourage the student to examine it critically. This is contrary to the nature of science.

(4) The use of evolution as a basis in the field of taxonomy has been seen by some to have had a deleterious effect on the field. Phylogenetic considerations above the species level are not based upon demonstrable evidence, but are rooted in speculation and circular reasoning, and hence are highly subjective. This makes the whole field of taxonomy open to question as an objective science.

(5) Although the evolutionary indoctrination of the past century has made it difficult to achieve objectivity, numerical taxonomists have provided an empirical system of classification by developing their system completely apart from evolutionary considerations.

Thus, the general theory of organic evolution has been seen by some scientists to lie in the realm of faith rather than demonstration. They have shown that the dogmatic assertion of this theory has not helped the field of biology, but that in at least some instances has hindered it.

CHAPTER III

CREATION-EVOLUTION AND THE EVANGELICAL

I. INTRODUCTION

An investigation into recent literature on the subject of creation and evolution reveals the fact that evangelicals are not agreed on this particular subject. The fact that one professes to be evangelical does not indicate his thinking concerning evolution and creation. Within the American Scientific Affiliation, which "was organized in 1941 to investigate the philosophy of findings of science as they are related to Christianity and the Bible and to disseminate the results of such studies,"¹ one will find members holding to positions from theistic evolution on the one hand to first creation on the other. The fact that the American Scientific Affiliation is an evangelical organization is seen by the statement of faith which is accepted by its members. "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."²

Generally speaking, evangelicals tend to hold one of three basic positions. Some hold that evolution is basically valid and that

¹Journal of the American Scientific Affiliation, Vol 20, Number 4 (December, 1968), inside back cover.

²Ibid.

it is the means whereby God created. This position is known as theistic evolution. Progressive creationism maintains that creation was by means of natural laws which are presently in operation and that the gaps in the geological record are the result of the fact that vertical progress, as opposed to mere horizontal variation, takes place only by creation. Fiat or special creationism holds that "... the worlds have been framed by the word of God, so that what is seen hath not been made out of things which appear," (Hebrews 11:3) and that present processes are not creative processes and therefore cannot be used to explain origins. Of course there is a certain amount of latitude and variation even within these three basic positions.

II. THEISTIC EVOLUTION

Theistic evolution is basically the result of an attempt to harmonize the Bible and the theory of organic evolution. Evangelical theistic evolutionists as well as fiat creationists are concerned about what the Bible has to say as well as being committed to modern science. Disagreement between theistic evolutionists and fiat creationists generally revolves around two foci. One focus is the problem of the scientific use of the Bible and the other is the problem of determining the scientific validity of the theory of organic evolution.

Richard Bube, current president of the American Scientific Affiliation and a leading proponent of theistic evolution, has spoken

to the problem of the Bible and Science. He discusses the subject around the ideas of "revelational purpose" and "revelational content."

By the phrase "revelational content" we mean the message that God intends that we receive from the Bible. It is the answer to the question, "What does all this have to do with me?" By the phrase "revelational purpose" we mean the reason for which the inspired author wrote the words in the first place. It is the answer to the question, "Why did the inspired author write this?"

Only those questions that are consistent with revelational purpose lead to the revelational content.³

Concerning the purposes of revelation he says,

First, foremost, and including all else that follows, the Scriptures were written to reveal God as the Redeemer of His people, with all that such a statement implies concerning the nature of God, the nature of man, and the relationships between God and man and between man and his neighbor. This revelation centers in the person and work of Jesus Christ; it is the purpose of the revelation to make God known in Christ and to lead men to Him as their Lord and Savior. Typically, John says in John 20:31, "These are written that ye might believe that Jesus is the Christ, the son of God; and that believing ye might have life through His name." . . . Secondly, the Scriptures were written to ensure the certainty of the faith, by the personal confirmation of those men who had experienced the events of Christ's life and who had been recipients of the special revelation of the Holy Spirit in the interpretation of those events. . . . Thirdly, the Scriptures were written to guide men into the paths of victorious living in the strength of the Holy Spirit, so that we might know the joy of serving God according to His will.⁴

Bube also writes that, "The simple mention of a secondary detail of some sort in the development of the revelational message does not bestow upon this detail the status of scientific objectivity unless it is

³Richard H. Bube and others, The Encounter Between Christianity And Science (Grand Rapids: Wm. B. Eerdmans Publishing Company, 1968), pp. 93-94.

⁴Richard H. Bube, "A Perspective on Scriptural Inerrancy," Journal of the American Scientific Affiliation, Vol. 15, No. 3 (September, 1963), p. 87.

itself the subject of the message."⁵ In effect, what Bube is doing is to make preparation for his dismissal of what he considers to be "secondary details" of the creation account in order to harmonize the Bible and his acceptance of evolution. His position is quite clear when he says that, "there appears to be no position that is scientifically defensible today except one consistent with the broad outlines of evolution previously discussed."⁶ The evidence which was presented in Chapter II, however, indicates that this is far from the truth. Bube continues, "The answers to evolutionary questions are not to be found in Genesis."⁷ In effect, he is saying that the Bible only tells us the "Who" of creation and does not tell us anything about the "how". However, Henry Morris has pointed out that

This is a very popular rhetorical device of theistic evolutionists. But if the only purpose of the Creation account is to tell us that God is the Creator, then what is the value of the rest of the account? Why does not the record simply stop at the end of Genesis 1:1, which gives us this information quite adequately?⁸

Bube quotes John 20:31 ("These are written that ye might believe that Jesus is the Christ, the Son of God; and that believing ye might have life through His name.") as indicating the purpose of revelation. It is important to note that, according to the context, John is

⁵Bube, The Encounter, p. 95.

⁶Ibid., p. 106.

⁷Ibid., p. 107.

⁸Henry M. Morris, Studies in the Bible and Science (Grand Rapids: Baker Book House, 1966), p. 90; cf. James Jauncey, Science Returns to God (Grand Rapids: Zondervan Publishing House, 1961), pp. 31-32.

referring especially to the account of the miracles or signs which Jesus performed. It is true that these miracles were performed and recorded to show mankind who Jesus was and is, but one wonders if anyone will actually believe John when he says that Jesus is the Christ if they do not believe that John was relating actual objective historical truth when he indicates that Lazarus was instantaneously raised from the dead at the word of Jesus (John 11:41-44), or that Jesus actually used clay made from spittle in causing the blind man to see (John 9:6-7), or that there were actually twelve baskets of leftovers from the feeding of the five thousand from five barley loaves and two fishes (John 6:5-14). Morris questions,

How can an inquirer be led to saving faith in the divine Word if the context in which that Word is found is filled with error? How can he trust the Bible to speak truly when it tells of salvation and heaven and eternity--doctrines which he is completely unable to verify empirically--when he finds that data which are subject to test are fallacious? Surely if God is really omnipotent and omniscient, He is as well able to speak with full truth and perspicuity when He speaks of earthly things as when He speaks of heavenly things.⁹

Morris is concerned that

Many evangelical expositors in recent years have gone to the extreme of insisting that the Creation record need not be interpreted in terms of history or science at all; that is, the first few chapters of Genesis are to be understood allegorically, or poetically, rather than historically. Genesis I merely tells us that God is the Creator, but does not tell us anything about the actual historical order of creation.¹⁰

⁹Ibid., p. 108.

¹⁰Ibid., p. 38.

The reason for his concern is that he holds that

This type of exegesis . . . is presumptuous and dangerous, to say the least. It divests these very important records of any real meaning or significance. This method could obviously be used to emasculate any portion of the Bible which, for one reason or another, was objectionable to the reader. Most seriously, it charges the New Testament writers (note Romans 5:12-19; I Corinthians 15:21,22, 45-47; Luke 3:38; Jude 14; etc.), and even Christ Himself (Matthew 19:3-6) with either credulity or duplicity, since they plainly taught that Adam and the events of Genesis 1-3 were genuinely historical.¹¹

Bube indicates his view of Scripture and the way in which he handles Scripture when he says,

. . . consider the words of Jesus in Luke 5:14, "Jesus warned him not to tell anybody, but to go and show himself to the priest and to make the offerings for his recovery that Moses prescribed, as evidence to the authorities"(Phillips). Does this statement constitute irrefutable proof that the book of Leviticus, and in particular the section on cleansing from leprosy, was written by Moses? The authors of the New Testament spoke and wrote in terms that were meaningful to those for whom they spoke and wrote. When they referred to the books of Moses, they were referring to a collection of writings that their hearers would recognize as having been traditionally called "the book of Moses." The authors of the New Testament were concerned with communicating the revelational content of the words given them by inspiration of God, words written in those historical books commonly recognized as being the books of Moses. . . . The scholarly hypothesis of the Mosaic authorship of Leviticus is actually neither affirmed nor denied by the statement of Jesus. This question is simply not relevant to His statement. No conclusion can be drawn from it about the authorship of Leviticus.¹²

It seems clearly evident that this treatment of Christ's words charges Christ with, as Morris has put it, either credulity or duplicity--- even though the charge is unintentional. For Christ could easily

¹¹Ibid.

¹²Bube, The Encounter, p. 96.

have substituted "the Scriptures" for "Moses" and not have lost the impact of what He was saying and not have given the clear and obvious implication that Moses was the author of the section on the cleansing from leprosy. It would seem that this implication would be clear to anyone who had not already determined that "secondary details" are unimportant.

It is clear that Bube's acceptance of the theory of evolution rather than accepted principles of hermeneutics has determined his interpretation of the early portions of Genesis. In effect, he is saying that the Bible must be interpreted in this way because science demands it. He has stated that

If one must insist that the Genesis accounts are descriptions of scientifically describable mechanisms, that there were at specific moments of time first creations of Adam and Eve as the first human beings, then one must deny the apparent evidence of the paleontological record. But it must be clear that such a choice is made on the basis of Biblical interpretation alone, and has no support from science.¹³

It is evident that to Bube's way of thinking, the "apparent evidence" of the paleontological record should be the primary factor in the interpretation of the early parts of Genesis. In light of the evidence presented in Chapter II and in the appendix, this would seem to be a very poor basis for Biblical interpretation. The statement that the choice of first creation has no support from science is in direct opposition to the evidence provided in the chapter on evolution and secular

¹³Ibid., p. 106.

science presented above as well as the section on fiat creationism which will follow. The evidence presented indicates that there is as much if not more scientific support for the position of fiat creationism as there is for the belief in the general theory of organic evolution. This should not be taken to mean, however, that there are as many or more scientists supporting fiat creationism over against evolution---only that the factual scientific evidence does indeed support fiat creationism as well or even to a greater extent than it does evolution.

It is interesting to note that not all Christian scientists agree with Bube in writing off the scientific objectivity and hence validity of what he calls "secondary details." In the book, The Encounter Between Christianity and Science which was edited by Bube and to which he has contributed five chapters, one finds that there is no mention made of the relationship between the Bible and archaeology. It is precisely the science of archaeology which provides a great deal of evidence indicating that the "secondary details" of the Bible show an extremely high degree of accuracy. Jauncy has pointed out that

For a hundred years now, every part of the Bible that could be tested by archaeological discoveries has been put under sharp scrutiny. The results have been so thoroughly convincing that now we look upon archaeology as the most positive evidence that we have for the traditional doctrine of the accuracy of the Scriptures. In almost every area where the Bible was criticized on subjective or theorizing grounds, it has already been vindicated on this objective basis.¹⁴

¹⁴Jauncy, Science Returns to God, pp. 38-39.

He goes on to say that

Much of the archaeological evidence on the authenticity of the Scriptures is related to tiny details which the average person would not notice. Although many of these details are unimportant as far as the general currents of Scriptures are concerned, they do give an opportunity for tests of accuracy.¹⁵

In listing several reasons for interest in archaeology, Allan MacRae has noted that

The second reason for interest in archaeology on the part of the Bible student is what might be designated as special corroboration in that it is not simply a matter of vividly presenting the background or showing the general fitting together of the two sources for reconstruction of history but is rather an examination in detail of particular points. If the Biblical account represented the imagination of a later time or the attempt to support theories by making imaginary stories of the distant past, one would expect that at point after point minor details would be obviously in error. It is interesting to compare specific details contained in the Bible with specific points of archaeological background, and to see whether the Biblical accounts contain the marks of being late imaginary reconstructions or whether they have indications of verisimilitude that would be found in contemporary documents.¹⁶

MacRae gives many examples of the accuracy of minor details. In one of them he says, "The similarity of the Biblical names to those used on the monuments and the correctness of the order in which they occur provide a striking corroboration of the general accuracy of the historical narrative."¹⁷

It should be noted that in examining the relationship between the Bible and archeology, the immediate concern is not with the

¹⁵Ibid., p. 90.

¹⁶Allan A. MacRae, "The Relation of Archaeology to the Bible," Modern Science and Christian Faith, A Symposium on the Relationship of the Bible to Modern Science by the American Scientific Affiliation (Wheaton, Illinois: Van Kampen Press, 1950), p. 212.

