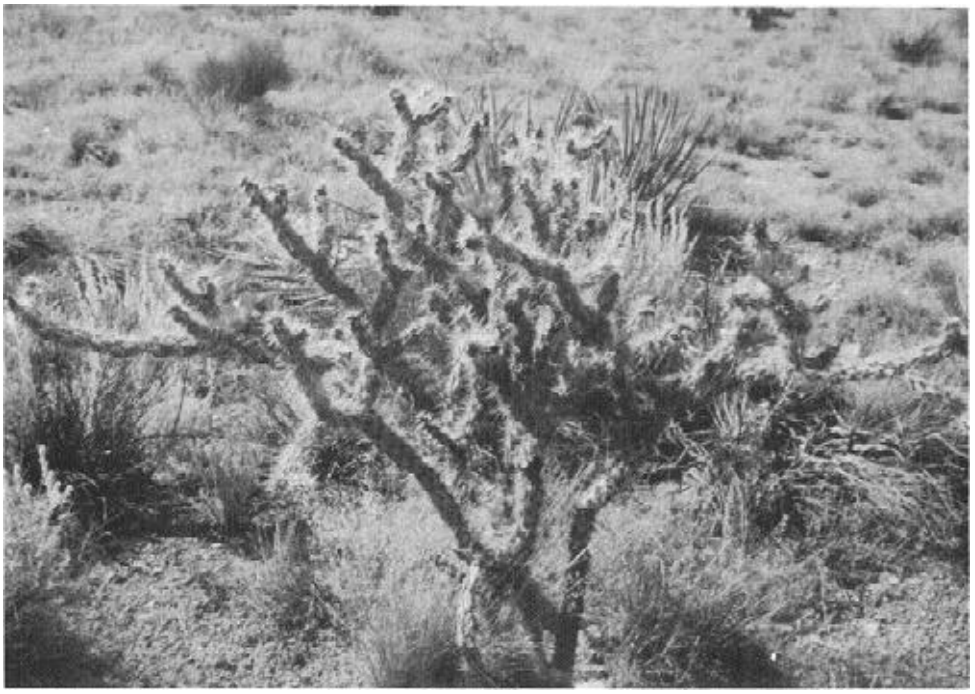
Creation Research Society Quarterly

Haec credimus:
For in six days the Lord made heaven and earth, the sea, and all that in them is, and rested on the seventh. — Exodus 20:11

VOLUME 28 SEPTEMBER 1991 NUMBER 2



BEAUTY and THORNS

WHY?

CREATION RESEARCH SOCIETY QUARTERLY

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Instructions to authors can be found in June Quarterly.

COVER PHOTOGRAPHS

Photographs of Buckhorn Cholla *(Opuntia acanthocarpa)* by Glen W. Wolfrom taken at Quartermaster Viewpoint, Western Grand Canyon, June 11,1990. The beauty of the created world is evident in the flower of this plant, however, the thorns on the plant can be interpreted as evidence of the curse proclaimed in Genesis 3:14-19.

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Errata

June 1991 Quarterly, page 28, first column, second complete sentence should read—John Grebe (1967, pp. 23-30) explained how biology based on molecular structure showed no proof for evolution.

June 1991 Quarterly, page 14, caption to Figure 15 should read Optical microphotograph of . . . Photograph by R. R. White.

The Panorama of Science selection entitled "Boulder Found in Coal Seam—Implications" in the June 1991 Quarterly was written by Emmett L. Williams, 5093 Williamsport Drive, Norcross, GA 30092.

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CREATION RESEARCH SOCIETY

History The Creation Research Society was first organized in 1963, with Dr. Walter E. Lammerts as first president and editor of a quarterly publication. Initially started as an informal committee of 10 scientists, it has grown rapidly, evidently filling a real need for an association devoted to research and publication in the field of scientific creation, with a current membership of over 600 voting members (with graduate degrees in science) and over 1100 non-voting members. The *Creation Research Society Quarterly* has been gradually enlarged and improved and now is recognized as the outstanding publication in the field.

Activities The society is solely a research and publication society. It does not hold meetings or engage in other promotional activities, and has no affiliation with any other scientific or religious organizations. Its members conduct research on problems related to its purposes, and a research fund is maintained to assist in such projects. Contributions to the research fund for these purposes are tax deductible. The Society operates two Experiment Stations, the Grand Canyon Experiment Station in Paulden, Arizona and the Grasslands Experiment Station in Weatherford, Oklahoma.

Membership Voting membership is limited to scientists having at least an earned graduate degree in a natural or applied science. Dues are $18.00 ($22.00 foreign) per year and may be sent to Glen W. Wolfrom, Membership Secretary, P.O. Box 14016, Terre Haute, IN 47803. Sustaining membership for those who do not meet the criteria for voting membership, and yet who subscribe to the statement of belief, is available at $18.00 ($22.00 foreign) per year and includes a subscription to the Quarterlies. All others interested in receiving copies of all these publications may do so at the rate of the subscription price for all issues for one year: $21.00 ($25.00 foreign).

Statement of Belief Members of the Creation Research Society, which include research scientists representing various fields of successful scientific accomplishment, are committed to full belief in the Biblical record of creation and early history, and thus to a concept of dynamic special creation (as opposed to evolution), both of the universe and the earth with its complexity of living forms. We propose to re-evaluate science from this viewpoint, and since 1964 have published a quarterly of research articles in this field. In 1970 the Society published a textbook, *Biology: A Search for Order in Complexity,* through Zondervan Publishing House, Grand Rapids, Michigan 49506. All members of the Society subscribe to the following statement of belief:

1. The Bible is the written Word of God, and because it is inspired throughout, all its assertions are historically and scientifically true in all the original autographs. To the student of nature this means that the account of origins in Genesis is a factual presentation of simple historical truths.

2. All basic types of living things, including humans, were made by direct creative acts of God during the Creation Week described in Genesis. Whatever biological changes have occurred since Creation Week have accomplished only changes within the original created kinds.

3. The Great Flood described in Genesis, commonly referred to as the Noachian Flood, was a historical event worldwide in its extent and effect.

4. We are an organization of Christian men and women of science who accept Jesus Christ as our Lord and Saviour. The account of the special creation of Adam and Eve as one man and woman and their subsequent fall into sin is the basis for our belief in the necessity of a Savior for all people. Therefore, salvation can come only through accepting Jesus Christ as our Savior.

Editor's Comments

This issue of the Quarterly is packed with useful information. Many thanks to all our writers, peer reviewers. and subscribers.

This is the third Quarterly which contains selections from the Symposium on Variation. The interesting material reflects the opinion of the writers on how much variation can be expected as opposed to barriers to variation present in the natural world. Readers will be pleased with the wide range of topics discussed in the symposium. Please consult the March 1991 and June 1991 Quarterlies for the initial articles.

For several issues, a brief review of back issues in Panorama of Science has been presented. It is amazing concerning the vast number of subjects developed from a creationist perspective that can be found in these old Quarterlies. This material needs to be available in all university and college libraries. Possibly you can influence someone in a college in your area to have the Quarterlies available for their students. I will be glad to hear from you and to receive notes, articles and letters on any creationist topic.

Editor work reminds me of the worldwide network of friends of the Creation Research Society. I hope you also enjoy the international creationist flavor of our Quarterly. The quality and recognition of the *CRSQ* will increase with our subscription count. Please help us promote the Society. Some readers could subscribe to multiple issues and distribute extras to interested friends.

If Quarterly subscribers would like a copy of the CRS Constitution and Bylaws, they are invited to send a request to the Society Secretary.

Don DeYoung, Editor

SYMPOSIUM ON VARIATION—VIII***

NEW TRENDS IN THE MOLECULAR BASIS FOR VARIATION

KEVIN L. ANDERSON*

Received 2 October 1990; Revised 26 December 1990

Abstract

All biological variation is a result of the genetic information contained on the chromosome of the cell. For evolutionary change (horizontal change) to occur, there must be a change in this genetic information. The discovery of introns and exons on the chromosome of "higher" eukaryotic cells has suggested these cells may contain far more genetic information than previously realized. Despite evolutionary suggestions that introns allow for greater variation that ultimately leads to evolutionary change, the cell is actually less capable of undergoing such a change. The potential ramifications for evolutionary change are devastating.

Introduction

The evolutionary model requires that biological variation be an ongoing, accumulative process leading to the formation of new phyla. However, despite pressures claimed to be exerted by "natural selection," any variation that occurs within the organism must originate from the genetic information contained on the cell's DNA. For evolutionary change ("macroevolution") to occur, there must be a change in the information content of that DNA, a mutation. While this has been known for years, it still seems to be "down played" in discussions regarding biological change. In part, this reflects a general lack of understanding of molecular biology, but it also reflects the realization that molecular biology is not responsive to a "vital force," that it is deaf to the call of natural selection. Regardless of whether the mechanism is an accumulation of hidden "neutral" mutations, the sudden appearance of massive mutations, or the gradual effects of minor mutations, the workings of the DNA molecule are governed strictly by chemical laws. These laws dictate that all mutations of the DNA sequence are a result of completely blind and random chemistry.

Mutations, therefore, are random, and their subsequent effect is random. Even simple statistical calculations reveal that random shuffling is a poor problem solver. There is little credibility given to the view that random mistakes in a computer program will eventually produce a more sophisticated algorithm. At a Wistar symposium? [5] Eden (1967) and Schutzenberger (1967) attempted to explain that random mechanisms will not produce the type of "upward" genetic change demanded by evolution. This view was met with great resistance, especially from those more interested in viewing evolutionary change as a natural force than a molecular alteration of the chromosome. As our understanding of the molecular biology of cells increases, we are presented with even more staggering complexity than was realized just a few years ago. Understanding these molecular processes points clearly to the inability of the cell to undergo evolutionary change.

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**Editor's Note: For detailed reviews of this symposium see Armstrong, H. 1968. Article review. *CRSQ* 5:35-37 and Williams, E. L. 1968. Book review. *CRSQ* 5:123-126.

***Parts I-VII are in *CRSQ* 27:144-153; 28:18-27.

The Central Dogma

It is well established that the genetic information in a cell is contained in the chromosome. The chromosome is comprised of deoxyribonucleic acid (DNA), which is a polymer of nucleotide molecules. The sequence in which these nucleotides are linked dictates the type of genetic information carried by the DNA, which determines the genetic characteristics of the cell. Francis Crick (1958) proposed a pathway for the flow of genetic information that he referred to as the central dogma (Figure 1). He concluded that DNA served as a template for RNA formation. The RNA then dictated the sequence of amino acids within a protein.

Figure 1. The central dogma as described by Frances Crick. The arrows indicate the flow of genetic information. The DNA molecule serves as a template for its own replication. The DNA molecule also serves as the template for RNA formation. It is now known that the DNA is subdivided into smaller units termed genes, the translation of which results in a mRNA molecule that encodes a protein. There is now evidence that RNA may serve as a template for DNA of complementary sequence, so the arrow may not be unidirectional.

Proteins act as "workers" inside the cell, constructing and dismantling, transporting and communicating—activities that give the cell its specific functions and characteristics. Thus, the DNA sequence controls the types of proteins made in the cell, causing the cells of a human to differ from that of a frog. Therefore, biological change (such as the frog becoming a human) must involve a mutational alteration of the DNA sequence, thereby providing the cell with a new store of genetic information. This new genetic information enables the cell to possess functions it did not previously possess.

Exons and Introns

The genome of the eukaryotic cell is more complex than that of the prokaryotes, and much more complex than once thought. Gradually researchers have come to realize that much of the DNA of "higher" eukaryotes is never translated into proteins. Use of recombinant DNA methodology revealed only 5% of the *Drosophila* and less than 2% of the human genome code for proteins. Also, in complex eukaryotes, few genes are

a continuous sequence of nucleotides. Instead, the genes are interrupted by DNA sequences that are not themselves translated. These noncoding sequences are called introns (intervening DNA), and sequences that are translated to form a protein are called exons (i.e., they are expressed).

All exons and introns that occur between the start codon and stop codon of the gene are transcribed into precursor-messenger RNA (pre-mRNA). This results in the pre-mRNA containing more sequences than will ultimately be translated into a protein. The number and size of introns varies with each gene. For example, the chicken collagen gene contains over 50 introns (Wozney, et al., 1981) and the gene for chicken ovalbumin contains about three times as much introns as exons (Chambon, 1981). Before the pre-mRNA leaves the nucleus of the cell however, these introns are removed and the exons are spliced together to form mature mRNA (Figure 2). The mature mRNA is then translated into a protein. The arrangement in which these introns are spliced together determines the sequence of the gene, thus the amino acid composition of the protein. This directly determines the nature and function of the protein.

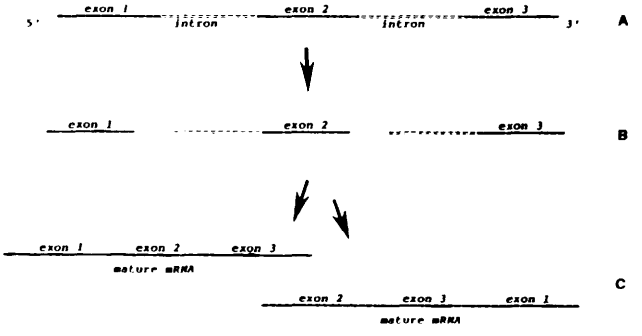

Figure 2. Schematic of a eukaryotic pre-mRNA molecule (A) with intermittent introns and exons. Introns are first separated at the 5' end of the RNA (B) and then completely removed. They are then degraded, or perhaps function in coordinating activation and inactivation of other genes. Exons are then spliced together to give mature mRNA (C). The exons may splice in any combination (exactly what governs this combination is not clear). The mature mRNA is then translated into a protein. The type of protein formed depends upon the sequence in which the exons are spliced together.

Originally it was thought that, even if the mRNA contained multiple start and stop codons, nothing beyond the first stop codon was translated because it automatically caused the ribosome to detach from the mRNA. This meant that one gene corresponded to a single RNA transcript that carried information for a single protein. However, the discovery of introns and exons has changed this perception. Most intron sequences do not appear to contain any specific function, but the existence of the splicing mechanism associated with introns apparently provides extra genetic flexibility for the cell. This flexibility is possible because different mRNA splicing patterns can generate a number of different proteins from the same RNA transcript. Thus, the same DNA sequence can code for several different proteins. For example, pattern changes of some transcripts have been found to occur during cell differentiation, thus the same DNA sequences code for different proteins (Andreadis, et al., 1987). How the variable recessing of identical RNA transcripts is controlled is not yet known.

The net result of RNA splicing is that it greatly expands the total number of genes in the cell. Thus, the DNA in a "higher" eukaryotic cell may contain far more information than once considered possible. This is illustrated by the *b* -globin gene of the mouse, rabbit, and human. The exons of this gene contain a very similar DNA sequence, but the introns vary in both length and sequence (Alberts, et al., 1983). Thus, the vast difference of the *b* -globin protein made by these three species appears to be a direct function of introns. While the exact significance of introns is still not clear, most evolutionists have attempted to "wave off" this new twist to cellular genetics. The general view is that such expanded genetic information allows for greater variation, and, as such, becomes a mechanism by which the cell can accelerate its evolutionary development. However, the potential ramifications for evolutionary change are devastating. Increasing the total genetic information of the chromosome also increases the total number of possible deleterious mutations. As Denton (1986) explains:

> If it turns out over the next few years that this [RNA splicing is being used to achieve a vast expansion in the total number of genes in the higher organisms, then it could well be that the total number of unique adaptive traits in, say, mammalian genomes is in the order of 10^{13} (10^{10} genes, each containing 10^{3} significant bits of information). Which could pose what would seem to be an almost insurmountable 'numbers problem' for Darwinian theory—a problem of such dimension that it would render all other anti-Darwinian arguments superfluous (p. 332).

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QUOTE

. . . one might say that the frailty of natural selection seems to be regarded as a *trade secret.*

Book review of *Ever Since Darwin: Reflections on Natural History* by Stephen J. Gould. 1978. *Systematic Zoology* 27:26.

SYMPOSIUM ON VARIATION—IX

PROBLEMS IN THE INTERPRETATION OF VARIATION WITHIN THE FOSSIL RECORD

TREVOR J. MAJOR*

Received 12 November 1990; Revised 15 January 1991

Abstract

According to evolutionary theory, the fossil record is supposed to show the development of life over long periods of time. However, construction of evolutionary phylogenies often depends on conclusions drawn from fossil morphology alone. With more detailed morphologic analyses, with comparisons of fossils to living species, and with genetic analyses of both fossil and living representatives, large-scale changes and unequivocal transitions are difficult to perceive. Using several recent studies, this lack of change is attributed to limits on variation through time and among similar organisms.

Introduction

Interpretation of variation in fossil plant and animal groups is a controversial topic among paleontologists and evolutionary biologists. Do the observed differences represent: (a) intermediate forms of a species in transition; or (b) genetic variability in an otherwise stable population? The issue often reduces to the appropriateness of making conclusions from morphology alone. In addition, creationists see a difficulty in explaining the transition of one morphological type into another. This paper explores the significance of these difficulties by reviewing several recent studies which pay special attention to the analysis and comparison of fossils with their living representatives or supposed descendants.

