

Creation Research Society Quarterly

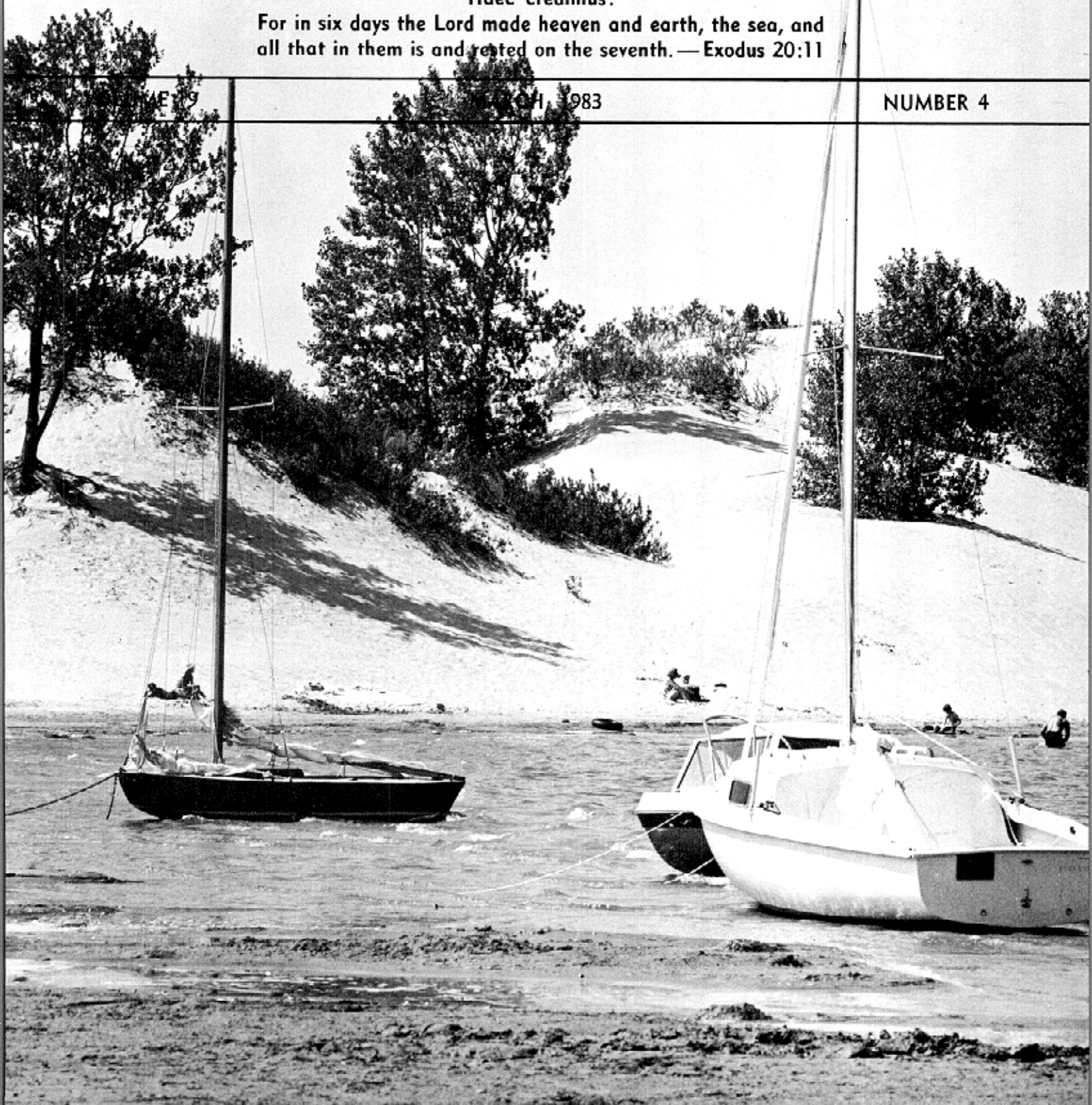
Haec credimus:

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

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COVER ILLUSTRATION

The picture on the front cover of this issue of the *Quarterly* is a view of sand dunes at the Sandbanks Provincial Park, near Picton, Ontario, Canada. The picture was provided by the Ministry of Industry and Tourism of the Province of Ontario, Toronto, Ontario, Canada, and is used here by permission.

It has been suggested that rocks, which are believed to have been formed by the hardening of deposits of sand, may provide evidence about the former state of the Earth's atmosphere. This matter is mentioned in the section Panorama of Science, elsewhere in this issue of the *Quarterly*.

☆ ☆ ☆

QUOTABLE QUOTE

"... we are accustomed to say that time wastes things away, and that all things grow old through time, and that there is oblivion owing to lapse of time. ... For time is by its nature rather the cause of decay ... it (time) must be in itself ... the condition of destruction ... nothing comes into being without itself moving somehow and acting, but a thing can be destroyed even if it does not move at all. And this is what, as a rule, we chiefly mean by a thing's being destroyed by time. Still, time does not work even this change; even this sort of change takes place incidentally in time."

Aristotle's Physics, Book IV,
Chapters 12 & 13.

WADING WITH WATERWINGS[†]

WILLIS E. KEITHLEY*

Then there is always that one clown in every crowd who has to be different.

Most birds are satisfied just to fly around in the air. But here is one who insists on flying under water as well. And tiring of that he will take a stroll on the river bed. This unusual bird is not a voting member of the waterfowl fraternity, but is actually a thrush with a thirst.

This scuba-swimmer with the aquatic complex bears the preposterous title of water ouzel—pronounced ooze!—a name as bizarre as the bird. Had he qualified as a waterfowl, he would dive and swim with webbed feet. But since he was programmed without webs or fins, he uses his wings as underwater oars—bona fide water wings!

This fantastic fowl not only swims with his wings, but also can blow his ballast tanks and walk around on the bottom of the stream; he will then turn the rocks over with his beak and toes to feed on the various water creatures that are dispersed.

It would seem that the hydraulic habits of this avian submarine may have affected his equilibrium. For he continually bobs up and down with a nervous twitch which has earned him the nickname of dipper, or teeter-bird.

But those oddities are outdone in his choice of a nest. For it is made of living moss and located beside or *behind* a waterfall through which he must fly to

reach his front door. The spray from the cascade keeps the moss alive, and it continues to grow and strengthen its attachment to the rock. Thus that menacing force of the falls is the very function which accents the security of his mansion of moss.

Could this capricious bird be assigned to some colossal quirk of Mother Nature? And just who is this "Mother Nature?" How glibly is God's creative reality bypassed for some nebulous entity who presumes to have all the power of God, but who can only create (?) a wee degree at a time. With such fame and acclaim attributed to her, wouldn't you think she could induce at least a few full-grown characteristics? Or at best, leave behind a few bits of evidence to show how they improved from one millennium to the next.

What a ridiculous picture to imagine our dipper-bird trying to gradually learn through the ages how to swim without webbed feet. Did each successive generation just dive deeper? Remember learned behavior is not inherited! What an engineering feat would be required to compute the angle and pitch of the wing to accommodate the change from the medium of the air to the resistance of water—a transition which would have to be made almost instantaneously when he dived. And those air sacs that give birds buoyancy—if he blows his tanks to submerge, how does he breathe? How many eons of sputtering and sneezing would be required before the delicate balance of buoyancy and breathing was perfected!

Absurd? Surely; but no more facetious or unreal than some of the theories to explain away the obvious evidence of creation. For all of those functions would have to be perfectly developed before our skinny-dipper could even discover there were bugs on the bottom of the river or incorporate them into his diet. How expressly is worldly philosophy confounded, even by a bizarre bird.



Figure 1. The water ouzel.

[†]An account, similar to this, is given, under the same title, in Mr. Keithley's book, *Portraits on Nature's Palette*, pages 175-177. The book is available from Mr. Keithley at the address given.

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Figure 2. The water ouzel at its nest.

GENETIC VARIATION, LIMITLESS OR LIMITED?

FRANK L. MARSH*

Received 8 March, 1982

Among organisms, living and fossil, two striking phenomena exist, namely genetic variation within, (micro-evolution), and discontinuity (gaps) between basic types. A biological principle of limited variation pervades: genetic variability in organisms can go no farther than to produce new variants within already existing basic types. No exception has been demonstrated.

The surface of our earth is literally moving or blooming with living forms. According to the late Theodosius Dobzhansky,¹ on our planet we have 1,071,500 species of animals, 368,715 species of plants, and 3,230 monerans (blue-green algae, bacteria, viruses). Sabrosky² tells us that the arthropods constitute about 82 percent of all animal species; among the arthropods some 92 percent are insects; and among the insects about 40 percent are beetles.

The species groups referred to above present a heterogeneous lot, arising from the intermingling of at least three taxonomic concepts—the typological-morphological species concept, the nondimensional species concept (that of the local naturalist), and the interbreeding-population concept.³

For practical purposes in this article I shall refer to the various larger populations of different plants and animals as *basic types*. *The individuals of any one of these basic types will be closely similar morphologically and will be capable of interbreeding.* These are the easily distinguished kinds which we see in our environment. Examples of basic types are men, horses, cows, cats, dogs, prairie dogs, grasshoppers, snakes, corn, wheat, maples, oaks, roses, and so on. The basic type is apparently the larger natural unit to which reference has previously been made by Kleinschmidt (*Formenkreis*, 1900); by Rensch (*Rassenkreis*, 1930)—groups for which Huxley, in 1940, suggested the names *monotypic species*—one not divided into subspecies—and *polytypic species*—one which contains two or more subspecies; by Mayr³ (*polytypic species*); and by Dobzhansky¹ (*biological species*).

Variation and Discontinuity

Two striking phenomena in our living world are *morphological variation* not only *among* the basic types but also often *within* most types, and *discontinuity* (gaps) between basic types. 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 variant. Instead, we observe that the variation is *discontinuous*. Rather than a graded series of individuals, we find separate clusters of similar forms, intermediates between which are absent. Regarding this situation Dobzhansky has remarked, "Biologists have exploited the discontinuity of variation as an aid in the construction of a classification of the living world. . . .

Biological classification is a man-made system of pigeonholes, serving the pragmatic purpose of recording observations in a convenient manner; it is also a reflection and an acknowledgment of the ubiquity of discontinuity in the living world."¹ Generally it is not difficult for even the man in the street to distinguish the basic types. Who cannot tell a tiger from an elephant, a rose from a cabbage or even a *Culex* from a *Drosophila*?

Microevolution

In the Middle Ages, it appears, scholars would not admit that there was variation within basic types. However, today we think life is getting dull if we cannot obtain a new variety of this or that plant, or a new breed of animal. Man is constantly inventing these variants; and nature, all on its own, produces them almost "as easy as the cook makes pancakes" (to borrow Darwin's expression).

In the biological literature we refer to the processes which produce these variants within the basic types by the philosophical and inappropriate term "micro-evolution" (actually nothing basically new is appearing). Our taxonomic experts list for us 64 species of blue grass and 160 species of panic grass in the United States;⁴ 17 species of the common thistle and 51 species of violets;⁵ 24 species of willow, 54 species of oaks, and 153 species of hawthorn;⁶ 66 subspecies of deer mice, and 214 subspecies of the southern pocket gopher;⁷ 13 species of true cattle in the world;⁸ more than 30 races of the song sparrow in the United States;⁹ and 160 distinct breeds of man on the earth.¹⁰ And is there anyone who wishes to attempt to tell the number of varieties of our domesticated plants and animals?

We are obliged to Darwin for calling our attention to the fact of variation. But the pity of this was that Darwin fell a casualty to his own discovery. Close observer though he was, he still failed to see any natural bounds or limits to variation. He concluded that all nature needed was merely enough time and the simple would produce the complex and generalized.

From Darwin's time to ours a full century of careful laboratory work has been done on processes of variation, and on the paleontological record. The problem for the biological scientist now is to build a new, a true, science in which more open-minded study is given to the factual part of natural science. This science consists of two parts: (a) demonstrated facts, laboratory proofs—the compulsive phase of science, and (b) the speculative—determining the significance of the natural facts. In this latter part is where Darwin failed. The danger is that scientists today will be

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unable to break away from the inaccurate conclusions to which Darwin led them. Agassiz had, to a certain degree, good advice here, "Study nature not books."

The problem to be solved is: Can microevolution (variation within basic types) produce macroevolution (organic evolution)? The outstanding geneticist Richard Goldschmidt put us on an alert here by declaring "... the facts of microevolution do not suffice for an understanding of macroevolution."¹¹

Genetic Process of Variation

He who thinks that microevolution has gradually produced new basic types needs seriously to study the laboratory findings regarding all genetical processes which result in variation: (a) recombinations, (b) gene mutations (visible, biochemical, and lethal), (c) chromosomal aberrations or mutations (changes in chromosome number—ploidy), and changes in chromosome structure that alter order or number (deletion, duplication, translocation, and inversion), and (d) hybridization. Then there are the findings from physical manipulations such as exposure to chemicals, to ultraviolet rays, and to maximum or minimum temperatures. The results from all these experiments are quickly told; in no case was anything more produced than new variants *within* existing basic types. To an open-minded scientist all these results lead to an agreement with Goldschmidt; microevolution can never break the barrier (the discontinuity) of the basic types so as to produce a new basic type. This is demonstrated science, not speculation.

Fossil Record

Turning from the living world, we review some facts disclosed in the records of the past. Perhaps paleontology is a little less familiar to us who are surrounded by the living organisms. I will admit that when it comes to studying the fossil record I feel a puzzlement over whether a student of the fossils is endeavoring to uncover all the facts or is he merely trying to prove an hypothesis. Here the requirement of the scientist for an open-minded approach appears peculiarly applicable.

Some years ago when Austin H. Clark, a starred man in *American Men of Science*, was with the National Museum he made this statement, "Since all the fossils are determinable as members of their respective groups by application of definitions of those groups drawn up from and based entirely on living types, and since none of these definitions of the phyla or major groups of animals need be in any way altered or expanded to include the fossils, it naturally follows that throughout the fossil record these major groups have remained essentially unchanged. This means that the interrelationships between them likewise have remained unchanged."

"Strange as it may seem, the animals of the very earliest fauna of which our knowledge is sufficient to enable us to speak with confidence, the fauna of the Cambrian period, were singularly similar to the animals of the present day. In the Cambrian crustaceans were crustaceans, echinoderms were echinoderms,

arrow-worms were arrow-worms, and mollusks were mollusks just as unmistakably as they are now."¹²

This statement involves the entire fossil record, and one cannot deny that for these relationships to hold from first life to our day considerable stability and even fixity would be required. We are led to suspect that some special principle existed throughout nature which assured the continued purity of basic types from the time of their origin, and at the same time prevented the development of new basic types.

We have already noted the presence of discontinuity in the living world. Did it exist in the past? Consider this statement by Norman D. Newell, "These finds (of assumed connecting links) are, however, rare; and experience shows that the gaps which separate the highest categories may never be bridged in the fossil record. Many of the discontinuities tend to be more emphasized with increased collection."¹³

Additional statements follow: "The sudden emergence of major adaptive types as seen in abrupt appearance in the fossil record of families and orders, continued to give trouble. The phenomenon lay in the genetical no man's land beyond the limits of experimentation. A few paleontologists even today cling to the idea that these gaps will be closed by further collecting, i.e., that they are accidents of sampling; but most regard the observed discontinuities as real and have sought an explanation for them."

"But the facts of paleontology conform equally well with other interpretations . . . e.g., divine creation, innate developmental processes, Lamarckism, etc., and paleontology by itself can neither prove nor refute such ideas."¹⁴

"The face of the record thus does really suggest normal discontinuity at all levels, most particularly at high levels, and some paleontologists . . . insist on taking the record at this face value."¹⁵

Discontinuity, Past and Present

We do not have space here to quote further. Suffice it to say that discontinuity, i.e., gaps between basic types, is a most important and easily observed phenomenon, both among living and fossil forms. It is possible that we have overlooked the fact that for each basic type (cats, dogs, horses, roses, petunias, etc.), to reproduce according to its own type means that a basic biological principle is involved. Because laboratory science has shown so completely that every living type *always* produces nothing other than its own type, this performance should have become axiomatic in our day.