¹⁷Ibid., p. 213.

spiritual message of the Bible, but rather with the minor or secondary details of the Bible. Archaeology is increasingly showing an outstanding accuracy in the Bible in the matter of these details. MacRae maintains,

It is vital that the Christian clearly understand the nature of his attitude toward the Bible. It is not because archaeological facts have been discovered which throw light upon it that he accepts it as true. He accepts it because of his belief in Jesus Christ of whom it speaks and who set the seal of His authority upon it. Christ regarded the Old Testament so highly that after His resurrection He said to His disciples, "Oh, fools, and slow of heart to believe all that the prophets have spoken" (Luke 24:25). It was His desire that anything which was contained in the sacred Scriptures should be accepted by them as true. Through the ages the attitude of the Christian Church has been to follow Christ in this attitude toward the Bible. It has regarded the Scriptures as being God's revelation of those great spiritual matters which He wants us to know, and consequently, of course, as giving us a true picture wherever it touches on science or on history.

The contacts of the Bible with history are many times as numerous as those with any field of natural science. If there was found a great number of extremely difficult problems in reconciling Biblical historical statements with the new light on ancient history which has come from archaeology, there would be a real problem facing one who accepts the testimony of Christ regarding God's Word.

"However," MacRae says, "such a situation does not exist."¹⁸ Evidently scientists in archaeology do not find the "secondary," or minor details in the Bible to be lacking in scientific objectivity even though they are not the major message of the Bible. In light of the strong evidence from archaeology, it would be wise to refrain from casting aspersions upon the scientific objectivity of the details of the creation account on the basis of the "apparent evidence" of the paleontological record.

¹⁸Ibid., pp. 222-223.

Medical science also provides evidence that details in the Bible are not lacking in scientific objectivity. William R. Vis, M.D., has written that

Moses . . . should be ranked not only with the great law-givers of history but also with the very great names in sanitary science. In safeguarding Israel from pestilence and communicable diseases he was the first and greatest of hygienists.¹⁹

S. I. McMillen, M.D. likewise, in his interesting and informative book None of These Diseases, has stated that

Although Europe brought its most devastating plagues under control by obeying the Biblical injunction to isolate the victims, other important diseases continued to decimate mankind because people did not take seriously God's promise that they would be freed from all diseases by their obedience to all the divine regulations. Hence, intestinal diseases such as cholera, dysentery, and typhoid fever continued to take a heavy toll of lives. Up to the close of the eighteenth century, hygienic provisions, even in the great capitols, were quite primitive. It was the rule for excrement to be dumped into the streets which were unpaved and filthy. Powerful stanches gripped villages and cities. It was a heyday for flies as they bred in the filth and spread intestinal diseases that killed millions.

Such waste of human lives that could have been saved if people had only taken seriously God's provision for freeing man of diseases! With one sentence the Book of books pointed the way to deliverance from the deadly epidemics of typhoid, cholera and dysentery: "You shall set off a place outside the camp and, when you go out to use it, you must carry a spade among your gear and dig a hole, have easement, and turn to cover the excrement" (Deuteronomy 23:12-13, Berkeley).²⁰

¹⁹William R. Vis, "Medical Science and the Bible," Modern Science and Christian Faith, A Symposium on the Relationship of the Bible to Modern Science by the American Scientific Affiliation (Wheaton: Van Kampen Press, 1950), p. 249.

²⁰S. I. McMillen, None of These Diseases (Westwood, New Jersey: Fleming H. Revell Company, 1963), p. 15.

McMillen gives many other examples where medical science and the Bible are interrelated. One of these areas of overlapping interest concerns circumcision. He points out that modern medical evidence indicates that the safest time to perform circumcision is when an infant is eight days old, due to the fact that an eight day old infant has a greater availability of blood clotting elements than at any other time in his life. McMillen says that

We should commend the many hundreds of workers who labored at great expense over a number of years to discover that the safest day to perform circumcision is the eighth. Yet, as we congratulate medical science for this recent finding, we can almost hear the leaves of the Bible rustling. They would like to remind us that four thousand years ago, when God initiated circumcision with Abraham, He said, "And he that is eight days old shall be circumcised" (Genesis 17:12).²¹

Once again it can be seen that the Bible is accurate and valid even in the "secondary details."

It is obvious, of course, that theistic evolutionists are convinced of the scientific validity of the general theory of organic evolution and are willing to accept it within the framework of theism. Theistic evolutionists are similar to many of their naturalistic counterparts in that they often fail to recognize the limitations of science. Walter R. Hearn and Richard A. Hendry in writing about the origin of organic compounds have said that

²¹Ibid., p. 23.

If the evidence for such drastically different atmospheric conditions during the early stages of earth's history is really good, there seems no reason to doubt that the formation of organic compounds did occur before life originated. In fact, we would have to conclude that at least the simpler compounds must have been formed, since their formation under similar conditions has now been demonstrated in the laboratory.²²

Even scientists without any particular religious interest recognize that just because something can be done in a laboratory today does not prove that it ever took place in the prehistoric past.²³

Hearn exhibits this same failure to understand the limitations of science once again when he criticizes John Whitcomb and Henry Morris.

Science probably appeals to most of us in the ASA as an imperfect but valid method for getting at a true picture of what God has actually done in His universe. Although each of us knows best the established principles and inherent limitations of the area of science in which we ourselves work, none of us should be too proud to listen to criticism of our field from those with a broader, or at least a different, perspective. Those who dwell inside the house of geological science have been in the process of remodeling it continuously ever since it was built. Now Henry Morris and John Whitcomb have come along insisting in the name of the Master Architect that the whole thing is on a shaky foundation and must be bulldozed to the ground. Detailed plans for the fine new edifice which would be built in its place, they claim, were found by them in the pages of the family Bible.²⁴

Whitcomb and Morris answer this criticism and others by pointing out a limitation of science which their detractors seem to ignore.

. . . we do not presume to question any of the data of geological science. Science (meaning "knowledge") necessarily can deal only with present processes, which can be measured and evaluated at the

²²Russell L. Mixter (ed.), Evolution and Christian Thought Today (Grand Rapids: Wm. B. Eerdmans Publishing Company, 1959), p. 65.

²³See statements by G. A. Kerkut in Chapter II, pp. 9-10.

²⁴Journal of the American Scientific Affiliation, Vol. 16, No. 1 (March, 1964), p. 28.

present time; the "scientific method" by definition involves experimental reproducibility. This extrapolation of present processes into the prehistoric past or into the eschatological future is not really science. It necessarily involves assumptions and presuppositions and is therefore basically a philosophy, or even a faith. . . . Geologists, therefore, must leave the strict domain of science when they become historical geologists. We repeat that we have no quarrel whatever with geological science, which in its many disciplines is contributing most significantly to our understanding and utilization of our terrestrial environment and resources. The so-called historical geology, on the other hand, has not changed or developed in any essential particular for over a hundred years, since the days when its basic philosophical structure was first worked out by such non-geologists as Charles Lyell (a lawyer), William Smith (a surveyor), James Hutton (an agriculturalist), John Playfair (a mathematician), George Cuvier (a comparative anatomist), Charles Darwin (an apostate divinity student turned naturalist), and various theologians (Buckland, Fleming, Pye Smith, and Sedgwick). Might we respectfully suggest that, if non-geologists were allowed to develop the standard historical geology, non-geologists might also be permitted to evaluate and criticize it? Historical geology, with its evolutionary implications, has had profound influence on nearly every aspect of modern life, especially in its fostering of an almost universal rejection of the historicity of Genesis and of Biblical Christianity generally. It is not reasonable, therefore, to expect Bible-believing Christians to acquiesce quietly when, in the name of "science," historical geologists attempt to usurp all authority in this profoundly important field of the origin and history of the earth and its inhabitants.²⁵

Hearn, in referring to The Twilight of Evolution by Henry Morris, once again criticizes Morris when he says, "Well-meaning and intelligent Christians sometimes become convinced by their own arguments that evolutionary thinking is 'completely contrary to all true science as well as to Biblical revelation.'"²⁶ In thusly dismissing Morris, Hearn indicates

²⁵Journal of the American Scientific Affiliation, Vol. 16, No. 2 (June, 1964), pp. 59-60.

²⁶Bube and others, The Encounter, p. 220.

that he is not willing to take a critical look at the theory of evolution. Nowhere does he deal with the serious scientific problems which Morris and others have pointed out in evolutionary thinking. One wonders how objective Hearn's approach has been when he dismisses arguments without explaining his reasons for their dismissal.

The evidence presented in this brief section has indicated that there is at least a tendency on the part of theistic evolutionists to try to make room for the theory of organic evolution in the Bible, rather than allowing the Bible to speak for itself. The evidence also indicates that theistic evolutionists have uncritically accepted the theory of organic evolution--that is, they have not seriously considered the valid scientific evidences against, nor the actual lack of evidence for the general theory of organic evolution.

III. PROGRESSIVE CREATIONISM

The position of progressive creationism is set forth by Bernard Ramm in his book, The Christian View of Science and Scripture. Ramm wants it clearly understood that he should not be classified as a theistic evolutionist, and it is true that he is not. Nevertheless, some of the objections which are raised against the theistic evolutionists can also be directed at progressive creationists.

According to Ramm, progressive creation is
the means whereby God as world ground and the Spirit of God as World Entelechy bring to pass the divine will in nature.

There is the concept in the mind of God, the idea, the form, the plan, the purpose. . . . This is followed by a sovereign and fiat act of creation by God at the level of vacancy or null and void. We believe Genesis 1:2 is not referring to ruin and destruction but to vacancy awaiting informing. . . . After this comes the process, or derivative creation. God creating flatly and sovereignly outside of Nature now turns the task of creation over to the Holy Spirit who is inside Nature. The Spirit . . . knows what is the divine blueprint and through process working from the level of vacancy realizes the divine form or intention in Nature. If dry land is to appear, the Spirit sets those laws of geology to work which will produce dry land. If the seas are to swarm with fish the Spirit initiates whatever is necessary for that to be realized. In the process of time the Spirit working through-and-through Nature, the command of God is fulfilled. The laws of Nature, under the direction of the Holy Spirit, actualize over a period of time and through process, the plan of God.²⁷

Ramm gives a greater role to the transcendent activity of God than do theistic evolutionists, yet he still maintains that creation was by means of natural processes acting over a period of time. Ramm is not quite consistent, however, for he recognizes that natural processes are degenerative rather than creative when he states that, "Evolution and entropy are headed in opposite directions."²⁸ Entropy (a name for the second law of thermodynamics which will be discussed in the next section) not only argues against evolution, but also against any concept of creation by means of natural processes.

Ramm has stated that

If we believe in the divine inspiration of the Scriptures and in the pictorial-day interpretation of Genesis, and in the

²⁷Bernard Ramm, The Christian View of Science and Scripture (Grand Rapids: Wm. B. Eerdmans Publishing Company, 1954), pp. 115-116.

²⁸Ibid., p. 275.

general truthfulness of modern geology, we are then driven to the theories of moderate concordism and progressive creationism.²⁹

It is obvious that it is the acceptance of the general truthfulness of modern geology that is foundational to his interpretation of the Bible, for he goes on to say,

By moderate concordism we mean that geology and Genesis tell in broad outline the same story. Both agree that the earth was once in what may be called a chaotic condition. Both agree that certain cosmical conditions had to be realized before life could begin, e.g., the need for light, dry land, separation of waters and atmosphere. Both agree that the simple is first and the complex later. Both agree that the higher animals and man were the last to appear. The time element is not stated in the Genesis record and must be learned from the geological record.

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The theologian knows that God is Creator, but that fact does not tell him the how and when. The geologist knows the how and when, but the Who is a mystery to him.³⁰

Ramm has failed to distinguish between geology and historical geology, and because he has accepted the latter as objective scientific truth, he has had to find some way to fit the vast stretches of time which historical geology requires into the Bible. In order to do this, he must maintain that the Bible is silent as to the time involved in creation. His attempt to do this will be examined in the section on fiat creationism.³¹

It is largely on the basis of historical geology that Ramm views the six days of creation to be topically or logically rather than chronologically ordered. He has stated that

²⁹Ibid., p. 226.

³⁰Ibid.

³¹See pp. 65-67 below.

It has been felt since patristic days that the Genesis account is not strictly chronological, but part topical and part logical. The most obvious illustration is the creation of the astronomical bodies in the fourth day. We have a botanical creation with no animals and a mammalian creation with no creation of plants, yet the science of biology tells us how intimately related plants, animals, and insects are in the order of Nature.³²

In another place he has stated his view that the order is not strictly chronological because, "Obviously insects were necessary for plant life."³³ These factors argue for a topical or logical ordering of the days in Genesis 1 only if one has already determined that the days are not literal 24-hour days on the basis of historical geology. Plants can easily survive for one day, or even a few days, without sunlight or insects. The difficulty comes in trying to explain how they could exist for long periods of time without these. The concept of logical or topical ordering of the days becomes necessary to avoid such an explanation.

