A CREATIONIST CRITIQUE OF HOMOLOGY

A. J. JONES*

Received 23 March, 1981

Ever since Darwin, homology has been one of the lines of evidence alleged to support evolution. It is shown here that such arguments mis-use the evidence, or fail to include all of it. When all of the evidence is included, and it is interpreted correctly, homology is seen to point to a Designer, Who uses a basic plan in many different ways.

PART ONE

A. Introduction

The evolutionist has, essentially, only two lines of approach available to him when he sets out to marshal evidence for evolution:

(1) through the evidence of hereditary variation and change;

(2) through the phenomenon of homology.

The first approach marshals the evidence from the biological disciplines of Biogeography and Genetics (including Domestication and Animal and Plant Breeding). Others have written fine critiques of this evolutionary approach, so we can let Colin Patterson's admission in the current British Museum handbook on 'Evolution' sum up the position:¹—

... all such examples (from Biogeography) illustrate change and divergence on a relatively trivial level.

That is, the evidence is indicative of change solely *within* the creationists's 'kinds'. If the evolutionist is to convince people of endless evolution then it must be through the second approach, i.e., through homologies.

It need hardly be noted that this second line of approach is the most appealing and persuasive. Darwin thought so:²—

(the facts of taxonomy, morphology and embryology) . . . seem to me to proclaim so plainly, that the innumerable species, genera and families . . . are all descended . . . from common parents . . . that I should without hesitation adopt this view, even if it were unsupported by other facts or arguments.

. . . we ought frankly to admit . . . community of descent: to take any other view is to admit that our own structure and that of all the animals around us, is a mere snare laid to entrap our judgment.

Many, especially theistic evolutionists, have propagated the latter argument. Dobzhansky³ goes so far as to describe the creationist position as 'implicitly blasphemous' because 'it actually accuses the Creator of arranging things so that they suggest evolution merely to mislead honest students of His works.

B. Comparative Studies

The evidence from homologies is the evidence provided by the similarities between different organisms which have been uncovered by all the different divisions of comparative biology: comparative anatomy, physiology, cytology, biochemistry, parasitology, ethology, and embryology, and taxonomy and molecular biology. The study of fossils (paleontology) also comes here, a fact which must be emphasized.

Evolutionists regularly refer to the fossil 'record' and state that fossils provide 'direct', 'objective', 'historical' evidence for evolution. All such claims are, of course, sheer nonsense. These terms are valid only if historical evidence is available. There is only one form of historical evidence, namely eyewitness reporting, and only one reliable form of historical evidence, namely the evidence of a witness known to be trustworthy. Evolutionists, who are bound by dogma to reject the very possibility of historical evidence (no witnesses had evolved until it was too late) should stop using such deceptive terms. However some paleontologists are now describing the situation correctly:—

... the paleontologist can provide knowledge that cannot be provided by biological principles alone. But he cannot provide us with evolution.⁴

That different strata contain different fossils is evidence of change in the past, but it is not direct evidence of evolution or of the causes of evolution.

Fossils may tell us many things, but one thing they can never disclose is whether they were ancestors of anything else.⁵

Put simply, fossils do not carry labels. What we make of them, we make on the basis of comparative studies, i.e. on the basis of our evaluation of homologies and of the content and significance we attribute to the concept of homology itself:—

... our knowledge that mammals descended from therapsids is based not on their temporal distribution in the fossil record, but on the same kinds of inference from their ancestral characteristics that are used to assess the phylogeny of existing forms that have no fossil record.⁶

C. Evolution and Homology

Evolutionists have traditionally given the concept of homology a purely evolutionary content:—

By definition this similarity is due to an inheritance from a common ancestor.⁷

Similarity due to common ancestry.⁸

Characters that resemble each other because they are descended from a common ancestor.⁹

As such, the concept is 'at the root of all phylogenetic schemes, for it is by means of their homologous structures and the modifications which they have undergone that the ancestry and affinity of organisms are determined.¹⁰

The basic argument is that similarities (of, e.g., structure) between organisms are proof of descent from a common ancestor (with, e.g., that particular structure).

^{*}A.J. Jones, Ph.D., receives mail at "Aotearoa", Landour, Mussoorie, V.P. 248179, India.

The first point to note, therefore, is that this is not a scientific argument, but what Popper¹¹ has called an 'historical interpretation'. It is an attempt to fit known facts into a pattern of past events (evolutionary descent) which is assumed, but which cannot be reproduced or confirmed (since historical evidence is lacking). This lack also entails that the interpretation is based on circular reasoning. In each case the criterion of homology (whether of organs, chemicals, behavior or whatever) is taken to be common origin, but the *only* criterion of common origin—the *only* way it can be recognized—is (by) homology.^{12,13}

In the very nature of the case, it will always be possible to conceive of some pattern of past events which would reconcile any given phenomenon with evolution. Let us imagine, for example, that we have three organisms, A, B, and C, whose evolutionary relationships we wish to study. They each have a particular structure which we regard as homologous in all three. This structure is very similar in A and B but different in C, so we might suggest the following 'historical interpretation':



Figure 1.

-However we have made some questionable assumption. We have assumed,

(1) evolutionary rates and selective pressures have been the same in all lines of descent;

(2) mutations have occurred randomly, all necessary mutations having equal probability;

(3) there has been no convergence and no backward steps. Now we have no reason (i.e. no historical evidence) for making these or any other assumptions. In fact there is no reason why we should not make *any* assumptions that suit us. Noone was there who could 'spill the beans'. This is not just a nice game: evolutionists do indeed permutate the assumptions so that their phylogenies fit their preconceptions.

The cytochrome of the turtle is more like that of birds than that of its fellow reptile the rattlesnake. In fact the amino acid differences in the cytochromes of these two reptiles exceed that found between members of different vertebrate classes. Do evolutionists therefore remove one of them from the Reptilia? No! The evidence does not fit their preconceptions, so they simply assume a faster rate of evolutionary change in some lines of descent, in this case mainly in the line leading to the rattlesnake!⁴

Numerous other examples can easily be found in the literature. There never can be facts which could contradict evolutionary preconceptions in the face of all the reconciling assumptions that are currently available. In this situation there is only one way we can evaluate the arguments scientifically. Even though we cannot test any given historical interpretation as such, we must be able to show that our outlined course of events does not contradict confirmed laws and principles from the relevant scientific disciplines. To do this we must first spell out the implications of the evolutionary approach.

D. Implications of the Evolutionary Approach to Homology

The biologists' evaluations of homologies have produced a hierarchical classification of organisms, i.e. a nested series of ever more inclusive groups. The question therefore arises, 'Why do we find this pattern?'

Why do organisms have to be classified like this? Why are they not strewn in single file up the ladder of the plant and animal kingdoms, or fortuitously like pebbles on a beach, or arbitrarily like the stars in imaginary constellations!¹⁵

Clearly, if a hierarchy of groups exists, it is because there are in the world certain constraints or principles which entail such a hierarchical ordering of groups. Any theory which purports to explain the pattern of homologies must show that the constraints or principles are to be expected in the light of its theoretical assumptions.

If homologies are the result of evolutionary descent from common ancestors, then evolution has conformed to at least the following four principles. Evolution is:—

- (1) a progressive process;
- (2) a conservative process;
- (3) a stochastic process;
- (4) an *inefficient* process.

(1) Evolution is a progressive Process

When evolutionists arrange the known types of organism so as to show their supposed evolutionary history, then it is immediately evident that evolution is, in general, a progressive process-'The striking feature about living creatures is that they are continually becoming more complex, and in this sense more improbable, if this concept has any meaning. During the process of evolution living things have collected more and more information about ways of keeping alive.'¹⁶ The general pattern of homologous organs clearly implies such a principle. For example, from a postulated ancestor with unspecialized limbs, evolution has produced organisms showing numerous variations, both simple and complex, on the basic pentadactyl theme. We have to explain this long-term increase in complexity.

(2) Evolution is a conservative Process

Living and extinct (fossil) organisms can be classified into a relatively small number of basic groups (phyla and classes). What the patterns of homologies demonstrate therefore is that, 'there are large numbers of organisms, differing considerably in the details of structure but constructed on the same fundamental plan.'¹⁷ e.g. that of the insect or vertebrate. Thus we have to explain why these fundamental structural plans continue to be inherited.

(3) Evolution is a stochastic Process

In mathematics *stochastic variables* are of such a nature that every event which occurs limits the number of possible succeeding events.

An example of such a process is embryonic development: the virtually unlimited competencies of the early cleavage cells are progressively restricted as development proceeds.

Evolution is similarly described. Each basic animal or plant group contains many specialized forms. It is generally agreed that the diverse species of each group could not evolve from such specialized forms. The first member (ancestral form) of each major group must have been a 'generalized plastic type'¹⁸ which possessed 'evolutionary or phylogenetic plasticity' and was thus capable of wide 'adaptive radiation' into all the specialized forms. For example, the first mammals are said to have evolved from a group of rather small and unspecialized reptiles which became rather like the modern insectivores such as shrews. Then as the forms specialized in each line of descent so the capacity for further radiation was progressively lost.

Villee et. al.²⁰ presented this principle as one of 'five principles of evolution to which nearly all biologists would subscribe.'

(4) Evolution is an inefficient Process

The arguments from homologies are based on a distinction between *ancestral* characters and *adaptive* ones. It is assumed, for example, that the structural plan common to all the diverse members of a group *cannot* be adaptive for a particular mode of life. Maybe it was adaptive in the ancestral species, but now it is there simply by inheritance. Paul Moody actually defines homologies as,

Fundamental similarities, not connected with similar habits or means of livelihood.²¹

Similarly, embryologists (e.g. de Beer²²) distinguish *palingenetic* (ancient or ancestral characters) from *cenogenetic* ones (special embryonic *adaptations* such as the embryonic membranes of mammals). Once the evolutionary process has begun with a given plan, it is seemingly stuck with it, even when it is no longer adaptive. It is only the specific modifications imposed on that plan during evolution which are adaptive *now*.

Many take the argument further and argue that organisms and organs are generally less than perfect for their function, suboptimal (from Darwin²³ passim to Futuyma.²⁴)

The historical development of the ancestral/adaptive distinction is surprising. It arose historically from the ideas of the German 'nature philosophers' (*Naturphilosophen*) of the early 19th century—who were creationists (though standing against historic Christianity). They asserted that homologous organs corresponded to their representatives in an 'archetype', a hypothetical blue print or exemplar on which groups of similar organisms had been created. The archetype was derived by abstracting all the similarities found in common in a group and ignoring all the variations. It was thus an abstraction. The famous Victorian zoologist, Richard Owen, spread these ideas in the English-speaking world,²⁵ and also introduced the term 'homology' into biological language to cover these similarities in basic structure.²⁶ The fact that the archetypal pattern itself had no apparent functional significance in the diverse members of each group was used as evidence for the existence of the ideal archetypes (in the mind of the Creator). Darwin simply took these ideas over, replacing the archetype with the common ancestor. The lack of function was now hailed as evidence for evolution.²⁷

On any other view the similarity of pattern . . . is utterly inexplicable.²⁸

The argument has been repeated, uncritically, from one generation of textbooks to another.²⁹

E. Is the Evolutionary Approach Scientific?

If the evolutionist interpretation of homology is valid then support for these principles must be forthcoming from the relevant scientific disciplines. We can highlight some of the critical gaps in this support.

(1) The Lack of Progressive Mutants

It is taken for granted in almost all evolutionist texts that genetic systems do proffer for selection some mutants which are more elaborate than the forms currently existing. However, despite the vigor of some of the claims, mutations which produce higher degrees of complexity or organization have *NEVER* been observed. Sir Peter Medawar was right when he stated that, 'the real weakness of modern evolutionary theory' is 'its lack of a complete theory of variation, of the origin of *candidature* for evolution.'³⁰ Worse than this, evolutionists do not have any reason to even *expect* progress. As the famous evolutionist John Maynard Smith has said, 'there is nothing in neo-Darwinism which enables us to predict a long-term increase in complexity'³¹

(2) The Lack of the Genetic Conditions

If the evolutionary interpretation of homologies is correct, then there must exist a 'mechanism' for the production of homologous structures which meets the following requirements:

(a) The mechanism must be *inherited* in some form so that the fundamental constancy of the homologous patterns may be explained;

(b) The mechanism must allow for hereditary alterations in the basic patterns so as to explain the enormous variation in their detailed expression.

The obvious explanation is that the developmental processes which produce homologous organs are specified by particular genes. The inheritance of these genes would explain the constancy of the homologous patterns; gene mutation would explain the variation in detail. This thesis has been assumed by numerous authors.^{32.34} However, it cannot stand today. It is a central statement of neo-Mendelism that there is no longterm persistence of any given relationship between a gene and a feature.³⁵ The genetic criterion of homology must go.^{36,37}

Well, maybe the developmental processes are constant even though genetic determination is not constant. This is possible though we then have no explanation for the constancy of the developmental processes. However there is no need to worry, because the developmental conditions of homologous organs are *not* constant. Indeed, as long ago as 1894 the great E.B. Wilson had stated that, 'Embryological development does not in itself afford at present any absolute criterion whatever for the determination of homology...''³⁸

The intervening years have only confirmed the soundness of his judgment.