Macroevolution or Microevolution?

Too frequently today students of variation, in an endeavor to demonstrate that *new* basic types do originate (macroevolution), have instead used cases of microevolution in their efforts. Illustrations of this are (1) Ruth Moore's book *Evolution*,¹⁶ in which variants among lizards, tortoises, finches, pigeons, begonias, roses, dogs, horses, and men are used beautifully as proof for macroevolution. As exhibit No. 2 is Sir Gavin de Beer's still more beautiful book *Atlas of Evolution*,¹⁷ in which he displays very exact photos of variants of horses, dogs, rhinoceros, ammonites, star-

fish, pigeons, the great tit, gulls, salamanders, and men. Let us state that we believe these illustrations are given honestly in the belief that they are examples of actual origin of new basic types. However, every such case used merely shows more completely that variants within basic types *do* occur, *but* there is *no known demonstration* of the origin of a *new* basic type. It is popular to say, "The origin of new basic types is a demonstrated fact" (and you will be shown pictures of variants within types to prove it), but the *natural facts* of science tell us, "Microevolution, yes. Macroevolution, *no*!" This is a natural scientific fact (i.e., it can be demonstrated) of tremendous importance, one which merits deep and thoughtful study.

Valiant efforts of paleontologists to demonstrate the origin of species often fall into the same category as that portrayed above. Simpson's¹⁸ best case of supposed speciation, that of the study of *Kosmoceras* (ammonites) by Brinkman,¹⁹ through 13 meters of sediments, and today P. G. Williamson's²⁰ fine study of speciation in snails and mollusks through 400 meters of sediments, are heralded by some as a demonstration of macroevolution. But let us not confuse the origin of possibly good species within a basic type with origin of new types. Brinkman's study of new species of ammonites merely began with ammonites and ended with ammonites. Williamson's study began with snails and clams and ended with snails and clams. That is not the program assumed by macroevolution. The development of new species *within* a basic type (ammonites, or snails, or clams) is not the development of new basic types. Proclamation by the uninformed that the development of new basic types is a demonstrated fact adds to the sad confusion of many eager students.

Conclusion

The paragraphs of this article are concerned entirely with items proven in the laboratory. We as natural scientists deal with natural truths. If a morsel of knowledge is presented, the modern scientist (he tells us) will refuse it unless it has been demonstrated in the laboratory to be naturally true. The items in these paragraphs are completely mundane. Therefore, they should not disturb anyone who claims to be a modern scientist. With this understanding I present the following biological principle which should have been recognized and put in use many years ago:

The Principle of Limited Variation: Genetic variation (variability) in animals and plants can go no farther than to produce new variants *within basic types already in existence*.

No exception to this principle (law) has been demonstrated. Its truth is verified every time a new organism is born, hatched, or sprouted. We live in a cosmos where natural principles cannot change with the passing of time. If any of these principles changed a chaos would immediately ensue. I welcome the opinions of my scientific colleagues.

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THE NECESSITY OF CONTINENTAL RE-LOCATION IN THE CREATIONIST MODEL

PATRICK S. HANSEN*

Received 17 February, 1982

Ever since Alfred Wegener offered his theory of continental "drift" in the early twentieth century there has been a continual controversy about whether or not the land masses we consider the Western Hemis-

phere and the Eastern Hemisphere were once joined and later split to form the Atlantic Ocean Basin. During the 1960's, research dealing with the spreading of the sea floor added credibility to the idea that sections of the earth's crust, called plates, not only moved in the past but still are moving, although at barely

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perceptible rates. Currently, the majority of earth scientists hold to the contention that the surface of the earth has, indeed, been rearranged over time.

Such a theory has been generally unacceptable to fundamental creationists, primarily because of the tens or even hundreds of millions of years required in the "orthodox" model of continental movement between the beginning of that movement and the present. Of course, lengths of time anywhere near that vast are not available for processes involving the earth, given a strict interpretation of Genesis. But the figure of many millions of years was arrived at based virtually entirely upon a uniformitarian interpretation of processes occurring today. This is the same principle that makes up the foundation of uniformitarian theory as a whole, that is, natural processes in the past were essentially the same as what we observe today. The entire creationist model, based on the Genesis record, presumes the opposite: the processes of the past, as manifestations of the handiwork of a sovereign God, are in no way contingent upon the present. So to the creationist the nature of historical events and processes in earth history, such as the speed at which they occurred, cannot be described or measured simply based on contemporary events and processes. Therefore, the creationist who has no problem accepting the fact that the earth had an origin, despite the dating discrepancy between the 4.5 billion years of the uniformitarians and the 6000 years or so of the Biblical creationist, need not categorically reject the theory of continental movement solely because of the discrepancy between 100 million years and 4000 years ago—the approximate time of "Peleg's division"¹—as the times the two respective models would assign to the separation of the continents.

On the other hand, the details provided in Scripture concerning the Flood of Noah not only necessitate the rearrangement of the continental land masses from an originally entirely contiguous alignment, they also require that such a rearrangement was after the Flood. The global pre-Columbian anthropological and zoological distribution could hardly have been achieved within the space of less than 4000 years from a single starting point following the Flood with the present locations of the continents by anything short of twentieth century transportation technology. Consider, for a moment, the plausibility of all human and nonaquatic animal life being assembled together atop Mount Ararat following a flood of worldwide proportions. If the six continents and various major islands of the world were situated then as we find them today, how could the kangaroo find its way from northeastern Turkey to the island continent of Australia? How could the bulky tapir have crossed several thousand miles of Atlantic Ocean to its current habitat in the jungles of South America? How could the remarkable civilization of the Incas, the Mayas, and the Aztecs have had the time first to cross the entire Atlantic Ocean from the Old World to the New and then reach such a level of advancement in the less-than-ideal environment of the South and Central American mountains or swamps in less than 4000 years?

With an imagination that probably is not as stretched as it would seem at first glance, one can

visualize the thrusting apart of a single land mass into two separate hemispheres, the subsequently formed gap being filled in with water from the recent Flood. Continental movement is often described as being a cause for mountain building. Sudden and extensive continental relocation, which certainly is no more drastic than a worldwide flood occurring within forty days, *could* account for the appearance of significant yet largely isolated cultures in mountainous environments, cultures which appear to have started at lower elevations.² The best examples of these high elevation civilizations are to be found in the Rocky Mountain-Andes Mountain system and on the southern slopes of the Himalaya Range, which is thought to have formed as the result of the Indian subcontinent splitting away from southeastern Africa and colliding with southern Asia. If this last mentioned event took place in a manner consistent with the Creation model, that is, recently and swiftly, it could account for the physiological similarities between the natives of India and many Africans. At the same time, Indians exhibit surprisingly few physical characteristics in common with the peoples of Central Asia or the Orient.

Indeed, the Flood of Noah was responsible for many of the vast animal graveyards and other anomalous fossils that have been discovered around the world. However, a great number of the more curious examples surely were not the result of aquatic devastation but rather the result of extremely severe, and apparently not localized, tectonic activity within the last few thousand years.³ A classic example is the so-called "Beresovka mammoth," an incredibly well-preserved specimen of a creature indigenous to temperate climates that was unearthed in the early twentieth century in Siberia.⁴ The condition of the animal itself along with the circumstances surrounding its death indicate a very unusual situation transpired there, possibly violent and extensive tectonic activity.⁵

Finally, even though there has been some controversy about the geological significance of the intriguingly mysterious reference in Genesis 10:25 to Peleg,^{6,7} a study of the etymological background of the name, "Peleg," shows that the derivation of the word involves meanings that include a physical dividing asunder, as earthquake, and "watercourse," perhaps a reference to a recent formation of a body of water, i.e., the Atlantic Ocean. Whatever the reason Peleg received his name, it is clear that a very significant geological event took place in his lifetime, which appears to have been nearly contemporaneous with the incident at the Tower of Nimrod's Babel,⁸ at which time the Lord "did scatter them abroad upon the face of all the earth."⁹

While the "orthodox" theory of continental "drift" is certainly incompatible with the Biblical account of Creation and subsequent events in the earth's history, some significant movement of most, if not all, of the earth's crust is not only compatible with Scripture, it is expressly or indirectly indicated by several passages in the Book of Genesis. The only difference is in the time-frame implied in the Scriptural model, both in terms of the recency of the event and of the speed at which it took place.

(Continued on page 225)

ELECTRIC EXPLANATION OF INERTIAL MASS

Received 2 February, 1982

THOMAS G. BARNES*

All bodies are assumed to consist of electric charges. The inertial reaction force acting backwards on an accelerated body is shown to be a magnetically induced electric force acting on the charges. Inertial mass is then associated with that reaction force and acceleration in accordance with Newton's second and third laws. This deduction is considered to have potential in a possible reinterpretation of the foundations of modern physics.

Introduction

There is a need to develop a better physical concept of mass and the associated mass-energy relationship. Authors such as A. O'Rahilly have shown that many of the relativistic concepts need to be reinvestigated.¹ Of particular interest here is the physical mechanism for the inertial reaction exerted by an accelerated mass.

This present paper concentrates on an electrical interpretation of *inertial* mass. The term *inertial* is used to limit this study to the reaction effects associated with acceleration. In a previous paper the author developed an electric theory of gravitation.² The validity of both of these papers hinges on the assumption that all bodies consist of electric charges. That position was held in a previous paper that developed a new model of the proton and the neutron.³

A later paper will be developed in hopes of providing an alternate interpretation of the zero rest mass particles. The author is aware of the hazards inherent in this departure from the conventional modern physics of our day. Nevertheless he finds it impossible to reconcile such things as the tremendous amount of magnetic energy in the spin of a "classical" electron with the concept of equivalence of mass and energy. The author has shown that the spin magnetic energy of a classical electron is several thousand times its mc^2 energy.⁴ He takes some comfort in knowing that H. A. Lorentz also pointed this out.⁵ If one accepts the modern physics concept of a *point* electron the mass-energy problem is vastly more unexplainable.

The author believes that it is time to return physics to a philosophy that puts physical reasoning ahead of blind faith in relativistic concepts that lead to nonsensical contradictions. The hope is that this more classical approach will eventually lead to the solution of some of the presently unsolved problems in physics. This present paper attempts to develop a simple pictorial means of explaining some very basic principles of mechanics in terms of straightforward electromagnetic phenomena. That is hopefully one more step toward a simplification and unification of the basic principles of physics.

1. Inertial Mass

When a force is exerted on an object it is the *inertial* mass that limits the acceleration in accordance with *Newton's second law*, which may be written as Force = (mass) (acceleration) or simply

$$F = ma \quad (1)$$

Assuming that all the elementary particles in an object (even the neutrons) consist of electric charges,⁶ one may show that inertial mass is due to induced electric force acting backwards on the charges when the object is accelerated. We shall make use of Eq. (1) and an electromagnetic phenomenon to deduce an electric formula for the inertial mass of an electron and a proton and extend the concept to all inertial mass.

This electric force acting backwards is the mechanism for *Newton's third law*. Newton's third law states that: *For every action (force) there is an equal and opposite reaction (reverse force)*. The reaction force is the *inertial reaction* of the mass when the object is accelerated.* That is why mass is sometimes said to be the quantitative measure of inertia. Our derivation proceeds as follows: We first set up an integral for the force required to deliver magnetic energy into the field of an elementary charge. From that relation we derive an expression for the inertial mass of the charge in terms of the charge and its dimensions. We then deduce 1) the electromagnetic mechanism which generates the reaction force, 2) the means of delivering induction energy into the field, and 3) the power radiated out of the system. These present derivations are limited to longitudinal accelerations.

2. Force Required to Accelerate Charge

It can be shown that the *kinetic energy* of a charge moving with velocity much less than the speed of light is the *magnetic energy* developed in the field of the charge.⁷ The magnetic energy in the field of a moving spherical charge is derived by integrating the energy density ($\frac{1}{2}\mu H^2$) over the whole volume V outside of the sphere.

$$T = \int \frac{1}{2}\mu H^2 dV \quad (2)$$

where the magnetic energy has been denoted as the kinetic energy T . Before carrying out the integration, the magnetic field H is expressed in terms of velocity v , field vector D , and the sine of the angle between vectors v and D , (Fig. 1)

$$H = vD \sin \theta \quad (3)$$

The following additional substitutions are employed: the electrostatic field equation and the volume element along which H is constant

$$D = \frac{q}{4\pi r^2} \quad (4)$$

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*This paper, and these comments, are restricted to dynamics: situations involving acceleration. It is hoped, in a later paper, to deal with Newton's third law as it applies in static situations.

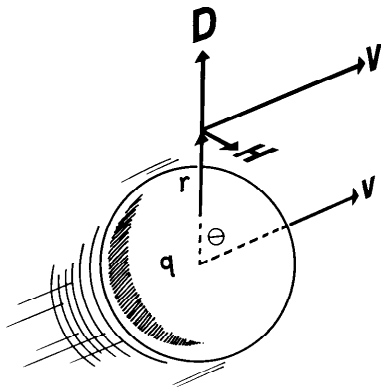


Figure 1. Generation of magnetic field H by the motion of the D lines associated with charge q which moves with constant velocity v .

$$dV = 2\pi r^2 \sin\theta \, d\theta \, dr \quad (5)$$

The integral is

$$T = \int_0^\pi \int_{r_0}^\infty \frac{\mu v^2 q^2 \sin^3\theta \, d\theta \, dr}{16 \pi r^2}$$

After integrating with respect to r

$$T = \int_0^\pi \frac{\mu v^2 q^2 \sin^3\theta \, d\theta}{16 \pi r_0} \quad (6)$$

In order to obtain an expression for the force, the kinetic energy is differentiated with respect to time, yielding power, and the power is then expressed in terms of force times velocity:

$$\frac{dT}{dt} = Fv \quad (7)$$

Carrying out that time derivation and dividing by v

$$F = \int_0^\pi \frac{\mu a q^2 \sin^3\theta \, d\theta}{8 \pi r_0} \quad (8)$$

Integration yields the required force equation

$$F = \frac{\mu q^2 a}{6 \pi r_0} \quad (9)$$

From Newton's second law, Eq. (1), and Eq. (9) one obtains the equation for inertial mass

$$m = \frac{\mu q^2}{6 \pi r_0} \quad (10)$$

This electric equation for mass applies to a spherical electron or a spherical proton, in which the charge is assumed to reside on the surface. H. A. Lorentz derived a similar equation for the mass of an electron in 1915.⁸ This equation has also been applied to the proton in a previous paper.⁹

3. Induced Electric Reaction Force

According to Newton's third law, when there is a force acting on a charge, the reaction force acts *instantaneously*. It therefore must act *at the surface where the charge is*. No wave motion is involved in the reaction force at that instant, because the wave has not had time to move. We know that when the charge is

accelerated that there will simultaneously be a rate of change in magnetic field *at the surface* of the charge. This rate of change of magnetic field at the surface of the charge *instantaneously* generates an induced electric field E_0 at the surface.

The total reaction force F during acceleration of the charge is the integral of the rearward components of the instantaneously induced electric vectors E_0 acting on the surface charge q . This induced electric field is tangential to the surface of the sphere. The induction process is illustrated by Figs. 2a and 2b. Fig. 2a shows the rotational direction in the curl of E around each vector $-dB/dt$ at the surface. The vector $-dB/dt$ is the negative rate of change of magnetic induction B . According to Maxwell's equation: $\text{curl } E = -dB/dt$. Fig. 2b shows the result, namely, that the induced E_0 at the *instant* of acceleration is confined to the surface (no wave propagation yet) and is tangential to the surface.

