

Creation Research Society Quarterly

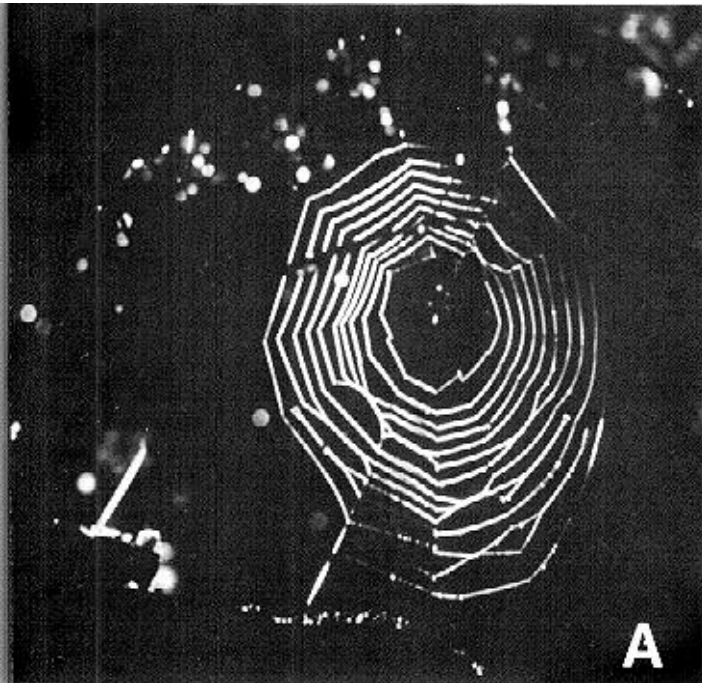
Haec credimus:

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

VOLUME 25

DECEMBER 1988

NUMBER 3



**25 YEARS
OF
*CRSQ!***

CREATION RESEARCH SOCIETY QUARTERLY

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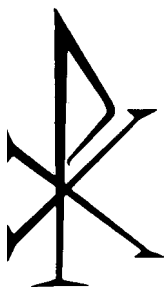
DECEMBER 1988

NUMBER 3

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QUOTE

He lays open the two major shortcomings in atheistic existentialism: its flight from reason and its attempt to define life in terms of will alone. By denying objective truth, rejecting revealed truth, and expelling completely any thought of man as created in the *imago Dei*, atheistic existentialism undermines the value and dignity of man which must be presupposed in any viable and compelling ethics.

Burke, Thomas J., editor. 1986. *The Christian vision: man and morality*. The Hillsdale College Press. Hillsdale, MI p. xii.

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Cover Photographs

- Orb web with dew on the silk fibers as seen with the morning sunlight filtering through the trees—Montecito, CA, February 1962.
 - A “lampshade” (truncated cone) web probably constructed by a *Hypochilus thorelli* spider. The web was located on an almost vertical cliff above Fontana Village, NC in the Great Smoky Mountain National Park, September, 1987.
 - The orb web of a green garden spider built in one of the editor's day lily beds. Every year for the past five years green garden spiders have taken up residence in this particular bed in the late summer and early autumn (September, 1987).
- See pp. 123-4 for a brief discussion of the topic of spider webs.
Photograph A by George Howe, B and C by Emmett L. Williams

MEMBERSHIP/SUBSCRIPTION APPLICATION FORM
CREATION RESEARCH SOCIETY

See the current *CRSQ* for membership information

ORDER BLANK FOR PAST PUBLICATIONS

CREATION RESEARCH SOCIETY

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

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

Membership Voting membership is limited to scientists having at least an earned graduate degree in a natural or applied science. Dues are \$17.00 (\$21.00 foreign) per year and may be sent to Glen W. Wolfrom, Membership Secretary, P.O. Box 14016, Terre Haute, IN 47803. Sustaining membership for those who do not meet the criteria for voting membership, and yet who subscribe to the statement of belief, is available at \$17.00 (\$21.00 foreign) per year and includes a subscription to the Quarterlies. All others interested in receiving copies of all these publications may do so at the rate of the subscription price for all issues for one year: \$20.00 (\$24.00 foreign).

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

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

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

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

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

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Editorial Comments

Dr. H. S. Hamilton continues his defense of the concept that the eye had to be a created organ. In this issue he notes that the evolution of creatures from a water-dwelling environment to a land-dwelling one presents some serious changes that had to be accommodated by the eye and are better explained by design. The topic of the age of the Mississippi River has been discussed previously in the Quarterly. A. W. Mehler presents evidence that the river is actually quite young. I invited Dr. D. Russell Humphreys to write a paper on his model of the earth's magnetic field. He postulates that the age of the field is quite young but he allows for field reversals. Dr. Thomas Barnes will respond in the March 1989 Quarterly.

Barry Setterfield was invited to reply to the criticisms of his model on the speed of light. He wrote to me stating that his reply would be delayed. It will appear in the Quarterly at a later date. However the minisymposium continues with a defense of small curved models of the universe by Dr. John Byl and an elementary discussion of the Doppler effect by Vincent Ettari.

There have been many discussions of australopithecines in recent Quarterlies. Wayne Frair's letter to the editor adds new information on the topic. There are many other shorter selections in the Quarterly including a brief introduction to spider webs (evolution or design?) by the editor. I hope you will find much to interest you. Please send all future manuscripts to Dr. Donald B. DeYoung, Grace College, Winona Lake, IN 46590.

Emmett L. Williams, Editor

Remarks by the President

This year the Creation Research Society has completed its twenty-fifth anniversary. Great changes have occurred during these two and a half decades. In the two decades before the 1960's, generally, the evolutionary community was ignorant of the creationist foundation which was being laid. In the 1960's they became aware of creationists because of the activities of the CRS and that of many other creationist organizations which had become active during those years. In the 1970's, as a result of proliferation of creationist literature and debates the evolutionary community became alarmed by creationists. An important anti-creationist book was published in 1977 and some evolutionists signed a pact indicating their belief that evolution now should be promoted as a "fact."

As the 1970's ended and the 1980's began, the evolutionary community became increasingly antagonistic toward creationists. The first issue of an anti-creationist periodical appeared in 1980 and various anti-creationist books and articles began to proliferate. For the purpose of combating the "threat" of creationism, groups were organized throughout the United States these merging into a so-called "National Center for Science Education." Activists in this organization perceived that the increasing creationist influence could lead to a downfall of quality science education and they tried to oppress creationists and to censor creationist beliefs from science classrooms and educational literature.

Now as the second quarter-of-a-century of CRS history begins, I see evidence of a softening of the tension between the evolutionary community and creationists. The National Center for Science Education appears to be shifting its emphasis from fighting the creationists toward upgrading the quality of science education and more evolutionists are carefully reading creationist literature. Also there seems to be more communication between opposing sides and members of each are participating in conferences held by opposing groups.

Hopefully, as the final year of the 1980's commences and the last decade of this century is dawning there will be a general acceptance of the creationist model as a viable alternative within the scientific community. This goal will be accomplished, God helping us.

Wayne Frair

THE EYE OF THE AIR-BREATHING VERTEBRATE: DID IT EMERGE FROM THE SEA?

H. S. HAMILTON*

Received 18 November 1987 Revised 14 March 1988

Abstract

According to evolutionary hypothesis, life originated in the primitive seas, swarming there for many millions of years before aquatic vertebrates emerged on land. This transfer involved many anatomical and physiological adjustments and modifications among which were important alterations to the eyes. Some of these obligatory ocular changes are discussed with the conclusion that omnipotent and omniscient Intelligence, not natural processes, was responsible for the design of the eye in air-breathing vertebrates.

Introduction

According to present evolutionary dogma the first stirrings of life took place in the ancient seas about three billion years ago, arising from fortuitous combinations of certain elements and compounds therein, in spite of the improbability of such an occurrence

(Thaxton, Bradley and Olson, pp. 3-4). From these postulated simple beginnings the first cell somehow materialized with all its complexity and huge information load. Over vast stretches of time, life forms gradually increased in organization and complexity until about 500 million years ago when the fossil record reveals an amazing outburst of complex invertebrate sea dwelling creatures for which there are no known fossil antecedents.

*H. S. Hamilton, M. D. receives his mail at 12587 15A Avenue, Surrey, B.C., Canada V4A 1L5.

As upward evolution supposedly progressed, the first vertebrates appeared in the form of pre-fish cyclostomes surviving as present day lampreys. Bony fish subsequently dominated the sphere of living organisms for millions of years exhibiting, along with the cyclostomes, the typical camera-like eye structure with its inverted retina, a pattern which repeats throughout the whole vertebrate phylum.

Invertebrate eyes, on the other hand, are classified into simple and compound. The first type varies from the simple light-sensitive eye spot in unicellular organisms to the much more complicated eyes of the squids and octopi which, in a number of ways, resemble the typical vertebrate structure, but with certain very important differences (Hamilton, 1987b, pp. 82-5). The compound eye is found in the honey bee. I will be concerned with the eyes of the earlier vertebrates as the latter supposedly emerged from the sea to dwell on land.

Walls (1963, p. 576) noted as follows:

The origins of all peculiarly amphibian ocular features must be sought far from the 'highest' fishes in the imperfectly known chondrostean-dipnoan-crossopterygian series of patterns.

Evolutionary details of such would inevitably be speculative but the same general principles as observed in present day water dwellers and air-breathing forms would, of necessity, be involved. Some of the marked differences in the eyes of these two kinds of vertebrates will be outlined.

The Evolutionary Succession.

The vertebrate phylum, according to evolutionary theory, is of enormous antiquity and is derived from the primitive Agnatha, jawless fish, whose ancestry is unknown (Davidheiser, 1969, p. 306). The only surviving jawless members are the hag fish and lampreys. From these the true fish possessing jaws and paired fins supposedly evolved. Three classes of true fish emerged, *Placoderms* (armored fish), *Chondrichthyes* (cartilaginous fish) and *Osteichthyes* (bony fish).

The main line of descent continued through the Rhinidistia, the only known living member being the caelocanth. It is supposed that these organisms could already breathe air and so with a change of fins into legs, a change of the hearing apparatus and marked alterations in the eyes, they could survive on land. With the supposed drying of the swamps most of the Dipnoi disappeared and only those amphibians with the necessary ear and eye changes which had adjusted to being on land, survived. Only three groups of amphibians have persisted to the present; frogs and toads, salamanders and newts and the wormlike caecilians. From the main line there subsequently evolved the fully terrestrial vertebrates, the reptiles and from them, in due course, the birds and mammals.

Perplexities, Problems and Puzzles

Changing from life in the water to that on land demanded a great number of alterations in form and function. Among them was the redesigning of the ear and eye to register and respond to aerial sound and light waves respectively.

Throughout the vertebrate phylum all eyes are constructed on the general plan of the camera with the entering light being brought to a focus on the light-sensitive retina lining the posterior two-thirds of the eyeball. Here, light energy is changed into electrical impulses which are conducted via the optic nerve to the visual cortex of the brain where they are interpreted, resulting in environmental awareness which may or may not result in overt activity.

There are many minor individual variations in the standard vertebrate pattern in fish and land dwellers but basic principles are involved and it is to these that the following is directed. Most of the various parts of the eye are involved in this transformation. In the environmental change from water to air the eye had to undergo two very major modifications. The first concerns the refractive state and the second involves the integrity of the eye in the new waterless surroundings.

Cornea

The cornea of the eye serves two main functions. Being the front transparent layer of the eye it transmits light to the interior of the eyeball. Corneas vary widely in absolute area with respect to the size of the eyeball in different animals, but in general they are larger in nocturnal creatures than in diurnal ones, as more light enters the eye and a larger field of vision is subserved. For example in fish that live in the deeper waters it is found that the corneas are quite large in comparison to the size of the eye as a whole.

Being the first layer that the light strikes, the curved cornea also serves as a refractive surface and, along with the lens, forms the mechanism bringing light to a focus on the retina posteriorly. To function properly the cornea must be kept moist or it would become cloudy losing its transparency with ensuing loss of vision. Living in a watery environment this is of no consequence but it becomes a great problem once the water dweller comes on land, necessitating that the eye somehow quickly provide its own source of moisture.

With regard to the refractive role in aquatic eyes the cornea plays practically no part, as it is immersed in a medium with almost the same index of refraction, thus nullifying any function in the focusing process. On the other hand a vertebrate cornea on land, being in a different medium, does play an important role assisting, in conjunction with the lens, in directing incoming light to a focus on the light-sensitive cells (rods and cones) of the retina at the back of the eye. For this reason it is essential that the corneal surface be perfectly smooth and rounded. In the water dweller, since the cornea does not enter into the refractive function, minor irregularities and furrows on its surface which are frequently present, are of practically no significance.

To assist in streamlining, even although in a minor way, the cornea of the fish is much flatter than in an air-breather, in which, for all practical purposes, it can be considered to be round. This corneal flattening results in the anterior-posterior dimension of the eye in fish being considerably less than it is in land vertebrates (Figure 1). The vertebrate cornea typically consists of five layers and this plan is the norm throughout both water and air dwellers although there are numerous modifications in both categories.

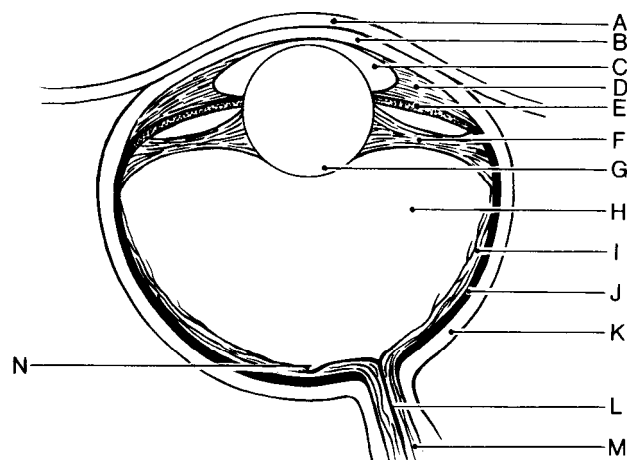


Figure 1. Eye of Water Dwelling Vertebrate (Schematic)
 A—Corneal epithelium. B—Scleral cornea. C—Anterior chamber.
 D—Annular ligament. E—Iris. F—Suspensory ligament. G—Lens
 H—Vitreous. I—Retina. J—Choroid. K—Sclera. L—Central retinal artery. M—Optic nerve. N—Fovea.

Iris

The size and shape of the pupil is largely determined by the state of contraction or relaxation of the sphincter and dilator muscles embedded in the substance of the iris, the colored part of the eye. In fish, pigments of various colors are scattered through the iris substance giving its varied colors of yellow, red, gold, purple, etc. A layer of cells containing guanine (the purpose of which is not known) often covers the front surface of the iris giving the eye its metallic sheen. In fish generally, the pupil is often quite large, round and inactive due primarily to poor or absent musculature. Also, since the large and firm spherical lens projects through the pupil and almost touches the cornea (Figure 1) there could be little space for any significant iris movement. The latter for most of its length is anchored to the cornea by the annular ligament, thus further immobilizing it. When the pupils contract minimally they do so sluggishly with the musculature reacting directly to light as there is no innervation from the central nervous system.

In air-breathing animals existing in a different environment in which extremes of light and shade are the rule, one finds a much more active pupil. This ability is mediated by a highly active iris, the musculature of which (sphincter and dilator fibres) is innervated by the central nervous system. Amphibians being the first among the vertebrates to exhibit this control. There is no annular ligament to restrict iris movement. The lens is further back thus enlarging the capacity of the anterior chamber which is, in both cases, filled with a watery fluid (Figure 2).

Lens

A most important part of the eye is the crystalline lens which is found in vertebrates only, with very few exceptions, and whose origin is a mystery. The lens in water dwellers constitutes the only means of bringing light to a focus on the retina. In contrast, the lens plus the cornea mediate this function in air-breathers.

In the typical water dweller the lens is spherical and situated far forward in the eye almost touching the

cornea (Figure 1). This position gives a wide field of vision and maximum refracting power to the animal which is essential as it is the sole means of focussing incoming light on the retina.

As an example of an initial air-breather, in the amphibian (frog for example), the lens is firm (as in fish) but in the adult tends to be somewhat oval rather than spherical and is further back from the cornea with a resulting deeper space between them. This space, termed the anterior chamber, is normally filled with fluid, mostly water. The cornea is round, not flattened, smooth and not irregular. As the eye now functions in air the refractive properties of the cornea come into play assisting the lens to focus light on the retina. This extra available focussing power in the amphibian and other air-breathers, if no further adjustments were made, would cause the image to come forward off the retina and into the vitreous. To overcome this problem the lens can now fall back from the cornea with a flattening of its anterior surface curvature. These two changes together restore the image to the retina where it should be. To expect that these extremely precise and necessarily co-ordinated anatomical and optical transformations could result from the action of natural selection on mutations which are almost entirely deleterious or lethal, is inconceivable.

Because the lenses in both fish and amphibians are firm, focussing, or the act of accommodation, cannot be accomplished in the same manner as in reptiles (snakes excepted), mammals and birds, where the curvature of the elastic anterior surface of the lens is altered by muscular effort. In fish and amphibians focussing for near and distance consists in moving the lens as a whole forward or backward from its position of rest. From the different positions of the lenses in these two, it is obvious that a different musculature arrangement would be needed in each case to accomplish the desired result. Sometimes a hinge mechanism is involved. In general, in fish where the

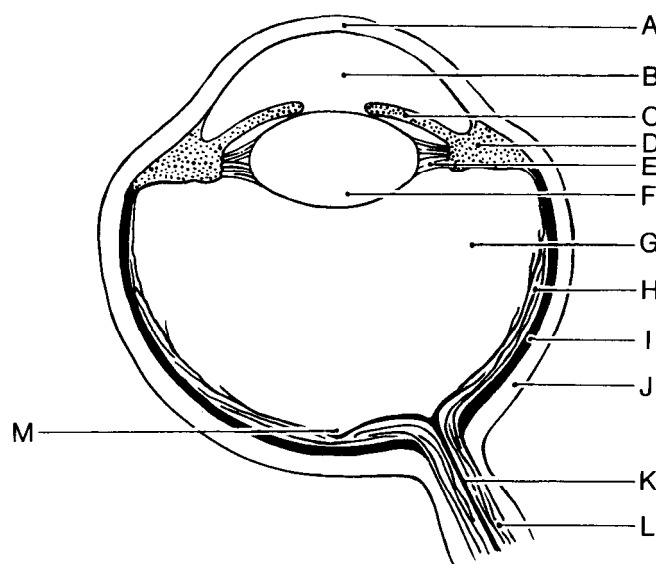


Figure 2. Eye of Air Breathing Vertebrate (Schematic) A—Cornea.
 B—Anterior chamber. C—Iris D—Ciliary body. E—Suspensory ligament. F—Lens G—Vitreous. H—Retina. I—Choroid. J—Sclera.
 K—Central retinal artery. L—Optic nerve. M—Fovea.

lens is situated far forward, the eye is at rest for near vision with the lens being moved backward slightly by muscular effort for far vision. Just the opposite is the case with amphibians where the eye is at rest for far vision with the lens being moved forward a bit by muscular effort for near vision. These movements are accomplished by small muscles attached, in fish to the lens directly (retractor lentis) and in amphibians to tissues closely associated with the lens (protractor lentis). In each case the muscles are anchored securely to various adjacent fixed structures of the eye.

Retina

The retina, being the image bearing stratum of the eye, contains the light-sensitive cells, the rods and cones. The cones, which primarily affect day vision, are concentrated at the posterior pole of the eye with the proportion of rods increasing as the periphery of the retina is approached. These proportions vary tremendously in different animals, with nocturnals having a higher proportion of rods. Cones predominate in diurnal species. The sizes and shapes of these light-sensitive cells vary widely also, with variations in the amount and nature of the photochemical substances they contain, such as rhodopsin and oil droplets. Each species is endowed with the suitable proportion of rods and cones containing the substances indicated for its specific needs. Air and water dwellers alike have a number of layers in their respective retinas conforming generally to the same basic pattern which is characteristic of the vertebrate phylum. To suppose that a non-teleological chance process with a basis in mutations which are almost entirely deleterious or lethal could ever fabricate such fitting and entirely efficient retinal adaptations is placing an intolerable and impossible burden on natural selection.

More Environmental Problems

There is yet another equally serious problem which concerns the integrity of the eye in its new surroundings. It has been stated that the cornea in air must be kept moist. It is obvious therefore that the eye or its neighbouring tissues must supply a continuous source of fluid for this purpose very shortly after the eye leaves its watery environment. Water dwellers do not have or require true eyelids but such are necessary in air dwelling vertebrates, with snakes as an exception. Eyelids accomplish several purposes in serving as a mechanism to spread moisture over the cornea; they constitute a mechanical cleaning apparatus to wash away any foreign material on the surface of the eye, and offer some protection from injury as well as helping to shut out excessive light if required.

Some extant sharks and bony fish do have flaps of fatty tissue at the bony margins of the eyes but these in no way could be termed eyelids and their functions and origins are unknown. In air dwelling vertebrates (again excepting snakes) there are upper and lower lids and frequently a third lid, the nictitating membrane. There are many models and varieties. In some the lower lid is more mobile than the upper with the third being variable in size and mobility. However the basic functions are similar in all.

For purposes of keeping the eyes moist and lubricated the lachrymal and Harderian glands are first found among the amphibians. As an exception the snakes have neither lids nor lachrymal glands, the cornea being protected by an overlying clear layer termed a brille, a structure unique to them (Hamilton 1987a, pp. 188-9). The lachrymal secretion is watery while the Harderian gland produces a sebaceous type of material. Lachrymal and Harderian glands, located under the upper or lower lids come in many sizes, shapes and variations, but they all accomplish the same purpose. The secretion overflows the cornea and is spread by lid action, with some being evaporated, but the rest is mostly drained into the nose through the naso-lachrymal ducts. The mechanism is not the same in all vertebrates as in some the lachrymal secretion predominates while in others it is the Harderian. Whatever the combination the total system is nicely adjusted to the animal's requirements. The Harderian gland is absent in primates.

Conclusions

Having briefly investigated some of the important anatomical and physiological characteristics of the eyes of water and air dwelling vertebrates it is evident that the differences are major obstacles when trying to plot an evolutionary course between the two. The required changes in the refractive or focussing mechanism during the switch to aerial vision are of such precise dimensions, both anatomical and mathematical, that chance processes would appear to be totally incapable and powerless to effect the transformation.

If visual integrity is to be preserved, on forsaking the watery environment, provision for keeping the eye moist must be forthcoming almost immediately, requiring the presence of lachrymal and/or Harderian glands. It would be unreasonable to expect that extremely slow processes such as characterize organic evolution could ever comply with this requirement. The only adequate agent is a supreme Intelligence with an infinite capacity for adaptation and design.