By 1938, it was clear that genetic and embryological criteria of homology had failed and deBeer was asking his fellow evolutionists what mechanism could it be that maintains the homologous patterns.³⁹ In 1971, he asked, 'if it is true that through the genetic code, genes code for enzymes that synthesize proteins which are responsible (in a manner still unknown in embryology) for the differentiation of the various parts in their normal manner, what mechanism can it be that results in the production of homologous organs, the same 'patterns', in spite of their not being controlled by the same genes?'40 Thus after more than 30 years he has to report that the question is still unanswered and that, 'the pride with which it was assumed that the inheritance of homologous structures from a common ancestor explained homology was misplaced' for homology is (for evolutionists) still 'an unsolved problem'. That is the situation today.41

Again we must conclude that the evolutionist argument from homology lacks scientific content. This particular lack has very serious implications; it strikes at the root of all attempts by evolutionists to give homology an objective basis and distinguish *homology* (similarities due to descent) from *analogy* (similarities *not* due to descent). The only way they can recognize analogous variation, especially when due to convergent evolution (*sic*) is by criteria (e.g. genetic or embryological) which we now know do not hold for organs of 'unquestionable' homology. The evolutionist concept of homology is now shown to be entirely subjective, as Blackwelder has long claimed:—

Taxonomists have never had an objective basis for homology . . . they cannot at present give it any objective basis, even though it is a logical necessity in the evolution of animals.⁴²

A problem indeed!

F. Logical Problems with the Ancestry/ Adaptation Distinction

(1) Methodology

The evolutionist argument assumes that only the various detailed expressions of a homologous pattern are adaptive now, but that the essential pattern itself is no longer adaptive. The question that must be asked is, 'How do evolutionists know that the basic patterns are non-adaptive?' It must be asked because it is, in fact, logically impossible ever to demonstrate non-adaptation. There are no *positive* criteria by which non-adaptation can be recognized and demonstrated. The *only* way non-adaptation can be demonstrated is by the ruling out of every conceivable adaptation (function). This is impossible because there will always be an infinitude of conceivable functions. There may not, in-

deed, be one prime function: the structure may be an optimal compromise between two or more partially incompatible specifications. Again the structure and/or function may change or adjust or even disappear during a specific stage of development or in response to environmental changes which affect the organism. Only after a great deal of careful research are we allowed the luxury of even *suspecting* a lack of function.

On the other hand research can produce positive and cumulative evidence for the adaptive function(s) of a given feature or plan.

This being so, we can only conclude that evolutionary science has been very bad science. Non-adaptation has simply been dogmatically assumed: little or no research had ever been done. It has always been fashionable for evolutionists to dismiss creationist science as 'God-ofthe-gaps' science, yet, in reality, it is the evolutionist who puts evolution in the gaps in our knowledge and who is continually retreating as those gaps are closed. Some examples will make the point.

Example 1. The Pinna

Darwin, on the basis of no evidence, argued that the external ear (pinna), together with its extrinsic and intrinsic muscles is vestigial in man and the great apes.⁴³ Cain's prediction was fulfilled:—

If it is taken dogmatically that many characters *must* be non-adaptive then of course there will be no motive to investigate them, and they will continue to be quoted as non-adaptive whether they are or not;⁴⁴

It was not until 1959 that any research was done! It was then quickly, and easily, demonstrated that the pinna performs 'an acoustical transformaton which is essential to localization in human hearing'.⁴⁵ If the pinna has a function then it must be provided with sufficient musculature to maintain the necessary blood supply. It is often forgotten that muscles serve other functions besides the movement of body parts!

Example 2. The Evolutionary Series of Vertebrate Cardiovascular Systems

Evolutionist texts have always placed different animal types in series which purport to show how 'advanced' types have been derived, in evolution, from more 'primitive' types. In the presentation of these series, the standard of comparison is the 'fully evolved' type put at the head of the series, the other types being seen as imperfect or less perfect solutions to the problems 'solved' by the 'perfect' type. The features of an animal are 'advanced' if like the condition found in the 'fully evolved' type or 'primitive' if like the condition found in the supposedly ancestral type. A classic example is the arrangement of the land vertebrate types to show the 'progressive' adaptation to terrestrial life (amphibia \rightarrow reptiles \rightarrow birds and mammals). However the evolutionist comparative anatomy which dominated biology until the 1940's was atomistic-and disastrous. Organisms were disintegrated into separate parts and organs whose structures were studied out of all relation to the context of a whole living organism adapted to a particular environment⁴⁶-museum jar biology! It is still true today that, 'Even for an expert it is very difficult to imagine how the various organs fit together.'47 or what a particular organism does with most of its characters.

In the land vertebrate series, the prime exhibit has been the 'progression' in heart structure from the twochambered fish heart to the four-chambered bird and mammal heart which is said to represent the optimal solution to the problems of terrestrial life. The amphibia, in particular, have had a raw deal, being seen as 'imperfectly adapted to terrestrial life', even 'phylogenetically senile'.⁴⁸ Such are the stultifying effects of a false methodology.

The amphibian heart is in fact remarkable specialized, being fully adapted for a respiratory regime in unique amphibious animals which utilize both cutaneous (skin) and pulmonary (lung) respiration.⁴⁹ Similarly, the reptiles have cardiovascular systems which are highly specialized for their particular modes of life.⁵⁰ The 'perfect' four-chambered hearts of 'higher' vertebrates would be very 'imperfect' for amphibians or reptiles. The relationship of the different heart types to one another is not that of 'primitive' to 'advanced' in an evolutionary series. They are equally optimal solutions to the problems posed by different modes of life. It must be emphasized that no valid comparison of structures can be made when their respective functions in the life of the organisms concerned have not been elucidated.

Example 3. The Monotreme and Marsupial Mammals

The mammal groups have usually been arranged so as to show the trend of evolution from 'an early and incomplete stage of development'⁵¹ in the monotremes and marsupials through to the 'perfect' adaptations of the eutherian mammals. This was again a consequence of the evolutionist approach to comparative anatomy which, in this case, was enshrined in T.H. Huxley's classification of mammals into Proto-, Meta- and Eutheria. As Tyndale-Biscoe notes, 'Huxley's idea has had a long and baneful influence on the understanding of marsupials and monotremes.'⁵²

One of the main exhibits has been the different body temperatures. Monotremes maintain temperatures at 31 ± 2 °C; Marsupials at 36 ± 2 °C and Eutherians at 38 ± 2 °C. When these facts were first reported (in 1897 and 1903) it was also claimed that monotremes and marsupials were unable to maintain their body temperatures against an ambient temperature gradient. 'Obviously' eutherians have evolved the best thermostat setting and the most efficient thermoregulation.

It was, again, an argument from ignorance, for little serious research was done until the 1960's! Schmidt-Nielsen admits that, 'There is no *a priori* reason to regard a lower body temperature as physiologically inferior... The fact is that we do not fully understand the advantage of any given body temperature.'⁵³ Contrary to the earlier assumptions there is no evidence that monotremes or marsupials are physiologically any less sophisticated. They are, in fact, excellent temperature regulators and their lethal temperature is about 6 °C above normal core temperature just as it is in eutherians. When corrected for temperature, the metabolic rates are the same for all types of mammals.^{54,55} There is no need to cite further examples. Research has invariably uncovered strong evidence of adaptation whenever supposedly non-adaptive or imperfectly-adaptive features have been investigated.⁵⁶

(2) Natural Selection

In recent years, many neo-Darwinists have expressed disquiet about the ancestry/adaptation distinction.⁵⁷ The source of the disquiet is that the distinction seems to contradict all that they affirm of natural selection. Plants and animals display a wide range of admittedly precise adaptations which enable them to exploit almost every conceivable environmental niche in sea, land or air. Some of these adaptations are so remarkable and intricate, with such a complex interaction of vital parts (even of more than one organism) that one can only marvel at the tremendous power of natural selection. How, then, can such a powerful force fail to perfect body parts and organs if they are imperfectly adapted? Ever since the pioneering theoretical studies of R.A. Fisher (1930) geneticists have argued that any gene that has an advantage of even as little as one per cent (i.e. organisms with that gene will tend to leave, on average, 1 per cent more offspring than organisms without it) will spread through a population. J.Z. Young cites these studies and continues, 'We cannot safely assume therefore that any conscious feature is developed just by chance, nor that an organ is retained simply as a vestige . . . We are better employed trying to find out what such organs as the appendix or the pineal gland do than in speculating about their vestigial' nature.'58

This contention gains force when we remember that in evolutionary series, the supposedly ancestral groups have, by that token, been in existence *longer* and thus subject to selection for *longer* and have survived the rigours of selection for a *longer* time.

Yet another consideration has forced biologists to reconsider the ancestral/adaptation distinction:

NOT



diverse adult livers

BUT

diverse beginnings

uniform liver structure

Figure 2.

In his reappraisal of liver structure, Elias found that all vertebrates possess a fully developed liver with a remarkable uniformity of structure. Yet this uniform adult structure is produced by an astonishing diversity of developmental processes.⁵⁹ Contrary to earlier recapitulation ideas, the reality is as shown. How can this be explained by evolutionists? The only suggestion Elias can make is that the adult structure is, 'not only the best but also the worst possible, i.e. the only tolerable structure which a liver must have to assure survival.'⁶⁰ Different modes of early development are possible, but only if they lead to the *one* tolerated end result.

The same situation is found for some other organs and indeed for the whole vertebrate body plan. Haeckel's famous diagrams showing the parallelisms in early vertebrate development⁶¹ have been rightly criticized for the way in which the original figures of other authors were doctored to demonstrate the similarities, but that is not the major point that must be made. The crucial point to make is that the diagrams begin-quite arbitrarily-with a relatively late stage in development which already shows the full layout of the basic vertebrate body plan (four body regions-cephalic, pharyngeal, abdominal, caudal-six basic organ-forming areas-epidermal, neural, noto-chordal, 2 mesodermal, endodermal-and the rudiments of the major parts and organs-brain, nerve cord, notochord, somites, heart, ears, eyes, kidney, liver etc.). If we start at the logical place-the fertilized egg-the argument loses all its force. The remarkable uniformity of the vertebrate body plan is attained by an astonishing diversity of developmental processes. The eggs of the different classes differ radically in their yolk content, in their size and shape, in their cleavage patterns, in their blastula type, in the organization that prepares them for gastrulation and in the processes of epiboly and gastrulation. Just prior to organ formation the different forms come to resemble each other quite closely (the *phyletic stage*) and then diverge again as development proceeds to the different adult types.⁶² The overall pattern is thus as shown right.

As Cohen notes, the same pattern obtains in other phyla:

Equally, the embryos of the other phyla of the animal kingdom are frequently very diverse from fertilization through cleavage, but allied forms come to resemble one another just prior to organ formation; then they diverge again as development proceeds.⁶³

With so much divergence in early development for natural selection to utilize, it is evident that the body plans would have been reconstructed if that would produce better adaptation to specific modes of life. Elias' argument is clearly the most reasonable to apply here also: the *phyletic stage* of development is not only the best, but also the worst possible, i.e. the only tolerable intermediate stage.

Since evolutionary texts make much of the embryonic aortic arches of land vertebrates (often, but quite incorrectly, called 'gills'), we can fittingly conclude this section with a comment from Arthur Cain,



NOT

diverse adult types

... we know so little about the actual mechanics of development that this may be one more argument from ignorance... the developmental features of classes, subphyla or phyla are more likely to be those best suited for producing a given basic plan.⁶⁴

(3) Convergence and parallelism; serial homology and sexual homology

There are three classes of apparent homologies which cannot be explained in terms of evolutionary descent from a common ancestor.

The *first class* consists of similarities found in forms which evolutionists can not regard as descended from a common ancestor possessing the feature in question. It has long been recognized by the experts that convergence and parallelism are extremely common.⁶⁵⁻⁸² Creationists, too, have discussed the topic.⁸³⁻⁸⁷

Evolutionists, following Darwin,⁸⁸ usually assume that convergence will never be so good as to mislead us,

but this assumption is quite gratuitous (see Section E(2)) as the continuing arguments in the literature demonstrate, e.g. Old World and American porcupines;⁸⁹ compound eyes of crustaceans and insects⁹⁰; the fine structure of cilia in diverse animals and plant; epibranchial organs in diverse fish⁹¹ and so on. On Darwinian assumptions these phenomena clearly demonstrate the strongly adaptive nature of the 'homologies' concerned.

The second class (serial homologies) concerns those similarities between organs repeated along the anteroposterior axis of one and the same organism, e.g. forelimbs and hindlimbs in land vertebrates; feeding, walking/swimming and respiratory appendages in arthropods; and gill arches and jaws in fishes. In no case can the similarities be traced back to any ancestor with a single pair of limbs, appendages or gill arches. At most it may be said that there has been a reduplication of pattern, but what does that explain? Why, for example, should there be in vertebrate *fore-* and *hind-*limbs, one upper bone, two lower bones, followed by groups of small bones and finally ending in five digits? It is 'A most remarkable convergence.'⁹² It is strongly suggestive that this is simply the most efficient basic pattern.