Due to symmetry the value of E_0 is constant around the spherical surface at angle θ . The subscript 0 is added to emphasize that this is the value at the surface of the sphere. Setting up the integral so as to sum the rearward components of the electric force on each elementary surface

$$F = \int_0^\pi E_0 \sin\theta \, dq \quad (11)$$

and making the following substitutions:

$$dq = 2\pi \sigma r_0^2 \sin\theta \, d\theta \quad (12)$$

and the surface charge density

$$\sigma = \frac{q}{4\pi r_0^2}$$

the force equation reduces to

$$F = \int_0^\pi \frac{E_0 q \sin^2\theta \, d\theta}{2} \quad (13)$$

We solve for the induced electric field E_0 at the surface of the charge by equating the integrands in Eqs. (8) and (13).

$$E_0 = \frac{\mu q a \sin\theta}{4\pi r_0} \quad (14)$$

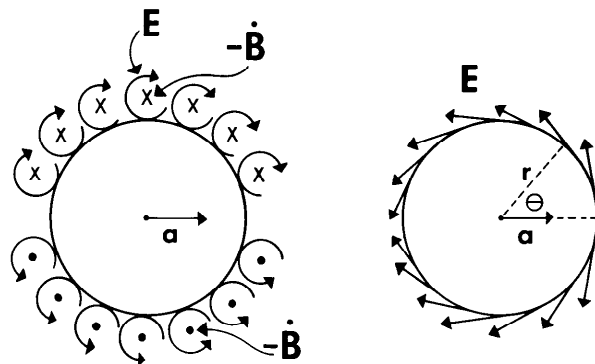


Figure 2. Instantaneously induced electric field at the surface of the charge during acceleration.

Part (a) (left) shows the directional sense associated with $\text{curl } E = -\dot{B}$.

Part (b) (right) shows the electric field E at the surface.

This magnetically induced electric field and its force on the charge is the mechanism for the reaction force in Newton's third law. This "hold-back" force on the electron will be "felt" by the external source which pushes the electron forward. Hence the physical mechanism for Newton's third law is the magnetically induced electric field acting backwards on the charge. Every body is, according to our theory, composed of electric charges. This explains why Newton's third law applies to "neutral" mass as well as to elementary charges.

4. Propagation of the Electric Vector into the Field

By aid of the constituent equation $B = \mu H$, Eq. (3) may be converted to the induction equation.

$$B = \mu \nu D \sin \theta$$

and by aid of Eq. (4)

$$\dot{B} = \frac{\mu a q \sin \theta}{4\pi r_0^2} \quad (15)$$

at the surface of the accelerated charge. In view of Eqs. (14) and (15)

$$E_0 = \dot{B} r_0 \quad (16)$$

This is the result that one would expect.

One may now derive a simple equation for E in the field in retarded time, that is to say at the time the wave reaches the field point, not the time at which the wave was initiated at the source. This process is equivalent to removing time from the problem, making it much easier to solve.

The transverse electric wave E is radiated out radially as a result of the acceleration of the charge. It obeys Maxwell's equation

$$\oint \mathbf{E} \cdot d\mathbf{s} = - \int \dot{\mathbf{B}} \cdot d\mathbf{A}$$

Taking the line integral around the elementary rectangular loop in Fig. 3 and expressing the enclosed area in incremental form one has $(E_2 - E_1)\Delta s = -\dot{B}\Delta s \, \delta r$ which reduces to

$$\frac{dE}{dr} = -\dot{B} \quad (17)$$

in the limiting case as the rectangular dimensions shrink toward zero. This important equation applies to the *transverse electric field* E in retarded time. The integral of Eq. (17) yields the successive values of

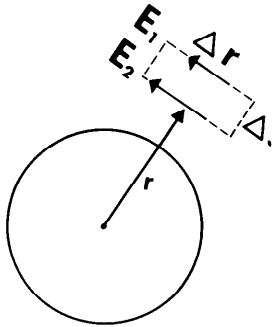


Figure 3. Rectangular path of integration that encloses the magnetic flux $B \Delta s \Delta r$.

E as the wave reaches successive radial distances. The integral equation is

$$\int_{E_0}^E dE = - \int_{r_0}^r \dot{B} \, dr$$

In view of Eq. (15) and the radial direction of the wave propagation

$$E_0 - E = \int_{r_0}^r \frac{\mu a q \sin \theta \, dr}{4\pi r^2} \quad (18)$$

which yields

$$E_\theta = \frac{\mu a q \sin \theta}{4\pi r} \quad (19)$$

after integration and substitution of Eq. (14) for E_θ . E_θ is the electric field as the E wave passes a particular point distance r and angle θ with respect to the center of the spherical charge. The subscript θ has been added to emphasize the fact that it is a transverse electric field, at right angles to the direction of propagation of the wave.

5. Energy Propagated into the Induction Field

The magnetic field which is produced in this process is called the induction field. Poynting's vector may be employed to derive the rate of propagation of magnetic energy into the induction field. The Poynting vector $\mathbf{E} \times \mathbf{H}$ (read $\mathbf{E}$ cross $\mathbf{H}$) gives the *intensity* and *direction* of the electromagnetic wave propagation into the field. When the electric field E_θ is induced at the surface of the spherical charge it is paired with the magnetic field H_ϕ at that point and generates the wave shown in Fig. 4. Note that the E_θ makes a 90° angle with H_ϕ and the cross product vector points outward in the radial direction and has the magnitude $E_\theta H_\phi$.

The derivation of the equation for intensity I is self-evident from the following equations:

$$I = E_\theta H_\phi \quad (20)$$

From Eqs. (3) and (4) the expression for the magnetic field at the surface of the charge is

$$H_\phi = \frac{qv \sin \theta}{4\pi r_0^2} \quad (21)$$

This magnetic vector moves on out, providing the value

$$H_\phi = \frac{qv \sin \theta}{4\pi r^2} \quad (22)$$

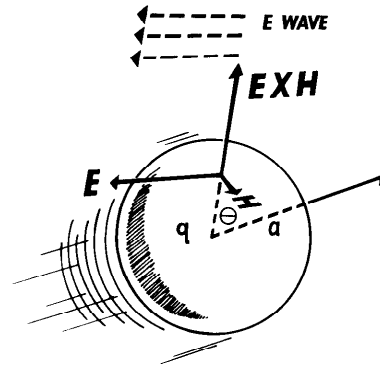


Figure 4. Electric wave resulting from Poynting's vector $\mathbf{E} \times \mathbf{H}$ applied to the induced electric field E and the magnetic field H .

at every field point (r, θ) . The velocity v is the velocity that the charge had at the prior time, the time the wave emanated from the surface of the charge. This wave moves outward with speed c , filling out the magnetic field very quickly. Substituting Eqs. (19) and (22) into Eq. (20) yields

$$I = \frac{\mu a v q^2 \sin^2 \theta}{16 \pi^2 r^3} \quad (23)$$

which is the intensity (watts/meter²) of this induction wave as it passes the point (r, θ) in the field. It is delivering the magnetic energy into the field as a result of the acceleration of the charge. This energy is retained in the field as magnetic energy, so long as the charge is not decelerated. We repeat this *induction field* of magnetic energy is stored in the field, not radiated away like a radio wave. We shall consider the radiated wave in a later section.

The total power involved in generating this induction field is the integral of the intensity over the whole surface of the sphere. Employing the surface element of area $dA = 2\pi r_0^2 \sin \theta d\theta$

$$\text{Power} = \int_0^\pi \frac{\mu v a q^2 \sin^3 \theta d\theta}{8 \pi r_0} \quad (24)$$

which yields

$$\text{Power} = \frac{\mu v a q^2}{6 \pi r_0} \quad (25)$$

Remembering that $m = \mu q^2 / 6 \pi r_0$, Equation (24) may be put in the form $\text{Power} = m a v$ or simply $\text{Power} = F v$ which gives a check on this work.

6. Electromagnetic Radiation

When a charge is accelerated the added energy is transferred into the induction field and into electromagnetic radiation. The radiation differs from the induction. The energy in the induction field continues to be "field bound" to the charge and move along with it. The radiated energy goes on out into space. An example of radiated energy is the energy in a radio wave. Whereas the induction energy is like the energy in a transformer's magnetic field. It is temporarily stored but will be shifted back into another form if the charge motion is decreased. The electromagnetic radiation is propagated out into space with the speed of light.

To deduce the radiation power we make use of "Ohm's law" for the electromagnetic field. This law was developed by D. Schelkunoff.¹⁰ According to this law with every E wave in electromagnetic radiation there is the associated H wave and the law relating them is

$$\frac{E}{H} = \eta \quad (26)$$

where η is the intrinsic impedance into which the wave moves. It is given by the equation

$$\eta = \left(\frac{\mu}{\epsilon} \right)^{1/2} \quad (27)$$

and in free space has the value 377 ohms.

In the radiation field (far field) the E and H are normal to each other and both are inversely proportional to r , not r^2 .

From the electric vector Eq. (19) and Ohm's law Eq. (26) one obtains

$$H_\phi = \frac{\mu q a \sin \theta}{\eta 4 \pi r} \quad (28)$$

Remembering that the speed of an electromagnetic wave $c = (\mu \epsilon)^{-1/2}$ and noting that $\mu/\eta = 1/c$ the equation reduces to

$$H_\phi = \frac{q a \sin \theta}{4 \pi r c} \quad (29)$$

The intensity I is given by Poynting's vector ($E \times H$), namely

$$I = \frac{\mu q^2 a^2 \sin^2 \theta}{16 \pi^2 r^2 c} \quad (30)$$

Taking the element of area $dA = 2\pi r^2 \sin \theta d\theta$ and integrating over the surface of a sphere of radius r , the power

$$P = \frac{\mu q^2 a^2}{6 \pi c} \quad (31)$$

This is the same as the expression deduced by Arnold Sommerfeld and others for the Lorentz electron.¹¹

An extension of the solution to relativistic velocities will probably yield similar results but with the inclusion of some form of the factor $\gamma = (1 - v^2/c^2)^{-1/2}$ or multiples of it. For example, Sommerfeld¹² shows that the relativistic expression for power radiation is

$$\text{Power} = \frac{\mu q^2 a^2 \gamma^6}{6 \pi c} \quad (32)$$

which is the same as Eq. (31) except for the γ^6 factor.

7. The Unsolved Problem

Although we have successfully accounted for the reaction force on the elementary charge resulting from the delivery of induction energy into the field, we have not deduced the reaction force resulting from the electromagnetic radiation. Fortunately, for most practical problems this radiation reaction force is extremely small and can be neglected. However, this radiation reaction force can not be neglected in some of the high energy accelerators of our day. There is of course experimental evidence of approximately what this force is under those conditions. Nevertheless there does not as yet exist a completely satisfactory theoretical solution to the radiation reaction force. The following quotes from J. D. Jackson's widely acclaimed graduate textbook in electrodynamics illustrates this basic problem with present day physics.

"—a completely satisfactory treatment of the reactive effects of radiation does not exist. The difficulties presented by this problem touch one of the most fundamental aspects of physics, the nature of an elementary particle. Although partial solutions, workable within limited areas, can be given, the basic problem remains unsolved. One might hope that the transition from classical to quantum-mechanical treatments would remove the difficulties. While there is still hope that this may eventually occur, the present quantum-mechanical discussions are beset with even more elaborate troubles than the classical ones."¹³

This problem is not restricted to the high-velocity case. It has not been satisfactorily solved in the non-relativistic case. To illustrate one of the difficulties, consider a particular solution listed by Arnold Sommerfeld,¹⁴ namely

$$F = \frac{\mu q^2 da/dt}{6\pi c} \quad (33)$$

It depends on da/dt , the rate of change of acceleration, not acceleration. It could not work during constant acceleration because that would imply that $F = 0$; but force is required to produce the constant acceleration and the associated radiation. This would be a violation of the law of conservation of energy. Sommerfeld of course knew the limitations of this solution; but neither he nor anyone else has been able to give a general solution. When it is done it will undoubtedly require a modification of Newton's second law, because Newton did not consider any radiation effects.

It is hoped that this unsolved problem will emphasize the need to reinvestigate some of the foundations of physics.

Acknowledgements

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pointed out the need of qualifying a statement about Newton's third law. See the footnote along with Section 1.

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NATURAL SELECTION AND THE CHRISTIAN VIEW OF REDEMPTION

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The theory of natural selection is irreconcilable with the Christian view of redemption. According to the theory of evolution, mankind and other species have common ancestors. Natural selection occurred through a process of the survival of the fittest, according to which species that were not sufficiently adapted to the environments in which they lived were unable to survive. The theory of natural selection is dependent upon the assumption that there was death in the world before the appearance of man and that death played a part in the development of modern man, since man is a product of the process of the survival of the fittest. Such a theory cannot be reconciled with the Christian view of redemption, according to which: (1) man's susceptibility to physical death was a result of the curse placed upon him as a result of the fall and (2) mankind has been released from the effects of the curse, including physical death, through the resurrection of Christ from the dead. If, as the theory of natural selection would require, death existed before the appearance of man upon the earth and man inherited mortality from his forbears, then it would be inconsistent to maintain (1) that man's susceptibility to physical death was a result of the curse, (2) that there is any redemption from physical death through Christ, (3) that there will be a physical resurrection of the dead at the end of the age and (4) that there was a physical resurrection of Jesus Christ from the dead.

Natural Selection and the Christian View of Redemption

For more than 120 years, the western world has become increasingly enamoured with the idea of the evolution of species, which is alleged to provide us with a compelling model for an understanding of the origin of all of life, and, most importantly, of the origin of mankind with his unfathomable intricacy of mind and complexity of personality. It is interesting that

prior to the publication of Darwin's *Origin of Species* in 1859, the dominant scientific world view in the English-speaking world and in western Europe was derived, for the most part, from the Judaeo-Christian Scriptures, according to which all species were created separately and were made to reproduce, each according to its own kind. It is true that there were some who urged doctrines akin to evolution even before the *Origin* appeared but these were in disrepute.

According to the theory of natural selection, those species best adapted to their respective environments have survived, whereas others that have been less

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suited to the conditions of their surroundings have become extinct. This idea of the survival of the fittest has pervaded not only the field of biology, but many, if not most other major fields of study in the twentieth century. Anthropologists and sociologists, for example, take the facts of evolution for granted; it has become axiomatic that man and other species have common ancestors. The predecessors of humanity, although similar in some respects to man, were far more primitive, both sociologically and biologically; and if one goes far enough back in time, through millions of years, the ancestors of mankind cease to be human at all. The most intelligent specimens among man's ancestors—those that were best able to use primitive tools and invent ingenious means for survival—remained alive and continued to evolve, while other less suitably equipped specimens did not survive.

Thus, the theory of natural selection places the origin of death prior to the existence of man. On the other hand, the Christian view of redemption is that man's fall introduced sin and physical death into the world and that Jesus Christ redeemed us from these effects of the fall through his incarnation, crucifixion and resurrection. According to the Christian view, death resulted from the fall of man. If this is so, then how could man have evolved through a process of natural selection, since death is the mechanism through which the survival of the fittest must necessarily occur?

Several methods might be tried for reconciling the apparent conflict between the theory of natural selection and the Christian view of death and redemption. Perhaps death was possible for animals prior to the fall, but until mankind sinned, he was not yet susceptible to death. The Bible does not specifically state that the death of animals was a result of the fall. It merely states that death came by Adam. Yet, if the mechanism of natural selection is responsible for the gradual evolution of mankind, at what point during the process do we stop and say that man has finally arisen? Is it possible to pin down the rise of man to a specific point in time, since man's development has been so gradual, over periods of millions of years? It is not reasonable to pinpoint any particular generation in such a process and claim that it is the first family of men. The postulated development is too gradual; the changes over the course of aeons are too subtle.

