

Creation Research Society Quarterly

Haec credimus:

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

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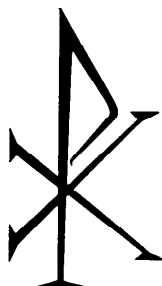


TABLE OF CONTENTS

	Page
Spectrum Spectacular Willis E. Keithley	83
The Origin of the Universe Donald B. DeYoung and John C. Whitcomb	84
Two Problems Relativity Fails to Explain Gerardus D. Bouw	91
The Creationist and Neo-Darwinian Views Concerning the Origin of the Order Primates Compared and Contrasted: A Preliminary Analysis Dennis W. Cheek	93
The Hoatzin Colin Brown	111
On the Vertical Movements of the Earth's Crust Douglas E. Cox	112
Faith and Population in a Declining Civilization Colin G. Clark	117
How the Flood Altered the Earth Everett H. Peterson	118
Panorama of Science	126
Book Reviews (2)	127
Letters to the Editor (7)	130
Report of the 1981 Board of Directors Meeting Wayne Frair	133
About the Election of Directors, 1982	134-135

CALL FOR PAPERS AT THE 1982 MEETING

C.R.S. members and others wishing to present reports of twenty minutes length (with twenty minutes more for questions) are invited to submit a one-page abstract to Dr. Emmett Williams, Jr., 5093 Williamsport Drive, Norcross, Georgia 30071. Dr. Williams will notify participants whose papers are accepted for presentation, and prepare the agenda.

If the number of papers should make it desirable, concurrent sessions may be arranged. These papers will be presented from 7 P.M. onward, Friday, April 23, 1982, at Concordia College, Ann Arbor, Michigan. All board members and others are invited to this session, and to the C.R.S. committee reports at a session the same day, beginning at 3:30 P.M.

COVER ILLUSTRATION

The picture on the front cover, of Steamboat Geyser, in Yellowstone National Park, was supplied by courtesy of the National Park Service, and is used here by permission.

The thought occurs, that maybe eruptions of water (perhaps not hot) from beneath the surface may have been common things before and at the beginning of the Flood, in view of certain models of the structure of the Earth. Some of these models, and considerations of what may actually exist beneath the surface, are discussed in items by Cox, Fox, and Peterson, elsewhere in this issue of the *Quarterly*.

SPECTRUM SPECTACULAR†

WILLIS E. KEITHLEY*

A rainbow is noted for its promises and prisms; its semi-circles and spectrums; its raindrops and refractions. But the most intriguing rainbow is not a bow, but the spectral band of diffraction lines.

One of the most exacting and meticulous skills in technology is the ruling of a diffraction grating to split the light ray into its component spectral colors. An optical surface is carefully scribed with parallel lines to form a fine grid. The more lines per millimeter, the more efficiently the grating will resolve the spectrum. Since these gratings are the heart of many delicate optical devices, one of the great challenges to science is to design a machine which will scribe finer lines, thus producing a more accurate instrument.

While man boasts of his technical excellence, he is chagrined to discover that the butterfly has been turning out flawless diffraction gratings for thousands of years. And not just a few at a time, but by the multiplied millions! Each butterfly's wing will be

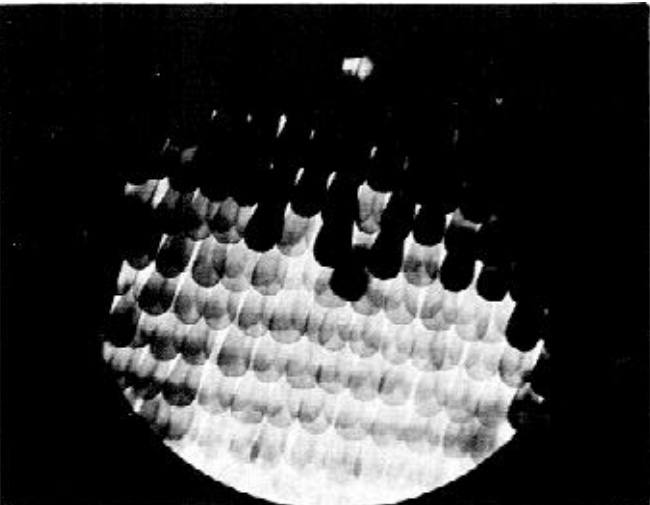


Figure 1. This shows the arrangement of scales on a butterfly's wing.

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† An account, similar to this, is given, under *Rainbow in the Rough*, in Mr. Keithley's book, *Portraits on Nature's Palette*, pages 40-42. The book is available from Mr. Keithley at the address given.

overlaid with countless numbers of those infinitesimal scales, each laid in exact order in a delicate pattern as seen in Figure 1. Not only are they shingled onto the wing in an intricate pre-determined design, but each tiny plate as seen in Figure 2 is a perfect diffraction grating, finely tuned to reflect a certain wavelength of light. This is what gives many butterflies their exquisite coloring.

Well might we ask how the insect performs this monumental task of technology, as it is apparently accomplished in a few short hours immediately preceding its transition from the larval to pupae stage. An even more pertinent question could involve not only the insect's ability to produce those scales, but the very origin of that expertise. There seems to be no evidence of intermediate steps in the development, thus this phenomenon of fabrication must have appeared *in toto* or completely formed.

What a massive mutation must have occurred to produce such colossal quality! What a colossal faith would be required to comprehend the infinity of specifics involved if we assign this fantasy to some fortuitous accident of chance. We dare not rule out the evidence of Creator and creation.

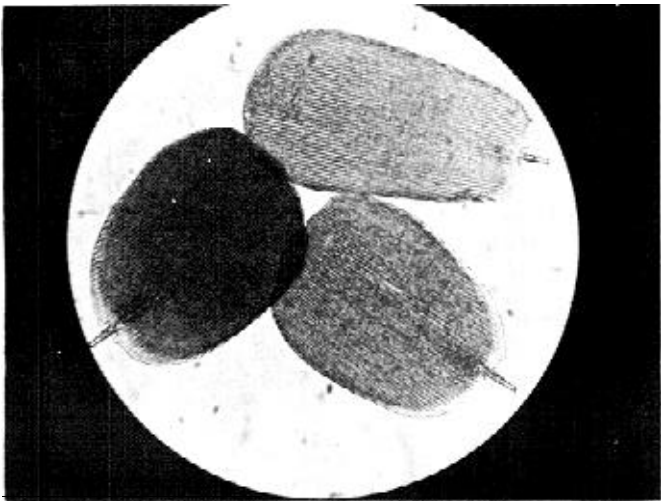


Figure 2. This shows a few of the individual scales, further magnified. Note the pattern of fine lines on them, which is what causes the diffraction of light, and the production of spectral colors.

Origin of the Universe

(Continued from page 90)

³⁰Pollard, W.G., 1979. The prevalence of earthlike planets. *American Scientist* 67(7):653.

³¹Oberg, *op. cit.*

³²Young, E.J., 1972. Commentary on the Book of Isaiah. Eerdmans, Grand Rapids, p. 3, 211. Some commentators have questioned the meaning of "a waste place" for *tohu* in Isa 45:18, because the following verse demands the idea of "in vain" for this term. Young

pointed out, however, that "despite this slight modification of connotation, it is correct to say that as God's creation was not for the purpose of being a *tohu*, so also His revelation is not a *tohu* but fulfills its purpose. The difference in connotation is not as great as at first sight appears" (3, 212).

³³N.L. Geisler is one of several evangelical theologians who accept the "theistic big bang concept. Geisler is convinced that "the big bang theory is in amazing accord with the creation account of Gen 1:1," and feels that it provides "overwhelming scientific evidence for creation (as recorded in Gen 1:1)." Review of R. Jastrow, *God and the Astronomers* in *Journal of the Evangelical Theological Society* 22 (1979) 282-84.

THE ORIGIN OF THE UNIVERSE

DONALD B. DEYOUNG* and JOHN C. WHITCOMB**

Received 25 June, 1980

The currently popular theory of the origin of the universe held by the vast majority of astronomers involves a gigantic explosion of matter and energy about fifteen billion years ago (the "big bang" theory), with subsequent cosmic expansion and evolution. The authors examine this cosmogony from both scientific (empirical) and Biblical (exegetical) perspectives, and conclude that it does not fit the facts of general and special revelation.

Introduction

The dominant theme in astronomy today is that the universe was spontaneously born out of chaos. This "big bang" interpretation assumes that an immense explosion of mass-energy took place fifteen billion years ago. Ever since, fragments of matter and space itself have been expanding outward like a fireworks display. Stars and galaxies, planets and people are said to have gradually formed from these fragments in a purely mechanistic and random fashion.

However, in spite of the current popularity of this theory, the dramatic beginning of the universe which the "big bang" assumes has proven to be an embarrassment to many cosmologists. Where did the initial mass-energy come from? What caused it to become unstable and begin to expand? Natural science simply does not have answers to these fundamental questions. Some scientists have desperately tried to avoid the entire question of ultimate origins by appealing to oscillating or steady state models of the universe which have neither a beginning nor an end. However, neither of these perpetual motion models is conformable to the presently known laws of physics. Thomas Gold, one of the originators of the steady state idea, now supports it mainly as "an excellent model against which to compare observations."¹ Others have tried to read the big bang theory directly into the first verses of Genesis. For example, the American astronomer Robert Jastrow feels that God somehow orchestrated the explosion as the Divine method of creation. This is an unsatisfactory compromise, as admitted by Jastrow in the beginning of his book, *God and the Astronomers*:

It should be understood from the start that I am an agnostic in religious matters. In the searing heat of the first moment, all evidence needed for a scientific study of the cause of the great explosion was melted down and destroyed.²

Steven Weinberg, of Harvard, one of the leading proponents of the big bang, echoes this same frustration:

Can we really be sure of the standard (big bang) model? Will new discoveries overthrow it and replace the present standard model with some other cosmogony, or even revive the steady-state model? Perhaps. I cannot deny a feeling of unreality in writing about the first three minutes (of the universe) as if we really know what we are talking about.³

The more the universe seems comprehensible (via the big bang) the more it also seems pointless.⁴

The big bang theory continues to lead many others to this same despairing view of the origin and purpose of the universe.

From a Biblical standpoint, such frustration is perfectly understandable, and for two prominent reasons. First, the concept of a living, personal, all-knowing, all-powerful and transcendent God is almost totally absent from the thinking of modern cosmologists. Faith in such a God has been replaced by faith in chance through time. All that is really left, however, according to the title of one of Isaac Asimov's latest books, is "A Choice of Catastrophes."⁵

Secondly, even the knowledge that a personal God rules the universe does not necessarily remove all human fear. Though he possessed a profound knowledge of God, David, overwhelmed by the magnitude and silence of the universe around him, could ask, "What is man that Thou does take thought of him?" (Ps 8:5-8).⁶ Thus, a confidence that God truly exists must be coupled with a deep confidence that he has revealed his clear plan and purpose for men in the words of holy Scripture. "We have the prophetic word made more sure, to which you do well to pay attention as to a lamp shining in a dark place" (2 Pet 1:19).

Evidence Adduced for the Big Bang

Two major discoveries have helped promote the big bang theory in recent years. The *first* is a measured red shift in the light radiated from distant stars. This effect on starlight is believed to be similar to the lowering in pitch of a departing train whistle, also known as the Doppler Effect. Light from most stars is found to be of longer wavelength, i.e. reddened as if the stars were moving away from the earth at various rates of speed. According to a basic assumption (note not observation) called the cosmological principle, the stars would show an identical expansion from any vantage point in the universe. Thus the shift to the red is taken as direct evidence of a big bang explosion in the remote past.

However, there are a variety of other recognized possible explanations for the stellar red shift which do not require any explosion or expansion of the universe. For example, light can also be reddened by gravity, the attractive force between all matter in the universe. This gravitational effect on light, first predicted by Einstein in 1912, can be demonstrated in laboratory experiments such as Mossbauer Spectroscopy.⁷ This effect is readily discussed in terms of photons, although the ordinary Doppler effect is explained in terms of waves.

If a material object were to be thrown up from a star,

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say, its velocity, and hence kinetic energy, would decrease as it rose. When light is concerned, the speed can not change, but the energy of the photons, in terms of which the matter can be considered, decreases. The energy E is given in terms of the frequency ν , and Planck's constant h , by $E = h \nu$.

If the mass of the star were M , and the frequency γ_0 at a distance r_0 from the center, at a distance r_1 the energy would differ by $GMm (1/r_0 - 1/r_1)$ (Which is the negative of the difference of gravitational potential energy.) Hence the frequency differs: the difference being given by $h\nu_0 - h\nu_1 = GMm (1/r_0 - 1/r_1)$. The mass m of the photon, incidentally, is related to the energy E and the speed of light c by $E = mc^2$. So $h\nu_1 = h\nu_0 [1 - (GM/c^2)(1/r_0 - 1/r_1)]$. Here G is the gravitational constant.

If the light moves away from the star its energy is thus lessened and its frequency ν_1 is shifted toward the red part of the spectrum. If it moves *toward* it, the negative sign becomes positive and the light is blue shifted. This explanation for stellar red shift on a universal scale has been ruled out because of asymmetry. Mainly red shifts are seen in every direction of the sky. This observation could only be compatible with the gravitational explanation if the Earth were situated at the precise center of an inhomogeneous universe. Such a requirement both defies the cosmological principle and gives the earth a preferred position which secular science cannot permit. Various spatial geometries have been proposed which *do* explain stellar red shift on the basis of gravitational interaction.⁸ They involve curved space and an earth positioned at a point of minimum mass. The conclusion here is simply that a gravitational explanation for the observed red shift is a possible alternative to a big bang expansion. This alternative is *not* a revival of historic geocentrism, since the earth in such a position could still rotate upon its axis and revolve around the sun. Although not essential to a Biblical view of creation, this possibility of a special location of planet earth is intriguing in view of the special emphasis given to the earth throughout the Scripture.

The expansion interpretation of stellar red shift also leads to a number of astrophysical problems. For example, the spiral galaxy NGC 4319 and the object Markarian 205 appear to be attached closely together in space by a luminous bridge.⁹ However, their Doppler Effect velocities as calculated from the red shifts are 1800 km/sec and 21000 km/sec respectively. How can two objects in space be attached and yet have relative speeds differing by 1000%? The separation distance of the two "connected objects, as calculated from the questionable Hubble law, is more than a billion light years. Such inconsistencies provide more reminder that the red shift may well be (for instance) a gravitational effect rather than expansion. Of course, even if universe expansion is going on today, extrapolation backward through billions of years and light years to a big bang beginning is a spectacular leap of faith into uncertainty.

The *second* discovery supporting a big bang is the presence of weak microwave radiation throughout space. It was first detected by A. Penzias and R. Wilson of Bell Laboratories, who subsequently received the Nobel Physics Prize in 1978 for their work.¹⁰ This background radiation is found to have a characteristic tem-

perature just 2.7 degrees Kelvin above absolute zero. It is interpreted as a "last fading ember" from the great explosion itself, and was actually predicted by the big bang theorist George Gamow three decades ago. As with the red shift, however, there are a variety of other possible sources for these detected microwaves. They may be radiated from distant regions of the universe, perhaps from certain varieties of stars. Perhaps the radiation is due to a large number of undetected stars characterized by low energy emission. The physical universe is permeated with a complex variety of waves and particles, including the energetic cosmic rays, whose origin and ultimate purpose we simply don't know at this time. To claim that the microwave background is necessarily fossil radiation from a big bang explosion is a biased interpretation based on an unwarranted extrapolation into the past. In conclusion, the two major evidences for the big bang, red shift of starlight and background radiation, are by no means conclusive.

Missing Links

Although the big bang theory is accepted today by the majority of scientists as the final and correct view of cosmic origins, it actually is faced with a number of difficult and fundamental problems. There are several "missing links" in the theory.

Consider first the concept of *missing mass*. If an expanding universe were to consist of sufficient material and unlimited time be available, gravity would eventually stop the outward motion and pull everything back together again into a cataclysmic fireball. This might even lead to a rebounding universe with endless expansions and contractions on an 80 billion year cycle. As mentioned earlier, many scientists find this oscillating universe idea attractive since it postpones the embarrassment of explaining an ultimate origin and a final destiny for the universe. The minimum density of mass in space to ensure collapse is only 5×10^{-30} grams/centimeter³, or about one atom per cubic foot.