The final class (sexual homologies) concerns the detailed correspondences between male and female genital systems. In mammals the male testes corresponds to the female ovaries; the scrotum corresponds to the labia majora and vulva (in abnormal cases the ovaries undergo 'descent' like the testes and pass into the labia)' the penis corresponds to the small clitoris (which also contains erectile tissue); part of the prostate corresponds to the uterus; the male has rudimentary mammary glands (which may even produce milk in newborns in response to the mother's hormones). The correspondences are remarkable, but it is impossible to explain them in traditional evolutionist terms. The rudimentary organs in each sex can hardly be regarded as vestigial since 'it is not possible to refer them to a single representative in a common ancestor, which in vertebrates was certainly not hermaphrodite.'93 Again the suggestion is there that this must be structurally and functionally the best way of producing the basic genital plan.

G. Conclusion to Part One.

On the one hand, these considerations abundantly demonstrate that the evolutionist has no scientific argument from homology at all.

On the other hand, the growing evidence for a soundly functional interpretation of the great body plans points the way to a creationist interpretation which will be developed in Part 2.

PART TWO-OPTIMAL DESIGN

A. Introduction—the Definition of Homology

The purpose of a definition is to state precisely what something is so that we may recognize it and distinguish it clearly from other things with which it might be confused. The 'definition' of homology in terms of evolutionary descent is thus clearly not a *definition* at all, for evolutionary descent is rather a (supposed) *con*- dition of homology. We certainly cannot recognize homology by means of a factor that (supposedly) explains its existence. We recognize something by its properties, not by its pedigree.^{94,95}

However, the definition of homology is a real problem. Homology is a structural concept which cannot be captured in a scientific definition. Science investigates the functional aspects or *modes* (numerical, spatial, physical, etc.) of reality. To do so it has to abstract from the integral wholeness of reality.⁹⁶ Consequently, it is unable to grasp coherent patterns, forms or structures. These it must presuppose even though they cannot be explicitly stated in the form of scientific propositions. It is simply a fact that much of our knowledge is inherently tacit and intuitive as Michael Polanyi has abundantly demonstrated.⁹⁷ This tacit (but integral) *subjective* knowledge of reality is the inescapable context of all our *objective* scientific understanding.

The only way we can recognize homology, and thus define it, is by congruence of characters. The author of the term, Sir Richard Owen,⁹⁸ defined homology as follows,

correspondence of a part or organ determined by its relative position and connections with a part or organ in a different animal, the determination of which homology indicates that such animals are constructed on a common type. (cf the *principe des connexions* of E.G. Saint Hilaire.⁹⁹)

This definition can scarcely be improved. The recognition of homology is the result of an often long and tedious process of study and comparison between two organisms. The resulting statement of homology indicates a conclusion referring to whole organisms ('constructed on a common type') and not simply to one pair of corresponding structures.¹⁰⁰ We can now illustrate the point made above. Owen's definition is not really a scientific one because the critical term 'common type' is not defined; indeed it *cannot* be scientifically defined.

As we work with and study a group of animals (or plants) we acquire a 'feeling' for the group and gradually build up a concept of that 'type' or organism. But we cannot specify this 'type concept'. It is not the 'type specimen', nor is it a character-list. Rather it is a 'Gestalt' which integrates all our knowledge of the organisms-their anatomy, embryology, behavior, ecology etc., as far as we know them. Typology, in this sense, is absolutely essential to biology; indeed it is inescapable.¹⁰¹⁻¹⁰⁹ Once we relegate the 'character-list' to its rightful position in taxonomic description (where it is, of course, irreplaceable) then we can avoid the confusion with so-called 'intermediate' and 'aberrant' forms. Thompson¹¹⁰ writes in regard to his experience of a difficult insect group that the extension of observation to more and more individuals of the group and thus to more and more points in structure and function, did not lead to a blurring of his concept of the type (as believers in an ultimate evolutionary continuum might have expected). On the contrary his concept of that type became increasingly distinct. I had the same experience when studying the extraordinary diversity of fishes which belong to the family Cichlidae.¹¹¹ Whereas the aberrant forms perplex a newcomer to a group who has to rely on the character-list (which is continually subject to revision) they pose little problem to the expert whose type concept is the integration of a long experience of the living, behaving organisms. Taxa, as Whewell noted long ago¹¹² are given by type not by definition.

This brief analysis should make it clear that, far from being an embarrassment to creationists, homology is very much a creationist concept—it entails a recognition of distinct types of organism.

B. Creationism

Before proceeding to a more detailed evaluation of homologies, we need to articulate certain aspects of creationism and clear away a few misunderstandings.

Evolutionists routinely insist that creationism does not belong to science because you cannot observe creation or in any way investigate it. This self-serving reasoning is plausible only when it is ignored that the term 'creation' has two distinct meanings—the original creative acts (creatio) and the results of creating, the created things (creatura). It is undeniably true that creatio is not open to scientific investigation, but it is equally true that creatura—the laws and phenomena of the created universe—is most definitely open to meaningful investigation in terms of creationism. The kinds of relationships we observe in the universe provide much positive evidence for creation and through them we can discover much about the Creator's methods and thus about the Creator Himself.

If, for example, we investigate a human 'creation' such as an aeroplane, then we can come to an understanding of all the laws and phenomena involved in its *operation*. These will not enable us to explain the *origin* of the aeroplane (*creatio*) but they will certainly tell us two things.¹¹³ Firstly, they will convince us that the aeroplane was created—it could never result from aluminum, glass, wood, etc., doing 'what comes naturally' (its property of flying is a result of a total organization imposed by intelligence on a collection of non-flying parts). Secondly, our investigations will tell us much about the manufacturer's methods and thus also about the manufacturer (designer) himself.

What, then, does the Biblical revelation lead us to expect?

Firstly, creation will show plan and purpose. Creation is not by magic.¹¹⁴ A magician says the word and it-anything-happens and it happens immediately, automatically and without cost. When the sovereign God creates it is according to a pre-determined plan which He maintains consistently throughout time (Eph. 1:9-10; Heb. 11:3). He created the universe by His wisdom (Jer. 10:12; 51:15) so that it reveals His sovereign power and glory-indeed His very Godhood (Ps 8:3-4; 19:1-6; 136:1-9; 139:14ff; Is 40:12ff; Rom. 1:20). The unerring regularity of the movement of the heavenly bodies is a token that God is a faithful Creator, one who will keep all His promises (Jer. 31:35-36; 33:25-26). Everything created has a purpose, a role to play in God's plan (cf Rom 12:4ff; 1 Cor. 12:12ff; Eph. 4:15ff; Col. 2:19).

Secondly, created things are optimally designed.

Since man was created in God's image (Gen. 1:28) we can draw some cautious conclusions from human creativity. A great inventor distinguishes himself in certain main ways—in the efficiency of function of his invention and in the economy of material, time and effort involved in its production, operations and maintenance.

When humans design their lack of omniscience allows errors to be incorporated so that revisions and redesigns are necessary. It is extremely rare to find a first design that fully accomplishes the desired results. With the advantage of hindsight, improvements can easily be suggested. When a series of redesigns has been completed we can say that the end result has been 'optimized', i.e. we have a design that operates with maximum efficiency under the appropriate conditions and which in its production, operation and maintenance keeps the expenditure of materials, time and effort to a minimum. When an omniscient God creates we may expect the first design to be optimal and the optimizing process absent.¹¹⁵

Creation, in the sense just outlined, has always been an extremely fruitful concept and it is not coincidental that the great scholars who established and developed the scientific tradition were Christian in their thinking.¹¹⁶ In many cases their specific discoveries were a direct result of a fearless application of the creation idea.¹¹⁷

C. The Phenomena of Homology

The phenomena requiring explanation may be detailed as follows:

(1) Homologies are present in hierarchical patterns. Some homologies characterize a wide range of groups (e.g. the pentadactyl limb is characteristic of all land vertebrates); others are of more limited occurrence (e.g. feathers are characteristic only of birds). The result is a hierarchical classification—nested sets of groups traditionally placed in categories (taxonomic levels) called phyla (for the most inclusive groups), classes, orders, etc.

(2) There is a relatively small number of distinctive architectural styles of organism. For example, there are only about 30 major types of metazoan animals. These are the largest groups that can be characterized by coherent patterns of homologies. Traditionally these groups are placed at the phylum level in biological classifications. Some eight are large groups with a wide variety of types (Vertebrata, Arthropoda, Mollusca, Annelida, Coelenterata, Echinodernata, Brachiopoda (mostly extinct) and Nematoda). Another ten or so are moderate in size, but the rest are small or even very small and almost all of these latter groups consist of marine organisms only.

A similar pattern obtains at all lower taxonomic levels, i.e. most groups contain some subgroups with a wide variety of types, some with a moderate variety of types and a larger number of small or very small subgroups.

(3) The body plans of the groups are embryonic plans or particular patterns of development. In their development all organisms unfold ('evolve'!) a special adult expression of the embryonic plan. The distinctive embryonic plans characterize phyla and so may be called *phyletic plans* (cf *phyletic stage*, in Part 1.)

(4) At all levels in the classification there is a mosaic distribution of characters within groups. In each group there is a limited, though varying, number of types of those organs or structures which are always present and these are distributed more or less evenly among the various subgroups. There are also some structures which may or may not be present. These are distributed, apparently impartially among the various subgroups. It is as if, to follow Douglas Dewar's analogy,¹¹⁸ we have 50 hands of 13 playing cards, all different, each with one card of each denomination (ace to king), but with some hands with 1 or 2 blank cards for cards of low denomination. These 50 hands could represent the distribution of characters in 50 subgroups of a large group. It is this fact, incidentally, which vitiates every attempt to draw up genealogical trees of the animal groups.119,120

(5) There is a high degree of mixture of design features ('convergence' in evolutionist parlance) both within and—more significantly—between groups at all levels, e.g. camera-type eyes are integrated into both the molluscan and vertebrate phyletic plans.

(6) All animals that have been adequately investigated have been found to be specialists. Although many can adjust to diverse regimes (e.g. utilizing whatever food source is most abundant) all have a particular environmental niche to which they are pre-eminently adapted. It is usually only in times of stress that most animals are restricted to their special niche. Thus we can distinguish between obligate and facultative specialists, but generalized organisms are nowhere to be found.

The author had an interesting experience which is very relevant to this point. For several years he studied the cichlid fishes (a family taxon of over 1,100 species of freshwater fishes found in tropical and subtropical waters of both the Old and New Worlds). One species studied ('Brown Acara') is wide-ranging in Central and South America and in all visible features it seems to be as 'generalized' a cichlid as one could wish for-an ideal 'ancestral' cichlid. But one night the air pumps supplying the aquaria failed and by morning most of the cichlids were dead-except the Brown Acaras, not one of which was affected! It was then that the truth was discovered. The Acaras are specialized, possessing a highly vascularized gut which acts as an efficient accessory breathing organ ('gill'). The Acaras are widely distributed because they are specially adapted to a common habitat of the tropics-stagnant water!121

D. Principles of Creation

If the patterns of homologies are the result of creation, then creation has conformed to at least the following four principles:

(1) Creation has conformed to limiting constraints.

A limitation of patterns implies limiting constraints. It is our contention that the phyletic plans represent the main possible solutions to the problems of life, the main designs for living in the environments found on Earth. Some of these solutions are capable of rich and diverse expression to meet more specific environmental demands. Other solutions are only capable of a more limited expression. This principle applies at all taxonomic levels: hence the disparate sizes of the subgroups of each group.

(2) Each organism is a unique combination of complete, functionally integrated traits.

Environmental demands necessitate adaptive features (traits) to meet the problems which they pose to a living organism. Each kind of living organism is a unique combination of specific design elements (adaptive traits) well-integrated into a distinctive type adapted to a particular range of environmental contingencies.

Some patterns of organization (e.g. of cells) and some design elements (e.g. cell membranes) answer to universal demands and so are universally present. For example, living systems are steady-state open systems which maintain their organization in a position away from equilibrium with the environment. Hence the universal presence of a bounding membrane (cell membrane) which can allow, but actively regulate, a throughput of materials so as to prevent the organism coming to equilibrium.

Other design elements are of more or less restricted distribution. Those which are always present in the members of a group (e.g. feathers in Aves) are essential to the basic adaptation. Those which may be absent (e.g. the long, sticky tongue of the flicker woodpecker) are necessary for adaptation to specific niches only.

Specific design elements which are capable of general application (e.g. camera-type eyes) may be integrated into different phyletic plans.¹²²

(3) Creation conforms to a mosaic pattern of trait distribution.