Ramm has failed to understand the position of fiat creationism when he said that, "The fiat creationist can be embarrassed by a thousand examples of development."³⁴ The fiat creationist, just as the progressive creationist, can allow for a great deal of development within the various "kinds" of Genesis. The major differences between the two positions are found to be in the areas of claiming that natural processes

³²Ramm, op. cit., p. 221.

³³Ibid., p. 218.

³⁴Ibid., p. 272.

are creative processes, that historical geology is objective truth, and that the Bible gives no indication as to the time involved in creation.

IV. FIAT CREATIONISM

The evidence presented in Chapter II has indicated that the general theory of evolution has been widely accepted and dogmatically asserted without adequate examination of its basic assumptions and implications. The general theory of evolution has not been accepted on the basis of overwhelming scientific evidence, for this evidence is virtually non-existent.

The positions of theistic evolution and progressive creation have been briefly examined and are found to be wanting in two major areas. First of all, both positions are attempts to harmonize the Bible with the general theory of evolution and/or historical geology. On the basis of the evidence presented in Chapter II this seems to be at best premature. Secondly, both positions base their interpretation of Scripture upon theories which have not been shown to be scientifically valid, using arguments which, if applied consistently throughout the Bible, could rob the Bible of any historical value or objective meaning. This brings us to the third position accepted by evangelicals--namely that of fiat or instantaneous creationism.

Basic to any study of the subject of creation and evolution is the relationship between the Bible and science. Russell Maatman,

writing in the Journal of the American Scientific Affiliation, says that

Many in the ASA have used the Bible in an attempt to prove that biological evolution did not occur. Those accepting evolution have responded that the Bible cannot be used in this way. Each group has thus established for itself a precedent concerning the use of the Bible. If evolutionists and anti-evolutionists cannot agree on the relevancy of the Bible for this question, neither will they be able to agree on its relevancy for other science-faith questions.³⁵

Henry M. Morris, writing on the relationship between the Bible and science from a flat creationist point of view, has stated that

It is obvious, of course, that the Bible is not a scientific textbook in the sense of giving detailed technical descriptions and mathematical formulations of natural phenomena. But this is not adequate reason for questioning the objective accuracy of those very numerous portions of Scripture which do deal with natural phenomena and historical events.

This type of apologetic device is both logically unsatisfactory and evangelistically unfruitful. How can an inquirer be led to saving faith in the divine Word if the context in which that Word is found is filled with error? How can he trust the Bible to speak truly when it tells of salvation and heaven and eternity--doctrines which he is completely unable to verify empirically--when he finds that data which are subject to test are fallacious? Surely if God is really omnipotent and omniscient, He is as well able to speak with full truth and perspicuity when He speaks of earthly things as when He speaks of heavenly things.³⁶

John W. Klotz concurs with this position when he says

There are those who ask why we are so willing to accept the statements of the Bible in preference to scientific theories

³⁵Russell Maestman, "Biological Evolution," Journal of the American Scientific Affiliation, Vol. 20, No. 4 (December, 1968), 119.

³⁶Henry M. Morris, Studies in the Bible and Science (Grand Rapids: Baker Book House, 1966), p. 108.

and hypotheses. They are quick to point out that the Bible does not claim to be a textbook of science or, for that matter, of history or anthropology or economics or sociology. The Bible has only one purpose, and that is to make us wise unto salvation through faith in Christ Jesus. It is essentially a book designed to prepare man for the life that is to come.

And yet the Bible is true in its every word. Jesus, who declared that He is the Way, the Truth, and the Life, said of the Bible, "Thy Word is truth." The Bible asserts that all its statements are true and correct, and this declaration applies also to historical, anthropological, sociological, and scientific statements.

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The Bible's claim of absolute truthfulness applies also to the account that it gives us of the origin of the world. It tells us that the world in which we live, the plants and animals which are found on it, and man himself were all created by God. They did not come into existence by chance. They did not develop gradually. But they were created in a wide variety of forms, many of them very complex, and all of them "very good," Gen. 1:31.³⁷

What these two men are saying is that while the Bible does not speak of the natural world in the highly technical and specialized jargon to which the modern scientist has become accustomed, it nevertheless gives a true picture of the natural world. The Bible speaks of the natural world in what might be called unscientific, possibly descriptive or phenomenal terminology, but this is not to imply that it is any less accurate than scientific terminology--only that it may be less precise. Klotz provides an example of this accuracy when he says that

. . . Solomon was charged with a biological error when, in Prov. 6:8, he referred to the ant as providing her meat in the summer

³⁷John W. Klotz, Genes, Genesis and Evolution (Saint Louis: Concordia Publishing House, 1955), pp. 1-3.

and gathering her food in the harvest. Critics were quick to point out that, so far as was known, ants do not store up food. They implied that Solomon had been guilty of faulty observation. . . . But we now know that there are harvesting ants.³⁸

Another point which flat creationists bring out is that "only the Bible claims infallibility for itself. The scientist, for one, does not claim to have absolute truth. He says that what he presents is at best relative truth."³⁹ Morris likewise agrees when he states that

The Bible claims, in numerous ways, to be God's unique revelation. It was accepted as such by Jesus Christ, who also claimed to be God incarnate, and who vindicated His claim by His uniquely perfect life, His atoning death, and especially by His glorious bodily resurrection from death.

The Bible, with this perfect claim to absolute divine authority, does very clearly establish a framework of interpretation within which men are expected to formulate their understanding of the data of science. It is most reasonable and most gracious of God to do so, since it is quite impossible for man, with his study of present processes, to know anything for certain about the prehistoric past or the eschatologic future. Only God can know these things, and we are able to know the truth about these matters only through faith in God's statements concerning them. Therefore, the Bible-believing Christian goes to the Bible for his basic orientation in all departments of truth. The Bible is his textbook of science as well as his guide to spiritual truth.⁴⁰

James Jauncey mentions three different views on the interpretation of the Bible. Speaking of the first, he says that

First of all, there is the traditional, or conservative, view, which claims that the Bible in its entirety is the Word of God and, as such, is accurate in everthing that it says in every branch of knowledge, including science and history.

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³⁸Ibid., p. 2.

³⁹Ibid., p. 3.

⁴⁰Morris, op. cit., p. 110.

It is the point of view of the present writer that if the term "Christian" means what it says, then the criterion by which one decides which of these views of the Bible is correct must be that which Christ Himself held. What is most reasonable to us on other grounds or what would bring the least difficulties with science is quite immaterial. If a person is not prepared to base his faith on Christ, he has no faith worth defending anyhow.

It is almost universally admitted that Jesus Christ held the traditional, or conservative, view.⁴¹

Morris further points out that

True knowledge and true wisdom, which is to say, true science and true philosophy, must come from God alone, and therefore must conform to His framework of revealed Truth. The wise man said: "The fear of the Lord is the beginning of knowledge," and he also said: "The fear of the Lord is the beginning of wisdom" (Proverbs 1:7; 9:10) And he (Paul) also emphasized that in Jesus Christ, the Living Word of God, "are hid all the treasures of wisdom and knowledge" (Colossians 2:3). Not only religious knowledge, but all knowledge; all the treasures of science and true philosophy are hid in Jesus Christ, who is the Creator and Sustainer of the physical universe!

It is not only legitimate then, but absolutely mandatory, for the Christian to depend implicitly on the scientific and philosophic framework revealed in Holy Scripture if he is to attain a true understanding of any of the factual data with which science deals and their implications.⁴²

It is obvious that the interpretation of the Bible is of crucial importance. The charge that fiat creationists interpret the Bible literalistically rather than literally is often made. In writing to the Journal of the American Scientific Affiliation concerning The Genesis Flood by Whitcomb and Morris, Roy M. Allen has stated that

⁴¹Jauncey, Science Returns to God, pp. 25-26.

⁴²Morris, op. cit., pp. 111-112.

It is apparent the authors are among those who believe the seven days of creation are literal 24 hour days. Here is where they get off the track. The Hebrew word "yom" is used throughout the Old Testament in three ways, 1) a 24 hour period; 2) for the daytime only, as opposed to the night; 3) as an indefinite period of time, just as we do today (e.g., "They did not have automobiles in George Washington's day"). Yom is used in this sense hundreds of times in the Old Testament (about 75 times in Isaiah alone).⁴³

In making this criticism, Allen demonstrates that he has failed to understand the argument of Whitcomb and Morris. They by no means deny that there are several valid possible translations of the Hebrew word "yom." What they do state is that

Since God's revealed Word describes this Creation as taking place in six "days" and since there apparently is no contextual basis for understanding these days in any sort of symbolic sense, it is an act of both faith and reason to accept them, literally, as real days.⁴⁴

The important phrase to note here is "contextual basis." Whitcomb and Morris are employing an accepted, valid principle of hermeneutics.

Bernard Ramm in his textbook on hermeneutics has stated that

Just as words are not properly understood until seen in the prospect of the sentence, so sentences are not properly understood until they are seen in the prospect of their context. For example, the English word nature has several major meanings and its meaning in a given sentence can only be determined by the sentence as a whole. . . . The study of the context of a passage takes its place with the study of words and grammar as absolutely basic to the interpretation of Scripture.⁴⁵

Ramm mentions several circles of context, the fourth of which

⁴³Roy M. Allen, "Letters to the Editor," Journal of the American Scientific Affiliation, Vol. 17, No. 2 (June, 1965), p. 62.

⁴⁴John C. Whitcomb and Henry M. Morris, The Genesis Flood (Grand Rapids: Baker Book House, 1961), p. 228.

⁴⁵Bernard Ramm, Protestant Biblical Interpretation (Boston: W. A. Wilde Company, 1956), p. 136.

. . . is the material which immediately precedes and follows the passage under consideration. If we know the flow of thought leading to a passage, and the flow of thought away from it, we can predict with some certainty the flow of thought within the passage. Clues to the meaning of a passage are frequently found in such preceding or following materials. Paul uses the word law over sixty times in Romans and with different meanings. A most careful study of the context is necessary to determine the meaning of the word law in each of its uses.⁴⁶

Morris has undertaken just this kind of careful contextual study of the word "yom" in the first chapter of Genesis.

In the relatively rare occurrences of the Hebrew singular yom where it is meant to refer to an indefinite period of time rather than the literal meaning of "day" (a 24-hour period, or the day-light portion thereof), such a symbolic meaning is always clear from the context. But a straightforward reading of the Genesis account does not indicate any indefinite period. Rather, it seems that it would have been practically impossible to convey to the reader the idea of literal 24-hour days of Creation any better than in the phraseology actually employed. In addition, it may be noted specifically that whenever yom is limited or modified by a numeral or ordinal, as is frequently the case in these passages, it always has the literal meaning. Such cases are not infrequent, occurring more than a hundred times in the Pentateuch alone. Out of all the hundreds of examples, only three possible exceptions to this rule might be claimed, (Zechariah 3:9; 14:7; Hosea 6:2). Each of these latter passages is contained in a prophecy, and each could well be interpreted in accordance with a literal meaning for "day." In view of the apparently matter-of-fact histories (not prophecies) in the Creation account, these questionable exceptions to the rule surely afford no warrant for taking the Genesis days symbolically. The Hebrew word elam (meaning "age," "long, indefinite time,") should have been used instead of yom if a long period of time were intended, or else the writer should have made it clear that yom was being used figuratively.

God actually defined the word "day" when He created light on the first day of Creation, and called the light "day" and the darkness "night." Whatever doubt may exist about the source of light for the first three days, there is no room for reasonable

⁴⁶Ibid., p. 137.

doubt as to their approximate length. It is obvious that each day did not consist of an age of light and then an age of darkness. Since all six days of Creation are spoken of in the same terms they must all be of the same character, whether literal or symbolic. And after the work of the fourth day, when doubt no longer exists concerning the source of the light for the following days, and in view of the definition of "day" as given on the first day (as well as in view of the ordinary meaning the word would be expected to impart to the readers for whom the Creation account was intended), it necessarily follows that the days were meant to be understood as literal days. This conclusion is emphasized by consideration of the actual description of the work of the fourth day, when the great lights were established. In verses 1:14-19, where this work is described, the word "day" or "days" appears five times. In four of these, there is no question but that the literal meaning is intended. No sensible writer, much less an inspired writer, would use a word to mean what it customarily means several times in one paragraph, and then suddenly use it to mean something entirely different, without any explanation or clarification. The Bible is perspicuous.⁴⁷

Thus, the information which is cited by Allen as indicating that Whitcomb and Morris had gotten off the track actually has a great deal to do with establishing the validity of their position, for when one word can mean several things, a careful study of the context must be undertaken in order to determine which meaning is being intended in any given passage. It is precisely this type of study which substantiates the position of Whitcomb and Morris.