However, recent data reveal that there is simply not enough material in space to draw the universe back upon itself. The mass density of the universe is too small by a factor of forty or more.¹¹ Desperate attempts to locate this "missing mass" in the form of oscillating neutrinos or invisible black holes remain speculative. The universe is found to be "open" and *not* in an eternal state of alternating expansion and collapse. This conclusion is in agreement with a *one-time* creation origin, even though it is the authors' position that no random big bang explosion has occurred.

Time is another missing link in the big bang theory. Many observations indicate a recent creation of the universe, only thousands of years ago instead of the assumed billions of years of history. These observations include studies of comets, galaxy shapes, and individual stars.¹² A complex theoretical cycle of evolution has been established for the stars. They are assumed to form initially within vast clouds of gas and dust by gravitational contraction. Then they mature slowly through stages called protostars, main sequence stars, red giants, and finally white dwarf stars. A billion-year time scale

is assumed for these changes as the stars power themselves by nuclear fusion. Our own sun is thought to have five billion more years of steady light as a main sequence star before it swells into its red giant phase and extinguishes life on earth. Even so, the sun has a very short life compared to the time span of the big bang. It is called a second or third generation star, not having formed until long after the initial explosion. The sun, the earth, and life on the earth are said to be made from the remains of stars that exploded and died a long time ago.

Historical records of the star Sirius B, however, tell a different story about the time scale of stellar decay. This binary star of Sirius A has visibly and unexplainably changed from a red giant star to a white dwarf within only a thousand-year period.¹³ The star is evidently decaying on a time scale which is much shorter than current theory indicates. This finding is appropriately called a "Sirius problem"! The giant star Betelgeuse, among others, has also shown color changes during recorded history.¹⁴ Such findings challenge the vast time scales assumed for the life cycle of stars, a time scale required by a big bang. Physicist Kenneth Brecher of MIT concludes, "I would much prefer to learn stellar evolution from the ancient myths of man than from the modern myths of the computer!"¹⁵

Even our nearest star, the sun, has recently raised serious questions about the assumptions of time and stellar energy. It has been taught for a half-century that the sun heats itself by way of nuclear fusion, converting hydrogen into helium. Such a reaction should also produce an intense flood of sub-atomic particles called *neutrinos*. The flux of solar neutrinos at the surface of the earth is estimated to be $10^{12}/\text{cm}^2 \cdot \text{sec}$. That is, one trillion neutrinos should impinge on every square centimeter of earth, every second, day and night. Being very non-interactive, neutrinos would pass right through the 8,000 mile diameter earth and continue onward at the speed of light. Such neutrinos would be the only possible messenger of the fusion reactions going on inside the sun. Thus they would also be the only possible physical evidence of stellar evolution by long term fusion. Current experiments are underway to detect some of these elusive solar neutrinos and verify the theoretical nuclear reactions. After ten years of careful searching, the result is that the particles *cannot* be found in sufficient numbers to verify the fusion theory.

Could it be that the sun is producing energy by some other mechanism than by nuclear fusion? The next most likely source of solar energy would be a gravitational contraction of the sun, first proposed by Helmholtz a century ago. Since this type of mechanism cannot possibly exist on a billion-year scale, it has been totally rejected by modern astronomy. However, the problem of *missing neutrinos* may well be a testimony to a recent creation of the sun. Solar physicist John Eddy concludes:

I suspect that the sun is 4.5 billion years old. However, given some new and unexpected results to the contrary, and some time for frantic recalculation and theoretical readjustment, I suspect that we could live with Bishop Ussher's value for the age of the Earth and Sun. I don't think we have much in

the way of observational evidence in astronomy to conflict with that.¹⁶

There is also a *missing explanation* for the initial formation of stars. The classical theory of star formation from a contracting gas cloud was formulated by Sir James Jeans in 1902.¹⁷ He compared the inward gravitational force $F_g = (3GM^2)/(2r^2)$ and the competing outward force of gas pressure of a spherical cloud, $F_p = (3nRT)/r$. Here G = gravitational constant, M = mass of gas cloud, r = radius of cloud, R = gas constant, T = temperature of cloud, n = number of moles of material in cloud. The gravitational force is seen to vary as r^{-2} while the gas pressure varies as r^{-1} . Thus for a given temperature and mass, there is a critical radius r_c for which gravitational contraction will dominate the system. This value of r_c , sometimes called the "Jeans length," is found by equating the inward and outward forces, and is $r_c = (GM^2)/(2nRT)$.

However when typical values of interstellar cloud mass M and temperature T are inserted r_c is found to be 50-100 times smaller than average nebular size. The conclusion is that stars will not spontaneously form in space since the dominant outward gas force will forbid collapse. Instead, gas clouds dissipate outward. Furthermore, this simple force comparison ignores the dispersive effects of nebular magnetism, rotation, non-sphericity and turbulence. Exceptions to the rule may be certain objects called Bok Globules, nebula which are indeed very dense and *perhaps* contracting. However these few nebula are certainly not adequate to provide the dozens of new stars per year required in our own galaxy to balance the continual loss of stars by nova explosion. The simplest conclusion is that the total number of stars available is rapidly decreasing in accordance with the second law of thermodynamics, the universal tendency toward disorder.

To circumvent this natural formation problem, it is currently proposed that gases may be squeezed together by nearby exploding stars called supernovas.¹⁸ This interesting explanation says that stars form from stars! But if the universe began with a big bang explosion, how did the first stars originate? Furthermore, supernovas are a rare phenomenon, unable to produce the vast number of stars visible. The last supernova observed in our *galaxy* was recorded by Kepler in 1604. It is certainly presumptuous to maintain that the formation of our solar system itself was triggered by a nearby supernova.

The fundamental star origin problem extends even to the makeup of our own bodies. Big bang calculations show that only the simple elements hydrogen and helium could possibly form in space following such an explosion, and, even then, only after 700,000 years!¹⁹ All the varieties of atoms other than hydrogen and helium could naturally form only within the cores of mature stars, assuming nuclear fusion was occurring. Thus the poetic statement is made that "our bodies are made of stardust"! however, if a big bang cannot produce stars to begin with, it also cannot produce the atoms of which we ourselves are made. We shouldn't be here!

Biblical chronology fixes the creation of stars after the creation of the planet earth and before the creation

ברא	bara	created
עשה	asah	made
תהו	tohu	empty

Table 1. This gives the Hebrew, the transliteration, and the translation of some of the Hebrew words mentioned in this article. The perfect is commonly taken as the standard form of Hebrew verbs; consequently there is a tendency to represent them by a past tense in a language such as English.

of the human race, within a 24-hour period. Some have objected that Gen 1:16 does not state that the stars were "created" (*bara*) but merely that there were "made" (*asah*). (See Table 1 about these and other Hebrew words.) But this does not produce a significant distinction of meaning in the context of Genesis 1. The two terms are used interchangeably in creation contexts elsewhere. For example, marine creatures were "created" (*bara*), on the fifth day, but land animals were "made" (*asah*) on the sixth day. Obviously, no distinction is intended.²⁰

Biblical revelation points clearly to a *completed creation*, with no new materials or basic kinds of things being added from time to time. "Thus the heavens and the earth were completed, and all their hosts. And by the seventh day God completed His work which He had done; and He rested on the seventh day from all His work which He had done. Then God blessed the seventh day and sanctified it, because in it He rested from all His work which God had created and made" (Gen 2:1-1; cf. Exod 20:8-11; 31:17). The author of Hebrews presupposes a literal interpretation of Gen 2:1-3 when he builds his argument for the necessity of entering into God's completed work of salvation (Heb 4:4, 10).²¹

So far from evolving into higher and higher levels of cosmic complexity, the stars we observe appear to be slowly *dying out* one by one. As they exhaust their nuclear fuel, some stars contract into burned-out cinders. Ones with a mass greater than 1.4 times that of the sun may die violently in infrequent supernova explosions. Still larger stars (3 or more times as heavy as the sun) may collapse without limit under the force of gravity. Calculations indicate that their size should decrease to that of the earth, then a baseball, and finally to a mathematical point!²² Thus, some stars *may* eventually collapse out of sight and into the speculative realm of *black holes* in space. Any object trespassing within a critical distance of this singularity would be permanently captured by its gravity. For a collapsed star of 3 solar masses, this distance, known as the Schwarzschild radius, would extend outward for 3 kilometers.

Do black holes really exist? Evidence remains uncer-

tain; none has been clearly detected. However, the idea is in keeping with the observed rapid unwinding and decaying of all things in the universe.

All of this is in complete harmony with the inspired statements of the psalmist written 3000 years ago: "Of old, Thou didst found the earth; and the heavens are the work of Thy hands. Even they will perish, but Thou dost endure; and all of them will wear out like a garment; like clothing, Thou wilt change them, and they will be changed" (Ps 102:25-26; quoted in Heb 1:10-12, cf. Luke 21:33). More than 200 years later, the prophet Isaiah confirmed this analysis of universal processes which we now describe in terms of the Second Law of Thermodynamics: "Lift up your eyes to the sky, then look to the earth beneath; for the sky will vanish like smoke, and the earth will wear out like a garment, and its inhabitants will die in like manner" (Isa 51:6a). Thus, the non-technical but completely accurate perspectives of Scripture combine with the detailed and prolonged empirical observations of science to contradict the evolutionary presuppositions of the currently popular big bang theory of the origin of the universe.

The trustworthy laws which govern the universe demonstrate the *missing randomness* predicted for an undesigned universe. Ever since its discovery by Isaac Newton 300 years ago, the form of the gravitational force law has interested scientists. The gravitational law states that there is an attractive force F between any two masses m_1 and m_2 , varying inversely with the square of their separation r , so that $F = (Gm_1 m_2)/r^2$ where G is once again the gravitational constant. As *Science News* recently said, this relation "has always seemed just a little too neat. Is the (r) exponent some fraction near two, which would be messy but might seem more empirical?"²³ The article goes on to recast the force law into the form $F = (Gm_1 m_2)/r^{2+n}$ where n is a small correction term. Recent precise measurements of the gravitational force using a torsion balance have shown that n is at least smaller than 10^{-5} , and is probably exactly zero.²⁴ Also, for n not zero the orientation of planetary orbits would change with time. Indeed, the exact value of 2 for the exponent of r is "too neat" to have resulted from a big bang. Isaac Newton himself was more aware of created design than are many scientists today. Public comments on design in nature are usually couched in vague language, as that of astronomer William Kaufman:²⁵

Like most scientists, Einstein included, I have an almost religious belief in a basic underlying order—a belief that natural forces are just manifestations of some deeper thing.

The inverse r^2 force dependence just discussed also appears in the electric force expression between charges. With this large Coulomb force, the exponent is found to be exactly 2 up to at least 16 decimal places,²⁶ i.e. $|n| \leq 10^{-16}$. The physical laws of the universe are faithful, symmetrical and certainly not random.

Life in Space

An intense search is underway to find life in space. If this universe and life itself began with a spontaneous explosion, many then reason that life must also have

arisen in countless other places. A typical astronomy text reads:

If any planet has surface conditions suitable or at least tolerable to any terrestrial organisms, life may be assumed to have developed there.²⁷

Even more dogmatic is the 1976 pronouncement of Robert K.G. Temple, author and researcher:

An attitude which asserts that man is the only intelligent life form in the universe is intolerably arrogant. Anyone holding such an opinion today is an intellectual freak.²⁸

Massive books have been written on the general subject of alien life in space, called exo-biology, without a shred of supporting data.²⁹ Man seems determined to prove that he is the result of blind chance rather than special creation! For twenty years, radio telescopes have been searching deep space for intelligent signals. The results so far point to a final missing link in big bang cosmogony, namely, that of *no life* in space. Table 2 summarizes some of the efforts that our country has made in the futile search for life in space. Probes sent to the moon, Mars, Venus, and the moons of Jupiter have revealed hostile, sterile surfaces. Where is everybody? It is not surprising that there is a growing feeling among astronomers that man may be alone in the universe after all:

There is a deeply ingrained conviction in the great majority of mankind, to which the appeal of

science fiction and fantasy bears witness, that the universe is so constituted that if an opportunity exists for hominids to evolve, that too will be actualized. Whatever may be the basis for such convictions, it clearly must be sought outside the domain of science. The most this study has been able to establish is that even the opportunity for such achievements occurs quite rarely among the vast profusion of forms in which matter is consolidated in the universe.³⁰

Could it be that life exists uniquely on the earth because God created it here and nowhere else?

Because of the obvious failure to find any evidence of intelligent physical life outside of the planet earth, a two-day symposium was held at the University of Maryland late in 1978 to explore the topic, "Implications of Our Failure to Observe Extra-Terrestrials." In an article describing this symposium, James Oberg commented that this topic "was bound to be provocative. For most of those attending, the implications were clear: since we haven't seen any trace of (extra-terrestrials), either they aren't there or there is something fundamentally wrong with our comprehension of the universe."³¹

There are a number of Biblical indications that point clearly in the direction of the absolute uniqueness of physical life on the earth. Psalm 115 focuses our attention upon the uniqueness of our God as creator and con-

Table 2. American Research Projects that Involve the Search for Life

Date	Project Name	Description	Cost (Dollars)	Results
1960	Ozma I	Green Bank radio telescope probe of two nearby stars (Epsilon Eridoni, Tau Ceti) for intelligent signals	1 million	No signals detected
1969-72	Apollo	Exploration of the moon	20 billion	No life detected
1972	Pioneer 10	First probe to leave the solar system; carries a plaque describing life on earth	—	—
1973	Ozma II	Monitoring of 500 nearby stars for intelligent radio signals	—	No signals detected
1974	Arecibo	Largest radio telescope on earth continuously monitors nearby stars for signals	—	No signals detected
1974	NRAO	National Radio Astronomy Observatory scanned ten nearby stars for signals	—	No signals detected
1977	Viking	Two landers designed specifically to detect life on Mars	1 billion	No organic material detected in spite of the presence of C, N, O, H
1977	Voyager I, II	Probes to the outer planets carrying detailed messages from earth	—	No life detected
1978	Pioneer Venus	Multiple Venus probes measured the atmosphere and surface for life possibilities	230 million	Extremely hostile and sterile environment
1980	VLA	"Very Large Array" of 27 radio antennas in New Mexico. Will probe for evidence of organic molecules in interstellar gas clouds	78 million	—
1980	Mariner-Jupiter-Saturn	Observation of Saturn's satellite, Titan, for life possibilities	—	No life detected
1983	Large space telescope	Orbiting telescope will search for planets of other stars	—	—
1980's	Cyclops	Proposed construction of 1000 connected radio telescopes for detection of deep space signals	20 billion	—

troller of the universe in total contrast to the man-made deities that characterize pagan religions. The Psalmist climaxes his message with this statement in v 16: "The heavens are the heavens of the Lord; but the earth He has given to the sons of men." A valid implication of this inspired statement is that those who truly know the Lord cannot possibly be threatened by anything that is in the universe beyond. In other words, the only "extra-terrestrial intelligence" men need be concerned about is the intelligence of God Himself, as revealed in his Word.

Isa 45:18 adds significant light to this fascinating question: "For thus says the Lord, Who created the heavens (He is the God who formed the earth and made it, He established it and did not create it a waste place, but formed it to be inhabited), 'I am the Lord, and there is none else.' " Since the Hebrew word translated here "a waste place," also appears in Gen 1:2, this statement in Isa 45:18 has frequently been used to support the so-called Gap Theory interpretation. This view maintains that God created an originally perfect earth (Gen 1:1), which later became "a waste place" because of the fall of Satan. Then, millions or billions of years later, the earth was recreated in six literal days. However, this is really not the thrust of Isaiah's statement. Isaiah is saying that God did not create the earth to be a waste place, but created it to be inhabited (in contrast to all other planets). As we turn to Genesis chapter one, we discover that is the way the earth was created. It was not created to remain empty, but within six brief days to be fully inhabited.

In comparing the statement of Isa 45:18 with Gen 1:2, Edward J. Young comments:

Isaiah does not deny that the earth was once a *tohu*: his point is that the Lord did not create the earth to be a *tohu*, for an earth of *tohu* is one that cannot be inhabited, and has not fulfilled the purpose for which it was created. The purpose rather was that the earth might be inhabited.³²

If intelligent physical life exists only on the earth, the question must be asked, "Why do countless stars and galaxies exist throughout the universe? Many Christians have asked, "Why would God go to all the work of creating billions of galaxies and then put life on only one comparatively small planet?" In answer to this question, it must be recognized, first of all, that it required no more exertion of energy for God to create a trillion galaxies than to create one planet. "Do you not know? Have you not heard? The Everlasting God, the Lord, the creator of the ends of the earth does not become weary or tired. His understanding is inscrutable. He increases power" (Isa 40:28-29).