In dealing with this problem, some Christian expositors have argued that God sovereignly chose a particular generation and decided, at precisely that point in time to put a spirit within a particular individual and call him man. Thus, there was a point of discontinuity during the evolutionary process at which time man arrived on the scene, quite distinct from his ancestral antecedents. Animals were subject to death before the fall of man, yet mankind's fall introduced death to the human race. This argument, however, seems forced. Why should man be descended from species that were susceptible to physical death, yet he himself was immune from it, at least until the fall? How is it any more remarkable that man should have been created by God apart from any process of natural selection, than that he should have been altered at some point in the evolutionary process, and then be

granted the immunity from death that he enjoyed until his fall?

Another approach to the problem interprets Biblical passages on death as symbolic. By Adam came death, but not physical death. Rather, biological death has always co-existed with life, but that which came about with the fall of man was spiritual death. This view is difficult to reconcile with the Scriptures. We see in I Corinthians 15:21-22, for example, that the introduction of death into the world through Adam is compared directly to the redemption we have through Christ's resurrection from the dead:

But now Christ has been raised from the dead, the first fruits of those who are asleep. For since by a man came death, by a man also came the resurrection of the dead. For as in Adam all die, so also in Christ shall all be made alive.

If we say that death in this context is not biological, but spiritual death, then we must also say that resurrection from the dead is not physical, but only spiritual. For here we see that the death that was brought about by Adam's fall is inextricably bound up with our resurrection in Christ. In fact, our redemption in Christ is treated in this passage as a rectification of the ill effects of the fall. What sense would it make for Paul to say that, just as man's death proceeds from Adam's transgression, so all shall be resurrected in Christ, if, in fact, the death were only spiritual, but the resurrection was to be physical?

If physical death was not introduced into the world through the fall, then not only does our redemption become nonphysical, but Christ's resurrection could not have been physical either. In the passage from I Corinthians under consideration, Paul draws a direct parallel between the results of Adam's disobedience and Christ's resurrection: "For since by a man came death, by a man also came the resurrection of the dead." The logical implication of this statement is that if the death that came by Adam is only spiritual, then the resurrection that came by Christ is also only spiritual. Paul provides a further parallel between Christ's resurrection and our own, since Christ, being raised from the dead, is considered the first fruits of those who are asleep. It would be nonsensical to refer to Christ as the first fruits of the resurrection if his resurrection was physical and ours is to be merely spiritual. The passage is meaningful only if Paul is alluding to physical death as a consequence of the fall. For if one holds that it was not physical, but only spiritual death that resulted from the fall, the only possibility for consistent interpretation of this passage would be that neither Christ's resurrection, nor our own redemption from death is physical. Yet the resurrection of Jesus Christ is the cornerstone of the Christian faith. Paul writes that, "If Christ has not been raised, then your faith is in vain."

The astute reader will recognize at this point that if the above argument is correct, then the theory of evolution is irreconcilable with the Christian view of redemption. According to the Christian view, man's fall introduced sin and physical death into the world and Jesus Christ redeemed us from these effects of the fall through his incarnation, crucifixion and physical resurrection.

Natural selection, on the other hand, could not possibly have taken place apart from the mechanism of physical death inherent in the process of the survival of the fittest. If men evolved as a result of this process, then physical death could not have resulted from man's fall. Rather, man's tendency to die would have been inherited from his immediate forbears. Yet, if physical death is not a result of the fall, then our redemption in Christ is not physical either, or such Biblical passages as I Corinthians 15:21-22 would be completely nonsensical.

In keeping with the parallels provided in the Scrip-

tures between Christ's resurrection and our own, it seems inescapable that, if our redemption is not physical, then neither can Christ's resurrection have been physical. Yet this is in direct contrast to the latter portion of the gospel according to John, in which Didymus the disciple is invited to touch the risen Christ and inspect the marks of the wounds inflicted by his crucifixion.

In view of these considerations, it seems inescapable that it is logically inconsistent to hold both that Christ has been raised in the physical sense, and that man has evolved during a process of natural selection.

LIEBERMAN REVISITED

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"If we accept the theory of evolution, we must face the problem of the evolution of human language."¹ Many philosophers² and researchers³⁻⁵ have approached this problem but no one answer has been universally accepted. Philip Lieberman's conclusions were presented in Palermo's⁶ book as probably correct—conclusions of which I am skeptical. Using scientific evidence, I have attempted to highlight his major errors, thereby showing that his suggestion of a missing link in the evolution of language is unfounded.

1. Lieberman's Argument

Philip Lieberman⁷ believes that evolution proceeds in small steps, and the only reason that human language appears to be so disjoint from animal communication is that the hominids who possessed "intermediate" language are all dead (i.e., Neanderthals). He says that human linguistic ability must be viewed as the result of a long evolutionary process that involved changes in anatomical structures through a process of mutation and natural selection which enhanced speech communication.⁸

Lieberman and his colleagues conducted a comparative study of twelve human newborn skulls and heads; two modern apes (*Pongidae*), who do not have speech; fifty modern adult skulls, who do have speech; and Neanderthal man, using La Chapelle-aux-Saints as the representative, to assess the language capabilities of the Neanderthal man. Although he and others^{9,10} agree that Neanderthal man probably had some form of language, Lieberman suggests that "Neanderthal man did not have the anatomical prerequisites for producing the full range of human speech."⁸ His conclusions are primarily based on skull and jaw structure similarities of Neanderthal man and the human newborn, and consequently, the differences of these two as compared with modern man. These include (as summarized in Le May¹⁰),

- 1) the body of the Neanderthal mandible is longer than the ascending ramus, whereas they are nearly equal in the adult man.
- 2) the ascending ramus of man inclines from a vertical plane and the angle formed by the body and the ramus is more open.

- 3) the mandibular coronoid process is broader; the mandible notch is more shallow in Neanderthal.
- 4) the styloid process is more inclined from the vertical plane, and the hyoid bone and the larynx are higher in position.
- 5) the dental arch is "U"-shaped (as opposed to "V"-shaped in modern man).
- 6) the length of the hard palate is less than the distance between the hard palate and the anterior margin of the foramen magnum.
- 7) the portion of the occipital bone between the foramen magnum and the sphenoid bone is nearer horizontal, while in modern man it is more vertical.

Furthermore, he concludes that Neanderthal man had no chin, which he designates as a pongid characteristic. The head was smaller than modern man, resulting in small frontal lobes and inadequate cavity space for forming vowels (particularly /a/, /i/, /u/). Also, he suggests that Neanderthal man had a supralaryngeal vocal tract in which the larynx exited directly into the oral cavity. In the adult human, the larynx exits into the pharynx.³ The tract consisted of only one tube, so Neanderthal could not encode, as modern man does with two tubes. (Speech is possible without encoding, but it is about ten times slower than normal speech.)

To reconstruct the supralaryngeal tract, Lieberman first located the position of the hyoid bone and thus of the larynx, which is beneath it; secondly, he reconstructed the tongue and the pharynx, relative to the larynx; next, he built the laryngeal, oral and pharyngeal cavities; and finally, he cast the supralaryngeal air passages, or vocal tract (as summarized in Falk⁴).

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It is essential that this reconstruction be accurate, as the human vocal tract displays characteristic features not found in other primates. Language is based on these specialized features,¹¹ the most important of which is that the tract is bent.¹²

The vowel triangle (i.e. /a/, /i/, and /u/) was chosen because Troubetskoy had noted that these vowels occurred in "practically all of the languages" that he studied;⁷ thus Neanderthal would have been able to produce them if he had an adequately formed vocal tract (according to Lieberman).

In conclusion, Lieberman, et al.⁸ claim that "the similarity between human newborn and the adult Neanderthal fossil conforms to the view that modern man and Neanderthal man had a common ancestor." Neanderthal is not "directly related to modern man" because he had specialized features, like a supraorbital torus, that are not present in most modern men, human newborns, or in apes. Since Neanderthal man was more advanced than present-day non-human primates in phonetic ability, but since he did not have "the full range of human speech," and also lacked the neural detectors involved in speech perception, "Neanderthal man thus represents an intermediate stage in the evolution of language, indicating that evolution of language was gradual, and not abrupt."³

2. Evidence Against Lieberman's View

Although some researchers support Lieberman's contention that Neanderthal had inadequate speech,^{13, 14} a number of others are critical,^{15, 16, 10} or cannot replicate his findings.^{4, 5} Morris states that Lieberman's argument "of human newborn-adult Neanderthal similarity, and dissimilarity of both to adult man is not necessary . . . (and) it can be refuted."

First, the Neanderthal skull chosen for study, La Chapelle-aux-Saints was not adequately representative of the race.¹⁵ It had only two teeth, which was the result of a periodontal disease, so the observed mandibular angle and the mandibular canal is distorted (points 2 and 3a above). Also, La Chapelle suffered from osteoarthritis of the temporo-mandibular joint, thereby producing superio-inferior shortening and thus, a shallow mandibular notch (point 3b above). Although Lieberman and Crelin¹⁷ argue that arthritis does not affect speech production, they fail to recognize that arthritis *does* affect the bones, which are what they were studying.

Concerning the reconstruction, Carlisle and Siegel,¹⁶ and Morris,⁵ find it faulty and the measurements inaccurate. For example, Morris noted discrepancies in Lieberman's illustrations as to the locations of the styloid process angle. This angle is important in that it is the key to the location of the hyoid bone, and thus of the larynx. Lieberman had measurements of 33 and 41 degrees, and 10 and 20 degrees in different figures. Morris' reconstruction places the hyoid bone lower and more posteriorly (indicative of modern man) than Lieberman's and he measured both styloid process angles to be 15 degrees. Morris shows that Neanderthal did not have high larynx position, an elongated vocal tract or an horizontal tongue resting position, but has low larynx position, an angulated

vocal tract, and the back of the tongue is vertical (forming the anterior wall of the oral part of the pharynx) as in modern man (point 4 above).

Supporting Morris, Falk⁴ reasons that the skeletal similarity between Neanderthal man and modern man suggests that the larynx of Neanderthal should be reconstructed like that of the adult human, with the hyoid bone well below the inferior edge of the mandible, and thus lowering the larynx position. He adds that Lieberman failed to take into account that Neanderthal man was erect and that "all parts of his body are as adapted to the upright posture as are those of modern man."¹³ Therefore, Neanderthal "could not have differed fundamentally from modern man in his cervical curvature and the carriage of his head," according to Falk. Consequently, one would expect that the oral passage would form a right angle with the oral pharynx as is the case for modern man, rather than the wider angle which characterizes the slumped posture of the chimpanzee (point 2 above). Also, the chimpanzee is not normally bipedal, as is shown by the carriage of the head and the high position of the epiglottis relative to the soft palate. Man is characterized by a separation of the epiglottis from the soft palate, which is correlated with his erect posture. Falk concludes that, in light of these facts, Lieberman is not justified in his high placement of La Chapelle's hyoid bone.⁴

Le May¹⁰ presents some statistics on some modern men with normal speech who show physical features in common with Neanderthal man (points 6 and 7 above). For example, one man had an U-shaped mandibular arch (point 5 above) and yet could speak (see Le May for illustration). Furthermore, both she and Carlisle and Siegel¹⁵ note that many modern men show prognathism, with the mandible longer than the ramus (point 1 above), and still have normal speech.

Lieberman's claim that Neanderthal man lacked a chin³ is also challenged.^{10, 15} Carlisle and Siegel assert that not only did Neanderthal man have a chin, but that not all modern men have distinct chins. Lenneberg,⁹ in reference to the absence of a chin, along with the structure of the mandible and the shape of the denture, states that "all we may deduce from this evidence (if it is indeed accurate) is that the vocalizations of fossil man did not bear any close acoustic resemblance to the speech sounds of any modern tongue" (p. 261).

Lieberman's assertion that Neanderthal had small frontal lobes³ is questioned by Le May.¹⁰ She claims that a study of La Chapelle's endocranial cast points to a larger brain, and one which "resembles modern man in an area important for speech and thereby suggests that Neanderthal had the neural development necessary for language." She states that the speech areas of the brain lie along the banks of the Sylvian fissures, usually on the left. Her approximations of Neanderthal Sylvian fissures resemble those of modern man (Le May gives an illustration).

Furthermore, Lieberman makes no comparison of other than American skulls (e.g., not with pygmies). Carlisle and Siegel¹⁵ note that La Chapelle can be compared to the Australian aborigines, which further

lessens any dissimilarities to modern man. Moreover, Lenneberg⁹ shows that "if one cannot make unflinching deductions from recent (three years ago, in his example) bones, one can hardly presume that inferences are possible about fossil man who lived under almost totally unknown circumstances" (p. 257). He also states that endocasts give no language-relevant information, only the approximate size and shape of the brain; and this furnishes no secure clue about the capacity for language. Le May¹⁰ supports this, citing pygmies and dwarfs, with smaller brains yet with normal speech, as examples. Also, there is "no direct evidence" to link the evolution of speech to the fossil record (Washburn & Lancaster¹¹).

E. L. DuBrul¹⁸ points out that if the Neanderthal vocal tract were as reconstructed, "he would not have been able to open his mouth, let alone speak." In the same way, Falk⁴ notes that Lieberman's reconstruction would indicate that the Neanderthal would not have been able to swallow like a human. The muscles would be pulling the hyoid bone forward in the act of swallowing, rather than raising it, as is normal for man; the tendons involved in swallowing are placed above the level of origin in Neanderthal, rather than below as is normal for man. Falk concludes by saying that there was too much missing from the skull and Lieberman made broad anatomical generalizations and miscalculated angles where organs were relative to one another. Lenneberg sums up by saying that "language is not an arbitrarily adopted behavior, facilitated by accidentally fortunate anatomical arrangements in the oral cavity and larynx. . . ." (p. 175).⁹

In using primarily the vowel triangle as a basis for "the full range of human speech," Lieberman fails to take into account the full range of modern speech productions. Computer analysis shows that Neanderthal could produce /I/ and /e/;⁴ and Lieberman admits that there may have been intermediate degrees of phonetic ability.⁸ Furthermore, Troubetskoy did not show that the vowel triangle was universal, but that "vowels like these occurred in *practically all* of the languages that he studied" (in Lieberman;⁷ italics are this author's). Neanderthal speech may not have included these vowels; in any case, their absence would not have made his speech inferior to that of modern man, as Lieberman would suggest. The following response by John H. Fremlen illustrates this point:¹⁹

The Demese of the Ne'enderthels:
Wes Lengege e Fecter?

Et seems qwetebreble thet the Ne'enderthel ked speke less well then ther seccessers, end thet wes the resen for ther demese. Bet even ef we beleve the kempeter reselts (Research News, 15 Nov. 1974, p. 618), et seems emprebeble thet ther speech wes enedeqwete bekens ef the lek of the three vewels seggested. The kemplexete ef speech depends en the kensenents, net en the vewels, es ken be seen from the general kemprehensebelete ef thes letter (1).

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1. The neutral vowel throughout is "e," as in "her."

Furthermore, Gibbons²⁰ estimates that the area of the formant frequency of the vowel triangle of La Chapelle-aux-Saints lies within 0.81 standard deviations of the mean of a modern population of English-speaking people, that is, within the range of 66% of the modern sample. This is another example of Lieberman's inaccuracy.

Some controversy exists as to the placement of Neanderthal man in evolutionary sequence.²¹ Marcellin Boule, who constructed the restored cast of the skull analyzed by Lieberman, et al.,⁸ did not believe that Neanderthal was a hominid. As a result, it is possible that his restoration was biased—and that this consequently biased Lieberman's results.

Finally, Lieberman, et al.,⁸ state that "although the larynx was judged to be as high in position as that in newborn and apes (Pongidae), it was purposely dropped to a slightly lower level to give Neanderthal every possible advantage in his ability to speak." This action is to me an unclear and questionable one.

3. Summary and Discussion

In summary, Lieberman's major errors include:

- 1) Faulty (and perhaps biased) reconstruction of the skull, including placement of the hyoid bone and consequent projected placement of the larynx.
- 2) Using the vowel triangle as the only basis for assessing adequate language and miscalculating Neanderthal's ability to produce those vowels.
- 2) Using an inadequate representative of the human race and then comparing it only with American skulls.
- 4) Making broad generalizations based on inadequate data.