Klotz also recognizes the clear Scriptural evidence concerning the length of the creation days.

. . . the Scriptures speak very clearly on the length of the creation days. It is a general principle of Biblical interpretation that a word is to be taken in its everyday meaning unless there is compelling evidence that it must be taken in a different sense. So in Gen. 2:4 it is very clear from the text itself that the word "day" here means a period of time longer than twenty-four hours.

⁴⁷Morris, op. cit., pp. 36-37.

And that is also true of the other passages of Scripture where the word "day" clearly refers to a long period of time. But there is nothing in the text or context of Genesis 1 which indicates that these were long periods of time. Sound principles of Biblical interpretation require that we accept this "day" as being an ordinary day.

Passages such as Ps. 90:4 and 2 Peter 3:8 are not meant to interpret Genesis 1 and 2. Their purpose is to show God's eternity. They have no connection at all with the creation story.

Insofar as the view is concerned that these could not be ordinary days because the sun had not been created, we should like to point to the fact that we still measure time in terms of days even though the sun does not appear or is not visible. For instance, north of the Arctic Circle and south of the Antarctic Circle the sun does not appear for periods of time up to six months at the poles themselves. We would not think of measuring time in terms of the appearance or lack of appearance of the sun in these areas. No one would contend that at the North or the South Pole a day is the equivalent of six months elsewhere.

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The repetition of evening and morning would almost indicate that God anticipated some of the controversies of our day and that He wanted to make it clear that the creation days were ordinary days. It is hard to escape the conviction that these were ordinary days when we read the almost monotonous repetition of evening and morning. Then, too, the sun was created to rule the day. Are we to believe that in those early days of the earth the sun continued to shine for thousands of years without setting?⁴⁸

Klotz combines his extensive background in the field of biology with his examination of the Bible when he says that

It would be possible for the plants to exist for one day without the sun, but it would be inconceivable that they should have existed for a long period of time without the sun. True, it may be argued that for the era represented by the third day the plants had some other source on which they depended for their energy--the general "light," for instance, created on the first day. But it can also

⁴⁸Klotz, op. cit., pp. 87-88.

be argued that it is unlikely that God would have made the plants dependent on some other source for energy for a long period of time and then transferred their dependence to the sun.

.....
 The repetition of evening and morning creates still another problem. Does this mean that for half the period represented, let us say, by the fourth day, the sun did not shine and that for half the period it did? The text speaks of evening and morning, implying a period of darkness and a period of light. It is hard to believe that the plants could survive an extended period of darkness lasting for hundreds or even thousands of years.⁴⁹

Klotz also agrees with Morris when he says that

... in the Old testament where the term yom is associated with a definite number, it is always used to designate an ordinary day. The repetition of the first day, the second day, the third day, indicates that these were ordinary days.⁵⁰

In studying the context of creation days, both Klotz and Morris have gone to the commandment concerning the Sabbath. Morris has stated that

The wording of the fourth Commandment plainly refutes the period theory: "Remember the Sabbath day to keep it holy. Six days shalt thou labor and do all thy work: But the seventh day is the Sabbath of the Lord thy God: For in six days the Lord made heaven and earth, the sea, and all that in them is, and rested the seventh day: wherefore the Lord blessed the Sabbath day and hallowed it" (Exodus 20:8-11).

In this passage the word "day" or "days" (Hebrew yom or yamin) appears six times. Four times the word's meaning is undoubtedly literal. The other two uses have to do with creative days; the same word is used, with no intimation that any other than the literal meaning is involved. To invest a word with symbolic meaning under such circumstances would constitute misuse of language, a crude pun at best! Remember that this Commandment was written with the finger of God Himself!

Furthermore, the word yamin, translated "days," is used twice in this passage, once for the six work days of God, once for the

⁴⁹Ibid., pp. 88-89.

⁵⁰Ibid.

six work days of man. The word is never used by Moses anywhere else to mean anything other than literal days, nor evidently by any other Old Testament writer, although it occurs more than 700 times. If the "days" of Exodus 20:11 are actually "ages," then this constitutes a unique use of the word, and again without any explanatory material whatever.⁵¹

Once again it can be seen that far from ignoring the fact that "day" can legitimately have more than one meaning, fiat creationists have recognized the problem and have used valid principles of interpretation in determining the meaning of "day" with reference to the Genesis account of creation.

Allen, of course, has not been the only person to criticize fiat creationism at the point of interpretation. Bernard Ramm has also criticized fiat creationism at this point, but from a somewhat different angle. His argument is basically that the Bible is primarily concerned with relating the Who of creation rather than the how. He has stated that

the Old Testament has an intensely theological or relational attitude toward creation, not a so-called empirical one. It is generally indifferent toward a precise modus operandi of creation. The method of creation (apart from that it was by the divine word), the sequence of acts, or the amount of time involved, is not the center or point of any discussion.⁵²

He argues that "We may conceive of creation as a bringing of something into existence, but we can form no picture of the process. The concept of creation is conceivable but it is not imaginable."⁵³ The distinc-

⁵¹Morris, op. cit., pp. 35-36. (Cf. Klotz, op. cit., p. 89.)

⁵²Bernard Ramm, "Theological Reactions to the Theory of Evolution," Journal of the American Scientific Affiliation, Vol. 15, No. 3 (September, 1963), p. 74.

⁵³Ibid., p. 73.

tion drawn between "conceive" and "imagine" is at least questionable, but it will be accepted for the sake of argument. Ramm continues in this vein as he says that

The first text states that man was created by God. We can form a picture of only that which we can imagine, but we cannot imagine creation; therefore we can form no picture of it. . . . And this inability to picture or imagine the creative activity applies to man just as it does to the other things. In Gen. 1:27 we are thus presented with the reality of man's origin by God's creative act, but we can form no picture or empirical accounting of it.

However, sometimes we do form a specious picture of creation. We imagine that God creates in the same manner in which a magician performs his tricks. One minute we see an empty hand, and the next moment something suddenly and "supernaturally" appears. And so we imagine God speaking, and suddenly the thing spoken exists. It is there! But this is picture-making of our own doing and nothing derived from Scripture.⁵⁴

It should be pointed out here that Ramm has just admitted that creation is imaginable, even if he considers the picture which is formed to be a specious picture. This would seem to contradict his earlier statement that the concept of creation is not imaginable. What Ramm seems to be saying is that the picture of the time element of creation which the fiat creationist holds has been inserted into the Genesis account by the reader and has not been derived in any way from Scripture. George F. Howe, on the other hand, has clearly shown that the "instantaneous" time element in creation is definitely derived from Scripture.

An interesting parallel is seen between Christ's miracles and the Genesis 1 description of creation. Our Lord's spoken words brought

⁵⁴Ibid., pp. 75-76.

immediate resultant action, without any apparent natural mechanism. For example when He spoke a word of rebuke, winds ceased and waves settled (Matthew 8:26). The words, "be it done unto thee" were spoken and a Canaanitish woman's daughter was healed (Matthew 15:28). As recorded in Matthew 21:19, one sentence left the mouth of Jesus and a fig tree immediately withered. Three words spoken by Christ in John 11:43 brought dead Lazarus out of the tomb. Christ's earthly utterances led directly to events that He willed. Turning to Genesis 1, a striking similarity is seen. The phrase "and God said," appears at least 9 times. Six of these 9 spoken commands were followed by the phrase, "and it was so." God spoke and it was so. Thus the record of creative activity parallels the New Testament miracles in which Jesus spoke and events transpired. The very language used by Moses breathes of supernatural working. There is no indication of a long, naturalistic, uniform development.⁵⁵

These examples have not been drawn from some "magicians" act, but rather Scriptural accounts of the supernatural (not "supernatural") ministry of Christ. Concerning the question of the creative days and therefore the element of time in creation, Klotz has written that, "It is hardly conceivable that anyone would question the interpretation of these as ordinary days were it not for the fact that people are attempting to reconcile Genesis and evolution."⁵⁶

Although almost all of the evidence presented in this section for fiat creationism has been strictly Scriptural in nature, Allen is correct when he states that, "The idea that the Bible and Science cannot be reconciled results when the theologian studies only the Scriptures, while

⁵⁵George F. Howe, "Miracles and the Study of Origins," Journal of the American Scientific Affiliation, Vol. 17, No. 3 (September, 1965), p. 94.

⁵⁶Klotz, op. cit., p. 89.

the scientist obtains all his knowledge for searching the physical realm, the World Book."⁵⁷ Ramm has noted that

The first mistake peculiar to the theologian is that of attitude. He has been unsympathetic with science, or suspicious of it, or he fails to understand science. In this the theologian is to blame. If he is censorious of the scientist who makes amateurish remarks about theology, and wishes that the scientist would learn a little theology before he spoke, the scientist can also ask the theologian to learn a little science before he speaks. To view science as the work of scheming atheists, iconoclasts, or plotting infidels is not true to the facts nor felicitous of the spirit of the Christian theologian. Slurring the name of science, branding it all as devil inspired, chiding it unsympathetically, further aggravate the situation that is already bordering on the incurable.⁵⁸

Although the problem of a hostile attitude toward science on the part of Christians was a major one in the past, many of the leading exponents of fiat creationism (Morris, Klotz, Zimmerman, McCone, and Jauncey to name a few) cannot be accused of being at all anti-science for the simple reason that they are successful scientists in their own rights. It has been the combination of Scriptural and scientific considerations which has convinced many individuals of the validity of the position of fiat creationism.

Morris, writing from a scientific as well as a Scriptural position, has stated that

. . . it does seem to be increasingly clear that evolution is not a science. Evidence continues to accumulate that it is rather an anti-Christian, anti-theistic way of thought, a system rather than a science, a philosophy instead of a history, The

⁵⁷Allen, op. cit., p. 63.

⁵⁸Bernard Ramm, The Christian View, p. 48.

issues are becoming more sharp and the lines more distinctly drawn, so that there is less reason now than even a decade ago for the Biblical Christian to seek hermeneutical compromises with evolution. The known facts of science and history can be interpreted in either of two frameworks--that of evolutionary progress or that of Creation and the Fall, and the framework chosen depends not on inductions from the known facts, but rather on deductions from one's basic presuppositions.⁵⁹

Morris continues that, "The most remarkable paradox of modern scientism is that the system of evolution could ever have obtained such nearly universal acceptance while being so utterly devoid of any genuine scientific basis."⁶⁰ Writing on this very question, Robert T. Clark and James D. Bales have stated that

So widely accepted is the doctrine of evolution that it is received by each oncoming generation for the simple reason that each generation finds that evolution is a part of the scientific world outlook in which it is reared. It is assumed that the battle concerning the truth or falsity of evolution was adequately waged in the nineteenth century, and that evolution won the day because scientific confirmation was set forth by the evolutionists.⁶¹

They further state that

Because a few eminent men first accepted the hypothesis of organic evolution, the multitudes--in science and out of science--accept it today. These do not accept it for the same reasons, whether sound or unsound, that these eminent men accepted it. They accept it for the simple reason that certain men, who were supposed to know, accepted it. Because these men were outstanding, and intelligent, multitudes conclude that they would not have accepted evolution if there had not been an abundance of convincing evidence to justify their so doing. This is not merely

⁵⁹Henry M. Morris, The Twilight of Evolution (Grand Rapids: Baker Book House, 1963), pp. 13-14.

⁶⁰Ibid.

⁶¹Robert T. Clark and James D. Bales, Why Scientists Accept Evolution (Grand Rapids: Baker Book House, 1966), p. 5.

the assumption of the non-scientists, but of many scientists. The fact that an individual is a scientist does not mean that he is well acquainted with the history of science in general, or of the history of his field of science in particular. Much less does it mean that he is acquainted with the reasons why scientists in the nineteenth century accepted evolution. This is underscored further by the fact that the reason these men accepted evolution is not brought out clearly in their scientific works but in their letters, biographies and autobiographies which many scientists have never examined. And yet, these materials furnish evidence that is very pertinent to the issue under consideration.⁶²

Clark and Bales have clearly demonstrated in a carefully documented examination of the letters, biographies and autobiographies of the leading nineteenth century evolutionists that the acceptance of the theory of organic evolution was not necessitated by the weight of scientific evidence substantiating its validity, but rather that it was the inevitable result of an a priori decision. Clark and Bales conclude that in light of the evidence presented in their book,

. . . it is not unscientific to suggest that the question of the truth or falsity of evolution be reopened; and that the hypothesis of evolution be required to pass as rigid tests as are required for other hypotheses before they are considered to be theories, and before they are viewed as laws. In other words, the authors are asking scientists to be scientific in their treatment of the hypothesis of evolution.⁶³

Serious questioning of organic evolution--its basic assumptions, implications, and the value of attempting empirical studies from a foundation of speculation--is currently being conducted both in secular scientific circles where evolution is still accepted by those doing the questioning, and in scientific circles where the Christian

⁶²Ibid., p. 108.