Human "Evolution"

An excellent example has emerged from the ever-contentious arena of human evolution (Bower, 1990). In their study of 100,000-year-old bones from caves at the mouth of South Africa's Klasies River, Rachel Caspari and Milford H. Wolpoff conclude that these fossils differ significantly from anatomically modern humans living in southern Africa several thousand years ago. Consistent with their polyphyletic view of human evolution, they propose that the bones belong to a transitional, archaic form of *Homo sapiens* evolving independently from a geographically isolated *H. erectus* population. Critics of this interpretation argue that the Klasies fossils fall within the range of modern humans, and may even resemble those of modern Eskimos. Consistent with the prevailing monophyletic view, most evolutionists would suggest that the Klasies fossils represent, not transitional forms, but variants of an anatomically modern human population descended from an archaic *sapiens* ancestor which arose in Africa 100,000 years earlier (e.g., Cann, et al., 1987). Here, the problem revolves around the distinction between "archaic" and "modern" features. Each interpretive framework must deal with the difficulty in determining the supposed trend from *H. erectus* to *H. sapiens* when temporal variations in fossil specimens approximate geographic variations in modern populations.

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Marine Invertebrates

The problem of variation also arises in the debate between gradualistic evolution and punctuated equilibrium. This is exemplified in a recent study by Jackson and Cheetham (1990) on cheilostome Bryozoa–a diverse group of predominantly sessile colony-forming marine invertebrates. These organisms have many living representatives, and the preserved remains of Bryozoan calcareous or chitinous housings are ubiquitous in the fossil record. However, because different fossil cheilostome groups can only be identified based on morphology, it has been argued that these morphospecies are not necessarily equivalent to biological species. Hence, inferences regarding the evolution of these organisms are thought to be constrained by the lack of correspondence between morphospecies and biospecies.

Through breeding experiments and enzyme comparisons, Jackson and Cheetham purportedly resolve this issue by finding a good correlation between morphologically and genetically defined species in three diverse extant cheilostome genera. Further, although the authors were able to determine morphologically indistinguishable (cryptic) species or subspecies, possibly representing populations undergoing gradual change, no such intermediates were found. These results led the authors to justify their observation of morphological stasis punctuated by relatively sudden appearances in the fossil record of new morphospecies in the cheilostome *Metrarabdotos.* Presumably, the study also affirms their assertion that: "Many fossil species appear in the fossil record fully differentiated morphologically and persist for millions of years with little or no indication of transitional morphologies" (p. 579). However, the authors recognize that cryptic species have apparently been observed in other animal groups, and recommend an examination of each major taxon on an individual basis.

Paleobotany

Extreme cases of morphological invariance are often provided by so-called living fossils. One recently discovered example comes from the field of Paleobotany (Eyde and Qiuyun, 1990). The subfamily Mastixioideae, of the dogwood family Comaceas, all possess fruitstones with an intrusive germination valve. Fossilized

mastixioid fruits feature prominently in European lignite beds, while 19 extant species occur in Southeast Asia and islands of the western Pacific. All living species belong to the genus *Mastixia,* and have fruits with fleshy outer layers. By comparison, the eight fossil Mastixioideae genera have fruits with relatively hard outer layers. It has long been thought that these "woody-fruited" genera became extinct four million years ago. However, Eyde and Qiuyun discovered that the fruit-stones of *Diplopanax stachyanthus,* a plant confined to the mountain forests of eastern Asia, closely resemble the fossilized remains of the woody-fruited *Mastixicarpum.* In part, this resemblance was obscured because *Diplopanax* had been placed into the ivy family Araliaceae incorrectly. Although this is an unusual example of paleontology reclassifying a living species, it illustrates the difficulty in gaining a proper perspective of the relationship between fossil and extant organisms.

Fossil Taxa

The problem of morphological identification of fossil taxa can be widened beyond the species level. For instance, Briggs and Fortey (1989) have attempted to show the following through cladistic analysis: (a) that arthropods which evolved during the Cambrian radiation show no more apparent morphological diversity than living groups; (b) that trilobites and chelicerates are relatively advanced compared with crustaceans; and (c) that problematic arthropods, while not readily assigned to living higher taxa, conform to the diversity expected in early stages of adaptive radiation. The authors interpret their cladogram as supporting a monophyletic origin (as opposed to a polyphyletic "lawn" suggested by others), and as explaining the "clear morphological separation between the living crustaceans and chelicerates" (p. 242). This study is not only an admittedly counterintuitive attempt to incorporate extreme diversity within a continuum, it is also an example of the challenge to evolutionary scenario building provided by well-preserved, yet seemingly unique, fossil taxa.

No doubt part of the problem in assessing variability can be attributed to the lack of preservation of genetic material in the fossil record. Until recently, the oldest DNA came from a ground sloth reported to be 13,000 years old. That figure has been pushed back to 20 million years by the analysis of an 820-base pair DNA fragment extracted from an extraordinarily well-preserved magnolia leaf found in the unoxidized, water-saturated lacustrine Miocene Clarkia fossil beds of northern Idaho (Golenberg, et al., 1990). The DNA came from the chloroplast gene *rbcL* which encodes the large subunit of the common photosynthetic molecule ribulose 1,5 bisphosphate carboxylase/oxygenase ("rubisco"). Analyses show only 12 transitional mutations between the rubisco of the fossil plant, *Magnolia latahensis,* and modern *Magnolia* species. This finding places the fossil well within the Magnoliidae and seems to reflect small rates of change over geologic time.

Conclusions

In summary, the preceding examples expose limitations to deductions based solely on morphology. These shortcomings often lead to arguments over the significance of variation, and to continuing modifications of phylogenies. Most importantly, the sample studies show limits on the amount of variation within contemporaneous populations, limited variation over time—especially at the genus level, and a lack of continuity between species. The measurement of genetic differences between apparently similar species, and the analysis of fossil DNA, serve to reinforce these conclusions.

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In that respect Saint Francis or the medieval man was not modern at all. But it is precisely that non-modernity of the medieval man which should be most helpful to modern man. In his contempt for tradition, for continuity, in his maddening resolve to raze to the ground almost everything in every forty or fifty years, in his craving for novelty for novelty's sake, modern man is obviously destroying the ground under his very feet. Whether he will be ready to turn to the medievals for a much-needed medicine remains to be seen.

If he does avail himself of that medieval medicine, modern man may also find a cure for his most serious sickness. It is his mastering of the realm of quantities to the extent of losing his sense of purpose and values. Modern man is so much a slave of quantities that he recognizes only patterns, and wants to see patterns where they simply cannot exist. Patterns—physical, economical, social, psychological, and even some cognitive patterns—are always quantitative, in principle at least. But no wizardry with quantities, numbers, and statistics is going to yield so much as a drop of value and purpose.

The result is the imprisonment of modern life in sheer relativism, a very logical result because there can be no essential difference among patterns. No pattern as such can be better in the valuational sense than any other pattern. Failure to recognize this is what constitutes the modern slavery to relativism through pattern worship. That slavery supports the fashionability of such new-fangled expressions as bi-sexual and hetero-sexual, so many verbal shields to make us see mere patterns and not moral disasters in realities denoted by such words as lesbian and homosexual.

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SYMPOSIUM ON VARIATION—X

BIOLOGICAL VARIATION**

FRANK L. MARSH*

Received 1 October 1990; Revised 27 December 1990

Abstract

A review is made of known factors, both nonhereditary and hereditary, in the production of new varieties among plants and animals. The origin of these new varieties ***within*** *basic types is most obvious, but since Creation Week, the production of new* ***basic types*** *of organisms apparently has never occurred.*

Introduction

To the student of origins the process of biological variation is of tremendous importance. Fortunately, mankind seems born with more or less of an appreciation for variety in many things, both botanical and zoological. Our world is kaleidoscopic with varieties.

As we study variation in nature, we soon discover another universal fact—the discontinuity of diversity among plants and animals. Living things in their multitudinous varieties cannot be arranged in a continuous unbroken series from simplest in structure to most complex, nor can one variant be traced through a continuous series to a markedly different one. Instead, we observe that the variation is discontinuous. Rather than a graded series of individuals we find separate clusters of similar forms. This fact makes it possible with the greatest of ease to distinguish among our domesticated plants and animals. We know the cats from the dogs, the roses from the camellias, the corn from the wheat, the maples from the oaks. This discontinuity has made possible the construction of scientific classifications of living things, and the discontinuous clusters have been assigned the terms *Phylum, class, order, family, genus, and species.*

In our study of the problem of origins we need to acquaint ourselves with the processes of change which operate in living things so we can determine their quality and magnitude. We are very aware that variation does occur in life forms. This fact becomes obvious as we compare the differences between a Nordic and Hottentot, a Clydesdale and a pony, dent field corn and popcorn, Better Times and a wild rose. What mechanisms operate to produce this variation? Is there any limit to how far the changes can go?

Even though we recognize that the entire topic of variation among living forms is one in which the records of investigation are shot through and through with biased speculation, still creationists and evolutionists are agreed that variation among living things may be divided into two large classes: nonhereditary (environmental) and hereditary (genetic).

Nonhereditary Variation

Nonhereditary variations are not caused by genetic difference but by environment, including variations produced by differential feeding, humidity, light, temperature, training, etc. An example would be the contrast in appearance of a stunted spruce tree growing at timberline and a fine specimen growing at a lower level. Again, a human being exposed to much sunshine may develop a deep coat of tan. The ability to produce melanin pigment varies from the person who can develop a heavy layer of the pigment to an albino who can develop none. However, the heavily tanned person knows that his color soon fades when his skin is shaded from the sun. Even in generations of suntanned ancestors, the acquired tan is purely environmental, not inherited.

The phenotype (exterior appearance) of any organism is necessarily a result of the interaction of a genotype (genes present) with an environment; both are necessary. Some genes of the genotype of an organism may never, even though dominant, manifest themselves unless they experience just the right environment. To illustrate, sun-red corn may live from generation to generation as a yellow-seeded corn so long as, during growth, the husk shades the ear during the milk stage of its seeds. One must strip down the husk and let the direct sunlight fall on the seeds while in the milk in order to get the photochemical reaction which produces red pigment in the seeds. This same situation holds, more or less, for all factors in the genotype. The genotype sets the stage, but afterwards what actually takes place on the stage depends on the environment.

As an illustration of genotypic influence vs. environmental, breeders of agricultural plants look for even slight genotypic improvements in yield and quality, since they may be expected to recur again and again in the progeny of the improved variety. However, yields are influenced not only by genotype but also by environmental factors such as the quality of the soil, the amount of soil moisture, heat, light, and the quality of the fertilizer. Obviously one must know whether a difference in yield between several samples of seed is predominantly genotypic or environmental. Experiments are devised whereby the relative influence of genotypic and environmental factors can be determined.

Hereditary Variations

Turning to hereditary variations, the changes with which the student of origins is most concerned, we note that these may come about in various ways, summarizable as (1) recombination, (2) gene mutations, and (3) chromosomal aberrations, sometimes called chromosomal mutations.

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**Editor's Note: This article is adapted, with slight modification, from *Variation and Fixity in Nature* by Dr. Frank Marsh (see back cover). Dr. Marsh, now in his 91st year, continues to support Creation studies.

1. *Recombination.* As the term suggests, the members of a pair of genes present in a sex cell may, through the process of reduction division, become separated into different daughter cells, then through the process of fertilization, are united in new combinations, producing new characters. One example of a recombination is the birth of a red-and-white calf to a Holstein line which has been only black-and-white for a number of generations. Other examples are the appearance of walnut comb on a fowl with single and rose-combed parents and the production of gray rats by crossing a black parent with a yellow one. These effects are reversions or "throwbacks" and are not new differences. Although they constitute the commonest source of differently appearing individuals, still they can give rise to nothing really new. They come from arrangements of genetic elements already in existence; without doubt they have already appeared many times in the history of the animal or plant.

2. *Gene mutations.* A gene mutation is a heritable alteration in a single gene. In the complicated double helix of chemical substances, there is considerable room in which a mutation could occur. A gene mutation implies that the genetic material can undergo some sort of change that results in the production of an altered phenotype. According to Levine (1968, p. 154), "Gene mutations represent changes that have occurred at the level of one to a few nucleotides within the DNA molecule and below the resolution of the electron microscope." According to Dobzhansky (1970, p. 72), "Most [gene] mutations are caused by substitution of a single amino acid in a protein and of a single nucleotide in the DNA chain coding this protein."

As a rule genes are so stable that the natural mutation rate is very low. Many species have remained much the same for thousands of years. The brachiopods among animals, and seaweeds and *Ginkgo* among plants, are examples of organisms in which almost no changes are observed in present-day species as compared with fossils. The comparative rarity of such changes is a fortunate thing, because gross mutations are usually harmful to the organism, and the majority of mutations threaten the organism's survival. This is to be expected as we remember that the organism is a delicately adjusted mechanism, and a random change would more likely be injurious than beneficial.

There are three kinds of gene mutations: visible, biochemical, and lethal.

In *visible* mutations the phenotypic effects alter the organism's morphology. These visible mutations in the fruit fly may be either dominant, as bar eye, or recessive, as white eye. Other visible mutations are the short-legged or Anton breed of sheep; albino man and albino animals such as rabbits, rats, mice, guinea pigs, foxes, skunks, squirrels and birds; hornless cattle; double-eared cattle; pacing horses; many-toed cats; mule-footed swine; and bulldog-faced dogs.

Conspicuous gene mutations of the visible class in plants include the Shirley poppy, remarkable for its wide range of colors, which originated from a single plant of a small red poppy common in English cornfields; double petunias, roses, azaleas, stocks, carnations, daisies, and other plant clusters which arose from single-flowered plants; dwarf portulaca; striped sugar cane, blotched leaf in corn; the Boston fern; red sunflowers; red sweet potatoes; spineless cacti and the Concord grape.

A second class of gene mutations may be called *biochemical.* They represent a loss of a specific biochemical function, since the mutant organism no longer has the ability to synthesize an essential metabolite such as an amino acid or a vitamin. Or this kind of mutation may be the cause of the loss of an organism's ability to make a specific protein, most often an enzyme necessary for the normal function of some essential process. Possibly such a loss or change is the underlying cause of most mutations, also visible mutations. In such a situation, of course, the biochemical mutations would cause death unless the organism is otherwise supplied with the metabolite it cannot synthesize.

Lethal mutations. These chemical changes appear early in development and cause the death of the organism in the embryonic stage.

Can mutations create new species? Biologists do not agree. Dobzhansky (1941, p. 78) says:

> Most biologists were skeptical, and justifiably so, of the mutation theory of de Vries, who claimed that new species arise by sudden mutations. Likewise, when Morgan and his associates described mutant Drosophila, many biologists remained skeptical, because these mutants looked like a collection of freaks rather than changes fit to serve as raw materials of evolution. . . . Most mutations, large as well as small, are more or less deleterious to their carriers. Mutation appears to be a destructive, rather than a constructive, process. One should not forget, however, that a mutation is neither useful nor harmful in the abstract; it can be so only in some environment. If the environment is not specified, the statement that a mutation is useful or harmful is meaningless. A mutant that is harmful when its carrier is placed in one environment may be neutral in another, and useful in still other environments. Furthermore, a mutant gene does not exert its effects on adaptedness regardless of what other genes an individual carries; a changed gene may be harmful on some genetic backgrounds but useful on others.

3. *Chromosomal aberrations (chromosomal mutations).* Composing this type of change there are two major classes: (a) changes in chromosome number (ploidy), and (b) changes in the chromosome structure that result in alterations of gene order or number.

Three kinds of ploidy are recognized: *Haploidy,* where the chromosome complement contains only a single member of each normal chromosome pair; *polyploidy,* where each chromosome complement contains more than two entire individuals of each chromosome; and *heteroploidy,* where a chromosome is subtracted from or added to the normal set. The situation in which a pair of each of the chromosomes is present is diploidy and is considered to be the normal arrangement.

How many chromosomes do different organisms have? The chromosome count of radiolarians (one-celled marine animals) runs to several hundred. As many as 208 are found in each cell of the crayfish

Cambarus immunis. In a large sample of 2413 species of plants, over one half had less than 12 chromosomes as a haploid number. Twelve chromosomes in the haploid set was the modal point where 391 species out of the 2413 were grouped. Eight in the 2413 had the same number as man, 23 in each haploid set (Dobzhansky, 1941, p. 224). The correlation between chromosome number and gene number is very low, longer chromosomes commonly having many more genes than shorter ones. Note that identity in chromosome number does not necessarily have any relation to the crossability. Some of the creatures having the same chromosome number as man (diploid 46) are: marmoset monkey, meadow mouse, shelduck *(Tadorna),* water snake, worm lizard, six-lined racerunner (lizard), an Old World lizard, and four bony fishes (Altman and Ditmer, 1962, pp. 1-5).

Returning now to the haploids, these individuals occur normally in the reproduction of such animals as bees, wasps, certain moths, and rotifers in which unfertilized eggs develop into males. In some animals, e.g., starfish, frogs, salamanders and rabbits, the eggs may be induced artificially to develop into haploid individuals. Often in such cases the diploid number is restored through a division of chromosomes not accompanied by cellular division. Haploids have been found in several plant species, for example, Jimson weed, tobacco, tomato and wheat. Such individuals may be induced by cold, radiation, or other external changes. But because of their rarity and infertility these forms probably play little part in adding to the supply of new natural variants.