Acknowledgement

I thank P. Susan Clow a freelance bio-medical illustrator working through the Bio-medical Communications Department of the University of British Columbia, Vancouver, B.C. Canada for making the illustrations.

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ANOTHER LOOK AT THE AGE AND HISTORY OF THE MISSISSIPPI RIVER

A. W. MEHLERT*

Received 8 August 1987; Revised 14 March 1988

Abstract

Evolutionists claim that the geomorphology of the Mississippi River shows strong evidence of great age. However, studies by creationists indicate that there is good evidence for the reverse conclusion.

Introduction

Historical geologists are fond of pointing to the amount of sedimentary deposits in the region of the delta of the Mississippi River which, they claim would require several millions of years to accumulate at the river's present discharge of approximately two million tons of silt and other material per day. Creationists need not be concerned about arguments as to just how deep the sedimentary deposits are in the deltaic area. Any amount can be easily accounted for in a short time frame.

The Delta,

Sedimentary Deposits and Rate of Deposition

At two million tons per day for about 4,000 years, the total sedimentary discharge amounts to a sizeable deposit—730 million tons per year which equals 600 cubic miles in that short time. Over 6,000 years the volume deposited would be on the order of 900 cubic miles.

Further major factors must be assessed. Few modern geologists mention the so-called Teays River referred to by Whitcomb and Morris (1961, pp. 318-20), who quote the writings of geologist Raymond E. Janssen who wrote at length on the subject in 1953. According to the account given by Whitcomb and Morris, at some time in the past, a truly mighty river once coursed across the United States from near the Atlantic coast to the present site of today's Mississippi. This 'super-river' left an enormous valley with thick beds of sand, gravel, water-worn boulders and clastic deposits from the bedrock region of the Blue Ridge Mountains. According to Janssen, only a great and powerful river could have achieved this. Whitcomb and Morris consider this 'Teays' River, as probably a huge channel developed by retreating Flood waters from the present Appalachian region as it was being uplifted. Considering the enormous valley left behind by this super-river, the amount of alluvial and other material it carried would have contributed enormously to the delta formation of the Mississippi—an amount probably beyond calculation. Quoting Janssen (p. 319), Whitcomb and Morris say—

... it seems evident that the greater bulk of the delta was built by the Teays, with the modern stream adding only the latest portion ... the immense delta area might, more appropriately be called the delta of the Teays.

In this respect it is interesting to note that the middle and lower Mississippi is incising an alluvial fill which had *already been deposited by earlier flows of great*

magnitude. This is important because a river cannot, in total, deposit and erode its own sediments at the same time, although it can move material from one place to another. However, if a river's volume is greatly reduced by means such as headwater capture or by a change from alluvial to dry conditions, or if the *relative* sea level changes, then it can cut into its own previously laid sediments when and if it flows again. These qualifications must be kept in mind. Whitcomb and Morris give a great deal of evidence to support the view that this situation has occurred in the Mississippi; that the deltaic deposits can be quite easily explained by the drainage action of this enormous Teays in the early and also post-Flood stages. See Figure 1.

Like Patterns in Other Parts of the World

A similar picture emerges from study of other great world rivers such as the Colorado, the Amazon, the Yangtze Kiang, the Congo and the Nile (Daly, 1972, pp. 254-67). The Nile is known to be cutting into a large *ancestral* drainage system as discovered by Soviet engineers and geologists preparing for the construction of the Aswan Dam in Egypt. It is a fact that most large rivers of the world have their present beds on top of sediments laid down by more ancient and much larger river systems.

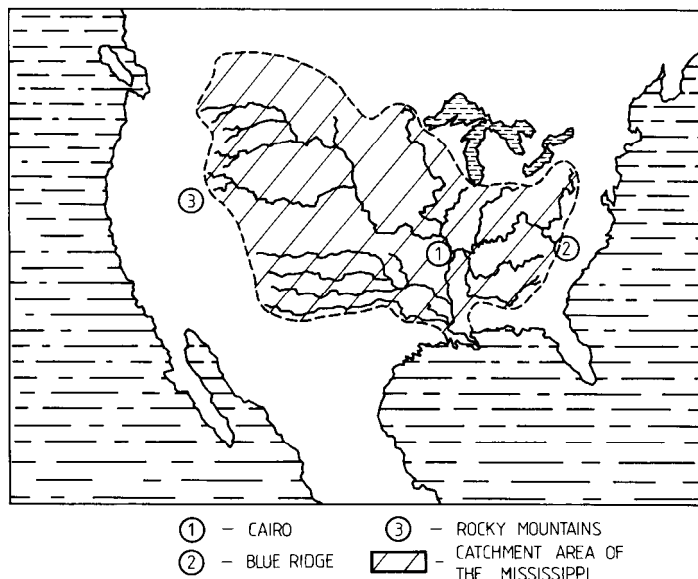


Figure 1. Map of the drainage basin of the entire Mississippi system, possibly the same as existed in pre-Flood times. Likely the so-called Teays system had its source in the East (2) which is the Blue Ridge area of the Appalachians. It is postulated that the flow from (2), when being uplifted would be incalculable, sweeping down from the east into the estuary area from Cairo (1) down to the Gulf. Drawing by Gary Mehler.

*A. W. Mehler, Dip.Th., receives his mail at P.O. Box 30, Beenleigh, Australia, 4207.

The present-day Mississippi in its mid and lower reaches winds and twists its way in typical alluvial style, in parts through a much larger valley and could be termed a misfit (underfit) river. There are many cases of underfit rivers throughout the world, especially in the British Isles and eastern Australia, where many present streams are too small for the valleys through which they flow and it is significant that examples of overfit rivers are almost impossible to find. The conclusion therefore is that the great width and depth of sediments through which the Mississippi is now cutting, were laid by a very much larger waterway which at some stage in the fairly recent past, either dried up or became a 'trickle.' That 'trickle' eventually became the present-day drainage system.

A Scenario

After studying a lengthy and informative paper by Allen (1972) and various text-books, I offer the following probable scenario. In pre-Flood times, an ocean estuary extended from about Baton Rouge, Louisiana up to about Cairo near the junction with the Ohio near the southern-most part of Illinois. In this northerly part the estuary narrowed and was fairly shallow throughout its length. At the onset of the Flood a large amount of silt, sand and gravel was washed into the estuary from various sources, including the Appalachian area, covering the marine organisms whose fossils we find in considerable numbers today. As the Flood main-phase retreated to near original sea-level (the ocean floors

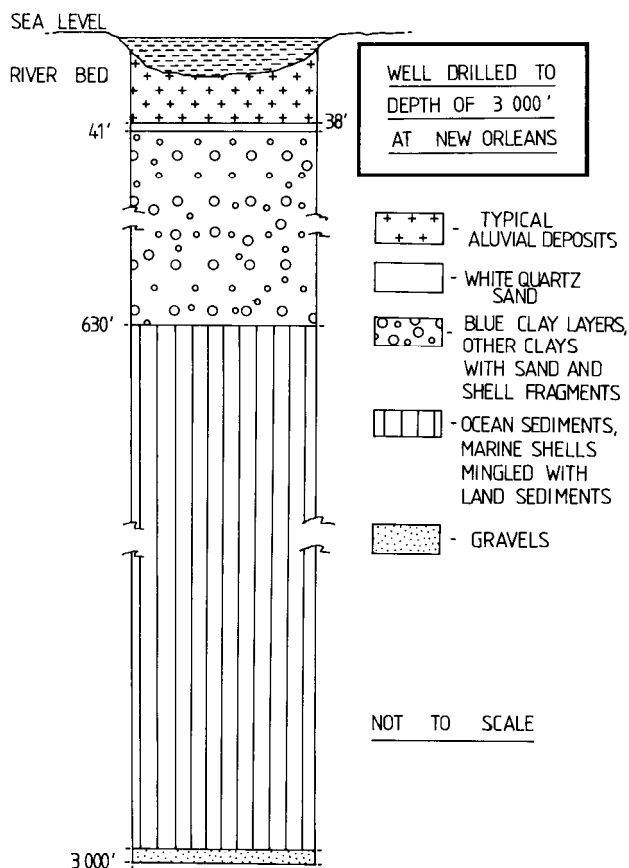


Figure 2. Cross-section of deposits to a depth of 3,000 feet at New Orleans taken from the measurements of Allen (1972, p. 98). Drawing by Gary Mehler.

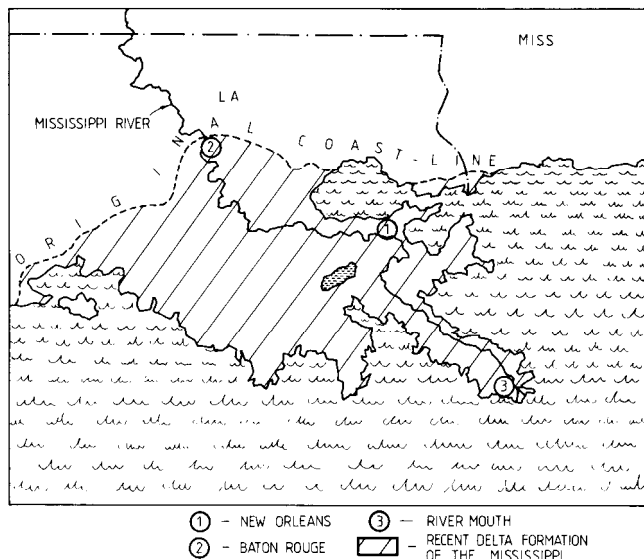


Figure 3. Area of the beginning of the delta at Baton Rouge (2). Drawing by Gary Mehler.

had subsided gradually), the Rockies and the Appalachians rose, releasing large volumes of escaping water which poured into the valley in which the Mississippi now flows, bringing more sediments which completely filled the old ocean estuary and spilled out into the then Gulf of Mexico, forming large deposits which make up most of the underparts of the present delta. This stage may be called the 'Teays.'

As the continental strata lithified, the volume of water and sediments fell sharply and the river system dwindled. The pre-Mississippi delta was now filled and large alluvial beds had formed. Marine fossils underlie and mingle with these deposits. The present Mississippi, Missouri, Ohio and other tributaries are remnants of the previous cataclysms but are still able to cut through the vast alluvial and other deposits in and over the old estuary, dumping more sediments into the present deltaic area.

Finally, the large continental glaciers in the northern U.S. and Canada began to melt, producing more heavy discharges of water into the seas, raising ocean levels—a process which ended fairly recently. The Mississippi reached its current observed rate of flow within the last few thousand years and its present bed lies on top of the previous system. The famous Blue Clay stratum seems to have appeared toward the end of the previous system, at levels about 40 feet deeper than the present bed in the Baton Rouge area. The Blue Clay, as pointed out by Allen (p. 100), underlies New Orleans below 41 feet alternating with sand and marine shells up to 630 feet and obviously was not deposited by the present river. See Figure 2.

Allen (p. 102) quotes Troubridge as stating that *the true Mississippi delta begins near Baton Rouge and not far up the river as some textbooks teach.* (Figure 3) This is most important to remember. Again Allen (p. 102) quotes geologist, Dana, who noted that if the Mississippi was responsible for *all* the deltaic deposits at the current rate of 2 million tons per day, it would require only 10 million years to fill the *entire Gulf of Mexico* even from its original boundary near Baton Rouge! As it has only filled a very miniscule portion of

the Gulf so far, it must be only a tiny fraction of the 10 million years in age. Again, Serventy (1967, p. 33) pointedly informs us that "The Mississippi is pushing its delta into the sea at the rate of a mile every 16 years." The conclusion is obvious: at this rate it represents an advance of over 250 miles in only a few thousand years, and the river cannot be older than those few thousand years.

Conclusion

The events described in the above scenario fit well with the observed facts and can account for any depth

of sediments in the past and present delta regions. There is thus no need to postulate on the basis of those sediments, that the Mississippi River system must be millions of years old.

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PANORAMA OF SCIENCE

Spider Webs

One of the truly marvelous engineering feats performed by living organisms is the construction of webs by many types of spiders (as illustrated on the cover). Spider webs have been classified as sheet, funnel, tube, reticular and orb types to name a few. Witt, Reed and Peakall (1968) state that throughout its life a spider's contact with the outside world is through the silk that it produces in its silk glands. Shear (1988, p. 1) claims that spiders use the web constructed from protein fibers in highly adaptive ways, i.e., as a drag-line, marker and path for potential mates, hiding places, egg masses, for protection, communication and for snaring prey. The European and Asiatic aquatic spider, *Argyroneta aquatica* builds a tent under water, filling it with air (Petrunkevitch, 1957, p. 215A).

Young spiders make their webs, even the most complicated ones, without significant experience and these webs are similar in design to those made by their parents (Shear, 1986, p. 364). Also Shear says that the type of web built is largely inherited and the program for building it develops without the need for practice. This behavior is species specific (Shear, 1986, p. 364).

Could such behavior and engineering ability have evolved? Witt, Reed and Peakall (1968) claim that evolution in the *Arachnidae* has been in the direction of making the greatest use of silk fibroins. Shear (1986, pp. 1, 2) speculates that the earliest (and of course the simplest) webs were mere accidental extensions from a hiding place—actually triplines to warn of approaching prey. Natural selection was involved and as time passed, the elaborate webs we see today developed. Shear admits that the above postulation is an oversimplification.

Shear (1986, pp. 364-400) presents a history of the concept of web evolution. For instance, in stating that the orb web appears to be a perfect achievement and the chance of it having evolved twice seems slight, but this is exactly one of the evolutionary hypotheses. Two spider families, under similar selection pressures, invented the orb web (Shear, 1986, p. 5). Another evolutionary scenario has the orb arising only once (p. 6). Coyle (1986, p. 301) suggests that in the study of silk entrance structures employed by certain spiders the evidence indicates "... that the phylogeny-construction utility of some of these behavioral characteristics may be low because they are prone to rapid evolution ..."

Shear claims (1986, p. 366) that both convergence and parallelism have been important in the evolution

of web building with convergence occurring many times. Two of several assumptions used by writers on web evolution have been (p. 366):

1. Web building in individual spiders is dependent on genetic programs impervious to learning (permanent environmental influence).

2. The sequence of steps in the evolution of web building is from irregular to regular webs.

Shear (1986, p. 367) admits that there is little evidence to support these and the other assumptions used by evolutionists. "Primitive" webs are not necessarily structurally simpler or less complex than "advanced" webs. Very little is known about the fundamental behavior and silks of webs or even the basic features of web architecture that might have caused the evolution of the orb (Coddington, 1986, p. 363). Shear (1986, p. 400) warns that the observations from his study of spiders should make scientists cautious about drawing evolutionary conclusions later to be translated into a taxonomic scheme.

He (1986, p. 2) admits that evolutionists often assume adaptation without really testing for its presence and this naturalistic fallacy has proven very tempting to evolutionary biologists. Petrunkevitch (1957, p. 215A) notes:

In the early days of arachnology spiders were even classified in accordance with the type of web they



Figure 1. A spider web approximately two feet in length found near Dog Canyon, Big Bend National Park, Texas (May 1988). Arrows indicate extremities of the web.

built. Attempts have been made later to derive one type of web from another and thus to establish trends in their evolution. Unfortunately all such attempts disregard other evidence of spider relationship and of changes involving the anatomical structure of various organs.

Of course as a creationist the writer believes that it is highly unlikely that the engineering and construction talent necessary to design and build webs could have developed by natural selection or adaptation.

However how do the web building habits of certain spiders fit into the creation model? Have spiders always been predators? Before the Fall, did spiders use their silk for purposes other than predation as some do today? Only after the Fall did certain spider families use their webs to snare prey? What is a reasonable creationist scenario? This is another area in which some research work is needed by creationists or at least a reinterpretation of existing data. A study of the very readable book edited by Shear would make a good starting point for further investigation.

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Contributed by Emmett L. Williams

International Congress on Relativity and Gravitation

The International Congress on Relativity and Gravitation was held in the Congress-Centre of the German Museum, Munich, West Germany from 22 to 24 April 1988. It was organized by the International Organization for the Advancement of Frontiers of Science, President Emil Andrej Maco, P.O. Box 810354, Hanover, West Germany. Fifty technical papers were presented by scientists attending. These papers will be published at a later date..

In his introductory address Dr. J. P. Wesley, Chairman of the Scientific Advisory Committee, stated:

The purpose of this Congress is to provide a special forum for those who have truly new ideas which do not agree with the *establishment* dogmas, a forum for those who do not blindly accept *special relativity* or *general relativity*, . . .

Why does the *establishment* tolerate the *twin paradox*, where each twin sees the other as being younger—which twin did the traveling? Why is the *establishment* committed to the quantum me-

chanical *uncertainty principle*, which clearly rejects science by claiming that nature is intrinsically unpredictable? . . . Why is the *establishment* so convinced of the *big bang*? What was before the beginning, and what will be after the end?

Why does the *establishment* know that *black holes* and the *Schwarzschild singularity* exist despite no observational evidence for their existence? . . . Why does the *establishment* accept instantaneous *quantum jumps* between states as fact with no experimental evidence?

Perhaps this Congress can help to establish scientific integrity, the freedom of scientific thought, and the pure joy in scientific discovery.

The papers presented experimental and theoretical flaws and proposed alternatives to Einstein's relativity and some other areas of modern physics. This reviewer presented an invited theoretical paper, *A Reactive and Propagative Ether in Absolute Space and Time*. Plans are underway for follow-up Congresses. The sponsoring organization of European scientists is determined to break down the existing barriers to openness in science. The fallout of this for creation science is that it is devastating to present day evolutionary cosmology of the Carl Sagan type.

Contributed by Thomas G. Barnes

Wind-Blown Ripples in Sand

Figures 1-2 are pictures of ripples in the sand on the beach formed by wind at South Padre Island, Texas in December 1987. They are similar to ripples formed in water (see cover of December 1987 CRSQ 24:105 illustrating fossilized ripple marks).

Henry M. Morris (1988) states

. . . the fluid mechanism of ripple formation is essentially the same in both wind and water. There can be geometrical differences in the ripple shapes because of the different fluid properties and flow phenomena, but they are basically the same.

Would it be possible to detect the difference by the ripple geometries of preserved marks in the geological column if they are wind-blown or water-formed?

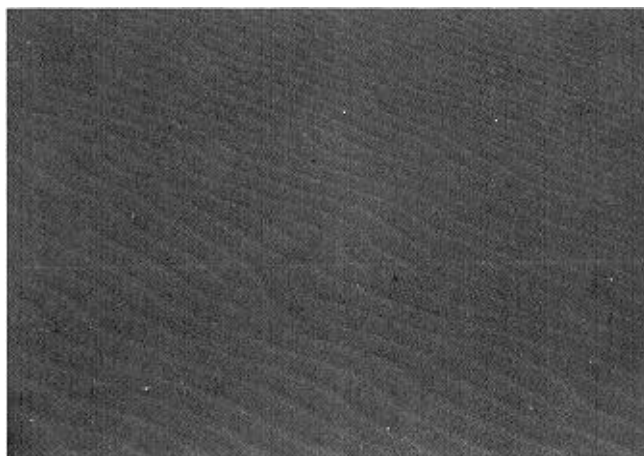


Figure 1. Ripples in sand caused by wind.

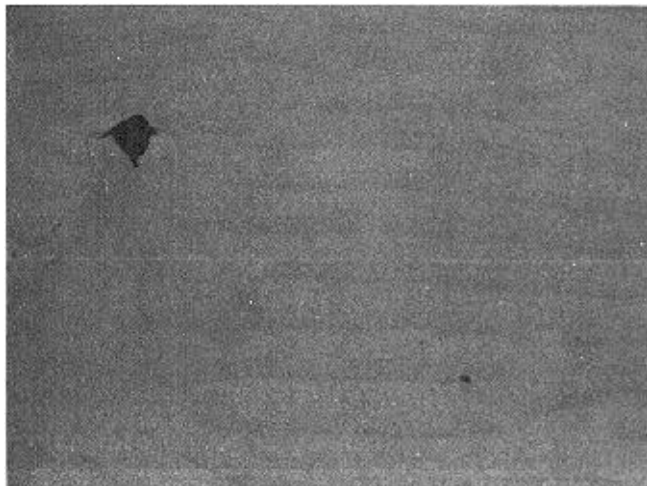


Figure 2. Ripples in sand caused by wind.

There are many interesting research possibilities in geology. Hopefully creationists will undertake such projects to advance creationist geology.

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Contributed by Emmett L. Williams

Naturalism (Roche)

The view that Nature is “the whole show” and “all there is” is as old as mankind. The polytheism of the ancients was a form of naturalism, for the gods were not believed to exist outside nature and were not creators of the world.

In modern times, infused with the findings of a growing science in the West, naturalism has become immensely influential in all our lives. All anti-heroes cleave strongly to naturalism, whether through a scientific basis or unexamined premise about the nature of reality.

Let us attempt a definition. Nature, in this view, is the interlocking system of the physical universe. The natural is what comes forth or goes on of its own accord, spontaneously, unasked. All finite events are part of the system, and nothing exists outside of Nature. Nature is thus the Ultimate Fact, the self-existent thing, on which all phenomena depend and of which all phenomena are a part. In our own century, the physical universe has been given a highly specific shape and size by Einstein’s equations, and beyond it is nothing—not infinite empty space but literal nothingness. Everything in space and time is part of Nature.

The contrapositive view may be called supernaturalism: The belief that the Ultimate Fact upon which all depends is in some manner above and beyond Nature, out of space and time, and is the Creator of the universe. This view is likewise as old as mankind. But let us limit it here to the Western view of God, other forms of supernaturalism being irrelevant to this discussion.

The argument today, as of old, is who is right, the naturalist or the supernaturalist? This may seem far removed from practical concerns, but there could hardly be any more important concern—or any more down-to-earth. To abridge a famous remark by Ches-

terton, “There are some people, and I am one of them, who . . . think the question is not whether the theory of the cosmos affects matters, but whether, in the long run, anything else affects them?” For, of course, if we believe life is a purely natural event determined by a purely natural cosmos, our institutions and customs and personal lives will be shaped by that view, and will be totally unlike life built upon belief in God. Indeed, the whole story of the past two centuries is the remodeling of Western life under the growing reach of naturalism.