God has condescended to give to men three basic reasons for his work of creating the stellar universe. "Let them be for signs, and for seasons, and for days and years; and let them be for light in the expanse of the heavens to give light on the earth" (Gen 1:14-15). The three stated purposes for the existence of the universe, as far as man is concerned, are: (1) signs, (2) a clock-calendar system, and (3) illumination by day and by night for earth dwellers. A fourth reason is conspicuous for its absence, namely, platforms for extra-terrestrial in-

telligent beings. The sign-value of the stellar universe is clearly emphasized in Psalm 8, Ps 19:1-2 and Rom 1:18-19. God apparently considers these three basic purposes sufficient for the creation of the stellar universe, and therefore it is unnecessary to multiply reasons beyond God's statement in Scripture.

The most significant Biblical evidence for the uniqueness of life on the earth is the incarnation and Second Coming of Jesus Christ. The second person of the triune God, through whom the entire universe was brought into existence (John 1:1-3, Col 1:16-17, Heb 1:1-2), became a permanent member of the human race by incarnation (John 1:14). The staggering implication of this fact dare not be minimized by those who profess to be Bible-believing Christians. There is not a shred of evidence in Scripture that the first coming of Christ was a comparatively insignificant event in the career of the Son of God, stopping briefly on earth, as it were, on his way to other planets and galaxies to carry on a cosmic ministry of revelation and redemption. The great Creator who became our Saviour also told us to pray: "Our Father, who art in heaven, hallowed be Thy name. Thy kingdom come. Thy will be done, in earth as it is in heaven" (Matt 6:9-10). The earth, not some other planet, will be the location of Christ's Kingdom.

In isolation, not one of these Biblical evidences is sufficient in itself to demonstrate the uniqueness of life on earth. However, in a book that professes to give to men all that is necessary for our understanding of life and the universe, it is highly significant that not one word is given that would support the concept of extra-terrestrial intelligent life. Secular scientism is haunted by the fear that we are totally alone in the universe. But this is not the Biblical perspective at all. Many millions of spirit beings, called angels, are deeply involved in the affairs of men (e.g., Dan 10:20, Luke 20:36, Heb 1:14). Infinitely above all of these invisible and powerful creatures, however, is God, the creator of all things, who has revealed himself to men as the Father, the Son, and the Holy Spirit.

God created men in such a way that they cannot find full and deep satisfaction apart from him. Utterly frustrated by the inequities and frustrations of this life, a psalmist by the name of Asaph entered into the sanctuary of God, and thus gained a totally new perspective on the world (Ps 73:17). He concluded with these inspired words: "With Thy counsel Thou wilt guide me, and afterward receive me to glory. Whom have I in heaven but Thee? And besides Thee, I desire nothing on earth" (Ps 73:24-25). The ultimate tragedy of cosmic evolutionism is that it virtually ignores the very God who created us to find our fulfillment in him alone. The secular scientific establishment, with its big bang cosmogony, has deliberately rejected the Christ "in whom are hidden all the treasures of wisdom and knowledge" (Col 2:3). In all of their vaunted brilliance, men are bypassing the Son of God "in whom all the fullness of the Deity dwells in bodily form," for "in Him" the apostle Paul asserts, "you have been made complete, and He is the head over all rule and authority" (Col 2:9-10). To the Christian, the universe is not meaningless. We are not alone.

A Theistic Big Bang

The big bang theory, aside from the multiple problems of missing links in astronomy, clearly and directly contradicts the order of creation events in Genesis 1. Thus, there is no legitimate way of harmonizing the big bang theory with a Christian theistic view. Christian theism presupposes the authority and infallibility of the Bible. An honest and consistent application of hermeneutical principles in analyzing the Biblical record of ultimate origins leads one to a complete impasse in accommodating it with the most popular cosmogonical theory of our generation. Theistic evolutionists speak much of God (or "a god"); but they apparently have not heard the clear message of His Word.

In contrast to the six-day creation period of Genesis, for example, the big-bang concept does not envision even such simple elements as hydrogen and helium appearing until about 700,000 years after the explosion. Stars did not form for perhaps another billion years. How can this be reconciled with the declaration of God that the planet earth was created *before* the stars?

The big bang theory postpones man's appearance until twenty billion years of apparently purposeless natural processes have run their course. But the Genesis record depicts man as the true king of the earth at the very beginning of earth history, exercising dominion over all animals, including those in the depths of the seas (Gen 1:26-28; cf. Ps 8:5-8), within a matter of hours of their creation. Even the stars of the heavens antedated man by the space of only two days (Gen 1:19, 31; cf. Exod 20:11); for they had no independent purpose of existence. They were created for the Son of God (Col 1:16) and for those who have been created and renewed in his image (1 Cor 3:21-23; Col 3:10). They did not wait billions of years to accomplish what they were created for, namely, to serve as "signs" to men of God's creative wisdom (Gen 1:14; Rom 1:20). Only by denying the clear testimony of the chronological sequences of Genesis can one speak in terms of a "theistic big bang."³³

A specific description of origins cannot be *proved* by science, whether a random explosion or a supernatural creation. The origin of the universe is a single past event. Thus, it is not subject to the scientific method of testing and reproducing. As God asked Job long ago, "Where were you when I laid down the foundation of the earth! Tell Me if you have understanding" (Job 38:4). Today science is depended upon for a great variety of answers, including origins. However, there is much more at stake here than the latest temporary theories of man. A deep personal faith is required, either in a random big bang or in an orderly creation by the God of the universe. But these alternative faith commitments cannot be equal options for men who bear the image of God indelibly imprinted upon their innermost being. The God of creation simply will not allow himself to be compared with any other "deity," including evolutionary time/chance: "'To whom then will you liken Me that I should be his equal?' says the Holy one. Lift up your eyes on high and see who has created the stars, the One who leads forth their host by number. He calls them all by name; because of the greatness of His

might and the strength of His power . . ." (Isa 40:25-26).

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(Continued on page 83)

TWO PROBLEMS RELATIVITY FAILS TO EXPLAIN

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1. Introduction

From time to time articles have appeared in the *Quarterly* which have dealt with various aspects of relativity theory. The most recent, by Harold Slusher,¹ has drawn attention to yet another of the paradoxical results inherent in the assumptions of relativity theory. There are, indeed, at least two physical phenomena with which relativity is supposed to be capable of dealing but where it totally fails to do so. Both of these are seldom encountered in print. Both violate at least one of the basic postulates of relativity.

2. The Generalized Doppler Effect

The first of these problems for relativity involves the Doppler effect. It has been observed that a change in the thickness, density, or index of refraction of an intervening medium can impart a Doppler shift in the wavelength of a light ray passing through said medium. In other words, if an inhomogeneous medium were to

move across the path of a ray of light, then such inhomogeneities would introduce a Doppler shift in the wavelength.² This situation is illustrated in Figure 1.

After an analysis of the geometry involved, O'Rahilly concludes that:

Perot verified this Doppler-Michelson formula for the case of a prism moving rapidly across the ray-path. It appears then that the ordinary Doppler formula is itself a particular case of a more general theorem which it is *impossible to incorporate in the theory of Relativity*.³ (Emphasis added.)

The general theorem or formula to which O'Rahilly refers is usually written as:

$$\nu = \nu_0 \left[1 - \frac{1}{c} \sum \left(L \frac{dn}{dt} + n \frac{dL}{dt} \right) \right]$$

where ν is the frequency of the light received at the observer, ν_0 is the frequency transmitted from the source, c is the speed of light through the medium, L is the optical path length, n is the index of refraction of the medium, and t is time.⁴ It is evident from the formula that changes in the value of the speed of light can also induce a Doppler effect.

This phenomenon has a number of implications, ranging from the cosmological distance scale where tangential velocities are fairly great and intervening material is both inhomogeneous and irregularly shaped, to the distance scale of the solar system where the interplanetary medium and solar wind may significantly affect a light ray incident upon the earth. The original motivation for the development of the theory was for application to the spectral lines produced in the solar atmosphere.⁵

3. Drag Aberration

The second phenomenon which relativity theory is unable to take into account involves what Stefan Marinov terms *drag aberration*.⁶ After analyzing the geometry of the problem (see Figure 2), Marinov concludes that:

It is clear that the automatic application of the Lorentz transformation leads to an unsound result, and this phenomenon cannot be explained without referring to its physical essence. Thus the Lorentz transformation is not *deus ex machina* and is to be applied with attention, after due physical analysis of the problem is considered. Here we have once more to recognize that physics is not a mathematical apparatus to which a physical reality is attached, but a mathematical apparatus attached to a physical reality.⁷

That this is so can be clearly seen from a comparison of the classical formula for the drag aberration.

$$\delta = \frac{v}{c} \left(n - \frac{1}{n} \right) \cos \psi$$

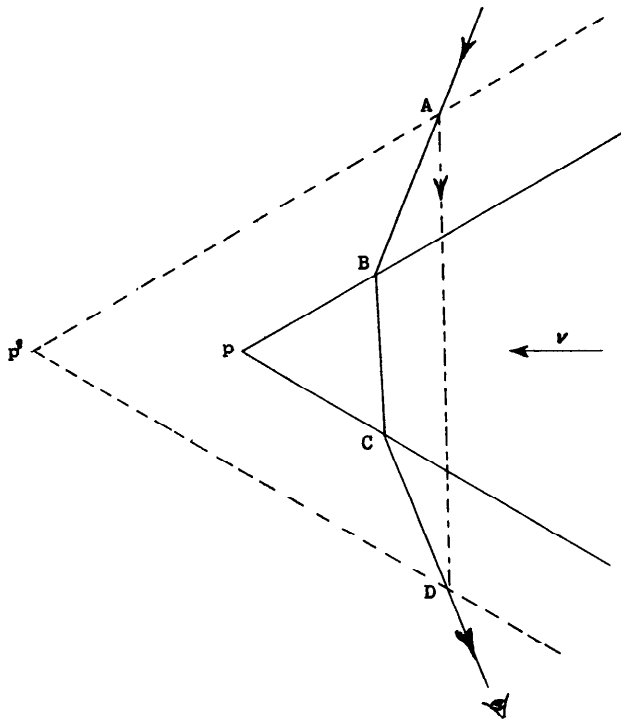


Figure 1. The figure pictures a prism moving from right to left with a velocity, v , so that the apex of the prism is located at point p initially and at point p' a short time later. In the original position (p), the light ray follows path $ABCD$ whereas at p' the light path is $A'B'C'D'$. Taking into consideration the difference in the lengths of the two paths as well as the different indexes of refraction of the external medium and the prism reveals a Doppler shift induced by the prism into the light ray.

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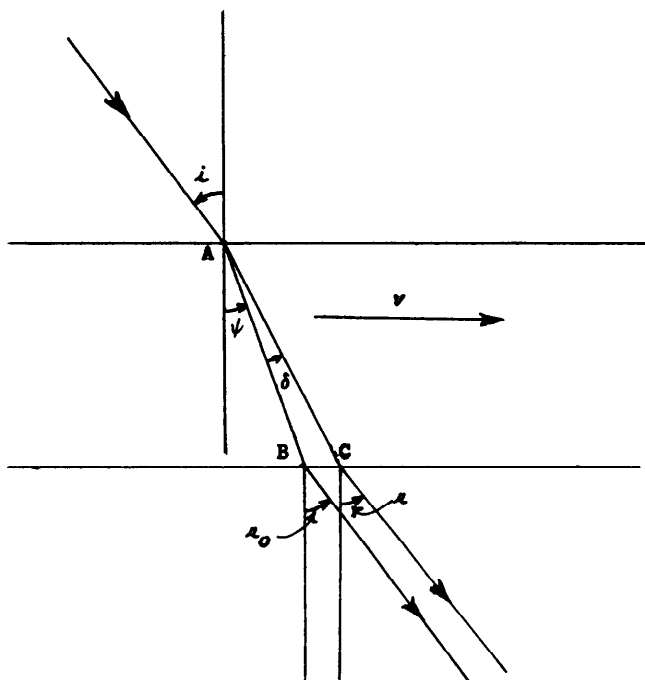


Figure 2. A slab of refractive material is moving from left to right with a velocity, v . The path AB is the one which a ray of light would follow if the slab were at rest. The velocity of the slab, however, drags the light so that it emerges at point C, following path AC. Here i is the angle of incidence of the light ray as measured from the normal, r_0 is the emergent angle, also measured from the normal, if the slab were at rest, and r is the emergent angle of the ray in the moving-slab case. ψ is the angle of refraction in the slab for the case where the slab is at rest and δ is the drag-aberration angle.

with the Lorentzian (relativistic) formula:

$$\delta = \frac{v}{c} \left(n - \frac{1}{n} \right) \frac{1}{\cos \psi}$$

Here v is the transverse velocity of the material; and the other variables are as defined in either Figure 2 or the first formula in the present paper. It is important to note here that this situation does not introduce a Doppler shift in the spectral lines of the light ray and is thus not identical to the Generalized Doppler case. It is one more example of how relativity fails to deal with physical reality.

The Hoatzin

(Continued from page 111)

In conclusion, then, there is no reason to view the living hoatzin, or the extinct archaeopteryx, as primitive, or as evolutionary links.⁵ They are, or were, both birds suited to their peculiar niches and ways of life, and having, for that reason, certain special features.

One may speculate at length about why such failures should be the case, because the implications of these failures extend even deeper than is generally realized. Not only do relativity and the Lorentz transformation fail in the above two cases, but all Lorentz-like transformations also fail. Historically, the Lorentz transformation was devised to explain the null result of the Michelson-Morley experiment, an experiment designed to measure the absolute velocity of the earth through the aether. If the Lorentz transformation proves to be un-physical, then we must conclude one of two things: either 1) there is an as yet unexplained and undetected physical phenomenon (or phenomena) which make it appear that the earth stands still, or else, 2) the earth really is at rest with respect to the aether. The dilemma is further exacerbated by the fact that the relative rotation of the earth and aether is detectable.⁸

Whatever one might conclude from this, some fundamental questions are raised by this analysis of the Lorentz transformation and relativity: questions such as: What did the Michelson-Morley experiment really show? What is really proven by the Coriolis effect, the stationary satellite, the oblateness of the earth and the Foucault pendulum? Finally, an historic epistemological question is raised: Were Luther and the Reformers right, after all, and Copernicus and Galileo wrong? In other words, is it really an unphenomenological, literal Scripture which God has given to man, or did He really write two books, both of which err when infringing into the other's realm? Certainly, whatever the truth of the matter may be, there is food for thought in the epistemological questions raised by these, and other, fallacies of relativity.

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THE CREATIONIST AND NEO-DARWINIAN VIEWS CONCERNING THE ORIGIN OF THE ORDER PRIMATES COMPARED AND CONTRASTED: A PRELIMINARY ANALYSIS

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After some consideration of the philosophical cautions which should be observed in any scientific discussion, the fossil evidence having to do with primates is reviewed. It is concluded that there is no real evidence to show either that the primates evolved from anything else, or that man evolved among them. The Scriptural view, that man and these other creatures were created separately, is fully as much in accord with the evidence, and is more credible on other grounds.

The Nature of Science and the Science of Nature

Before proceeding to the central thesis it is necessary to set out some basic ideas concerning the nature of science and evolutionary theory as they are presently viewed within the scientific community. Until recently it was a highlight of science to pose as the arbiter of all truth in the physical world through the use of elaborate theories and laws which were viewed as somewhat immutable. With the advent of quantum mechanics and research on the frontiers of knowledge in the related physical sciences this naive view of human investigation of the cosmos has given way to a radical departure from previous scientific conceptions epitomized best by the field of relativity theory in modern physics.¹ Scientific endeavor today is viewed not as a means to the end of acquiring total objective truth but as a valuable yet limited way to increase human knowledge consequent to the limits of human observation.²

One of the foremost thinkers in forging this new conception of modern science is Karl Raimund Popper, Professor of the Philosophy of Science, University of London. Popper views science as being composed of five major logical steps: a problem (usually a response to an existing theory of expectation); a proposed solution (new theory); a deduction of testable propositions from the new theory; tests (attempted refutations); and a preference established between competing theories.³ Popper arrived at this view of scientific method after formulating the concept of three worlds as a philosophical premise: 1.) the world of objective, material things; 2.) the subjective world of mind, and 3.) objective structures which are the products of minds of living creatures, which once produced, exist independently of them.⁴ According to this view the aim of science is to refine existing theories thru proposed experiments of refutation in order to arrive at a closer approximation of truth. Science is then viewed as a completely rational, logical enterprise, and scientists as logicians of the first order.