The second kind of ploidy, *polyploidy,* appears to be more important. A number of leading evolutionist geneticists hold that this process of variation is the most promising in the matter of generation of new species. Two types of polyploids are recognized: *autopolyploids,* where there has been a multiplication of the basic chromosome number characteristic of a *single* race; and *allopolyploids,* where the individuals have arisen from a fusion of gametes having more than the reduced or haploid number, but which have come from *different* races, species, or genera.

Autopolyploidy may occur spontaneously in nature or may arise from adventitious buds arising at grafts or after decapitation in tomato and nightshade plants. Some of the shoots which develop from these buds in callus tissue formed at the cut surface are polyploid. Flowers on these shoots may perpetuate the condition through sexual reproduction. Treatment of buds and seeds with the alkaloid colchicine from the autumn crocus is a simple way of inducing polyploidy experimentally. Under the influence of this alkaloid, splitting of chromosomes occurs, but the cell fails to form two daughter cells at the time, thus doubling the chromosome number.

Of particular interest to us is the fact that auto polyploids may possibly occur naturally in the field. Muntzing (1935) lists 58 such apparent examples in Europe. Some very intriguing cases in our country among species of spiderworts *(Tradescantia)* are described by Anderson and Sax (1936). *T. occidentals* is distributed over the prairie states from the Rocky Mountains east to the Mississippi River. Plants having twice the normal number of chromosomes (tetraploid) are found over most of this area. The range of *T. canaliculata* lies mostly east of that of the former species, and its individuals are also largely tetraploid. However, there is a fairly broad strip just west of the Mississippi in which both species grow. Tetraploid developed in this area and spread outward, *T. canaliculata* going chiefly east and northeast, while *T. occidentalis* spread to the north and northwest. The thought is that the tetraploid races were better adapted to those environments than the diploid races.

It would appear that the systemic effect of polyploidy is similar to that of mutation. Any change from the normal condition which might be produced by polyploidy could be favorable for the organism under some environmental conditions and unfavorable under others. However, since either addition or loss of chromosomes, possibly through disturbance of the normal finely adjusted balance among the genes which achieves the amazing phenomenon of each living thing, usually lessens the vitality of the offspring, the reproductive powers of the new individuals would more frequently be impaired. This would be a limiting factor in the usefulness of ploidy in the production of variation.

Some interesting allopolyploids have been produced in the laboratory. One of particular interest is the intergeneric hybrid between radish, *Raphanus sativus,* and cabbage, *Brassica oleracea,* made by Karpechenko. Both parents have nine pairs of chromosomes, and individuals of the first hybrid generation have 18 univalent. The individuals of the first hybrid generation are nearly sterile; most plants produce no seeds at all, but some do produce a few. These seeds give rise to individuals with 36 chromosomes in each cell (tetraploid). These plants are irregularly fertile. Unfortunately, this hybrid had a root like the cabbage and a top like the radish. This feeble and variable plant, which must be pampered in order for it to continue, has been named *Raphanobrassica,* a fusion of the generic names of the radish and the cabbage.

The production of allopolyploids in the laboratory reveals a mechanism in nature which *may* have functioned to some limited extent in producing complexity within original kinds. However, these forms usually show such great irregularities in the distribution of their chromosomes, accompanied with prevalent infertility, that very likely they would not be able to compete successfully in nature and thereby survive. Thus a laboratory demonstration of the effectiveness of ploidy in the production of new species is still largely lacking. The evidence for the service of ploidy in producing variation still remains chiefly of the subjective type. What are technically new species, because they do not interbreed with the parent form, have been produced. Their low fertility and limited change from parental forms make it unlikely that these supply the amount of variety evolution requires.

Numerous examples of plant species appear to be cases of allopolyploidy. The origin of the marsh grass *Spartina townsendii,* as suggested by Huskins (1931), apparently illustrates such a case. This species was discovered occupying a single locality in southern England in 1870. A rapid spread of this grass was recorded a short time later. By 1902 it occupied thousands of acres along the English coast, and in

1906 it had appeared on the coast of France. Because of its desirable agricultural properties it has now been introduced into many parts of the world. Systematists have decided that because of its morphological characteristics it must be a hybrid between *S. stricta,* a native European species known for 300 years, and *S. alterniflora,* a native species of America which had been introduced into England and become common in some localities. The chromosome number of the former is 28 pairs, whereas that of the latter is 35 pairs. This would mean that an allotetraploid of these two species would have 126 chromosomes. *S. townsendii* actually shows 126 ± 2. Thus it seems reasonable to assume that *S. townsendii* may have arisen as a tetraploid hybrid of the other two species. The superior adaptapility of this possible hybrid is demonstrated by its overrunning both *S. stricta* and *S. alterniflora* when meeting them in natural competition.

The results of cytogenetic investigations on species of wheat *(Triticum)* and the related genus *Aegilops* (goat grass) made by Sax and Sax, Sapehin, Watkins, Bleier, and Kihara are interesting in this connection. The 15 described species of wheat fall into three classes: viz, the *einkorn* group of three species each of which has seven pairs of chromosomes (diploid), the *emmer* group of eight species, composing the “hard” wheats, which have 14 pairs each (tetraploid), and the *vulgare* group of four species, commonly called the “soft“ wheats, each member of which has 42 chromosomes (21 pairs and hexaploid).

In this case, with few exceptions, the hybrids between species with the same chromosome number are fully fertile. The hybrids between the members of the emmer and vulgare groups are pentaploid, showing 14 bivalents and seven univalent at meiosis. Crosses of emmer and einkorn have four to seven bivalents and from seven to 13 univalent. The vulgare-einkorn cross produces from none to as many as 10 bivalents, seven being the usual number, at least in certain crosses. These relationships have been interpreted to mean that the einkorn, emmer and vulgare groups have, respectively, one, two and three sets of seven chromosomes which are different from each other. It has been thought that the species of the vulgare group are allohexaploids, their origin being due to a cross with a species of *Aegilops.*

The case is an interesting one in that it serves as an illustration of the chromosome relations within the members of a related group. That several modern species have come from a few can be sensibly concluded. These variation changes of wheat are possibly of two kinds: species formation through new combinations of chromosome sets, and these in turn combined with gene mutations and new arrangements of genes. The very greatest apparent changes here have done no more than to erect additional species within the kind of grass involved in the crosses.

With regard to the third kind of ploidy, *heteroploidy,* it has been studied in detail in the Jimson weed *(Datura),* in the evening primrose *(Oenothera)* and in the vinegar fly *(Drosophila).* Heteroploid forms, it will be recalled, are those which differ from the normal members of the species by one or possibly two chromosomes more or less. This means that in some way at least one member of the usual diploid complement is lacking entirely or that there may be three members in a "pair" instead of two. These forms appear sporadically and show numerous and generally slight departures from the wild or normal type in many characters. Because they never breed true and are of lower fertility than normal diploids, they probably do not become established as new types in nature.

That polyploidy may be widespread among plants is indicated by an examination of the chromosome numbers of various genera. The case of species of wheat with their 7, 14, and 21 pairs has been mentioned. Some other genera with the chromosome number of included species are *Chrysanthemum,* 9, 18, 27, 36 and 45 pairs; meadow rue, 7, 14, 21, 28, 35 and 42 pairs; roses, 14, 21, 28 and 35 pairs; *solanum* (nightshade), 12, 18, 24, 30, 48, 54, 60 and 72 pairs. Various cultivated varieties of garden flowers, vegetables, crop plants and fruit trees appear to be polyploids. Apparent triploid and tetraploid varieties are known and cultivated among hyacinths, tulips, lilies and others. Some varieties of these kinds of flowers were experimentally produced. Polyploidy is of considerable economic value in cultivated varieties of cotton. Quite likely some of the “new” forms developed by Burbank in his outcrossing experiments, if examined for their chromosomal composition, would turn out to be polyploids.

The abundance of apparent polyploids in plants and their relative scarcity among animals is one of the most striking differences within the variants in the two kingdoms. About the only authentic instances of tetraploidy in animals is in brine shrimps *(Artemia)* and the nematode worm *Ascaris.* Indications of ploidy are found in a study of the chromosome numbers of flatworms, leeches, and a few other annelids, all of which are hermaphroditic (bisexual). The reason there is apparently much less polyploidy in animals than in plants may be that many “higher” plants are hermaphroditic, while animals are usually of two sexes differentiated by the diploid mechanism of segregation and combination.

I now discuss part (b) of chromosomal aberrations, those changes in the chromosome structure that result in alterations of gene order or number. These changes consist of deletions, duplications, translocation and inversions. Deletions (deficiencies) and duplications appear to involve losses or multiplications of single genes or of a part of a gene, or they may affect larger regions of the chromosome so that several to many genes are modified. Therefore such changes are basically distinct from the latter two, which merely change the arrangements of the genes and not their number. Addition or subtraction of genes is usually accompanied with effects which can be seen, while translocations and inversions may not be apparent on the surface.

Illustrations of effects produced by demonstrated deficiencies are the notched wing of *Drosophila* described by Bridges and Mohr and the waltzing gait in mice explained by Gates. Mice with this deficiency in this gene complement cannot run in a straight line and usually whirl about in small circles. Study of *Drosophila* has shown that most deficiencies are lethal. According to Sturtevant and Beadle (1939, p. 149),

> Duplications in *Drosophila* have phenotypic [visible] effects more or less in proportion to their lengths. Short ones may be very slight effects. Longer ones have progressively stronger effects—usually in roughening of the eyes, changes in the shape of the wings, modification of bristles.

Translocation have actually been seen in the cells of *Datura* (e.g., Jimson weed), corn, *Drosophila* and other organisms. Among plants in which these changes have occurred are peas, bellflower, onions, tulips, peonies, many grasses, spiderworts and evening primroses. Very few such changes have been found in animals. In several species of seed plants wild populations may contain chromosome sets that differ from one another by reciprocal translocation. It is also clear that related species sometimes differ in this respect and that translocation has been of importance in accomplishing diversity within groups.

Genes appear to be strung along end to end in the chromosome. Thus translocation which would not be expected to break exactly between genes would suggest position effects. If genes were entirely independent in each instance, it would make no difference if their arrangement in a chromosome were 123456 or 123654. But owing to evident position effects, changes in the serial order of genes are important in the development of variants from a normal form. Usually no appreciable reduction of the reproductive power takes place in the individuals in which inversion has occurred. Some situations appear to indicate that in *Datura* races show circles or chains of chromosomes at meiosis (mitosis with halving of number of chromosomes) in addition to bivalents.

Hybridization

Hybridization deserves an important place among those factors which produce variants among plants and animals. However, it has limits. The fact that crossing cannot occur across basic types but is in each instance confined to the members of a single kind, makes it of no further service than to increase the complexity of variants within separate kinds. Isolating mechanisms in nature never permit more than an increase in the diversity within the original kind.

Discussion

With this brief treatment of hereditary changes in the basic mechanisms of heredity, I wish to emphasize one outstanding fact. Even if it be allowed that all these known processes of variation accomplish the *greatest* changes that investigators claim for them, mutations in vinegar flies merely resulted in new variants *within* the type. No one has ever conceived of the results as being anything other than vinegar flies. Autopolyploidy in spiderwort resulted in additional variants within the spiderwort type. Allopolyploids in marsh grass were additional variants of marsh grass.

Among animals, tetraploid in roundworms and brine shrimps merely produces new variants of roundworms or of shrimps. Heteroploidy in evening primroses merely produces varieties of primroses. Deletions and duplications merely produced waltzing mice from normal mice and notched-wing vinegar flies from normal vinegar flies. Translocation in Jimson weed and corn merely resulted in new variants of Jimson weed and corn.

It is thought that inversions of genes within the chromosome may have been active in the development of the fruit fly genus *Drosophila.* Sinnott, Dunn and Dobzhansky (1970, p. 294) state that "pericentric inversions have been active in the evolution of this genus *(Drosophila).* Similar evidence exists for grasshoppers and, less directly, for some other animals and plants." However, if inversions have produced some of the species of the genus *Drosophila,* then, by evolutionist definition, here is a case where macroevolution has occurred. This would be true if we were to define macroevolution as "interspecific variation," i.e., the production of new species. However that this cannot be accepted as a definition of macroevolution (which in current usage refers to the assumed appearance of *new basic types,* i.e., organic evolution) is obvious when we recall that all the species of the genus *Drosophila* are 100 percent vinegar flies. Therefore, all inversion in vinegar flies has done is merely to produce new variants of bonafide vinegar flies. *This kind of development could never result in organic evolution.*

What, then, has been accomplished by inversion? Just this: variation within a basic type (vinegar flies), no more. And that is *microevolution.* According to all demonstrable evidence, no change greater than variants *within* a basic type has been observed. The term *macroevolution* should be reserved for such speculative, assumed, and undemonstrable cases as the development of new basic types. After all these processes have achieved their greatest possible changes, we still have nothing newer than vinegar flies, spiderworts, radish-cabbage hybrid, marsh grass, primroses, roundworms, brine shrimps, corn and Jimson weeds. Thus, nothing higher than microevolution has been achieved by all these processes of change. The crucial point is: *Each of these basic kinds is set off from every other basic kind by some "residual part" which no amount of gene change can erase.*

Dobzhansky (1941, p. 52) states that even between species "it must be admitted that in no case have all the differences between two good species been completely resolved into gene changes." If this is true of species, what can be said of the differences which set off one group of species from another species group? If we stick to the facts, we must recognize that *no present-day natural process is capable of accomplishing the change necessary to bridge the discontinuity between kinds now so widely evident in nature.*

A study of fossil forms shows that representatives of the large systematic groups are just as complex at their "earliest" appearance in the rocks as are their descendants today. Sequoia, beech, hazelnut, cottonwood, oak, willow, linden and elm are as distinct at their earliest appearance as fossils as are the living trees today. In some cases the *species* of these fossil ancestors are not identical to our modern *species* within each respective kind. They may be as different from our modern species as two of our modern species of the same basic kind differ from each other. The same occurs among the animals. Credit can be given to the concept of evolution here only as it directs attention to these processes of variation. The

researcher may assume as many millions of years since the formation of fossils as he likes, *yet all the processes of change have not accomplished, even in a single case, the erasure of the discontinuity which marks off the different kinds of organisms.*

We need not become confused by the fact that processes of change apparently have operated in some variable basic types of organisms *since their creation.* These populations produced variants to which taxonomists have assigned the terms species, genera and even families. An example is Darwin's finches on the Galapagos Islands. David Lack (1939, p. 17) divides these finches into three genera (some taxonomists have assigned six and seven genera) and 14 species. The finch populations of all the islands have been placed in the subfamily *Geospizinae,* endemic to the Galapagos, of the world family *Fringillidae* (all finches). The inadequacy of the terms microevolution and macroevolution, as defined by evolutionists, is obvious in such cases. We should remember that, while taxonomic categories are arbitrarily chosen, the individual organism is the natural reality, and these individuals are grouped naturally into morphological-physiological groups which we may call basic kinds or types (baramins). We need not argue about the variously defined "species" or debate processes of microevolution and macroevolution upon such low-level, vague, fluctuating populations. The clusters we call species may be legitimate game for taxonomists, but the high-level, enduring basic types (including many "biological" species) lie clearly before the gaze of the physiologist and for the biologist constitute the true building blocks of the living world.

The student of Darwin's finches is impressed with the similarity of all populations of these birds. In most respects, other than beak differences, the individuals of these populations are "closely similar to each other," to use Lack's words (1939, p. 19). Although considerable change has apparently developed in the beaks of the different populations, still whatever processes of variation operated, they have done no more than produce an interesting community of finches. Is this microevolution or macroevolution? Since no new basic types have appeared, we must consider this another case of microevolution, even though taxonomists tell us that new species and even genera apparently developed.

Throughout the living world the greatest actual changes that the evolutionist has found are the mere production of additional variants *within groups already present and clearly set off in nature.* Nevertheless he is optimistic and has great faith in this theory. He commonly says, when presented with these difficulties, "Just give the processes more time." However, the thoughtful scientist can see that such an attitude is not reasonable, because natural laws do not change with passing millennia. If we cannot lift ourselves by our bootstraps today, we could not do it in a million years. If processes of variation today are not erasing the differences between kinds, neither could they do it in millions of years.

How does the theory of special creation fare in the light of these known causes of variation? The creationist turns to Genesis and reads that each kind of plant yields seed according to its own kind (Genesis 1:12). He next turns to nature to see what Genesis means. He sees that both plants and animals still bring forth after their respective kinds. He finds that, even with all forces of change operating at maximum strength, vinegar flies still continue to bring forth vinegar flies and corn continues to bring forth corn. He finds in the fossil record that this same discontinuity has existed since the earliest natural record; all the work of all the scientists can demonstrate only minor differences which have come in by microevolution since the origin of basic biological forms. Thus the scientist who accepts the Genesis creation record owes no one an apology.