It is his adherence to the evolutionary theory of man that hinders Lieberman. In his desire to produce evidence for a (questionable) existence of a missing link, he makes errors that may not have been made had he been more cautious in his approach. His inferences that the speech he does concede to Neanderthal was inferior are unfounded (as cleverly illustrated by Fremlen). He does not know the extent to which the vowel triangle appeared in speech utterances throughout history. He assumes much importance of a relatively minor detail, especially since these vowels have not been found to be universal.

His failure to examine skulls other than the average American is a major oversight, particularly since La Chapelle was not discovered in North America.

In conclusion, Lieberman bases his theory on information which has yet to be verified. The theory of evolution is just that—a theory—and the idea of a missing link is conjecture. I refer the reader to the opening quotation from Haldane. The theory of evolution is one I do not accept; therefore, this kind of study of language evolution is unnecessary. In T. S. Kuhn's terminology, Lieberman is operating in a paradigm which has the evolutionary theory as its base. I am operating in the paradigm which has creation as its base. The two are incommensurate with each

other, which makes communication difficult. However, Lieberman's results have been seriously brought into question — the errors cannot be ignored — and I feel that this is important to recognize when reading his paper.

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GENETIC ENGINEERING: THE EVOLUTIONARY LINK

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Although a great deal has been said about the creation-evolution controversy, much less has been written about the implications of evolutionary thinking. One area of great concern is how evolutionary assumptions cloud our perception of genetic engineering. It is the purpose of this paper to expose that link and provide a Biblical base for evaluating genetic engineering.

Genetic Engineering

For thousands of years, man has had the ability to breed variations within created kinds. But recent advances in genetics now allow him radically to alter genetic structures and transcend the barriers between the created kinds of plants and animals. One of the most sophisticated techniques used to do this is recombinant DNA research (rDNA).

This research technique was first developed in the 1970s by scientists working at Stanford University and the University of California at San Francisco. By using restriction enzymes, they could cut small segments of DNA (called plasmids) and insert foreign DNA into various hosts (principally *Escherichia coli*). These formed genetic hybrids called chimeras (due to their conceptual similarity to the mythological Chimera which was a creature with the head of a lion, the body of a goat, and the tail of a serpent).

The possible benefits of this technique are vast. They provide a means by which genetic repair can be

affected on plants, animals, and man. They also allow scientists to alter existing organisms so they can manufacture medical or industrial products for our use.

But there are also dangers. Many scientists have been concerned that rDNA techniques might produce an "Andromeda Strain"¹ for which there is no cure. As a result, the National Institutes of Health have established various guidelines for physical (P1, P2, P3, and P4) containment. Further studies, however, have shown that the potential danger of escape and infection is much less than originally assumed.

But it is with these guidelines that we begin to see evolutionary assumptions working. The assumptions about safety are based upon the theory of evolution. Experiments performed with DNA from animals considered to be evolutionarily close to man are believed to be more dangerous than those performed with DNA from less-advanced animals.

Since we live in a created world, such a rating may not be completely accurate. Certainly, similarity in morphology implies some similarity in genetic structure. We might expect that DNA sequences of other mammals would be more similar to human DNA than to viral RNA, but we would also expect some excep-

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tions. In this regard, creationists also operate with a degree of ambiguity because there is not as yet a conclusive genetic criterion to distinguish one created kind from another.

A scientist might be misled by the distance of genetic relationship between humans and a "primitive organism" to use a P2 facility (with normal laboratory safety procedures) when in actual practice a P4 facility (with more rigorous safety procedures) might be needed. Safety, therefore, should be based upon the accurate genetic mapping of organisms rather than on these evolutionary assumptions.

But the greatest concern over genetic engineering should not be over safety (though it is a significant one which needs greater attention) but rather over the future direction of genetic engineering. Fueled by evolutionary assumptions and ignited by the rise of sociobiology (a new theory of social behavior), genetic engineering promises to be one of the most explosive issues of the 1980s.

Sociobiology and Genetics

Edward O. Wilson is the founder of sociobiology, which is deeply rooted in an evolutionary world view. This relatively new science is described in his book *Sociobiology: The New Synthesis*, published in 1975.² According to the *New York Times*, Wilson has claimed that sociobiology is a well-established discipline of biology and has been for 25 years.³ Most people, however, have not been aware of its growing influence until the last few years.

Wilson defines sociobiology as "The systematic study of the biological basis of all social behavior."⁴ By "biological basis," he refers specifically to genetics and ultimately to evolutionary theory. Sociobiology is the application of evolutionary theory not only to animal, but also to human social behavior.

Here is where the real danger occurs. Human beings as well as all living creatures are assumed to be the sum total of their genetic makeup. If they were dealt a bad genetic hand, then they lose and natural selection removes them from the population. If they were dealt a good hand, they stay in for another round and reproduce and pass their genes on to the next generation. Genetic engineering, therefore, provides a mechanism by which to effect certain "sleight-of-hand" and intervene in the process of evolution.

What is even more fearful in this view is the assumption that the individual is meaningless. Species evolve, not individuals; therefore, individuals in the long run are insignificant. The individual reproduces and dies, but its genes persist into the next generation.

Someone once said that a chicken is simply an egg's way of making another egg. Wilson has modernized this, saying "The organism is simply DNA's way of making more DNA."⁵ The organism exists for the sole purpose of making more DNA. The individual again loses his dignity by being in the role of merely a supporting actor to the ever-reproducing DNA.

When its theory is applied to man, we discern even more clearly the thin line between truth and error. In the last chapter of his book, *Sociobiology*, Wilson lays before us his view of man. Who he is, why he is,

where he is going, and where will he need to go in the future, are questions he addresses. Wilson begins by recognizing that man is anatomically unique in respect to the rest of the animal kingdom, yet he has no doubts that man's behavior is to be understood in terms of the selfish genes.

Acknowledging the seemingly endless variety of human social organizations, Wilson insists that the underlying basis for culture is genetic. Different cultures arise simply as different genetic strategies to achieve the same basic survival goals, which are already genetically determined.

If you accept this assumption, then genetic engineering offers great promise. Not only does it provide a means by which to restructure life, it provides a means by which to restructure society. Sociobiologists' great hope is that genetic engineering will enable man to rid society of many social and cultural ills.

No one can deny that an individual's genetic makeup has some effect on his patterns of behavior. But to believe that by simply changing the genes we change the whole man is to deny our spiritual nature. This denial, however, is essential to the sociobiologist's world view.

Although such hopes may be extravagant, many scientists nevertheless hold them. Genetic engineering offers promise of curing societal discontent. Even many scientists who do not like sociobiology and its tenets hold great hope for genetic engineering due to their evolutionary assumptions.

Evolution and Genetics

Out of this growing world-view is the assumption that life can and should be taken apart and put together at will. Although it is an erroneous view, it is logically consistent within a naturalistic world-view which accepts evolution as fact. Scientists assume that life on this planet is the result of millions of years of chance. They reason that if life is a random result, then surely they as intelligent scientists can do a better job in their laboratories than nature can do alone.

One striking example of this attitude can be found in the title of a recent book on genetic engineering: *Improving on Nature*.⁶ If you accept an evolutionary framework then you can easily accept the idea that nature needs improving. Nothing is absolute; all life is the result of a random process in a particular situation. Nothing is sacred; there are no barriers between man and animals. Nothing is forbidden; every piece of DNA is open to human control.

Scientists, therefore, stand poised on the threshold of wholesale genetic redesign. They mimic the hope of Julian Huxley who looked forward to the day when scientists could fill the "position of business manager for the cosmic process of evolution."⁷

If these hopes are fulfilled, scientists have the technological ability to be gods and seek this new-found power over the genetic structure of all creatures. Even scientists question whether they should have this power. An editorial in *Science* 81 asked, "Are we wise enough to play at being masters of evolution? . . . We tinker with atoms, but their forms are fixed. Not so with biological forms. . . ."⁸

As creationists and Christians, we must raise even more critical questions and therefore resist this power. We may have the technological ability to be new creators, but we are not the One Creator of the universe. We are sinful creatures (Rom. 3:23) affected by the fall of man (Gen. 3). It is arrogant to believe that we can overthrow the Creator and become re-creators of this earth.

A Christian View of Genetic Engineering

Does genetic engineering have a place in a Christian world view? Should we reject all of it or can aspects of genetic engineering be redeemed by fallen man? In order to answer these questions we must distinguish between two types of genetic research.

The first type of research is what we might refer to as *genetic repair*. This research attempts to remove or treat the 1600 or so genetic diseases that afflict mankind. It also includes various forms of minor genetic manipulation for the benefit of mankind. Part of God's command to us is to subdue the earth (Gen. 1:27) and we can do this through the wise and ethical use of technology. This is very different from the second type of research many evolutionists are advocating.

The second type of research involves the *creation of new life forms*. Many scientists seek rDNA techniques in order to restructure and *vastly* alter existing life forms. This is something that Christians cannot support. It is one thing to add one gene or a short gene complex to an organism and modify it slightly to allow it to produce a useful product. It is quite another to create life forms that do not fit in existing niches and that may create havoc with the biosphere. If we are rightly concerned about environmental deterioration through human intervention then we should be even more concerned about human restructuring of life forms on this planet.

Further, we should resist any scientist's desires to redesign human nature. Edward O. Wilson has said, "We will have to decide how human we wish to

remain."⁹ We are created in the image of God (Gen. 1:27) and attempts to make man in his own image cannot be allowed. Already many are fearful of recent attempts to breed highly intelligent progeny from sperm provided by Nobel prize winners.¹⁰ Human engineering is but one step away from the crazed dreams of building a superior human race.

Once again the creation model provides not only predictive capability but research guidelines which can prevent a new technology from leading us to disaster. There is nothing to fear from genetic engineering itself. Its application and the world-view which guides it are what should make us anxious. If an evolutionary world view prevails, then is Huxley's *Brave New World* too far on the horizon?

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- (Editor's note.) May I add two quotations? The first is by Sherlock Holmes: "When one tries to rise above nature, one is liable to fall beneath it." (In the story, *The Adventure of the Creeping Man*).
- The second is by Aristotle, in commenting on the Spartans, who, above all other ancient people, went in for eugenics; but at Aristotle's time had declined sadly: "We should judge the Spartans not from what they used to be, but from what they are." (*Politics*, Book VIII, Chapter 4.)

THE FLOOD ON AN EXPANDING EARTH

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Born's lattice theory is used to prove that a change in the permittivity of free space would cause a differential expansion of the earth and yet allow for compressive forces necessary to account for various geologic features.

One of the most outrageous hypotheses in geology is the suggestion that the earth's radius has expanded. It has never achieved widespread acceptance because of the lack of a mechanism which will explain the compressional features of the earth. This paper will propose a mechanism which is hoped will overcome this objection to an expanding earth.

The model of an expanding earth will explain several features on the earth. As noted in a previous article¹ the sediment distribution cannot be explained on the basis of a flood which occurred on an earth of the present radius. There is a thicker layer of sediment on top of the continental platforms which are topographically higher than on the ocean floor which is topographically low. This feature violates the second law of thermodynamics if one assumes that the

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sediments are the result of a worldwide flood on an earth of the present size. This problem, however, disappears if the flood can be assumed to have occurred when the earth was nearly half of the present size.

The geometric fit of the continents is good if one assumes that the earth were once smaller. The continental platforms have been shown to fit together if the earth were only 55% of its present radius.² The continental platforms would then form a solid sialic covering for the earth.

Other problems for current interpretations, both secular and creationist, are easy to find. Owens has shown that wedge-shaped pieces of ocean, which occur on reconstructions on the present radius of the earth, disappear when the continents are recurved and reunited on a smaller earth.³ Meservey has presented a brilliant topological disproof of current ideas of how the continents drifted. He concludes,

"The only hypothesis that has been suggested thus far that resolves the paradox described above is that in the past the earth's interior has expanded considerably. . . ."⁴

In a previous paper it has been shown that continental drift by convection current is too slow to fit into a creationist time-frame. If some other means could be found for speeding up the drift to fit into the Biblical time span, the heat due to friction would destroy the earth.⁵

Another advantage to the expanding earth model is that it explains why all the ocean basins are young. This conclusion must be accepted if one believes in any form of relative dating. No paleozoic sediments are found in the ocean basins, and they should be there if the basins were in existence at the time of the flood. The term paleozoic is used to describe sediments with certain characteristics which are determinable regardless of whether one is a creationist or a uniformitarianist.

Other items seem to support the idea of an expanding earth rather than continental drift. There is a north-south ridge both east and west of Africa as well as a north-south rift in East Africa (see Figure 1). There is no subduction in between the three parallel ridges. The usual answer to this problem is to claim that the two outer convection cells are moving away from the central rift. Physically this is hard to justify.

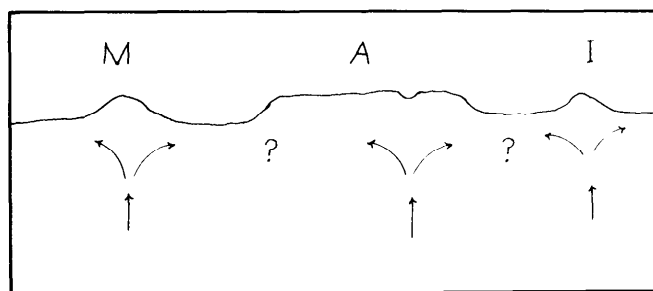


Figure 1. Three parallel ridges with no subduction in between. This is indicative of an expansion of the earth's radius. M, A, and I indicate respectively the Mid-Atlantic ridge, the African rift, and the Indian Ocean ridge.

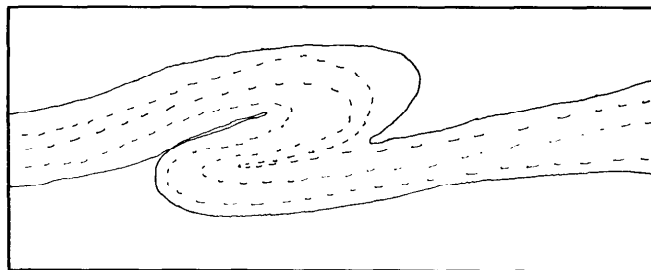


Figure 2. A type of nappe, or fold in the strata.

Antarctica is in even worse shape as far as drift is concerned. This southernmost continent is completely surrounded by a ridge which encloses twice the area of the continent. There seems to be no evidence of subduction at the center of Antarctica.

C. H. Barnett has pointed out that the petal-like shapes of all the southern continents is better explained by the assumption of expansion.⁶

The main reason that the expansion hypothesis has not been accepted is as mentioned above, the problem with compressional forces. Adrian Scheidegger explains,

"However, there is one fundamental difficulty. This is that in an expansion theory, it is no longer easy to account for the observed crustal shortening as there is no reason for the 'skin' of an expanding sphere to be crumpled up. It would therefore appear that all the expansion could create, is a pattern of fissures through which the liquid 'magma' below could rise to cause mountains. There seems no possibility of explaining nappes and similar phenomena."⁷

Thus it would seem to be crucial that any expansion mechanism be able to explain nappes (Figure 2), thrusts, and other compressive features such as the Benioff zone. (Figure 3)

The Mechanism

This author has proposed that God miraculously changed the permittivity of free space, i.e., the coefficient going along with electrical forces, and has used that postulate to explain a variety of problems associated with Noah's flood. It has been shown that the condensing water vapor would give off enough heat

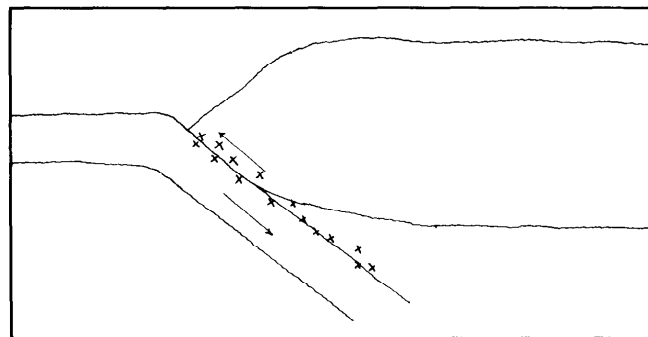


Figure 3. The usual explanation of the Benioff zone, according to plate tectonics. The Benioff zone is the plane along which the earthquake foci, indicated here by the x's, are observed.

to destroy all life if somehow it could be forced to condense over a forty day period. What would in fact occur is that it would cease raining long before the forty days were completed. The frictional heat generated by an expansion of the earth, albeit not as great as the heat generated by separating the continents by other means, would still need accounting for. A mechanism is proposed for absorbing this heat.⁸

Another item explained by this proposed change in the electric force is the rainbow.⁹ The Bible seems to indicate that it was a new phenomenon after the flood and a change in the electric force would change the index of refraction.