In contradistinction to Popper's methodological approach to modern science there are the equally powerful conceptions of Thomas S. Kuhn, Professor of the Philosophy of Science, University of Chicago, who views science as a sometimes irrational process in which scientists frequently experience conversion in a quasi-

religious sense in response to a crisis experience. Thus science is viewed as being in a continual state of revolution with one competing paradigm winning out over another in a never ending sequence.⁵ Once again as concerns methodology the view is that science is aim-oriented.

Not all scientists would agree with either of the two views expressed above yet it is these two views that have come largely to dominate scientific enterprise in the West. Einstein believed that science should attempt to formulate vast schemes in an attempt to find a conjectured unified harmony in nature and should not be subservient to the minutiae of aim-oriented scientific investigations.⁶

It is probably true to say that the so-called "pure sciences" are more subject to empirical investigations and explanations than the applied sciences. Mathematics for this reason would stand as the queen of the sciences since it is the most precise both in its formulations and its systems and subsystems of proofs, yet, even the "foundations of mathematics remain wobbly" since the only way to prove simple arithmetic consistent is through the use of transfinite induction, the logical consistency of which is open to serious doubt.⁷ Arranged in descending order relative to internal logical consistency one author has suggested the following scheme: mathematics, physics, chemistry, biology, and the social sciences.⁸ It is interesting to note that the further one moves away from mathematics the more theories are known by "discoverers" names: e.g. Adlerian, Freudian, Piagetian schools of psychology or Neo-Darwinian and Lamarckian theories of evolution. Recent studies have led to the conclusion that not only is present-day science built on many unsubstantiated premises and "illogical" assumptions but that scientists also fall prey to biases which distort observations such that even scientists of two diametrically opposed theories can both make the same observational mistake.⁹

Biology, being one of the least verifiable sciences, has been overwhelmingly influenced by the idea of evolution. It is important to remember that ideas of evolution did not begin with Darwin but have a long intellectual history. The ancient Babylonians, Egyptians, Indians, Chinese, and Greeks expressed ideas about the evolution of life from inanimate matter.¹⁰ With the rise of modern science at the close of the Middle Ages ideas began to be expressed in a more scientific manner concerning the possible evolution of life. Ultimately this resulted in the noted works of Buffon, Diderot, Herder, and Lamarck.¹¹

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Charles Darwin took the works of his predecessors one step further by attempting to systematize in one philosophical and scientific system the doctrine of evolution. Recent writers have criticized Darwin's work on both counts, since in many instances in the *Origin of Species* and later works Darwin seems as intent to explain away as to explain. Philosophers have been particularly vehement in their objections since Darwin's selection theory is guilty of circularity in reasoning.¹² Frequently writers on evolution maintain that Darwin arrived at his theory through the patient accumulation of a vast body of facts which led to his inevitable conclusion. In fact, as one perceptive writer has noted, Darwin, like all of us, began collecting data with a theory already present in his conceptual scheme and only noted those data which were conformable to his theory.¹³ Darwin in his works failed to take account of the work of his contemporary, Gregor Mendel, who had presented a paper before the Natural History Society of Brunn, Austria in 1865. Consequently it awaited the independent work of three investigators in the early 20th century before heredity was given its rightful place in biology and evolutionary theory. Today the dominant view of evolution in the Western world is Neo-Darwinism or the synthetic theory of evolution. It is important to note however, that not all evolutionists today subscribe to this theory. Especially is this so in Europe. Some ardent neo-Darwinists either ignore such dissent or attempt to ridicule it to *reductio ad absurdum*.¹⁴

Additionally there is an admittedly minority group of scientists who do not espouse any form of macroevolutionary theory but express a view which has come to be known as scientific creationism.¹⁵

It is the premise of this author in agreement with various authorities that none of the above positions is amenable to strict scientific investigation, as theories of biological order or emergence by their very nature are not subject to empirical investigation. The most reasonable position to take on the question of origins is to view the above ideas as models in which to fit relevant data; the more definitive the model the greater the number of facts which can be accommodated within the conceptual constraints.¹⁶

Since limitations on this paper make it impossible to present a detailed analysis of the biological sciences relative to competing models, I will focus on the origin of man viewed in the light of the two competing models of Neo-Darwinian evolution and scientific creationism.

Neo-Darwinism: Some Basic Assumptions and Concepts

Kerkut has categorized the assumptions of evolutionary theory into seven basic statements as follows:

1. Nonliving things gave rise to living material, i.e. that spontaneous generation occurred.
2. Spontaneous generation occurred only once.
3. Viruses, bacteria, plants and animals are all interrelated.
4. Various invertebrate phyla are interrelated.
5. Protozoa gave rise to the Metazoa.
6. Invertebrates gave rise to the vertebrates.
7. Vertebrates and fish gave rise to the amphibia, the amphibia to the reptiles, and the reptiles to the birds and mammals.¹⁷

All seven assumptions up to the present moment in time are incapable of empirical verification leaving one writer to conclude: "Neo-Darwinism seems in danger of replacing one set of dogmas about the origin of man by another set."¹⁸

The foundations of Neo-Darwinism rest on the twin concepts of natural selection and fitness. Natural selection can be defined as the process whereby certain individuals which make up part of the population of a given species contribute more offspring to the succeeding generation than individuals having other characteristics.¹⁹ Fitness has been defined of late as relative reproductive efficiency.²⁰ It is generally accepted that most evolutionary changes occur during random speciation events through the influence of natural selection. This idea found mathematical expression in the seminal work of R.A. Fisher whose Fundamental Theorem of Natural Selection stated: "The rate of increase in fitness of any organism at any time is equal to its genetic variance in fitness at that time."²¹ The strict formulation of the Theorem applies to allelic variation in fitness at a single gene locus, and assumes that the environment remains constant. Although this is impossible, Fisher's Theorem still remains the basic foundational concept in population genetics.²² Recently several critics of neo-Darwinian orthodoxy have maintained that Fisher's Theorem and mathematical formulations while having validity in limited cases are insufficient and incapable of furnishing a mathematical basis for the understanding of evolution.²³

Experimental attempts to view natural selection in action have resulted in the highly acclaimed work of Kettlewell with *Biston betularia* in England, and F.J. Ayala's pioneering work with *Drosophila serrata*.²⁴ While no one can dispute that these studies and others have demonstrated natural selection in action, it is important to remember that in neither case has evolution been demonstrated, since when all is said and done you still have *Biston betularia* and *Drosophila serrata*. Indeed in both cases you are only dealing with gene frequency changes in one or at most two or three loci and it appears to be a reversible phenomenon.²⁵

The raw material which furnished the basis for the action of natural selection is genetic mutation. It is an acknowledged fact that the vast majority of mutations are harmful or even lethal to the individual in question since they consist of changes in a very precisely ordered sequence.²⁶ Of those which do survive in a population the mutation must have taken place in the germ cells in order to be passed on to future progeny. Calculations based on known rates of gene mutation and transmission have yielded a figure for the chance probability of an amoeba being converted into a horse as one in one thousand raised to the power of one million, which according to all known laws in probability theory renders it impossible.²⁷ While natural selection therefore is held to act as a powerful force to mold the shape of evolution in the orthodox view, recently a controversy has begun in the upper realms of genetic theory. The neutralist school maintains that most genetic mutations are selectively neutral. While this controversy is far from being resolved it appears to bear heavily on a fundamental change in genetic conceptions for the basis of evolu-

tionary theory.²⁸ Indeed, an amazing thing about life is that mutations are so infrequent when one considers the amount of coding that takes place in the average cell. One noted embryologist and a noted botanist maintain that the present view of selection cannot be true since it cannot account for gene uniqueness or cellular ontogeny, while a noted paleontologist and recognized zoologist believe it inadequate to account for speciation events.²⁹

Concerning a genetic approach to the origin of man from the other primates there has been no theoretical formulation yet propounded in sufficient detail to enable any kind of scientific assessment of its feasibility in genetic terms. Much has been made of similarities in protein structure in the various primates with man including attempts by Dickerson and Sarich to calculate divergences from common ancestral stock.³⁰ It is important to realize that the arranged series are based on molecular morphology which is at most circumstantial evidence for macroevolution. It is open also to serious questions in regards to underlying assumptions from a genetic standpoint and criteria for selecting an appropriate scheme.³¹ Additionally there is no evidence for the evolutionary origin of the basic design for the enzymes in question. Evidence like this can be interpreted readily in a creationist framework as one specialist in biochemical taxonomy has recently done.³² Interestingly enough the time sequence based on protein structure is in conflict with evolutionary estimates sequencing based on radiometric dating, paleomagnetic studies, and paleoecological approaches.³³

Another problem posed today in evolutionary biology is the Biological Species Concept. According to Mayr, species are "groups of interbreeding natural populations that are reproductively isolated from other such groups."³⁴ The problem with this definition is that it is highly subjective since it is difficult to assess zones of mating in the wild; and even if such zones could be delineated there is no feasible way to test for reproduction isolation for the vast majority of wild animals and plants.³⁵ The effects of such arbitrary species concepts can be illustrated by multitudinous examples. For example the nineteenth century witnessed the description and taxonomic naming of sixty species of chili peppers (*Capsicum*). In 1923, Bailey reduced these to a single species. Presently five different species of domesticated chili pepper are recognized.³⁶ It seems we are left in the position that "a species is what a competent systematist considers to be a species."³⁷

Creationism: Some Basic Assumptions and Concepts

The basic underlying assumptions of the creationist position have been summarized as follows:

1. There is an omnipotent, omnipresent, and omniscient God who always was and always will be.
2. Creation and organization of inorganic crystalline rock structures of the earth as well as liquid water.
3. Creation of the atmosphere and elevation of vast amounts of water from surface up into the hot upper atmosphere and perhaps into near-space beyond, in order to sustain a strong 'greenhouse effect' over the earth's surface in its original form. (Some Creationists might differ here.)

4. Formation of the original continents.

5. Creation of various members of the plant kingdom. This was the beginning of biochemical systems, not just biochemical molecules, but complex, highly organized, self-replicating molecular systems.

6. Creation of sun, moon, stars, and other bodies of the heavens.

7. Creation of the sea and air animals.

8. Creation of the various kinds of land animals, each to reproduce after its own kind.

9. Creation of the first man and woman. 'Creationists believe that although man was created having molecular and physical similarities with other created animals, he was also uniquely endowed with a moral and spiritual consciousness not shared with other creatures. Man is a quantum jump beyond the animals'.³⁸

As is true of Neo-Darwinism, all of the above assumptions up to the present moment in time are incapable of empirical verification. That this should be true for both models is due to the fact that both consist of axioms which are not open to proof or refutation. This throws new light on the long standing conflict between creationism and Neo-Darwinism as in the words of one researcher: "We may now recognize that neither challenge is fair. If the Neo-Darwinian theory is axiomatic it is not valid for creationists to demand proof of the axioms, and it is not valid for evolutionists to dismiss special creation as unproved so long as it is stated as an axiom".³⁹

The creationist model rests on the premise of the primacy of Scripture as the absolute standard in all matters of life and conduct. Over the years there have been various attempts to identify the account of God's creation week with an emergent form of evolution.⁴⁰ Such views hold that the Genesis record is a series of truth-pictures which function in the role of mythological accounts shaped to accommodate the ideals of Near-Eastern thought. Such a view does not do justice to the Bible's uniqueness in relation to ancient Near Eastern creation mythologies as numerous Biblical scholars and professional archaeologists have emphasized.⁴¹ Such a concordist view is also open to strong theological objections.⁴²

Creationists view life as being organized around certain basic underlying structures, but do not postulate that there is any genetic or hereditary relationship between the various phyla, orders, and families. On the species level creationists maintain that the present phyletic school's definition of species is too narrow and that a return to a concept of a Biblical 'kind' is more in order. Frequently it is stated that Linnaeus held to a fixity of species, but such a statement is clearly in error. As Linnaeus continued his studies of hybridization (for which essential information was grossly lacking in his day) he concluded that in his earlier efforts to discover Genesis kinds he had often set his species locus too low and too narrow.⁴³ A creationist view applied for example to the Canine family would maintain that *Canis familiaris*, *Canis lupus*, and *Canis latrans* are all part of the same Genesis kind. Studies of these animals bred in captivity as well as chance matings in the wild have continually resulted in fertile offspring, thus refuting

the Biological Species Concept as it is presently applied.⁴⁴ Professor R.V. Short of the MRC Unit of Reproductive Biology at Edinburgh University has recently championed the view that the two genera and thirty-three species of wild geese can all interbreed successfully with domestic geese and favors scrapping the taxonomic distinctions.⁴⁵ Three creation geneticists are currently seeking to investigate through hybridization experiments the limits of genetic variation in selected plant and animal groupings in an attempt to delineate certain Genesis kinds.⁴⁶ We shall return to this concept later in this paper when discussing certain species of *Homo* as it seems to have real relevance to the current plethora of taxonomic names for hominids.

Certain creationists believe there is scientific data which can be amassed for a young age for the earth in the neighborhood of 10,000 years—a figure very different from the 4.5 billion years or so which their evolutionary counterparts use in everyday scientific endeavor. While it is impossible to deal with this subject in any great length in this paper it is interesting to note that none of the assumptions underlying the use of radiometric dating methods can be verified since even nuclear decay is extrapolated from minute observations in the laboratory. Harold Slusher, a geophysicist at the University of Texas and Melvin A. Cook, Professor of Metallurgy at the University of Utah have dealt with this subject in great detail.⁴⁷ Studies of the earth's magnetic field as it decays over time also yield a maximum age for the earth of approximately 10,000 years. The magnetic field decay involves heating, and a figure of five billion years would have resulted in total vaporization of the earth's elements according to Thomas G. Barnes, Professor of Physics at the University of Texas.⁴⁸ Robert G. Whitelaw of VPI and consultant to the U.S. Atomic Energy Commission has analyzed 10,000 dates that have been printed in *Radiocarbon* and has demonstrated that they offer strong support for the creationist position.⁴⁹ Robert V. Gentry of Colombia Union College and visiting scientist at the Oak Ridge National Laboratory of the Atomic Energy Commission, top experimentalist in the field of radiohalos, has demonstrated thru the study of polonium halos in silicate minerals of igneous rocks that the radioactive decay rate is not constant. Studies of the trapping of Alpha-decaying heavy nuclei in zircon lead to speculation that all forms of radiometric dating founded on uniform decay rates may be in error.⁵⁰ Other information based on uniformitarian assumptions (a hazardous business for both creationist and evolutionist) can be adduced for a young age for the earth such as meteoritic dust accumulation on the lunar surface, sedimentological deposition and subduction in the oceans, ocean chemistry trace elements and demographic studies.⁵¹ Other creationists read the evidence as indicating an old age for the earth.⁵²

The creationist model also postulates the occurrence in the earth's recent past of a global flood as recorded in Genesis. The effects of this flood are believed to be evidenced by the nonconformities and paraconformities in the geological column where various strata which according to uniformitarian assumptions are youthful are buried beneath sedimentological layers which are far older. While such an interpretation has yet to be worked

out in great detail the broad outlines have been enumerated by a respected hydraulic engineer and numerous geologists.⁵³ The evolutionary explanation for the 'myth' of the flood is the layering-out of sequences which can occur with river terraces. The rise in sea level that accompanied the end of the glacial period caused peoples on the coasts to lose many miles of land over the years.⁵⁴ Burdick and Rusch have reported numerous discoveries of human fossil footprints which have been ignored and overlooked by evolutionary-minded geologists and paleontologists.⁵⁵

In summary the creation model postulates a youthful earth, and thus would of course necessitate a complete rewriting of earth history from a creationist perspective. Since the number of creationists is few the task will be an ongoing project for many years to come till a model approaching the comprehensiveness and testability of the evolution model is propounded. The very fact that both models are so amenable to the data in question reflects once again the philosophical and metaphysical underpinnings of both models and the paucity of their ability to function as valid scientific theories.