Conclusion

Popularly the claim is made that creationism is only religion, evolution is natural science. However, due to the fact that the origin of a new basic type has never been observed in nature or in the scientific laboratory, evolutionism rests *entirely* upon faith in an undemonstratable assumption, not upon scientific fact. In contrast the theory of special creation is in complete harmony with all demonstratable (scientific) proof.

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QUOTE

This fact, of God's articulate disclosure of His moral will in the Decalogue and other ethical imperatives that Scripture publishes in a literary canon, and that Jesus Christ publishes in His life and ministry, has far-reaching consequences. It disputes mystics who would deny intelligibility to divine revelation because of its supernatural character. And it disputes modern rationalists as well, who in the name of evolutionary intelligence consider final divine revelation offensive to the modern mind.

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HYPERBARIC OXYGEN AND FRACTURE HEALING

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Abstract

Recent medical evidence offers beneficial effects for living systems involving hyperbaric oxygen. New findings imply that past environmental conditions may have better supported life here on Earth. Reviewed here is an investigation in early fracture healing with hyperbaric oxygen exposure. Also, Biblical implications are discussed.

History

Our planet Earth is the most remarkable bubble of life in all the vast and harsh dimensions of the known universe. The specific conditions endowed here are absolutely essential for life support. As J. E. Lovelock (1979, p. 10) astutely observed,

> The climate and chemical properties of the Earth now and throughout its history seem always to have been optimal for life. For this to have happened by chance is as unlikely as to survive a drive blindfolded through rush hour traffic.

Dr. Lovelock, in the book entitled *Gaia,* describes the cybernetic system here on Earth which seeks the continuity of life. He defines Gaia (p. 11) as ". . . a complex entity involving the Earth's biosphere, atmosphere, oceans, and soil . . . which seeks an optimal physical and chemical environment for life on this planet." He theorizes that life must have arisen in an anaerobic atmosphere where there was neither free oxygen nor ozone in the air. The mystery of the appearance of oxygen ". . . held an almost fatal catastrophe for early life" (Lovelock, p. 31). With oxygen,

> . . . the Earth's atmosphere was so curious and an incompatible mixture that it could not possibly have risen or persisted by chance. Almost everything about it seemed to violate the rules of equilibrium chemistry (Lovelock, p. 67).

He states that there is an upper limit for available atmospheric oxygen that would be compatible with continuing existence of life and that with a 15% increase over present conditions, grass in a rain forest would burn (Lovelock, p. 71).

Theories concerning possible original Earth atmospheres in general exclude oxygen. Dr. Urey suggested to Dr. Miller for his classic experiment in 1953 (for which he won a Nobel Prize) to use methane, hydrogen, ammonia and water vapor. The reason for this mixture is, as Klotz (1972, pp. 481-482) states,

> . . . the absence of oxygen prior to this time prevented the oxidation of the relatively simple compounds which could exist in a reducing atmosphere but would have been destroyed in the present oxidizing atmosphere.

Now evidence from the past concerning the presence of oxygen on Earth in a greater quantity than present conditions is coming forward. The problem with oxygen regulation has always been critical as Lovelock (p. 20) acknowledges: "If Gaia does exist, the need for regulation was as urgent at the start of life as at any time since." George F. Howe (1977, p. 176) has noted,

> . . . the sedimentary distribution of carbon, sulfur, uranium and ferrous iron depend greatly upon ambient pressure and should reflect any major change in the proportion of oxygen in the atmosphere or hydrosphere. The similar distributions of these elements in sedimentary rocks of all ages are here interpreted to indicate the existence of a Pre-Cambrian atmosphere containing much oxygen. . . . We find no evidence . . . that an oxygen-free atmosphere has existed at any time during the span of geological history recorded in the well preserved sedimentary rocks.

Also quoted in this article studying the chemical evidence for the presence of oxygen in fossil rocks: ". . . no other conclusion but that oxygen has always been an important constituent of the atmosphere seems possible."

As Cox (1976, p. 121) has noted, the question of oxygen's presence in the atmosphere and the age of the Earth-are related:

> What seemed puzzling, is that, while the oxygen associated with the photosynthetic cycle should be in balance, oxidation of minerals and rocks, etc., would be expected to make the proportion of oxygen in the atmosphere decrease, but there is no evidence that it has decreased.

His note continued,

> . . . it is only in conjunction with a belief in a very old Earth that this matter of the removal of oxygen by oxidation causes any trouble. If it is admitted that the Earth is young, the oxidation need cause no concern.

Recent investigations into air trapped in amber fossil finds have given some unexpected results. This "fossil" air has been reported by geochemist Robert Berner of Yale and Gary Landis of the U.S. Geological Survey to contain tiny bubbles of entrapped atmosphere from the Late Cretaceous, 80 million years old (Bemer, 1988). Their mass spectrometry analysis yields oxygen levels over 30% compared to the 21% found today. The oldest samples studied had the highest oxygen values. However, a debate arose after this announcement. Hopfenburg (1988, pp. 717-718) and Beck (1988, pp. 718-719) disclaimed the idea that amber could be a sealant for ancient air. Perhaps this will be resolved with additional studies as Berner and

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Landis state, "Amber existed three hundred million years ago. We have opened a new field of study" (Anon., 1988, p. 12).

Experience with neonates limits the upper tolerability of humans to higher levels of oxygen. For example, oxygenation above 0.4 atm (100% increase) would lead to retinal hyperplasia and blindness (Smith, 1980, p. 108).

Creation theories about a possible vapor canopy allude to prior elevations in atmospheric pressure. Joseph C. Dillow (1978) wrote about the canopy and ancient longevity. He also talked about the relationship of higher oxygen levels and giantism displayed in the fossil record. Dillow calculated a possible atmospheric pressure of 2.18 standard atmospheres with a vapor canopy.

> If the oxygen tension in the alveolar sacs was doubled due to increased atmospheric pressure, this would increase the oxygen diffusion force and hence enable the animal effectively to deliver more oxygen to its body cells (Dillow, 1978, p. 27).

Hyperbaric Oxygen

Implications toward accelerated wound healing and the effects of the aging process using hyperbaric oxygen have been noted in prior creation literature (Dillow, 1978, pp. 31-32). Hyperbaric oxygen (HBO) exposure at 100% absolute oxygen and two atmospheres of pressure for short periods of time have proven definite therapeutic effects. Increased oxygen tension in the presence of fractures has been shown to stimulate the early appearance of osteoblasts (Niinikoski, 1972, p. 746), accelerate rates of calcium deposition and callus (Coulson, 1966, p. 449), and to augment the tensile strength in healing bone (Yablon, 1968, p. 186). A controlled investigation of rat femur fractures, without internal fixation, concluded that HBO therapy accelerated all phases of bone healing, i.e., subperiosteal new bone formation, cartilage deposition, cartilage to bone transformation, and advanced the overall healing rate by 25% (Heppenstall, 1975, p. 357). Hyperbaric oxygen appears to enhance the development of the fibroblastic collagen framework. This precedes the trailing invasion of vascular branches and the subsequent development of osseous callus deposits.

Acceleration through the stages of bone healing has been shown with hyperbaric treatment in oral and maxillofacial surgery. Studies have also shown enhancement in bone regeneration and have reduced by one-third the time needed for internal fixation (Kerley, 1981, p. 9). HBO is effective in the healing of refractory osteomyelitis probably by improving oxygenation in poorly vascularized bone (Davis, 1986, p. 1210). HBO therapy has proven helpful in many other medical settings (Myers, 1984, p. 83).

The Study

A pilot investigation was performed, analyzing fracture repair in rabbit femurs which had received intramedullary rodding. Surgical exposure, osteotomy, reaming and placement of an intramedullary rod would lend the fracture site avascular of its periosteal and endosteal blood supplies. Thus, it would appear that in this avascular setting bone repair effects of hyperbaric oxygen may prove demonstrable.

Twenty-one same age adolescent male white New Zealand rabbits entered the study. All rabbits received the same treatment and care including general anesthesia, a lateral incision to the midshaft femur, transverse osteotomy using oscillating saw and intramedullary fixation using a Steinmann pin. The animals were weighed and received hemoglobin checks to assure quality of health. All animals were treated the same except for random selection of rabbits to receive hyperbaric oxygen treatment. Twice daily dives in 100% oxygen at two atmospheres were arranged for one hour. Sacrifice analysis was done at 1, 2 and 3 weeks on the fractured femurs. Data for comparison between treated and nontreated groups was obtained through microscopic, radiographic and biomechanical tests.

Results

Microscopic

Animals and specimens handled at one week post fracture were eliminated from the study secondary to technical difficulties and fracture instability. It was noticed that qualitatively less callus was produced in HBO treated fractures. See Table I and Figure 1 for percentage quantization of longitudinal sections through the callus for old bone, new bone (osteoid), cartilage and marrow.

Table I. Longitudinal sections for comparison through fracture sites. Control and HBO-treated specimens were analyzed to show cartilage versus callus differences at two and three weeks.

RABBITS-HYPERBARIC OXYGEN STUDY
(Data reflects the percentage of old bone, callus, and cartilage to the total section area: add marrow to get 100%)

ANIMAL	OLD BONE	CALLUS	CARTILAGE	TOTAL
TWO WEEKS POST FRACTURE				
4008*	16.19%	33.42%	28.71%	78.32
3999*	16.15	27.51	14.88	56.65
4010**	17.03	12.93	24.45	54.40
4005**	14.89	12.27	27.84	55.00
4011**	19.05	15.54	22.56	57.15
THREE WEEKS POST FRACTURE				
4003*	13.89	50.13	17.86	81.88
4000*	11.91	44.29	37.83	94.03
3996**	15.69	55.69	25.43	96.81
4014**	14.25	35.24	20.70	70.19
4002**	26.06	38.35	24.50	86.92

* Controls
**Hyperbaric oxygen test group

For callus formation "osteoid" at two weeks, there was 125% more in the control group. At three weeks, the values were still greater in controls but only 9.5% greater. Cartilage formation percentages differed, being 14% greater in the HBO group at two weeks, but at three weeks there was 15.4% less in the HBO group versus controls. The callus in the treated femurs appeared to be more 'mature.' The woven cartilaginous framework of the osteoid was more compact, and the osteocytic lacunae were smaller around the osteoblast.

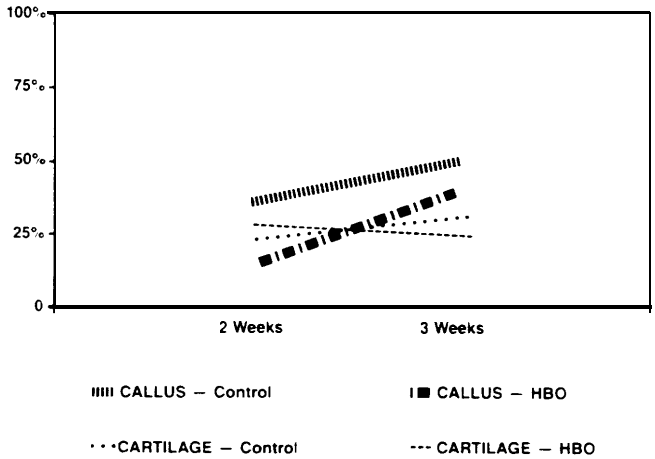

Figure 1. Graphic display of differences in cartilage and callus formation at two and three weeks.

There was less uncalcified osteoid, the width of the spicules were narrow and the orientation of the spicules less random. See Figures 3 and 4 for comparison of microscopic appearance of fracture healing at three weeks.

Radiographic

Little difference was detectable at two weeks between HBO and controlled groups; however, at three weeks, the HBO treated callus appeared qualitatively denser and to a greater extent demonstrated bridging callus across the fracture site. See Figures 5 and 6 for comparison between fracture healing at three weeks. See Table II for radiographic rating at three weeks fracture healing.

Biomechanical

See Figure 2 for graphic comparison between flexoral stiffness of the test samples. Using a 4-point bending stress test, the flexoral stiffness of the fractured femurs was analyzed and compared to its intact contra-lateral femur. Taken as a group, the HBO treated animals displayed greater flexoral stiffness, being 34% greater in treated femurs, versus controls. It is noted that a slight alteration in the four-point bending stress test was necessary due to a proximally placed fracture in one of the HBO treated femurs.

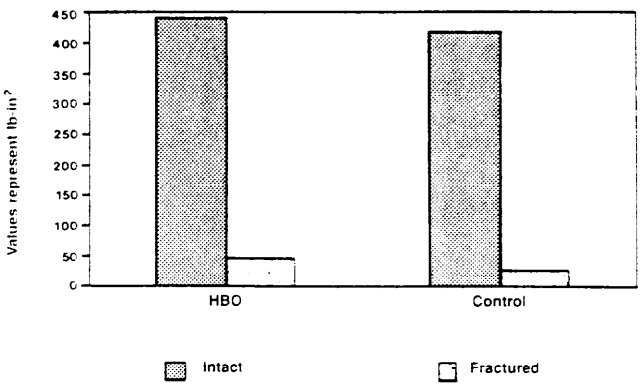

Figure 2. Graphic comparison for flexoral stiffness for control and HBO femurs. Both fractured and intact opposite femurs were tested at three weeks healing time.

Discussion

This pilot study attempted to delineate any major differences in fracture healing of rabbit femurs receiving intramedullary fixation in the presence of hyperbaric oxygen. It is believed that microscopic analysis allows an assumption of more advanced maturity in the fracture callus, a greater percent in early appearance of cartilage, and conversion of cartilage to osteoid. Radiographic analysis appears to demonstrate a greater density representing compaction of the calcified osteoid spicules. The biomechanical analysis appears to demonstrate advancement in fracture healing toward greater stiffness.

Admittedly, one weakness of this pilot study is the small number of samples. Of concern also is the lack of uniform appearance of the fractured femurs in that specimens showed variable degrees of comminution. In a subsequent analysis, careful steps will attempt to obtain a reproducible model that eliminates these variables and also uses sample numbers worthy of significant biostatistical analysis. However, the general assumption appears to be valid that hyperbaric oxygen may 'effect' the fracture callus toward accelerated stages of development.

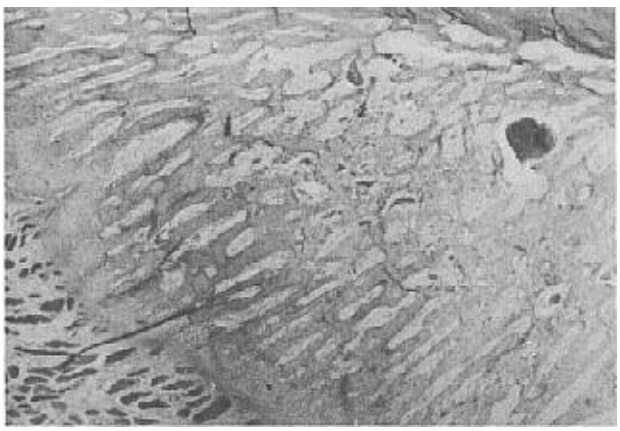

Figure 3. Control photomicrograph showing central cartilage and radiating spicules of osteoid fracture healing.

Conclusion

In a subsequent study, it is intended to produce solid evidence that HBO provides beneficial accelerated healing potential to fractures. It is hoped that this will prove to be of benefit in the human setting. It is possible that hyperbaric oxygen treatment could more quickly return people to their pre-morbid (pre-fracture) status. Such a benefit could considerably decrease hospital stay and cost, loss of time from work, the number of follow-up physician visits, the need for immobilization, casts, internal and external fixation, etc., and enhance early return to work or sports.

The possible pre-Flood condition of increased oxygen levels and atmospheric pressure have been discussed. Certainly, upper limits in each condition to sustain life are known (Smith, 1980, p. 12). Modern understanding regarding possible pre-Flood conditions is certainly inadequate. Lovelock (p. 107) has an explanation:

> Biblical teaching that the fall was from a state of blissful innocence into the sorrowful world of the

Figure 4. HBO photomicrograph showing central cartilage and radiating spicules of osteoid at the fracture site.

flesh and the devil through the sin of disobedience is hard to accept in our contemporary culture.

Yet, perhaps such possible beneficial effects as HBO demonstrate that a proper exposure to these "Eden-like" conditions may allow more effective cellular physiology. It is curious from an evolutionary scenario, starting with the reducing atmosphere and building the atmospheric oxygen level to the present 21%, why leukocytes, (which supposedly have never seen any oxygen conditions above 21%) are better phagocytic killers of bacteria at elevated oxygen tensions (Mader, 1981, p. 45). Similarly, for osteoblasts exposed to elevated oxygen levels as Shaw (1967, p. 74) notes, ". . . the most extensive and and uniform osteogenesis was observed in the explants grown in the gas mixture containing 35% oxygen." Could it be that the cellular machinery "remembers" or was designed originally for elevated oxygen levels?

Additional studies will hopefully clarify some of these issues. Imagine optimal conditions for terrestrial life including the beneficial effects of a combined stronger magnetic field, a vapor canopy, elevated oxygen levels, and elevated atmospheric pressures. Knowing more about the past world conditions can only help us become better stewards of our present earth. Curiously, Lovelock concludes in his book *Gaia* (p. 145), with this statement,

Figure 5. HBO x-ray of healing fracture at three weeks. Notice the fluffy bridging ossification.