The pattern of trait distribution is correlated with the environmental patterns to which the organisms are adapted. There are no genetical or evolutionary (branching) relationships between habits and niches, but rather a mosaic or kaleidoscopic pattern of environmental demands (or restrictions) on organisms. Consequently, in each group, we would expect to find a corresponding mosaic pattern of adaptive traits, i.e. a creationist *ecological* explanation of the pattern of variation. Such a pattern would be expected to obtain at all taxonomic levels, i.e. to traits of wide distribution as well as to those of more restricted distribution. Evolutionary branching patterns of trait distribution, suggestive of descent from common ancestors, will not be found.

(4) Creation designs are optimal from the start.

This perfection has no history. Only complete, fully functional traits will be found, whether in living organisms or in extinct ones known only as fossils. Evolutionary transitions—incomplete (part-way) traits —showing the trial and error development of optimal results, will not be found.

E. The History of the Optimal Design Approach

The perfection of structure for function has always been the expectation of creationists as the long lineage of books describing it demonstrates.¹²³⁻¹²⁶ Later in the 19th century we have the prestigious 'Bridgewater Treatises on the power, wisdom and goodness of God as manifested in the Creation.' (1833-1836). Of the 12 volumes in this series, the best known is probably that by Sir Charles Bell on 'The Hand',¹²⁷ which went through many editions during that century.

It was not until evolutionary ideas began to dominate that things changed. From the 1870's a false methodology reigned supreme. There was an immense concentration of effort in comparative anatomy and embryology, but it was all largely descriptive because the main object was the tracing of ancestries. In Britain, at least, physiology was allowed to become an independent and medically-orientated discipline with experimental methods which were hardly applicable to most organisms. G.P. Wells was hardly exaggerating when he wrote that, 'a great darkness had settled on the majority of British zoologists in the early years of this century.'¹²⁸

Things were little better elsewhere. When he attempted to explain development in terms of actual physical causes he met with the retort that, 'We have better things to do in embryology than to discuss tensions of germinal layers and similar questions since all explanations must of necessity be of a phylogenetic nature.'¹²⁹

By the time of the Second World War it had become abundantly clear that the evolutionary approach was barren, though this has rarely been admitted. After the war things changed rapidly, but it is sad to report that through all this period no significant creationist writing appeared. It was a medical scientist, David Cohn¹³⁰ who in 1954 resurrected the older approach when he put forward the idea of 'optimal design' in a paper on the vascular system. The 'Optimal Design' approach is simply the assumption that each organ or part is constructed in such a fashion that, within its appropriate environment it will function in an optimal fashion with respect to efficiency of operation, energy expenditure and ease of maintenance. Any other design, substituted for the actual organ, will in some sense result in a lowering of the overall metabolic efficiency of the organism. Rashevsky¹³¹, Rosen¹³² and Rudwick¹³³ have developed the idea; and Dullemeijer¹³⁴ has written on the methodology. More recently, creationists have again taken up the approach, the monograph of Marlyn Clark¹³⁵ on cardiovascular fluid mechanics being an outstanding example:

... The human body's complex subsystems are optimized. If, for a given human mechanism, an optimum operating characteristic has somehow been determined, the body will be found to be operating at this optimum. If a range of an operating characteristic is involved and, if one point in the range is more crucial to well-being than the others, the optimization will occur at the crucial point.

The support for this approach is now so extensive e.g. Cain,¹³⁶ that creationists can pursue it with confidence. See Part 1.

F. Conclusion

Contrary to the popular, self-serving reasoning of the evolutionist establishment, a creationist interpretation

of homologies is not only a valid scientific approach, but provides a working hypothesis of immense heuristic value. Indeed its fruitfulness has been demonstrated through three centuries of application. Specifically it makes three falsifiable predictions:

- (1) The biological features of each kind of organism will be found to be optimally adaptive for the organisms in their normal environments.
- (2) The eco-ethological correlation (that with normal habits and environment) will always be totally consistent. A consistent correlation provides positive justification for the creationist interpretation.
- (3) Correlation with a supposed evolutionary descent of types will only be consistent to the extent that it parallels the adaptive (eco-ethological) correlation. Elsewhere it will be inconsistent showing that evolutionists have no positive criterion which could be used to justify an evolutionary interpretation.

Thus we assert that the biological features of both living and extinct (fossil) organisms provide clues to the normal environment and habits of these organisms, *not* to evolutionary relationships.

The oft-repeated argument that Creationism is unacceptable because it is 'God-of-the-gaps' science is seen to be fallacious. It is doubtful if any Christian scholar has ever been guilty of practicing such science.¹³⁷ Historically and currently, it is the evolutionists who have been practicing such bad science. Their foundational argument for evolution (from homologies) has been based on nothing more than their ignorance of the adaptive significance of many of the biological features of organisms. As science has advanced its frontiers, those gaps in our knowledge have steadily been closed—and it is evolution, not the Creator, that has thereby been squeezed out.

PART THREE: APPENDICES

Appendix One: The Created Kinds

In an earlier article¹³⁸ I presented the Biblical evidence that demonstrates that the Biblical term 'kind' (Hebrew *min*) is a technical term and that there is full justification for the use of the term by present-day creationists to denote the distinct created kinds of animal and plant. Strangely this analysis has been ignored by later writers and, in particular, by those who contest that conclusion, e.g. Strickling.¹³⁹ However its arguments have not been refuted.

In two articles following the one just mentioned^{1+0,1+1} I marshalled the Biblical evidence that indicates the taxonomic level or category (in current classification schemes) in which these kinds should be placed. This Biblical evidence *demonstrates conclusively* that many kinds cannot be placed as low as the species level. The evidence strongly *suggests* that kinds often lie at the family/subfamily level in current animal classifications. Lammerts¹⁺² and Howe¹⁺³ have concluded that vertebrate families seem to be based on character differences that in plants distinguish *genera*. Consequently, Howe tentatively proposed that in plants the *genus* is frequently the modern counterpart of the created kind.¹⁺⁴ Ten years later I am more confident than ever that the basic equation of animal families = kinds is correct. These units *are* a recognizable reality and distinct at all times and in all places. It is a notable fact that modern classifications often agree in minute detail with the 'folk classifications' of so-called primitive people, and that what is recognized as a distinct 'kind' is indeed usually the 'family' of modern zoology.

Hugh Tyndale-Biscoe145 comments on the mosaic pattern of character distribution in marsupials as follows: 'By comparing the various criteria available it becomes clear that one must hesitate to ascribe the terms primitive or advanced to the several groups, rather one must acknowledge that no living species is any less evolved than another and all have diverged to different degrees from their remote predecessors. It is also evident that several remarkable convergences must have occurred independently in different groups so that it would be unwise to draw conclusions about closeness of relationship.' He then continues, 'What does become evident, however, is the unity of species within groups, regardless of criteria used, which encourages the belief that these are natural groups; how the separate groups are related in time, however, must await a far better fossil record than is presently available. These natural groupings within marsupials have usually been given familial rank . . .

I came to the same conclusion when studying a number of teleost (fish) families.¹³⁶

Similar confessions abound in the literature. Phillips Dales writing of the polychaete annelids (true worms) states that, 'in considering the evolution of the Polychaeta we are faced with two difficulties: First, the existing families are very distinct, . . . and, secondly, there are no fossils worth mentioning'¹⁴⁷ Van Tyne and Berger¹⁴⁸ write of the birds that, 'many families are so well marked that there is not the slightest disagreement among ornithologists about which species should be included in those families.' The entomologist William Thompson writes that, 'We can tell at a glance to what Order or Family a particular insect belongs.' In contrast, 'there is often controversy and uncertainty about the definitions of genera, species, and varieties.'¹⁴⁹

It is basically only in the groups of clean animals that there is disagreement about families, but then only because the wealth of variation tempts some zoologists to try to divide the natural groupings.¹⁵⁰

Appendix Two: The Created Kinds and Homologies

For creationists, the created kinds are the basic units in nature. In an earlier article¹⁵¹ I gave some of the evidence that suggests that the basic organizational patterns of an organism's structures and processes are coded in cell membrane templates (the *cortome* system). Thus I would suggest as a working hypothesis that the created kinds are the least-inclusive (lowest-level) taxa which are characterized by a distinctive *cortome* pattern, i.e. the basic pattern of homologous organs is controlled by the cortome system. Put another way, the major *condition* of *kindness* is that the organisms share in a common style of embryonic development, whose unique organizational pattern is encoded in the cortome.

Different expressions of these patterns, giving lowerlevel taxa, would then be produced by genic mechanisms (the *genome* system).

Incidentally (*pace* Sicgler,¹⁵² and Morris¹⁵³) the existence of distinct created kinds does *not* mean that all the other more inclusive groupings are artificial or arbitrary. These other groupings, when properly distinguished, are a natural and recognizable reality. The rationale has been given in Part Two of this article.

Appendix Three: The Historical Consistency of the Creationist View

There is a notable consistency in the creationist position on this matter of the created kinds.

It was not until the 17th century (when the folklore and mythology began to be removed from the Western tomes of Natural History) that a biological understanding of the created kinds became possible. In 1686 ('Historia Plantarum' Vol. 1) John Ray defined 'species' as groups with mutual fertility. In 1735 Carolus Linnaeus (Systema Naturae, 1st Edition 'Classes Plantarum') identified these 'species' with the created kinds. It was a mistake and after years of specific research in plant hybridization, Linnaeus concluded that he had indeed drawn the boundaries of the kind too narrowly. In 1774 ('Systema Vegetabilium') he settled on the genus as the created kind. In the pre-Darwinian era this was the view of most creationist naturalists (evidence for this can be found in, of all places (!), the 'Historical Sketch' which Darwin placed at the front of his 'Origin of Species'). Since then, there has been a general tendency for Linnaeus' animal genera to be promoted into the family category (a category which Linnaeus did not have) whereas his plant genera have tended to remain in the genus category. This being so, we can claim that creationists have been in general agreement over the identification of the kinds for over two centuries!

Appendix Four: The Created Kinds in Taxonomy

I would agree¹⁵⁴ with Siegler¹⁵⁵ and Ancil¹⁵⁶ that we adopt Marsh's term *baramin*^{157,158} for the taxonomic level which contains the created kinds. The groupings placed at this level would be distinguished by the suffix *-imin* (this is preferable to Siegler's *-min*¹⁵⁹ as it brings the suffix into conformity with *-idae*, *-inae* etc.), e.g. *Equimin* (horse kind); *Canimin* (dog kind) etc.

Marsh¹⁶⁰ argued that, 'from the standpoint of unity, convenience and practicability' creationists should adopt current evolutionist classifications. He concluded that, 'a creationist classification would be a challenging and interesting endeavor, but it would possibly largely be love's labor lost because evolutionists would not use it, and the resulting confusion would finally bring taxonomy to a complete impasse.' Siegler¹⁶¹ concurs with this conclusion when he suggests that the creationist insert one additional category—the *baramin* category into current systems at whatever level is appropriate in each case. Ancil, however, asks if it is not time for a creationist taxonomy. 'Need creationists be bound by the conventional categories and criteria?'¹⁶²

These different views are not incompatible. The con-

ventional categories (phylum, class, order etc.) are largely, I believe, acceptable (they were, after all, the product of creationist thinking!). Current schemes simply need to be reformed in two main ways—

Firstly, we should urge on our evolutionist colleagues the need to ensure that classification schemes recognize only natural groups (cf Appendix 6). The so-called 'cladist'' taxonomists (G.J. Nelson; C. Patterson; N. Bonde; N.I. Platnick et al) have done much to aid creationists in this regard. Colin Patterson writes that, 'as the theory of cladistics has developed, it has been realized that more and more of the evolutionary framework is inessential, and may be dropped.'103 The leading cladist, Gareth Nelson, wrote to Patterson (summer, 1980) that, 'In a way, I think we are merely rediscovering pre-evolutionary (i.e. creationist!—A.J.) systematics; or if not rediscovering it, fleshing it out.' It is not surprising that other evolutionists are unhappy with them. Alan Charig¹⁶⁴ correctly says that cladistics is really 'natural order systematics'. He wonders, 'what the 'natural order' can possibly mean if it does not indicate any type of phylogenetic relationship'. He is unhappy because creationists can accept the cladists' phenetic schemes. Fascinating!-and we are not even involved in this virulent controversy!

Secondly, if we can agree on which category of current schemes usually hold the baramins, then we should work to bring all deviant groupings into line at this level. Outside our own circles we can use the conventional name for this level (*family*, *genus*).

One word of warning. It is important to remember that *baramin* is primarily a taxonomic *category* or *level*. Whether or not a grouping is regarded as a created kind depends on our current understanding. In some cases, future research may require the removal of a group from that category to a different one.

Appendix Five: The Identification of Baramins

This is the crucial matter—either we can identify the kinds or else our creationism has no taxonomic utility.

In 1941, Frank Marsh¹⁶⁵ proposed a reproductive criterion for the identification of the kinds which he sharpened in 1957.¹⁶⁶

'Animals are members of the same kind if their gametes can participate in true fertilization, i.e. the nuclei can unite so that chromosomes from both parents play a role in development.'