The naturalist view is completely determinist. That is, all “events” interlock, and all are the result of previous events in an unbroken chain of cause-and-effect going back to the beginning of things. Thus no serious naturalist believes in human free will. If our will were more than an illusion, we would actually be introducing “new” events, without previous cause, into Nature’s system (and without her say-so). This would put us outside the system, dictating to Nature instead of obeying her, so it is not possible under naturalism. This means you literally have no choice about reading these words at this moment; your doing so was, as it were, determined by the stars. Nor have I any choice in what I’m writing, being merely a stenographer for what is dictated by the dance of the atoms. Consequently, if I were to write that all naturalists were ugly useless cockroaches, the naturalist would have to agree that Nature herself forced me to say so. But would it mean anything? Of course not. For the same reason, the statements naturalists seem to make in apparent defense of naturalism are illusions, written by Nature, without meaning. Yet they seem to believe their own babble. Why?

Kindred difficulties—which is to say, impossible contradictions—await us if we look at the naturalist view of thought and morality. The rigorous naturalist claims that human reason is also an illusion, and thought a meaningless secretion of the brain gland. Any other interpretation would allow human reasons, again impermissibly, to overrule Nature and change the system from outside. And because amoral Nature is the cause of all events, all human morality is disallowed; it is deemed another illusion. There are no such things as good and evil, right and wrong; any contrary opinion is leftover superstition from a pre-scientific age.

Step by rigorous step, the naturalist thus denies our human qualities, but each time ignoring the contradictions that leave the theory of naturalism in ruins. Contriving the theory has required a great deal of thought and the finest scientific reasoning: Only to conclude that thought and reason are meaningless. If the conclusion is correct, the theory is nonsense and no one need believe it. If the conclusion is false, it is just that, false, the theory is again nonsense. To unblinded eyes, the naturalist chose the career that led him to conclude that choice is impossible. Why, then, should his apparent choice make any difference to anybody? Finally, he denies all morality in one breath, and exhorts us all to become naturalists in his next—for the good of mankind.

Naturalism, looked at philosophically rather than through the truncated thought of science, insults the intelligence. I do not see how its theorists, even if their

minds are epiphenomenal, can stand building a world view on blatant contradictions.

A few years ago several theorists launched something called kin theory, stating that instances of "co-operative" or "altruistic" (how would scientists form such a concept?) behavior are genetically determined, according to the nearness of transmissible genes. Roughly stated, we are more likely to do something nice for our own offspring than for our second cousin's children, and not at all likely to be nice to a neighbor's dog. Now, I don't know the gentlemen and have no idea whether they are naturalists of the sort we have been discussing. However, this is the sort of theory naturalists love to seize on and apply to human behavior with little or no evidence (the study in question concerned insects). If the theory applies to us, it means that Lenny Skutnik would almost surely not have dived into the Potomac to rescue a stranger a few years ago; but he did. Surely it must mean that no humans would ever risk their lives to rescue drowning cats; but they do. The error of naturalism lies in equating insects with people, on ignoring the rule, "one law for men, another for things."

Harvard sociobiologist Edward Wilson affirmed (*On Human Nature*, 1979) that "life and mind have a physical basis," and that the "minimum claims" of evolutionary theory are that the behavioral and social sciences have to be "consistent" with the laws of physical science, and "linked in chains of causal explanation." Wherewith we learn that, "The emotional control centers in the hypothalamus and limbic systems of the brain which flood our consciousness with all the emotions" used by "ethical philosophers" in perceiving "standards of good and evil." Mind is "an epiphenomenon of the brain," secreting the meaningless illusion of thought. Bravo! My hypothalamus and limbic systems this very moment are flooding my epiphenomenon with the delightful, albeit meaningless, thought that thought is meaningless. It would be mischievous to wonder whether, if thought is so useless, Harvard oughtn't throw open its admissions to all students? Or just close shop? (Pardon me, my limbic system made me say that.)

After we see the fundamental fallacy of naturalism, there is nothing more to be said to its adherents, and only one more thing to be said of the theory. Namely, it is a blunder of unbelievable cost at the center of the great tragedy of our era. In denying our humanity, it has made us brutes. In denying God and all moral authority, it has delivered us into the coercive power of the unlimited parasitic state. In rejecting a moral order, it has torn the restraints off mass war, off political genocide and persecution, and off crime. Under its malign influence, the values of life, liberty, property and family have been under constant assault and gravely damaged. In a word, naturalism is a weapon in the hands of the anti-hero intent on bringing down all civilization.

You see, it really does matter, and matters very much, how we think about the cosmos.

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Concerning Disjunct Populations of Mammals and Plants*

The distribution of mammals on the Pacific coastal states of Washington, Oregon, and California is most interesting since many of them are extremely limited to comparatively small areas. Also they are remarkably well adapted to these areas. Lloyd G. Ingles in his book, *Mammals of the Pacific States* (1965) Stanford University Press, states that there are 233 recognized species of mammals along the coast and within the boundaries of the three Pacific states. For the purposes of this discussion I will omit the 25 sea inhabiting mammals such as the whales, dolphins, and porpoises since they could rather easily migrate via the Bering Straits to the waters of the Pacific coast. Also as Ingles points out at least six of the shrews may really be only subspecies of other quite widely distributed ones. There remains 11 very distinctive species of shrews and a total of 232 land inhabiting mammals. How did they get here?

As with the sea inhabiting mammals it would be possible for the larger mammals such as the four foxes, the wolf, coyote, the bears, the magnificent Bighorn sheep and mule deer to migrate after the Flood to the Bering Straits and cross it especially when it might have been partially frozen. What would lead them to make such a trip from their relatively comfortable quarters in the valleys and mountains below Mount Ararat to such a cold area in order to eventually live only in the Pacific coast states? It is the smaller mammals such as the meadow mice (130-198 mm in length) and especially the smaller shrews such as the Malheur shrew (77-95 mm) and the Marsh shrew (145-174 mm) that bother me as to how they could possibly travel such a long distance. Not only are they very small but each species lives only 16-18 months. During this time all have at least one litter of young and some have several litters. The Trowbridge shrew lives at most 18 months and frequently has two or three pregnancies after the birth of the first litter. It would seem that this would leave very little time for these very small animals to travel. Finally, the shrews live in very small ranges. For instance, the Santa Catalina shrew lives only on Santa Catalina Island off the coast of Southern California. The rare Mt. Lyell shrew occurs only within Yosemite National Park. The Inyo shrew is found only in eastern California and the Gray shrew is found only in the mostly arid Sagebrush Scrub and coastal Sage Scrub of Southern California. Shrews and moles are found all over the world except Australia. Whether populations in other parts of the world present disjunct populations I do not know but the ones on the Pacific coast are sufficient to illustrate the problem.

Many species of birds are found only on the west coast. The brown Towhee is resident from southwest Oregon through California west of the Sierra Nevada mountains. It is also found from west and central Arizona, central Colorado, west Oklahoma, west and central Texas to south Mexico. The Rufous-Sided Towhee is found from south Canada to Guatemala and Florida. Anna's hummingbird is a resident of

*Editor's Note

This selection should be compared with the following discussion. Culp, G. Richard. 1988. The geographical distribution of animals and plants *Creation Research Society Quarterly*. 25:24-7.

California west of the Sierras from San Francisco and the head of the Sacramento Valley to northwest Baja California, south Arizona and Sonora. It is casual and has bred in South Vancouver Island and west Texas. Similarly Allen's hummingbird breeds in coastal California from the Oregon line south to Ventura County. It is casual in southwest Oregon, west Washington and migrates through Southern California, and Arizona. It is also resident on the Channel Islands and winters in northwest Mexico.

Similarly the Least Grebe and Western Grebe are found only in America. The Least Grebe is found within tropical America and the Western Grebe in western North America. Just glancing quickly through any bird guide, I can find at least 200 birds that are found only in America and many of these only on the West Coast (Peterson, 1961) though they do migrate south to Mexico.

For many years I have worked with the mountain lilac or *Ceanothus* and have originated two very successful varieties, Sierra Blue and Mountain Haze. The *ceanothus* are confined to the continent of North America. Only four species occur east of the Mississippi, namely *C. americanus* and *C. ovatus* and the two in Florida, *C. microphyllis* and *C. serpyllifolius*. Most of the other species occur only in California for a total of 44 species. Quite evidently California is the center of distribution of the species of this remarkable genus.

While in Chile in 1978 and 1979 I found that *Calceolarias* or the florists' 'pouch flower' occurs only in Chile, mostly south of Santiago. There are at least 120 species of *Calceolarias* in Chile and I personally collected about 20 which I brought back and grew here as ornamental plants around my lawn. I am trying to combine the shrub characteristics of one species with the beautiful flower of the florist type, an annual species.

For some inexplicable reason mountain lilacs are found only in North America and *Calceolarias* in Chile. Considering the world-wide Flood, chance alone might account for this. Plants evidently survived in what might be called floating plant rafts and when the Flood subsided it just happened that a raft of plants containing plants and/or seeds of the mountain lilac or *Ceanothus* settled in North America and a raft of plants containing *Calceolarias* settled in southern Chile. But just what would make these radiate into so many species in North America for the *Ceanothus* and Chile for the *Calceolarias*? I found at least 40 other lovely ornamentals which were limited to Chile, seeds of which I brought home and still have growing in my garden areas.

In the above discussion of shrews, birds and flowering plants the problem is how these very lovely and truly distinctive species originated? George Howe postulates that genera survived with sufficient inherent variability to gradually become the species we now find in these areas. I find this hard to believe. In my opinion the Genesis account of the origin of the races of mankind may well be taken as a model of how God brought about the remarkable adaptation of the many surviving species of plants and animals following a world-wide Flood. Quite evidently along with the confounding of the speech (originating the main group of languages) thereby scattering them abroad upon the

face of the earth, the resulting inbreeding rapidly established races. Though there is no precise statement of the concept in the tower of Babel episode I am of the opinion that God greatly increased man's genetic variability potential. Such changes might have been effected by changing the DNA pattern of nucleotides to develop more basic racial distinctions such as are found in skin color, facial features, hair, and skeletal proportions. Similarly the relatively uniform pre-Flood world needed to have comparatively few varieties and species in the many genera or created kinds of plants and animals. Thus the environmental zones and niches for plants were probably not nearly as many as exist now.

When I expressed this viewpoint (Lammerts and Howe, 1974) it was objected to by Dr. Henry Morris (1974) who quite correctly argued that the only miracle recorded in Scripture is the confusion of tongues at Babel. No other miracle would have been required to account for the rapid appearance and fixing of distinctive tribal physical features. According to Morris something of the same phenomenon would have been experienced in the animal realm.

In my reply (1975) I wondered if Morris had ever considered what a miracle would have been required for Noah to have inherited or been heterozygous for all the genes in mankind, estimated at between 5000 and 120,000 by Curt Stern (1950, p. 69). There is nothing in the Bible to indicate such a miraculous event was connected with the selection of Noah as the sole survivor of the then existing race. His selection was clearly based on the fact that "he walked with God." (Genesis 6:9). Also by the year 1921 B.C., 326 years after the confusion of tongues, we find Abram leaving famine stricken Bethel and going to Egypt, evidently a well known nation already! This was about 10 generations after mankind was scattered over the face of the earth. Now if Noah did not have the potential for transmitting the gene differences for the various races of mankind then how did they originate? As mentioned above I am of the opinion that coincident with the creation of languages, God also greatly increased man's genetic variability potential. Regarding believing anything not mentioned in the Bible, I pointed out that Morris accepts the idea of a glacial period, yet nothing is mentioned about glaciation in the Flood narrative or discussion of events thereafter!

In the Flood narrative there is no direct statement of the alteration of God's original creation of plants and animals, yet there are references to it in other parts of the Bible. In Psalm 104:30 we read: "Thou sendest forth thy spirit, they are created: and thou renewest the face of the earth." Matthew Henry (1710, p. 631) comments that this means that from time to time they are created. I do not advocate any continuous creation and doubt if Matthew Henry does. But he does insist that new ones were created. This is in the same chapter as the reference to the Flood in Psalm 104:9: "Thou hast set a bound that they may not pass over; that they turn not again to cover the earth."

If it would be possible for anyone to explain the present disjunct populations of animals and plants by purely natural means I would be grateful to hear from them. But try as I have, I find it impossible to account for the unusual places in which many of these animals live by purely natural means.

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Contributed by Walter E. Lammerts

Prey-Predator Relationship

In 1976 E. Norbert Smith authored one of the most significant papers published in the Quarterly. The title of the article was "Which Animals Do Predators Really Eat?" (1976, pp. 79-81). The gist of this excellent dissertation was that contrary to the evolutionary mythology, predators do not necessarily weed out the weaker members of a population. Often predators preferably run down the healthy members of a selected prey. Readers are urged to study Smith's discussion.

Wauer (1980, pp. 79, 80) employs the same thesis as referenced by Smith to illustrate the preference of selecting strong, healthy prey by mountain lions.

How many mountain lions occur within the park? Roy McBride (1977) has provided some information about lion populations along the Texas-Mexican border that is more than speculation. He spent sixteen years studying lions before writing a thesis on the subject for a master's degree at Sul Ross State University in Alpine. He estimated that the Big Bend National Park population was twenty-

one animals in 1976, with an additional sixty-four animals in the rest of Brewster County. His thesis has provided a great deal of valuable and surprising information about the habits of desert lions. Some of his information contradicts long-standing beliefs; for example, he describes a herd of Mule Deer on a ranch in southeast Brewster County:

A limestone hill between the ranch headquarters and a windmill served as a browsing area for four doe mule deer. They frequently could be seen in the same area and were very gentle. One of the does had been shot through the front leg but had somehow managed to live. She was unable to run and just hobbled around with the other does as best she could. A female lion moved into the area and in a 60-day period killed the three healthy does but not the crippled one. This doe remained in the same region until she disappeared, many months later. I assumed that she died and I later found her carcass (uneaten) not far from the site where she always stayed.

She would have been easy prey for the lion, but I can only assume that because of her poor condition, the lion did not want her. In view of these facts, it seems that a lion's function in a deer herd is not simply to weed out the sick or crippled, but to suppress the overall deer herd. [pp. 101-102]

One can watch various "nature" programs on television and often hear the moderator drone on about how predators clean out the weak and helpless members of a prey population. In spite of the evidence to the contrary, the myth continues.

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Contributed by Emmett L. Williams and John R. Meyer

Minutes of the 1988 Creation Research Society Board of Directors Meeting

On Thursday, 21 April, a meeting of the Executive Committee was held at the Varsity House Motel, Ann Arbor, Michigan, from 1930 to 2200 hours to plan the agendas for the committee meetings on Friday. On Friday, 22 April, between the hours of 0800 and 1600, the Constitution and Bylaws, Financial, Publication, Quarterly Editorial and Research Committees held meetings each of approximately two hours. An appointed secretary recorded the discussions in preparation for the Saturday business meeting.

The official annual meeting of the Board was opened at 1900 by President Frair in Room 102 of the Science Building at Concordia College, Ann Arbor. Present: D. Boylan, E. Chaffin, D. DeYoung, W. Frair, D. Gish, G. Howe, D. Kaufmann, J. Meyer, D. Rodabaugh, W. Rusch, E. Williams, G. Wolfrom, P. Zimmerman. Absent by prior arrangement: J. Klotz. Also present were 47 visitors. The President welcomed everybody to this meeting initiating the 25th year of the Society. This was followed with a silent prayer.

Meyer gave a report on the CRS Research Station in northern Arizona which includes a 2.5 acre plot with available electricity, telephone service and sewage. This was followed by a report on rapid canyon formation and a future study in north central Pennsylvania. Howe gave a report on the ongoing "human footprint" research in Tuba City, Arizona.

Then Dr. Ted Aufdemberge of Concordia College introduced Dr. David Schmiel, President of Concordia College, who welcomed CRS members to the College. Frair gave a report on the anti-creationistic activities of the National Center for Science Education at Boston where he attended their convention and business meeting. The President expressed the gratitude of the CRS to Mr. David Golisch and others who were visiting from the Southeastern Michigan Creation Science Association (SECSA). Mr. Golisch spoke briefly expressing his appreciation for the work of the CRS. The meeting was recessed at 2100 for refreshments provided by SECSA.

The meeting was reconvened at 2035 with the following presentations. Frair gave a report on blood protein studies with turtles. Wolfrom introduced the mini-symposium on design. Gish gave a mini-lecture on the biochemistry and mechanisms of the bombardier beetle and how it is designed to defend itself against predators. DeYoung gave a mini-lecture on design in atoms, protons, gravity, light and solar energy. Kaufmann gave a mini-lecture on design in the human body showing an analogy between organs and organelles and pulley wheels in the knee and ankle joints. The meeting was adjourned at 2215.

On Saturday, 23 April, the closed business meeting of the Board was called to order at 0835. Present: D. Boylan, E. Chaffin, D. DeYoung, W. Frair, D. Gish, G. Howe, D. Kaufmann, J. Meyer, D. Rodabaugh, W. Rusch, E. Williams, G. Wolfrom, P. Zimmerman. Absent according to prior arrangement: J. Klotz. The minutes of the 1987 meeting were read and adopted. The following were elected to the Board for a three-year term: E. Chaffin, J. Klotz, D. Rodabaugh, W. Rusch and G. Wolfrom.

The membership report by Wolfrom was given as follows: total membership has dropped from 1981 thru 1985 but has slightly increased through 1987. The membership breakdown is: Voting 36%, Sustaining 43%, Subscriber 19% and Student 2%. Total membership is 1782 with the greatest increase occurring in voting members. The report of the Constitution and Bylaws Committee was given by Boylan as follows. Written position descriptions for each officer have been developed and will be on file with the Secretary and President. It was moved and passed that we inform the membership of the following proposed constitutional change in Article IV Organization, Section 2 which will be replaced by the following: "The President, Vice President and Secretary shall be elected annually by the Board of Directors from their own membership. The Membership Secretary, Financial Secretary and Treasurer shall be elected for a three year term and confirmed annually by the Board of Directors from their own membership."

It was moved and passed that we notify the membership of the addition of Financial Secretary and Editor as officers by changing Bylaw Article I, Section 1 to read: The Officers of the Society shall consist of a President, Vice President, Secretary, Membership Secretary, Treasurer, Financial Secretary and Editor." It was moved and passed that we notify the membership of the proposed addition of a Section 4 Bylaw Article II. It would read as follows: "The President shall appoint and supervise the following Standing Committees: Constitution and Bylaws, Financial, Publication, Quarterly Editorial and Research."

The Treasurer's and Financial Committee's report by Meyer was given as follows. The total income for '87/'88 was \$99,759. General expenses for '87/'88 were \$44,035. Other expenses for '87/'88 were \$48,805. The

total net assets (membership, general, book sales, textbook, research, lab fund and quarterly endowment) of the Society were \$245,987. It was moved and passed that Meyer find a new Accountant in the Clarks Summit (Pa.) region.

The Research Committee report by Meyer stated the approval of one research project for \$1200 and the refusal of another. It was moved and passed that the Treasurer have the option of borrowing up to \$10,000 from other funds to meet any immediate financial needs. It was moved and passed that Life Membership dues be raised from \$250 to \$300. It was moved and passed that all membership dues and subscriptions be raised \$1. It was moved and passed that the dollar differential for foreign memberships be \$4.

The report of the Publication Committee by Rusch was given as follows. A total of 911 books were sold in '87/'88. The only book that needed to be reprinted was *The Argument*. Kaufmann was to approach Concordia Publishing House about acquiring the plates and copyright to: *Creation, Evolution and God's Word, Darwin, Evolution and Creation* and *Rock Strata and the Bible Record*.

The report of the Quarterly Editorial Committee by Williams was accepted by the Board. It was recommended that DeYoung be elected Editor starting with Volume 26 of the Quarterly. The meeting adjourned for lunch at 1130 and reconvened at 1300 hours. It was moved and passed that the size of the Board for 88/89 be 14. It was moved and passed that Boylan, DeYoung, Gish, Kaufmann, Williams and Zimmerman be re-nominated for the '89/'90-'91/'92 board term. Meyer nominated Michael J. Oard of Great Falls, Montana, to run on the same ballot. It was moved and passed that the following officers be re-elected for '88/'89: President, W. Frair; Vice President, G. Howe; Secretary, D. Kaufmann; Membership Secretary, G. Wolfrom; Treasurer, J. Meyer. President Frair re-appointed J. Klotz as Financial Secretary and E. Williams as Quarterly Editor. Frair, Klotz and Mulfinger (posthumously) were elected as Fellows of the Society by unanimous vote. It was moved and passed that our next board meeting be 4, 5, 6, May 1989 at Ann Arbor.

Rodabaugh was appointed Chairman of the Friday evening educational program for our '89 Board meeting. It was moved and passed that the President print stationery and officers and board members use their own envelopes with the details of the stationery left up to the President. It was moved and passed that we not open a Canadian CRS branch. It was announced that board members are covered by liability insurance.

It was moved and passed that the Secretary write a letter to the family of the late G. Mulfinger expressing our sympathy as well as our thankfulness for his service to our cause and the victory of Christ in the resurrection. The meeting was adjourned at 1515 hours.

David A. Kaufmann, Secretary

QUOTE

The Continental Congress's declaration of July 6, 1775, was likewise filled with references to "the divine Author of our existence," "reverence for our great Creator," "the Divine favour towards us," and "those powers, which our beneficent Creator hath graciously bestowed upon us," before closing with an expression of "humble confidence in the mercies of the supreme and impartial Judge and Ruler of the Universe."

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INVITED PAPER

HAS THE EARTH'S MAGNETIC FIELD EVER FLIPPED?

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Abstract

Much paleomagnetic data has been reported in this century suggesting that the earth's magnetic field has reversed its polarity many times in the past. Evolutionists have assumed that the time between reversals must be very long so they use reversal data as evidence that the earth is old. Often creationists are unfamiliar with the depth and variety of the paleomagnetic data and thus do not know whether the reversals were real or not. Until recently they have generally questioned the credibility of the data. Many have made the same assumption as the evolutionists, that reversals could only take place slowly. In a recent paper (Humphreys, 1986a) I have shown that this assumption is not justified, and that rapid reversals occurring during the Genesis Flood would explain the paleomagnetic data nicely. In this paper I review the evidence for reversals in order to show that it is indeed credible.

Introduction

On an early spring day in 1926, a professor from Kyoto Imperial University removed a block of basalt from a Japanese cave. The professor, Motonori Matuyama, had carefully recorded its orientation before taking it out of its natural position. When he brought a compass needle near the block, he found that the block was magnetized with its north pole pointed southward and upwards, nearly opposite the direction of the earth's magnetic field at that time. Matuyama proceeded to collect over a hundred samples from dozens of sites in Japan and Manchuria. He found that the magnetism of the samples fell neatly into two groups; they were either nearly parallel to the earth's present field or nearly 180° opposite to it. Other scientists had reported reversed magnetizations (Brunhes, 1906), but Matuyama examined the site strata more carefully. He noticed that none of his reversed rocks came from layers higher than the lower Pleistocene. He decided that the earth's magnetic field was of opposite polarity than today's field when the lower Pleistocene lava was flowing (Matuyama, 1929), a conclusion that made him one of the founding fathers of the new science of *paleomagnetism*, the study of magnetic fields preserved in the geologic strata.