Table II. Radiographic rating for healing callus. Scale: No callus, 0; small amount, 1; moderate amount, 2; profuse, 3; bridging, 4; osseous bridging, 5.

Results

Radiographic

three weeks	callus	ossification
4000	2+	1+
4003	2+	2+
4000*	4+	3+ bridging
4014*	2+	2+
3996*	4+	3+

*HBO

There is, for example, a fresh awareness of the concept of Christian stewardship whereby man, while still allowed dominion over the fish and the fowl and every living thing, is accountable to the gods for good management of the Earth.

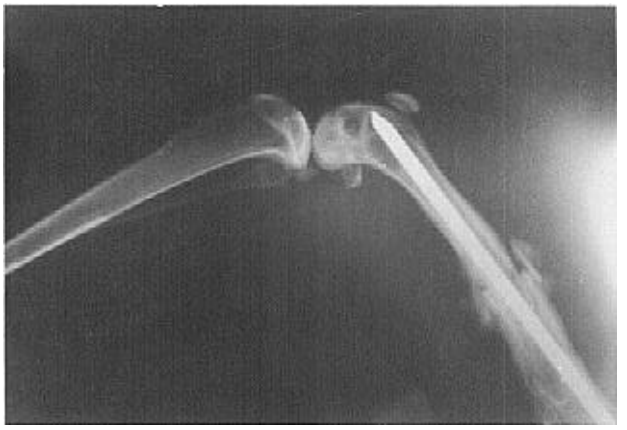

Figure 6. Control x-ray at three weeks healing. Notice the lesser abundance of ossified bridging callus.

Acknowledgments

Appreciation is expressed to Susan C. McLeod, Margaret Lee, and Dana Little for manuscript assistance.

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FUNCTIONAL PROTEINS: CHAOS OR LOGOS**

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Abstract

The purpose of this paper is to explore whether undirected, randomized energy through physicochemical laws (Chaos) could make functional proteins necessary for cellular life. Both downhill and uphill work are explained. These two types of work are further explained as thermal entropy work and configurational entropy work. The four requirements for making a single functional protein of living systems areas follows: use of only left-handed amino acids, use of only peptide bonds, linking of amino acids in correct order and prevention of other organic molecules joining the chain. Random methods (Chaos) violate all these requirements. Therefore, the correct three-dimensional structure of functional proteins cannot be developed by undirected physiochemical laws which do not perform configurational entropy work. It is clear that there needs to be an outside intelligent agent (Logos) to fulfill these requirements. An unbiased observer would have great difficulty denying the rationality of inferring from the complexity of functional proteins and a living cell the activity of a "Logos" which is the prime component of the creation model.

Introduction

Evolutionism and creationism disagree on how life began. Evolutionism claims all non-living and living matter can be explained only by natural causes, i.e., the laws of chemistry and physics. It claims these physiochemical laws explain not only how all things work, but how they came into being in the very first prebiotic soup of chemicals. These physiochemical laws operate solely by random methods (Chaos).

Creationism claims that although physiochemical laws are valid to explain how chemicals function today, they cannot explain how non-living complex chemicals and living cells and organisms originated in the first place. In order for matter and energy to organize itself into self-directing functional units, they must have a designed program with an uphill energy conversion system (configurational entropy work). This designed program with its uphill energy conversion system must be imposed on matter from an outside creative force (Logos). For example, the blueprint of an automobile is not contained within the steel, aluminum, chrome and vinyl materials. There is no spontaneous urge for these materials to develop into engines, frames, bodies and interior by random methods (Chaos). The design and programmed operation of these components were ordered by automotive engineers and skilled craftsmen (Logos). Likewise in the first living cell, the basic unit of living structure, i.e., a functional protein, must be developed. If functional proteins can be developed solely by physiochemical forces acting randomly (Chaos), then evolutionism would be a true explanation of life. But if a simple flow of energy through a system of matter cannot organize chemicals into a functional protein, then evolutionism could not explain the origin of life. If it can be shown that to organize amino acids into a functional protein a selecting, sorting and sequencing program with an uphill energy system is required, then the creation model which includes a creative force (Logos) would be the logical explanation for the origin of life. It is the purpose of this paper to explore whether undirected, randomized energy through physiochemical laws (Chaos) can make even one functional protein. It will discuss the two types of thermodynamic work and how physicochemical forces (Chaos) fail to perform configurational entropy work. It will show how the Logos of the creation model must be required to originate and make functional proteins.

Discussion

Easterbrook (1988, p. 32) stated: "Nobody has any idea what makes chemicals start living. The origin of life is perhaps the leading unknown of contemporary science." Wickramasinghe (1988, p. 611) bluntly observed:

> One is inevitably faced here with a situation where there are few empirical facts of direct relevance and perhaps no facts relating to the actual transition from organic material to material that can even remotely be described as living.

These quotes demonstrate the immense problems associated with explaining how chemicals organize themselves into living entities. The question this paper will try to answer is how, when no life existed, did functional proteins, the building blocks of DNA and organelles, come into existence which today are absolutely essential to living systems yet which can only be formed by those systems?

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Downhill and Uphill Work

The cell is a living factory; proteins are the chemical machines that carry out the directed work. To originate life, DNA and protein, which are not living, must be synthesized. Understanding how they are synthesized involves the Second Law of Thermodynamics. Pearcey (1989, p. 8) quotes Bradley explaining the application of this Law as follows:

> The Second Law of Thermodynamics tells us which processes tend to happen spontaneously in nature. Processes that involve a loss of energy occur spontaneously; processes that involve an increase of energy don't. Hot water cools down spontaneously because that involves a loss of kinetic energy in the molecules. Cold water doesn't naturally heat up because that involves an increase in energy. That's why we have water heaters in our homes—to achieve something that doesn't happen naturally.
>
> Spontaneous processes are sometimes called "downhill" processes. That's because they are illustrated by things that go downhill—balls or wagons or waterfalls. Take a ball to the top of a hill and let it go. What happens? It rolls down. Take the same ball to the bottom of the hill and let go. Does it roll up? No. Why the difference? The first represents a loss of energy. A ball perched on the top of a hill is full of potential energy, which is lost on the way down. That's why rolling downhill happens spontaneously. Rolling uphill, on the other hand, requires an increase of energy. That's why we have to kick the ball, or a strong wind might come along and push it, or whatever. To get the ball uphill takes an input of energy from outside, what we call "work."

Thermal Entropy and Configurational Entropy Work

The building blocks of proteins are amino acids. They are easy to make in the laboratory, because they involve only downhill reactions. Achieving a downhill chemical reaction to occur is no greater event than getting a ball to roll downhill. However, producing a functional protein is an extremely difficult process. Proteins synthesize when several hundred amino acids react to join into a chain. They have to be forced together by outside energy (uphill).

To push forward a thermodynamically unfavorable reaction—an uphill process—we need to apply work to the system. Thermodynamically there are two kinds of work: thermal entropy work and configurational entropy work. Entropy is "a statistical concept that measures the number of ways a system can be arranged." Pearcey (1989, p. 8) quotes Bradley explaining these two forms of work as follows:

> Thermal entropy is a measure of the way energy is arranged. The difference between a hot cup of water and a cold one is that the hot water has more energy. Its molecules are moving around faster. To produce hot water, we have to do thermal entropy work. The other kind of entropy is configurational entropy: that's a measure of the way mass is arranged. The difference between a pretzel and a bread stick has nothing to do with energy—it has to do with their shape, their configuration. To produce a pretzel shape, we have to do configurational entropy work.

Requirement of a Functional Protein

To synthesize a functional protein, one kind of work is needed to make the parts join together; another kind to make sure the parts are in the correct sequence in order to yield a specific chemical structure. Evolutionary theories on the origin of life fail to make this distinction. They go on the assumption that we only need to locate an energy source to drive forward a reaction and make the amino acids join together, then we have solved the problem of synthesizing a functional protein. Evolutionary theory relies on only thermal entropy work. Simple application of thermal entropy work merely causes amino acids to join together and form a random chain. But to synthesize a functional protein, the second type of work, configurational entropy work, must also be applied. A chain of amino acids hooked by random methods is not a functional protein.

There are four requirements for making a functional protein and not just a random chain of amino acids.

1. Living systems use only amino acids that bend light to the left, called left-handed amino acids. The problem is when chemicals are mixed in the laboratory, the result is ***always*** a relative 50-50 mix of left- and right-handed amino acids.

2. Amino acids must be connected only by peptide bonds and no other chemical bonds. The problem is using random laboratory methods result in approximately 50% peptide bonds.

3. The amino acids must be linked together in exactly the correct order. The problem is that random methods of linking produce a non-functional random order.

4. Any organic molecules floating around in the environment must be kept from joining the amino acid chain. The problem is there are about 100 different amino acids bumping around in any prebiotic soup, but only 20 are used in living cells. Random methods promote the mixing of the non-vital amino acids with the 20 required vital amino acids.

Imposing these four requirements on a protein chain is configurational entropy work. What is needed is a selecting, sorting and sequencing program supplied by some creative force (Logos). The creation model claims this creative force is an intelligent agent which is the Supreme Being and Creator, the Triune God of the Bible.

Biological function of proteins requires a three-dimensional morphology which depends on acquiring only left-handed amino acids, only peptide bonds, correct sequences and avoidance of all other organic molecules. Physiochemical laws (Chaos) do not meet any of these requirements. Therefore, the correct three-dimensional structure cannot develop by undirected physicochemical laws and the resulting chemical will not have any biological function. The argument here for the origin of functional proteins is between natural forces (Chaos) and an intelligent agent (Logos).

Chaos or Logos?

Denton (1986, p. 324) has commented: "No evolutionary biologist has ever produced any quantitative proof that the designs of nature are in fact within the reach of chance." He further stated (1986, p. 305):

> There is simply no way of explaining how a uniform rate of evolution could have occurred in any family of homologous proteins by either chance or selection; and, even if we could advance an explanation for a particular protein family, we would still be left with the mystifying problem of explaining why other protein families should have evolved at different rates.

Crick (1981, p. 88), alluding to the need for a divine intelligence to originate life, stated:

> An honest man, armed with all the knowledge available to us now, could only state that in some sense, the origin of life appears at the moment to be almost a miracle, so many are the conditions which would have had to have been satisfied to get it going.

All the problems of requiring both thermal entropy work and configurational entropy work for synthesizing a functional protein apply to DNA—only more so, because DNA is many times more complex. And even the simplest living system is much more than functional proteins or DNA molecules. The synthesizing of functional proteins or DNA is still a very small step in the development of a living system.

Evolutionism argues that given enough time, the impossible not only becomes possible, but inevitable. Yet, Blum (1955, p. 178) points out that long time spans work the opposite. The longer the time span for a reversible synthesis to occur, the more likely the reverse reaction (decomposition) occurs. Blum (1955, p. 9) stated:

> the greater the time elapsed, the greater should be the approach to equilibrium, the most probable state, and it seems that this ought to take precedence in our thinking over the idea that time provides the possibility for the occurrence of the highly improbable.

Anderson (1989, p. 55) commented on the gap between the first simple organic molecules and a complete reproducing cell:

> While much attention and effort has focused on the prebiotic formation of such molecules as amino and nucleic acids, the formation of a reproducing cellular entity in a prebiotic environment constitutes a gap seldom addressed in the scientific literature. Indeed, the gap between simple organic molecules and a reproducing cell is vastly greater than that envisioned by most researchers in origin of life studies. The nature and complexity of known cells suggests that the simplest conceivable cellular form is far too complex to be a product of known prebiotic mechanisms. From directing metabolic processes in maintaining osmotic stasis, all would be necessary functions for the first cell.

Wilder-Smith (1976, p. 256) commented on the basis of all biology:

> Thus the basis of all biology is codified information, i.e., stored or crystallized Logos. Thus modern coded molecular biology requires a thinking, concept forming, instruction giving Logos (i.e., a Logos full of ideas) as basis. Chaos (chance) imparts no simulated, coded instructions—and develops no ideas.

Conclusion

How did the first and subsequent functional proteins originate? The contrast is between natural forces (Chaos) and an intelligent agent (Logos). The essence of intelligence is precisely the ability to select and direct processes. The evidence presented is that a "Logos" is necessary for the origin of functional proteins, DNA and living systems. Of course, this “Logos” is not a human being but a Divine Designer. An unbiased observer would have great difficulty denying the rationality of inferring from the complexity of living cells the activity of a “Logos.”*

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*Editor’s Note: Readers interested in this topic could benefit from consulting the following two books;

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2. Williams, E. L. (editor), [1981]. Thermodynamics and the development of order. Creation Research Society Books. Kansas City, MO.

QUOTE

In a novel (Miller, 1944) a preacher trying to teach a woman to read makes the following statement:

> “In the beginning God created the heaven and the earth” he would read. “That is all the sum of our knowledge; all else is contributory . . .“

A good deduction applicable even to modern man.

Reference

Miller, Caroline. 1944. Lebanon. The Blakiston Company. Philadelphia, p. 184.

PANORAMA OF SCIENCE

Death Knell for the Big Bang

Evolutionists and creationists are in general agreement that the Second Law of Thermodynamics is an arrow pointed toward the future heat death of the Universe. A corollary of this basic concept is that there must have been a beginning. For an evolutionist this beginning is usually described as the Big Bang. The scientific community is beginning to recognize that the Big Bang scenario does not look like a good way to form galaxies. The problem is that the Big Bang allows too little time for the force of gravity alone to gather the matter produced by this explosion into the patterns of galaxies we see today. What is more puzzling is that we can observe not only the multitude of galaxies but also clusters and superclusters of galaxies linked together gravitationally in patterns like the "Great Wall," estimated to stretch across the heavens for more than half a billion light-years. The recent cosmological upheaval is further exacerbated by observations of extremely distant quasars close to the edge of the universe which, according to evolutionary thinking, indicates stars clustering in galaxies much earlier than had been thought possible (Cowen, 1991, p. 52).

It may be that the Big Bang only survives in the literature because the alternative is creation. Princeton's David N. Spergel lends weight to this analysis with the following comment:

> If there were an alternative model that explained the microwave background and the nucleosynthesis abundances observed, and produced galaxies, then people would start thinking about it. But there's no good, viable alternative to the Big Bang (Peterson, 1990, pp. 184-185).

Not only do superclusters of galaxies mean trouble for the Big Bang, but even individual galaxies yield difficulties. Years ago Dr. Vera Rubin discovered that galaxies spin so fast that they ought to fly apart. In response to this dilemma she proposed the cold-dark-matter model which is considered to be the standard theory of how the universe evolved. The idea is that the galaxies only remain intact over the vast time spans that evolution requires because they are "embedded in vast spheres of matter whose gravity keeps the stars in check" (Bartusiak, 1990, p. 88). According to theory this cold-dark-matter should make up at least 90% of the mass of the universe. Cold dark matter is an unknown kind of matter which is considered to be "cold" because its particles move slowly and "dark" because it does not absorb or radiate light and hence is invisible to our detectors.

According to science writer Ivars Peterson (1990, p. 184):

> The trouble is that no current theoretical model of the evolution of the universe seems to fit all of the observations without at least some inconsistencies. Cosmologists find they must labor to squeeze their pet theories into the steadily tightening straitjacket of observational data.

From a creation science point of view, this is a welcome change. Astronomers should not be excused from the rigid requirements of the scientific method.

The death knell for the Big Bang started last year with evidence from the Cosmic Background Explorer (COBE) spacecraft that suggested a very smooth beginning gor the Universe. Measurements in the infrared failed to see any point brighter than its surroundings by even one part in 25,000. Therefore, there is no trace of energy-releasing events that could provide seeds for galaxy formation. A member of the COBE team, John C. Mather of the NASA Goddard Space Flight Center, acknowledged the problem:

> I'm completely mystified how the present-day structure (of the universe) has come to exist without having left some trace at the level of sensitivity that we know we have with our apparatus. There should have been some kind of energy release (after the Big Bang). But there isn't anything there (Peterson, 1990. p. 36).

What NASA obtained was a perfect black body radiation curve suitable for use in an undergraduate physical chemistry class.

All of these findings put together mean that the cold-dark-matter theory answer to the Big Bang dilemma must be abandoned. The facts are: (1) Astrophysicists cannot account for the enormous conglomerations of galaxies observed. (2) They have been unable to determine the nature and amount of the cosmic mass. According to current theory, too much mass and the universe would contract and collapse; too little and it expands forever. (3) They have failed to find any local variations in the background radiation. (4) They have found, to their dismay, giant clusters of quasars at the "edge of the universe," 12 billion light years from earth. (5) The apparent expansion rate of the universe cannot be explained.

No doubt the experts will find some way to patch up the Big Bang. After all, look how long the caloric theory of heat survived contrary data. But the obvious conclusion for the creationist is that the universe is relatively young and that God created it with partially apparent age without help from the Big Bang.

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Reprinted *CRSQ* Volume 5

Introduction

The *Creation Research Society Quarterly* has been published since 1964 (27 complete volumes). Many of the early Quarterlies are out-of-print, yet these past issues contain articles of continuing interest and value. In an effort to make these volumes available, the

Board of Directors has incurred considerable expense to reprint them. In order that those interested in good scientific creationist articles, sound criticisms of the evolutionary hypothesis, along with the needed literature citations accompanying the treatises will have a general idea of the contents of each volume, brief synopses will be written to appear in this and future Quarterlies. See Williams, 1990a, pp. 57-58; 1990b, pp. 93-94; 1991a, pp. 136-138; 1991b, pp. 27-29.