Development may arrest at an early stage, but cytological evidence of true fertilization, or the identification of specific phenotypic features from both parents in the hybrid embryo, would be sufficient to meet this criterion. Siegler¹⁶⁷ and Ancil¹⁶⁸ concur with Marsh. However, I am unable to subscribe to this view.

(1) We are making the same mistake that we charge evolutionists with in connection with *homology*. We cannot *recognize* (or *define*) the baramins by means of a *condition* of 'kindness'. We are failing to say what baramins actually *are*.

(2) No Biblical or scientific theoretical support can be given to this criterion. It is certainly fair to deduce from the Biblical statements that viable hybrids between kinds can not be produced.¹⁶⁹ The problem, of course, is

that this does not give a *definitive* criterion because hybrids are not always possible *within* kinds. Hence Marsh's sharpening of the criterion so that true fertilization becomes the test. But why should this be so? We have obviously gone beyond the Biblical data. Is there, then, any scientific support? I believe not.

The criterion has scientific credentials only if we can show that it is entailed by our current theories of heredity and development. But as I have argued in a previous paper¹⁷⁰ the major difficulty facing a scientific theory of evolution is that currently there are no theories at all! It is also a problem for us, because without such theories we cannot justify Marsh's criterion.

In the article just mentioned I proposed as a working hypothesis, a two-system model of heredity (cortome and genome). If this model is correct, then Marsh's criterion is wrong. If the baramin organizational pattern is coded in the cortome, then in fertilization the baramin pattern will always be determined by the organism providing the egg; the sperm parent providing only genome factors. A real hybridization of kinds would be impossible! The degree to which a given genome can work with a given cortome could be expected to bear some relationship to taxonomic distance, but no particular cut-off point could be expected. Indeed there is no particular cut-off. True fertilization has been obtained between animals belonging to distant baramins, e.g. Fundulus heteroclitus (Order Cyprinodontiformes) × Scomber scombrus (Order Perciformes).171,172

How then do we recognize baramins? As with homologies, so with baramins—the recognization is a tacit affair whereby, as an integration of study experiences, we build up a concept of a particular type of organism (cf Appendix One). In animals, behavior plays a leading role, so I proposed the following definition of an animal baramin.¹⁷³

A baramin consists of all those animals that partake of, and recognize, the same pattern of behavior.

The support for this criterion is three-fold:

(1) Empirical-The truth of this criterion is a fact of everyday experience in relation to the diverse breeds of domestic animals. My own research with species of the freshwater fish family Cichlidae (Cichlimin!) abundantly supported the criterion. The Cichlidae is an extraordinarily diverse family of some 1,100 species found in tropical and subtropical freshwaters from the Americas to India. Cichlids could recognize and respond appropriately to behavioral elements found in other species which were not a (noticeable) part of their own normal pattern of behavior. This was true regardless of the morphological, ecological, or geographical 'distance' between the species. In contrast, morphologically, ecologically and geographically 'near' species from different kinds (classified as families in this case) could not cooperate in a specific behavior pattern (e.g. mating behavior).¹⁷⁴ Research workers, besides myself, have often reported that after working with a group for some time they develop such a tacit awareness of the characteristic behavior that they can easily pick out members of that kind (even species new to them) from

amongst many superficially similar animals belonging to other groups.

(2) *Biblical*. The Bible never addresses itself to the question of the recognition of the kinds. Definitive statements are never needed until controversy calls for them. On this issue controversy is a very recent phenomenon! Nevertheless we are not left entirely in the dark.¹⁷⁵

The Syriac word corresponding to the Hebrew min means 'clan' or 'family'. In Genesis the Hebrew mishpachah, 'clan', is the parallel of min (Gen. 8:19 with 7:14) and mishpachah was 'basically an administrative rubric' (Speiser) which denoted political, extrinsic relationship rather than genetic, intrinsic relationship.¹⁷⁶

We need only think of the acceptance of the Moabitess Ruth (Ruth; Mtt. 1:5) or the Canaanite harlot Rahab (Jos. 6:17, 22-25, Mtt. 1:5) into Israelite clans, to appreciate this point. The solidarity of a clan derived primarily from the acceptance of common obligations according to custom and law. In Israel this centered in the primary obligation to observe the Mosaic Covenant Law.

The implication is clear that the members of an animal *min* are one because they obey the same laws, i.e. the same innate (instinctive) pattern of behavior.

This is surely why (contra Strickling¹⁷⁷) Man is not called a min in Genesis One. He was created 'in the image of God' that he might enter God's family (mish pachah = patria Gen. 12:3/Acts 3:25). But as an outworking of the Fall, mankind in fact split up into numerous nations and clans (min!). Only by new birth into God's family can unity be found in the obedience to the Spirit of Christ. There is really no 'mankind' now!

(3) *Philosophical*. In terms of Herman Dooyeweerd's Christian Philosophy¹⁷⁸ the *psychical* (ethological) is the qualifying modal function of animals. Thus a behavioral criterion for distinguishing kinds would be expected. It is also interesting that Dooyeweerd's ideas applied to biology would lead us to expect that DNA is not the be-all and end-all of heredity (see de Wit^{179,180}). I mention this philosophy because Dooyeweerd's analyses contain some very useful material for creationists even if we may not agree with all that he writes.

Conclusion.

It is my belief that the unity of a baramin is not necessarily a unity of descent from created originals. I believe that many baramins were created with a variety of types. The unity of a baramin lies in the participation of those types in a common pattern of behavior.

The diversity of the clean baramins in large measure survived the Flood whereas the single surviving pairs of some unclean kinds has meant a greatly reduced diversity in these kinds.¹⁸¹

The diversity in some kinds (e.g. the 1,100 species of cichlid) is, however, not as great as it seems. Often the diverse species are the product of endless permutations of a relatively small number of characteristics.¹⁸²

Appendix Six: Intermediate Kinds

(1) Groups and non-groups

It is a significant fact that whenever evolutionists

describe some animal or fossil as a 'link' they describe it as a link between groups which are not comparable. Almost always the descendant groups are genuine, characterizable groups, whereas the groups held to be ancestral are not. The ancestral groups (e.g. 'Invertebrates', 'Fishes', 'Reptiles', 'Rhipidistian fishes'; 'Therapsid reptiles' etc.) are characterized only by the lack of characters, i.e. they are non-characterizable. Although convenient labels for many purposes, they do not represent natural groups. For example, the Fishes (Pisces) as a group can be defined only by the lack of pentadactyl limbs etc. All characters that might be used as diagnoses are found in other groups also (scales, fins, gills, etc. arc all found in amphibians, for example). The actual characterizable groups are 'cartilaginous fishes' (Chondrichthyes), 'bony fishes' (Osteichthyes), etc.

Thus creationists must insist that links have not been shown to be links until they have been shown to be links between characterizable groups.

(2) Complete and incomplete traits

'Links' are not links if they are mosaics of complete functional traits from other groups. True links must, of necessity, show the intermediate states in the development of new traits. Yet all claimed links are—if anything—mosaics and thus just a special case of the general phenomenon of the mixture of design features (Part 1). To a creationist proponent of optimal design these 'links' simply show that more unique combinations of design elements are possible than we might have once thought. These 'links' are an indication, *not* of evolutionary relationships, but of a particular ecological niche—and we are spurred to discover as much as we can about the environment and way of life of the animal.¹⁸³

(3) Archaeopteryx

We can illustrate these remarks by reference to that most famous 'missing link', *Archaeopteryx*.

Archaeopteryx is said to be a link between reptiles (ancestral group) and birds (descendant group). But whereas birds (Aves) are a natural (characterizable) group, the Reptilia is an artificial construct. Reptiles are simply those animals left when the birds and mammals are removed from the Amniota, i.e. they are characterized by the absence of mammal and bird characters, not by the presence of diagnostic 'Reptilian' characters. In reality the Reptilia contains animals which should be placed in a number of smaller characterizable classes (for the crocodilians, snakes and lizards, turtles and tortoises, pterosaurs, dinosaurs, etc.—for a relevant creationist work, see Newton.¹⁸⁴). Thus the supposed 'Reptilian' features of Archaeopteryx are not, in reality, the features of any genuine group. The forelimb claws, socketed teeth, breastbone without keel, unfused backbone, long bony tail, etc., tell us nothing about ancestry. Since natural groups are characterizable and all of Archaeopteryx's characters are those of birds, the creationist can confidently regard Archaeopteryx as a bird kind.

Archaeopteryx shows no intermediate states in the (supposed) evolution of bird traits. It has completely developed, fully functional wings; fully developed func-

tional featurers and an extremely robust wishbone. This point is, however, now generally recognized. Futuyma¹⁸⁵ says of therapsids and *Archaeopteryx* that, 'they are mosaics of ancestral and derived character states rather than true intermediates'. Similarly Gould and Eldredge¹⁸⁶ had written that, 'curious mosaics like *Archaeopteryx* do not count'.

Appendix Seven: Molecular Homologies

It is not uncommon today for biologists to admit that, 'we have no absolute proof of the theory of evolution, by direct evidence of the senses; all the available evidence is merely circumstantial.'187 Many would endorse Popper's description of the theory of evolution as 'a metaphysical research programme'188 Nevertheless, these biologists still embrace the theory enthusiastically, claiming that it does have scientific value and that there is no alternative theory that fits the facts so well ('Evolution is, indeed, the one coherent system of principles that unified all of biology.'189) As one criterion of progress in science, Popper suggests that, 'If the progress is significant then the new problems will differ from the old problems: the new problems will be on a radically different level of depth.' Patterson continues, 'It is surely true that the problems which occupy today's workers in molecular evolution are on a radically different level of depth from those which interested mid-Victorian evolutionists.'190 It is, indeed, a common claim that the series of variations in the monomer sequences of proteins and nucleic acids from different organisms constitute 'new' evidence which provides powerful support for evolution. However, it is difficult to reconcile this euphoria with three pertinent facts:

(1) No new principles or types of evidence are actually involved;

(2) There is a serious conflict between the arguments of the molecular biologists and those of other comparative biologists;

(3) Biologists are repeating the same methodological mistakes that have long vitiated the 'classical' studies of comparative anatomy and embryology.

(1) Nothing is new

The biomolecular evidence—like the classical evidence of comparative anatomy—is based on the recognition of homologies, in this case the recognition of the 'same' sequence, patterns. The criterion of homology is taken to be common origin, but—as before—the only criterion of common origin is homology! There are still no criteria independent of the evolutionary conclusion.

(2) Molecular biologists versus the rest

The comparative anatomists and embryologists have argued that the basic patterns are 'ancestral' whereas the various detailed expressions of these patterns are 'adaptive' and thus not necessarily indicative of ancestry. No-one seems to have noticed that the molecular biologists have drawn almost the opposite conclusion. For them it is the basic patterns—the common amino acid residues (sequence patterns) and the threedimensional configurations they entail—that are fundamentally 'adaptive'. It is held that these cannot be replaced without major disruption of the essential biological properties of the molecules. The various differences between the molecules of different species are held to explore the possible expressions of the primary adaptation, i.e. they all result in functional molecules. However, it is tacitly assumed that they are not more specific adaptations, i.e. the different sequences are not related to the different habits and environments of the organisms, but are merely random productions within the functional range supposedly provided by biopolymer redundancy.

The creationist is in a position to apply Occam's razor to the confusion and provide one consistent explanation for all types of homology.

The basic patterns are adaptive in relation to basic functional demands; the varying expressions of these patterns are secondary adaptations in relation to more specific functional demands.

(3) The same old methodological blunder

The particular molecules found in each species are compared with the corresponding molecules in the (supposedly) ancestral organism and the degree of difference determined. This degree of difference is quantified as the minimum number of point mutations required to produce the descendant condition. The numerical difference between two organisms is then taken to be roughly proportional to their evolutionary relatedness. No attempt is made in the presentations to relate the differences in the monomer sequences to the differences in the demands placed on the polymers by the different habits and environments (internal and external) of the organisms. The famous saying of G.W. Hegel is again fulfilled, 'What experience and history teach is this—that people...never have learnt anything from history.'

The unmistakable lesson to be learnt from the history of anatomical and embryological re-interpretations is that no valid comparison of structures can be made when their respective functions in the life of the organisms have not been elucidated (Part 1), and that the only valid methodological approach is to assume optimal adaptation since there are no positive criteria by which non-adaptation can be recognized and demonstrated.

Work on the functional interpretation of biomolecular structures has scarcely begun, but we can already marshal the following evidence in support of the contention that sequence differences are a reflection of functional differences related to each organism's different habits and ecology.

A. Indirect Evidence

(1) Natural Selection. The 'ancestral' polymers are identified in *modern* organisms which have been subject to natural selection for as long as or longer than those other modern organisms which yield the 'descendant' molecules. (Part 1)

(2) Single predominant types.¹⁹¹ There is usually only one predominant molecular type of each protein molecule in each species. But why should other, perfectly functional molecules disappear? What has happened to all the intermediate types between the ancestral molecule and the modern one? Each 'good' point mutation should increase by one the functional types present. Only if a species population is reduced to a few individuals could the laws of probability favor a mutant becoming predominant. If, on the other hand, natural selection is held to have eliminated all but one molecular type in each species, then this would, of course, be positive evidence that only that one type is optimal for each species.