Since that time hundreds of geoscientists have investigated thousands of sites on land and sea, measuring the direction and intensity of magnetization of thousands of rock samples. In any given formation, the magnetic directions are not usually found to be random; instead they cluster within five or 10° around a particular direction. However, only half of the formations have normal directions. The other half are reversed. There are clear correlations in the sequence of reversed/normal strata from sites all over the world. Recently several sites have been found which record reversal transitions in detail, continuously tracking both direction and strength.

A Conflict of Interpretations

On the basis of these data, paleomagnetists have gradually constructed a picture of the earth's field reversing its polarity at irregular times while the geologic strata were forming. They call this view the

field-reversal hypothesis, as opposed to the view that other things besides a reversal of the field might have caused the reversed magnetizations. Evolutionists (Dalrymple, 1983) and old-earth creationists (Young, 1982) think of these field reversals as occurring over millions of years. They assume that processes in the earth's core have always been ponderously slow, and that it is physically impossible for the field to reverse itself in less than a few thousand years. They point to *archaeomagnetic* (magnetism of pottery, bricks, campfire stones, etc.) evidence for a steady decrease of the field's intensity for the past 1500 years. The decline, they say, is just another reversal which is taking place right now. They support their interpretation with other archaeomagnetic evidence that the field has not steadily decayed for its entire history: thousands of years before Christ, the field fluctuated and then slowly increased to a maximum before beginning to decrease at about 500 A.D. (Merrill and McElhinny, 1983, pp. 101-6). Also see Figure 1.

The evolutionists' interpretation springs from their *dynamo* theories, which try to show that flows of conducting fluid in the earth's core can generate and sustain the magnetic field for billions of years. These

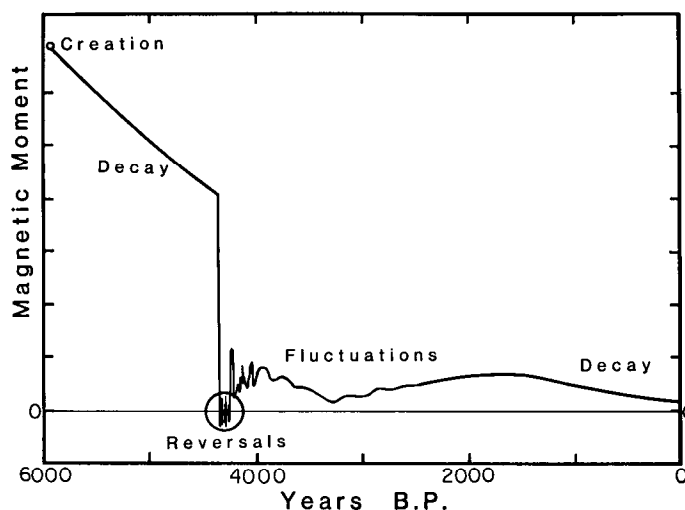


Figure 1. History of the earth's magnetic field, plotted in years before present. By this scenario, the field decayed after its creation, underwent rapid reversals during the Genesis Flood, fluctuated for the next two millennia, and then resumed a steady decay (Humphreys, 1986a).

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theories are very complex and have problems (Barnes, 1972; Humphreys, 1986a, p. 126; James, Roberts, and Winch, 1980; Inglis, 1981). In contrast, creationists have been developing a much simpler theory, which says that the earth's magnetic field is produced by a freely-decaying electric current in the core (Barnes, 1972, 1973; Humphreys, 1983, 1984). Nothing would maintain the current except its own electromagnetic inertia. These fields can last for thousands, but not millions of years. This free-decay theory accounts for the major features of the magnetic fields of the Sun, Moon, Earth, and other planets, whereas dynamo theories have trouble with the same data (Humphreys, 1984, 1986b).

However, critics have pummeled the simple free-decay theory for not taking account of large variations of the earth's field in the past, particularly polarity reversals (Brush, 1982; Dalrymple, 1983; Young, 1982). Until recently the response of many creationists to this criticism has been to discount the paleomagnetic data as being unconvincing (e.g., Barnes, 1972, 1982, 1983, 1984). They seemed to think that field reversals would be incompatible with a young age for the earth. Such thinking makes the very same assumption the evolutionists make: that reversals have to take place very slowly.

Recently I have shown (Humphreys, 1986a) that this assumption is not justified. I showed that rapid reversals are possible according to basic physics, that they are demonstrated by the Sun's presently observed magnetic field reversals, and that a simple mechanism could produce them. In particular, I suggested that strong convection (upwelling caused by heat) in the earth's core could have reversed the earth's field rapidly many times during the year of the Genesis Flood. The reversals I picture would differ from what dynamo theorists imagine: (1) The reversals would dissipate energy, subtracting from the energy in the earth's field rather than adding to it. (2) They would not involve the entire core, but instead only its surface. (3) They would be the result of a single powerful event in the core, rather than a continuing process throughout the history of the field. Figure 1 outlines what I think is the history of the earth's magnetic field.

Prior to my paper, young-earth creationists had not done much work toward modifying the free-decay theory, although one letter to this journal opened the question (Montie, 1982). But how convincing is the evidence for reversals? Five years ago I decided to seriously study paleomagnetism and see for myself. I read many books and articles on the subject, spoke with specialists, and gathered samples of my own. Last year I took a graduate-level geology course in paleomagnetism, taught by a recognized expert in that field. It allowed me to get acquainted with the latest laboratory and field techniques, as well as the frank views of an insider on the problems and strengths of paleomagnetic research. I found that the evidence for reversals is much deeper and more varied than I had thought.

Many creationists seem to be as unaware as I was of the massiveness of the data involved. There is some confusion as to exactly what a magnetic field "reversal" is. I will outline the positive evidence for field reversals. Then I will list all of the criticisms of the field reversal

hypothesis that I know, along with rebuttals. Finally, I will weigh the various arguments and give my conclusions. This review will not be highly detailed, but it should help an interested reader to get acquainted with the basic ideas and find important references.

A good introduction to the scientific literature is a compilation by Alan Cox (1973) of some of the most important papers from 1929 to 1971, along with interesting introductions and biographical comments. William Glen's history of paleomagnetism, *The Road to Jaramillo* (1982), captures some of the excitement among mainstream earth scientists in the 1960's when paleomagnetism and potassium-argon dating joined to beget a new view of the earth's history, plate tectonics.

What are Reversals?

When a rock forms, either by cooling from a molten state or by hardening of sediments, the earth's magnetic field at the time magnetizes grains of magnetic minerals in the rock, as shown in Figure 2 (Tarling, 1983, pp. 15-75). After formation, the grains resist being remagnetized in other directions. For cooling igneous rocks, this point of resistance happens at a particular temperature called the *Curie point*, which is between 500 and 700°C depending on the mineral involved. A few hundred degrees below the Curie temperature, the magnetization of most minerals is as difficult to change as that of a permanent magnet. For a hardening sedimentary rock, a similar fixation process happens as pressure and heat produce chemical changes. After such processes, the rock has *remanent magnetism*, a magnetic "recording" of the intensity and direction of the earth's field at the time of cooling or hardening. If the field was of reversed polarity at that time and place, we would expect the rock to have a reversed magnetization.

By a field of "reversed polarity," or a "field reversal," I mean simply that a compass needle on the spot at that instant would point south instead of north, about 180° opposite its normal direction. If a magnetic field reversal were to happen today, most creatures would not notice any difference, except for some birds and

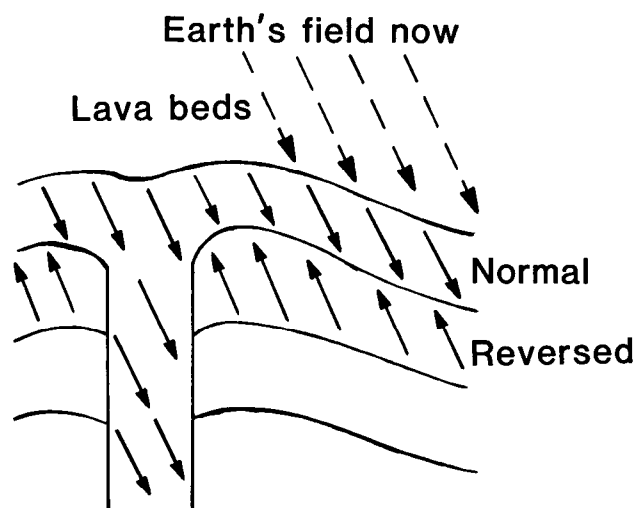


Figure 2. Magnetizations in two successive lava flows. Top flow is magnetized in the same direction as today's field; the flow below is reversely magnetized.

bacteria which seem to navigate by means of the field. The earth's rotation axis would not be affected; eskimos would still see the North Star overhead, and the sun would still rise in the east. Gravity would not be affected; we would still weigh the same. But to students of the earth's field the difference would be very important, because today there is no place below polar latitudes where the field points south. If at any instant in the past there was just one such place, it would mean that the earth's field at that time was drastically different than it is today.

The existence of a field reversal would not necessarily mean that all of the electric current in the earth's core switched directions. In fact, there are good physical reasons to think that only the topmost layers of the core could participate in reversals (Humphreys, 1986a, pp. 114-6). This would leave the currents and fields in the deeper parts of the core almost unchanged. I have stripped my definition of a field reversal to the minimum. It does not require a massive reversal of all the electric currents in the core. Nor does it require the field to reverse simultaneously over the whole earth.

Evidence for Field Reversals

Here is some of the positive evidence that field reversals have indeed occurred. It is not a complete survey in detail, but rather some general features which I find impressive:

A. Many observations. In the past few decades, there have been countless published studies of reversals. Many of these report thousands of samples measured. As an example of such studies, one survey in Iceland sampled about 900 separate lava flows lying atop one another. The survey team measured the magnetization of over 2000 samples and found at least 60 complete transitions from one polarity to another (Dagley, 1967). This and all of the other studies together represent at least 200,000 measured samples, and possibly as many as a million. Of all the samples measured, about 50 percent are of reversed polarity (the others being normal) (McElhinny, 1973, p. 130). This means that those who would deny the reality of field reversals must explain the existence of anywhere from 100,000 to half a million pieces of rock with reversed magnetization!

B. The variety and extent of the observations. Paleomagnetists have measured fossil magnetism in many different ways and places: igneous and sedimentary rocks, lava flows, clays, lake sediments, deep-sea sediments, cores of rock below the ocean floors, and land and sea magnetic survey profiles. The sea-floor profiles show strong, systematic pattern of deviation from the normal strength of the earth's field, the famous "magnetic anomalies" (Vine and Matthews, 1963; Merrill and McElhinny, 1983, pp. 145-7). Deep-sea drilling cores confirm the existence of reversed polarity rocks in the anomaly regions (Johnson and Merrill, 1978). The anomaly patterns in the Atlantic are roughly symmetric about the mid-Atlantic Ridge. They stretch for 500 km east and west of the ridge, following it south from Iceland nearly 20,000 km, almost to Antarctica. This pattern of "magnetic stripes" thus covers about 2×10^7 km² of the Atlantic floor. The other oceans also have anomaly patterns. And although there is much ocean data, *the data from the continents*

greatly outnumbers the sea floor data simply because it is easier to gather. Often the land data is of great horizontal extent; it is not unusual to follow a reversed stratum for hundreds of kilometers (McElhinny, 1973, p. 84).

C. The continuity of the observations. Many of the sediment core samples track reversals smoothly from one polarity to the other, in both direction and intensity (Opdyke, Kent, and Lowrie, 1973; Valet, Laj, and Tucholka, 1986). Recently (Bogue and Coe, 1984; Prévot *et al.*, 1985) several continuous lava flows (considered more reliable than sediment studies) have been found which similarly record polarity transitions in detail (Figure 3).

There are many worldwide correlations of unique magnetic events. For example, a thick section of reversed polarity in Carboniferous and Permian strata and a thick section of normal polarity in Cretaceous strata have been seen wherever samples have been taken throughout the world (McElhinny and Burek, 1971). Another example is in deep-sea sediments: all of the uppermost ones show normal polarity, but a few meters downward, they all are of reversed polarity (Tarling, 1983, p. 183). So there appears to be continuity both vertically and horizontally.

Another sort of continuity has to do with the past location of magnetic poles. The inclination (angle of dip from horizontal) and declination (deviation from true north) of a particular sample's magnetization allows the paleomagnetist to calculate roughly where the north (or south) magnetic pole was at the time the sample acquired its magnetization (Figure 4). This is called the *virtual pole* of the site and stratum. The virtual poles of widely-separated Permian sites in North America are within 15° of a particular point in Manchuria (Piper, 1987, pp. 105,301). This agreement among hundreds of sites thousands of miles apart is difficult to explain without all the Permian rocks in North America being (a) laid down at about the same time, and (b) magnetized by the same large-scale field. The virtual poles from other strata in North America center on other paleomagnetic pole locations, or *paleopoles*. Plotting the North American paleopoles in sequence from Permian to Pleistocene shows them following a continuous path, the *polar wander path*, which winds its way from Manchuria to the present north geographic pole (Piper, 1987, p. 302). Polar wander paths from the other continents are similarly continuous.

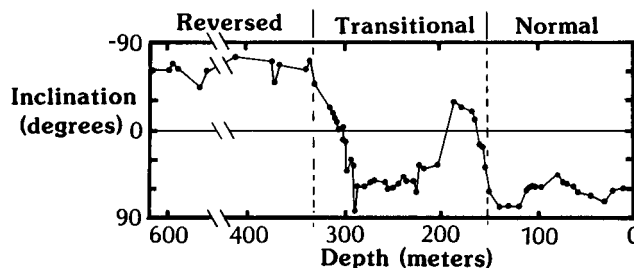


Figure 3. Magnetic inclination (dip angle) of a polarity transition as continuously recorded in a single Miocene lava flow at Steens Mountain, Oregon (Prévot *et al.*, 1985). Declination (deviation from north) and intensity were also measured and also were found to track continuously through the transition. The intensities in the section labeled "transitional" were considerably lower than those in the other two sections.

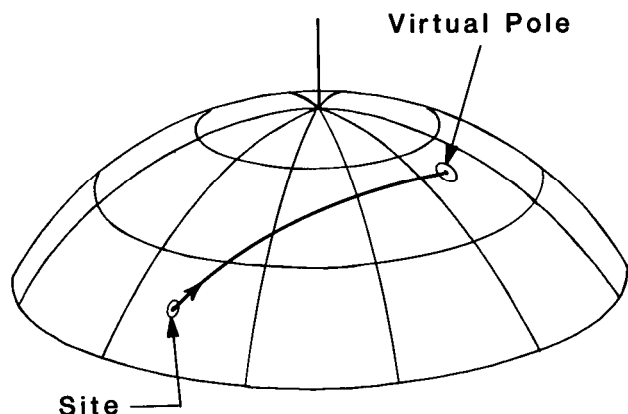


Figure 4. Virtual magnetic pole of a site, determined by the declination and inclination of magnetization at the site. The virtual magnetic poles of most Permian sites in North America are within 15° of a point in Manchuria, the Permian paleopole for North America.

D. The consistency of the observations. Many careful geological studies have been done to check the validity of the field reversal hypothesis, and the results are consistently in favor of the hypothesis. As just one example of such a study, let us consider a survey of rocks heated by lava (Merrill and McElhinny, 1983, pp. 137-9). The purpose was to find out how many rocks could have reversed the polarity of their magnetizations by themselves—self-reversal instead of field reversal (see point 1, next section). When lava intrudes into cracks in rock, it bakes the region around the intrusion. Since the baked rock and the lava cool over approximately the same period of time, they should both acquire magnetization in the same field. Usually the intrusion and baked zone are quite different types of rock. If self-reversals can occur in many types of rock, we would expect to find self-reversing types next to non-reversing types fairly often. In that case, the magnetization of baked zones should frequently be opposite to that of the intrusions. But if self-reversing rocks are rare, most of the baked zones should have the same direction of magnetization as the intrusion (Figure 5). In a survey of 157 such sites, only three had a difference between the baked zone and intrusion magnetizations (Wilson, 1962; McElhinny, 1973, pp. 110-1). This indicates that self-reversals are infrequent, and that most of the reversed-polarity magnetizations we find are from true reversals of the earth's magnetic field.

Even the three discordant cases may be explainable by something other than self-reversal. The Curie temperatures of rocks can differ by as much as a few hundred degrees. In such a case, the baked zone and intrusion would cool through their Curie points at different times, possibly a few days apart. If reversals occurred every week or so, as I suggested in my rapid-reversal hypothesis, then in such situations the two sides of the boundary could have an opposite magnetization. This would be extremely unlikely if reversals took millions of years, but it would happen occasionally if the reversals occurred rapidly. Thus, if chemical and mineralogical studies could eliminate the possibility of self-reversal, the three discordant sites could be evidence for rapid reversals.

However, the main point is that 98 percent of the sites had concordant magnetizations. A reviewer of the work concluded:

On the basis of the present data, it appears that, at most, one percent of the reversals in igneous and baked rocks are due to mineralogically controlled self-reversals. The evidence in favor of the field-reversal hypothesis is overwhelming (McElhinny, 1973, p. 111).

Criticisms and Answers

In the following sections I have listed all of the criticisms against the field-reversal hypothesis I have been able to find. The leading critic among creationists has been Dr. Thomas Barnes, so I will be citing him frequently. (Even though his views about reversals may be wrong, I think Barnes is correct in asserting that the decline of the earth's field is a free decay, and I respect him for being the first to say so.) Many textbooks on geomagnetism give fairly careful consideration to the validity of the field-reversal hypothesis. A recent one (Jacobs, 1984) is readable, concise, and yet reviews a lot of data on both sides of the question. Another new book (Merrill and McElhinny, 1983) is a good survey of geomagnetism in general, although it is more one-sidedly in favor of field reversals. For more details on methods, an older book (McElhinny, 1973) is good, as are several more recent ones (Collinson, 1983; Tarling, 1983).

1. Self-Reversals

Criticism: Self-reversals can occur. A French physicist (Neel, 1955) proposed four theoretical ways a rock might show magnetization opposite to the field causing it (Barnes, 1972, p. 49). All of the mechanisms he postulated involve rocks having a particular mixture of two widely different magnetic minerals (Tarling, 1983, p. 182). Some rocks of this type which actually can self-reverse have been synthesized in the laboratory and a few have been found in nature (Nagata, 1952; Ishikawa and Syono, 1963). Recently, rocks of this general class, titanohematites, were found to be somewhat more common than previously thought (Weisburd, 1985).

Answer: Self-reversals are rare. Only a small percentage of natural rocks have the precise proportions of certain magnetic minerals required by Professor Neel's theory (Jacobs, 1984, p. 32; Merrill and McElhinny, 1983, p. 137). Even in the article about titanohematites, Weisburd acknowledged that "... magnetite, a material that records the earth's field with great fidelity, was shown to be the dominant magnetic carrier in rocks" (p. 235), and again that there are "relatively few findings of self-reversing minerals in lava beds" (p. 236). Moreover, there is good geological evidence [see (D) and Figure 5] that self-reversals account for less than one percent of the reversal data.

2. Peculiarities in Data

Criticism: Reversals in odd places. Barnes (1972, p. 49) quotes an early book by J. A. Jacobs (1962, pp. 105-6): "all rocks of Permian age have normal polarity." Barnes thought that it was inconsistent that the field might fail to flip only during the time Permian rocks were being laid down. Barnes also quoted a comment by Jacobs (1962, pp. 105-6) that surface lavas along the Japanese coast were normally magnetized in some areas and reversely magnetized in other areas close by. Jacobs apparently felt that the lavas flowed too closely

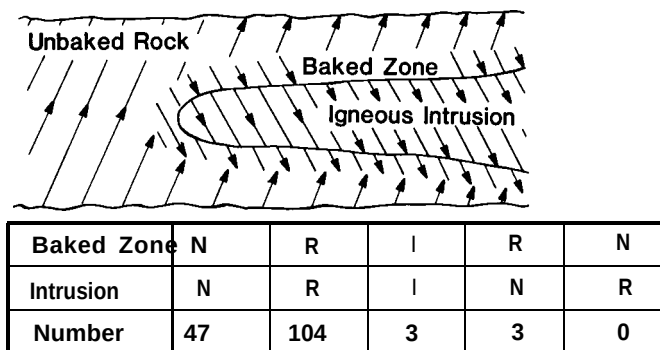


Figure 5. Igneous intrusion test for self-reversals. The intrusion bakes a zone around it; when both cool down they are magnetized by the field at the time. If self-reversals are rare, the baked zone and intrusion should have the same magnetization direction in most cases. The table shows the results of a survey of intrusions and baked zones (Merrill and McElhinny, 1983, p. 138). The letters show the polarities of each zone: N = normal, I = intermediate, R = reversed. In only 3 out of 157 cases were the polarities of baked zone and intrusion different, thus indicating that self-reversals are rare.

together in time to record a field reversal taking millions of years to occur, so he raised the question of reversal by other means.

Answer: Peculiarities support field reversals. Since 1962, changes of polarity have been found in Permian rocks, and the most predominant polarity is *reversed* (McElhinny and Burek, 1971; Collinson, 1973, p. 339), not "normal," as Jacobs reportedly said. It is true that Permian layers have considerably less than the average number of polarity flips. Paleocene layers, on the other hand, have considerably more (McElhinny and Burek, 1971). Yet on the average, Permian rocks are not known to be chemically or physically different from Paleocene rocks. The two strata, like all others in the fossil column, differ only in the type of fossils they contain, as creationists have been saying for years (Whitcomb and Morris, 1960, p. 131-5). Therefore it is difficult to explain such a globally consistent difference in the frequency of reversals in the two layers by an internal chemical or physical difference. It is easier to imagine an *external* factor, such as change in the frequency of reversals of the earth's field, or a change in the deposition rate of the strata. As I have pointed out (Humphreys, 1986a, pp. 117-8), the apparent changes in reversal frequency with depth in the fossil column correlate very nicely with inferred changes in sedimentation rate from stratum to stratum. Thus the peculiarities Barnes thought were inconsistent with the field reversal hypothesis actually strongly support it.