Anthropology

In an interesting survey of the state of anthropology as of 1968, Arthur Custance discussed the available information within a Genesis framework. Some of the abstract of his paper is given:

> The evidence indicates that *Homo erectus* (essentially man as we now know him), *Homo habilis* and *Zinjanthropus* were broadly contemporary. Hence any attempt to derive *H. erectus* from either of the other forms runs contrary to the paleontological record.
>
> Aside from the interesting Olduvai fossils in Africa, the geographical distribution of fossil human remains indicates they are marginal representatives of a widespread dispersion of people from a single multiplying population in the Middle East. All were of one basic stock—the Hamitic family of Genesis 10 . . . .
>
> The extraordinary physical variability of fossil men results from the fact that they were members of small, isolated inbred populations . . . (Custance, 1968, p. 5).

He also discussed how modern a Neanderthal skull was, as well as where the "cradle" of man actually was the Middle East, not Africa.

George Howe (1968a, pp. 23-33) examined morphology, taxonomy, reconstructions, tools, brain size and language as possible indicators of the humanity of particular man-like fossils. He concluded that:

> It is impossible to construct an evolutionary tree of man's origin for the simple reason that the intelligence and humanity of man-like fossils cannot be evaluated with certainty. Furthermore, fossils that closely resemble modern man are often buried *deeper* than those which are supposed to be his ancestors according to evolution theory . . . (Howe, 1968a, pp. 31-32).

Generally creationists classify past finds of "fossil man" as

1. fully human
2. fully animal
3. too fragmentary to draw conclusions
4. fraud

No transitional forms between the apes and man have been found.

Some of the frauds and misrepresentations of "fossil man" were presented by William Tinkle (1968, pp. 42-45). He noted how some reconstructions are highly imaginative and that the chasm between man and beast has never been bridged. John Hewitt (1968, pp. 46-48) briefly explained that man's upright posture is important and that his bipedal locomotion is unique. Hewitt then discussed man's unquenchable desire to worship, a characteristic not present in animals.

In an article entitled "Blood Really Counts," Evan Shute (1968, pp. 49-52) used blood groups as indicators that man is not related to apes. He noted that what is known about blood groups causes immense trouble for evolutionary arguments based on similarity.

Any creationist interested in the study of man should obtain this volume of the Quarterly since there are many articles of historical and practical importance contained in it.

Radiocarbon Dating and Radiohalos

Several articles appeared in this volume on radioactive carbon dating. R. H. Brown (1968, pp. 65-68, 87) presented a good introduction to the subject and offered some background material and data to help those not familiar with the method. He felt that reliable conversion between historical age and radiocarbon age goes back only 3-4000 years. Melvin Cook (1968, pp. 69-77) using material from his book, *Prehistory and Earth Models*, claimed that there were no reliable long-time radiological "clocks" and even the C-14 dating method (a short-time "clock") was in need of repair. In a fascinating article he developed his nonequilibrium model of C-14 in the carbon cycle which telescopes all C-14 dates to within 10,000 years before the present. He also noted the absurd claims of accuracy by some investigators when discussing C-14 dating.

Robert Whitelaw (1968, pp. 78-83) discussed the radiocarbon and potassium argon dating methods in relation to Biblical chronology. Using the nonequilibrium model of the build-up of terrestrial radiocarbon, he believed that the C-14 method of dating confirms Biblical history. Whitelaw then discussed problems with the assumptions used when the K-40 to Ar-40 decay is employed as a dating method.

Robert Gentry (1968, pp. 83-85) questioned the invariance of the radioactive decay constants over geological time using some of his work with pleochroic halos. Since this article, Gentry has written several others in the Quarterly defending his model of earth history.

Geology

Harold Coffin (1968, pp. 85-87) felt that since tubes of the small marine tubeworm *Spirorbis* are found as a constituent of Carboniferous coal, they are strong evidence for the allochthonous origin of coal. See Williams, 1991c, pp. 29-31 for a note on the allochthonous origin of coal.

On June 1, 1968 William Meister, Sr. climbed about halfway up a 2000-foot mountain face, making footholds in order to continue his ascent. This "rockhound" was hunting for fossilized trilobites at Antelope Springs, Utah. Meister (1968, p. 97-102) removed a two-inch slab of rock from the Wheeler Formation (Middle Cambrian) and upon striking it with his hammer, it opened to reveal trilobites in what appeared to be a shod footprint of a human. The sandal print with encrusted trilobites (both mold and cast) are shown in the article. Subsequent field trips were discussed in the article.

Wilbert Rusch, Sr. gave a brief description of the science of palynology (1968, p. 103-105 and noted that spores of vascular plants have been found in the

Cambrian. Thus as far back as traceable, plants are as distinct from one another as now. Wayne Frair (1969, pp. 133-135) examined the evidence that a human skull was composed of coal and concluded that it was a carving. See Williams, 1991c, pp. 29-31 for a brief discussion of this controversy.

Life in a Test Tube?

With the above provocative title, Wayne Frair (1968, pp. 34-41) discussed the research on DNA and RNA up to 1968. He mentioned the minute complexity of the genome, discussed bacteria and viruses and their life cycles. Then Frair evaluated the research noting the caution of most investigators.

Seed Germination Experiments

In an interesting series of tests, George Howe (1968b, pp. 105-112) exposed seeds of five different species and families of flowering plants to 140 days of soaking in solutions of fresh water, sea water and mixed baths. Three out of the five species germinated after this soaking treatment. He related these results to possible plant survival in the Flood waters. He suggested possible topics for further research.

Convergence

Evan Shute (1969, pp. 135-138) examined the concept of convergence and the idea that resemblance means relationship concerning the biochemical compounds found in living organisms. He suggested using many examples, that rather than assuming descent from a common ancestor or parallel evolution, it could be evidence of a Designer using a similar chemical compound in different organisms to accomplish the same function.

Simplified Thermodynamics

Rather than employing the mathematics necessary to explain the laws of thermodynamics, Williams (1969, pp. 138-147) developed these principles in a philosophical vein. The usefulness of these laws to a creationist viewpoint was explored. Suggested objections to macroevolution from the first and second laws of thermodynamics were offered.

Effects of Darwinism on Society

William Tinkle (1969, pp. 148-150) considered that a philosophy stemming from natural selection has had an adverse effect on human behavior. Bolton Davidheiser (1969, pp. 150-152) examined the philosophy of social Darwinism and its use by unscrupulous men in developing hideous, destructive philosophies. Darwinism has spawned some serious unbiblical world-views.

Conservation, Technical Notes

A creationist conservation philosophy was presented by Harold Armstrong (1969, pp. 155-156). Also a column of technical notes entitled "Comments on Scientific News and Views" was available in each Quarterly of volume five. Forty-four topics, a few paragraphs in length, were covered in a brief fashion. The range of subjects was vast. Readers will find much to interest them in this volume of *CRSQ*.

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_____ 1991a. Reprinted CRSQ volume 3. *CRSQ* 27:136-138.

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_____ 1991c. Boulder in coal seam—implications. *CRSQ* 28:29-31.

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QUOTE

An egg can be unscrambled by feeding it to a hen, [but] I do not agree that the process violates the Second Law of Thermodynamics. If the hen is regarded as a thermodynamically open system, the decrease of entropy involved in organizing a new egg is more than compensated by the hen's concurrent production of entropy-rich wastes. Thus, the inviolability of the Second Law is preserved.

Carnahan, C. L. 1990. A letter in *Science* 249:228.

QUOTE

The greatest tragedy that ever befell man's thinking was when the beautiful and wonderful and mysterious world fell into the hands of theorists, who captured the minds, first of the thinkers and then even of the thoughtless. For what they showed them was not nature as it is but a horrible caricature of nature as it would have to be to make their theories work.

Barclay, V. 1950. *Darwin is not for children.* Herbert Jenkins. London. p. 74.

BOOK REVIEWS

Gods Wedding Band—Reflections on the Creation-Evolution Controversy by Norman DeJong. 1990. Redeemer Books. Winamac, IN. 102 pages. $7.95 paperback.

Reviewed by Don B. DeYoung*

Norman DeJong is a Professor of Education at Trinity Christian College, IL. This short book is the result of a 1986 conference he attended on the History of Science, sponsored by the Christian College Coalition. DeJong found himself the only person that publicly supported special creation. I attended this same conference a year earlier, and had a similar experience. DeJong has attempted to write his personal defense of recent Creation. Unfortunately, for several reasons his approach does not greatly help our cause. *First,* the author goes to great length to deny an ice age. He calls the ice age idea a blatant lie (p. 61) and a hoax (p. 68). His main approach is to criticize a 25-year-old geology text (p. 62). Apparently DeJong is unaware of excellent progress by leading creationists in understanding the post Flood ice age. One can look seriously at the multiple evidences for a single ice age without accepting evolutionary time scales. *Second,* the author misspells the name of theistic evolutionist Howard Van Till countless times. Van Till is DeJong's main target for severe, repeated evolution bashing. Even Kepler's name is spelled wrong (p. 12)! The recent surge of self-published books has too often resulted in dismal editing and poor scholarship. *Third,* another error occurs when the evolutionary age of the earth is stated as 14.5 billion years. The author needs to do some fundamental science homework. *Fourth* and most serious, DeJong takes a "soft" position on the meaning of creation days, claiming that they are problematic, inconsequential, and not precise (pp. 44-45). For most creationists, the length of the creation week is a fundamental issue.

It is always encouraging to hear of another creationist such as Dr. Norman DeJong. However, not every creationist book can be highly recommended.

*Don B. DeYoung, Ph. D., is editor of *CRSQ.*

*Charles Darwin's Religious Views: From Creationist to Evolutionist*** by David Herbert. 1990. Hersil Publishing. London, Ontario, Canada. 104 pages. $8.00.

Reviewed by Wayne Frair*

Authored by a secondary school history teacher in London, Ontario, this book chronicles the life of Charles Darwin with emphasis on his spiritual journey. Chapter headings include "Religious Heritage," "Medicine to Theology," "A Zealous Disciple of Lyell," "Conversion to Evolutionism," "Origin-The 'Bible' of Naturalism," "'My Theology is a Simple Muddle,'" and "Deathbed Repentance: Fabricated or True?" There are end notes for each chapter. At the end of the book is a list of primary and secondary sources and an index.

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**Another review of this can be found in *CRSQ* 27:155-156.

Darwin's spiritual heritage included training by devoted Unitarians, and Darwin's wife, Emma, was of this particular faith. Charles Darwin appears to have given lip service to the Bible and its teaching in his early days, but his journey was toward naturalism and skepticism as Herbert points out.

> By presupposing that man's religious ideas evolved as he did and, thus, were naturalistic in origin, how could one ever deem them to be trustworthy? What profound truths of a spiritual nature could the mind of a being—half-man, half-monkey have? Since, to his way of thinking, religions and the idea of God were the culmination of an evolutionary process, Darwin had every reason to be skeptical (p. 76).

However, it appears that what theologians call natural revelation had its impact on Darwin's life, and he never could get away from the fact that there may have been more than just physical reality.

> But in the midst of these theological musings, Darwin had the nagging suspicion that there might be something that he had overlooked. The wonder and the beauty of the universe drew his attention in an opposite direction from the naturalism he espoused, toward some supernatural element. Surely, this universe could not be the mere product of chance (p. 76).

Darwin also recognized the "redeeming power" of the Gospel of the Lord Jesus Christ. When he learned of the changes in the lives of Tierra del Fuego natives who had received the message of the Christian missionaries there, Darwin sent a donation to the South American Missionary Society "as a testimony of interest he took in their good work" (p. 33). In the fall of 1880 a Brethren layman named J. Fegan wanted to conduct Christian services in a facility over which Darwin had some rights. He asked Charles Darwin for permission, and Darwin replied:

> You ought not to have to write to me for permission to use the Reading Room. You have far more right to it than we have, for your services have done more for the village in a few months than all our efforts for many years. We have never been able to *reclaim a drunkard* but through your services I do not know that there is a drunkard left in the village. Now may I have the pleasure of handing the Reading Room over to you (p. 96).

The impact of Fegan's preaching even reached into Darwins own household because his butler, Joseph Parslow, who had labored there for some 40 years, and Mrs. Sales, who was the housekeeper, both "committed their lives to Jesus Christ as a result of Mr. Fegan's preaching" (p. 97). Herbert, however, observes that:

> The reality of God's redeeming power as witnessed by Charles Darwin in the work of the South American Missionary Society in Tierra del Fuego and in the effective proclamation of the gospel to the alcoholics of Down and members

> of his own household seems to have had little impact on his life. But God was indeed at work in Darwin's world! As foretold in the Scriptures, He would manifest His presence and power in the lives of those who by faith had committed themselves to Him through Jesus Christ (p. 97).

In dealing with the question of Darwin's deathbed repentance, author Herbert considers that the story is a fabrication. Herbert's position is consistent with that of authors Rusch and Klotz as expressed in the CRS monograph, *Did Charles Darwin Become a Christian?* This monograph, though more concise than Herbert's book, does discuss many of the highlights of Darwin's spiritual journey. Herbert indicates in his book (p. 91) that in the monograph Rusch hypothesizes that Mrs. Emma Darwin, Charles' widow, was the author of the "fabricated" tract. Rusch does say (p. 14), "the 'last hours' account may be anchored in the efforts of Mrs. Darwin." However, Rusch told me in a personal conversation that he did not believe that Emma was the author of the tract and that he did not intend to convey this idea by his statement in the monograph. Rather, he just intended to indicate that Emma did not want people to think her husband believed that spiritual beliefs were not higher than their origins from animals.

Herbert's book includes some pertinent drawings (including cartoons) and photographs. In the preface of his book Herbert identifies himself as an evangelical Christian. I respect him for his honesty in identifying his own religious orientation and for his fair and concise evaluation of the historical record of Darwin's religious views.

*Portraits of Creation** by Howard J. Van Till, Robert E. Snow, John H. Stek, and Davis A. Young. 1990. Eerdmans. Grand Rapids. 285 pages. Paperback. $14.95.

Reviewed by David Newquist**

Two of these authors, Howard J. Van Till and Davis A. Young, have written previous books on the subject. This is their newest and largest book. Their comments reflect an extensive familiarity with the arguments of scientific creationism. These authors are not in agreement with several of the basic tenets of creationism, specifically the young universe and Flood geology. But they are Christians, in fact consider themselves to be evangelicals. They would be classified as theistic evolutionists. They lean further toward some aspects of liberalism than Creation Research Society (CRS) members would. But these factors are unrelated to the central information and conclusions of the book.

Chapters 1 and 2, titled "Where Are We?" and "How Did We Get Here?," briefly describe the modern-day perception of science and Christian faith as being two irreconcilable antagonists engaged in unending warfare throughout the past centuries. Chapter 3, "The Discovery of Terrestrial History," reviews the history of modern geology, describing the types of observations which have led to the conclusion that the rocks were formed over a time period of several billion years. The Colorado Plateau and its canyons are reviewed as a case study.

Chapter 4, "The Scientific Investigation of Cosmic History," begins with an excellent and concise summary of modern astronomy's understanding of the structure of stars, their formation, and their change with time. Then follows a discussion of the Big Bang model of the origin of the universe, and the relationship between that theory and Biblical creation. A careful distinction is drawn between cosmic evolution as a scientific concept and naturalistic evolutionism as a creedal perspective. The latter is philosophical naturalism, which the authors clearly reject as the antithesis of Christian theism.

Chapter 5, "The Character of Contemporary Natural Science," summarizes the methodology of scientific research and the culture of the scientific community. Chapter 6, "A Critique of the Creation Science Movement," takes chapter five as a basis for evaluation of creation science as it is practiced. The shrinking sun episode is discussed as a typical example. Consideration then focuses on creationists' assertion that there is scientific evidence which indicates that the universe is young. On the other hand, creationists have made many statements about the limitations of science when applied to questions of origins, and find the concept of "created age" indispensable. John N. Moore's discussion of a creationist philosophy of scientific research is discussed as the most serious attempt thus far to develop such a philosophy. Moore defines natural events as repeatable ones, and defines history, specifically the theories of stellar evolution, as unobservable and thus inherently beyond the reach of scientific study. The writer points out the weaknesses of this position. Creationists Frair, Davis, and Steidl are commended for trying to bring critical and competent review to bear on creationists' statements, and Robert Gentry for producing significant research data. Their conclusions, however, are still not accepted as the final word on the subject. The chapter concludes with a discussion of world-view, science, and folk science, placing creationism in the third category. This is done in a highly sympathetic, not pejorative, manner; folk science is viewed as not only legitimate but necessary. But it must maintain communication with science, and be subject to correction by science. Scientific creationism, however, has failed to deliver the scientific goods it promises.

Chapter 7 asks the crucial question, "What Says the Scripture?" The conclusions are that the Biblical concept of creation, in Genesis and elsewhere, does not support the drawing of a line between miracle and providence, nor between fiat and process, the opinions of some (note: not all) prominent conservative theologians notwithstanding. The creation of the universe "ex nihilo" is derived from the Genesis passage as a whole, but it is not required by any of the individual words used in the creation account. This conclusion is supported by a careful, extensive survey of the uses of the words elsewhere in Scripture.