Specific examples reveal further problems. For example in most vertebrates there are two varieties of globin-myoglobin and haemoglobin. Land vertebrates have alpha and beta types of haemoblogin, mammals have a third gamma type and some primates a fourth delta type. All these (and other types not mentioned here) are supposed to have arisen by duplication and variation of a single ancestral gene that coded for the original vertebrate globin. It sounds a nice story until we examine it. For example, for the single chains of myoglobin to associate (four to haemoglobin) the primary structure of myoglobin must undergo alterations at many sites (the 'D' helix is lost). Modern vertebrates can tolerate very little variation in these globin chains, yet evolutionists are postulating that there was at some stage a series of animals which could tolerate all the necessary intermediate stages between these two basic types of globin chain. Ipso facto these intermediates were neither good myoglobin nor good haemoglobin and so would have been eliminated by natural selection!192

(3) The failure of evolutionary correlations. Creationists might expect that biomolecular relationships would broadly parallel the supposed evolutionary relationships, simply because the traditional evolutionary pattern is broadly one of an ecological progression from marine organisms to tidal zone dwellers, to shore dwellers, to lowland dwellers and finally to upland dwellers. However, just as a consistent (self-justifying) evolutionary interpretation of the geological systems cannot accommodate the numerous fossil mix-ups, strata mixups, polystratic fossils, etc., so a consistent evolutionary interpretation of molecular homologies cannot tolerate the numerous cases where molecular relationships flatly contradict evolutionary relationships (see, e.g. Parker¹⁹³) Falsa in uno, falsa in omnibus. All these exceptions can, of course, be explained away, but not without losing every positive criterion which might otherwise have been used to justify an evolutionary interpretation. At the very least, consideration of other interpretations is in order.

(4) Some biomolecular types have a mosaic pattern of distribution

The distribution of, for example, the haemoglobins fits no evolutionary branching pattern whatever. They occur in a few plants (e.g. yeast, the mold *Neurospora* and in the root nodules of legumes) and in *some* members of every major invertebrate phylum except those of the sponges, coelenterates and (surprise!) the protochordates (including the amphioxids). Richard Dickerson admits that, 'It is hard to see a common line of descent snaking in so unsystematic a way through so many different phyla . .' (cited by Parker, loc. cit). So evolutionists are forced to postulate numerous independent origins:

The distribution of hemoglobins among invertebrate animals does not fit any phylogenetic scheme. It appears as if hemoglobins have arisen independently many times in the course of evolution.¹⁹⁴

It seems likely that the gas-transporting function of hemoglobin... evolved a number of times within annelids.¹⁹⁵

However Dickerson admits that repeated evolution seemed plausible only as long as haemoglobin could just be considered red stuff that held oxygen. It does not seem plausible now that we know the complex eighthelix folded pattern of the molecule.¹⁹⁶

Analysis of amino acid identities in the particular helices of the different haemoglobin chains brings to light further problems which are difficult to resolve in evolutionary terms.¹⁹⁷ What is happening in the field of molecular biology is exactly what has already happened in the classical fields of comparative anatomy and embryology. It is easy to place phenomena in evolutionary patterns when little is known of their functional roles. The more we learn about the phenomena the less and less easy it becomes to see any evolutionary pattern. When *ad hoc* hypotheses are increasingly necessary to explain why the pattern looks nothing like the evolutionary branching pattern expected, then the evolutionary interpretation has long since lost any coercive force.

B. Direct Evidence

(1) The molecules have to meet various demands. Each of the 20 or so amino acids has its own unique set of properties and thus distinct advantages of its own. Different amino acid sequences will therefore provide molecules in a continuous spectrum of overall properties. It can therefore be expected that particular sequences will provide the optimal properties for particular situations. Certainly we know two things. The *first* is that the primary structures (monomer sequences) of biomacromolecules must meet many stringent demands, e.g.

(a)ensure the correct three-dimensional configuration and stabilize the molecule;

(b) provide sites for attachment to cell membranes;

(c) give specific immunological properties;

(d) provide sites which respond to hormones or other regulatory mechanism . . . etc.

In addition each type of macromolecule must meet many more specific demands, e.g. enzymes have,

(a) active (catalytic) sites;

(b) sites which ensure substrate specificity;

(c) sites which permit inhibition by feedback control from distant products in the chain of reactions \dots etc.

Often these properties are conferred by parts of the primary sequence *spread over the molecule*. The more we learn of each biomacromolecule the more it seems that the entire molecule is necessary to the function and that therefore the very first molecule of each type must have had most of the sequence intact.¹⁹⁸

Secondly, we do know that properties vary from one organism to another in relation to differing demands and that this is the reason for some differing primary structure.

(2) Specific examples of molecular adaptation. These are just a few examples chosen to illustrate the possibilities. (a) The aspartokinase enzymes in *E. coli* catalyse the formation of aspartylphosphate from aspartic acid and ATP. Aspartylphosphate then undergoes a series of reactions to give rise to the amino acids lysine, threonine and methionine. One enzyme is inhibited by lysine and the other by threonine. Thus excess of one reduces, but does not stop, the supply of phosphate.¹⁹⁹

(b) The temperature kinetics of lactate dehydrogenase enzymes vary as predicted by their relative prevalence in minor populations from cold and warm waters.²⁰⁰

(c) In two series of fishes from cold and tropical waters it was found that the temperature for thermal shrinkage of their collagen rises and is directly correlated with the hydroxyproline content.²⁰¹

(d) It might be expected that different cytochrome-c must behave differently in the different cellular milieux of the organisms in which they occur. Investigations have scarcely begun, but Aw²⁰² cites a report that the cytochrome-c from a few species show individual high affinities for the enzyme cytochrome-c oxidase at low ionic strengths. Further reports are awaited with interest!

(e) *The haemoglobins*. The properties of different haemoglobins are adapted to the different environmental demands on the organisms concerned and it is the amino acid sequence patterns which are responsible for these major physiological adaptations.

The oxyhaemoglobin dissociation curve varies in relation to (i) temperature; (ii) carbon dioxide and other acids (Bohr effect; Root effect); (iii) ions and (iv) organic phosphates. Associated with these parameters are some major adaptive patterns, e.g.:

(i) Small endotherms have curves which are displaced to the right in comparison with those of larger endotherms. This ensures that the tissues of smaller mammals are supplied with oxygen at the higher rates needed to sustain their higher metabolic rates.

(ii) The Bohr effects show a similar variation, being much larger in smaller mammals than in larger.

(iii) Animals adapted for life at high altitudes (e.g. llamas) have curves displaced to the left allowing efficient blood oxygenation at low oxygen pressures.

(iv) Other animals which must obtain oxygen in oxygen-deficient environments (e.g. aquatic animals and internal parasites) have curves shifted to the left.

(v) Very active animals (e.g. birds) have curves shifted to the right in order to facilitate their high metabolic rates.

(For more details, further examples and references see Schmidt-Nielsen.²⁰³)

These facts would obviously lead us to expect that, say, human and horse haemoglobin would be more similar than human and carp haemoglobin! Until the molecular biologists have elucidated the relationships between primary structure and the functional demands, creationists must insist that no evolutionary argument from biomolecular homologies is valid. For his part this creationist confidently expects that future research will confirm the predictions made in the conclusion to Part Two of this series of articles.

In grasping at the evidence of 'chemical paleogenetics' evolutionists thought that they had a prize rose. They were mistaken; it is, for them a nettle.

Appendix Eight: Imperfections

Creationists do recognize some imperfection in that this is now a cursed world in which there are distortions of the original perfect harmony. However the nature of *this* imperfection is quite different from the imperfection of evolutionary intermediates.

We may assume that the basic adaptation of each kind (encoded in the cortome) is optimal. Imperfections can then be introduced through the genome in three main ways: by random genetic drift in small populations; by mutation or by excessive change in one or a few features (through genic recombination). In the latter two cases it is a distorted environment that is responsible for the distorted adaptation.

(1) Random genetic drift. In small populations (no more than a few hundreds at most) isolated from others, genetic information is lost fairly rapidly by random effects, so that certain genes may reach 100% by the loss of their alleles. The Amerindians, for example, all lack the B blood group gene, probably because they were founded by a small migrant population.

Small populations will also tend to fix bad mutations. For example, the 300 descendants of the 15 people shipwrecked on Tristan da Cunha included 4 homozygotes for the rare condition *retinitis pigmentosa*.

It is strange indeed that modern evolutionists are claiming that evolution takes place in small populations! Devolution perhaps, evolution no!

(2) Mutation. Mutations do not primarily effect variation, but affect (or assault!) the organism's viability. Genes have multiple effects of the most diverse kinds. Thus it may chance that one component of a mutant gene's action is advantageous in some deleterious environment, but the net (or overall) effect will still be a lowering of the organism's viability. However if the lowering due to some other factor against which the advantageous component provides protection then, of course, the mutant will spread in the population (by natural selection). This is the case with sickle-cell anaemia.

In certain deleterious (malarial) environments the death rate from anaemia is less than that from malaria. But this is really a perverse result—if this is evolution then evolution is death on an installment plan. Genic compensation, which increases the proportion of foetal haemoglobin in the adult (up to 30%), may reduce the anaemia considerably, but this does not mean that the mutation itself is no longer deleterious. It remains unchanged and the evolutionary end will still be death. Genic compensation simply allows more installments.

(3) Unbalanced recombination. Recombination can produce the same result as mutation. Through breeding programs, man can, through the selection of particular

genomes, 'improve' or 'enhance' the functioning of a particular mechanism (e.g. egg production; milk production, etc.), but this is again a perverse result for the organisms concerned. Each mechanism interacts with all the rest and where there are no corresponding adjustments in all the other mechanisms, the organism's overall viability in its environment is reduced. In many cases such adjustment would not even be possible. Most of man's breeds of animals are monstrosities which, although useful to man, could never survive on their own.

It is evident that extreme environments can have a similar effect in nature. In an extreme environment organisms with some grossly enhanced (or reduced) feature may persist because the concomitant lowering of viability is less than that caused by an environmental factor against which the enhanced (or reduced) feature provides protection (e.g. wingless flies on windswept islands).

In all these and similar cases, the imperfections are easily recognized as degenerations from perfection. They can not be confused with intermediate steps on an evolutionary road *to* perfection.

For helpful discussions of imperfection see also $Cain^{204}$ and $Cody^{205}$

Appendix Nine: Evolution and Optimal Design

Historically the optimal design approach developed within creationism, but latterly some evolutionists have adopted it (e.g. Cain²⁰⁶). The question we must ask is, 'Is this a valid evolutionist interpretation?' The answer to this question is definitely NO!

Criticism One. Natural Selection is an Optimization Process.

The evolutionist argument has been as follows: 'If natural selection has produced the remarkable and complex adaptations that we know exist, then how could such a powerful force fail to perfect any imperfectly adapted part or organ?' In other words the argument is circular—it is assumed that natural selection *is* the mechanism by which optimal adaptation is attained. But that is hardly a valid approach.

Natural selection is an optimization method, specifically one of the methods of a class known as steepest ascent methods.²⁰⁷ Such a trial-and-error method is bound to produce a series of modifications or subforms before the optimal result is eventually obtained. Indeed the charge of the mathematicians (Ellacott, 208 Moorhead and Kaplan²⁰⁹ passim) has been that the random ascending paths which natural selection follows would require vastly more time to produce the known results than evolutionists actually have available. Worse still, such a slow process could not avoid being completely nullified by random losses. Be that as it may, evolutionists must-if they wish to maintain their theory of natural selection-expect to find in the living world, or in fossils, evidence of stages in the optimization processes (Futuyma²¹⁰). No such stages have ever been found.

Criticism Two. The Optimal Results were Original When applied to the known phenomena, the evolutionists' interpretation entails that, without anything further, natural selection acting on random variations, came up with optimal solutions to the relevant problems of life *AT THE VERY START* of the evolution of every type of part, organ or organism. But how can this be? It is as if it is *known in advance* what evolution is aiming at, as if the optimal results are pre-determined. But modern evolutionary theories explicitly exclude such possibilities.

A single example will highlight the problem.

Evolutionists make much of the universality of the eukaryotic cell structure without discerning the problem it poses. The clear implication is that the first single-celled protist (whether algal or protozoan does not matter) had been tossed up with a structural plan which has proved to be optimal for all the vast range of its descendants—syncytial, colonial, metaphytan and metazoan. But how could natural selection do this, an agent, after all, which is not noted for foresight, an agent which could only select in relation to the *then existing* conditions and demands? Natural selection could take no notice of all the demands placed on the vast range of eukaryotic types that *now* exist by the vast range of environments they *now* exploit.

The only alternative is to assume that a vast range of earlier, less optimal types has now been reduced to uniformity. But this is to admit such a phenomenal amount of convergence that evolution becomes a *reductio ad absurdum*. Scylla and Charybdis indeed!

Criticism Three—Adaptation leads to natural selection not vice versa.