⁶³Ibid., p. 109.

faith is a motivation.⁶⁴ Morris has pointed out that

In spite of the unanimous agreement among evolutionists that all intelligent people agree with them, however, there are many who do not. Furthermore, the writer is convinced, from having discussed the subject with hundreds of people, that the main reason most educated people believe in evolution is simply because they have been told that most educated people believe in evolution! Very rarely is such a person able to do more than repeat a few stock "evidences for evolution," and almost never has he given any really serious consideration to the question of their real implications.

For when a man will really examine critically the nature of these evidences, he will find that very serious difficulties and contradictions abound in them. Probably more people are doing just that today than at any time since the rise of Darwinian evolution.⁶⁵

Writing concerning the American Scientific Affiliation and its over one thousand members who subscribe to the doctrine of an inspired and inerrant Bible, Morris states that he

. . . has the privilege of being a Fellow of this organization and there are quite a number of other A.S.A. Fellows who are anti-evolutionists, all of them qualified and recognized scientists, with the doctorate degree or its equivalent.

Furthermore, only a very small percentage of those scientists who are non-evolutionists are in the A.S.A. The writer has spent a total of twenty-two years on the faculties of five universities (Rice, Minnesota, Southwestern Louisiana, Southern Illinois, and Virginia Polytechnic Institute). At each of these places, there were a number of men who were not only conservative Christians but who did not believe in evolution. At V.P.I., for example, the writer knows personally more than twenty-five faculty members who fit this description. None of these schools is a Christian school in any sense of the word; four are state-supported universities

⁶⁴See Chapter II for a discussion of scientists who from a secular point of view question the assumptions and implications of evolution and the value of evolutionary speculations for empirical studies.

⁶⁵Morris, Twilight, p. 26

and the fifth, Rice, is private, and its tone may be described by noting that Julian Huxley was on the faculty there for the first four years of its existence.⁶⁶

One of the major points made by fiat creationists who are also qualified scientists is that the question of origins, and therefore the theory of organic evolution, really lies outside the domain of scientific inquiry and therefore is incapable of scientific proof. George F. Howe, Associate Professor of biology at Westmont College, has stated that

God has chosen to maintain the universe in a partly predictable fashion and at the same time man was endowed with the gift of prediction by means of the scientific method. Science is therefore man's realization of God's mandate to study the "natural laws" of the created universe, the laws by which God governs His handiwork. Concerning these cosmic laws, Colossians 1:17 says, ". . . and in him all things consist." God can likewise move miraculously, producing effects without any apparent natural causes. Such non-repeatable activity falls outside the domain of human inquiry because it cannot be subjected to laboratory analysis.⁶⁷

According to Klotz,

The reason for the conflict between Scripture, or absolute truth, and science, which represents man's quest for the truth, lies largely in the nature of science and its limitations. It deals only with those things that can be measured and seeks cause-and-effect relationships in all of the phenomena which it observes.⁶⁸

Morris has stated that

It is certain that no one can possibly know anything of the prehistoric past or of the eschatological future with any certainty unless these matters are revealed by God. Science can only speak

⁶⁶Ibid., pp. 26-27.

⁶⁷Howe, op. cit., p. 93.

⁶⁸Klotz, op. cit., p. 20.

with certainty on things which are now. Science can measure and correlate and evaluate present processes and phenomena, but has no way whatever of knowing that these have always been the same or that they always will be the same. The principle of uniformity, which assumes this, represents therefore not a scientific law, but rather an act of faith. . . . The decision between these two faiths is not a scientific decision, but a spiritual decision, and is therefore made on the basis of moral and spiritual considerations rather than scientific evidence.

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The only processes which can be actually studied and scientifically evaluated are those which are in operation now or which have been in operation within the historic past, as pointed out above. But philosophers have projected these processes into the past and future, on the basis of the premise of uniformity, and have called this projection evolutionary science. It is clearly only philosophy, or even a religion of sorts, rather than a true science, but the highly vocal advocates of this kind of extrapolation have succeeded in persuading many people that "science" indeed has disproved the Biblical framework of earth history.⁶⁹

Morris presents another very important, basic scientific evidence against the validity of the theory of organic evolution.

. . . it is quite impossible to extrapolate from the processes of the present world, which are available for scientific measurement, into the past far enough to determine the real facts of the origins and development of all things. This is clear from the simple fact that the processes of the present world are not in any sense processes of origins and development, but rather of conservation and decay.

This is a profoundly important truth which needs to be recognized and emphasized on a far larger scale than it has been heretofore. All of the various processes of the universe--whether physical, biological, geological, chemical, or of any other field of science--must operate within the framework of just two basic laws. These are the first and second laws of thermodynamics, the laws of energy conservation and deterioration. They define the state of the measurable universe as one of quantitative stability and qualitative decay. Nothing is now being either created or destroyed, but that which presently exists is becoming less ordered

⁶⁹Morris, Studies, pp. 102-104.

and less useful, drifting down toward an ultimate condition of quiescence and death.

Every type of process in the universe involves interchanges of energy. The study of these processes . . . is precisely the domain of science. . . . And always, no matter what the particular process may be, it operates within the framework of the first and second laws of thermodynamics. There is no known exception to this generalization.

And these two laws are fundamentally and basically in opposition to the entire philosophy of evolution. Evolution says that present processes are the same as those by which the universe came into existence and is thus still coming into existence. But the first law of thermodynamics says that no energy (and this includes everything) is now coming into existence. No energy is being either created or destroyed.

Furthermore, evolution says that there is a universal law whereby things tend to become progressively more organized and more complex. . . . But the second law of thermodynamics says that there is a universal law operating throughout the observable universe whereby everything tends to become less organized, to become disordered, to decay and die.⁷⁰

Although the two laws of thermodynamics pose a very real and serious problem to the foundation of evolution, they fit very nicely with what God has revealed about nature in the Bible. The first law states that creation is not taking place and this is exactly what we find recorded in Scripture.

"Thus the heavens and the earth were finished, and all the host of them. And on the seventh day God ended his work which he had made; and he rested on the seventh day from all his work which he had made. And God blessed the seventh day and sanctified it: because that in it he had rested from all his work which God created and made" (Genesis 2:1-3; Cf., Exodus 20:11, 31:17, Psalm 33:6,9, Hebrews 4:10).

⁷⁰Ibid., pp. 145-146.

The Bible draws a clear distinction between creation and maintenance. Creation was finished and is past, while God is presently active in maintenance or preservation.

"Thou, even thou, art Lord alone; thou hast made heaven, the heaven of heavens, with all their host, the earth, and all things that are therein, the seas and all that is therein, and thou preservest them all" (Nehemiah 9:6).

The second law of thermodynamics states that there is a universal tendency toward decay and disorder. This also is in accord with what is found in the Bible.

"Of old hast thou laid the foundation of the earth; and the heavens are the work of thy hands. They shall perish, but thou shalt endure: yea, all of them shall wax old like a garment; as a vesture shalt thou change them, and they shall be changed" (Psalm 102:25,26; Cf., Isaiah 51:6, Romans 8:20,22, I Peter 1:24, Ecclesiastes 3:20, Matthew 24:35).

Therefore, these two very basic scientific laws stand with Scripture in direct opposition to the theory of organic evolution.⁷¹

The professional scientific background which many of the proponents of fiat creationism possess has enabled them to point out many of the scientific difficulties in the theory of organic evolution as well as the basic problems between science and evolutionary thought as discussed above. The study of homologous structures (those which correspond to one another in different organisms but do not necessarily have the same function) and analogous structures (those which have

⁷¹See Morris, Twilight, pp. 29-46 for an excellent discussion. Cf. also Klotz, op. cit., p. 546 and Henry M. Morris and others, A Symposium on Creation (Grand Rapids: Baker Book House, 1968), pp. 14-17.

the same function but do not necessarily correspond to one another) has long been considered to provide evidence for evolution. This is the basic approach taken in the study of comparative anatomy. Klotz has pointed out that

The fact that the wing of a bat resembles the arm of a man more than it resembles the wing of a bird, is pointed to as evidence for the fact that the bat is more closely related to man than to the bird. Essentially this argument is once more based on the premise that similarity is evidence or proof for descent from a common ancestor.⁷²

Klotz shows, however, that this whole line of evidence is suspect when he points out that

There are times when organisms which are very similar are not classified as being closely related. The woolly rhinoceros, which is extinct, and the living white rhinoceros of Africa are very similar in their tooth structure and skull structure. And yet they are not believed to be closely related, because fossil evidence seems to indicate that they have come from different ancestors. In this case evolutionists themselves take refuge in the facts of parallel mutation. They believe that these two forms have evolved parallelly since Miocene-Pliocene times.

Similarly, the platypus, one of the strange mammals of Australia, is not regarded as a link between birds and mammals. It has a bill, but that resembles the bill of a duck only superficially. It has webbed feet and tarsal spurs, but these, too, are believed to be only superficial resemblances. But if this is true, isn't it possible that many of the other resemblances referred to in the argument from homology are superficial, too?⁷³

This example given by Klotz also illustrates what Robert E. D. Clark meant when he spoke of "after-the-event" explanations or guesses.

Not only can we produce these pseudo-scientific "explanations" for everything that has happened in the past or will happen in

⁷²Klotz, op. cit., p. 129.

⁷³Ibid., pp. 130-131.

the future, but we can explain everything that has not happened also--just in case it does! If a kettle should freeze when we put it on the fire, or monkeys should produce the plays of Shakespeare by thumping on the keys of typewriters, we shall at once be able to explain these events by saying that on statistical grounds they were bound to happen occasionally, if rarely, and that no doubt we have witnessed a rare fluctuation! . . . for if we are at liberty to invent untestable explanations as and when we please, it is obvious that we can explain everything.⁷⁴

Clark goes on to show that "evolutionary explanations are almost entirely of the after-the-event kind."⁷⁵

It is recognized that the theory of organic evolution requires vast amounts of time in earth history and appeals to historical geology for evidence of this time. Adverse evidence, however, is generally ignored. Donald Patten points out that

In a quarry in England a tree was found, about one hundred feet long, and at a forty degree angle. It went through strata after strata, each supposedly laid down millions of years apart. At the top, the tree was about one foot in diameter. At the bottom it was five feet in one diameter and two feet in the other diameter, as if it had come under immense pressures. Obviously if the strata were laid down millions of years apart, the top would have long since rotted. This is but one of thousands of inexplicable items for uniformitarianism to explain; in my opinion the understanding of the Flood in its cosmological perspective helps immensely.⁷⁶

Man has long been interested in determining the age of the earth, but even the ages indicated by the modern radiological methods of dating cannot be considered to have been scientifically proven.⁷⁷ Klotz

⁷⁴Robert E. D. Clark, The Christian Stake in Science (Chicago: Moody Press, 1967), pp. 23-24.

⁷⁵Ibid., pp. 26-27; cf. Morris et al., A Symposium, pp. 148-150.

⁷⁶Morris et al., A Symposium, p. 109; cf. Whitcomb and Morris, The Genesis Flood, pp. 116-211.

⁷⁷Cf. Klotz, op. cit., pp. 97-116 and Paul A. Zimmerman et al., Darwin, Evolution, and Creation (Saint Louis: Concordia Publishing House, 1959), pp. 143-166.

points out that the most widely used method of dating, the uranium time clock, is still unsatisfactory for the purpose of evolutionists.

Another difficulty that makes the uranium time clock somewhat unsatisfactory so far as the purposes of the evolutionists are concerned is that from their very nature most pegmatite masses cannot be accurately associated with the geological time scale. The time scale, as it has been set up, has been set up largely on the basis of fossils found in the various rocks. Evolutionists would like to be able to correlate the age of the rock as determined by the uranium time clock with the fossils it contains. But this is rarely possible, for most of the pegmatite dikes are found in rocks which have few or no fossils.⁷⁸

Another so-called evidence of evolution is the presence of vestigial organs. Vestigial organs are organs for which no function has been demonstrated. Evolutionists postulate that these organs were once functional, but that through the course of evolutionary history they lost their usefulness and deteriorated. Klotz has pointed out that while an evolutionary explanation may be given to vestigial organs, the presence of vestigial organs cannot be considered as evidence of evolution.

It is even possible that an organ such as the appendix, which can be removed without any discernible effect, may have a function which is taken over by other structures after it has been removed. The "margin of safety" phenomenon, which consists in man's having more tissue of a specialized type than he really needs, is an example of this. Man can live with only one kidney or one lung, but God had provided him with two as a sort of margin of safety.