Fossils and Fantasies

Since both creation and evolution are presentable as axiomatic statements from which to perceive and correlate relevant biological and other data we then come to really the only record that will enable us to determine the possible validity of either model according to the present state of our knowledge. Michael Day, noted anatomist and evolutionist at Guy's Medical School, London, reminds us:

Paleontology, or the study of fossils, provides the really crucial evidence concerning the evolution of the Hominidae in the past. However extensive and compelling it may be, the evidence for evolution based on the study of creatures living today can be only indirect . . . Direct evidence of evolution must depend on actual demonstration from the fossil record of a succession of stages representing the transformation of an ancestral into a descendant type . . . that evolution did occur can be scientifically established only by fossilized representative samples of those intermediate types that have been postulated on the basis of indirect evidence.⁵⁶

In comparing the two models relative to predictions concerning the fossil record of plants and animals the evolution model postulates that with the increasing discovery of fossilized remains of past creatures there will emerge a picture of increasing complexity (Dollo's law) and many graduated stages leading from one major type of organism to a succeeding one in a phylogenetic continuum. The creation model, on the other hand predicts that no amount of fossilized material will demonstrate such a gradual change but that the paleontological record will consist of systematic gaps between genera and families (and perhaps in some instances species due to the inadequacy of the present term).

While it is impossible to assess in this brief space specific cases to demonstrate the feasibility of each model relative to each major radiation several quick examples will be cited from the literature. The amphibian to reptilian transition postulated on the basis of the evolution

model foresees the gradual development of a number of features in the reptiles not possessed by any amphibian, living or fossil. Basically, such changes can be grouped into seven major categories: the development of the amniote egg, evolution of the palate, change in patterning of the skull at back of roof table and cheek region, reduction in tabular horn, change in position of tympanum and shape and orientation of stapes, changes in vertebral structure and modification of the scales. After a detailed assessment of morphological and physiological changes necessary for such a transition one researcher concluded: "Unfortunately not a single specimen of an appropriate reptilian ancestor is known prior to the appearance of true reptiles. The absence of such ancestral forms leaves many problems of the amphibian-reptilian transition unanswered".⁵⁷

Archaeopteryx is frequently cited as the bird which is a transitional link between reptiles and birds. On the basis of five specimens discovered in the lithographic stone of southern Germany, Archaeopteryx is believed to have possessed feathers, merrythought, rotatable and opposable big toe, and an opisthopubic pelvis, all characters of modern birds. It also possessed a continuing backbone, true teeth, a forelimb furnished with three complete fingers, fully developed fibula, and gastralia or abdominal ribs, all of which are believed to be reptilian characters.⁵⁸ For many years this bird has been put forward in evolutionary literature as a precursor to modern birds; yet several of the supposed reptilian characters have been found to be present in modern birds, the juvenile hoatzin (*Opisthocomus hoatzin*) of South America and the juvenile touraco (*Touraco corythaix*) of North Africa.⁵⁹ Recently, Professor James A. Jensen of Brigham Young University has reported the discovery of a bird which he believes to be sixty million years older than Archaeopteryx, leaving John Ostrom of Yale to conclude: "It is obvious that we must now look for the ancestors of flying birds in a period much older than that in which Archaeopteryx lived".⁶⁰

The remainder of this paper will deal particularly with the palaeontological record of early man but a few general conclusions are in order here related to the fossil record. The fossil record at present appears to be more amenable to the creation model than the evolution model due to the systematic gaps that there are between genera, families, and orders; a fact that cannot be due to a paucity of material as Darwin in the nineteenth century, D. Dwight-Davis a quarter of a century ago, and others since then have pointed out.⁶¹ A recent work has tried to summarize patterns of evolution based solely on paleontological information. Yet, as a reviewer pointed out, the book fails to record details from fossils of morphological transitions between higher taxonomic groups. So up to the present neither ecologists, geneticists, or paleontologists have elucidated macroevolutionary patterns in sufficient detail to be workable or theoretically testable.⁶²

Attempting to establish phylogenetic relations based on fossilized forms is extremely difficult if not impossible. This is particularly true in regards to human evolution, as a quick survey of the literature shows; for there are many different evolutionary scenarios based on the same data considered from different viewpoints. Isaac,

in a very illuminating essay mentions scenarios constructed by a primatologist, social anthropologist, cultural anthropologist, human biologists, and then offers, as an archaeologist, his scenario.⁶³ A recent paper reviewing the construction of family trees and evolutionary scenarios for human evolution concluded that the only testable and therefore fairly accurate representation was the cladogram—a branching diagram illustrating the pattern of distribution within a group of related organisms of derived characters which indicates an evolutionary relationship whose exact nature remains unspecified.⁶⁴ The authors decided that in the construction of family trees they could offer no clear-cut methodology, largely because of the twin problems of recognizing species in the fossil record and the improbability of correctly ascertaining whether an older fossil is really ancestral to a younger fossilized form or to a living species. Thus they suggest leaving such practices to "the realm of speculation, informed or otherwise". As if this situation would not be frustrating enough, they concluded that, as vague as the aforementioned methodology is there is no methodology at all for the formulation of a scenario. It is 'limited only by the bounds of one's imagination and by the credulity of one's audience'.

The Origin of Primates

The primates are generally believed to be descended from the insectivora. The dates given for the initial departure from insectivora stock is variable from ninety million to as low as sixty-five million years ago. Since Le Gros Clark's pioneering papers on the tree shrew (family *Tupaiaidae*) in the mid-1920's these creatures had been believed to be the ancestral stock from which primates arose; and they were assigned to the order Primates. With the discovery of fossil tree shrews from the Indian Sivalik Miocene deposits with essentially modern characters this view has given way to the belief that tree shrews can only serve to indicate the range of characteristics of the common ancestor of all placental mammals.⁶⁵ Elwyn Simons, one of the world's leading primatologists has confessed that: "The early history of placental mammals is still too poorly known for anyone to be able to state when the initial radiation of the Order Primates actually occurred".⁶⁶ Since the ancestral primate stock is not known from the fossil record, all accounts of so-called primitive characters in present day prosimians are just speculations based on the author's suppositions as to a possible ancestral type.⁶⁷

The lemurs (suborder *Prosimi*) are believed to be the first primates to have evolved from insectivore stock. Despite detailed research into possible ancestors for the lemurs, which today occupy only the island of Madagascar, there is at present no ancestral type which can be postulated on the basis of paleontological evidence.⁶⁸ A similar situation exists for the lorises and tarsiers.⁶⁹

The prosimians are supposed to have given rise to the platyrrhines and the catarrhines. Relatively little work has been done on the platyrrhines in consideration of the wealth of available material. Differences between the two groups can be summarized as follows:

1. Platyrrhini have wide internasal septum, nostrils

open laterally and less inferiorly; Catarrhini possess narrow internasal septum and nostrils open caudally;

2. Platyrrhini thumb is not highly differentiated, thumb (when present) has two phalanges, but lacks degree of efficiency of Cercopithecoidea;

3. Platyrrhini has technically flat nails, the nail in cross section looks more tentlike and is almost a pseudo-claw;

4. All Platyrrhini lack cheek pouches, ischial callosities, and an externally apparent menstrual cycle.⁷⁰ Although the Platyrrhines are readily distinguished from the Catarrhini and have not adapted to as wide a range of ecological niches as the latter, a detailed classification of these monkeys has never been devised. Indeed, leading authorities are in fundamental disagreement as to subfamilies, let alone species. For example, Hershkovitz, after anatomical studies, concludes that the *Callithricidae* (including marmosets and tamarins) are the most primitive of living monkeys and feels they must have separated from the rest of the platyrrhines for a long time.⁷¹ A more recent anatomical analysis sees these as non-primitive characters but holds to the same phylogenetic scheme.⁷² Bender and Chu, after studying chromosomal patterns concluded that they are a specialized group and are not at all primitive.⁷³ Leslie Aiello has now proffered a view that the howler monkey is the ancestral stock from which the anthropoids diverged.⁷⁴ Other authorities are divided on the question and the situation is not helped by the fact that the *Callithricidae* are completely unknown in the fossil record. The origin of the Catarrhines from an ancestral stock is still a complete mystery from paleontological research which means that neither for the Platyrrhines nor Catarrhines is there any demonstrable fossil sequences for phylogenetic relations.⁷⁵

Frequently one reads in evolutionary literature that man did not descend from a monkey but from an earlier common ancestor.⁷⁶ While fossil evidence needed to document a transition is lacking, such a proposed hypothetical ancestor would certainly be called a monkey in popular speech by anyone who saw it; and the terms monkey and ape are defined by popular usage.⁷⁷ Two evolutionists on the basis of detailed anatomical knowledge of extant primates even believe that monkeys have evolved from apes and men in view of their much more specialized structure.⁷⁸

The Origins of the Hominoidea

The *Hominoidea* are believed to have descended from the monkeys; and they comprise gibbons, siamangs, orangutans, chimpanzees, gorillas, and man. There is much disagreement as to the nature of the origin of the *Hominoidea* lineage from monkey stocks. Various forms such as *Aegyptopithecus*, *Parapithecus*, and *Apidium* are considered early representatives. Erich Thenius of the University of Vienna believes that all monkeys and apes arose from a single ancestral stock, the *Omomyidae*, during the early Tertiary; and that through convergent evolution they arrived at their present-day diversity of forms.⁷⁹ Adolph Schultz of the University of Zurich believes that the simian primates of the Old World and America originated from different ancient stocks whose exact nature is uncertain.⁸⁰

Interestingly, *Propliopithecus* when first discovered was believed from teeth and mandibular characters to bear a close resemblance to *Limnopithecus* and *Pliopithecus* of the Miocene, and therefore to be close to the ancestry of the gibbons. When *Aeolopithecus* was discovered and demonstrated possibly to be of a lineage much more like modern gibbons than *Propliopithecus* it was then postulated as being most reasonably the exact ancestor of the other *Hominoidea*. One researcher admits that while the lower molars are like those of pongids, *Propliopithecus* is "already too specialized to be ancestral to both hominids and pongids".⁸¹ With the recent discovery of *Aegyptopithecus* from the Fayum in Egypt, by Simons and associates, *Propliopithecus* has now lost his place as a presumed precursor to the Dryopithecines and hence to man.⁸² With the passage of time it now appears from the literature that *Propliopithecus* is a small-tailed, monkey-like ape who is believed to be the ancestor of the gibbon. The question of the taxonomic status of *Aeolopithecus* is left insufficiently answered for this writer; although many believe it was the ancestor of the hylobatines.⁸³

The ancestry of the orangutan is also poorly understood from the fossil record. Several schemes have been proposed, including a gibbon-like or monkey-like ancestry as well as a knuckle-walking ancestry.⁸⁴ The possible ancestor of the gorilla is still missing, while the evolutionary ancestry of the baboon is equally far from demonstrable.⁸⁵

Dryopithecus

Dryopithecus is a fossilized specimen dated to approximately 20-10 million years ago, and has been found in Turkey, Pakistan, Russia, China, and India as well as parts of sub-Saharan Africa. Specimens appear to weigh as much as 150 pounds and as little as 25 pounds. Jolly believes that *D. africanus* was monkey-like in limb proportions. Recent research concludes that *D. africanus* was a quadruped in very much the same respect as modern cercopithecoids. This, of course, does not rule out the possibility that nonquadrupedal adaptations with hominoid affinities existed in early Miocene times; but it certainly excludes *D. africanus* from such a group on the basis of its wrist, inferior radioulnar joints, and forelimb. The dental characteristics of the Dryopithecines are similar to living forms of apes.⁸⁶

Ramapithecus

Ramapithecus is believed to be the first firm link with the *Hominoidea* from the fossil record. The oldest fragments are dated about 14 million years ago and consist of a complete maxilla and matching mandibular fragment from Fort Ternan, Kenya. Based on jaw and canine structure a picture has been built up of *Ramapithecus* as a creature similar to modern human beings by its most ardent proponents, notably David Pilbeam.⁸⁷ There are several problems, however, to such an easy evolutionary scheme.

There is a huge gap in the fossil record between the latest ramapithecines and the earliest australopithecines of a minimum of five million years.⁸⁸ This five to

eight million year gap is the reason for a major project underway by paleoanthropologists to bridge the time span between primitive *Homo*, *Australopithecus*, and *Ramapithecus*.⁸⁹ Added to this is the problem that such a cosmopolitan ape as *Ramapithecus* only gave rise to *Australopithecus* in Africa and not in India, Hungary, Greece, Turkey, or Pakistan. A proffered explanation is that since ramapithecines contained such wide variation one line progressed in Africa or even between East Africa and South Asia while others remained the same or degenerated. The fossil evidence of *Ramapithecus* in Africa, however, is nonexistent.

The specimens collected consist primarily of isolated teeth and fragments of jaw, and no postcranial bones have been uncovered up to the present. Robert B. Eckhardt of the University of Pennsylvania undertook a detailed comparison of the range of variation between groups of teeth belonging to *Dryopithecus sivalensis*, *Dryopithecus indicus*, and *Ramapithecus punjabicus*. He compared a total of 24 different measurements with those of a chimpanzee population at the Yerkes Primate Research Center and a larger sample of wild chimpanzees from a reserve in Liberia. His conclusion is well worth recording:

On the basis of these tooth-size calculations, at least, there would appear to be little evidence to suggest that several different hominoid species are represented among the Old World dryopithecine fossils of the late Miocene and early Pliocene times. Neither is there compelling evidence for the existence of any distinct hominid species during this interval, unless the designation 'hominid' means simply any individual ape that happens to have small teeth and a correspondingly small face. Fossil hominids such as *Ramapithecus* may well be ancestral to the hominid line in the sense that they are individual members of an evolving phyletic line from which the hominids later diverged. They themselves nevertheless seem to have been apes—morphologically, ecologically, and behaviorally.⁹⁰

Molar shape has frequently been cited in favor of a hominid ancestry; but a recent study concludes that *Ramapithecus* is no more like *Australopithecus* than is *Sivapithecus*.⁹¹ It is important to remember that isolated teeth are usually insufficient to provide information about adaptation or taxonomy since: "Morphological analysis of occlusal surfaces, especially when isolated teeth are evaluated, may not provide definitive answers regarding either adaptation or phylogeny".⁹²

The usual published reconstruction of *Ramapithecus* shows a man-like dental arcade which is based on the original work of C.E. Lewis in 1934, followed by Simons in 1961 and thereafter. A recent research study reexamined in detail such a reconstruction and concluded that there is no dental evidence at present to warrant a reconstruction of the palatal arcade as humanlike, or to include *Ramapithecus* in the *Hominidae*, since there are many features in the dentition especially of YPM 13799 that are not typically hominid.⁹³ It is interesting that a precanine diastema is evident in the photographs of two Indian specimens of *Ramapithecus*; yet this is ignored in published reconstructions.⁹⁴

Also damaging to a hominid status for *Ramapithecus* is the extant Gelada baboon (*Theropithecus gelada*) which dwells in the upper highlands of Ethiopia and has teeth and dental characteristics very similar to *Ramapithecus*.⁹⁵ Clark and Andrews after assessing the African evidence believe that it is impossible to assess *Ramapithecus*' exact status but that it may be put either in the family of hominids or pongids whichever way the researcher wishes to read the evidence.⁹⁶ It now appears that even Pilbeam has reconsidered and holds the view that *Ramapithecus* is distinct from pongids, dryopithecines, and hominids.⁹⁷ Johanson's find of a nearly complete skeleton of a female (Lucy) which was hailed as the first hominid is now also in question, as one writer believes it to be a female member of a late form of *Ramapithecus*.⁹⁸ Most authors group it with the Australopithecines, specifically *A. africanus*.⁹⁹

Ramapithecus from all the available evidence at present seems not to have been a hominid despite certain published reports to the contrary. In that case the evolutionary history of the *Hominidae* has a gap of more than twenty million years unfilled by any fossilized ancestral stock. Presently, studies are focusing on the pygmy chimp as an alternative ancestor.¹⁰⁰

Australopithecus

Australopithecus was first discovered with the uncovering of the Taung child in South Africa by Raymond Dart in 1924. With increasing discovery the total list of *Australopithecus* remains is summarized as follows:

From Africa

Australopithecus africanus

Australopithecus prometheus

Australopithecus transvaalensis

Homo habilis (disputed)

Koobi Fora *Australopithecus*

Lothagam Hill *Australopithecus*

Omo *Australopithecus* remains (*Paraaustralopithecus aethiopicus*)

Paranthropus crassidens

Paranthropus robustus

Peninj mandible

Telanthropus capensis (disputed)

Tchad Hominid (disputed)