As for the lava flows in Japan, it is conceivable that reversals took place much faster than Jacobs thought possible. Then two lava flows could occur within a short time and yet have different magnetizations. McElhinny (1973, pp. 129-30) reported a fair number of "mixed" results, that is, both polarities found within the same formation. Mixed polarities would result whenever different parts of a formation cool or solidify at different times during a reversal. Again, this kind of data could be direct evidence for my rapid-reversal hypothesis (Humphreys, 1986a, p. 121).

3. Magnetization by Lightning

Criticism: Lightning can cause reversed polarities. The large electric currents spreading from a lightning

strike can magnetize rocks for many meters around the point of impact. Many points near the strike will then have abnormal polarities (Barnes, 1972, p. 49).

Answer: Lightning affects only small areas. A lightning strike causes random remanent magnetization (in all directions) over just a few square meters. Therefore, it cannot explain the consistent (directions within 5 or 10° of one another) reverse magnetization usually observed on land over many square kilometers (McElhinny and Gough, 1963). Also, paleomagnetists make strenuous efforts (such as drilling deep below the surface of an outcrop) to select samples from locations less susceptible to lightning strikes (McElhinny, 1973, p. 70).

4. Mechanical Stress

Criticism: Stress can disturb magnetizations. Barnes (1972, pp. 49-50) quotes an article saying that mechanical stress on a rock could disturb the direction of its magnetization (Doell and Cox, 1967).

Answer: Stress does not reverse directions. In the article Barnes quoted, Doell and Cox consider the possibility that mechanical stress might perturb the direction of magnetization a few degrees. But then they cite (p. 453) an experiment (Stott and Stacey, 1959) which found no such perturbation. No one has ever suggested that stress could completely reverse the magnetization 180° except perhaps in the rare class of rocks that Néel postulated (point 1).

5. Tectonic Rotations

Criticism: Folding can turn rocks. Upheavals and folding in the earth's crust could physically turn a rock so that its magnetization no longer points in the direction of the field that formed it. A normally-magnetized rock could then appear to be of reversed polarity (Barnes, 1972, p. 50).

Answer: Folding is usually obvious. Any folding or faulting which would turn a south-pointing rock northward would usually affect the entire stratum. The signs of such processes are usually plain even to non-geologists, and magnetic stratigraphers are careful to note such signs, and in fact use them as a test of the stability of magnetizations (McElhinny, 1973, p. 88). At best, only a small percentage of the land-based data could be explained this way.

6. Theories

Criticism: Dynamo theories are incomplete. Barnes correctly points out that evolutionists have no rigorous theory explaining how the earth could have reversed its field (Barnes, 1972, p. 50). If there were no theory to explain the data, the data would be more open to question.

Answer: Creationist reversal theories are possible. The lack of a good evolutionist theory of reversals is not a strong argument against the reality of the reversals. After all, evolutionists do not have a rigorous theory for the main features of the present field, and yet we know the field exists. And, as I have mentioned above, we have the beginnings of a creationist theory of reversals (Humphreys, 1986a).

7. Archaeomagnetic Data

Criticism: Intensity measurements have errors. Barnes (1984, p. 112) cites a Russian compilation of archaeomagnetic measurements (from pottery, etc.) of

field intensities at particular localities (Burlatskaya, 1967). He compares these to historical measurements of the earth's magnetic dipole moment over the past 150 years. The *dipole moment* is a measure of the overall strength of the earth's magnet; it is best to calculate it from a number of simultaneous measurements all over the globe. Eleven of the 14 archaeomagnetic measurements are within 10 percent of the historical measurement curve, two are within 20 percent, and the last is within 40 percent. Barnes (1984, p. 112) asserts that the discrepancies mean that the archaeomagnetic data are "meaningless."

Answer: Directions are more reliable than intensities. The Russian archaeomagnetic measurements actually appear to be fairly accurate. Intensity measurements at particular locations should differ from the average expected intensity by 10 percent or so, since the intensity of the earth's present field can differ by more than that amount from point to point along a given magnetic latitude line. Moreover, the general trend of the archaeomagnetic data for the past 1500 years (Merrill and McElhinny, 1983, pp. 101-6) confirms the decay Barnes pointed out in the historical measurements of the past 150 years. Thus, archaeomagnetic (post-Flood) intensity measurements seem to be fairly reliable. Since (by the young-earth hypothesis) the paleomagnetic (during-Flood) data are only a few thousand years older, one would expect them to be nearly as reliable.

However, the evidence for reversals depends on 180° *direction* changes, not on intensities. One could easily imagine mechanisms whereby magnetizations in rocks could become less intense with the passage of time or by the application of heat and mechanical stress. But directions are harder to change. Barnes (1972, p. 49) himself mentioned an archaeomagnetic study which found good agreement between directions of magnetization in French bricks and actual observations in London and Paris going back to the year 1540 A.D. (Chapman and Bartels, 1961, pp. 135-6). This indicates that paleomagnetic methods are reliable enough to establish the 180° direction changes in reversals.

8. Opinions of a Paleomagnetist

Criticism: An expert had doubts. Barnes (1972, p. 49) quotes a summary of the work of Emile Thellier, a pioneer in paleomagnetism: "[Thellier] concludes that the permanent magnetization of rocks is ill-defined, and gives no safe basis on which conclusions can be arrived at" (Chapman and Bartels, 1961).

Answer: The expert changed his mind. Chapman and Bartels were summarizing Thellier's thesis, published 50 years ago (Thellier, 1938). Thellier went on to do more research in paleomagnetism for nearly 30 more years. I was not able to get a copy of his thesis, but his opinions later were considerably different from the ones Chapman and Bartels reported. In a 1959 article Thellier reported his measurements of the intensity (not just direction) of the earth's field in the geological past, and he drew conclusions about the past state of the earth's magnetism, in contrast to his reported opinion in 1938. In 1966 Thellier wrote the following about reversals of the earth's magnetic field: "The phenomenon [reversals] that we have described as the first conquest of paleomagnetism remains perhaps the

most clear and the most certain of its acquisitions" (Thellier, 1966, p. 180, my translation). So even if Chapman and Bartels correctly summarized Thellier's earlier opinion, it would still only represent the ideas of a graduate student half a century ago. A lot of techniques, such as magnetic "cleaning," were invented after 1938 (Collinson, 1983, pp. 308-59). Thellier's mature opinions should be given more weight than what he thought as he was just beginning his work.

9. Seafloor Magnetometer Surveys

Criticism: Some geologists doubt interpretations. Barnes quoted two geologists' conclusions about seafloor magnetic data: "The so-called magnetic anomalies are not what they are purported to be—a 'taped record' of magnetic events during the creation of the new ocean floor between continents" (Meyerhoff and Meyerhoff, 1972, p. 337).

Answer: The geologists did not deny field reversals. In the article quoted, the Meyerhoffs did not deny the existence of "magnetic anomaly" patterns on the ocean floor, nor did they deny that reversed rocks beneath the floor are probably causing the anomalies. The main thing they were denying was the assertion of plate tectonics theorists that the anomalies are relatively recent: "The main purpose of this paper is to show that the magnetic anomalies are not young features of the ocean basins, and thereby to stimulate new ideas" (p. 337). They stated: "Our conclusion is that the magnetic anomalies are caused by differences in magnetic susceptibility and by magnetic [*field*] reversals" (p. 355, italics mine).

10. Deepsea Drilling Cores

Criticism: Seafloor magnetic data is complex. Studies of seafloor magnetism in the 1970's and 1980's have shown that the magnetic anomaly patterns are actually much more complex than the popular science literature of the 1960's indicates. I have not seen this point mentioned in creationist writings, but it surfaces frequently in verbal discussions. The gist of it seems to be an implication that since the data is complex, it is somehow invalid.

Answer: Seafloor data supports rapid reversals. Deep-sea drilling of the ocean crust in anomaly regions has produced core samples which directly confirm the existence of reversed magnetizations (Johnson and Merrill, 1978; Dunlop and Prévot, 1982). A recent study typifies the large amount of work that has been done in this area (Smith and Bannerjee, 1987). The main confusion is that the drilling has not found nice uniform layers of reversed and normal magnetization such as are found on land. Instead the data suggests that the ocean crust is a hodgepodge of rocks of different polarities, very localized both vertically and horizontally, perhaps on a scale of meters (Figure 6). The area under the anomaly regions would thus have simply a higher percentage of reversed rocks than non-anomaly regions.

Evolutionists have difficulty with this data, since they picture the rocks cooling much faster than the assumed thousand or million-year reversal periods. According to their picture, they should find uniform layers of magnetization. However, if the rate of re-

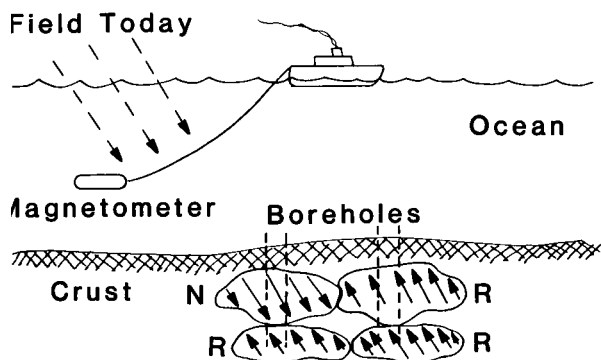


Figure 6. Seafloor magnetizations. Towed magnetometers show strong reductions in the intensity of the earth's magnetic field in "magnetic anomaly" regions. Deep-core samples from the oceanic crust show the existence of reversely-polarized rock beneath the anomaly regions, not in uniform layers, but in a highly localized hodgepodge of reversed and normal rocks.

versals were high, about the same as formation and cooling rates of the new basalt in seawater, much spottier patterns would occur. Imagine two pieces of basalt, A and B, each a meter in diameter, formed at the mid-ocean ridge on a Sunday morning during the Flood. Piece A has more seawater circulating by it and cools through the Curie temperature on Monday, when the field is of normal polarity. On Wednesday, the field reverses direction. By Friday piece B, being right next to A but less exposed to water, finally cools through the Curie point and records a reversed magnetization. Thus we could have two pieces of rock side by side with opposite polarities. But since piece B is more typical of the general area, the overall magnetization is in the reversed direction. Thousands of years later, magnetometers towed over the area record a lower-than-normal magnetization. Thus a creationist view of rapid reversals and rapid formation of ocean crust during the Flood can explain this data.

11. Chemical Correlations

Criticisms: Oxidation may correlate with reversals. Barnes did not mention this point, but it has been discussed in mainstream literature. In some locations the iron compounds in reversely magnetized lava appear to be more highly oxidized than in normally magnetized lava (Jacobs, 1984, pp. 34-7). If events in the core (producing the field) were not connected with physical conditions in the crust or atmosphere (producing the oxidation), then the chemistry of the lavas might have caused the reverse magnetization.

Answer: The Flood could cause correlations. Further studies in other locations have shown that the correlations of oxidation and magnetization are not found in many places (Watkins and Haggerty, 1968; Kristjansson and McDougall 1982), and some scientists take issue with the correlation, calling it an artifact of the data analysis (Larson and Strangway, 1966; Merrill, 1975). Jacobs (1984, pp. 35-7) reviews both sides of the controversy. However, if there is a correlation, it might be understandable from a creationist standpoint. It is suggested that the Genesis Flood apparently affected the earth's core (Humphreys, 1986a, pp. 117-8, 125-6; Humphreys, 1978) as well as events on the surface of the earth. If the reversals happened during the Flood, it is quite possible that some lava flows could be synchronized with the field reversals.

Conclusion: Weighing the Evidence

Let us consider what evidence we would need in order to say that a field reversal has taken place. In the second edition of his book, Barnes lists criteria which must be met in order to evaluate the earth's dipole moment in the past: we must have accurate intensity and direction measurements from a large number of points over the whole globe, and these must be known to be nearly simultaneous compared to the decay time of the field (Barnes, 1983, p. 124). While this may be possible (in principle) for the archaeomagnetic data, it is much more difficult for the paleomagnetic data, since there are many reversals recorded in the fossil column. Thus, estimates of the dipole moment at various times during the Flood may not be very accurate.

Barnes' criteria are much more stringent than what is needed. We do not need to know the overall dipole moment of the earth at various times to prove that a field reversal has occurred, especially not one of the limited kind I defined in the third section. We need neither intensities, nor very accurate directions, nor simultaneous data from many locations. All we need is evidence that the field at just one point on the earth, at just one instant in the past, was roughly opposite to the normal direction.

Do we have such evidence? Let us consider the criticisms first. Points 2 through 9 of the critique have fairly straightforward answers. Point 10 also seems answerable, although much research remains to be done on the sea floor anomalies. However, one could completely dismiss the seafloor data without doing much damage to the case for reversals. The few occasions of "mixed" polarities (point 2) are explainable in terms of my rapid-reversal hypothesis, and in fact, support it. In my opinion, the most serious criticisms were number 1, the possibility of self-reversal, and number 11, the correlation of oxidation with reversals in some rocks. Theory, laboratory experiments, and geological data all indicate that self-reversing rocks are rare. The correlations are also rare (and disputed), but if they exist, there is a possible creationist explanation for them which allows the existence of field reversals. So it seems to me that we have sufficiently good answers to all critiques.

The positive evidence is strong. If just one of the more than 100,000 reversely-magnetized samples reported was really made by a reversed field, it would prove that a limited reversal has occurred. If the reversely-magnetized samples were only a small percentage of all the samples taken, there might be grounds for suspicion. But fully *half* of all geologic samples having a measureable magnetization are of reversed polarity. The variety, extent, continuity, and consistency of the reversal data all strongly suggest that most of the data is valid, far more than the one genuine sample we need. Therefore, I conclude that polarity reversals of the earth's magnetic field have indeed occurred. We need to understand them.

Acknowledgement

I appreciate Dr. James O. Dritt's careful reviewing of this manuscript.

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 JGR—Journal of Geophysical Research
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QUOTE

It is to be remembered that the facts are from God, the explanation from men; and the two are often as far apart as Heaven and its antipode.

These human explanations are not only without authority, but they are very mutable. They change not only from generation to generation, but almost as often as the phases of the moon. It is a fact that the planets move. Once it was said that they were moved by spirits, then by vortexes, now by self-evolved forces. It is hard that we should be called upon to change our faith with every new moon. The same man sometimes propounds theories almost as rapidly as the changes of the kaleidoscope.

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MINISYMPOSIUM ON THE SPEED OF LIGHT—PART III

ON SMALL CURVED-SPACE MODELS OF THE UNIVERSE

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Abstract

Moon and Spencer's model of the universe does have serious deficiencies. However, it is possible to construct alternative small, curved-space models of the universe that avoid these shortcomings. Thus a more sophisticated analysis is required before such models can be definitely eliminated.

Introduction

Many creationists have wrestled with the problem generated by the apparently large size of the universe: if the distant galaxies are really billions of light years away, does this not imply that their light must have traveled for billions of years to reach us now? And how is this to be reconciled with the notion of a young universe?

The implied large age of the universe rests essentially upon these main assumptions: 1. The large distances of the galaxies are (at least roughly) correct. 2. The speed of light is constant in time and space. 3. The light we see has actually traveled from the stars where it appears to originate. Attempts to "save" the traditional Biblical chronology have generally been based on challenging one or more of these assumptions.

In 1953 Moon and Spencer proposed a cosmological model that postulated much smaller distances for the galaxies. Many creationists have since cited this paper in support of a young universe. Recently the Moon and Spencer model has been severely criticized (Akridge, 1984; Phillips, 1988). In this paper we shall see that while this model has serious shortcomings, it is possible to construct a more viable alternative.

Elliptic Space

Moon and Spencer (1953) assumed that space remains Euclidean for material objects but is elliptic for light. Thus they accept the astronomical distances for galaxies but, upon assuming a constant positive curvature of five light years, the maximum light travel time is at most about 15 years. In essence this model postulates that light covers the distance from the distant galaxies at a speed much greater than the local speed of light.

The theory raises a few problems. In the first place it does not seem physically realistic to have Euclidean space for material objects while having elliptic space for light. Furthermore, if light were to travel in elliptic space we would expect to see other observational consequences. For example, the apparent luminosity distance L would be given by*

$$L = R \sin(r/R) \quad (1)$$

where R is the radius of curvature and r is the "actual" or radar distance. For small values of r/R this yields an L almost equal to r , but as r increases it becomes much

*The following formulae can be readily derived from elliptic and hyperbolic trigonometry as found, for example, in M.J. Greenberg, 1980. *Euclidean and Non-Euclidean Geometry* (second edition). W. H. Freeman. New York.

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larger than L . Thus the apparent distances of the galaxies based on their luminosity (implicitly assuming the Euclidean inverse square law) yield an **underestimate** of the actual distances. It follows that all astronomical objects should, in this theory, have apparent luminosity distances of less than R , or 15 light years. Since this is not observed the Moon and Spencer model must be rejected, or at least drastically modified. Moon and Spencer do refer to a further paper, entitled "Riemannian Space for Astronomy," where some of these difficulties would presumably be overcome. However, I have searched the literature without having been able to find this paper. I doubt that it was published.

Hyperbolic Space

It is evident that the model must generate apparent distances that are larger than the actual distances. To do this it is necessary to appeal to hyperbolic, rather than elliptic, space. Generally, distances can be measured by four methods: by radar, by apparent size, by apparent luminosity, and by trigonometric parallax. Radar measurements are feasible only within the solar system. The distances obtained via apparent size and apparent luminosity are both the same for a hyperbolic space of constant curvature and are given by

$$L = R \sinh(r/R) \quad (2)$$

Thus, for example, if the radius of curvature R is 50 light years (ly) then a galaxy at, say, 1000 ly will have an apparent luminosity distance of 12 billion ly. The parallax distance P is

$$P = R \tanh(r/R) \quad (3)$$

However, this is the absolute parallax. In practice only the relative parallax is calculated: parallactic movement is measured with respect to the background stars which are assumed to be at infinity. The relative parallax P' is

$$P' = R \tanh(r/R) / [1 - \tanh(r/R)] \quad (4)$$

The variations of L , P , and P' with r/R are given in Table I.

It is evident that L and P' begin to differ significantly when r/R is about 0.2. Parallax can be measured accurately (to within roughly 10%) only to about 100 ly. For an r of 100 ly and an (r/R) of 0.2, this corresponds to a curvature of 500 ly. Any curvature less than 500 ly should thus be detectable. If the distant stars are to be at most 6000 ly away then R must be a maximum of 320 ly. Since this is less than the critical number it follows that this model can be observationally tested.

Table I. Actual distances versus apparent distances in hyperbolic space.

r/R	L/R	P/R	P'/R
0.01	0.01	0.0099997	0.0101
0.1	0.10017	0.09967	0.111
0.2	0.2013	0.197	0.246
0.4	0.411	0.38	0.613
1.0	1.17	0.76	3.19
2.0	3.6	0.964	27
5	74	0.999	11012
10	11013	1.0	∞
20	2.4×10^8	1.0	∞

However, I have assumed the curvature to be constant throughout space. One could modify this assumption and postulate a more general situation where the curvature is allowed to vary with distance. One could then obtain a "fit" with the observations by, for example, letting the curvature become appreciable only at distances beyond, say, 100 ly.

General Relativity

The Moon-Spencer model was criticized by Akridge (1984) because its curvature would require much too high a density, as calculated via general relativity. Akridge also claims that Moon and Spencer "borrowed" their distance formula from general relativity. But this is not the case. Their formula, as well as the ones above, is derived from non-Euclidean geometry on the assumption of constant curvature. It is true that these formulae are also used by general relativity. However, the distinctive feature of general relativity is the further assumption that the curvature is entirely due to the matter-energy content of the universe and that an empty universe would have zero curvature.

It is evident that Moon and Spencer did not accept this general relativistic origin of the space curvature. Indeed, one could ask why the curvature of empty space should necessarily be zero; it can as well be assumed that empty space has an inherent non-zero curvature. Since the proposed curvature is very small it cannot be tested in the laboratory but only via very large-scale effects. In following this approach one need not completely reject general relativity. It could be modified by postulating that the matter-energy content of the universe superimposes a curvature on the initial (non-zero) curvature of empty space.

In the light of the above comments and the further fact that general relativity is merely one of a number of competing dynamical theories, it must be concluded Akridge's general relativistic criticism of curved-space models is inadequate.

The Red Shift

Thus far I have implicitly assumed the universe to be static. If the red shifts of distant galaxies are accepted as reflective of actual radial motion then the equations for distances from apparent luminosity and apparent size will have to be corrected by factors of $(1+z)$ and $1/(1+z)$ respectively*, where z is the fractional red-shift. Then the most distant galaxies are receding from us at close to the speed of light. For a universe of

age 6000 years this implies that, assuming the speeds to be constant, the most distant galaxies must be at a distance of at least 6000 ly. Otherwise we get a singularity after creation. Taking into account the travel time for light it follows that the most distant galaxies currently observed must have been at least 3000 ly distant at the time of light emission.

Note that in this model the red shift is proportional, not to the actual distance, but to the apparent distance. Hence, upon extrapolation into the past, we do not obtain a big-bang situation where all the material was at one point at one time. It should be possible to test this case by observing the variation of the apparent distances of distant galaxies. If they really are fairly close then their apparent magnitudes should decrease significantly over a relatively short timespan.

However, one could also consider the possibility that the redshift is caused by something other than recessional motion. Various alternatives have been proposed: (1) "tired-light" theories (La Violette, 1986), (2) photon decay due to space curvature (Crawford, 1979), or (3) gravitational redshifts due to a massive second center of the universe (Ellis, 1978). In the latter case the curvature would vary with distance in such a way that space would initially be hyperbolic but would become elliptic as we approach the second center at the most distant part of the universe.

Isotropy and Homogeneity

In this model the distant galaxies are much more closely packed than the near ones. This is directly contrary to the Cosmological Principle that underlies most modern cosmologies (e.g. the Robertson-Walker models). The Cosmological Principle asserts that the universe is spatially homogeneous (i.e. it is roughly the same everywhere in space).

The observations, however, yield direct evidence only for isotropy (i.e. as seen from the earth the universe appears to be spherically symmetric). The concept of homogeneity is based more on philosophical presuppositions than on empirical considerations. According to cosmologist G.F.R. Ellis (1975, pp. 249-50) it is fundamentally due to the Copernican-Darwinian revolution in our understanding of the nature of man and his position in the universe. He notes that:

It would certainly be consistent with the present observations that we were at the centre of the universe, and that, for example, radio sources were distributed spherically symmetrically about us in shells characterized by increasing source density and brightness as their distance from us increased. Although mathematical models for such Earth-centered cosmologies have occasionally been investigated, they have not been taken seriously; in fact the most striking feature of the radio source counts is how this obvious possibility has been completely discounted. The assumption of spatial homogeneity has inevitably been made, and has led to the conclusion that the population of radio sources evolves extremely rapidly. What has therefore happened is that an unproven cosmological assumption has been completely accepted and used to obtain rather unexpected information about astrophysical processes.