This third criticism is simply to underscore the superficiality of the evolutionist discussions of 'adaptation'. Adaptation, as a process, is 'the alteration of an organism so as to bring it into a correct relationship to its environment.' Before any adaptation (state or process) can be understood both the organism (as an adaptable entity with the intrinsic ability to adapt) and the environment (to which it adapts) must first be assessed in their own right. Both the organism and the environment must be 'fit', or adapted, to each other to start with. The environment must be 'fit' in the sense that the existing law order, properties of natural elements and compounds, etc., must be such that the adaptations of organisms are possible.^{211,212} The law-order and properties are original: they are obviously not themselves the product of the evolutionary process acting on the organism!

In reality all organisms are already adapted; all natural selection can do is enable organisms to *maintain* their state of adaptation, enabling them to keep up with a changing environment. The idea that natural selection (i.e. the environment!) can improve or originate adaptations—especially convergent ones—is something to which no evolutionist has ever yet lent any plausibility. It is really the Marxist error that if you improve the environment, then people will automatically change to fit it and so become better!

It is clearly no exaggeration to say that a belief in optimal design and a belief in evolution are completely incompatible.

References

- Patterson, C., 1978. Evolution. British Museum (Natural History). ²Darwin, C.R., 1871. The origin of species, sixth edition. Issued 1971 in the Everyman's University Library, J.M. Dent and Sons, Ltd. P. 436 and p. 32.
- ³Dobzhansky, Th., 1955. Evolution, genetics, and man. John Wiley and Sons.
- *Kitts, D.B., 1974. Paleontology and evolutionary theory. Evolution 28(3):458-472. See especially p. 466.
- SReference 1, p. 133.
- ^eFutuyma, D.J., 1979. Evolutionary Biology. Sinauer Associates.
- ⁷Villee, C.A., W.F. Walker, and R.D. Barnes, 1978. General Zoology, fifth edition. W.B. Saunders Co.
- *Reference 1, p. 189.
- ⁹Ayala, F.J., and J.W. Valentine, 1979. Evolving: the theory and processes of organic evolution. Benjamin/Cummings Publishing Co.
- ¹⁰de Beer, G.R., 1962. Embryos and ancestors. Oxford University Press.
- ¹¹Popper, K.R., 1961. The poverty of historicism, second edition. Routledge and Kegan Paul.
- ¹²Zangerl, R., 1948. The methods of comparative anatomy and its contribution to the study of evolution. Evolution 2(4):351-374.
- ¹³Jardine, N., 1969. The observational and theoretical components of homology. Biological Journal of the Linnean Society 1, 327-361.
- ¹⁴Aw. S.E., 1976. Chemical evolution: an examination of current
- ideas. University Education Press, Singapore. P. 99. ¹⁵de Beer, G.R., 1958. The Darwin-Wallace Centenary. Endeavour
- 17, 61-76. ¹⁶Young, J.Z., 1971. An introduction to the study of man. Oxford
- University Press.
- "Thompson, W.R., 1956. Introduction to (a new printing of) the origin of species, by C.R. Darwin. J.M. Dent and Sons. Pp. vii-xxiv.
- ¹⁸Newman, H.H., 1932. Evolution, genetics, and eugenics, third edition. University of Chicago Press.
- ¹⁹Reference 10, p. 116.
 ²⁰Villee, C.A., W.F. Walker, and F.E. Smith, 1963. General zoology, second edition. W.B. Saunders Co.
- ²¹Moody, P.A., 1966. Evolution, organic (In) McGraw-Hill encyclopedia of science and technology. Vol. 5, pp. 130-133.
- ²²Reference 10.
- ²³Reference 2.
- ²⁴Reference 6, pp. 434-437.
- ²⁵Owen, R., 1849. On the nature of limbs. A discourse. John Van Voorst.
- ²⁶Owen, R., 1843. Lectures on the comparative anatomy and physiology of the invertebrate animals. Vol. 1. Longmans Brown, Green, and Longmans.
- ² Reference 2, pp. 184, 191, 414, 415, 420 & 453. ² Darwin C.R., 1871. The descent of man and selection in relation to sex. Vol. 1. John Murray.
- ²⁹Kimball, J.W., 1974. Biology, third edition. Addison-Wesley Publishing Co.
- ³⁰Medawar, P.B., 1961. Critical notice: the phenomenon of man by Pierre Teilhard de Chardin. Mind 70(277):99-106.
- ³¹Smith, J.M., 1969. The status of neo-Darwinism (In) Toward a theoretical biology. 2. Sketches. (C.H. Waddington Ed.) Edinburgh University Press. Pp. 82-89.
- ³²Haldane, J.B.S., 1927. The comparative genetics of colour in rodents and carnivora. Biological Reviews 2(3):199-212.
- ³³Boyden, A., 1935. Genetics and homology. *Quarterly Review of Biology* 10, 448-451.
- ³⁴Reference 6, p. 143.
- ³⁵Jones, A. J., 1982. The genetic integrity of the "kinds" (baramins): a working hypothesis. Creation Research Society Quarterly 19(1):13-18.
- ³⁶Harland, S.C., 1936. The genetical conception of the species. Biological Reviews 11(1):83-112.
- 37de Beer, G.R., 1971. Homology. An unsolved problem. Oxford **University Press**
- ³⁸Wilson, É.B., 1895. The embryological criterion of homology. (In) Biological lecture, 1894, Marine Biological Laboratory, Wood's Hole. Pp. 101-124.
- ³⁹de Beer, G.R., 1938. Embryology and evolution (In) Evolution: essays on aspects of evolutionary biology presented to Professor E.S. Goodrich on his seventieth birthday. (G.R. de Beer Ed.) Clarendon Press.

- ⁴⁰Reference 37, p. 16.
- "Ibid.; also p. 1
- ¹²Blackwelder, R.E., 1967. Taxonomy. A text and reference book. John Wiley.
- *3Reference 28, pp. 20 & 21.
- **Cain, A.J., 1964. The perfection of animals. (In) Viewpoints in biology (J.D. Carthy and C.L. Duddington Eds.) Butterworths. Pp. 36-63
- ⁴⁵Batteau, D.W., 1967. The role of the pinna in human localization. Proceedings of the Royal Society B. 163 (1011):158-180
- ⁴⁶Goodrich. E.S., 1930. Studies on the structure and development of vertebrates. 2 volumes, re-issued by Dover, 1958.
- ⁴⁷Dullemeijer, P., 1971. Comparative ontogeny and craniofacial growth. (In) Cranio-facial growth in man. (Moyers and Krogman Eds.) Pergamon Press. Pp. 45-75
- **Parker, T.J., and W.A. Haswell, 1962. A textbook of zoology Vol. 2. (Seventh ed. by A.J. Marshall.) Macmillan.
- ⁴⁹Reference 7, pp. 327-329.
 ⁵⁰White, F.N., 1976, Circulation. (In) Biology of the Reptilia (C. Gans Ed.) Vol. 5. Academic Press. Pp. 275-334.
- ^{s1}Reference 2, p. 109.
- ^{s2}Tyndale-Biscoe, C.H., 1973. Life of marsupials. Edward Arnold.
- 53Schmidt-Nielsen, K., 1979. Animal physiology: adaptation and environment, second edition. Cambridge University Press. ⁵⁴Reference 52, pp. 9-12.
- ⁵⁵Reference 53, pp. 189 & 190.
- ⁵⁶Reference 44.
- ^{s7}Reference 44.
- ⁵7Ibid.
- ^{ss}Reference 16.
- ⁵⁹Elias, H., 1955. Liver morphology. Biological Reviews 30(3):263-310.
- 60 Elias, H., 1955. Embryonic diversity leading to adult identity: the early embryology of the liver of vertebrates (a preliminary report). Adatomischer Anzeiger 101, 153-167 (13/15)
- ⁶¹Haeckel, E.H.P.A., 1866. Generelle Morphologies der Organismne. Berlin
- ⁶²Cohen, J., 1967. Living embryos. An introduction to the study of animal development, second edition. Pergamon Press.
- ⁶³Ibid., p. 64.
- ⁶⁴Reference 44, pp. 57 & 58.
- ⁶⁵Wasmann, E., 1909. Evolution, Kegan, Paul. Trench Truber, and Co.
- ⁸⁶Vavilov, N.I., 1922. The law of homologous series in variation. Journal of Genetics 12, 47-89.
- ⁶⁷Berg, L.S., 1926. Nomogenesis: or evolution determined by law. Constable.
- *Clark, W.E. Le Gros, 1934. Early forerunners of man. Bailliere, Tindall, and Cox.
- °'Wallis, W.D., 1931. The structure of prehistoric man (In) The making of man. Modern Library. Pp. 69-75
- ⁷⁰Romer, A.S., 1949. (In) Genetics, paleontology, and evolution (G.S. Jepson Ed.). Princeton University Press. P. 115
- ⁷¹Zuckerman, S., 1951. Morphological series of hominid remains. Journal of the Royal Anthropological Institute 81, 57.
- ⁷²Wood Jones, F., 1953. Trends of life. Arnold.
- ¹³Lawrence, G.H.M., 1951. Taxonomy of vascular plants. Mac-millan. Pp. 102 & 103.
- ⁷⁴Russell, L.S., 1960. (In) Evolution: its science and doctrine. (T.W.M. Cameron Ed.) University of Toronto Press. P. 10.
- ⁷⁵Kerkut, G.A., 1962. Implications of evolution. Pergamon Press. Pp. 152, 153, & 157.
- ⁷⁶Keosian, J., 1960. On the orgin of life. Science 131 (3399):479-482.
- ¹⁷Andrews, H.N., 1961. Studies in paleobotany, John Wiley and Sons. Pp. 159, 312, 315, (398-402
- ⁷⁸Nursall, J.R., 1962. On the origin of the major groups of animals. Evolution 16(1):118-123
- ⁷⁹Hardy, A.C., 1965. The living stream. Collins. Pp. 119-202.
- 80Reference 44, pp. 51-54.
- ⁸¹Marshall, N.B., 1971. Explorations in the life of fishes. Harvard University Press. Pp. 100-168.
- ²Reference 52, p. 6.
- ⁸³Short, A.R., 1943. Modern discovery and the Bible. Inter-Varsity Fellowship.
- ⁸⁴Shute, E., 1961. Flaws in the theory of evolution. Temside Press. ⁸⁵Howe, G.F., 1970. Paleobotanical evidences for a philosophy of
- Creationism (In) Why not Creation? (W.E. Lammerts Ed.) Creation

- Research Society Books, Norcross, Georgia. Pp. 230-242.
- ⁸⁶Howe, G.F., 1971. Homology, analogy, and creative components in plants. (In) Scientific studies in special Creation (W.E. Lammerts Ed.) Baker Book House. Pp. 243-257.
- ^{\$7}Woodmorappe, J., 1978. The cephalopods in the creation and the universal deluge. Creation Research Society Quarterly 15(2):94-112.
- ⁸⁸Reference 2, pp. 175 & 190.
- ⁸⁹Reference 6, pp. 113 & 114.
- ⁹⁰Tiegs, O.W., and S.M. Manton, 1958. The evolution of the Arthropoda. Biological Reviews 33(3):255-337.
- "Reference 81, pp. 126 & 127.
- 92Ibid., p. 158.
- ⁹³Reference 37, p. 15.
- ⁹⁴Reference 12.
- ⁹⁵Inglis, W.G., 1966. The observational basis of homology. Systematic Zoology 15, 219-228. ⁹⁰Jones, A.J., 1971. The nature of evolutionary thought. Creation
- Research Society Quarterly 8(1):44-49.
- ⁹⁷Polanyi, M., 1958. Personal knowledge. Also 1967. The tacit dimension. Both Routledge and Kegan Paul.
- ⁹⁸Owen, R., 1847. Report on the archetype and homologies of the vertebrate skeleton. Reports of the British Association for the Advancement of Science, 1846, pp. 169-340. See especially p. 175. Also 1848. On the archetype and homologies of the vertebrate skeleton. John van Voorst, London.
- ^{**}Saint Hilaire, E.G., 1818. Philosophie anatomique des organes respiratoires. Mequignon-Marvis, Paris. Pp. xxv-xxviii.
- ¹⁰⁰Reference 95.
- ¹⁰¹Whewell, W., 1847. The philosophy of the inductive sciences, founded upon their history, new edition. 2 volumes. John W. Parker, London. Pp. 486 et seq.
- ¹⁰²Pantin, C.F.A., 1954. The recognition of species. Science Progress 42, 587-598.
- ¹⁰³Pantin, C.F.A., 1968. The relations between the sciences. (A.M. Pantin and W.H. Thorpe Eds.) Cambridge University Press. Pp. 77 et seq.
- ¹⁰⁴Polanyi, 1958. Personal knowledge. Routledge and Kegan Paul. P. 122.
- 105 Thompson, W.R., 1962 Evolution and taxonomy. Studia Entomologica 5, 549-570.
- ¹⁰⁶Greene, M., 1966. The knower and the known. Faber and Faber. ¹⁰⁷Greene, M., 1967. Biology and the problem of levels of reality. The New Scholasticism 41, 427-449.
- ¹⁰⁸Dalcq, A.M., 1968. Form and modern embryology. (In) Aspects of form (L.L. Whyte Ed.) second edition. Lund Humphries, London. Pp. 91-120.
- ¹⁰⁹Lorenz, K.Z., 1968. The role of gestalt perception in animal and human behavior. (In) Aspects of form, Reference 108.
- Reference 105, pp. 565 & 566.
 Jones, A.J., 1972. Developmental studies and speciation in cichlid fish. Ph.D. Thesis, Dept. of Zoology and Comparative Physiology, Birmingham University, Birmingham, England.
- ¹¹²Reference 101, p. 494.
- ¹¹³Parker, G.E., 1980. Creation: the facts of life. C.L.P. Publishers. Pp. 1-17.
- "Clark, R.E.D., 1972. Creator God or cosmic magician. (In) Symposium on Creation, volume 4 (D.W. Patten Ed.) Baker Book House. Pp. 108-122.
- ¹¹⁵Clark, M.E., 1976. Our amazing circulatory system . . . by chance or creation? I.C.R. Technical Monograph. C.L.P.
- ¹¹⁰Jaki, S.L., 1974. Science and creation. Also 1978. The road of science and the ways to God. Both Scottish Academic Press.
- 117Reference 114.
- 118Dewar, D., 1931. Difficulties of the evolution theory. Edward Arnold.
- ¹¹⁹Dewar, D., 1957. The transformist illusion. DeHoff Publications. Pp. 246-248 and 274-280.
- ¹²⁰Reference 111.
- 121Ibid.
- ¹²²Howe, G.F., 1971. Reference 86.
- ¹²³More, H., 1655. An antidote against atheism or, An appeal to the natural faculties of the mind of man whether there be not a God, second edition. W. Morden, Cambridge.
- ¹²⁴Ray, J., 1704. The wisdom of God manifested in the works of the creation, fourth edition. S. Smith, London.
- ¹²⁵Paley, W., 1903. Natural theology: or, Evidences of the existence