The distribution of radioactive isotopes is anomalous as far as creationists are concerned. The change of permittivity would allow an easy explanation for this distribution¹⁰ as well as the correlation of the biostratigraphic position with radiometric age.¹⁰

The present proposal has been a fruitful hypothesis in terms of explaining the facts of the earth from a creationist position. However, until this time it had not been illustrated that the change in the permittivity would cause a differential expansion in the earth. The reason for the requirement that the expansion must be differential is that if the expansion were uniform, meaning everything expanded the same amount, there would be no noticeable change in anything. Thus, if this theory is to be successful, the expansion must occur non-uniformly.

The expansion mechanism will come out of Born's lattice theory which is well known in the study of solids. Consider two ions such as Na^+ and Cl^- separated by an infinite distance. As we bring the two ions close together we find that the attractive potential varies thus: $U^+ = -e^2/\epsilon_0 r$, where e is the electric charge, ϵ_0 is the permittivity and r is the distance separating the two ions. One can see that there is no minimum value for the attractive potential (Figure 4).

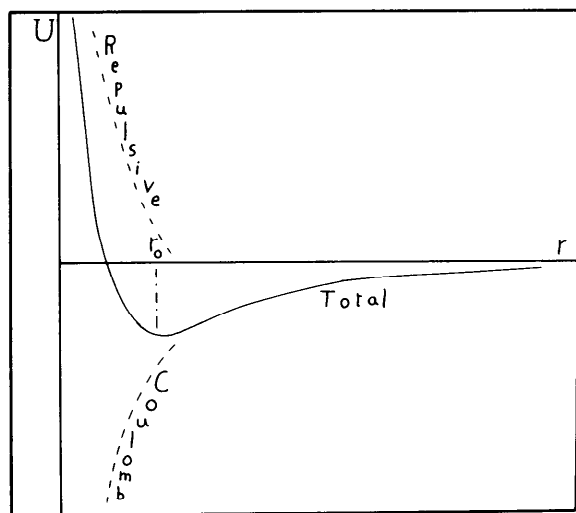


Figure 4. The potential well for ionic bonding. The repulsive potential, i.e. potential from which the repulsive force would be derived, decreases in absolute value with distance r more quickly than the attractive, Coulomb, potential. Thus the potential passes through a minimum—a "well"—at $r = r_0$. At that distance the force, which is given by the gradient of the potential, is zero; the arrangement is in equilibrium.

The closer the two ions get to each other the greater is their mutual attraction. Mendel Sachs observes of the situation,

"Let us now suppose that the only forces present are those due to the classical electrostatic interactions between the array of charged ions, and let us determine the magnitude of the interatomic spacing at equilibrium. Since the coulomb force acting between any pair of ions is inversely proportional to the distance between the ions, it is clear that, because of the lack of a minimum value for the electrostatic potential as a function of the interionic spacing, the supposition of the existence of electrostatic forces alone leads to the result that there will be no equilibrium value for the interionic spacing and that the entire crystal will collapse in towards the origin."¹¹

After presenting another argument concerning the inadequacies of the electrostatic forces alone, Sachs concludes,

"It is seen from these arguments that it would be impossible to maintain a stable ionic crystal under the action of electrostatic forces alone."¹²

The source of the repulsive potential was not understood until the advent of quantum mechanics. Sachs continues,

"The need for a repulsive potential in order to maintain a stable crystal was recognized long before the discovery of quantum mechanics, and in order to facilitate the computation of the cohesive energy of ionic crystals, many of the early workers adopted an empirical repulsive potential of the form $b|r_{ij}|^{-n}$, where b and n were taken as constants to be determined by the condition of thermodynamic equilibrium of the crystal lattice. However, the source of a repulsive potential was not discovered until the advent of quantum mechanics and the requirement of the Pauli exclusion principle."¹³

There have been several proposals for the precise mathematical form of the repulsive potential. Sachs proposes an exponential form. Orson L. Anderson, in a 1970 paper, defends the earlier power law function.¹⁴ Thus the potential function for the ionic bond is $U = -Ae^2/\epsilon_0 r + b/r^n$ where A is the Madelung constant.

Setting the derivative of U with respect to r equal to zero, allows us to solve for r_0 the equilibrium inter-

ionic spacing, obtaining $r_0 = (bn\epsilon_0/Ae^2)^{1/(n-1)}$. In order to determine whether r_0 will change if the permittivity changes we need to examine each term in the expression on the right. b must be independent of the permittivity since it is a constant of proportionality for a non-electrostatic force. A , the Madelung constant, is based upon the crystal lattice structure. n is also independent of the permittivity as Anderson proved.¹⁵ Therefore, r_0 is proportional to the $n - 1$ root of the permittivity.

The importance of this relationship to an expanding earth is not appreciated until it is realized that n is a different value for each mineral and because of this different minerals will expand differently for a given change in the permittivity.

In order to evaluate the expansion, we need to determine how much ϵ_0 has changed in the past. In a previous paper it was shown that the isotope distribution implies that the permittivity has changed significantly.¹⁶ In fact it would appear that ϵ_0 before the flood was approximately 1676 times smaller than the present value. Assuming this to be true one can calculate how much a given mineral expanded. Table 1 shows the value of n and the postflood size of the mineral compared to the preflood size.

The absolute value of an expansion is of little import in explaining the compressive features of the earth. The relative change in size between two minerals is significant as will be seen.

Explanation of the Earth's Structure

In the expansion as it is being postulated, different parts of the earth's crust would expand at slightly different rates due to slightly different combinations of chemicals each part contained. This is the suggested answer to the problem of the compressive forces.

The first structure which will be examined is the Benioff zone since it has often been used as an objection to the expansion and support for plate tectonics. The Benioff zone is a zone of earthquake foci which is noticed at some plate boundaries. The earthquake foci or locations of the source of the earthquake are always located along an approximate 45° sloping

Table 1

Mineral	Repulsive Term, n	Relative Expansion	Reference
LiF	8.4	2.72	14
NaF	8.6	2.65	14
NaCl	8.8	2.58	14
KCl	9.0	2.52	14
KBr	9.7	2.34	14
KI	12.5	1.90	14
RbBr	12.6	1.89	14
CsCl	9.9	2.29	14
CsBr	9.2	2.47	14
CsI	9.7	2.34	14
Garnet	9.3	2.44	14
CaO	8.7	2.62	14
ZnO	7.4	3.18	14
BeO	9.5	2.39	14
CaF ₂	7.7	3.02	14
BaF ₂	8.2	2.79	14
MgO	6.5	3.85	14
Al ₂ O ₃	5.0	6.37	14
Fe ₂ O ₃	6.6	3.75	14
Mg ₂ SiO ₄	6.5	3.85	14
MgAl ₂ O ₄	5.6	5.00	14
LiCl	8.0	2.88	21
LiBr	8.7	2.62	21
NaBr	9.5	2.39	21
He	5	6.37	21
Ne	7	3.44	21
Ar	9	2.52	21
Kr	10	2.28	21
Xe	12	1.96	21
SiO ₂	11.2	1.93	14

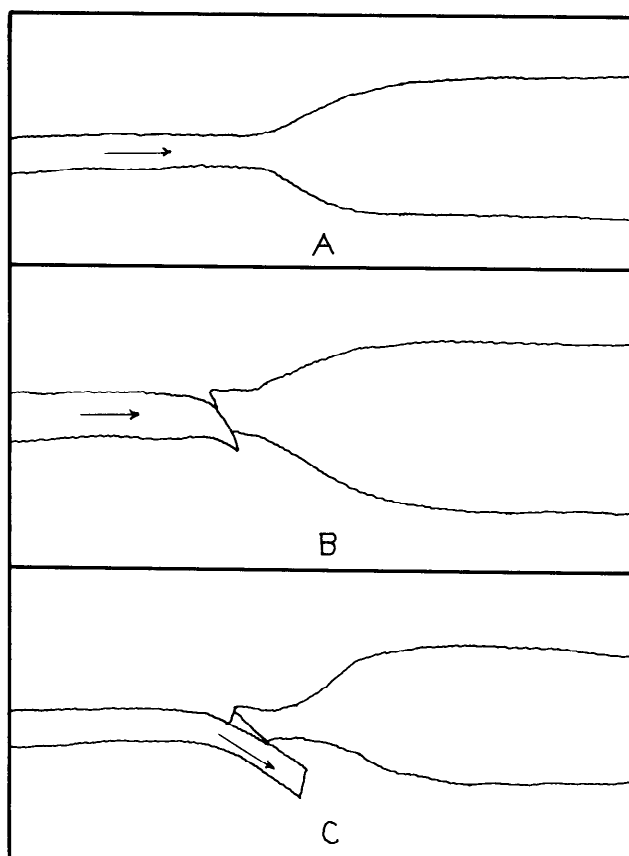


Figure 5. The development of the Benioff zone on an expanding earth. The significance of the stages A, B, and C is explained in the text.

plane. Further to complicate the problem for an expansion model is the fact that the movement determined from seismic records is what would be expected if a plate of oceanic crust were being driven under the continent. (Figure 3) This in fact is the explanation which arises from plate tectonics. The suggested explanation of these facts within an expansion model is shown in Figure 5. Assuming that the material in the oceanic crust expanded more rapidly than the earth as a whole then tension would build up as shown in 5a. Ultimately this tension would cause a reverse fault as shown in 5b. Continued expansion would cause the oceanic crust to be driven under the continent. Movement along the fault would be the same as is deduced from seismograms. The trench would be formed at the contact of the oceanic and continental plates.

Nappes (Figure 2) are another difficult problem for expansion theories. Clark notes a problem for all in explaining nappes. He says,

"If the coefficient of friction between the nappe and the underlying rock is similar to that observed in the laboratory for dry rocks sliding across each other, it is easy to show that the maximum possible length of a nappe is about 10 km. In the case of a longer nappe, friction would completely inhibit the motion, and the rock of the nappe would be crushed. Yet nappes are commonly observed to be much longer than 10 km."¹⁷

Hubbert and Rubey have suggested a mechanism which would explain overthrust (and nappes) but this author believes that their mechanism is very improbable.¹⁸ In any event the maximum distance which their theory will allow for overthrusting is 137 km. The Alps are believed to have been compressed by 150 to 450 km.¹⁹

As noted above the problem with thrusting is that the strength of the rocks wouldn't allow them to be shoved 450 km. In a portion of the crust which is expanding more rapidly than average, nappes would form because part of the sediments would be longer than the surface upon which it lies and so it must fold over onto itself. This process is similar to the fold which occurs in a throw rug when it is pushed on one end.

Overthrusts are generally treated as being fictitious by creationists.²⁰ Some overthrusts may be fictitious but it is this author's opinion that at least some of them are real. (Figure 6) As has been pointed out, the major problem with the overthrusts is that the rocks do not appear to have been rigid enough for them to have been thrust as far as they have been. If the hypothesis of a change in the permittivity is correct, then the bonding between the atoms of the rock would have been greater, giving increased strength to the block as it was thrust. Cotton and Wilkinson give an expression for the cohesive energy.²¹ It can be shown that the ratio of preflood bonding to postflood bonding is $\bar{U}/U = (\epsilon_0/\bar{\epsilon}_0)^{\frac{n}{n-1}}$ where $\bar{U}$ is the preflood bonding, U is the postflood bonding, $\bar{\epsilon}_0$ is the preflood value of

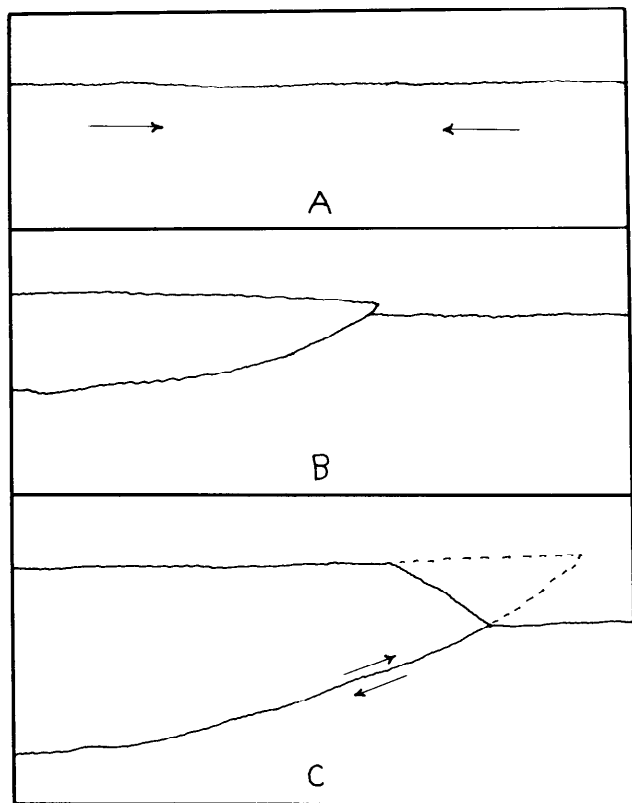


Figure 6. The development of an overthrust. The significance of the stages A, B, and C is explained in the text.

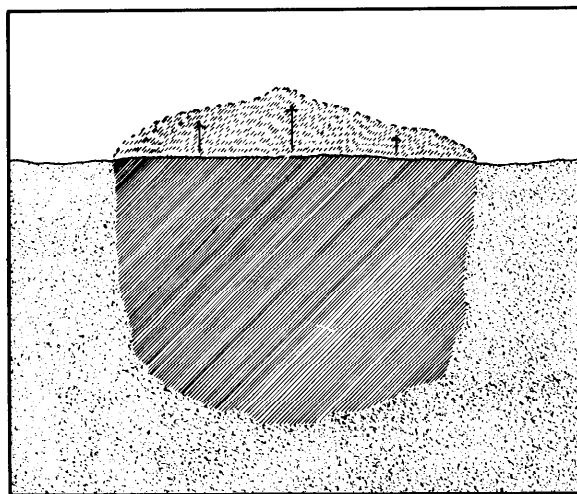


Figure 7. An explanation of uplift. The cross-shading shows the more expansive material before the expansion; the broken cross-shading the more expansive after. The dotting shows the less expansive material. The horizontal line represents the antediluvian surface.

the permittivity and ϵ_0 is the postflood value. As can be seen if the permittivity was nearly 1700 times smaller before the flood, then the strength of bonding would be over 1700 greater. This should allow for a block of material to be thrust further than is possible today.

A certain amount of uplift can be explained as shown in Figure 7. If a more expansive material is trapped in a less expansive bowl, then the only way for the pressure to be relieved is for upward movement to occur.

Thus it is concluded that since different areas of the crust contain slightly different mixtures of minerals, some areas will expand more rapidly than the earth as a whole causing compressional features while other areas will expand more slowly than the earth as a whole causing tensional features.