Organs may also take over functions which they do not ordinarily have. The spleen produces red corpuscles before birth but in the adult it ordinarily does not. In cases of severe

⁷⁸Klotz, op. cit., p. 105.

hemorrhage, however, it may resume this function until the emergency is over. . . . There are some physicians today who believe that the appendix has a function in embryonic life and early infancy though none has been demonstrated. For that reason they are reluctant to perform an appendectomy on an infant.⁷⁹

Another scientific difficulty for the evolutionist is the explanation of the many obligate relationships in nature. Klotz gives several examples, one of which is the relationship between the yucca moth and the yucca plant.

The yucca flowers hang down, and the pistil, or female part of the flower, is lower than the stamens, or male part. However, it is impossible for the pollen to fall from the anthers or pollen sacs to the stigma, the part of the pistil which receives the pollen, because the stigma is cup-shaped, and the section receptive to the pollen is on the inner surface of the cup. The female of the yucca moth (Pronuba) begins work soon after sundown. She collects a quantity of pollen from the anthers of the yucca plant and holds it in her specially constructed mouth parts. She then usually flies to another yucca flower, pierces the ovary with her ovipositor, and after laying one or more eggs, creeps down the style (the stalk of the pistil) and stuffs a ball of pollen into the stigma. The plant produces a large number of seeds. Some of these are eaten by the larvae of the moth, and some mature to perpetuate the species. . . . in the absence of the moth the yucca plant produces no seed, while without the yucca plant the moth cannot complete its life cycle. . . . The evolutionist, of course, assumes that this arrangement developed as a result of evolutionary processes, but it is incredible that both the yucca moth and the yucca plant should have reached their present stage of development within a period of just a few years.⁸⁰

These few examples together with the discussion of some of the basic difficulties between science and evolutionary thought indicate that first creationism rests upon a valid scientific foundation as well as the Scriptural foundation discussed earlier. Many spokesmen for

⁷⁹Ibid., pp. 133-134.

⁸⁰Ibid., p. 532.

flat creationism are neither anti-intellectual nor anti-science, but rather come as accepted members of the scientific community as well as the Christian community. They have done something which all scientists should but few scientists do. They have taken a critical look at the theory of organic evolution. In this, they are not downgrading science, but rather they are approaching the theory of organic evolution in a scientific manner.

V. SUMMARY

The evidence presented in this chapter has indicated that:

- (1) Theistic evolutionists (and to a certain degree, progressive creationists) fail to recognize the limitations of science.
- (2) Theistic evolutionists and progressive creationists determine their interpretation of Genesis upon a questionable supposedly scientific basis, rather than allowing the Bible to speak for itself.
- (3) Theistic evolutionists and progressive creationists ignore certain accepted principles of interpretation.
- (4) Accepted methods of Biblical interpretation are employed by flat creationists.
- (5) The secondary details of the Bible are objectively accurate, and therefore,
- (6) The Bible does tell something of the "how" of creation as well as the "Who," and that,
- (7) Flat creationism is not anti-science nor unscientific.

CHAPTER IV

SUMMARY AND CONCLUSIONS

I. SUMMARY

In Chapter II, evolution was viewed from the standpoint of secular science. The sources cited in this chapter were not writing with any religious axe to grind. The evidence indicated that:

(1) For the most part, biologists have ignored the basic assumptions and implications of the general theory of organic evolution.

(2) While there is evidence that living organisms can undergo changes in the course of time so that new species are formed, there is no clearcut evidence that all life has arisen from a single source which itself arose from an inorganic source.

(3) Even though there is a pronounced lack of evidence for the general theory of organic evolution, it remains as the integrating principle around which biology is taught and is dogmatically asserted.

(4) The use of evolution as a basis in the field of taxonomy has been seen by some to have had a deleterious effect on the field. Phylogenetic considerations above the species level are not based upon demonstrable evidence, but are rooted in speculation and circular reasoning, and hence are highly subjective, which makes the whole field of taxonomy open to question as an objective science.

(5) Although the evolutionary indoctrination of the past century has made it difficult to achieve objectivity, numerical taxonomists

have provided an empirical system of classification by developing their system completely apart from evolutionary considerations.

Thus, the general theory of organic evolution has been seen by some scientists writing apart from religious considerations to lie in the realm of faith rather than demonstration. They have shown that the dogmatic assertion of this theory has not helped the field of biology, but that in at least some instances has hindered it.

In Chapter III, the three basic positions on the subject of creation and evolution taken by evangelical Christians (Theistic Evolution, Progressive Creation, and Fiat Creation) were presented. The evidence presented in this chapter indicated that:

- (1) There is a distinction between the positions of theistic evolution and progressive creation, but that
- (2) Theistic evolutionists (and to a certain degree, progressive creationists) fail to recognize the limitations of science, and that
- (3) Theistic evolutionists and progressive creationists determine their interpretation of Genesis upon a questionable supposedly scientific basis, rather than allowing the Bible to speak for itself.
- (4) Theistic evolutionists and progressive creationists ignore certain accepted principles of Biblical interpretation.
- (5) Fiat creationists employ accepted methods of Biblical interpretation.
- (6) Fiat creationists validly accept the secondary details of the Bible as objectively accurate when properly interpreted.

(7) The Bible does tell something of the "how" of creation as well as the "Who," and that

(8) Fiat creationism is not anti-science nor unscientific.

II. CONCLUSIONS

On the basis of the evidence which has been presented, the author has come to several conclusions.

(1) Fiat creationism is a Scripturally valid position. Fiat creationists have validly substantiated their position using accepted principles of Biblical interpretation which those who try to harmonize the Bible with evolution tend to ignore.

(2) The position of fiat creationism is scientifically valid inasmuch as it is in complete harmony with the first and second laws of thermodynamics and is not contrary to any known valid scientific data. Fiat creationism is not at all unscientific because it does not accept the general theory of organic evolution, for this theory is built upon a foundation of speculation and circular reasoning and is without any substantial scientific demonstration of its validity.

(3) There has been a tendency on the part of some evangelical Christians to make unnecessary concessions in the area of Biblical interpretation to the general theory of organic evolution. Inasmuch as science does not dictate the necessity of accepting the general theory of organic evolution, it is clearly unwise for theologians to force an interpretation upon the Bible which will fit with the theory

of evolution. Those attempting to harmonize the Bible and evolution have employed methods of interpretation which if applied consistently to the entire Bible would rob the Bible of its historical, objective, and eventually spiritual value.

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APPENDIX

The following was taken from Processes of Organic Evolution by G. Ledyard Stebbins, pp. 137-145 and 162-174.¹ Only the scientific names were italicized in the original. The rest of the underlining was added to emphasize the tentative, speculative nature of the presentation.

Before answering the question: "Did the higher categories evolve by means of the same processes which gave rise to races and species?", we must first be clear in our minds as to what we mean by "higher categories." According to the system devised by Carl von Linne two hundred years ago and now in universal use, organisms are arranged into a hierarchy of categories, of which the lowest is the species and the highest the kingdom. Between them are placed the genus, family, order, class, and phylum. These categories are sometimes subdivided still further, but only the major ones mentioned above will be considered in the present discussion. Table 7-2 presents the classification of the dog according to this system. We know enough about dogs and their relatives to say that the processes of mutation, genetic recombination, natural selection, and reproductive isolation, as discussed in previous chapters of this book, can explain the differentiation from a common ancestor of the various species of the genus Canis, such as the dog, wolf, coyote, and jackal. We must now ask the question: Can these processes, acting over the millions of years encompassed in the evolutionary time scale, also account for the differentiation of dogs from foxes, of dog-like from bear-like animals, of carnivorous from herbivorous mammals, of mammals from reptiles, of vertebrates from other kinds of animals, and of animals from plants and microorganisms?

Our answer to this question depends in part on how we answer another, somewhat philosophical question: Are the categories of the systematic hierarchy intrinsic entities which the naturalists themselves have established in order to understand better the complex pattern of living beings in nature?

The correct answer to this question, which has now become reasonably clear, can be understood on the basis of the following predictions. If genera, families, and other categories are intrinsic entities which only need to be discovered, then we would predict that the more intensively a group was studied by different biologists, the more easily could these authorities come to agreement on the limits of the categories. On the other hand, if higher categories are largely human inventions, then each biologist approaching the problem of classifying a particular group of organisms would have a somewhat different idea from his predecessors and contemporaries as to which characteristics are the

¹G. Ledyard Stebbins, PROCESSES OF ORGANIC EVOLUTION, (C) 1966. Reprinted by permission of Prentice-Hall, Inc., Englewood Cliffs, New Jersey.

most important and would define the categories in a somewhat different way. Consequently, as more biologists acquired more facts about a group of organisms, they would not be able to define its categories any better, and the differences of opinion between them might even become stronger. If, therefore, greater familiarity with a group does not make its subdivisions easier to define, then we must conclude that these categories are largely human constructs, created by naturalists in order to make classification easier.

When we look at different groups of organisms, we find that for some of them the first prediction has been realized and for others, the second prediction has come true. The orders of mammals, such as bats (Chiroptera), primates, rodents, whales (Cetacea), carnivores, etc., have been recognized as such for more than a hundred years, and modern knowledge has increasingly confirmed, with few exceptions, the classical delimitations of contemporary orders. Within many of the orders, such as the whales, carnivores, elephants, odd-toes and even-toed ungulates, the modern families are equally well defined. In other orders, particularly the rodents, zoologists have had much greater difficulty in deciding how its families can most naturally be delimited. In respect to genera, differences of opinion extend to many families and universal agreement is confined largely to those families in which the modern genera are relatively few and small.

These differences in the ease of defining categories can be understood when we look at the fossil record. On the whole, the mammals are a declining class. They reached their peak in the Miocene and Pliocene epochs. Since then, the number of old genera to become extinct has exceeded that of new genera which have evolved in most orders. Conspicuous exceptions are the rodents and some groups of even-toed ungulates. It is exactly in these exceptional groups which are still flourishing that the delimitation of genera is the most difficult. This fact would suggest that higher categories become well defined through the extinction of populations or species which are intermediate between the most successful surviving groups.

When we review the classification of other groups of organisms, we find the same relationship between distinctness of modern categories and probable extinction of intermediate groups. In higher plants, genera are most easily defined in the pine family and other cone bearing trees, as well as in the magnolias and their relatives. These groups are known to be relatively ancient. Some of their genera are clearly declining or are small persistent relics of formerly more widespread groups. On the other hand, in plant families which are known to have increased in importance during the more recent geological epochs, and which have spread still further as a result of man's activity, genera are particularly hard to define. The best examples are the grass family

and the sunflower family. Apparently, therefore, the process which increases in importance as we consider the evolution of higher categories is extinction. This process results inevitably from an extension of evolution into time spans comprising millions of years.

If categories become well defined because forms intermediate between them become extinct, then in the history of groups having a good fossil record we should be able to find periods when categories which are now well defined were connected by transitional forms. If we analyze the fossil record of vertebrates, this is exactly what we see. Among modern animals, the dog and bear families are regarded as definitely related to each other, but even when all contemporary members of the two families are considered, nobody has any difficulty in distinguishing bears from dogs, foxes, and coyotes. In the Miocene and early Pliocene epochs, however, the situation was different. At that time, animals intermediate between dogs and bears were common, so that paleontologists have great difficulty in deciding just when the dog and bear families became distinct from each other. The present distinctness of the two families is due partly to the fact that bears, in connection with their acquisition of an omnivorous diet rather than one consisting only of meat, have acquired distinctive jaws, teeth, and faces. At the same time, their relatively large size and slow movements are associated with the fact that they no longer pursue their prey, as did their ancestors. This adaptive radiation, however, would not have made them easy to recognize as a separate family unless the intermediate dog-bear animals which existed in the Miocene and early Pliocene epochs had become extinct since then.

Going farther back in the fossil record, we learn that in the latter part of the Eocene epoch, primitive animals which are now clearly recognized as forerunners of the principal families of carnivores; dogs, cats, weasels, civets, and their relatives, were linked together by a complex network of resemblances. When the characteristics by which we now recognize these major families first appeared, they were distinctive of genera rather than families. As in the example of dogs and bears, the distinctness of the other major modern families of carnivores was a result of the combined effects of continued adaptive radiation by means of genetic change guided by natural selection plus extinction of generalized intermediate forms. The same trends can be followed in the evolution of families in other orders of mammals and, though less clearly because of imperfection of the record, the differentiation of the orders themselves.

Although the differentiation of the classes of vertebrates is less clearly illustrated by the fossil record, the available evidence indicates that their origin was no different from that of orders and families. In the Devonian period, one of the most abundant and dominant groups of fishes was the lobe-fins. These fishes possessed two pairs

of fins which in their center contained thick, fleshy lobes, of which the skeletal bones were not unlike those of primitive amphibians (Figure 7-2). We cannot reconstruct the way in which these ancient, extinct fishes lived, but since some modern fishes use their fins for waddling slowly over the bottom of shallow bodies of water, we can suspect that the lobe fins did the same. They also had openings for nostrils in the roof of their mouth. This fact, along with the close relationship of lobe-fins to modern lungfishes, suggests that the lobe-fins had lungs, and breathed air when their water became foul, stagnant, and lacking in oxygen.