Zinjanthropus boisei

From Asia

Meganthropus paleojavanicus (disputed)¹⁰¹

When Professor Dart first announced his finds formally in February of 1925, his report was greeted with consternation by the anthropological community at large.¹⁰² Professor Arthur Keith, the leading authority on fossil men at that time, concluded that the Taung specimen represented a pongid related to the chimpanzee and gorilla, although it possessed a few peculiar characteristics. Professor Eliot Smith, Dart's former teacher, remained unimpressed with Dart's claim of humanity for the specimen, while Dr. W.H.L. Duckworth of Cambridge University believed that the specimen resembled the gorilla rather than the chimpanzee. Finally, Smith Woodward of the British Museum doubted that the new fossil find had any bearing on human ancestry.¹⁰³ It remained for Dr. Robert Broom to endorse the new specimen as a genuine creature on the

way to modern man; and he was soon joined by W.E. LeGros Clark.¹⁰⁴ Today the general view is that *Australopithecus* not only belongs to the family of man but that he was also a tool-user. This has been disputed, however, by those who accept the presence of *Homo habilis* on the sites contemporaneously with the Australopithecines.¹⁰⁵

The brain case of *Australopithecus* is frequently cited as an indication of being an intermediate between man and extant great apes; however, all of the figures thus far published fall within the accepted range for the apes (range from 404 to 530 cc., average of 459 cc.). Moreover, as Holloway has emphasized, man's brain differs not only by an increase in size but also a change in structure, a difficult if not impossible change to detect in fossilized specimens.¹⁰⁶ Some anatomists have argued that the weight of the brain relative to that of the body may have been greater than in extant apes resulting in a higher cerebral status.¹⁰⁷ The brain/body ratio weights, however, vary tremendously in primates and even is higher in some monkeys than it is in man.¹⁰⁸ Further, the ratio is very much higher in juvenile apes, monkeys, and in children than in adults. The accepted line of reasoning, then, leads to the obvious absurdity that the cerebral area degenerates with age. Not only is this true of hominid encephalization, but it would also appear to be true of fish, reptiles, amphibians, birds, and mammals. Jerison has marshalled a wealth of such data to show that any discussion of vertebrate brain evolution must ignore 'brain-body space' arguments.¹⁰⁹

Claims have been advanced that the Australopithecines possessed face and jaws that are more in line with human lineages than pongid lines, to which Zuckerman has stated categorically that: "The australopithecine skull is in fact so overwhelmingly simian as opposed to human that the contrary proposition could be equated to an assertion that black is white".¹¹⁰ Anatomically, if such claims are correct then the foramen magnum should be forward in the region of the middle of the long axis of the skull rather than near the back part as in quadrupeds. LeGros Clark, basing his analysis on three correlated indices: the nuchal area height index, the supraorbital height index, and the condylar position index, stated on this basis that the Australopithecines must have been bipedal.¹¹¹ He studied only one skull of *Australopithecus*; and in his published report he gave no tables citing studies of human skulls for comparison. Ashton and Zuckerman, utilizing an extensive collection of specimens of men and australopithecines, confirmed Clark's conclusions about the nuchal area height index and the supraorbital height index, but found that regarding the condylar position the australopithecines were much closer to the ranges for apes than human skulls.¹¹² Interestingly, while the literature reports Zuckerman's first two conclusions, nothing is ever said about the discordant findings related to the condylar position index, an important issue that Zuckerman himself believes definitely means that the australopithecine skull was balanced like that of apes.¹¹³ The most detailed research seems to indicate that the position of the foramen magnum is independent of the nature of a primate's locomotion and posture.¹¹⁴

Three specimens of Australopithecine skulls (*Para-*

thropus) possessed a well-marked sagittal crest in the mid-line of the top of the skull, a feature which is never found in humans but occurs in great apes, many species of monkeys, and many of the long-snouted mammals. Generally it is also associated with a nuchal plane which is capped by a nuchal crest, both of which indicate the existence of fairly powerful neck muscles, a necessary apparatus to support the skull on the vertebral column of a quadruped. Studies of several hundred skulls in apes, monkeys, and man demonstrate that the Australopithecines on this basis must have carried their heads like apes and not like men.¹¹⁵ Robinson has tried to get around this impasse through arguing that the nuchal crests of the Australopithecines were not formed as in other primates through the opposing pull of the posterior fibres of the temporal muscles and nuchal musculature and he differentiated crests into simple and compound.¹¹⁶ This claim is seen by Zuckerman to have no basis in anatomical fact.¹¹⁷

The anatomical characteristics of the Australopithecine pelvis are frequently cited in favor of a designation of *Homo*.¹¹⁸ Zuckerman and colleagues examined the most complete Australopithecine innominate bone that was available at the time and utilized as comparative material thirty foetal and new-born individuals' innominate bones, forty-three adult human bones, ninety-four innominate bones of the great apes, and a varying number of innominate bones of monkeys and baboons. They concluded that it seemed difficult on this basis to ascribe bipedalism to the Australopithecines.¹¹⁹ The angle of twist between the main plane of the ilium and the ischiopubic part of the innominate in the Australopithecine cast corresponded to that in macaque, cercopitheque monkey, and baboon; and was well outside the range for apes and adult men (although close to the limits for a new-born baby). Surprisingly, he also found that the angle of twist in man was usually less than in apes which coupled with other observations lead to the conclusion that the gluteus maximus of the Australopithecines was a muscle which abducted the thigh as it appears to do in monkeys and apes rather than extensoring the thigh on the trunk as in man, an aid to erect posture. Further studies have been launched since this preliminary study and they confirm in even more detailed anatomical reasons the above conclusions.¹²⁰

Oxnard, using canonical analysis and other means, has studied the scapulae of forty-one different genera of monkeys and apes and concluded that man is the only living primate that never uses his arms as a normal aid for locomotion.¹²¹ Oxnard's more detailed recent results confirm his earlier conclusion and indicate that *Australopithecus* was an ape in terms of locomotion whatever else may be said.¹²² An independent study of the scapula of *A. africanus* from Sterkfontein concluded that the reconstruction indicates pongid, not hominid, affinities.¹²³ These finds on the shoulder bones tie in well with a report on the humerus of robust Australopithecines which concludes that it was of a size to be expected if it was used for locomotion rather than habitual bipedalism, in the manner of extant apes.¹²⁴

Studies of the Australopithecines' os capitatum have also greatly exaggerated their significance in an effort to support the position for hominid status. A detailed

morphological analysis of the Sterkfontein capitate upon which most assertions are based has failed to support the oft-stated position. Indeed, the researcher noted that the capitate: "conserves, with but little progressive modification, important biomechanical characteristics still found in *Pan*. There are indications that the capitate from Bed I, Olduvai Gorge, although badly damaged, was essentially similar in form".¹²⁵

There is tremendous disagreement at present concerning the relations of the gracile *Australopithecus africanus* and the *robust* and *boisei* species of *Australopithecus*. Features that both specimens seem to commonly possess are small brain size, low, sloping forehead, post-orbital constriction, parabolic dental arcade, and jutting face. *Australopithecus africanus* possesses no sagittal crest and small molars and pre-molars while *Australopithecus robustus* possesses a heavier musculature, sagittal crest, and larger molars and pre-molars.¹²⁶ The inference has been made that the gracile species was omnivorous and the robust species was vegetarian. A Canadian investigator, however, from studies of tooth chipping, found that they did not differ substantially in the amount of grit in their diet, which fact would seem to negate the omnivorous-vegetarian distinction.¹²⁷ This appears to tie in with the belief currently gaining in favor among the investigators most closely associated with the materials that the two forms are male and female of the same species. This view is based primarily on Richard Leakey's uncovering of the remains of both forms in the same deposit.¹²⁸ It should be pointed out that two other competing views are also current in the literature; that of subspecific variation, allopatric in some regions and sympatric in others; and hominid speciation.¹²⁹ Jolly has proposed a model of australopithecine dietary habit based on an analogy with the gelada baboon of Ethiopia. Critics have pointed out, however, that such a view is not borne out by studies of extant primates, since *Gorilla gorilla* and *Theropithecus gelada* possess similar dental morphology but dissimilar diets.¹³⁰

Additionally there now appears to be evidence from Johanson and White of a new species of the Australopithecine group- *Australopithecus afarensis*, based on analyses of specimens from Hadar in the Afar region of Ethiopia and Laetoli in Tanzania. These specimens include "Lucy", a forty percent complete skeleton of a three and a half foot tall, small-brained female. Preliminary assessment by Owen Lovejoy of Kent State University has led to the conclusion that Lucy was a facultative biped in spite of her small cranium. Unfortunately a published report of his reconstruction will not appear till late spring of 1981 so an evaluation of this new data would be premature. It is important to note also that Richard Leakey has objected to the new species believing that Lucy is completely separated from the remainder of the group, while Mary Leakey objects on the grounds of a one thousand mile geographic separation and the renaming procedure followed by White and Johanson.¹³¹

Dart maintained that osteodontokeratic tools and weapons were manufactured by the Australopithecines on the basis of fossil assemblage from Makapan; and this is the view at present accepted by most authori-

ties.¹³² Other experts who have undertaken field studies of hyena scavenging and resultant remains are unconvinced, holding to the view that the Makapan assemblage represents the uneaten remains of carnivore kills.¹³³ Additional evidence has come forward from the research of Brain who believes that the Australopithecines were consumed by some carnivore. Leopards could be indicated, since they seemingly accumulate bones and systematically damage bone. Thus it may well be that the Makapan assemblage is the result of both hyena and leopard kills.¹³⁴ Other "tools" found at Shungura Formation, Lower Omo Valley and at Olduvai seem to compromise either facies. Some (especially at Olduvai) may be associated with the stone habitation hut found at the bottom of Bed I (FLK NN1) whose deliberate manufacture seems to indicate the presence of modern man at the site contemporaneously with the Australopithecines and *Homo erectus*. This real hiatus for evolutionists frequently is eliminated altogether in discussions of the materials.¹³⁵

Homo habilis, or "Handy Man", also must be mentioned in our considerations of the Australopithecines. There are four specimens presently designated, all of which were named by Louis Leakey at Olduvai Gorge due to their seeming initial association with tools. Most authorities prefer to class these habilines as a local variation of the gracile Australopithecines; and many of the "tools" are still under debate as the majority resemble naturally produced stones in the area. It has been suggested by some that these *habilis* remains can be correlated with features of KNMER-1470 from Koobi Fora on Lake Turkana, but the definitive anatomical report needed to refute or support such assertions is presently lacking.¹³⁶

What then is the taxonomic status of *Australopithecus*? It is this writer's opinion that the taxonomic status of *Australopithecus* is best summed up in the words of Charles Oxnard:

The various Australopithecines, viewed as a single group at the higher taxonomic level, are generally more similar to one another than any individual specimen is to any living primate. They are uniquely different from any living form to a degree comparable at least to the differences among living genera. The manner in which they are similar to living apes and man, is either such as is applicable to all living apes and man, or such that displays special morphological resemblances to a particular ape, the orangutan . . . We may well have to accept that it is rather unlikely that any of the Australopithecines . . . can have any direct phylogenetic link with the genus *Homo*.¹³⁷

It seems that the Australopithecines furnish a perfect example of what happens when paleoanthropologists let their imaginations run away with themselves rather than carefully sifting, analysing and evaluating the data in its entirety. Alan Walker has listed some excellent points to be taken into account when attempting to diagnose differences between two genera which bears repeating:

1. The diagnosis should be based on all available parts that are known in common for both genera.
2. The diagnosis should be based on material that

can be shown to be (a) definitely associated or (b) reasonably attributed, and resort should not be made to parts that are doubtfully associated unless this is clearly stated. Where cranial remains of two genera are known and postcranial remains of one can be definitely associated, it is reasonable to attribute a second series of limb bones to the other genus, provided that what has been done is stated and provided that the bones can be distinguished.

3. The diagnosis should be made on the morphology alone and not upon inferences from the morphology. Presumed diet, locomotion, and such should not be used, since these are, after all, only inferences from the morphology and can easily be erroneous. The morphology upon which the inferences are based should be sufficient and has the virtue of being available for checking.

4. Cultural "associations" are not to be recommended, since the proof of such an assertion is not likely to be forthcoming.

5. The geological age of the specimen and the geographical location should play no part in the diagnosis. The known ranges of the genus in time and space can be given as information after the diagnosis.

6. Specimens showing gross pathological features or artificial distortion should not be taken into account without due caution.

7. If the information is available, not only should the maximum number of skeletal parts be used to differentiate genera, but infant and senile material should be treated separately.

8. If the species of the genera are sexually dimorphic and this can be demonstrated, the nature of the dimorphism should be stated.

9. Wherever possible, statistical evidence should be presented to substantiate or amplify statements; for, since taxonomy is a science that deals only with samples, it is by definition a statistical science.

10. Great care should be taken when making statements about taphonomically altered specimens, and especially about measuring them. If distorted specimens have been used, the limits of the distortion should be measured and all factors related to this taken into consideration.¹³⁸

Utilizing the above criteria the author goes on to state his belief that while it is impossible to render a conclusive judgement, KNMER-1470 has many characteristics constantly found in *Australopithecus*, a view corroborated by comparing multivariate statistical data from Oxnard.¹³⁹

Man—his Uniqueness

It is perhaps best at this point, before proceeding to a discussion of *Homo*, to mention several characteristics in which man is distinct from all other beings in the living world, since most books on human evolution spend most of their time talking of similarities. From present evidence those differences can be categorized into psychological, anatomical, physiological, behavioral, and ethical features.

Psychologically man functions on a level far higher than any mammal or living creature that we know of in the indices that we are capable of measuring. Professor Grey Walter, pioneer of uses for the EEG conducted ex-

periments in the 1940's and 1950's in which he amplified the wave patterns of primates 10,000 times in an effort to approximate those of a human. His conclusion was that:

... the mechanisms of the brain reveal a deep physiological division between man and ape, deeper than the superficial physical differences of most distant origin. If the title of soul must be given to the higher functions in question, it must be admitted that the other animals have only a glimmer of the light that so shines before men.¹⁴⁰

A research study by Jacobsen in 1936 concerning functioning of the frontal association areas in monkeys led to the conclusion that contrary to man, monkeys following unilateral lesions showed no evidence of hemispherical dominance.¹⁴¹

If Noam Chomsky is correct in his analysis of deep structures which are manifested in surface structure in generative grammar then neurobiologically this would call for the view that aspects of this structure are wired-in to the brain with certain cortex connections programmed in such a way as to make the emergence of language inevitable and uniquely human.¹⁴² This would appear to have a neurological and ontological link with comparative anatomical studies which have demonstrated that emotional expression in animal species is managed by a neural mechanism in the middle brain stem. This appears to be true also in man; yet the cortical areas for symbolic speech are topographically distant from this deep-lying mesencephalic system, existing only in the associational cortex of the human brain.¹⁴³ These capacities for symbolic language depend upon neural mechanisms which develop only in the dominant cerebral hemisphere rather than bilaterally. It is hard to conceive how such an arrangement could have evolved successfully from the cerebral organization of the chimpanzee or other primate.

Much has been made recently of attempts at teaching language to chimpanzees. To mention three well-known cases. Sarah and Lana's training have been based on the principles of operant conditioning while Washoe's training in its earlier stages had been stimulus-response: "This behavior is dependent however on humans to generate and is basically gestural, this does not imply that the chimpanzee has even limited linguistic ability equivalent to man".¹⁴⁴ John Lyons, Professor of Linguistics at the University of Sussex, England believes: "It is still an open question . . . and to some considerable extent a matter of definition, whether apes have been shown capable of learning a communication system that is rightly described as a language".¹⁴⁵ David McNeill, an expert in language development in children is no more optimistic.¹⁴⁵ A further barrier to language acquisition in chimpanzees or any nonhuman primate is anatomical, as Philip Lieberman explains:

Our data indicate . . . that the nonhuman primates would not be capable of producing human speech even if they had the requisite mental ability. Unlike men, the nonhuman primates do not appear to change the shape of their supralaryngeal vocal tracts by moving their tongues during the production of a cry. The only vocal tract shape that the monkeys and apes use is one similar to a slightly /a/ - like schwa

... Living nonhuman primates lack the anatomic apparatus that is necessary to produce the full range of sounds of human speech. Monkeys and apes inherently could not produce 'articulate' human speech even if they had the requisite mental ability.¹⁴⁷

It is now realized, after extensive research, that the spontaneous processes of normal language mastery by normal children will not be clarified by ape-language work. Apes and monkeys have a circumscribed intelligence relative to man that will delimit their ability to engage even in symbolic communication with humans.¹⁴⁸ Even such an advocate of ape language as David Premack confesses that chimpanzees cannot produce pure grammatical classes as their ability to relativize and nominalize are lacking.¹⁴⁹ Recent evidence has appeared that pigeons can also be conditioned to utilize symbolic language much as chimpanzees using operant conditioning.¹⁵⁰ It now appears obvious that contrary to earlier exaggerated claims from some of the more vocal members of the evolutionary camp, man's "... entire cognitive function, of which his capacity for language is an integral part, is species-specific".¹⁵¹

Anatomically, man can be readily distinguished from other primates when complete specimens are available for study. Arthur Keith compared the anatomical characteristics of man with various species of apes and monkeys. Of 1,065 characteristics the chimpanzee shared 369 with man, the orangutan 359, the gorilla 385, the gibbon 117, and the monkey 113. He compiled a list of 312 characters that are exclusive to man.¹⁵²

Anatomical differences concerning the skull can be detailed in sufficient measure to illustrate an unbridgeable gulf between human skulls both fossil and extant and that of the other primates. The example of the 'hunchback' or kyphosis in the basisphenoid area of the skull of man will suffice here:

In nonhuman primates, the kyphosis is situated in the presphenoid (presellar) kyphosis) ... the characteristic aspect of the kyphosis of the human skull base is that this angle is wider than that in nonhuman primates. In man the vertex is located above the sella; while it is before the sella in nonhuman primates. In the chimpanzee the location of the vertex most closely approaches the location in man, but it is always found lying just frontal to the sella. In the orang the vertex is found much more frontally with regard to the sella than in the chimpanzee.