and attributes of the Deity, collected from the appearances of nature, sixth edition. R. Faulder. London. This work has been reprinted by St. Thomas' Press, Houston, 1972.

- ¹²⁶Cuvier, G., 1817. Le regne animal distribué d'apres son organisation. Deterville, Paris.
- ¹²⁷Bell, C., 1833. The hand: its mechanism and vital endowments as evincing design, second edition. William Pickering. London.
- ¹²⁸Wells, G.P., 1976. The early days of the S.E.B. (In) Perspectives in experimental biology (P.S. Davies Ed.) Pergamon Press.
- 129Reference 17, p. xx.
- ¹³⁰Cohn, D.L., 1954. Optimal systems I: the vascular system. Bulletin of Mathematical Biophysics 16, 59-74.
- ¹³¹Rashevsky, N., 1960. Mathematical biophysics, third edition, volume II. Dover Publications.
- ¹³²Rosen, R., 1962. The derivation of D'Arcy Thompson's theory of transformations from the theory of optimal design. Bulletin of Mathematical Biophysics 24, 279-290.
- ¹³³Rudwick, M.J., 1964. The inference of function from structure in fossils. British Journal for the Philosophy of Science 15, 27-41.
- ¹³⁴Dullemeijer, P., 1968, Some methodology problems in a holistic approach to functional morphology. Acta Biotheoretica 18, 203-214. Also Reference 47.
- 135Reference 115.
- ¹³⁶Reference 44.
- 137Reference 114.
- ¹³⁸Jones, A.J., 1972. A general analysis of the Biblical kind (min). Creation Research Society Quarterly 9(1):53-57.
- ¹³⁹Strickling, J.E., 1980. After their kind and in His image. Creation Research Society Quarterly 17(2):106.
- ¹⁴⁰Jones, A.J., 1972. Boundaries of the min: an analysis of the Mosaic lists of clean and unclean animals. Creation Research Society Quarterly 9(2):114-123.
- ¹⁴¹Jones, A.J., 1973. How many animals in the Ark? Creation Research Society Quarterly 10(2):102-108.
- 142Lammerts, W.E., 1970. The Galapagos Island finches (In) Why not creaton? (W.E. Lammerts Ed.) Presbyterian and Reformed. Pp. 354-366.
- ¹⁴³Howe, C.F., 1979. Biogeography from a creationist perspective 1. Creation Research Society Quarterly 16(1):38-43. 144Ibid.
- 145 Tyndale- Biscoe, C.H., 1973. Life of marsupials. Edward Arnold. P. 26.
- 146Reference 111.
- 147Dales, R.P., 1967. Annelids, second edition. Hutchinson. P. 64.
- ¹⁴⁸Van Tyne, J., and A.J. Berger, 1959, Fundamentals of ornithology. John Wiley and Sons. Pp. 368 (376.
- ¹⁴⁹Reference 17, p. xvi.
- ¹⁵⁰Reference 141
- ¹⁵¹Jones, A.J., 1982, The genetic integrity of the 'kinds' (baramin)-a working hypothesis. Creation Research Society Quarterly 19(1):13-18.
- ¹⁵²Siegler, H.R., 1978. A creationists' taxonomy. Creation Research Society Quarterly 15(1):36-38 & 11.
- ¹⁵³Morris, H.M., 1876. The Genesis record. Baker Book House. Pp. 62-&71
- ¹⁵⁴ Jones, A.J., 1970. Myth and science in evolutionary thought. I. The unmasking of evolutionary thought. (2 parts) Private edition of 500 copies.
- 155Reference 1523
- ¹⁵⁶Ancil, R.E., 1980. A proposal for a new creationist discipline. Creation Research Society Quarterly 17(2):123-127.
- ¹⁵⁷Marsh, F.L., 1941. Fundamental biology. Privately published. P. 100
- ¹⁵⁸Marsh, F.L., 1947. Evolution, creation, and science, second revised edition. Review and Herald Publishing Association. (First edition 1944.) Pp. 174 & 175. See also Reference 157.

¹⁵⁹Reference 152.

- ¹⁶⁰Marsh, F.L., 1973. Review of Siegler's Evolution or degeneration-which? (Reference 167.) Creation Research Society Quarterly 10(2):125-127.
- ¹⁶¹Reference 152.
- ¹⁶²Reference 156, p. 125.
- ¹⁶³Patterson, C., 1980. Cladistics. *Biologist* 27(5):234-240.
- ¹⁶⁴Charig, A., 1981. Cladistics: a different point of view. Biologist 28(1):19 & 20.
- ¹⁶⁵Reference 157.
- 166 Marsh, F.L., 1957. Life, man, and time. Pacific Publishing Associa-

VOLUME 19, DECEMBER, 1982

tion. P. 118.

- ¹⁶⁷Siegler, H.R., 1972. Evolution or degeneration-which? Northwestern Publishing House. See also Reference 152, p. 37.
- \$68Reference 156, p. 124.
- ¹⁶⁹Reference 138.
- ¹⁷⁰Reference 151.
- ¹⁷¹Newman, H.H., 1915. Development and heredity in heterogenic teleost hybrids. Journal of Experimental Zoology 18, 511, 576.
- ¹⁷²Russel, A., 1939. Pigment inheritance in Hundulus-Scomber hybrids. Biological Bulletin 77, 423-431.
- ¹⁷³Reference 154.,
- ¹⁷⁴Reference 111.
- ¹⁷⁵Reference 138.
- 176Ibid.
- 177Reference 139.
- 178Dooyeweerd, H., 1953-1958. A new critique of theoretical thought. 4 volumes. Presbyterian and Reformed.
- 179de Wit, J.J.D., 1965. THe impact of Herman Dooyeweerd's Christian philosophy upon present day biological thought. (In) Philosophy and Christianity. J.H. Kok N.V., Kampen. Pp. 405-433.
- 180 de Wit, J.J.D., 1965. A new critique of the transformationist principle in evolutionary biology. J.H. Kok.
- ¹⁸¹Reference 141.
- ¹⁸²Reference 111.
- ¹⁸³Reference 133.
- ¹⁸⁴Newton, B., 1979. Monsters and men. Dunestone Printers Ltd.
- ¹⁸⁵Reference 6, p. 162.
- 186 Gould, S.J., and N. Eldredge, 1977. Punctuated equilibria: the tempo and mode of evolution reconsidered. Paleobiology 3, 147.
- ¹⁸⁷Reference 164.
- ¹⁸⁸Reference 1, p. 149.
- ¹⁸⁹Reference 6, p. 11.
- ¹⁹⁰Reference 1, p. 149.
- ¹⁹¹Mills, G.C., 1968. The evolutionary significance of the species variation in cytochrome c structure. Journal of the American Scien-

- tific Affiliation 20(2):52-54.
- 182Edsall, J.T., 1968. (In) Structural chemistry and molecular biology (A. Rich and N. Davidson Eds.) W.H. Freeman. P. 88.
- ¹⁹³Reference 113, pp. 20-22.
- ¹⁹⁴Riggs, A.F., 1966. Respiratory pigments. McGraw-Hill Encyclopedia of Science and Technology, Volume 11, pp. 510-513. ¹⁹⁵Reference 7, p. 657. ¹⁹⁶Reference 113, p. 20.
- ¹⁹⁷Reference 14, p. 106.
- ¹⁹⁸Ibid., pp. 79 & 96.
- 199Paul, J., 1967. Cell biology, second edition. Heinemann Educational Books.
- ²⁰⁰Merritt, R.B., 1972. Geographic distribution and enzymatic properties of lactate dehydrogenase allozymes in the fathead minnow Pimephales promelas. American Naturalist 106(948):173-184.
- ²⁰¹Prosser, C.L., 1965. Levels of biological organization and their physiological significance. (In) Ideas in modern biology (J.A. Moore Ed.) Natural History Press, New York. Pp. 357-390.
- 202Reference 14,
- ²⁰³Reference 53, pp. 68 et seq.
- ²⁰⁴Reference 44, pp. 56-58.
 ²⁰⁵Cody, M.L., 1974. Optimization in ecology. Science 183 (4130):1156-1164.
- ²⁰⁶Reference 204.
- ²⁰⁷Ellacott, S.W., 1977. Mathematical problems in the evolutionary model. N.S.A. Report. London.
- 208Ibid.
- ²⁰⁹Moorehead, P.S., and M.M. Kaplan, (Eds.) 1967. Mathematical challenges to the Neo-Darwinian interpretation of evolution. Wistar Institute Press.
- ²¹⁰Reference 6, pp. 28, 29, and 434-437.
 ²¹¹Clark, R.E.D., 1977. Creation and the argument from design. *Faith* and Thought 104(2):99-108.
- ²¹²Clark, R.E.D., 1978. God beyond nature. Pacific Press Publishing Association.

PROFESSOR FRICK—AND THE THEORY IN STONE

HILTON HINDERLITER*

This is an analogy to the development and present status of evolution. Please read the story of Prof. Frick, in the lefthand column, all the way through. Then go back and re-read while following, according to the reference number, the point-by-point explanation in the right-hand column.

Once upon a time, in the small town af Academia, there was a professor of economics named Frick. Though he was not a stone-gatherer by training¹ Prof. Frick developed a strong desire to collect rocks. So one bright, sunny afternoon he trekked into the neighborhood hills, and came back with three outstanding specimens: one was bright blue, with jagged edges; another was dull gray, and smooth all over; and the third was gravish-blue, being moderately rough in texture. Relaxing on his patio, Frick began to exercise his imagination; and before long he had developed a new theory about the origin of rocks. Immediately he called together the local populace, and standing before them in the town square he began, "I have discovered that all rocks were originally gray and smooth, with blueness and sharpness developing simultaneously over long periods of time-and all by the action of natural processes." Then he continued into a lengthy discourse, by going on to say, "Just how, my friends, do you suppose that gray smooth rocks changed into blue sharp ones? I am going to explain to you today processes whereby this may have occurred."². No one in the group questioned

Note: the term evolution is used here to mean the development of all life forms from a common ancestor, and that from non-living materials, all by the spontaneous action of natural processes. In contrast, creation-although it allows for variation, within kinds-holds that life in its various forms was supernaturally brought into being, as was also the matter and organization of the universe in its totality. For a proof that scientific studies require the acknowledgement of supernatural events, see appendix I of Does it belong here?-An Open Letter to Anyone Who Declares Evolution to be more Scientific than is Creation, also by Hilton Hinderliter. Itemized references to the following points can be supplied; but they are omitted in this paper, for the sake of brevity.

1) The recognized founders of modern evolutionary theory were not acting in the fields for which they were qualified. Lyell was an attorney; Darwin eventually graduated from theological school, after having unsuccessfully tried classics and medicine.

2) Contemporary science textbooks typically use this approach; base the argument on the assumption of evolution; and imply that any evolutionary process that might have happened, must have happened.

^{*}Hilton Hinderliter, Ph.D., is Assistant Professor of Physics at The Pennsylvania State University, New Kensington Campus.