At the end of the Devonian Period appeared the first animals with legs rather than fins, the most primitive amphibia. These animals were, however, by no means land dwellers. All of the adaptations of their skeletons, aside from their limbs, were for life in the water. Although they probably made short journeys overland from one body of water to another, their limbs were probably used more for waddling over the bottoms of swamps and shallow pools in search of aquatic prey than for life on land. Thus, the structures which eventually made life on land possible, lungs and feet, were probably first acquired by basically aquatic animals as part of an adaptive radiation into the extensive bodies of shallow water which existed when these animals first evolved.

Although later amphibians, like some of our modern frogs, toads and salamanders, evolved adaptations which enabled them to live all of their adult life on land, all amphibians require water or at least moisture for their reproductive stages. This is because their soft, jelly-like eggs have no protection against drying up. The first truly terrestrial class of vertebrates is the reptiles, which lay eggs protected by shells and containing large amounts of food material for nourishing the early embryo. Since eggs are only very exceptionally preserved as fossils, we have no way of finding out how the reptilian egg evolved. There are, however, many differences between modern reptiles and amphibia in the structure of their skeletons, and these have been used by paleontologists for recognizing the first reptiles to appear. An eminent paleontologist, A. S. Romer, remarks of these animals: "Primitive Paleozoic reptiles and some of the earliest amphibians were so similar in their skeletons that it is almost impossible to tell when we have crossed the boundary between the two classes." (Vertebrate Paleontology, p. 121). In all likelihood a zoologist transported to the early part of the Permian period, not knowing anything about animals which evolved later, would have placed in the same class, the same order, and perhaps even in the same family animals which had some characteristics of amphibians along with others having characteristics now associated with reptiles.

In respect to the early evolution of mammals, the same situation exists. The distinctive characteristics of modern mammals; warm blood, hair, and the ability to suckle their young, cannot be determined in

fossils. In respect to their skeletons, however, modern reptiles are, and the dinosaurs were, very different from modern mammals. On the other hand, the animals which dominated the land in the later Permian and early Triassic Periods, before the dinosaurs appeared, were the mammal-like reptiles or therapsids, which in both their skulls and teeth were almost halfway between typical reptiles and primitive mammals (Figure 7-3). Although their soft parts are completely unknown, some features of the skeletons of therapsids suggest that at least the most advanced members of the group were not completely cold blooded, but had some form of temperature regulation. Since the most important function of hair is protection of a warm blooded body, we may speculate also that the evolution of hair took place within the therapsids. Moreover, the most primitive modern mammals, the duckbill and the spiny ant eater of Australia, have both skeletal characteristics and chromosomes which set them off sharply from other mammals. Although their fossil ancestry is completely unknown, most paleontologists suspect that they have descended from the therapsids independently of other groups of mammals. Since these Australian monotremes possess hair, warm blood, and suckle their young in a primitive fashion, the speculation that these animals were independently descended from therapsids carries with it the implication that some members of this group of "reptiles" resembled primitive mammals more than modern reptiles in the soft parts of their bodies. If the therapsids could be resurrected, we might again find a group in which characteristics now diagnostic of different classes were separating forms which were genetically related to such a degree that they would naturally be placed in the same order or even family.

During the Triassic period, the therapsids gave rise to a group of rather small, light boned, and apparently very active animals, the ictidosaur. These animals, which existed for at least twenty million years during the later Triassic and early Jurassic periods, had skeletons which were mammal-like in every respect except for two small bones of their lower jaws, described later in the chapter (Figure 7-9), and which in mammals have become two of the small bones in the middle ear. Since the paleontologists who classify the skeletons of vertebrates have arbitrarily decided that the presence of these bones on the jaw is a characteristic of reptiles, these ictidosaur are placed in the reptilian class. Commenting on them, another eminent paleontologist, E. H. Colbert, remarks: "All of which indicates how academic is the question of where the reptiles leave off and the mammals begin." (Evolution of the Vertebrates, pp. 134-135.)

The first true mammals appeared in the middle Jurassic, about the time when the ictidosaur were becoming extinct, and were contemporary with the earlier dinosaurs. Consequently the transition from reptiles to mammals is gradual and even, both in time and in the bodily form of the animals themselves.

The transition from reptiles to birds is more poorly documented than are the other transitions between classes of vertebrates. Nevertheless, many of the small reptiles in the group ancestral to dinosaurs and crocodiles had light skeletons from which those of birds could have arisen, and moreover walked exclusively on their hind legs, as do birds. Furthermore, the earliest fossil birds, from Jurassic deposits of Germany, had jaws containing teeth and forelimbs with well developed fingers (Figure 7-4). We classify them as birds because feathers are preserved with their skeletons; but if their preservation had been somewhat poorer and the feathers were not present, these animals might well have been classified as reptiles.

Thus, the fossil record of vertebrates strongly suggests that the characteristics which distinguish the modern higher categories appeared first as distinctive features of certain species or genera. They became characteristics of families, orders and classes only after descendants of the animals which first possessed them developed them further, radiated into numerous adaptive niches, and became separated from other groups by extinction of intermediate forms. In other groups of organisms such as insects and higher plants, in which the fossil record is far more fragmentary, profound gaps exist between many order, suborder, and classes. Furthermore, no transitional forms are known between any of the major phyla of animals or plants. In view of the incompleteness and biased nature of the fossil record in all of these groups, and extremely long time, measured in hundreds of millions of years, since the various phyla of organisms evolved, the large gaps which exist between many major categories of organisms aside from the vertebrates are most reasonably ascribed to known imperfections in the fossil record. The hope always remains that new fossil finds will fill in some of these gaps.

To the questions which were asked at the beginning of this section, we can now give the following answers. When the characteristics first appear which later distinguish the major higher categories, they are distinctive of species and genera. At this stage, definition of genera is somewhat arbitrary, and their naturalness is not evident. As members of different groups diverge farther from each other in evolution, and as intermediate organisms become extinct, the higher categories become easier to define. Consequently, the only qualities of naturalness or intrinsic identity which higher categories possess are conferred on them by a continuation of known evolutionary processes through long periods of time, of communities of organisms to repeated changes of their environment. There is, consequently, no reason to invoke any special processes to account for the evolution of higher categories, beyond those which give rise to races and species.

A further point must be emphasized in connection with the evolution of families, orders, and classes. This is its "mosaic" character. As pointed out in connection with both the evolution of amphibia from

fishes and of mammals from reptiles, the various characteristics which now distinguish the more evolved class probably evolved separately, some relatively early, others much later, at periods of evolutionary time which in some instances were separated from each other by millions of years. This is almost certainly true of the basic adaptive characters of the placental mammals; warm blood, hair, the four-chambered heart, the ear apparatus, vivipary rather than egg laying, and the placenta. The placental mammals did not radiate into their present diverse ways of life or become the dominant land animals until all of these characteristics had become perfected. Those characteristics which possess a close functional connection with each other, such as hair, warm blood, and the four-chambered heart, were probably fairly closely synchronized in their evolution. On the other hand, the evidence strongly suggests that the evolution of these physiological characteristics was only weakly correlated with the steps in the evolution of the ear and of the reproductive system.

Consequently, we cannot speak of any single "step" in the evolution of mammals from reptiles. In some instances, such as the change in position of the jaw bones to the ear, a relatively small number of genetic changes may have triggered off the evolution and establishment of a new adaptive complex with respect to that particular character, as in the evolution of mimicing races of butterflies or of species of columbines with spur bearing petals described in Chapter 4. These changes would, however, have occurred at the level of subspecies or closely related species. A contemporary taxonomist, transported to the Mesozoic era and not knowing anything about the evolutionary future, would probably have classified the first population bearing all three bones; hammer, anvil and stirrup, in its middle ear, as an aberrant species belonging to the then widespread group of therapsid reptiles. As stated above, this group probably already possessed a mixture of characters which we now associate on the one hand with reptiles and on the other with mammals.

In the next chapter, evidence will be presented to suggest that the evolution of man from the apes was probably of this same mosaic nature. Characters evolved in synchronous correlation with each other only to the degree to which they were functionally interdependent.

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More than a half century ago, in 1894, a young Dutch anatomist, E. Dubois, electrified the scientific world by reporting that he had discovered the "missing link." The German anatomist Haeckel, a follower of Darwin, had predicted that, on the basis of evolutionary theory, fossils would be found of creatures intermediate between apes and men. Dr. Dubois asked to be appointed as army doctor in the East Indies so that he could search for such fossils. In river deposits at Trinil, in eastern Java, he found first a skull cap, then a femur, and other remains.

The experts of Europe and America agreed on the importance of this discovery, but disagreed on almost everything else. Some said that

it was just an ancient man with an abnormally low forehead. Others proclaimed it to be an ape related to the orangutan or perhaps the gibbon or chimpanzee. Since Java man started the search for fossils which would reveal man's ancestry, the scientific world has been a succession of discoveries of fragmentary bones belonging to man's evolutionary line, accompanied by a corresponding succession of arguments about their nature and relationships.

During the past twenty years, the number of known fossils of man and his ancestors has greatly increased. Furthermore, both these newer finds and the older ones are being interpreted in a different way. In the past, the scientists who described these fossils were thinking in terms of individual types rather than populations. They asked themselves: Is this newly found fossil different in any way from other known individual fossils? If the new find proved to be different, and it nearly always did, they gave it a scientific name, placing it in a different species and often a different genus from all other human or man-like fossils. We now realize that the differences between many fossils found in strata of the same or similar age are no greater than those between, for example, an Australian bushman and a tall tribesman from East Africa, a slender Amazonian Indian and a stocky Eskimo, or a narrow faced man from the Middle East and a broad, round headed central European. Consequently modern students of these fossils, both anthropologists and zoologists, are tending to discard nearly all the names of "genera" which have been erected in the past. They recognize that since their divergence from the apes, the ancestors of man have progressed chiefly along a single line of evolution. At times this line has branched to produce two or three related and sympatric species, but during at least the past 600,000 years it has probably consisted of a single species, possessing a common gene pool, and subdivided into a number of different races. For these reasons, every account of human evolution written before 1950 is already or will soon be obsolete.

Unfortunately, the fossil record of man's ancestry, though much better than it was even a few years ago, is still very incomplete. We can begin with a group of apes which were common in Africa and Asia during the Miocene Epoch, from about 25,000,000 to about 13,000,000 years ago, and are collectively designated dryopithecines. They undoubtedly consisted of several species, and are usually placed in a number of different genera. Some of them inhabited forests and were tree climbers like the modern apes, while others apparently lived in open savannas and walked about on all fours. Few if any of them had developed fully the specialization of modern apes, such as their very long arms by which they move hand over hand from one tree branch to another; the "simian shelf" of their jaws, which supports strong muscles used for tearing and chewing the bark of trees; and their large canine teeth with which they crush hard nuts.

Since only a single skull belonging to one species of these apes is preserved in its entirety, good estimates of the size of their brains

are not available. Probably, they were somewhat smaller than those of modern apes. These apes were sufficiently generalized so that they could have formed the ancestral stock from which the line leading to man arose.

From the end of the Miocene to the end of the Pliocene Epochs stretches a gap of more than ten million years, from which very few fossils belonging to the line leading to man are known. At the end of this gap we find two separate kinds of creatures which may have been forerunners of man. One of these was that of the australopithecines or "southern apes," so named because their first remains were found in South Africa. More recently, abundant remains of australopithecines have been found in East Africa, and a few fragments of teeth and jaws which may belong to members of this group are known from Java.

In respect to their intelligence and their way of life, these animals were still more like apes than men. Their brains were only slightly larger than that of the chimpanzee, and hardly more than one-third the size of the brain of modern man. They did not use fire, probably did not build shelters, and in all probability could communicate with each other only by means of crude cries or grunts. On the other hand, they did walk erect, and they probably used crude tools. Their limb and body skeletons are much like those of modern man. Their skulls show a mixture of ape-like and man-like characteristics. Their large jaws and small brains ally them to the apes, while in their relatively small, regular front teeth they are much like men.

There are still many uncertainties about the exact age of many of the fossil australopithecines. Present finds and their dating suggest that that this group of apes existed from at least the later part of the Pliocene epoch (two million years ago) until well into the Pleistocene or ice age, perhaps 700,000 years ago. There were at least two species, which in some places were sympatric and did not intergrade. One was a larger animal, which had relatively large teeth and may have been strictly vegetarian in diet. The other was smaller but had a brain just as big or slightly bigger than that of its larger relative. Judging from the appearance of its teeth, it probably ate some meat and perhaps killed small animals.