Proposals

This theory if substantiated would help one to explore for minerals by considering which minerals expand faster or slower than average. The importance of a theory's ability to predict phenomena is obvious to all acquainted with the history of science. There is a paucity of creationist theories which are capable of making numerical as well as qualitative predictions, while at the same time explaining in a positive unified manner the facts of the world. Creationists have little reason to expect secular science to pay serious attention to them until they can present such a unified numerical theory. It is felt that the theory presented here is such a theory.

Further development of this idea will require more theoretical as well as experimental work in order to present a numerical model of the earth to verify or refute this proposal. This author has no access to a computer and is basically a theoretician rather than an experimental scientist. Therefore the substantiation of this idea with models will await the effort of others.

Postscript

One of the necessary features of this proposal is that the granitic continental platforms must expand less than the interior of the earth. The expansion proposed by this theory is indeed in the proper direction. Granite is made on average of 70 percent quartz (SiO_2). As can be seen from the Table 1 SiO_2 would only have a relative expansion of 1.93. The mantle of the earth is believed to be primarily composed of a mineral called dunnite. Dunnite contains only 40 percent quartz but is high (25-55 percent) in MgO , a mineral which would have a relative expansion of 3.85. Granite contains less than 5 percent of MgO . Thus the best knowledge available concerning the make up of the earth's mantle and continental platforms shows that the interior of the earth would approximately double in size in relation to the granitic platforms—precisely the needed amount.

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- ¹⁷Clark, Sydney P., Jr., 1971. Structure of the earth. Prentice-Hall. Pp. 13-15.
- ¹⁸Hubbert, M. King, and William W. Rubey, 1959. Role of fluid pressure in mechanics of overthrust faulting. *Bulletin of the Geological Society of America* 70 (2):115-166. They suggest that water, under high pressure, supported the weight of the overthrust block. But once the fault plane cut the surface the pressure would be lost.
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PANORAMA OF SCIENCE

Sandstone and Atmospheric Pressure

There have been suggestions that formerly the atmospheric pressure may have been considerably greater than it now is. Some Creationists have considered that the weight of the canopy, which they believe formerly encircled the Earth, would have compressed the underlying air. Others have doubted whether some of the extinct flying reptiles could ever have flown in air at the present pressure, and suggested that the pressure must have been greater when they were alive and active.

An argument has been offered on the other side.¹ There are, in many places, sandstones. If, as is commonly supposed, they were formed from sand which had been deposited by the wind, there should be evidence, in details of their structure, about the atmospheric pressure at the time when they were deposited. It appears, in fact, that they were deposited under conditions not much different from those existing at present.

If, on the other hand, it is established that formerly the pressure was greater, then perhaps the argument can be turned around. Maybe, in that case, it is a mistake to suppose that the sand was deposited by wind. Might it have been deposited by water? It

would seem that such a thing might easily have happened during the Flood.

Mr. Darwin and Mr. Blyth

Some readers of the *Quarterly* may wish to become familiar with a skeleton in the closet of Darwinian memorabilia. What I am referring to is Darwin's appropriation without acknowledgement of the natural selection idea from a certain Edward Blyth, a zoologist. The case is presented by the evolutionist and humanist Loren Eiseley,² who advances convincing evidence that Darwin had read two articles published by Blyth in 1835 and 1837 (Darwin began *The Origin of Species* in 1837) in *The Magazine of Natural History* in which he discussed natural and sexual selection. Darwin was not one to give credit to others; although in fact, all of his work, except for a book on barnacles, is a reiteration, in scientific terminology, of his grandfather Erasmus' work. The obvious reason why Darwin could not acknowledge Blyth was because Blyth's concept of natural selection was one of a conservative force which would eliminate any deviations from the norm, consequently, preserving the *status quo*. Darwin perverted Blyth's concept of natural selection and made it a creative force.

My own thinking on the issue is that Darwin was likely aware of the idea of nature selecting before reading Blyth's articles. Eiseley mentions that natural selection was known earlier in the century under other names. Darwin's problem was how to convince people that natural selection was occurring around them in the great outdoors. Observation was out of the question; Darwin was forced to use imaginary examples in the *Origin*. What Darwin turned to suit his own ends was Blyth's use of the artificial selection-natural selection analogy. Eiseley points out that, "Blyth, long before Darwin had expressed himself on the same subject, had clearly recognized the analogy between artificial and natural selection." Blyth's concept of the analogy is stated as follows: "The original form of a species is unquestionably better adapted to its natural habits than any modification of that form. . . ." "He saw natural selection as pruning out the least deviation which threatened to unfit the animal for its environment." To Blyth, domesticated plants and animals are examples of the unfit. Conversely, the way Darwin used the artificial selection-natural selection analogy was to say that, if humans can select and preserve deviations from the norm, nature can do likewise. This mental sleight-of-hand is used frequently, not only in chapter four, where he introduces natural selection, but throughout the *Origin*. It is quite obvious once one is aware of the technique. If you will believe artificial selection, and who doesn't, then you should believe natural selection.

Readers of the *Quarterly* may also be interested in a little book that I am having published and will be available soon, called *The Secret of the Sixth Edition*, which bears on this matter. It consists of four articles previously published in the *Quarterly* and two new ones. In the first article, *The Secret of the Sixth Edition*, I prove beyond a doubt, I hope, that Darwin abandoned natural selection as the mechanism for evolution in the sixth edition of the *Origin* and shifted to Lamarck's theory of use and disuse as the mechanism for change. The great irony of all of this is that the typical introductory biology text usually presents Lamarck's theory of use and disuse as a defunct theory compared with Darwin's natural selection.

By extricating himself from his responsibility in the controversy, I believe (he established the idea of what is nowadays envisioned under natural selection) he cured himself of his anxiety-caused psychoneurosis which began in 1837 and ended in 1872, when the sixth edition was published and ten years before he died of heart disease. The symptoms of his psychoneurosis (the only known cure for a psychoneurosis is to come to terms with whatever is causing the anxiety) were vomiting, shortness of breath (Da Costa's syndrome), attacks of eczema, heart palpitations, and general weakness, causing him to become a semi-invalid. These symptoms reportedly disappeared after 1872.

I use several quotes from the sixth edition as compared to previous editions; but the most destructive quote is when he "proves," in agreement with a critic, that natural selection is incompetent to account for the development of incipient (partly developed) organs.

The last article in the book is called *The Principle of Applied Creation in an Origins Curriculum*. It is a minimal use of creation as a curriculum tool to eliminate bias in evolutionary theory. It has universal application. It will automatically attach itself to whatever materialistic theory is in vogue; whenever non-testable hypotheses (statements of belief) are used. It is based upon the National Education Association code of ethics which states: "In fulfillment of the obligation to students, an educator shall not unreasonably deny students access to varying points of view."

Contributed by Mr. Randall Hedtke

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CORRECTION

Figure 5 of Morton's article, on page 109 of the *Quarterly* for September, 1982, was inadvertently printed upside-down.

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(Continued from page 207)

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- ⁹Genesis 11:9 (KJV).

BOOK REVIEWS

The Ultimate Resource, by Julian L. Simon. Princeton, N.J.: Princeton University Press. Hardback. 415 pages. \$14.50.

Reviewed by John W. Klotz*

The author, professor of Economics and Business Administration at the University of Illinois, takes issue with many of the currently accepted ideas about population and resources. It is his thesis that the only decades for which we have acceptable data regarding the per capita food situation have been the last three since World War II and that since World War II the per capita food situation has been improving. He also believes that the amount of agricultural land has been and still is increasing substantially, that our supplies of natural resources are not finite in any economic sense. He believes that population growth is not the villain in the creation and reduction of pollution. While he believes that in the short run additional children impose additional costs, in the long run per capita income is likely to be higher with a growing population than with a stationary one both in the more developed and less developed countries.

It is generally believed that the cost of extracting raw materials increases as time goes on since it is necessary to use lower and lower grade ores. Professor Simon presents statistics which he believes support the idea that the costs of extracting materials have fallen over the course of recorded price history. He believes that even as we use coal, oil and iron they are becoming less scarce rather than more scarce. "Proven resources," he says, "are a ridiculously pessimistic floor for forecasting." He also questions the value of the total amount of the material in the earth's crust but believes that the most economically relevant measure is that of "ultimate recoverable resources" which the U.S. Geological Survey presently assumes to be one hundredth of one percent (.0001) of the amount of the top kilometer of the earth's surface. He believes this suggests that there are large resources available and that the stories of scarcity which are found in our daily papers are "scare stories."

He questions the predictions of food shortages and points out that it has been popular to predict wide spread famines every year since 1970. He believes that the fact that these famines have not occurred is evidence that the threat is not real. The sharp food-price rise in the early 1970s, he believes, was caused by a chance combination of increased Russian grain purchases to feed livestock, U.S. policies to reduce "surpluses" and get the government out of agriculture, a couple of bad world harvests, and some big-business finagling in the United States.

He does not believe that we are losing land. He presents figures that suggest there was 9% more total arable land in 1960 than in 1950 in the eighty-seven countries for which data were available. Still he is not suggesting complacency. He does believe that

the data provide no ground for panic and no basis for opposition to continuing economic and population growth.

Simmon's book is worth reviewing. He is clearly swimming against the stream and needs to be heard. However, it appears to this reviewer that he too has gone to an extreme. He forgets that God is the creator and we the creatures. We cannot claim ownership but can only claim to be stewards and God expects us to be wise stewards at that. We do have problems as a result of exploitation and we need to recognize these. Man is basically selfish, a sinner. He seeks to use not for others, but for himself and this is the reason for many of the problems that we face. While God has been very generous in what He has given us, the resources of this planet are limited even though many of them can be recycled. We are to use — and God has given us these resources for our use — but we are not to abuse and exploit.

The reviewer is also struck by the use that Simon makes of statistics. His studies often lead to conclusions diametrically opposed to those of other economists. Economics and forecasting are soft sciences. One is again impressed with the difficulty of dealing either with the past or the future. Science has been extremely successful in dealing with the present. The scientific method does supply us with a great deal of information and with the ability to rule over our earth and subdue it but it is extremely limited when it seeks to paint pictures of the future and it is just as limited in reconstructing the past.



Maps of the Ancient Sea Kings: Evidence of an Advanced Civilization in the Ice Age, by Charles Hapgood, 1979. E. P. Dutton, New York. 276 pages. \$9.95.

Reviewed by Paul Sattler*

One of the areas in which creationists should become active is in the production of multidisciplinary models which take widely divergent information and place it within an overall framework of past events. A creationists' synthesis would do much to unite the evidence supporting creationism into a form more comprehensive in scope and comprehensible to the public, which is showing an increased interest in the tenets of creationism. For this reason, creationists should be on the search for new data and ideas from which conceptual frameworks can be produced which would incorporate creationist evidences from a diversity of disciplines.

While *Maps of the Ancient Sea Kings* by Charles Hapgood was not intended as a contribution to the creation/evolution debate, it contains much information that creationists should be aware of, both from the aspect of factual data and in providing possible

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direction for a creationist's synthesis. Hapgood's primary observation is that many Medieval maps show an accuracy far superior to the technology and explorations of that time. Since Medieval technology could not have produced these maps, Hapgood argues that they must have been based upon preexisting maps of superior accuracy. The major thesis of the book, which is becoming known as the "Hapgood Hypothesis," is that an unknown, technologically advanced civilization from "prehistory" produced extremely accurate maps of the entire world. Some of these maps must have persisted through this civilization's collapse until at least Medieval times, and from these maps rather than the explorations of their own times were these very accurate Medieval maps produced. Hapgood does an excellent job in leading the reader through his investigations, building a powerful and convincing case for his major theme.

The historical implications derived from these maps are significant; however, of greater interest to creationists are the geographical and geological features. Many geographical features are shown which according to uniformitarian geological theory should have occurred, if at all, hundreds or thousands of millions of years ago, certainly long before the origin of man, when these features could have been recorded on maps. Some of the features shown are truly remarkable. The Hamy-King Chart evidently shows a time when the Northern plain of India was flooded, the Arctic coast of Siberia was ice-free, and a significant land mass extended from Asia out into the Indian Ocean. Zeno's Map of the North shows Greenland without an ice cover, and the Ptolemaic Map of the North may show a somewhat later period, since only a part of Greenland is glaciated. Hadji Ahmed's World Map shows an Alaskan-Siberian land bridge possibly 1 thousand miles wide, and the Oronteus Finaeus World Map shows Antarctica before it was ice-covered.

All of Hapgood's conclusions may not be valid. Creationists may take exception with Hapgood's proposed mechanism to account for at least some of the indicated geographical changes — a shifting of the earth's poles. However, there is much information which creationists should be quite interested in, both from the standpoint of factual data, and as a possible model for producing a creationist's synthesis. At the very least, the existence of these maps argues that the geological changes which they show must have occurred within the existence of man, an idea completely compatible with creationism, but not with evolution.



Tesla, Man Out of Time, by Margaret Cheney. Prentice Hall, 1981.

Reviewed by Thomas G. Barnes*

I began reading this book with high anticipation. As a boy I had been fascinated by the dramatic demon-

strations that the scientists of that day made with the Tesla coil. It would produce spectacular long streaks of artificial lightning. They could apply this extremely high voltage, high frequency electricity to an insulated person and make his hair stand on end without harming him. I also had knowledge of some important contributions that Nikola Tesla made in the pioneering development of alternating current generators.

I regret to say that I was disappointed with the book. Perhaps it was because this is not a book from which one can learn the scientific principles involved nor the details of Tesla's remarkable developments and certainly not any patent details on his devices. Perhaps another factor in my disappointment is the exposure of the man as less than the man of character I had expected him to be.

The book gives a well researched description of Nikola Tesla's life from his upbringing in a strong Christian home to his experiences as an emigrant in America who gained fame from his spectacular feats and his input to the early developments of the electric power industry. His struggle to obtain financing and his sometimes unfortunate association with the captains of industry give historical insight into the behind-the-scenes forces that came into play in the emergence of the dominant companies in that industry.

Much of the book is devoted to Tesla's social life in his efforts to court wealthy people and to obtain fame. His later life was filled with exaggerated claims and some deception to exploit every opportunity to gain wealth, which always seemed to elude him. It appears that even the author was taken in to some extent. Tesla had some very erroneous notions about some basic principles of propagation of electromagnetic waves even though those principles were well known by the great scientists of his day. For example he spent a great deal of time, and other's money, on efforts to transmit radio signals through the earth to the opposite side of the earth. Such erroneous notions as this about the propagation of electromagnetic waves cast some doubt on the author's claims that Tesla was a substantial contributor to the development of radio, radar, computers, and guided missiles. However, Tesla did pioneer many applications in his day, and the book presents that and some interesting information about the history of science.

Tesla departed from the Christian faith of his parents. He leaned toward the psychic and spiritualism. He was a cruel man on some occasions. He never married and sometimes took advantage of lady friends who admired him and tried to support his work. He loved the glory of fame and was a real showman in his lectures. His developments for the generation of electricity were indeed great achievements in his day. He had no regard for Thomas Edison, for whom he had worked at one time. The book presents Tesla as a better scientist than his competitor Edison.

Tesla's final days are tragic and leave the impression of a very empty life from every point of view other than the earlier inventive achievements. Upon finishing reading, one is left with the sad feeling: how much better it could have been!

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The Creator in the Courtroom "Scopes II." The Controversial Arkansas Creation-Evolution Trial, by Norman L. Geisler, A. F. Brooke II and Mark J. Keough, 1982. Mott Media, Milford, Michigan. 242 pages, \$5.95.

Reviewed by Wayne Frair*

This timely publication includes a Foreword by Duane Gish who, along with Norman Geisler, was present during the entire trial. He brings out (and as one who attended most of the trial, I agree) that Dr. Geisler was a lead witness for the defense and that Geisler's account stands as a "refreshing contrast to the usual (not always) distorted and biased accounts which appeared in the mass media and a relief from the sophistry that appeared in the many scientific journals."

The Preface includes a history of court decisions which have led to secularization of our society and a violation of our own Declaration of Independence which reads, "We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with certain unalienable rights. . . ."