*See, for example, Steven Weinberg. 1975. *Gravitation and Cosmology*. John Wiley. New York. p. 423.

In the big-bang cosmologies philosophical considerations lead to the assumption of spatial homogeneity, which is “saved” from observational falsification by purely *ad hoc* assumptions regarding the rapid evolution of radio sources. In the curved-space model this assumption is not needed and we retain only the observed spherical symmetry of the universe.

Ellis refers to “earth”-centered models of the universe. But this does not necessarily mean that we have to limit ourselves to strictly geocentric models. The observationally determined spherical symmetry would be viable also if we choose the center to be at the Sun or some other relatively near position.

Conclusion

I have given a rough sketch of how a curved-space cosmology could be modified so as to explain the observational evidence in terms of a relatively small universe. The prime motivation has been to demonstrate that it is possible to explain the empirical data in more than one way. It may be argued that the curved-space model can be “saved” only via a number of *ad hoc* assumptions. However, the same consideration applies also for the big-bang cosmologies. The difficulty faced in cosmology is that we can directly observe only a minute portion of space-time. To draw cosmological conclusions from these limited observations requires drastic simplifying assumptions and

extrapolations. Since more than one model can account for the observations it is crucial that objective criteria be established that enable us to choose the “best” theory. But even the establishment of such criteria is a very subjective process in which we are strongly guided by our prior philosophical and religious commitments.

Thus I conclude that the possibility of constructing viable, small curved-space models of the universe has been too easily dismissed. A more detailed analysis of the various observational implications of such models and an assessment in the light of clearly expressed theory selection criteria are necessary before they can be definitely invalidated.

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CRITICAL THOUGHTS AND CONJECTURES CONCERNING THE DOPPLER EFFECT AND THE CONCEPT OF AN EXPANDING UNIVERSE—PART I

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Abstract

The main evidence for the various “expanding universe” cosmologies is drawn from the red shifting of the spectral lines in the light emitted by galaxies, quasars, and other extraterrestrial objects. It is demonstrated that there are many mechanisms which can cause red shifts, and that the current interpretation of these red shifts yields absurd conclusions concerning the nature of the universe. The result is that the basic evidence for the “expanding universe” cosmologies is shown to be the result of misinterpretation of these red shifts, thereby undermining the concept that the universe originated in some primordial explosion.

Introduction

The nature of red shifts in the line spectra of extragalactic objects, such as galaxies, quasars, and radio stars will be examined and it will be demonstrated that these shifts are not necessarily Doppler effects. Other mechanisms will be offered as explanation for these line shifts. Consequently, the evidence usually offered as proof that the universe resulted from some primordial “big bang” will be shown to be inconclusive and largely subjective.^a

The Nature of the Doppler Effect— The Basic Premise of an Expanding Universe

Light, indeed all electromagnetic radiation, consists of transverse waves. If light is formed by the excitation

of the electrons of an element the spectra of that light will appear as bright lines. The position of these lines is predictable and distinct for every element, that is, they always appear in the same place on the spectrum. Often the light from a star will contain dark lines. These are formed as the radiation from the star’s surface passes through its atmosphere, which will absorb different frequencies of the light, blanking those frequencies from the star’s spectrum, causing them to appear as dark lines. (Figure 1)

If a light source approaches an observer at high speeds, these dark and bright lines will change their position in the spectrum and be displaced towards the blue end of the spectrum (i.e. they will become blue shifted). If the light source is receding, the lines will be displaced toward the red end of the spectrum (red shifted). This shifting effect, as caused by the recession

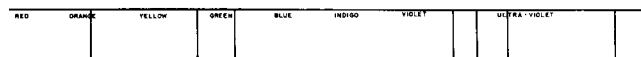


Figure 1. Typical line spectra for an element.

^aOther problems concerning the big bang hypothesis have been detailed in past CRSQ articles and more recently in the CRS Monograph No. 2, *Design and Origins in Astronomy* (The Editor).

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or approach of a luminous object is known as the Doppler effect (Figure 2).

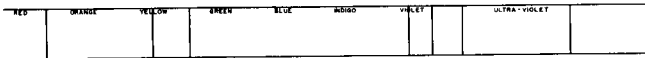


Figure 2. The line spectra of Figure 1 shifted toward the red area of the spectrum.

Many scientists perceive the universe somewhat as an exploding bomb. As the fragments fly from the center of the explosion, the distance between them will increase. Thus, an observer on any one of the fragments will see all the other fragments moving away from him, their movement being perceived as relative to his position (Figure 3). We are thought to be on one of the fragments resulting from the "big bang" and the red shifts in the line spectra of the extra-galactic objects are taken as evidence that all the other galaxies are receding from us as well as from one another. In this manner the red shifts comprise the primary evidence of the hypothesized "big bang" and "expanding universe" cosmology.

Supposed Recession of Galaxies

The red shifts in extra-galactic spectra were discovered in 1963 when M. Schmidt noticed that some of the Balmer lines in a cluster's spectra were shifted to the red end of the spectrum. He assumed that the shifts were Doppler effects and computed the velocities of other stellar objects.

... If the redshift is a Doppler shift, the object must be receding from us at about 15 percent the speed of light! With this hint, the emission lines in the other objects were reexamined to see if they too might be well-known lines with large red shifts. Such proved, indeed, to be the case, but the other objects were found to be receding from us at even greater speeds ... (Abell, 1973, p. 407).

Abell's "if," however, is quite a big one, and is an unprovable assumption. Actually, the argument is circular in nature, that is, stellar objects display a red shift because they are receding from us; stellar objects must be receding from us since they display a red shift. Unfortunately, all attempts at defining other mechanisms for causing red shifts are ignored. Notice Abell's cynicism (1973, p. 409) towards the idea that quasar red shifts might be gravitational in nature. "It has not been absolutely ruled out that the red shifts of the quasars are entirely or partially gravitational, but most experts regard it as very unlikely." Abell is asking us to believe

that quasar red shifts are indicative of motion simply because we have been too limited to determine other causes. Consider his comments (1973, p. 409) on the idea that the quasar red shifts are gravitational.

It is difficult, even theoretically, to construct a configuration of matter that fits the general characteristics of a QSS (i.e. a quasar) and has so large a gravitational redshift. (Parentheses added)

However, there remains the distinct possibility that the quasar red shifts are actually a combination of the two effects, as has been admitted by Bell and Fort (1973). Moreover, quasars appear to have enough mass to induce pronounced red shifts. "... quasars appear as though they might be the sort of dense, compact objects whose gravitational fields could produce appreciable red shifts." (Anon. a, 1976)

Since red shifts usually increase with the distance of an object, it has been assumed that the more distant an object is from our galaxy, the faster it is moving. Some have hypothesized that these galaxies are substantially older and appear to be moving faster than nearer, younger galaxies, since they had not decelerated appreciably at the time they emitted the light we are now viewing. However, to make the assertion that the red shift phenomenon is linearly related to distance one would first have to have mass/luminosity and luminosity/distance relationships worked out for quasars. These have not been determined (Anon. b, 1977). Thus, if a quasar behind a galaxy were found to be exhibiting a greater red shift than the galaxy, we have no way of determining how much farther away it is than the galaxy. Actually, we cannot determine galactic distances with any certainty.

... looking at things very far away is equivalent to looking far in the past, and if the observer can see a difference between how things were moving then and how they do now, he can maybe say something about openness or closure.

The procedure is to set up a Hubble diagram, which compares the red shifts of galaxies with the light flux received from them at earth. The formula that relates the flux at earth to their intrinsic luminosity contains the deceleration parameter.

This procedure works best if galaxies all have the same intrinsic luminosity. The fact is that they don't. Furthermore, galaxies are extended objects. Brightness varies across a galaxy's image, and the observer must be sure that his telescope aperture is adjusted to compare them.

The observer can take the brightest galaxy in each cluster, or whole clusters, and hope that these will have the same intrinsic luminosity; but then evolutionary problems intervene.

Galaxies evolve as units. Big galaxies tend to eat their satellite galaxies, and this changes their brightness as it goes on. Furthermore, stars evolve and change their brightness. As we look farther and farther away we look farther back in time to a period when perhaps the stars in the galaxies we see were all very young and therefore differently luminous from those in older galaxies. (Thomsen, 1976)

Since galactic distances are not obtainable, there is no way of knowing if the red shift in their spectra might

- A. THE UNIVERSE IS PICTURED TO HAVE ORIGINALLY BEEN A BALL OF HIGHLY CONDENSED MATTER. THE ANALOGY WOULD BE A BOMB WITH A LITE FUSE.
- B. DUE TO HIGH PRESSURE AND ATOMIC INTERACTIONS THE MATTER OF THE UNIVERSE WAS BLOWN APART. THE ANALOGY IS AN EXPLODING BOMB.
- C. AN OUTSIDE OBSERVER OF THE UNIVERSE (DOO?) WOULD SEE ALL MATTER SEPARATING FROM A COMMON CENTER. THE ANALOGY WOULD BE THE FRAGMENTS OF THE BOMB FLYING OUTWARD AFTER THE EXPLOSION.
- D. A VIEWER ON ONE OF THE FRAGMENTS WOULD SEE ALL THE OTHER FRAGMENTS FLYING AWAY FROM HIM.

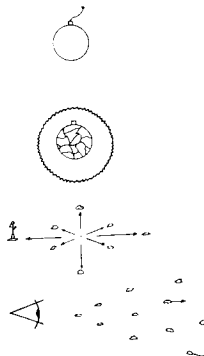


Figure 3. An analogy of the exploding universe.

not have some gravitational component. Moreover, there is also no way to forge a red shift/distance measurement scale for galaxies since there are no known mass/luminosity or mass/distance relationships with which to calibrate it. Thus, we see that little is actually known about red shifts and their relationship to the mass or distance of a galaxy or quasar. Therefore, the contention that they are Doppler effects remains unprovable.

Thermodynamics and the Red Shifts

The energy of a photon is given by the formula,

$$E = hf = (hc) / \lambda \quad (1)$$

where h is Planck's constant, f is the photon's frequency, and λ is its wavelength. Since c , the speed of light, is considered to be a universal constant, E , the energy of the photon, is directly proportional to its frequency and inversely proportional to its wavelength. However, the speed of a photon is not constant and c is the speed of light in a vacuum. When light enters a medium, such as glass, its speed is affected. As a photon passes through a piece of glass its speed decreases then increases upon reentering the air. But when its speed increases, does it do so at the expense of its energy content? And, if its energy content were reduced, would its wavelength not be lengthened, causing a red shift in the line spectra?

A photon could lose energy as it passes through the medium of space in other ways. Radio waves, which are a form of electromagnetic radiation, tend to lose energy as they travel along the earth's surface.

... ground-wave radiation consists of three components ... (one of which is) ... the surface component, which moves along the surface of the earth with the bottom edge of its wavefront in contact with the surface of the earth, in which it induces minute earth currents; poor conductivity, dry, sandy soil tends to attenuate the earth currents thus limiting the range of communication. (Topper, 1973)

If the dry, sandy soil of the earth could oppose the movement of "electromagnetic photons," there is no reason why the dry, poorly conductive dust in space could not have the same effect on photons. The result would be a decrease in the photon's energy that would be proportionally related to distance. Thus, we would expect the more distant objects to display greater red shifts since their light photons would have lost more energy during their intergalactic trip. This is exactly what is observed.

Light waves are composed of two components, that is, an electrical wave and a magnetic wave. This is significant since space is filled with ionized particles. When a magnet is moved through a closed loop of wire it will generate electrical currents in the wire. These currents, in turn, set up a second magnetic field which opposes the motion of the magnet. Likewise, the magnetic component of light moving through an ionized region of space would cause electrical currents to flow in that ionized field. The generated currents would then set up magnetic fields which would oppose the motion of the light wave, resulting in a decrease in the photon's energy and a corresponding decrease in its frequency, and an increase in its wavelength. This

effect would also cause greater red shifts in the spectra of more distant objects, in conformity with observational data.

Interstellar dust is capable of effectively scattering light waves as they pass through it.

A detailed description of the dust itself is not yet available. The dimming that they cause is typical of particles having a diameter of about 10^{-4} cm, and this value is confirmed by the reddening effect on light going through them, which may be thus explained: light going through a layer of dust will undergo a partial scattering. As blue light is scattered more effectively than red, the light that does get through contains an excess of red. (Degani, 1963, p. 95)

It appears that nebulae have the ability to interpose their velocity onto that of the light, causing red shifts (Anon. c, 1976). Thus, intergalactic and interstellar dust might cause red shifts simply by depleting the energy of the photons.

Gravitational Red Shifts

I have briefly discussed the phenomena known as "gravitational red shifts." This effect was first postulated by Einstein, (1961, pp. 130-1) who states, "An atom absorbs or emits light of a frequency which is dependent on the potential of the Gravitational field in which it is situated." Einstein found experimental verification for this postulate in the spectra of the sun and other stars and the curvature of light rays around the sun. He states that "these two deductions from the theory have both been confirmed," (Einstein, 1961, p. 104) and further elaborates on the shifting of spectral lines in the spectra of the companion star of Sirius and the Sun, for which the predicted shift was two millionths of a wavelength (Einstein, 1961, pp. 131-2). However, Einstein eventually discarded these observations along with his postulated mechanism for producing red shifts in favor of Doppler effects (Einstein, 1961, p. 134). Prominent astronomers are suggesting that quasar red shifts might be a combination of the Doppler and gravitational effects (Bell and Fort, 1973). Others state, "A strong gravitational field at the source of light will cause a red shift ..." (Anon, a, 1976)

Actually, the gravitational effect coupled with a tired light effect explains the observed phenomena very well. We have seen that the more distant a galaxy, the higher a red shift that it displays. Also larger galaxies tend to display larger red shifts than smaller galaxies. "Some astronomers at once noted that the bigger the galaxy, the bigger the red shift, and the greater the speed ..." (Gallant, 1966, p. 58). These data, on the other hand, do not conform well with the present cosmological model, for why should larger galaxies display larger red shifts? This is especially significant since there is no reason why larger galaxies should be moving faster than smaller galaxies. In fact, the converse is true since the velocity of ejection of an object in an explosion is inversely proportional to its mass. Moreover, this observation goes contrary to the present cosmological model which postulates that the smaller galaxies are the youngest, having emitted their light millions and billions of years ago. Since they had not slowed appreciably at the time they emitted the light

we are now seeing, they are supposed to have been traveling faster than the larger, older galaxies, which emitted their light relatively recently. Thus, the larger galaxies should be moving slower, not faster. Also, since our planet recedes from the sun for six months, the sun should display a blue shift during that time. Instead, it displays a continual red shift.

Wavelengths of Photons Can Be Changed by Focusing

In 1976, scientists in France and at Los Alamos discovered that highly focused laser photons act as if they have a shorter wavelength than they have when first emitted . . . (Allen, 1977)

While such an effect will cause a blue shift in the photon's line spectra, it is noteworthy for it shows that the wavelength of a light particle can be altered by mechanisms other than the Doppler effect.

The Effect of Nebulae on The Frequency of Photons and The Aurora Effect

Auroras are caused by the interaction of electrons with hydrogen atoms in the outer parts of the earth's atmosphere. As the electrons excite the hydrogen atoms, they transfer some of their momentum to the atoms, which then display a blue shift in their spectra as they spiral into the inner earth atmosphere (Whitten and Poppoff, 1971, pp. 203-13). Stars, being of the same basic composition as our sun, emit protons and electrons, both of which will cause Doppler blue shifts when they interact with gases of interstellar and stellar space. This effect is significant since such interactions will either cause line shifts in the spectra of the object emitting the particles or alter any shifts which might have already been present. The total shift would then be unwittingly attributed to the stellar object. Thus, even if the shifts are Doppler in nature, this effect would make the determination of radial velocities impossible. Some astronomers have actually hypothesized that nebulae between a stellar object and a viewer could actually impart shifts corresponding to their own movement, eradicating any Doppler shift which the object itself imparted to the photons.

. . . one might envisage a number of . . . 'clouds' intervening between the observer . . . (and the galaxies one is viewing) . . . The clouds would be moving with just the right velocities so as to cause the Doppler shifts attributed to the galaxies which they front. (Anon. c, 1976)

The explosion of Nova Persei caused an echo effect on a neighboring nebulae which made the nebula appear to be traveling at twice the speed of light.

. . . in the explosion of Nova Persei of 1901 . . . Light from this explosion was reflected from a nearby nebula, and the part of the nebula that reflected the 'echo' appeared to be moving across the sky at a speed of $2c$. (Anon. d, 1977)

It is recognized that black holes are capable of sending the ionized gases around them into motion at speeds approaching that of light.

This kind of action could produce flashes of light moving in opposite directions along the axis of the vortex . . . (piercing the sphere of infalling matter

around the black hole) . . . As these flashes struck patches of ionized gas in space, they would set it moving at speeds near that of light. The patches hit by the light burst would be visible from earth by reflection of the light from the central source or by light of their own generated as a result of the disturbance. (Anon. d, 1977)

There is observational and theoretical evidence for the Aurora effect that can cause line shifts in light spectra.

Molecular Beams Can Cause Line Spectra Shifts

When light passes through a molecular beam perpendicular to the direction of the beam, very little "Doppler" shift is induced in the light waves. If the waves enter parallel to the molecular beam, an effect known as "Doppler excess" is caused, and the lines will have an additional shift imposed upon them. Concerning the effect, Harmony (1972, pp. 101-2) states,

One final broadening phenomenon that is important in some spectroscopic applications with gases is that of Doppler broadening. The Doppler effect produces a shift in the absorption frequency . . . We see that light molecules, high temperatures and high frequencies tend to increase the line width. Doppler broadening has been effectively reduced in some experiments by using molecular beams in which the molecular velocities . . . are nearly unidirectional. Thus the electromagnetic radiation, if brought in at right angles to the molecular beam, produces very little Doppler shift and consequently very narrow linewidths are obtained . . .

Proton, electron and molecular beams can cause shifting in the line spectra of stellar objects as outlined by Howard, You, and Eshleman (1964).

During 1962 and the first half of 1963 more than three hundred hours of data on radar echoes from the moon have been collected and analyzed. This letter is a preliminary report on the principal features of the studies of the 'Doppler excess' frequency, the amount by which the measured Doppler frequency (received frequency minus transmitted frequency) exceeds what it would have been if the propagation medium had been free space. In the present experiment the Doppler excess frequency is almost entirely due to the time rate of change of the electron content in a column between the earth and the moon.

A limited number of comparisons with Faraday polarization and with other ionospheric measurements reveals that the Doppler excess effects are largely due to changes that take place in the ionosphere, the rest of the cislunar medium being fairly stable . . . changes taking place in the ionosphere are responsible for most of, but by no means for all, the earth-to-moon columnar density changes detected in the Doppler excess measurements . . . Gradients in the interplanetary electron density could result in very large values of Doppler excess.

This effect, that is the "Doppler" shifting of radar waves bounced off the moon, shows conclusively that any model based on the premise that red shifts are

solely Doppler effects is simply wrong. Quasars and pulsars generate large beams of energy and molecules, along with novae, stars, black holes, neutron stars, and other galactic phenomena. All these would cause disruptions in the electron content of the universe, thereby inducing line shifts in the various light quanta traveling through space. Since the effect would be cumulative, this mechanism alone can explain why red shifts increase with the distance of an object. In essence, it is possible that none of the red shifts are Doppler effects and that the whole foundation for an expanding universe resulting from some primordial big bang is non-existent.

Temperature and Wavelength

High temperatures and high frequencies tend to cause the line spectra to broaden. Line broadening can also result "from shifts of energy levels during the collision process." (Whitten and Poppoff, 1971, p. 78). This type of broadening is known as Lorentz broadening. The temperatures of nightglow emissions are sometimes measured by determining the width of the line spectra (Whitten and Poppoff, p. 199). Moreover, the temperature of an object does have other definite effects on the wavelength of the light which the object will emit. For example, the temperature of an object will cause one of the wavelengths of the emitted light to possess more energy than the other wavelengths, that wavelength being denoted as $\lambda_{\max}$ (Degani, 1963, pp. 76-7). $\lambda_{\max}$ is related to temperature by the following formula,

$$T = \frac{289 \times 10^5}{\lambda_{\max}} \quad (2)$$

$\lambda_{\max}$ is found by plotting the light intensity for the various wavelengths of light emitted by an object. $\lambda_{\max}$ will have the highest intensity. Since temperature can affect the wavelength and width of spectral lines of the light emitted by a luminous object the possibility that it might also affect the positioning of the spectral lines cannot be discounted.

Doppler Broadening

The rotation of stars and galaxies can cause spectral line broadening. (Petrie, 1969, p. 72; Münch, 1968, p. 388). However, this broadening is usually attributed to the Doppler effect and is called Doppler broadening. Keu (1968, pp. 577, 584) discusses the presumed relationship of line broadening to emitter speed. He states that "integrated profiles from external galaxies have widths of several hundred kilometers per second." Münch (1968, p. 388) states that galactic rotation can cause line broadening and admits that some of the broadening in galactic spectra cannot be accounted for. This should have been obvious since there exist many mechanisms for broadening spectral lines. Moreover, many lines are so narrow that the lines themselves can only be detected if they are broadened (Keu, 1968, p. 584). Lastly, to complicate matters further, the spectral lines of galaxies will sometimes merge, forming one "broadened line." Unfortunately, these broadening and blending phenomena are not necessarily symmetrical.

Two effects generally prevent the use of laboratory data without investigation, as follows: (a) the

blending of several pure absorption lines into a single feature and the asymmetrical broadening of a single strong line by adjacent absorption lines and (b) asymmetrical broadening such as that produced by the Stark effect, which influences the position of an absorption line in a complicated way. In addition, we must also consider the possibility of local atmospheric motions producing a false radial velocity, as, for example, in the spectra of 'shell' stars. This matter cannot be investigated very well until the blending and broadening distortions are evaluated. (Petrie, 1969, p. 72)

Thus, the determination of line shifts or the amount of line broadening is questionable for no one knows where the unaltered lines lie on the spectrum.

... It has been found that, in spectra later than AO, practically all features are blends of two or more lines when observed with moderate dispersion. The effective wave lengths vary with linear dispersion and spectral purity, and, with a given spectrograph, a great many vary with spectral type, with absolute magnitude, and with the amount of broadening caused by rotation of the star. One cannot, without prior investigation, adopt wave lengths from the literature and be certain that the resulting velocities are, in fact, accurate motions in the line of sight. (Petrie, 1969, p. 72)

In measuring line broadening and line shifting, much of the conjecture concerning an object's speed is based on sketchy data. First, consider how small the line shifts actually are.