Very recently, in the same beds as those which contain the East African australopithecines, a small number of fossils has been found of creatures which were exactly intermediate between australopithecines and the most primitive species of man (Homo erectus), to be described below. This intermediate form, which has been given the name Homo Habilis, was probably the maker of the crudely chipped stone tools which are found in association with both its fossils and those of some australopithecines (Figure 8-2a). The discovery of Homo habilis, which was described as recently as 1964, tell us two things. In the first place, the known fossils of australopithecines do not represent the direct ancestors of

man, since they lived contemporaneously with the more advanced H. habilis. Nevertheless, the evolutionary line which led to man most probably passed through a stage similar to the known australopithecines. There is every reason to believe when fossils are discovered belonging to representatives of man's evolutionary line which lived during the earlier and now unrepresented Pliocene Epoch, they will be like the known Pleistocene australopithecines. Such discoveries would tell us that australopithecines were, in fact, direct ancestors of man. They nevertheless persisted side by side with their derivatives, the earliest men, for several hundred thousands of years. Such contemporary existence of related primitive and more advanced species is a very common situation in other groups of animals both fossil and modern.

The second message conveyed by Homo habilis is that, as Darwin believed, the transition from apes to man was a truly gradual one. The australopithecines were certainly apes; they did not possess any distinctive features absent from modern apes except the ability to walk erect. Nevertheless, the difference between the most advanced australopithecines and Homo habilis is no greater than that between two closely related species of animals, except that the stone tools probably made by H. habilis must have required a greater development of the learning process than that found in any ape. On the other hand, the differences between Homo habilis and the earliest forms of H. erectus (see below) are in all respects only quantitative, and are not very great. In short, we now have available a series of fossils--dryopithecines, australopithecines, Homo habilis, H. erectus, H. sapiens--which forms a complete and gradual transition from apes to modern man.

In the early middle Pleistocene directly following the time when the last H. habilis existed, remains of creatures are found which are now generally regarded as belonging to the genus Homo. They include the original fossils discovered by Dr. Dubois plus several more recently discovered remains of the same age and kind from Java. They also include Peking man, discovered in caves near Peking, China, as well as isolated fragments from other parts of the Old World, such as Africa, and perhaps the jaw discovered long ago near Heidelberg, Germany. These fossils are similar enough to each other so that they could have belonged to the different races of a single species, but they are so different from modern man that they deserve rank as a separate species, Homo erectus (Figure 8-1f).

The body skeleton of Homo erectus was essentially the same as that of modern man. He differed mainly in his massive skull, larger teeth, and smaller brain. The average brain size of this species of man was about 75 per cent as large as the brain of the australopithecines.

The fossils of these earliest men are often accompanied by a large quantity of stone tools, including hand axes, which they must have

made and used. They differ from the crude, chipped stones used by Homo habilis in having a series of definite designs, which were repeated in various localities throughout Eurasia and Africa, and showed a steady progression of improvement through time (Figure 8-2b,c). It is hard to see how men could have made such well-fashioned tools, apparently according to established traditions, unless they were able to teach each other how to make them. We can suppose, therefore, that Homo erectus possessed at least a primitive form of speech. In all of his fossil sites, moreover, are found bones of large animals such as giant pigs, sheep, oxen, baboons, horses, hippos, and elephants, which these hunters apparently killed. To do so they must have hunted in well organized bands, which suggests that they already possessed a well developed tribal structure. Some of the sites contain charred pieces of wood, indicating that their occupants used fire.

Recent interpretation of the fossil record by some paleontologists, as well as by zoologists acquainted with modern species of animals, have led to the belief that from the time of Homo erectus (600,000 years ago) to the first appearance of modern man, the entire habitable land masses of Eurasia and Africa were apparently occupied by a single species of man. Through the ages this species evolved gradually and irregularly in brain size, certain anatomical features, and culture. At all times it was subdivided into many races, which arose in various places, sometimes spread to other parts of the earth, and from time to time either eliminated other races by conquering and killing them or combined with them through interracial mating. The first men which were anatomically indistinguishable from ourselves appeared during the last advance of the glaciers, from thirty-five thousand to forty thousand years ago. Their appearance was accompanied and followed by a rapid expansion, diversification, and improvement of culture. People of this period made elaborate, beautifully fashioned stone axes and spears which modern man could not imitate without years of practice (Figure 8-2d,e). They carved figures of animals and people, and made lifelike paintings on the walls of their caves (Figure 8-3). Since they buried their dead together with implements carefully laid around the body of the deceased, we can imagine that they had some kind of religion and believed in an after life. The age of modern man, Homo sapiens, had begun.

We have no way of knowing anything about the variability within populations of the ancestral apes and australopithecines, and the fossil record is still too incomplete for us to say to what degree they were differentiated into distinct species. As already suggested, however, the present evidence suggests that since Homo erectus evolved about six hundred million years ago, mankind has possessed a common gene pool. If this is true, then man's ability to wander over long distances would enable the bearers of any improved genetic characteristics to transmit them throughout most of the range of this species in a relatively short

time, at most a few hundred years. On this basis, it is idle to speculate on just where or when a particular trait or biological character complex first appeared. The evolution of man from Homo erectus to our modern species should not be visualized in terms of the origin of particular types at certain places and their subsequent spread as distinct entities. We should, rather, imagine that various new and valuable traits appeared in different parts of man's vastly extended range of distribution. People who became successful because they had newly acquired a particular trait subsequently migrated to different parts of the world, and by conquest, intermating, or both, transmitted this trait to other races of people. Another different trait could have originated in an entirely different part of the world and could have combined with the first one in a race inhabiting still a third region. The pieces of man's mosaic evolution may have been fashioned separately in regions far apart from each other. They may have been assembled and reassembled in different combinations at different places and times, until finally a particularly successful combination lifted man's evolutionary line up to a new level of adaptation.

The evidence now available, fragmentary though it is, can best be explained by the hypothesis that mankind has always been subdivided into races. Their evolution has included both divergence in isolated regions and fusion of pre-existing races through intermating. Races have likewise become extinct both through being conquered by other, more efficient races, and by genetic mixing. Consequently, there is no need for speculating on what may have been the relationships between the races of modern man and those which existed 25,000 years ago or earlier. For instance, during historic and late prehistoric times western Europe was repeatedly invaded by people coming from the east, who eliminated most of the older inhabitants, such as the Cro-Magnon men who made the famous cave paintings of France and Spain (Figure 8-3). Nevertheless, anthropologists have good reasons for believing that the Basque people of northwestern Spain and the Berbers of the Atlas Mountains in North Africa may be the relatively unaltered descendants of the Cro-Magnon stock. If so, the fact that these people have frequently intermarried with descendants of the invaders indicates that all modern Europeans and their American descendants contain many genes derived from the Cro-Magnon people. At an earlier time, the heavy-bodied, brutish-looking, but relatively highly cultured people of the ice age known as Neanderthals, were apparently extinguished by conquest in western Europe. On the other hand, in caves near Carmel, in Israel, there is evidence that Neanderthal-like people intermingled and exchanged genes with people belonging to a race similar to the Cro-Magnons. Such mixing, however, was probably not confined to the caves where the intermediate individuals have been found. Knowing the habits of conquering men, one finds it difficult to imagine that the Neanderthals were killed off by men of other races before their females had made a considerable contribution of genes, both voluntary and involuntary, to the conquering races.

In Africa, where the ice age did not decimate the population, but on the other hand rendered habitable large parts of the Sahara desert because of the increased rainfall, the divergence and mixing of races was, if anything, greater than in Eurasia. Some African races, like the South African bushmen, are apparently very ancient. Others, like the Negroes, are very recent and probably of mixed origin. The recent races of contemporary man did not, however, evolve from primitive, extinct species of man but from existing races of Homo sapiens. Many of the biological features of Negroes, for instance, are more advanced than are those of any other races, in that they are more divergent from the features of primitive man, and his ancestors. These advanced traits include thick lips, curly hair on the head, and the lack or scarcity of body hair.

These facts are mentioned in order to point out that from the point of view of the evolutionist, the term "purity of the race" has little meaning. All of the modern races of mankind are of mixed origin; the differences between them in this respect are merely in the extent of mixing that has occurred in recent times. The genus Homo is exceptional among all higher organisms in that it has undergone a phenomenally rapid evolution in terms of progress toward a new adaptive complex, and toward a tremendously increased dominance over its environment, without the accompaniment of any permanent adaptive radiation.

This consideration of the biological evolution of mankind can be concluded by some speculation about the kinds of selective forces which guided it. The most significant changes which these changes brought about were the following:

1. The change from the four footed gait of terrestrial apes and monkeys to the bipedal gait of man. This required a considerable change in the structure of man's skeleton, which can be traced whenever fossils are found which include the right parts.
2. The perfection of the hand for tool making. The generalized apes from which the line leading toward man diverged had already evolved hands with opposable thumbs, probably in connection with grasping branches of trees.
3. Increase in brain size and intelligence. This involved not only mere increase in size of the brain, but also particular development of those centers in which intelligent responses are localized. When whole skulls are available, these changes can be followed to some degree.
4. Change in the diet from fruits, hard nuts, and tough roots to softer food, including an increasing dependence on meat. This involved decrease in size of the tearing canines, the development of more regular surfaces on the grinding molars, and later the reduction of the size of the molars themselves. These changes are easier to trace through the fossil record than are any other parts of the skeleton.

5. Increase in the ability to communicate with others, and to develop organized community behavior. Direct evidence for this type of change cannot be obtained from the fossil record, but it can be approached indirectly in various ways.

The greatest value to man of walking on his hind feet is the freedom which this posture offers his hands for holding tools or other objects, throwing them, or catching them. Since the first known ancestors of man who walked erect, the australopithecines, were tool users, and probably obtained much of their food with the aid of them, the gradual change to the erect habit probably accompanied the increasing use of tools. Both of these changes were probably promoted by the change from life in the trees to existence on the ground, which began during the radiation of the dryopithecine stock in the Miocene epoch. Chimpanzees, man's nearest living relatives, often use tools such as sticks and stones. In their native habitat, they have recently been seen to break sticks or pieces of vine of the correct length for getting termites out of their nests and to remove the branches from these sticks in preparation for use. Observers of groups of chimpanzees saw young animals learning this simple art from their elders. When molested by baboons, chimpanzees often pick up stones to throw at them.

Since chimpanzees live most of their lives in trees and subsist on fruit, tools are of little use to them for their principal tasks of food getting. But for a ground feeding ape with similar intelligence the situation would be different. It might learn to use sticks for digging up nutritious roots or extracting rodents and ground-inhabiting insects from their burrows. Its need for throwing stones to frighten off enemies would be much greater than in the case of an arboreal ape. Once throwing stones for defense had become a regular habit, the ape might achieve enough accuracy to kill small game at a distance. Naturally, the more quickly the ape could stand erect to achieve this purpose, the more accuracy he would gain. There is good reason, therefore, to suppose that the use of primitive tools and erect posture were both acquired gradually and in relation to each other. They probably began with the first tendency to spend long periods of time out of the trees. Based upon the principle of double function during a period of transfer, as discussed in the last chapter, we would expect that in the earliest stages of this transition the apes lived partly on fruit and retired to the trees for protection, making increasingly greater excursions into open territory in order to increase their food supply. A later stage in the transition could have been one in which the daytime hours were spent on the ground, but the apes retired at night to the trees for protection. This way of life would have been compatible with existence in the open savannas, where some of the African dryopithecines lived.

Since the brain of the tool-using australopithecines is not much larger than that of anthropoids, we might logically conclude that most of man's intelligence was acquired after he had become a regular tool user

and walked erect. Intelligence, however, depends not only on the size of the brain in relation to that of the body, but also on the development of specific areas in the brain. Perhaps the australopithecines were considerably more intelligent than anthropoids because of the development of these centers. Even if the australopithecines were little more intelligent than anthropoids in their overall reactions to stimuli, the ability to imitate and learn must have been much more highly developed in australopithecines than in typical anthropoids.

Nevertheless, the most rapid increase in brain size and presumably in intelligence took place during the evolution of Homo erectus from the australopithecines. This increase accompanied the development of well fashioned tools of a relatively constant design. At about the same time, men learned how to tame and use fire. With better tools, these primitive ape-men learned to hunt large game, presumably in cooperating bands. The selective advantage of more efficient communication under these conditions is obvious. Consequently, we may reasonably suppose that the period when man's brain was increasing most rapidly coincided with the evolution of his ability to invent and use language. We cannot overestimate the importance of speech to man's way of life. Not only is it essential for carrying out complex hunting maneuvers and teaching the art of tool making, but it is also basic to the development of ideas and plans for the future. If we wish to single out any one period in human evolution when our evolutionary line acquired the human state, we must point to the transition from australopithecines to Homo erectus, when the first primitive forms of speech probably evolved.