As is well known, primates also have a kyphosis of the brain formed by the bending of the hemispheres against the brain stem and the medulla oblongata ... The vertex of the angle in man is always located above and behind the sella in the fossa interpeduncularis. In the chimpanzee and the orang, it is located above the sella, but slightly more rostral than in man. The vertex of the angle in lower primates is always rostral but in differing degrees than in the pongids ... the angle of the brain kyphosis is always greater in man than in nonhuman primates.¹⁵³

Attempts to sketch human evolution in terms of the evolution of the skull while fascinating flights into fantasy have no basis in detailed anatomical analysis. Welker, in a brilliant analysis of brain evolution, maintains that we will never be able to construct a scenario

that will have any experimental and verifiable validity. This is due not only to the limited specimens at hand but also the very nature of man's understanding of himself:

In almost all respects, I have attempted to show that the truth regarding brain evolution is still beyond the horizons of our vision and lies yet veiled by the limitations of our rational verbal concepts and exploratory tools. Unconscious inference and intuition are still preeminent modes of providing understanding of basic truths. However, these truths are often provisional and ephemeral figments limited by the stylistic logic of rational descriptions, operational definitions, and explanations.

Perhaps an insurmountable problem is that the incredibly vast and diversified network of interrelated, perpetually changing neurobiological structures and functions are of such a nature as to be beyond the ken of the thinking, perceiving, analytical and explaining machinery of human brains. The logical operations by which human neural circuits are constrained to function surely do not provide adequate or faithful analogs of the spatiotemporal flux of phenomena that we so pretentiously wish to detect and divine. For example, only a few of the features of these natural phenomena may be sufficiently discrete or optimally suited to be transmitted accurately into our verbal and symbolic language. Consequently, the bulk of reality regarding the dynamic flow of life processes may forever remain hidden behind a veil of ignorance imposed by these intrinsic limitations. If new structures were to evolve to conceive more accurately what now lies still hidden, even then additional impalpable mysteries regarding the function of these newest structures would concurrently have been created.¹⁵⁴

Comparative studies of fetuses of man and other primates indicate that man differs greatly from the apes in this stage of life. Significantly, the volume of the human brain-casing during fetal life appears to reach the upper limit for safe expulsion from the birth canal and man in the fetal stage is the only primate capable of reverse deformation of the braincase at birth due to the developmental delay of the neurocranium bones.¹⁵⁵

Perhaps the most obvious anatomic difference between man and the other primates is his upright posture. Recent studies have concluded that analysis of muscle function is not sufficient to reveal all of the essential differences but that the whole behavioral repertoire must be analyzed in terms of function.¹⁵⁶ A gorilla's thigh extensor is power-oriented while man's is speed-oriented. Man also possesses a more effective lateral balance control while walking. Correlated with the above features of the gluteus medius and gluteus minimus are numerous other features of the pelvic girdle and especially the innominate bone that are strikingly unique to man as summarized here:

- (1) ... the dorsal extension of the dorsum ilii, which brings the gluteus maximus and gluteus medius muscles into a different alignment with the hip joint;
- (2) the great dorsal extension of the iliac crest, which provides a more extensive attachment for the muscles used in supporting the trunk in the erect posture, and in particular for the powerful sacrospinalis muscle;

(3) a rotation of the sacral articulation associated with a reorientation of the sacrum as a whole relative to the vertical axis of the os innominatum in the upright positions; (4) a great reduction in the total relative height of the ilium; (5) the formation of an angulated and relatively deep greater sciatis notch associated with an accentuation of the ischial spine; (6) the development of a conspicuous and stoutly built anterior inferior iliac spine associated with the attachment of the ilio femoral ligament and the origin of the large rectus muscle; (7) an abbreviation of the body of the ischium with a corresponding approximation of the tuber ischii to the acetabulum; and as a corollary of the previous items; (8) a relative approximation of the sacral articular surface to the acetabulum.¹⁵⁷

Jenkins has demonstrated that bipedal chimpanzees are not bipedally locomoting as in the human gait but retain the quadrupedal pattern of femoral flexion and extension within a posture that includes a reoriented pelvis. Such biomechanical elements of locomotion in apes and men illustrate once again man's uniqueness.¹⁵⁸

In summary, man can be recognized from the skeletal material on the basis of the following major points:

1. An enlargement of the brain.
2. An increased thickness of the cranial vault.
3. A reduction in postorbital construction and the size of the temporal fossae.
4. A reduction in facial prognathism.
5. A projecting nose associated with the true antero-inferior nasal spine and protruding nasal bones.
6. An inflated frontal sinus and the development of the supra-orbital torus where nasion is located below the torus.
7. A reduced supramastoid crest.
8. A vertically oriented temporal squama.
9. A mastoid notch which is separated from the occipitomastoid suture and occipital groove by the occipitomastoid crest.
10. Vertically oriented incisors and alveolus with a palate of nearly uniform depth both anteriorly and posteriorly.
11. M_2^1 which are larger than M_3^1 (molars).
12. A mental eminence.
13. An intermebral index where the upper-limb is considerable shorter than the lower limb.¹⁵⁹

Man is also the only tool-maker despite claims advanced to the contrary by certain members of the evolutionary camp. Warren has defined a tool as "any object extraneous to the bodily equipment of an animal that serves as a functional extension of the organism, permitting it to enlarge the range of its movements or to increase their efficiency in manipulating the environment".¹⁶⁰ On the basis of such a definition it can be stated that only one nonprimate mammal is known to regularly use a tool; the California sea otter who hammers sea urchins against a stone resting on its chest. There are isolated instances of horses, elephants, and goats using sticks as scratching tools but no evidence to indicate continual usage. Therefore only primates among the mammals seem to use tools on a regular basis and manufacture various types for the situation at hand. Evidence has been put forward that chimpanzees

utilize novel motor patterns in solving tool problems and occasionally learn to use tools by imitation rather than by trial and error. However, this remains to be demonstrated in wild animals not on reserves. Thus one may conclude that perhaps some of the observed behavior has been copied from human beings.¹⁶¹ Mary Leakey believes that the above definition of tool use is too general; and that a far more utilitarian definition, and one which immediately distinguishes man from the other primates is that man uses one tool as an instrument to make another rather than simply modifying objects with hands and teeth.¹⁶²

Behaviorally, man also emerges in a class by himself among the primates. Food acquisition is a corporate responsibility, exchange and sharing predominating, a behavior nowhere approached by any other primate. There is also an evident home base in human social groupings which is totally lacking in the great apes. Additionally there are many differences in human hunter-gatherers and apes which are too detailed to go into here.¹⁶³

Man is the only living creature that has the capacity to worship a transcendent being. Freud attempted to relegate religion to that section of the basement wherein were contained the neuroses of man; yet in doing so he ignored both history and psychology since as Rapaport reminds us:

Neither history nor anthropology knows of societies from which religion has been totally absent, and even those modern states that have attempted to abolish religion have replaced it with beliefs and practices which themselves seem religious. A century ago E.B. Tylor (1971), whom some consider 'the father of modern anthropology', attempted to account for the universality of religion by reference to the psychic unity of mankind. It is the experience of dreaming, common to all men, that has suggested to all men the existence of the soul, he argued, and it is from a primordial belief in the soul that religion in its manifold forms has evolved. But as Durkheim (1961) asked at the beginning of this century: 'How could a vain fantasy have been able to fashion the human consciousness so strongly and so durably?' He argued that it cannot be accepted that 'systems of ideas like religions, which have held so considerable a place in history, and from which, in all times, men have come to receive the energy which they must have to live, should be made up of a tissue of illusions'.¹⁶⁴

Many other distinctive qualities set man apart from the other primates but this section will close with a summary statement from Denis Alexander, formerly of the Institute of Psychiatry in London:

"I am a man" is one of the most profound things that I can say. It involves the power to conceptualize—to hold an idea long enough in my mind to think about it. It involves conscious self-awareness—the ability to look 'outside myself' and realize what I am. It involves the use of language which has been moulded and influenced by thousands of years of human activity. The fact of linguistic consciousness means that I can be both a subject and an object. I can think about my brain mechanistically, and yet when it

comes to my own choice know that it is not predetermined. As we have seen, nobody could make a prediction which would be binding on me. I am a free agent. Furthermore, my linguistic consciousness means that I can be genuinely creative. I can dream up ideas, create works of art and think thoughts which are genuinely new, which have never been created or thought of exactly that way before. I also have an incredible capacity for learning and memory, which is nowhere near matched by any animal. And I have the ability to adapt through the learning process and to communicate new ideas and learning experiences to my progeny, an ability also possessed by no animal. This means that I can read of man's learned experience written thousands of years ago and they can still have extreme relevance to my own situation today . . . However clever a chimpanzee may be in learning tricks or getting food that is placed beyond its reach, it cannot retain an image long enough in its brain to think about it. An animal could never therefore, imagine, calculate, predict, or make a moral choice, because it could not conceptualize the ideas needed to carry out these activities.¹⁶⁵

Homo Erectus

The infamous story of *Homo erectus* begins with a Dutch physician, E. Dubois who joined the Dutch army on assignment in Java hoping to uncover the remains of early man. In 1891 along the banks of the Solo River he discovered near the village of Trinil a low-vaulted skull-cap with prominent supraorbital tori. About a year later and some fifty feet from where he had found the skull-cap, Dubois found a femur and assumed that the two were associated. He coined the term *Pithecanthropus erectus*, also associating two molar teeth with the original specimen. Also he discovered a premolar tooth which he also included with the initial finds. Exhibiting these curiously isolated specimens now grouped together at the International Congress of Zoology in Leyden in 1895 Dubois found himself either lauded or castigated by various national anthropological groups. The English favored a human designation, the Germans believed it was an extinct ape, and the French were somewhere in the middle.

Classically *Homo erectus* has been defined by the following matrix of traits: average population brain volumes are substantially lower than those of *Homo sapiens* and much larger than those of *Australopithecus*; neurocrania are long and low, with angulated occipitals and relatively flattened frontals; moderate to large supraorbital tori, and thickened vault bones; molars and premolars are smaller than in *Australopithecines*, both absolutely and relative to body weight; anterior teeth are absolutely as large and relative to cheek teeth, larger than those of the earlier genus.¹⁶⁶

The Kabuh beds at Trinil which yielded the original *Homo erectus* calvaria, femora, and teeth is fraught with difficulties in dating. The late Marcel Boule, former Director of the French Institute of Human Paleontology after a thorough examination of the skull-cap found by Dubois, concluded that it was most similar to that of chimpanzees and gibbons, and reported that von Koenigswald ascribed two of the molar teeth to an

orangutan and one premolar to true man.¹⁶⁷ In summarizing the finds Boule stated:

If we possessed only the skull and the teeth, we should say that we were dealing with beings, if not identical with, at least closely allied to the Anthropoids. If we had only the femora, we should declare we were dealing with Man . . . We have seen that serious reservations had to be made with regard to the teeth; and whatever the presumptions in favour of the femur belonging to the cranium, some doubt remains, and will still remain, until new and more fortunate excavations put us in possession of less imperfect relics found in close association . . . All attempts at restoration were undertaken on the assumption that the Trinil remains belonged to one and the same creature. Dubois, Manouvrier, McGregor, Osborn and Weinert published reconstructions of the cranium and even of the whole skull. These attempts, which were based principally on human anatomy, were far too hypothetical, since no data were available for the reconstruction of the base of the skull, the whole face, and all the apparatus of the lower jaw. Painted models of a complete *Pithecanthropus* such as have actually been made, are pure flights into fancy.¹⁶⁸

More recent investigations support his conclusions, as there seems to be insuperable objections anatomically to the belief that the various specimens are interrelated.¹⁶⁹

Peking Man is believed by many to be *Homo erectus*, but until the actual remains can be rediscovered (if such an event is likely) there can really be no definitive talk of the taxonomic status of an individual(s) whose remains are not available. A detailed anatomical analysis is essential before an adequate judgement can be rendered, although it may be possible that some of the original bones are indeed available.¹⁷⁰

The remaining specimens that are presently grouped in the *Homo erectus* group are of varying ages geologically and vary widely in their cranial capacities all the way from 775 cc up to 1225 cc.¹⁷¹ Because of the various problems associated with these specimens it is difficult for a non-specialist to deal with them at any length. It does seem certain that some of the specimens like Heidelberg and Swanscombe are exceptionally modern in appearance, as far as can be judged from those fragments that are available for study.¹⁷² It would seem, from an outsider's point of view, that the taxonomic distinction *Homo erectus* could best be done away with. Either some of the specimens could be grouped into *Homo sapiens erecti*, or the present designation be retained for these specimens only and the rest removed to either a form of *Australopithecine* or a temporary designation of *Pithecanthropus* till further specimens come to light.¹⁷³

Homo Sapiens

Man from this study emerges with no common ancestor in any of the primate groups. This view is quite distinct from the evolutionary model, although both sides base their conclusions on the same basic data. Remains of *Homo sapiens* date from 250,000 B.P. to c. 15,000 B.P. (by the uniformitarian dating) as sum-

(1) Specimens of the 'intermediate' sapiens group			
(a) before c. 100,000 B.P.			
Steinheim	Swanscombe		
Taubach	Fontchevade		
Ehringsdorf	Vertesszöllos		
(b) between 70,000 and 40,000 B.P.			
Genovce 66,000	Saccopastore 60,000		
Tabun 40,900	Skuhl 39,700		
Krapina			
(2) Specimens of the 'classical neanderthal' group			
Europe		Middle East	
La Chapelle 35-45,000		Shanidar 50-60,000	
Charente 35,000		Galilee 70,000	
La Ferrassie 35,000		Jebel Gafza 70,000	
La Quina 35-55,000			
Gibraltar I 35-70,000			
Gibraltar II 50,000			
Circeo 35-70,000		North Africa	
Neanderthal 35-70,000		Haua Fteah 40,700	
Le Moustier 35-70,000			
(3) Specimens of the 'Rhodesian' group			
Hopefield 40,000			
Broken Hill 30,000			
(4) Specimens of the 'Solo' sapiens group			
Ngandong			
(5) Specimens of the 'modern' sapiens group			
Europe		Outside Europe	
Combe Capelle 34,000		Niah (Borneo) 38,000	
Vestonice 26,000		Florisbad (S. Africa)	
Piedmont 26,000		Afalou (Algeria) 11,000	
Cromagnon 20-30,000		Matjes R. (S. Africa) 11,000	
Oberkassel 12-17,000		Natchez (America) 11,000	
La Madeleine 12-17,000		Upper Choukoutien? 10,000	
and other French		Wadjak (Java)? 10,000	
Magdalenians		Singa (Sudan) c. 23,000 ¹⁷⁴	

Table 1. Fossils identified as *Homo sapiens*, with the dates ascribed to them. (All "B.P.")