The measurement of stellar radial velocities is generally difficult because of the smallness of the Doppler displacements. A typical single-prism spectrograph may be expected to give a linear dispersion . . . of about 40 angstroms per millimeter. One millimeter on a spectrogram of this dispersion corresponds to a radial-velocity displacement of nearly 2900 km/sec. Radial velocities are ordinarily about 1 percent of this amount, and we must therefore make significant measurements of a few microns on the photographic plate. (Petrie, 1969, p. 64)

Second, a large amount of interpolation must be employed. This, coupled with human error, photographic distortions, and equipment defects make the measurement of red shifts almost impossible.

It was mentioned above that Doppler shifts are usually a few microns on the single-prism spectrograms ordinarily obtained in extensive programs. Defects in the measuring apparatus, photographic distortions, and human frailties can produce errors of about the same size. Significant measures are possible largely because the process is one of interpolation from comparison to stellar spectrum. Every care must be exercised in the use of measuring micrometers, and good judgment must be applied in making visual settings. As remarked by Campbell, 'an inexperienced or careless measurer will obtain poor results from perfect plates.' (Petrie, 1969, p. 67)

Thus, the determination of radial velocities from the measurement of line shifts or line broadening remains questionable at best.

Absurd Conclusions Based on the Current Interpretation of Red Shifts

A brief survey of the scientific literature will show that the present interpretation of red shifts is incompatible with the available data. For instance, if these shifts are Doppler effects, then many objects in the universe are moving at impossible speeds.

The largest speed yet measured (at the time of writing) is of a very distant cluster, known as 3C295, that is moving away from us at 41 percent of the speed of light, or about 76,000 mi/sec. (Abell, 1973, p. 415)

The mass of the object described by Abell would have increased 20 percent if the object is really moving that fast. If this is the case, then luminosity/distance and luminosity/mass relationships would remain unobtainable. Another problem is that of our own position in space. Are we actually traveling at 76,000 miles per second? Or could we be traveling at the speed of light, and therefore incurring infinite mass, unable to recognize our situation or to discriminate finite mass from infinite mass? If we are traveling at appreciable speeds, then the mass of our electrons, protons, and neutrons is greater than their true rest mass. If this is the case, then we can conclude that we know nothing about the nature of the universe and that our "constants" are totally useless.

In fact, astronomers have actually found objects with such large red shifts as to lead to the conclusion that they are traveling faster than light.

An object that goes faster than light is about as welcome to physical scientists as a real live ghost would be to the American Humanist Association. Yet there are at least three quasars that appear to be composed of two or more pieces that are flying away from each other at speeds greater than that of light. The response of most astronomers is that it is just an appearance and must somehow be explained away. The most popular explanations to date seem a bit contrived, however . . . the faster-than-light phenomena include apparent velocities up to $8c$. . . The apparent large multiples of c are gotten rid of by changing the value of the Hubble constant from the commonly used 55 kilometers per second per megaparsec to 110 kilometers per second per megaparsec. (Anon. d, 1977)

But how can a branch of science stand when its most fundamental constant, the Hubble constant, is constantly being changed? The admission of the above article is that we have no idea as to the true relationships between red shift and velocity or distance, and that the computed distances and speeds are totally unreliable. Their speeds could be halved or doubled depending on the prevailing opinion as to what the value of the Hubble "constant" is. Moreover, an increase of 100 percent in the Hubble constant would decrease the computed age of the universe by 50 percent. If objects with still higher red shifts are found, the age of the universe could be decreased (to 10,000 years, perhaps?).

The situation is still more irrational than appears at first. Consider Figure 4, which is a simple diagram of the universe showing our position with that of two other galaxies. Since the vast majority of galaxies and quasars are red shifted, it is assumed by astronomers, astrophysicists, and cosmologists, that all these galaxies and quasars are receding from us. However, receding celestial objects are found in all directions. When we invoke vector analysis, it then becomes obvious that if all these objects are receding from us, many of them must be moving at the speed of light, or faster. For instance, if we observe objects A and B moving at 80 percent of the speed of light, and if we are moving in the direction of object B at some unknown velocity, then object B would actually be traveling at a velocity equal to the sum of our galaxy's velocity plus its apparent recession velocity. If we are moving at 20 percent of the speed of light, then object B is actually moving at the speed of light. If we are moving faster, then the speed of object B would exceed that of light. This, of course, is impossible since it would have to have an imaginary mass, making it impossible to see the object. Thus, the present acceptance of the red shifts as Doppler effects is not valid.

Discordant Red Shifts

Are there any inconsistencies in the data itself which would warrant the discarding of the hypothesis that red shifts are Doppler effects? Consider the evidence gathered by Arp.

The quintet and sextet are tight groupings of galaxies whose markedly different red shifts would (if conventionally interpreted as distance indicators) imply very unequal distances from us. Arp has long maintained that large red shifts do not always indicate great cosmic remoteness, and has offered evidence that the galaxies in each group are really at the same distance and are physically related . . . Particularly significant are a broad luminous tail that appears to connect the low-red shift member of Stephan's Quintet to a nearby high-red shift galaxy, and filaments that seem to lead from high-red shift members of the quintet to the center of the nebulous network between it and NGC 7331. . . . The scientists found what is possibly an 'umbilical cord' connecting the high-red shift galaxy of the sextet to a low-red shift member. (Anon. e, 1977, pp. 107-2)

Here we have direct evidence of a cosmic catastrophe causing the discordant red shift. But how many other catastrophes may have befallen the galaxies in the universe, affecting their speed and red shift? Consider

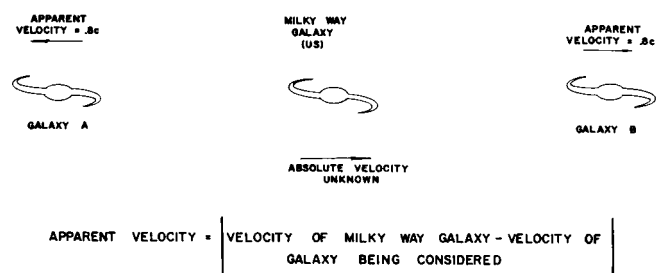


Figure 4. Galaxies receding from Milky Way.

a second example in which two totally unrelated galaxies display red shifts which cannot be harmonized with the present cosmology.

... At the meeting, Arp presented an instance where a high-red shift object appears to be in front of a low-red shift one. There appears to be a bright object with a red shift corresponding to a speed of 13,300 kilometers per second in front of the E galaxy NGC 1199, which has a red shift corresponding to 2,600 kilometers per second. Arp argues that the bright object is in front of the E galaxy because it is surrounded by a disk of dark matter that appears spectroscopically as if it is absorbing light from the E galaxy. If the bright object were behind the E galaxy, it would add to the brightness of the image and the absorption by the dark disk would not be seen. Therefore, most of its red shift must come from some cause other than motion of recession, he says. (Anon. f, 1977)

This finding directly contradicts the present "expanding universe" cosmology which insists that galactic red shifts are directly proportional to their distance. However, when we consider the various mechanisms for imposing line shifts discussed in this article the situation becomes clearer. The light from galaxy E, as it passes through the closer object, is being absorbed, as noted by Arp. The clouds are then altering the spectral line shift in the light of galaxy E, causing an "Aurora effect." The spectral lines are thus being blue shifted from their red shifted positions as the light passes through the nebulae. Moreover, it now appears that galaxies come in certain types, each type displaying its own peculiar red shift characteristics.

... In 1973, William G. Tifft of the Steward Observatory reported that the red shifts of a group of galaxies in the center of the Coma cluster separated into three distinct bands when plotted against the galaxies' apparent magnitudes. ... He has categorized into three groups a complete sample of galaxies taken from the Zwicky catalog which lie within 3° of the center of the Coma cluster. The first group contains all the galaxies that emit radiation in the radio continuum. The remaining two groups are populated by those that emit a strong hydrogen spectral line ... on one hand and those with a weak or absent H-beta line on the other. He contends that the whole of the data reinforce the original observations of the three discrete bands. ... The 'weak-emission line' data plotted alone seem to fill in only the middle red shift band with only a few 'stragglers' in the high and low bands. The other two galaxy groups, however, each populate only the outer two red shift bands, the high and low ones. Tifft argues that this different behavior among the three groups would not be expected if the shifts were truly

Doppler ... From Tifft's point of view, short of some contrived mechanism that would assign just the right systematic velocity to a galaxy depending on the type of radiation it emits, the Doppler shift interpretation appears untenable ... (Anon. c, 1976)

Since the red shifts appear to be related to the type of radiation the object emits, rather than its distance, I conclude that few of the shifts are actually Doppler in nature. The other mechanisms, such as gravity, are shown to be more appropriate for generating the red shifts. Moreover, due to the vagueness and seemingly contradictory nature of the recorded data, a red shift/distance relationship has never been successfully calculated, leaving the so-called "Hubble constant" undetermined and indefensible as a theoretical construct. Thus, the Doppler explanation must be abandoned, leaving the "Big Bang" evolutionary cosmology without any supporting evidence.

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QUOTE

Is our economy of profane possession more proficient in its technology? Will our magical belief in matter as the only value not bring us to a disaster as final as the Indians received? Will we then imitate the stake and electrocute the scientist and the engineer for our common failure to make all substance give up the secret, and for our particular impiety in substituting the laboratory for the altar?

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ARTICLE REVIEW

Ontogeny and phylogeny recapitulated by K. S. Thomson. 1988. *American Scientist* 76:273-5.

Reviewed by Walter E. Lammerts*

Though an evolutionist, evidently Thomson has little use for the recapitulation theory. As he says:

I wonder whether the phrase "ontology recapitulates phylogeny" would so persistently have fascinated biologists, or so long have survived among the debris of half forgotten science that we all retain from high school, if it were not rather euphonious. Would something like "development repeats evolutionary history" have worn so well?

He grew to love the rich authority of those fifties and sixties McGraw-Hill books with the sober brown bindings and gold lettering. In them of course the so called biogenetic law was claimed to be one of the most firmly established facts of biology. And he learned, with everyone else, how to confuse Haeckelian and von Baerian recapitulation. He then asks what does this matter more than 30 years later. Surely the biogenetic law is as dead as a doornail (according to Thomson). Von Baer and his predecessors had hit upon a fundamental fact of nature. Because all organisms are related, this relatedness is demonstrated in similarities of embryological development. Thus in vertebrates the notochord is developed or observable before any primordium of the jaws, and the jaws earlier than feathers and so on. To the extent that there is any validity to these generalizations, therefore there ought to be a clue to phylogenetic history in ontogenetic history if only we could find it.

Von Baer showed in 1828 that adult recapitulation does not actually occur. A close comparison of the embryonic series demonstrates only that embryos resemble other embryos. There is no recapitulation of adult stages of ontogeny. Von Baer's first and second laws established the major parallelism between ontogeny and phylogeny: "the general characters of the big group to which the embryo belongs appear in development earlier than the special characters"; and "the less general structural relations are formed before the more general and so on until the most special appear." Now Thomson claims that these concepts of von Baer are wonderful evidence for the fact of evolution. This belief of Thomson is simply one which I fail to see. For under any plan of creation surely the same units of construction were used wherever possible. Accordingly all organisms are in this sense 'related' since they were made by the same Creator.

In 1866 Haeckel put the emphasis back on adult recapitulation, and his law states that: "ontogeny is the short and rapid recapitulation of phylogeny." Thomson points out Haeckelian recapitulation cannot be literally true because the ontogeny of any living species would be almost indefinitely long as the sequence of characteristics of every ancestor (any evolutionary divergence) was rerun. For the Haeckelian view to be true evolutionary change would have to occur through

the addition of new stages of terminal additions to the developmental history of the immediate ancestor.

Despite all the weight of evidence Haeckelian recapitulation was believed for a long time, probably because it fit so perfectly with emerging Darwinian evolution, that is small gradual changes in the phenotype as a result of selection on phenotypic characters appearing in adults. Mendelian genetics looked similar to terminal addition, but it should be noted that the simple term *allele substitution* contains the very antithesis of terminal addition.

Some systematists still use time of appearance in ontogeny of a character as a measure of its relative primitiveness. The need of comparative morphologists and especially paleontologists for a solid theoretical foundation for homology was also a factor requiring some sort of recapitulation. If evolution proceeded largely by terminal addition and if these involved only small changes in phenotype, then progressive evolution in the sense of major phenotypic reorganization and major new innovations would be largely finished. According to Thomson the major divergences in evolution, from the origin of the phyla to the diversification of groups like vertebrates at the class and ordinal level must all have involved key additions to ontogenies long ago when they were simpler. Ontogenies would now be so complex and interactive, that only minor additions and deletions would be possible. This is precisely what creationists believe, only they appeal to a creative process which instigated these original diversifications.

In this view the sort of trivial changes made possible by shifts in balance between size, form and sexual maturity expounded by de Beer and Gould become the principle source of available evolutionary change in morphology.

The Haeckelian point of view persisted so long because we are highly conservative, especially when the logical alternative upsets the rest of our world view. As Thomson says, logical consequences of the von Baerian approach are not revolutionary. For the logical consequence of von Baer's generalizations is that ontogenies do not change through terminal addition, but rather through a substitution of information at given stages. This view was anathema to many traditional evolutionists who saw in it the worst enemy of Darwinism, which is macromutationism. Also ontogenies of related organisms do differ at early stages rather than at late terminal ones.

Thomson concludes that neither von Baerian nor Haeckelian concepts tell us much about phylogeny. One of the most important statements that Thomson makes is that minor taxonomic differences such as at the species or genus level can be caused at any ontogenetic stage from the egg to final differentiation of the cells to complete the development of the organism. Therefore, comparative ontogenetic sequences cannot give us a precise reading of relative time of divergence.

Thomson concludes that all the versions of a biogenetic law have the same infuriating but fascinating quality. They reveal nothing beyond the generality that we already know. No one has yet succeeded in

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developing a greater range of hypothesis, and, given the opportunistic nature of evolutionary change, the chances are that no one ever will. Creationists would agree to this for the simple reason that evolution never

occurred and so there is no chance of finding any clue to the relationships of organisms when there has actually been no development of one organism from another except, of course, varieties within species.

BOOK REVIEWS

Catastrophes in Earth History (ICR Technical Monograph 13) by Steven A. Austin. 1984. Institute for Creation Research. El Cajon, CA. 318 pages. \$13.95.

Reviewed by Emmett L. Williams*

The author has performed a good service for earth scientists in general and creationists in particular by preparing this monograph. Austin realizes that the concept of the earth evolving to its present configuration by only the action of gradual processes is flawed. Many catastrophes that have affected the earth are presented in this book to indicate the importance in earth history of such events.

After a chapter entitled history and philosophy in which the author discusses gradualism and catastrophism noting some of the failings of uniformitarianism, he discusses specific catastrophes cataloguing them as follows: Cosmic Catastrophes

Extrusive and Intrusive Catastrophes

Mass Movement Catastrophes

Water Catastrophes

Atmospheric Catastrophes

A final section deals with related topics such as rapid lithification and sudden extinction of living organisms.

When a specific catastrophe is presented, a primary literature source is given for further study with a one-paragraph abstract to familiarize the reader with the event or phenomenon. References to recent events such as the eruption of Mount St. Helens and subsequent rapid changes and the development of Surtsey Island are noted. Several illustrations enhance the presentations. This work is a valuable source book for students of earth history and offers a refreshing antidote to an overdose of gradualism once popular in geological circles.

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The Origin of Living Things by Darrel Kautz. 1988. 10025 West Nash, Milwaukee, WI 53222. 68 pages. \$5.95.

Reviewed by Larry S. Helmick*

At first glance, one would not expect to find much technical information concerning the origin of life in a 68 page paperback book written by a person who confesses that "the field of science is tangential" to his "lifelong work as a student of the Bible." But this book is a pleasant surprise. Not only has Kautz done his homework in this area, but he writes with an exceptionally straightforward, clear, concise style that reflects his years of experience in teaching as well as writing.

The book is up-to-date. It presents the latest thinking and research by leaders in origin science, and is thoroughly documented (166 references). The prin-

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cipal creationist and evolutionist positions are well understood and accurately presented without distracting or derogatory comments so often found in this field. Technical terms are not only used for the benefit of the professional scientist, but they are also always concisely and accurately defined for the student or layman who has a nontechnical science background.

Kautz uses "known scientific information" to solve the problem: "How did the universe, earth, vegetation, fish, birds, animals, and human beings come into existence?" He lists four possible solutions: 1) the agnostic's solution; 2) the atheistic evolutionist's solution; 3) the theistic evolutionist's solution; 4) the Biblical creationist's solution. Half of the book deals with the first three solutions and half deals with the fourth one. Kautz does not equivocate or compromise in his conclusions. After comparing all four solutions to known scientific data and laws, he clearly, specifically, and completely rejects the first three while standing solidly behind Biblical scientific creationism. This conclusion is summarized in the following statement: "Contrary to much current thinking about origins, no Bible-believing person need be intimidated by any evolutionist."

My only concern about the book is that it was not published by an organization which could give it nationwide publicity and distribution. It certainly ranks with some of the best summary material in origin science that has been published in recent years and deserves a wide audience. I plan to use it as required reading for a five quarter hour general education course in origins, and strongly recommend it for others who desire to obtain that depth of understanding of origin science.

What is Creation Science? by Henry M. Morris and Gary E. Parker. 1987. Master Books, El Cajon, CA. 336 pages. \$10.95.

Reviewed by Clifford L. Lillo*

This summary of creation science is probably the best available. A revised and expanded version of the book by the same title originally printed in 1982, it incorporates many current quotations by evolutionists. A section presenting the credentials of the two authors is followed by an Introduction that answers the question: "What is creation science?"

The body of the book is divided into three sections:

1. Evolution: Is it science or a religious faith? New to this version, this section, written by Dr. Morris, contains excerpts from the rest of the book. In crisp, concise paragraphs, Morris summarizes many of the most important creationist positions that show evolution is indeed a religious faith.

2. The life sciences: Included are sections by Gary Parker giving the evidence of creation in living systems, a discussion of the nature of biologic change,

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and finally the fossil evidence leading to the inescapable conclusion that life on the earth was created.

3. The physical sciences: Here Morris covers the laws of science, catastrophism in geology, and a discussion of how the world began.

Throughout the book, Parker and Morris have quoted extensively from evolutionist literature to show that there is diversity of opinion among evolutionists. For example, in the life sciences section, Dr. Parker has quoted from Michael Denton's book, *Evolution: A Theory in Crisis*, published in 1985. Denton acknowledges the many problems with evolutionary theory but still remains an evolutionist. As Parker says:

Dr. Denton refers to the chemical evolution scenario as "simply an affront to reason," i.e., an insult to the intelligence!

He openly and frankly states that the thesis of his book is "anti-evolutionary" . . . but it seems to me that he is cautiously taking a step even further . . . in his honest analysis of the creation-evolution controversy through history, Dr. Denton freely admits that many of the scientific views of the early creationists have been vindicated by modern discoveries in science (p. 49).

In parts I and III, Morris quotes from Denton, but also from Steven Stanley, Niles Eldridge, Tom Kemp, and many other prominent evolutionists. Especially interesting is the quote from Tom Kemp, Curator of the University Museum at Oxford University:

A circular argument arises: Interpret the fossil record in the terms of a particular theory of evolution, inspect the interpretation, and note that it confirms the theory. Well, it would, wouldn't it? (p. 4)

Although quotations from evolutionists help the creationist cause to a large degree, the research on various methods of determining the age of the earth, listed in Table I, offers one tremendous problem for evolutionists. Even if the theory of evolution could overcome the problems of trying to get life from non-life and the total lack of support offered by the fossil record, the many indicators of a young earth provided by Table I make the theory of evolution absolutely unacceptable to any thinking scientist.

Genesis 1 (Word Bible Commentary, Volume 1) by Gordon J. Wenham. 1987. Word Books, Waco, TX. 353 pages. \$24.95.

Reviewed by David C. C. Watson*

This is an academic commentary written for theological students rather than ordinary Christians. Many pages are devoted to the JEPD hypothesis: we are disappointed to find no such defense of the Mosaic authorship which was formerly standard among evangelical scholars 50 years ago. GW is more concerned that we should weigh all possible views, rather than adopt any particular one.

However, this 'neutral' attitude is markedly absent in Genesis 1-3 where he follows Henri Blocher's exposition (*In The Beginning*, Intervarsity Press, 1984)—

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heavily biased against creationism. GW makes the same error of imagining that a passage of literature carefully constructed with repetitions, 'formulae,' etc. cannot be literally true. So without examination he dismisses the traditional interpretation, and condemns all attempts to relate these chapters to the real world of geology, biology and anthropology. Science, we are told, is "complementary" to Scripture. Is man an ascending ape, or a fallen angel? Both!

I feel sorry for theological students thus doomed to sit forever on the fence. "When you read of a new book published, buy an old one" was Winston Churchill's advice. In my opinion Calvin's commentary, or Leupold's or Henry Morris's *The Genesis Record*, all have a better claim to be called "the best in evangelical scholarship" (publisher's blurb). But if you have the misfortune to be facing a BD examination, go for Wenham!

Evolutionary Epistemology, Rationality and the Sociology of Knowledge. 1987. Edited by Gerard Radnitzky and W. W. Bartley III. Open Court, La Salle, IL. 475 pages. \$14.95.

Reviewed by Paul A. Zimmerman*

This volume is a collection of essays by an international group of distinguished philosophers, a historian and a psychologist. Some are classics in the field while others are published here for the first time. The editors indicate that this publication has its roots in a series of conversations, meetings, and extensive correspondence by the contributors. Conferences were held largely in Europe from 1982 to 1985. Special credit is given to Sir Karl Popper the distinguished English philosopher. Indeed two of Popper's essays are included in the book.

Epistemology is the theory of the method of gaining knowledge. Evolutionary Epistemology is the application of evolutionary theory to methods of gaining knowledge. It also includes an evaluation of the logic underlying the evolutionary process. The first part of the volume is devoted to this endeavor. The last two-thirds examines the theory of rationality and the sociology of knowledge. Issue is frequently taken with other scholars in the areas of contemporary sociology and the psychology of knowledge.

It is this reviewer's impression that this is a book by professional philosophers published for professional philosophers. It is very difficult reading, both because of the nature of the subjects treated and because there is little attention given to explaining philosophical jargon for the benefit of the non-philosopher.