This is followed by a history of the Arkansas creation bill (Act 590) and the complete contents of the Act. Chapter 2 is a commentary on the Arkansas case and includes the logical fallacies contained in the judge's decision, which Geisler feels was patently biased against the creationist cause and virtually has supported humanism in the public schools. In Chapter 3 there are The Legal Briefs For and Against the Creation-Evolution Act. Here Geisler points out that "Act 590 leaves it to the professional judgment, training, and discretion of the teacher in the classroom on how the treatment of both evolution-science and creation-science should be balanced."

A Record of Plaintiffs' Religion and Philosophy Testimony is the content of Chapter 4 where summary statements are given for all prosecution witnesses. Chapter 5 has the Record of Plaintiffs' Science and Education Testimony. The next two chapters abstract the Record of Defense's Religion, Philosophy, Educa-

tion and Science Testimonies. Included in Chapters 4-7 are samples of newspaper accounts on the trial and testimony of the various witnesses. There is a following chapter on The Judge's Decision Against the Creation-Evolution Act. (Chapter 8).

An Appendix indicates the defense rationale for not appealing and includes some recent material in various creation publications. Also it gives an outline of both creation and evolution models, gives the Louisiana creation-evolution act with a brief comment, and deals with the question of whether evolution is scientific or not.

This book, which was produced quite rapidly, is authoritative and required reading for all concerned about the Arkansas trial. The work not only stands as a monument to the defense position in this issue, but also it presents the author's attempt to represent fairly the prosecution position. Most people in our country would agree with the statement made by ACLU's lawyer, Clarence Darrow, at the 1925 Scopes trial when he said: "[It] is bigotry for public schools to teach only one theory of origins." Yet at the 1981 trial the ACLU, in effect, was arguing that only evolution be taught.

This book by Dr. Geisler will serve to expose the unwarranted decision at Little Rock; and hopefully it also will rouse its readers to actions which will right this injustice while encouraging fairness and better scholarship in our schools.

NOTICES OF BOOKS

A Jubilee of Witness for Creation Against Evolution, by C. E. A. Turner, 1982. Creation Science Movement, "Rivendell," 20 Foxley Lane, High Salvington, Worthing, West Sussex, England.

In 1982 was the fiftieth anniversary of the founding of the Evolution Protest Movement, of which the name was recently changed to Creation Science Movement; and this booklet is issued as a commemorative pamphlet. It recalls briefly the founding of the E.P.M., and continues with some reminiscences of the distinguished people who have served as officers. The work concludes with a brief look at Creationism as it now stands, and a few thoughts about the future.

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LETTERS TO THE EDITOR

Comment on the 3° Microwave Background

I have been looking for a creationist explanation of the cosmic 3° microwave background for about ten years now, so I was excited to see the article by Akridge *et al* in the December issue.¹ However, the article contains a number of flaws, which, I believe, invalidate the results.

In correcting the standard model, they say that after the time of decoupling "In a matter of only a few years all of these high-temperature photons would have escaped the expanding universe . . . All the original

photons would be far past the outer boundary of the expanding universe." The universe at the time of the big bang seems to be viewed as a large empty place in which there is an explosion. The matter and energy thrown out by this explosion expand and fill the space, and have an expanding boundary, inside of which is the exploding material and outside of which is empty space. This is not the usual view; rather the big bang is not in space, it is space; there is nothing outside. It has no boundary and there is no place for photons to escape to.²

They also state that if the photons were still around they would have to remain at their high temperature because they are decoupled from the rest of the universe. But the cooling is due to the Doppler redshift of the photons since their source, the matter at which they were last scattered, is moving away at near the speed of light. By the way, the $1/R$ dependence of temperature is derivable without the assumption of a reflecting surface on the inner side of the boundary of the universe.³ For, as stated earlier, the big bang universe has no boundary.

A number of models have previously tried to explain the microwave background as due to radiation from dust.⁴ They have all failed. One of the major reasons is the extreme isotropy of the radiation field which is uniform to at least three hundredths of a percent.⁵ As Akridge *et al* acknowledge in their article, the distribution of dust and gas in our galaxy is far from uniform. It is hard to see how clouds of dust and gas whose density varies by orders of magnitude from the galactic plane to the poles could produce a microwave background with the observed isotropy.

For this reason the majority of dust models have relegated the dust to distant galaxies, making the background radiation the sum of point sources. These fail because of the stringent spectral requirements and the isotropy, greater than can be explained by discrete sources even if nearly all galaxies were contributors.⁶ So even pushing their absorption model to include other galaxies could not account for the observed isotropy.

There is a further problem with Akridge *et al*'s calculation of the time during which dust has been heated by starlight.

The optical energy density and the microwave energy density in our Galaxy are almost the same, at 10^{-13} Wm^{-3} .⁷ (Coincidentally, this is the same as the energy density of cosmic rays and the galactic magnetic field also.) This implies that even if dust grains are heated to 2.7°K by starlight, they are already in equilibrium. Thus it is impossible to tell how long ago the equilibrium was reached or to derive an age for the Galaxy from it.

Finally, there is evidence that the microwave background is universal, not confined to just our galaxy as Akridge's model seems to suppose. Observations of the background radiation in the direction of certain clusters of galaxies shows a decrease in intensity in those directions. This appears to be due to Compton scattering of the microwave photons by electrons within those clusters.⁸ For this to be the case, the background radiation must be present at least at the distances of those clusters. Also, recently an asymmetry in the temperature of the radiation has been found amounting to a temperature difference of 0.003°K . It is 0.003 degrees cooler than average in one direction and 0.003 degrees warmer in the opposite direction. This is likely due to the motion, either of the Earth, or, in the case of Akridge's theory, possibly of the sources. However, this difference implies a speed of 600 km/sec . The orbital speed of the Earth in the Galaxy is only 300 km/sec and in a different direction.⁹ It is hard to believe that such a speed is typical of the gas

and dust clouds in our Galaxy, all moving uniformly with respect to the Earth and contrary to their orbital paths within the Galaxy. The microwave background cannot be due to sources within our Galaxy.

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(Editor's Note:) *Genesis 1:3 & 4 suggests that at first light came in a rather undifferentiated way, and was channeled through discrete sources later. Is it possible that the microwave background is a relic, or memorial, of the initial state of affairs?*



Reply to Steidl

Mr. Steidl's model of the expanding universe and the Doppler shifted background radiation violates the basic tenet of relativity. Observable objects cannot travel faster than the speed of light.

The background radiation is supposed to decouple about 300,000 years after the big bang. After another 15 billion years, more or less, here we are.

If, as Steidl suggests, the 3-degree background radiation we see now was emitted at a retarded time of decoupling, then it traveled 15 billion years to get to us. Today's 3-degree background radiation in his model was emitted 15 billion light years away from us 15 billion years ago.

Everything, even the matter from which the radiation decoupled, started out from a point at the time of the big bang singularity 300,000 years before decoupling. Thus, the average speed of the matter, whose decoupling radiation we observe today, was 15 billion light years divided by 300,000 years or 50,000 times the speed of light. It had to move that fast after

the big bang to get so far from our common location at the singularity in 300,000 years, that its light required 50,000 times as long to get back to us.

Conversely, suppose the matter that decoupled from the Doppler-shifted radiation in Steidl's model 300,000 years after the big bang traveled no faster than the speed of light in the 300,000 years between the big bang and the time of decoupling. That matter could not have been co-located with the matter in our present portion of the universe. Going backward in time, it couldn't travel further radially inward than 300,000 light years from the decoupling point to its location at the time of the big bang. Thus, Steidl's model has much of the matter of the universe separated by 15 billion minus no more than 300,000 light years at the time of the big bang singularity. That model hardly justifies the name singularity. The matter and energy in Steidl's universe is never colocated at a single point. Steidl's universe never has a big bang.

If the accepted model is as Steidl suggests, then everyone would know the big bang is wrong. Instead, the accepted model claims (often with double talk as Steidl's two partially conflicting references from Silk illustrate) that the stretching coordinate systems of general relativity lengthen and redden the 3,000 degree decoupling glow by a factor of 1,000.

I will explain below in terms of general relativity why stretching the decoupling radiation is nonsense. For the moment, let us assume it is true. Then any other light traveling freely through the same space becomes stretched in the same way. That means light from the distant galaxies was reddened en route from them to us, rather than by a Doppler shift at the moment of emission. That same result was the point of the article I wrote, except that the article went at it a different way. The article used gravity, instead of stretching coordinates. This brings us to the coordinate question.

General relativity uses comoving coordinates for mathematical simplicity. The comoving coordinate system is an imaginary grid that expands or contracts along with the expansion or contraction of the universe. Both the coordinates and the mass points (galaxy clusters) expand or contract by the same factor, say $F(t)$.

Newtonian physics usually uses physical, rather than comoving coordinates, but it doesn't have to. If $r(t)$ is the radial coordinates of a galaxy cluster in a Newtonian universe, and if r_0 is the value of $r(t)$ in the present epoch, then setting $r(t) = r_0 F(t)$ turns the Newtonian problem into one of comoving coordinates with expansion or contraction factor $F(t)$. In fact, the $F(t)$ is the same for the Newtonian universe as it is for the flat universe in general relativity, namely, $F(t) \sim t^{2/3}$.

It is incorrect to say that the general relativity expanding universe is an expansion OF space and time, because it usually uses the comoving coordinate system, and to say that the Newtonian expanding universe is an expansion IN space, because the Newtonian universe usually uses physical coordinates. Either coordinate system could be used for either

universe. There is no difference between the two descriptions of the universe on that count, although they differ in other ways.

Since there is a free choice of coordinate systems, one can use any system in any theory. I think that if one will carefully reread both of Steidl's quotes from Silk, he will find that in both of them Silk claims the reddening of the decoupling radiation to 3 degrees is due to the stretching of the universe, contrary to what Steidl says Silk says. In this case, Silk confuses a coordinate system with reality, and Steidl confuses Silk's confusion.

Yours in Christ,
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Received 28 October, 1982,
revised from 12 May, 1982.



Job 41 and the Dinosaur

Evolutionists teach that dinosaurs lived around 100 million years ago and Man did not "evolve" until 4 million years ago. If it can be shown that Man and dinosaurs were contemporary, evolutionism would suffer a mortal blow.

A close study of the book of Job, Chapter 41 which was written many centuries before Christ, shows that the writer gives a pretty good description of a saurian. In various translations the animal is described generally as "leviathan." In the original Hebrew the word used is "liviathan"—"great water animal." (Or "great water serpent").

The first point to remember is that the Hebrew language was quite adequate in naming the elephant, the crocodile, the whale, etc., but in Job 41:1 the ancient writer uses deliberately the word "liviathan." (Also see Job 3:8, Ps. 74:14, Ps. 104:26 and Is. 27:1.)

A close examination of Job 41:1 seems to indicate an unusual type of animal, huge and ferocious, coated with armor and mail and with sharp projections around the belly and underneath. This description fits some types of dinosaur but does not fit the elephant, the crocodile or the whale.

Verse 10 says—"he is so fierce that no-one dares to arouse him." Verse 25 says—"When he raises himself up, even the mighty fear him." Verse 33 says—"Nothing on earth is like him." Does this sound like whales, elephants or crocodiles—all of whom were fairly easily hunted down and killed or captured by Man long before Christ's time?

The fact that Leviathan had closely fitting scales (mail)—(verse 13) definitely rules out elephants, rhinos and whales which are all mammals. Verse 9 says that the bravest of men would fall in fear at the very sight of him—hardly a fitting description of a crocodile. Verse 9 is supported by a vision of huge size in Verse 25. A crocodile can raise himself perhaps 12 inches whereas a dinosaur stood 20-40 feet high.

In other parts of the ancient Hebrew scriptures (our Old Testament) the word "*leviathan*" is often translated "great sea-serpent" or "water serpent" and I feel we are looking at something very unusual—See Job 41:33. Leviathan seems to be at home on land and sea (or swamp/lake). See verses 25 and 31/32. Verse 12 mentions the mighty strength in his limbs. Verse 34 says "he looks on everything that is high; he is king over all the sons of pride." (Quotations from the NASB).

Remember the point made earlier—the Hebrews had words for crocodiles, elephants and whales—why not use them? This leviathan was something different. When taken into consideration with dinosaur tracks at the Paluxy River site in Texas, the evidence is powerful that Man and saurian did exist together, just as Creation Scientists have maintained.

For full examination of the Paluxy River footprints, see *The Genesis Flood*, 1961, (Morris & Whitcomb) and *Tracking Down Those Incredible Dinosaurs*, 1980, by Dr. John Morris.

It is only the evolutionary atmosphere which has prevailed since 1859 which has clouded even the minds of some Biblical commentators who cannot conceive that Man and Dinosaurs lived together. Once those preconceptions are removed, as has been done by Creation Scientists over the last 20 years, there is no

barrier preventing anyone from taking Job 41 at face value. There is certainly a *prima facie* case for taking leviathan as one particular genus of saurian or the dinosaur group as a whole. The "smoke & fire" of his breath (verses 19/21) indicates a huge, fierce animal with a very powerful breath and probably unpleasant or frightening odor.

William Beck's translation (and some others) has verse 34 to read—"He looks down on all high things as a King over all proud creatures." Surely a fitting description of an Allosaurus, Tyrannosaurus Rex or a Stegosaurus. The fierce sea serpents Elasmosaurus and Tylosaurus cannot be overlooked either but I am inclined to think leviathan means the great saurian family as a whole. The Criswell Study Bible says that because "*leviathan*" does not seem to fit any known modern animal, it possibly refers to an *extinct monster* of ancient times. Taken together with the Paluxy River Man & dinosaur tracks, plus the tree branch embedded in Cretaceous rock at Paluxy River, and C 14 dated at 12,800 years BP, only the most biased would not be convinced that Man and dinosaur coexisted.

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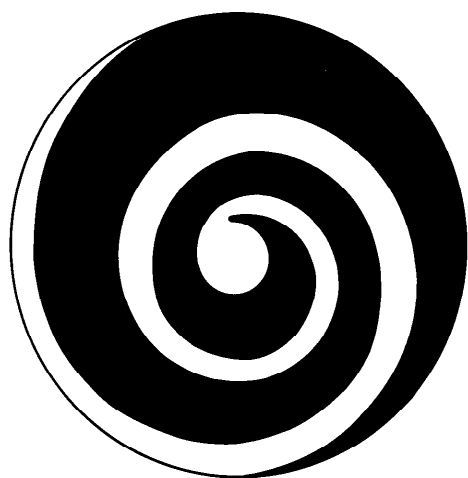
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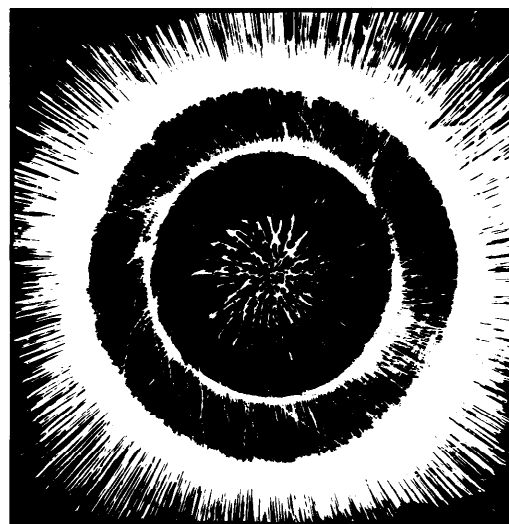


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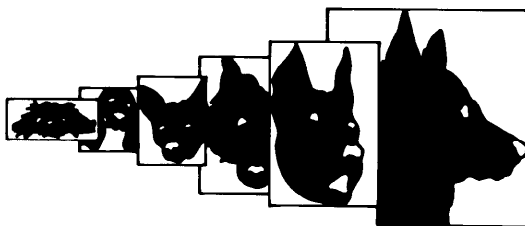
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