Chapter 8 is the "Epilogue: Where do we go from here?" In answering the question "Why does the warfare metaphor persist?" a key factor is the "all-or-nothing" attitude of many people. Many Bible-believers

*Editor's note: There are two reviews of this book. This review is by an old-earth creationist. The second is from the recent creation position.

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regard the entire traditional recent-creation conceptual system as a package to be preserved in its entirety at all costs. Any adjustment at all is seen as "accommodation to secular science." This is on a collision course with a secularized American educational system and mass media, and writers like Asimov, Sagan, and Atkins. The authors of course consider themselves to be at the point of delicate balance between these extremes. The final section gives five principles for proceeding. They can be summarized as forsaking the warfare model and encouraging hard study of both creation and revelation, with humble awareness of the possibility of misinterpretation of both.

In summary, the book is a comprehensive survey of the data relevant to the date and manner of origin of the universe and the earth. It focuses accurately on these crucial issues: the weaknesses of the recent-creationist interpretation of the Biblical account, a selected few of the many traps into which advocates of this view have been lured in the search for scientific validation of that interpretation, the insistence that the Big Bang theory and biological evolution are inseparable and therefore rejection of evolution requires rejection of the Big Bang, and the logical viability of the "created-age" concept. These are the factors that at present bar this reviewer from membership in CRS. They are the foundation of the recent-creation system. The authors document instances in which creationists have massaged observational truth and principles of logic to bend them to the support of recent creation. These challenges must be faced if creationism in this form is to retain its constituency and its integrity, and accomplish its goal of glorifying the Creator.

Portraits of Creation by Howard J. Van Till, Robert E. Snow, John H. Stek, and Davis A. Young. 1990. Eerdmans. Grand Rapids. 285 pages. Paperback. $14.95.

Reviewed by Don B. DeYoung*

The writers are professors at Calvin College and Seminary (Van Till, Stek, Young) and Potsdam College, NY (Snow). There has been an ongoing controversy at Calvin over the issue of theistic evolution. The school supports the authors, who promote the evolution view, but the conservative Christian Reformed constituency has been greatly disappointed and disturbed. In this book the authors argue their case for accepting the modern scientific view of history, and rejecting a literal reading of Scripture. The book does not discuss organic evolution or the origin of mankind. Instead geology, astronomy, and theology are emphasized.

Davis Young begins with a plea that the "warfare metaphor" existing between Christianity and science be ended. He blames creation science in particular for much of the current tension (p. 10). The recent creation view is given colorful descriptions throughout the book: astounding (p. 166), eccentric (p. 166) sect-like (p. 178), puzzling (p. 166), folk science (p. 201), intellectually dishonest (p. 269), perversely impressive (p. 183), false and misleading (p. 139), and blind (p. 85). So much for the proposal to end hostilities! The "warfare" actually goes deeper than a science/Christianity struggle—it is a spiritual war.

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Young summarizes his earlier works on earth history (Young, 1977, 1982). The Colorado Plateau is discussed as a case study showing the earth's assumed antiquity. To emphasize that the creation week should not be taken literally, Young refers to Psalm 93:1 —[The earth] cannot be moved. However, Young fails to also mention Psalm 30:6, where David says that he will never be moved, using the same verb, mot. This is clearly a figure of speech meaning stability and fidelity to God's chosen path. The burden is upon Young to prove that Genesis 1-2 are likewise filled with non-literal figures of speech instead of authentic history.

The critique of the creation science movement by Robert Snow is especially interesting. In some areas good insight is shown: Snow concedes the value of creationist publications as a needed "protected environment" in which ideas that deviate from conventional professional science can be tried out and polished (p. 176). He then analyzes *CRSQ* authors, concluding that they come in two contrasting flavors: a few moderate, thinking scientists; and many extreme dogmatists. Unfortunately, creationist articles used as examples are all at least 10 years old. Snow does not mention the healthy exchange of ideas and peer reviewing that the *CRSQ* has carried out for the last decade. In fact, the *CRSQ* would reject Snow's manuscript because he has not done a current creationist literature search on the very topics he complains about, such as the shrinking sun problem.

Snow makes some surprising statements. He calls William Paley's *Natural Theology* (Paley, 1802) "one of the greatest apologetic disasters in the history of Christian thought" (p. 21). This is strong condemnation of a classic work that was once required reading at Cambridge! Paley's liberal views should indeed be criticized, but his detailed design arguments still deserve careful study today. Snow also claims that an explicit ex nihilo creation is not taught in the Old Testament (p. 50). One wonders how he handles Exodus 20:11, Psalm 33:9, etc.

Howard Van Till writes an astronomy chapter summarizing his previous, controversial *The Fourth Day* (Van Till, 1986). He denies any "shred" of created appearance of age, stating that cosmic [big bang] history is authentic history (p. 107). This forces Van Till to inseparably link vast cosmic distance with a vast time scale, perhaps one of the greatest sources of error and confusion in understanding our created universe.

Theologian John Stek writes the section on biblical origins. He thoroughly discusses the Genesis words create (bara'), form (yasar) and make ('asah). God is never said to create (bara') from some prior existent material. However, Stek nonetheless concludes that bara' allows for a creation with preexisting materials because 'asah does, thus siding with Robert Snow in denying a supernatural, ex nihilo creation. One wonders about this exegesis: can any words in Scripture that appear interchangeable be used to qualify and limit each other? The result would surely be chaos.

Stek believes that early Israelites could not have comprehended the abstract idea of ex nihilo creation (p. 221). On the basis of contemporary Old Testament miracles, however, early Israelites may actually have understood the concept better than we do today! Stek concludes that Scripture actually promotes an incorrect

view of science, based on ancient Near Eastern reflexes instead of reality (p. 238). Genesis 1-2 is declared to be metaphorical, not authentic history (p. 237). To take Genesis literally is said to trivialize it. Sadly, this conclusion to the book is inevitable. A complete accommodation to modern secular science leads to no other destination. Many Christians clearly see two basic flaws with this expression of theistic evolution. First, how can secular science even begin to understand singular, supernatural events such as the creation week? Second, how can incomplete, imperfect science theories be the final interpreter of Scripture? For many Christians, *Portraits of Creation* does not give satisfying answers.

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The Genesis Debate: Persistent Questions about Creation and the Flood. Edited by Ronald F. Youngblood. 1990. Baker Book House. Grand Rapids. 250 pages $12.95

Reviewed by Frederic R. Howe*

This book is a collection of essays dealing with some specific issues in biblical interpretation in Genesis. The format is unique: each question is answered "yes" by one essayist and "no" by another, and the answers are printed in such a manner that each essay literally "confronts" its opposite position right on the pages of the book. The 11 key questions cover these areas: the length of the days of creation, the order of events in Genesis One, the age of the earth, evolution in the process of creation, the doctrine of the Trinity implied in Genesis One, the reason for Cain's offering being rejected by God, existence of pre-Adamic human beings, longevity of people before the Flood, the sons of God in Genesis 6, the extent of the Noahic Flood, and the issue of justifying capital punishment based on Genesis 9. Space does not permit extensive comment upon each essay.

Concerning the days of creation, Terence E. Fretheim, professor of Old Testament at Luther Northwestern Seminary, St. Paul, MN, argues "yes" to the question: "Were the days of creation twenty-four hours long?" His discussion deals extensively with the actual data of Scripture, and he concludes that, as far as the text itself, the days were normative days, not figurative. He then suggests that the best way to put this position into theological and scientific balance is to

> move to an 'accommodationist' view—namely, that God, in working with the author, accommodated the telling of the story of creation to the knowledge of the times. . . . The Genesis text remains . . . as an important paradigm on how to integrate theological and scientific realities in a search for truth (p. 33).

This statement seems to undercut the historical validity of the creation account, and almost demands a "double hermeneutic," one to interpret the biblical data, the other to decipher that data in terms of scientific categories. Fretheim's arguments seem stronger to this reviewer, however, than those offered against the normative use of "day" by writer R. Clyde McCone, professor of anthropology and linguistics, California State University, Long Beach. He summarizes his case as follows: "The process of the work of creation is spiritual, and its days are divisions of distinct creative acts. The connection between these days is not one of temporal development" (p. 26). McCone does not define what the term "spiritual" means with reference to the creation of specific entities and life forms.

Eugene Merrill, professor of Old Testament at Dallas Seminary, gives a strong appeal to the unity of Scripture and for a true biblical theology as he shows how Genesis One sets forth a pattern of theology that leads to the development of the biblical doctrine of the Triune Godhead.

Mark Hillmer, professor of Old Testament at Luther Northwestern Seminary, argues for evolution in the process of creation. John N. Moore responds cogently to this theistic evolutionary approach offered by Hillmer. Strangely absent from Hillmer's documentation is any reference to major books questioning macroevolution in recent years.

Duane L. Christensen, professor of Old Testament at the American Baptist Seminary of the West, Covina, CA, argues against the biblical affirmations about the long lives of people before the Flood. James Borland, professor of Biblical Studies at Liberty University, Lynchburg, VA, argues for the validity of these long ages. In the opinion of this reviewer, Christensen's attempt to interpret some of the age lengths as symbolic falls quite far short of the demands of exegesis.

Geologist Steven A. Austin discusses capably the universal extent of Noah's Flood, and Donald C. Boardman, late professor of geology from Wheaton College, argues for a local flood. These two essayists develop strong cases for their respective positions, with Austin's essay being, again in this reviewer's opinion, the most consistent with reference to the biblical data.

All in all, the book provides readers with introductory and summarizing arguments on both sides of some very crucial questions in Genesis. It is a useful source volume for further study, and the documentation supplied with each essay can direct the reader to sources for reflection and further analysis.

Environment of Violence by C. Warren Hunt. 1990. Polar Publishing. Calgary. 250 pages. $30.00.

Reviewed by David J. Tyler*

Catastrophism in geology has come a long way since the 1960s, when an extended battle took place with uniformitarians over the interpretation of the Channeled Scablands near Spokane. Many geologists in the academic community and in industry are now willing to consider catastrophic explanations for field evidences. Perhaps the best known instance today is the asteroid impact theory of events bringing the Cretaceous Period to an end. Flood geologists have

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been active also, in pointing out numerous evidences of large-scale catastrophism in the Earths past.

A major problem faced by contemporary catastrophists is that of integration. It is not sufficient for evidences of catastrophism to be noted. A scientific approach is one which seeks to show cause and effect, and which reconstructs a geological history of a locality or region. C. Warren Hunt is a professional geologist who has stood aside from the plate tectonics revolution and has used his critical mind to assess field evidences in the western and central parts of North America. The result is a remarkable book which presents Hunt's reconstruction of a series of interrelated catastrophic events.

The early chapters of the book focus on the geology of the Klamath arc north of San Francisco. Hunt rejects the contemporary terrane accretion model of the area and proposes an alternative based on catastrophic diapirism. One of the events is suggested to be responsible for the devastations at the Cretaceous/Tertiary boundary, and it is argued that this is a more satisfactory explanation of observations than asteroid impact. Hunt advocates the carbide-hydride theory of the inner Earth as this also integrates a number of observations ranging from core and mantle density variations to the existence of deep crustal hydrocarbons. This theory provides a mechanism for catastrophic diapirism involving the upward migration of volatiles, partial melting of crustal rocks and periodic violent surges which produce large-scale movements of crustal material.

A range of catastrophic surface processes are discussed, with particular reference to the emptying of glacial lakes and the rapid melting of ice caps. Many widely-held beliefs are challenged, such as the mode of formation of drumlin fields and the processes involved in landscape development.

Environment of Violence is a highly original book written by a field geologist who accepts the conventional timescale of geological history. His important contributions to catastrophism are in the areas of integrating field evidences, suggesting possible mechanisms, and reconstructing the geological history of a region. It is a book written for professional and amateur geologists and it makes considerable demands on the readers knowledge of geological issues and background geography. Nevertheless, it repays careful study. Flood geologists will find much of interest here to stimulate thought and to promote ideas.

Voyage to the Stars by Richard Bliss. 1991. Institute for Creation Research. San Diego. 111 pages. Paperback. $9.95.

Reviewed by Don B. DeYoung*

Dr. Richard Bliss chairs Education studies at the Institute for Creation Research (ICR). He is dedicated to providing quality creationist resources and curriculum for youth. This unusual book gives a refreshing view of astronomy from the perspective of two high school students. The narrative form describes an imaginary trip into space aboard the space shuttle. Along the way many details are covered: escape speed, the gyrocompass, telescope construction and constellations. Dr. Bliss may attempt too much in this book: the Cepheid variable distance measurement (p. 37) and Olber's paradox (p. 71) are of high interest to creationists, but they are difficult to explain on this level of writing. The book is profusely illustrated with the ICR'S unique, attractive style. There is considerable information packed into this book. It will be of interest to readers of all ages.

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LETTERS TO THE EDITOR

Moon Dust

I wish to comment on George Matzko's letter regarding moon dust in the September 1990 Quarterly. He related that in 1958 Isaac Asimov stated that the dust on the moon might be 50 feet deep in places, and that in 1989 Asimov explained that the Apollo moon walkers did not fall into deep dust because most moon "dust" is firm and compact. Matzko implied that a problem still existed, noting that even if the dust were compact, it would still be 20 feet deep. However, when the physical evidence and Asimov's statements are further examined, the problem implied by Matzko does not exist.

First, Asimov's 1958 statement referred to the estimated maximum dust depth at the foot of craters, not the average depth. Second, Asimov's 1989 statement concerned only the firmness of the dust, not its depth. Asimov's point was that most of the dust would be firm enough to support men and vehicles, whatever its depth. Third, in order to assess the validity of the "problem" claimed by Matzko, one must understand the actual composition, depth, and nature of the materials found on the moon.

One source of dust on the moon is micrometeorite bombardment. Although some creationists have claimed that many feet of micrometeoric dust would accumulate over 4.5 billion years, such claims were based on some early and indirect estimates. Later, more direct and reliable satellite measurements, including some made before the Apollo missions, indicated that the rate of micrometeoric bombardment on earth is such that less than one centimeter of micrometeoric dust would fall on the moon in 4 billion years (Dohnanyi, 1972; Millman, 1973; Gault et al., 1972; Hughes, 1978; Kyte and Wasson, 1986; Van Till et al., 1988). The thin layer of fine dust on the surface of the moon (typically a few centimeters or less), is composed partly of such material, and partly of pulverized material from other sources.

Mixed with micrometeoric dust, both at the lunar surface and below, are larger quantities of pulverized lunar material (the smaller particles of which also may be considered "dust"), consisting of shattered meteors and fragments and nodules of native lunar rocks and particles—resulting primarily from meteor impacts and to a lessor degree micrometer erosion.

At the very surface of the moon these materials exist in a loose, unconsolidated form. However, under this loose layer is a much deeper layer containing the same type materials, but with a more firm and compact consistency. This firm layer, known as lunar regolith, covers much of the moon to a considerable depth. Near the Apollo-17 landing site, seismic tests showed that the regolith ranges from 6.2 m (~20 ft.) deep to 39.6 m (~120 ft.) deep. Apollo-15 and -17 core samples several feet deep showed regolith extending to the bottom of the cores. Based on these and other findings, including craters that penetrate the regolith, the average depth of the regolith is estimated to be 4-5 m on the luna maria and about twice that deep on the highlands (Taylor, 1975). The depth and composition of the regolith is consistent with the extensive meteorite activity the moon has experienced, and the amount of "dust" within and above the regolith is consistent with micrometeor influx and erosion rates, and a moon over four billion years old (Van Till et al., pp. 78-81).

Thus, whether one considers only the loose surface dust or also the underlying regolith, the evidence is compatible with a moon about 4.5 billion years old. This alone does not prove that the moon is this old (since rates of micrometeoric bombardment may have been different in the past), but it does undermine claims that "moon dust" evidence supports a young moon.

Further, contrary to the suggestions of some authors, the Apollo moon walkers were not surprised to find a shallow layer of loose dust on the moon. Prior to the manned landings, the micrometeoric measurements mentioned above as well as the Luna IX and Surveyor I surface probes in 1966 removed any concerns about sinking into a sea of soft dust (French and Maran, 1981). Indeed, the landing gear of the first manned craft on the moon was designed for landing on a firm surface, not a deep layer of soft dust (Van Till et al., 1988).

Last, in regards to the young-moon interpretation, Awbrey (1983) has raised the question of how thousands of meteorites could have struck the moon within human history without having been widely reported. The impacts would not have been heard but certainly could have been seen from earth; indeed, many would have been spectacular. Although reports of one or two impacts have been claimed by some (Yenne, 1987), no records exist for the vast majority of impacts, including the largest ones. Also, one may ask why (in a young-earth framework) there are no reports that the earth itself was not showered by thousands of meteorites, since the earth presumably was subject to approximately the same meteor activity as other planets and moons in the solar system (Shore, 1984)?