It also seems that the scientific theory of evolution is accepted rather noncritically in applying it to epistemology. Popper is quoted on page 54 as saying:

The Darwinist theory of evolution is assumed; but it is restated by pointing out that its 'mutations' may be interpreted as more or less accidental trial and error gambits, and 'natural selection' as one way of controlling them by error elimination.

In treating the probable development of instinct by evolutionary processes Campbell, on page 61, states,

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"The joint likelihood of the simultaneous occurrence of the adaptive form of the many mutations involved is so infinitesimal that the blind-mutation-and-selective-retention model seems inadequate." However he goes on to state conditions under which he conjectures this handicap could be overcome. Some attention is given to the alleged tautology or circularity of Darwin's theory of natural selection, i.e.; it only asserts the survival of the survivor. But attempts are made to rebut this in support of Darwin (p. 196).

Sir Karl Popper evidently believes that evolution is well established. However he cautions on page 143:

The claim that it (i.e. Darwinism) completely explains evolution is of course a bold claim and very far from being established . . . really severe tests of the theory of natural selection are hard to come by, much more so than tests of otherwise comparable theories in physics or chemistry.

Credit must also be given to the philosophers that one frequently finds words such as "our speculation" and "I conjecture." However, the main thrust of the book is the use of "the language of evolutionary theory to confront and treat problems relating to the advancement of knowledge" (p. 450). The same reference contains the caution that the "mechanisms of organic evolution and those of cultural and intellectual evolution are not identical, despite their close parallels."

Did Charles Darwin Become a Christian? by Wilbert H. Rusch, Sr. and John W. Klotz. 1988. Creation Research Society Books. Norcross, GA. 38 pages. \$3.00
Reviewed by Preson P. Phillips, Jr.*

Repeatedly, throughout his life's ministry, the Christian leader will be confronted with a tract from some unknown source that sets forth the startling "truth" that Charles Darwin was "converted" in the twilight years—or months—or weeks—of his stormy and controversial

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life. There is something about Christians that gives them the feeling that the conversion of some widely-known atheist or enemy of the Bible is a great miracle and is the strongest possible evidence of the trustworthiness of the Bible and of the Gospel—much stronger than the "ordinary" conversion of the "run of the mill" Christian. Such tracts as those mentioned above prey upon Christians with this type of mind set.

Rusch and Klotz do an excellent job of debunking the Darwin Conversion Theory. One of the most interesting items that appears throughout the volume is that the Darwin Conversion Theory rests entirely upon the testimony of one woman—a "Lady Hope"—a nebulous character that cannot be positively identified.

Whoever "Lady Hope" might have been, her description of "Darwin's Last Hours"—when, allegedly, he gave his testimony of conversion—is rejected categorically by Darwin's own daughter who further states that "Lady Hope" was not even present at the time of Darwin's death. In fact Darwin never even saw her. The daughter, quoted by Rusch, says this "Lady Hope" was not present during Charles Darwin's last illness—OR ANY OTHER ILLNESS. Nor was his home and its environs in any way the same as described by "Lady Hope." Thus the Darwin Conversion Theory must rest entirely upon the testimony of one woman who cannot even be identified—much less believed.

Klotz uses the testimony of Darwin himself—right to the very end of his life—to show that, far from being converted, he became stronger and more consistent in his UNBELIEF as he approached the end of his life. Klotz summarizes his evidence in these words:

It is apparent that once Darwin had given up his acceptance of the authority of the Scriptures and the historicity of their reports he moved farther and farther from the faith and more and more into the area of skepticism.

In fact, his ultimate characterization of himself was "agnostic."

LETTERS TO THE EDITOR

Meditations on Order and Disorder

Introduction

We are the children of chaos and the deep structure of change is decay. At root, there is only corruption, and the unstemmable tide of chaos. Gone is purpose; all that is left is direction. This is the bleakness we have to accept as we peer deeply and dispassionately into the heart of the Universe.

Yet when we look around and see beauty, when we look within and experience consciousness, and when we participate in the delights of life, we know in our hearts that the heart of the Universe is richer by far. But that is sentiment, and not what we should know in our minds. Science and the steam engine have a greater nobility. Together they reveal this awesome grandeur of the simplicity of complexity. (Atkins, 1984, p. 200)

This quotation yields a rich harvest of the despairing thoughts of modern science: 1. There is only corrup-

tion, no redemption. 2. Chaos is unstoppable and ineluctable. 3. Existence is bleak and joyless. 4. The heart of the Universe is the object of worship. 5. Sentiment is banned from science. 6. Awesome grandeur belongs to "simplicity of complexity." (Can even dialectics understand that simplicity and complexity are really the same?)

An Image of the Relationship of Order and Randomness

After pouring over the Portland city map all day, inserting colored spots with a felt tip pen to indicate addresses of customers for a given month, I turned the map over and a simple image of the relation between order and disorder, intelligence and chance was revealed. I will assume I have intelligence. I also was directed by a purposive algorithm which required a series of actions—a process with an end—the completion of all the representative spots for all customers for the given month. When this process was finished the results could be used for interpreting many intelligent

aspects of the business. The map surface was rational, revealing, and restrictive in the intelligent relationships discovered.

Here is the revelation! The back of the map had no rational, revealing, or restrictive information. All that presented itself was an apparent random pattern of felt tip bleed-throughs from the rational side of the map. However, I know the pattern on the map back was *not* random. I know their position is determined by the work of an intelligent being who has worked on the oriented map on the other side.

Thus it is that God drives men to feel "vanity of vanities; all is vanity" (as with P. W. Atkins above) with respect to the universe—because they have refused to allow God to take them topside of the ship of life from which vantage point He plots and maps the course of all the Universe. Instead they try to make sense of existence by correlating the random points made apparently "on their own" which reveal no rationality without the Word of God—the master map maker and interpreter.

Without The Word, the world consists of random points connected without sense . . . with the Word, a Creation of finite glory pointing us to its Maker. God drives the finite world in which we dwell to vanity in order that we shall be unable to worship any corruptible thing or even the entire Universe (still a corruptible thing as P. W. Atkins sees so clearly). Either give glory to God and cling to His integration points or suffer the world to be meaningless and worthless. That is the decision for the free will of every man.

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ABR Magazine

Your readers will be interested in learning about a magazine involved with both creationist and Biblical Archaeological work. The Associates for Biblical Research (ABR) resumed publication in Autumn 1987 of the *Bible and Spade* under a new name, *Archaeology and Biblical Research*. *Bible and Spade*, during its twelve years of publication by Word of Truth Publications, provided students of the Bible with a wealth of helpful and inspiring information.

Archaeology and Biblical Research, just as *Bible and Spade*, is written for laymen, but is scholarly enough to be appreciated by intellectuals. It is helpful to teachers, pastors, parents and students and is meant to strengthen the faith of *believers* in the Bible as the Word of God and to encourage *non-believers* to investigate the Bible and the Gospel. Therefore, there are articles which help to confirm and illuminate the Scriptures. Each quarterly issue contains several full-length articles of vital interest to students of the Bible. A column called, "The Stones Cry Out," (also the name of ABR's weekly radio broadcast) contains reports of well-known archaeological finds which substantiate the Bible. Reports of excavations in progress provide information from those digs helpful in understanding and interpreting the Bible. Opportunities to actually

participate in an excavation are offered periodically. Articles of general interest from other Biblical archaeology magazines are reviewed.

Archaeology and Biblical Research also has articles on *creationist* subjects which touch on archaeology, such as the origins and development of early man, movements of people across continents and oceans after the Flood, dating methods and their reliability. A column, "Questions on Evolution and Creation," gives answers to the most commonly asked questions on this subject. Subscription information may be obtained by writing the Associates for Biblical Research, P.O. Box 31, Willow Grove, PA 19090.

Robert L. Goette

Australopithecines: Relationship to Man?

Introduction

It commonly is believed that australopithecines (including *Homo habilis*) were early hominids leading to *Homo erectus* followed by *Homo sapiens* (Stebbins, 1982). There has been considerable debate among anthropologists regarding which of the various australopithecines were our closest ancestors, but recently some serious questions have arisen regarding whether australopithecines even belong in the human lineage.

The Black Skull

In the summer of 1985, a new australopithecine skull was discovered by Alan Walker in Kenya, Africa. Its museum number is KNM-WT 17000, but it popularly has been called the Black Skull because of its color. The skull does not readily fit current evolutionary schemes leading to humans, one reason being its small cranial capacity. Paleontologist Pat Shipman has analyzed the various finds with which it could be related. As a result of this study, she came to the conclusion that, "The best answer we can give right now is that we no longer have a very clear idea of who gave rise to whom; we only know who didn't." (Shipman, 1986, p. 92).

Also, toward the end of this article, she evaluated the various options currently open to anthropologists. In this discussion she said, "Finally, we could assert that we have no evidence whatsoever of where *Homo* arises from and remove all members of the genus *Australopithecus* from the hominid family. . . ." She continues, "I've such a visceral negative reaction to this idea that I suspect I'm unable to evaluate it rationally. I was brought up on the notion that *Australopithecus* is a hominid." (Shipman, 1986, p. 93). So her educational background could be influencing her objectivity in handling new data, this being a common human attribute. Though she may not be ready yet to pull *Australopithecus* from the hominid limb of the human family tree, she at least is open to the possibility that australopithecines may not belong in this tree.

Mathematical Studies

Anthropologist Charles E. Oxnard has discussed his own mathematical evaluations and the literature dealing with reputed human ancestors. In speaking about the two types of australopithecines (gracile and robust) in a study of their wrist bones, ankle bones, and humerus of the forearm, he says,

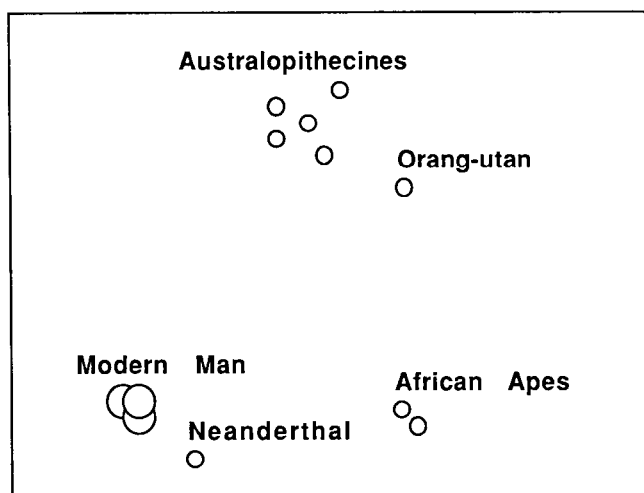


Figure 1. Generalized spatial view showing that australopithecines are not intermediate between African apes and man. Rather, they may be thought of as a specialized group. Distances between circles are roughly proportional to degrees of morphological similarities among forms represented by the circles. (after Oxnard, 1987, p. 229-230).

In each case although initial studies suggest that the fossils are similar to humans, or at the worst intermediate between humans and African apes, study of the complete evidence readily shows that the reality is otherwise. These fossils clearly differ more from both humans and African apes, than do these two living groups from each other. The australopithecines are unique. (Oxnard, 1987, p. 227).

In another discussion of australopithecines he reports that many authors have come to the "conclusion that the individual features of these creatures, whether like apes or humans individually, show, when aggregated into an overall pattern, anatomical systems that are unique." (Oxnard, 1987, p. 123). See Figure 1. Although there has been some heated discussion over how humanlike Oxnard previously considered certain australopithecines (DuBois, 1987), it now is clear from his most recent book that Oxnard does not consider australopithecines hominids.

Survey of 100 Years

Three anthropologists (Cartmill, Pilbeam and Isaac, 1986) have reviewed evolutionary thinking regarding human origins during the past century. They consider australopithecines to have been bipedal, but they find no grounds for believing that they resembled humans ecologically or behaviorally. In many features, the australopithecines were apelike, for example, skull, premolar teeth, limbs and joints. Also they may have been to a high degree arboreal. They say,

... new data, coupled with the new concentration on evolutionary discontinuities that has resulted from recent trends in systematics and evolutionary theory, have led paleoanthropologists to start stripping away that essential humanity from the early hominids. The australopithecines are rapidly sinking back to the status of peculiarly *specialized apes*, and the technical and behavioral capacities of early *Homo* are increasingly seen as unlike our

own. (Cartmill, Pilbeam and Isaac, 1986, p. 419, emphasis added).

Typology

The Australian scientist, Michael Denton (1986), presents a typological viewpoint in which there are groups in nature, but these groups are separated by gaps and do not fall into an evolutionary continuum. Consistent with Denton's general typological concept, the australopithecines, inferentially, could be in one group (or possibly two groups), African apes in another and humans another (Figure 1). If australopithecines are not hominids, the available data would be consistent with what has been termed the Abrupt Appearance Model (Sunderland, 1984). A creationist hypothesis is that each group was a separate creation. Some recent creationist discussions of *Australopithecus* are found in Duffett, 1986; Mehlert, 1987; Morris and Parker, 1987; Pearcey, 1986; and Unfred and Mackay, 1986.

Anthropological Interpretations

In a recent book review, Martin Rudwick (1987) discusses his understanding of the history of evolutionary anthropological thinking saying,

Partly as a result of the continuing scarcity of human and near-human fossils, the empirical evidence for human evolution was always open to a wide variety of interpretations; and those interpretations owed almost as much to broad assumptions about human nature as they did to the details of human anatomy. Yet conversely the interpretations were never entirely unconstrained by such evidence as was available. . . . (Rudwick, 1987, p. 897).

Rudwick further believes that as a result of cumulative evidence there have been "increasing constraints" on the diversity of plausible explanations of the data. My own understanding of the situation would include among the options the view that humans originated independently of australopithecines and extant apes.

Acknowledgments

I am grateful to Cyndi Martin and Ruthanne Dhuse for aid on this manuscript.

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A Golden Mystery

Gold! The word captures everyone's interest. As with all elements, gold was created with many unique properties. Its beauty is virtually indestructible by chemical attack; it does not rust, tarnish, or corrode. The metal is extremely malleable: one ounce of gold can be stretched into a wire 50 miles in length. You probably have a bit of this material inside your watch or calculator. Silver and gold are the top two conductors of electricity. Gold's shiny surface also provides a protective heat shield for space vehicles. Gold is rare; the entire world's recovered supply could be placed in a cube just 18 yards on each side. This includes all coins and jewelry, all bullion and industrial gold. The cube would weigh 100,000 tons and would quickly sink into the earth! Gold has made many nations wealthy and it has also destroyed them.

The land of Havilah was one early source of gold (Genesis 2:11). This may have been "placer" gold which accumulated along the river Pishon. The geographic location of this pre-Flood site is not known today. In David and Solomon's day, gold was collected in great abundance to decorate the first temple at Jerusalem. The recorded quantities are impressive: 100,000 talents of gold, each talent weighing about 75 pounds (I Chronicles 22:14). This amount of gold can be expressed several ways:

100,000 talents
7,500,000 pounds
3,750 tons
375 10-ton truckloads!

The world's production, distribution and supply of gold is accurately known. Much of the ancient gold has been fought over and remelted but it has never been destroyed. Today, most gold is in the form of stored bullion. Its function is to provide international financial stability instead of the beautiful temple artwork of Solomon's day. Historical figures on the production of gold are estimated by the Gold Information Center:

Early times - 1400	50 tons
1400 - 1900	5,500 tons
1900's	95,000 tons

As expected, new search and mining techniques have greatly increased the world's gold production. Just since World War II, the total world supply has doubled. The figures also reveal a mystery: the quantity of gold described in the Old Testament temple (3,750 tons) is 75 times more than known to exist in early times (50 tons). In fact, Solomon's gold amounts to nearly four percent of the present world supply. Annual additions of gold to Solomon's treasury may well have doubled this figure to eight percent or more (I Kings 10:14). Considering the vast difference in ancient and modern gold recovery technologies, this is a sizeable percentage.

Regarding the historical discrepancy in gold figures, one has several options. *First*, a talent of weight may have been less than 75 pounds. However, a talent was the largest weight standard of early Hebrews, apparently a full burden for a man to carry (II Kings 5:23). It may have been more than 75 pounds, but certainly not less. *Second*, Solomon's gold may have been an impure, diluted form of metal. However, early people were proficient at the alloying and purifying of metals. In Genesis 4:22, Tubal-Cain is described as a metal-lurgist. There were at least six Hebrew words for gold and the temple reference is to gold with a pure, golden surface. *Third*, the published supply of the world's gold may be in error by several percent. It may be that more than 3,700 tons of gold (3750-50) have been hidden, lost or wrongly categorized. Perhaps the account books of gold need to be audited! This is a case where Biblical data reveals useful information that modern science and technology has missed.

The reader is encouraged to do similar research on the abundance of silver in Solomon's temple. It would be interesting to compare the amount stated in I Chronicles 22:14 with published values for ancient and present-day silver quantities. Scripture provides one final perspective on man's desperate longing for gold and silver. There is something much more valuable and durable: faith in the Creator who made these metals (I Peter 1:7).

Reference

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CRS According to Soviet Atheism

The Soviet monthly series *Nauchnyi Ateizm* [Scientific Atheism] recently devoted its entire issue to what it termed "scientific" creationism. While it placed "scientific" in quotes in front of the word *creationism*, it found no need to do so in front of the word *atheism*.

The publication states (Skibitskii, 1987, p. 9) that one of the "most active creationist organizations" (along with ICR) is the "Obshchestvo issledovaniia problem tvoreniia" (Society for Research of the Problems of Creation), that is, CRS. Soviet readers are told that the CRS has a center in Ann Arbor, MI, with branches all over the country and that it publishes a special journal.

CRSQ readers will also be interested in knowing why creationism is a phenomenon of the present day. According to *Scientific Atheism*, it is because of the "crisis of capitalism."! (Skibitskii, 1987, p. 4).

Reference

M. M. Skibitskii. 1987. "Nauchnyi" kreationsizm: pretenzii i deistvitel'nost' ("Scientific" creationism: pretensions and reality), *Nauchnyi Ateizm* (Scientific Atheism Series) 8:3-10.

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QUOTES

Some twenty years ago, in a happier day, Bertrand Russell raised a question that we are still far from being able to answer:

There are certain old conceptions [he said] which represent man's belief in the limits of human power; of these, the two chief are God and truth . . . Such conceptions tend to melt away; even if not specifically negated, they lost importance and are retained only superficially . . . What then?

Traditionally, through centuries and millennia, the limits upon pleasure and power had been set by the "higher law," a law beyond all human manipulation and control. And this "higher law" was understood to emanate from that which was ultimate in the universe, God for the Hebrews, Reason for the Greeks. The entire spiritual structure of the Western world was built upon these convictions. With these convictions so rapidly losing their appeal to the modern mind, nothing has been left but the indulgence of pleasure, the anarchy of power, and the chaos of "self-created values." The moral crisis of our time is, at bottom, a metaphysical and religious crisis.

It is hardly surprising, though it is painfully ironical, that man's success in his frantic search for pleasure and power had brought with it the gravest threat to his humanity. Without grounding his being in something beyond, man cannot preserve his humanness. At the very moment when Algernon Charles Swinburne, echoing the new modernity, was singing "Glory to Man in the highest, the Maker and Master of All," forces were coming to head that were to drive Western man, through unimaginable disasters, to a point where his very survival would come into question. But even more than physical survival, it is the survival of man in his humanness that is becoming problematic.

Herberg, Will. 1986 What is the moral crisis of our time? *The Intercollegiate Review* 22(1):11.

Closer to the end of his career he [Roepke] seems to have spoken more forthrightly and explicitly on the importance of God and religion in society and civilization. As he stated it:

. . . the nidus of the malady from which our civilization suffers lies in the individual soul and is only to be overcome within the individual soul. For more than a century, we have made the hopeless effort, more and more baldly proclaimed, to get along without God and vaingloriously to put man, his science, his art, his political contrivances, in God's place . . . It is as though we had wanted to add to the already existing proofs of God's existence, a new and finally convincing one: the universal destruction that follows on assuming God's non-existence.

Ancil, Ralph E. 1986. The third way: Wilhelm Roepke's vision of social order. *The Intercollegiate Review*. 22(1):41.

Biblical creation-based historiography would not call anything in history "chance" because the God of the Bible is sovereign over all things. He knows the number of hairs on our heads, not a sparrow can fall from a roof without His knowledge and will; to Him, the Creator of all things out of nothing, and the ever-present Sustainer of all things, all things, that is, all His works, are known in His eternal present from the beginning of the world (Acts 15:18). It is only the unbelieving historian who must postulate chance in historical events when they cannot be accounted for by plausibly arising from preceding events or circumstances (that is, by process history) but "just happen." Sometimes a historian of this kind in ancient or modern pagan fashion sees history as a combination of man's will and "fate," as does the historical actor himself who does not know the God of the Bible.

Myers, Ellen. 1987. Towards a Biblical Creation-based historiography. *Creation Social Science and Humanities Quarterly*. X(1):6.

In the biblical outlook God as the Creator of all existence and Lord of life gives a unifying focus to human thought and action. Only in the context of the living God and of His moral purpose in the universe do we find the reason for man's being. "If God, the creator, is," Emil Brunner remarks, "then the gloomy idea of fate and fatality which lies like a spell over the ancient as well as the modern world, loses its basis. It is not a fate, an impersonal abstract determining power, . . . which is above everything that is and happens, but He, the creator spirit, the creator person." In consequence, as Arthur F. Holmes observes, biblical monotheism "involves a theology and an ethic that affected every kind of human activity."

Henry, Carl F. H. 1986. The God of the Bible and moral foundations in Burke, Thomas J., editor, *The Christian vision: man and morality*. The Hillsdale College Press. Hillsdale, MI pp. 4, 5.

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QUOTE

He (Theodore Dreiser) tells us in *A Book About Myself* that after reading Huxley, Tyndall, and other nineteenth-century scientists, he arrived at the conclusion that "Man was a mechanism, undevised and uncreated, and a badly and carelessly driven one at that." And so he wrote in *The Financier*: "The damnable scheme of things which we call existence brings about conditions whereby whole masses suffer who have no cause to suffer, and . . . whole masses joy who have no cause for joy. . . . We suffer for our temperament, which we did not make, and for our weaknesses and lacks, which are no part of our willing." And in *The Titan* he remarks, "This is a world in which nothing is proved, all is permitted." In such a world neither intellect nor moral will has any efficacy. But there cannot be a story about a man who has no moral choice; there can be only a chronicle, and between the two lies a great gulf. (Parenthesis added.)

Curtis, III, George M. and James J. Thompson, Jr. (editors). 1987. Contemporary Southern Literature in *The Southern Essays of Richard M. Weaver*. Liberty Press. Indianapolis. p. 54.

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