The answer from an ancient-earth perspective is that most of the meteorite impacts occurred millions of years ago, and that evidence of most on earth has been eroded and reworked into the earth's crust, while many remain on the moon, where far less erosion occurs. Parks (1990) suggested that this explanation was refuted by the shallow depth of dust on the moon, which as demonstrated above, is not a valid refutation. Parks also proposed that most meteoric activity took place in a brief, explosive bombardment before and during the Flood. However, craters on the moon show varying degrees of micrometeor erosion, suggesting prolonged rather than sudden and massive bombardment (Awbrey, 1983, p. 28).

In summary, lunar dust does not provide support for a young moon, and evidence from lunar craters pose further questions for a young moon interpretation.

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Response to Kuban

The arguments about the depth of dust on the moon's surface as evidence regarding the moon's age have become extremely complex, and, as Glen Kuban points out in his letter, recent measurements of the rate of micrometeorite influx do seem to indicate that this rate is less than previously supposed. If these measurements are considered by themselves, they might therefore seem to support the view that the relatively thin layer of dust observed on the moon's surface is consistent with an age of the moon on the order of several billion years.

However, to understand this issue properly, we must take several other factors into consideration. First, the sizes of meteoritic bodies impacting the moon's surface probably form a continuum from microscopic to asteroidal. As Brown (1990) has pointed out, if the dust from the explosion of larger meteoritic bodies striking the moon is included in our calculations, the layer of meteoritic dust which would accumulate over billions of years should be far deeper than that which we have actually observed—even if we include the meteoritic dust found in the moon's regolith. It is a serious mistake to look only at the rate of micrometeorite impacts and to conclude that this rate determines the thickness of dust accumulated in a given period of time.

Second, if evolutionary theories that bodies in the solar system formed from the accretion of dust are correct, then the rate of dust influx in the past must have been much greater than it is today, since by now most of the interplanetary dust would have been swept up by the planets and their satellites. Therefore, the dust layer on the moon should be much thicker than what we would calculate from the rate of influx which is presently observed. Evolutionists apparently want to "have their cake and eat it too": They imply that the rate of influx has always been essentially the same when attempting to explain the relative paucity of moon dust, while at the same time invoking theories of planetary evolution which would require enormously greater dust influxes in the past.

Third, studies of the one- to two-inch-thick layer of loose dust on the moon's surface have indicated that only about 1/60 of it is meteoritic in origin (Ganapathy et al., 1970). Even if the rate of dust influx is far less than investigators had originally supposed, it should have contributed much more than this negligible amount over 4.5 billion years.

Kuban also comments that the older craters on the moon's surface appear to have been eroded by micrometeoritic impacts, and he assumes that this process must have been "prolonged rather than sudden and massive." However, this assumption is not justified. We know from observations of local flooding on the earth that erosion can take place rapidly. The first craters to form as the result of a single event could have been substantially eroded by the subsequent impacts of meteorites and meteoritic dust occurring over a period of only days or weeks.

Kuban does not even address two other extremely serious problems for an evolutionary origin of the moon. As Morton et al. (1983) have observed, rock in the walls of the moon's craters should have experienced "creep" which would level these walls in a period on the order of only tens of thousands of years. Since the craters have not leveled out, they must have formed very recently. And, as I suggested in my own paper on this issue (Parks, 1990), the absence of comparable craters on the earth's surface seems to indicate a single crater-forming event whose results on the earth were largely obliterated by a single worldwide erosional and depositional event.

Also it is well known that a gravitational interaction between the moon and the earth's tidal bulges is causing the moon gradually to recede from the earth. Projections back through time show that the moon could not be more than a few hundred million years old at the very most. Beyond that time it would have been too close to the earth to exist in its present form. Evolutionists are, of course, well aware of this problem, but Kuban fails to mention it or the fact that it has never been solved—at least not within the framework of an evolutionist cosmology.

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Editor's comments: The efforts of Glen Kuban and William Parks to clarify the moon dust issue are appreciated. Several additional comments can be made.

1. The rate of change is always a key problem in age measurements, including moon dust. The burden is certainly upon the old age position to prove that present rates can be extrapolated into a dusty, nebulous past.
2. Kuban questions why large-scale lunar meteorite impacts were not observed and reported. It should be realized that meteorite observations are very rare on the *earth,* and naturally rarer yet on the moon. Nevertheless, lunar studies reveal a rich history of observed transient lunar phenomena.
3. It is frequently said that the Eagle lander was designed for a hard surface landing. However, the 2.5-foot pads at the bottom of each leg display a lingering uncertainty.
4. Measurements of terrestrial dust inflow are very few, and remain uncertain. Kuban has emphasized data that indicates little dust and long age. Even so, his Kyte reference gives a measured accumulation of dust on earth that is *four* times the values summarized in his Van Till reference! Complicated questions are seldom solved simply and permanently. The reader is urged to watch for future dust measurements, when and if they are published.

Meteoritic Activity and Working Hypotheses

Meteor Showers, Micrometeorite and Age Measurement

Glen Kuban, in discussing the thickness of dust on the surface of the Moon, asks the question as to ". . . why there are no reports that the earth itself was not showered by thousands of meteorites. . . ?" Meteor showers on the earth are quite common (Abell, 1975, p. 368). As an example, Abell (p. 370) discussed the recurring Leonid meteor showers and he noted that ". . . up to 140 meteors could be observed per second" in some southwestern states on November 17, 1966.

Concerning micrometeorite, Abell (p. 376) claimed:

> In the vicinity of the earth, micrometeorites may number from 10 to a very few hundred per km^3, but this estimate is very uncertain. The annual accretion of micrometeorites by the earth is estimated at 10^5 tons.

Astronomers are very aware of the *continuing* meteoritic activity on the earth and in its atmosphere. Considering that the moon probably is exposed to the same type of activity, the question remains, where is the dust on the surface of the moon if it is so ancient? Regardless of selecting the "proper" rate of micrometeor bombardment to achieve a 4.5 billion year old moon, the same uncertainty about the moon exists as noted about the earth.

Working Hypotheses

If all of Kuban's statements were absolutely known and not subject to uncertainty, possible refutation or different interpretations, the moon dust argument for a young moon still would be an excellent working hypothesis for creationists. Let us consider some working hypotheses used by naturalistic macroevolutionists. The evolution of life from nonliving matter is one case generally accepted as necessary by naturalists. They maintain this working hypothesis regardless of the "mountains" of scientific evidence against it. Another working hypothesis employed by macroevolutionists who adopt the view of gradual change is that of the necessity of transitional forms. Yet, there are no undisputed transitional forms found in the fossil record! This unproductive hypothesis may have led to the development of the punctuated equilibria concept.

Obviously evidence can be presented pro and con for any working hypothesis necessary to a particular model of science. Yet, no matter how much negative evidence is mounted against it, the idea survives because of the nature of the model that demands it. The moon dust—young age hypothesis has considerably more credibility and less negative data against it than do the two naturalistic concepts mentioned. The philosophical beliefs of scientists often take precedence over actual evidence.

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Goiter and Plate Tectonics

As a Mission General Practitioner I have been researching the local connection between endemic goiter and geology. One of the results has been an hypothesis linking continental drift and plate tectonics to goitrogenesis (Stewart, 1990). The proposed mechanism is that, as one plate subducts under the other the resulting melting causes rising heat and water vapor which concentrate various minerals in the mountains above. These minerals reach the animal via the diet. In the presence of iodine deficiency, one or more of these minerals acts as a goitrogen to compound the biochemical effects of low environmental iodine, resulting in goiter and its associated diseases. There are two common environmental explanations for iodine deficiency:

(1) Glaciation strips away soil, with not enough time thereafter to replenish soil iodine (Merke, 1967).
(2) Heavy rainfall leaches iodine out of the soil; this assumes high soil iodine at the beginning (Hetzel, 1989).

Both of these theories are lacking convincing proof despite being around for many years. They are opposite in nature, although they are supposed to operate at the same time in different parts of the world.

Glaciation as a cause of endemic goiter should mean that more heavily glaciated areas have more goiter. This is not consistently true, nor does recent mapping confirm that areas of iodine deficiency disorders (IDD) are co-terminous with glaciated areas. Leaching fails because what little is known about soil iodine indicates that rainfall, far from leaching iodine, actually increases the soil levels. Linking plate tectonics and IDD accounts for nearly all the known areas of IDD distribution, barring the tracts due to thiocyanate ingestion in Central Africa, and allows for flexibility in expression of iodine deficiency and fluctuating goiter rates. It was making this link between plate tectonics and disease that finally convinced me that the earth did not develop its current form over millions of years, since any disease causing process must be post-Fall. I therefore would be interested in corresponding with any other members of the Society who are interested in plate tectonics, glaciation, pedology, or disease process. I would like to learn of creationist understanding of these subjects. Much of the literature I have been able to obtain is anti-evolution; very little presents a positive creation model. Does this exist; can we develop one?

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An Ancient Historical Test of the Setterfield-Norman Hypothesis

I have read with interest a number of the articles in your recent Minisymposium on the theory of Barry Setterfield and Trevor Norman (1987) that the speed of light has changed drastically since creation. As direct measurements of the speed of light only go back to about 1675 (when the percentage change would be quite small), there continues to be considerable disagreement among the disputants whether the apparent change in c since then is real or merely the result of instrumental or psychological error. It is naturally desirable that we seek ways of using much earlier historical data from times when the Setterfield-Norman model would predict values of c drastically different than the modern value. May I suggest one such approach?

Setterfield and Norman accept the Einstein formula for the transformation of matter and energy (1987, p. 31; Setterfield, 1989, p. 195):

$$E = mc^2 \quad (1)$$

To maintain the conservation of energy over time in the various nuclear and chemical reactions, they take E to be invariant with respect to changes in c. Thus for equation (1) to continue to hold, the mass of a particle m must vary inversely as the square of c, as the authors admit. But according to their model, the value of c must have been very much higher early in human history than it is at present, having a value of (say) 100 times the current value at some time between

4000 BC and 3500 BC, and at least 10 million times the current value at the time of creation (Setterfield, 1989, p. 191). At the time that c was 100 times its current value, the mass of any particle would have been 10,000 times smaller than it is today, and the gravitational attraction between two objects of masses M and m would be 100 million times less than today, since the gravitational force F depends on the product of the masses of the two attracting objects:

$$F = GMm/r^2 \quad (2)$$

It is clear that the earth could hold no atmosphere (nor even humans!) if gravity were reduced by a factor of 100 million. Thus the historical evidence that the earth did hold breathable air and humans at that time is historical evidence against the Setterfield-Norman hypothesis.

The authors attempt to avoid this problem later on in their paper (1987, pp. 43-45) not by having G change with time, but by defining a c-independent mass M* and a gravitational flux-density or acceleration B*, such that the gravitational force is

$$F = B^*M^* \quad (3)$$

This does not avoid their problem, however, since they admit that equation (2) also holds; for though M* is defined as invariant with changes of c, B* is in fact inversely proportional to the fourth power of c, and the acceleration would still be 100 millions times (100 to the fourth power) less than it is today! This effect would be even more severe the closer one goes back to creation.

I submit that the Setterfield-Norman hypothesis is refuted by ancient historical evidence.

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What is Nature?

John Adams might have asked, but did not, one question that Emerson certainly would have asked: What is Nature?

When Jefferson used the word he generally had in mind a mechanistic process of some kind through which the business of the universe was accomplished. Although he came to an appreciation of the concept of the sublime in nature, he did not, characteristically, refer to nature either as a wild and unruly force or as a source of intuitive truth, and he would probably have found Emerson's transcendental view of nature as alien to his thinking as he found Plato. For much the same reason he scoffed at those who said that "The information of books is no longer necessary" and who recommended "rejecting the knowledge acquired in past ages, and starting on the new ground of intuition." In referring to men as natural aristocrats he did not for a moment wish to suggest that they would take their coloration from "unhandselled savage nature" like the true American Scholar whom Emerson was to call for a few years later. He saw neither the natural world of violence and struggle which the evolutionists later revealed nor the universe of darkness and mystery and occluded meaning which yawned before Hawthorne and Melville. His temperament was "sanguine," as he once told Adams, and he possessed to the end the soul of an agriculturalist who regarded human nature, like wild nature, as useless without cultivation, improvement and careful husbandry. (Taylor, 1969, pp. 30-31)

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QUOTE

Scientists can be very subjective, and awareness of this is never a luxury. In this age of ours, when the tools created by science embody awesome potentialities, it can never be remembered strongly enough that a scientist is as prone to foibles and prejudices as any other human being. Like other humans they, too, have their subjective limitations and peculiarities. Yet unlike others, scientists seem to communicate with one another at least in matters scientific with a much greater effectiveness than other professional groups.

Jaki, Stanley L. 1986. *Chance or Reality and Other Essays.* University Press of America. Lanham, MD. p. 25.

QUOTE

During the long evolution of vertebrates, no animal outside of a laboratory ever encountered a dinitrophenylated protein. Yet at the first encounter with such a protein, most vertebrates produce dinitrophenol-specific antibodies. This response is the most remarkable aspect of the immune function—the ability to recognize the whole universe of potential determinants whether or not the species has encountered them at any time in evolution.

Darnell, J. E. 1986. *Molecular Cell Biology.* W. H. Freeman. New York. p. 1087.

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Education taught in a cultural vacuum short-changes the student who must live his life, as we do, in a particular historical context and must understand its far-reaching implications. We are not contemporaries of Plato or of Paul or of Hegel but of Stephen J. Gould and Carl Sagan who despise the supernatural and, even more, seem wholly ignorant of divine commandments and of revealed truths. No teacher does serious learning any service who implies the finality of contemporary culture and represents its conceptual content as the acme of truth and the criterion of wisdom. Modern culture is the expression of one particular epoch in the much longer chain of human history, and it has no authentic basis for claiming ultimacy for its representations of reality, truth and good.

Henry, Carl. 1988. ***Twilight of a Great Civilization.*** Crossway Books. Westchester, IL. p. 92.

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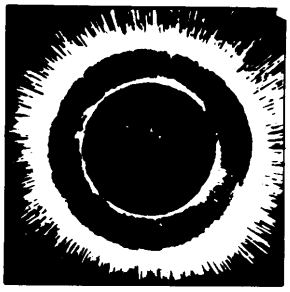

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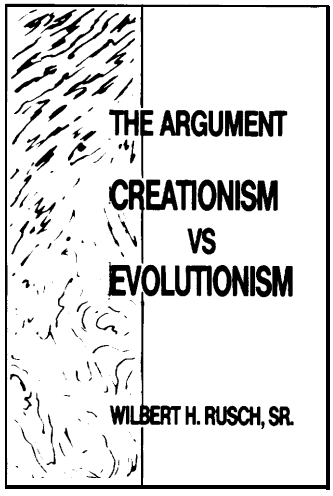

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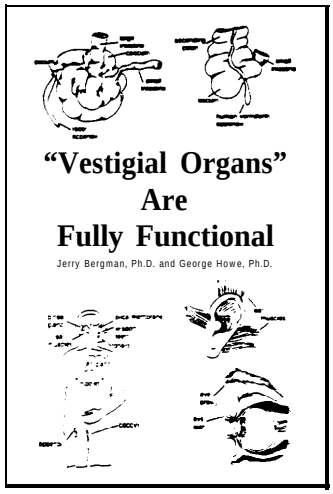

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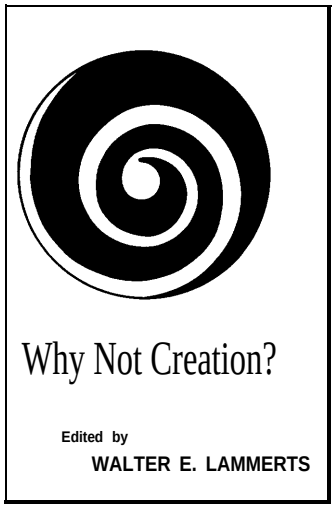

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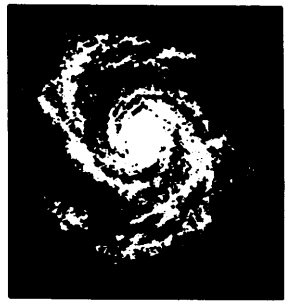

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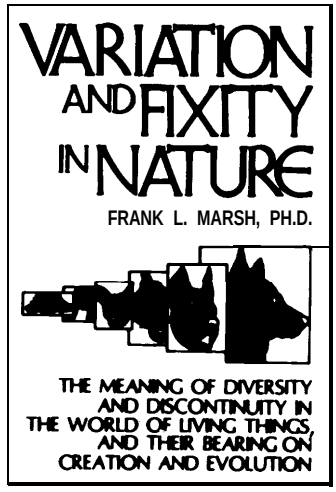

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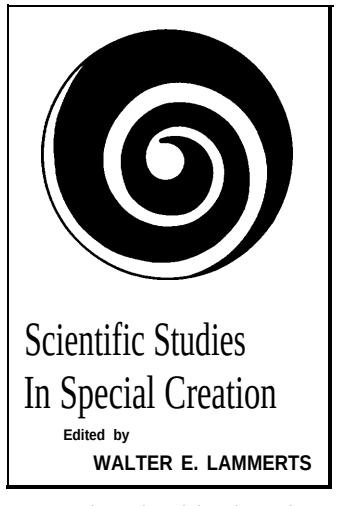

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