marized in Table 1. There are basically three schools of thought in the evolutionary camp as to the origin of modern day man. The first view is the Hat-rack or Neanderthal theory of unilinear evolution and its chief advocates have been Hrdlicka and C. Loring Brace.¹⁷⁵ The view postulates that there is a simple, direct evolutionary relationship between Australopithecines, *Homo erectus*, Neanderthals, and Cro-Magnon with scarcely any side-branching. The Preneanderthal school splits the origin of man at the time of Steinheim and Swanscombe and believes that Neanderthal in western Europe was an evolutionary dead end. The alternative school, the Presapiens, suggest that *Homo sapiens* originated as a distinct lineage completely separated from the Neanderthal line. They differ in time of separation also with the pre-Neanderthal theory, placing the time of divergence much later than the Presapiens who put the divergence before the Mindel-Riss interglacial and some even before the Mindel glaciation. An older view has held that the Neanderthals were wiped out by an invasion of Cromagnon men from the near East and the Mediterranean moving into north-western Europe;

but this view finds little favor today except among the French. It is believed rather that the Neanderthals would have been stiff opposition to an invader, and that they probably were assimilated in a gradualistic way, interbreeding till the gene pool had stabilized.¹⁷⁶

All of the peoples in question during this period in human pre-history were definitely possessors of a high degree of culture as evidenced by their art, burial practices, and associated cultural assemblages. The old view of Neanderthal as a stooped semi-brutish creature has given way to a more realistic appraisal of his marked capabilities in comparison with *Homo erectus* or the Australopithecines.¹⁷⁷ The origin of human racial types is shrouded in mystery since the gene frequency data needed to answer such a question are lacking and will probably never be forthcoming.¹⁷⁸

Evolutionary Frauds and Freaks

An interesting sideline to the whole question of the origin of man has been the number of frauds perpetrated in studies of human evolution, including such well-known examples as Piltdown man and *Hesperopithecus harold cookii* (Dawn man). Also interesting are certain finds which have been reported in the literature, yet because they do not fit currently conceived theories of human evolution they are simply ignored and summarily rejected without a fair hearing. The most obvious examples are the Castenedolo, Olmo, and Calaveras skulls, all of which were found in strata dated geologically as Pliocene (ranging in depth from 140 feet to 6½ feet). Sir Arthur Keith was the last anthropologist to do any justice to these skulls; and he concluded that these fossil skulls would have been accepted as genuine had they not so radically contradicted the current evolutionary theories of his day.¹⁷⁹ The original field work done by Professor Guiseppe Sergi of the Instituto di Anthropologia at the University of Rome has never been refuted in a scientific manner. It would seem that most present day anthropologists are unaware of these discoveries since the only recent treatment of these specimens is that of a creationist astronomer.¹⁸⁰

The last three sections of this paper have been brief because I have not had time to delve into the complexities of these subjects sufficiently for a lengthy treatment. The creationist position does, however, seem more amenable to the archaeological, anthropological, and paleontological evidence than the evolutionary position. A detailed discussion of some of the anthropological topics from a creationist point of view can be found in an excellent work by a noted Canadian anthropologist, Arthur Custance.¹⁸¹ It should be noted in passing that creationists do not believe in the current schemes advanced to explain the domestication of animals nor in the gradual ascension of man culturally through the phases of hunter-gatherer to agrarian to technological, since there are both Biblical and archaeological data to the contrary. Due to the nature of the material covered in this article, it is obvious that much of the relevant literature on acknowledged humans, but prehistoric ones had to be ignored. However, I hope to continue this research in the future with a view towards proposing a more definitive creationist position concerning human prehistory.

In conclusion, man possesses no phylogenetic affinity to any other primate. This statement is based on analysis of all known fossilized specimens from all areas of the world. Anatomical data cited here present an unbridgeable gap facing the serious evolutionist attempting to construct a feasible model of hominid evolution. Behavioral studies of extant apes and monkeys, both in the wild and in laboratory situations, furnish no conclusive evidence for evolutionary speculations regarding the origin of man. By far the phrase that makes the most sense out of the 'science' of physical anthropology was uttered long ago: "And God said, Let us make man in our image, after our likeness: and let them have dominion over the fish of the sea, and over the fowl of the air, and over the cattle, and over all the earth, and over every creeping thing that creepeth upon the earth".¹⁸²

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(Continued on page 134)

THE HOATZIN

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The hoatzin is often mentioned by creationists as a modern counterpart of the archaeopteryx.¹ It may be of interest, then, to consider a few things about the hoatzin in its own right.

The hoatzin is of the order *Galliformes*, family *Opisthocomidae*. It lives on plants, and is a relatively poor flier. These last two facts are connected, for the following reasons.

Plant-eating birds, as a rule, grind their food in the gizzard. But the hoatzin stores, and partly digests, plant food in its very large crop. The crop has a number of grooves, and internal horny projections, to help with the grinding. The gizzard, on the other hand, is quite small.

When much food has been eaten, and is stored well forward in the crop, there is a problem of balance. This affects not only flying but also perching; the bird can not perch as it would normally do. What helps to support it is a flattened disc on the keel of the breast-bone. In fact, the sternum is keeled only in the posterior third.

Many naturalists have viewed the hoatzin as a relic, or a link with past, supposedly primitive, birds, especially the archaeopteryx. The hooks or claws, which the young hoatzin has on its wings, are one reason for this notion. But the similarities really have to do with the way of life; in conventional terms they would be called an example of convergence. They do not prove any direct relationship.

Nevertheless, some interesting comparisons between the hoatzin and the archaeopteryx, and a few other birds, can be made.

In my opinion the matter is one of compensation, a very general principle.² The hoatzin has its plant diet; but it has sacrificed any great flying ability. Now birds which have forgone, wholly or partly, the ability to fly, seem to be less showy or colorful, and to have a sort of general or basic look about them. They have, in fact, a form or function which seems not entirely bird-like; and we can see something of the sort in the hoatzin.

Other birds which have sacrificed the ability to fly (or, the Creator sacrificed it for them; I am not saying that the ability gradually evolved away) are the *Ratitae*: ostriches, rheas, etc. . . . These, too, are not colorful, and are rather basic. The young ostriches have some rudiments of the claws found on the hoatzin and the archaeopteryx. In the whole order of *Ratitae* the sternum is flat, again as in the hoatzin and the archaeopteryx. There are, it is true, differences. In the hoatzin, there is at least the disc shape of the keel found on the sternum. In the archaeopteryx no keel is found, and the sternum is small. In the *Ratitae* there is no keel or wishbone.

It might be remarked also that the carinate birds, which are often said to follow the ratites rather closely, are difficult to classify. One, for instance, the tinamou, a South American ground bird, has a keeled breastbone similar to that of the ordinary flying birds. But other

anatomical features, such as an unusual palate structure, seem to link them more closely with the ostriches and rheas. The structure mentioned, incidentally, is found in the adult tinamous, but only in the embryonic stages of certain other carinates.

All the fossils of the archaeopteryx seem to have been found in water-laid sediment, in places which, it is believed, were shallow seas when the birds were living. I have previously pointed out certain characteristics which the archaeopteryx shared with sea or water birds.³ Its vertebrae, for instance, have no saddle-shaped articulations; and that is true also of the cormorants, darters, gulls, and even certain parrots. The free metatarsal and metacarpal bones are somewhat like those found in the penguin. It is interesting that the hoatzin tends to make its nest as close as possible to the edge of the water, so that the young can dive into the water when danger threatens.

Some have believed that the feathers on the archaeopteryx were loosely attached. That is also true of the hoatzin, which, as already suggested, has sacrificed much that goes along with good flying ability for the sake of its diet. It has been argued, on the basis of the form of its feathers, that the archaeopteryx was at least a fair flyer.⁴ Incidentally, it had on the front limbs the same number of feathers as modern birds: ten primary and fourteen secondary. Also it seems to have had hollow bones. Now large birds as a rule need hollow bones in order to be able to fly or glide; but small active birds, such as swallows, swifts, martins, etc., have solid bones.

The archaeopteryx's feet were well adapted to perching on branches. Presumably, then, it could at least glide down from the branches. But how did it get up to them? Could it fly up?

Or if, as suggested, it lived close to water, was it able to rise up on air currents, as one may see gulls doing? A bird living in a dense jungle, on the other hand, would surely get little or no help from air currents.

Or, did the archaeopteryx climb the trees, maybe with the help of its wing claws, before gliding down? These are questions needing further study.

May I make one more point, concerning the size of brain? As far as can be told from casts, it appears that the Archaeopteryx had a larger brain than most reptiles, living or extinct; but it was smaller than that of many birds.

It may be remarked also that there is much variation among birds in this regard. Generally, the birds which are agile flyers have the largest brains, comparatively speaking. Those of more sedate flyers, and of flightless birds, are smaller. The largest brains seem to be found among crows and parrots. (Is there any connection here with the fact that those birds are among the ones which can learn to imitate human speech?)

All of this, then, would fit in with the view that the archaeopteryx was a true bird, but probably one which did not fly particularly well.

(Continued on page 92)

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ON THE VERTICAL MOVEMENTS OF THE EARTH'S CRUST

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One of the major problems facing the Creationist is how to account for the source of the waters of the world-wide flood described in Genesis. The possibility of a major source of these waters existing within the earth, immediately below the earth's crust, is explored in this article. This hypothesis can explain the extensive geologic evidence for vertical uplift, that should be taken into account in any geophysical model of the earth's interior.

Introduction

The feasibility of crustal subsidence followed by uplift, as a possible mechanism of the flood, was discussed in a recent article by Morton.¹ He posed certain challenges to those Creationists who have considered this to be a major contributory factor in the flood.

This problem of the cause of the flood is probably the most crucial question facing the modern Creationist.

The scriptures seem to indicate two main sources of the flood waters: rain, and the breaking up of the fountains of the great deep. This latter source, the subterranean waters of the "great deep", has yet to be thoroughly investigated in the light of the available geological and geophysical data. One of the possible interpretations of these Biblical statements requires new concepts about the composition of the earth's interior.

The Fountains of the Deep

The possible interpretations of the meaning of the Biblical "fountains of the great deep" seem to be:

- (1) These waters were groundwaters within sediments and other rocks, such as one encounters in wells;
- (2) The waters were contained in lavas that were extruded during the flood;
- (3) The waters were from some zone within the earth that consists primarily of H₂O.

In the first of these interpretations the water would presumably have been a minor component of the source material. According to Darcy's law,² the flow of pore fluids through the host rocks would require some pressure gradient, and the quantities required to flood the earth in a short time seem to rule out this source as a major contributory factor.

The second possibility, that the waters came from lavas extruded from the interior, seems to imply the flood waters would have been extremely hot, if this was a source of great volumes of flood water.

One objection to this interpretation is the fact that marine creatures such as fish were apparently not taken upon the ark, and survived the flood in the seas. Although vast numbers of marine creatures evidently perished, some survived. So the waters could not have been at a high temperature, or else the oceans would have boiled and all species of fish, and other marine animals would have become extinct.

The third interpretation, that the waters were from some zone within the earth consisting of H₂O, has

received relatively little consideration from Creationists as a possible solution to the problem of the fundamental cause of the flood. This concept has seemed unattractive for two main reasons: the earth's average density is about 5½ times the density of water, and the geophysical evidence indicates the interior is solid to depths of about 2,900 km.

Humphreys has discussed several scriptures that seem to indicate a significant supply of water exists within the earth.³ He proposed that these waters are located at the earth's core.

A concept of subterranean waters, providing a source for the waters of the deluge, was proposed by Thomas Burnet in the 17th century. His *Sacred Theory of the Earth* was highly regarded for more than a century.

The possibility of subterranean waters existing in the zone immediately below the earth's crust is investigated in this article. This would provide a more readily available source for the waters which engulfed the continents during the deluge, than waters from depths as great as the earth's core. The hypothesis would accommodate rapid vertical movements, including differential movements, in the earth's crust, at the time of the flood. The waters could have been in a fluid state at the time of the flood, but it is suggested that the interior waters were subsequently frozen, due to the high pressures existing in the interior.

Morton argued that the rate of uplift and subsidence of continents would be too slow to have been accomplished in the time span of the flood and a youthful earth.⁴ The viscosity of the earth's interior that was assumed in his calculations was 2.4×10^{22} poise. This would not be applicable to vertical movements which occurred during the flood, if there was freezing of the interior material following the flood. The interior viscosity has been estimated on the basis of the historical measurements of the rate of elevation of the Scandinavian Peninsula. According to Zharkov and Trubitsyn:⁵

The viscosity of the earth's interior can be approximately determined on the basis of the following geophysical data. The post-glacial rising of Fennoscandia gives for the mean viscosity of the subcrustal layer, η , a figure of 10^{20} to 10^{21} poise. In contrast, water at 30° C and at atmospheric pressure has a viscosity of 8.01×10^{-3} poise, and smaller values at higher temperatures.⁶ Thus there would be no problem from the point of view of the time required for uplift and subsidence with this model.

For the purpose of investigation of a possible mechanism of the flood, it is proposed that the subcrustal material consists partly of H₂O which is now in some solid form, but melted at the time of the flood

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when "the fountains of the great deep were broken up."⁷ Water from below the earth's crust may have burst forth to the surface, causing the flooding of the continents. This would be accompanied by subsidence of the crust.

In the following sections, evidence for vertical movements of the earth's crust is cited, and it is shown that subsidence and uplift are essential ingredients in the required mechanism of the flood, as well as in any valid interpretation of the earth's composition and past history. An earth model in which the subcrustal zone consists partly of H₂O is consistent with this sort of evidence, and can be shown to be compatible with data on the earth's mass and average density.

The Depth of Sedimentary Material

The presence of sedimentary rock over much of the continents is an indication of former vertical movements of the earth's crust. The abundance of sedimentary material in some regions requires enormous depths for the accumulation of sediment piles. Accumulations of as much as 60,000 feet of sediment are known, and the average thickness of sedimentary material on the continents is about 7,000 feet.⁸

Before compaction, the thickness of sediment would have been considerably greater. The uppermost sedimentary layers must have been below sea level at the time of deposition. These facts seem to clearly indicate former vertical movements of the earth's crust.

In creationist interpretations, the accumulation of vast piles of fossiliferous sediment has been attributed to the erosive power of the currents of the flood waters.

Marine Sediments in High Mountains

The existence of high mountains composed of marine strata is another indication of vertical uplift. Not only are many mountain ranges chiefly composed of marine sediments, but these regions are among the most eroded of the earth's strata. The laminations in the sedimentary rocks comprising the mountain peaks can be seen to terminate in "thin air."

The continuation of these laminations can be traced across wide valleys and between the peaks, as can be seen, for example, in Jasper National Park in Canada. This implies vast quantities of sediment are missing. Not just sedimentation at depth, but erosion was necessary for the formation of the features of the mountain chains. They provide evidence for vertical uplift that must be measured in miles. Joly stated:

The most striking fact known about mountains is that they are largely and often mainly composed of sedimentary rocks, that is, of rocks which have been deposited originally in the seas. True, these sediments may be contorted, folded, metamorphosed almost beyond recognition, but none the less they have risen from the sea floor to form the mountain chain.

It is a universal fact. Even of the volcano-tipped Andes and Caucasus it is true. In the great precipices of the Alpine heights the limestones, folded as if made of wax, reveal themselves in giant arches. The hard slates, (often changed to mica-schist) tell-

ing of former deep waters, buttress such giants as the Matterhorn, and overlies or intermingle with the granites of the Himalayas.⁹

These facts about the mountains provide some indication of the scale of the flood catastrophe. The evidence for erosion can be explained by the action of currents of the flood waters when the sediments were submerged and still partly unconsolidated. Sediment was removed to distant regions by the currents and redeposited. It is nowhere to be seen in the valleys and lakes in the vicinity of the mountains.

The flood waters provide an agency of erosion and sediment transportation far more effective than any geologic process now acting on the earth's surface. In contrast, almost nothing that has been learned about the origin of the mountains can be understood in terms of existing processes.

The world's mountains, then, provide strong support for former submergence and uplift of the earth's crust.

Tectonic Evidence of Uplift

In most environments of sedimentation, the attitude of the bedding tends to be generally horizontal. Where the sediments that occur in the earth's crust are tilted at some angle, or have been folded, faulted or contorted, the deformations may reveal the degree of differential vertical movements that have occurred.

Such movements are particularly evident from the complex structure of mountain regions. These vertical movements are also evident in the continental cratons. The differential movements indicated by the downwarping of the crust in the Michigan Basin, for example, was 1,500 meters.¹⁰

Describing the process of subsidence that is supposed to have occurred during Silurian time, that caused the Michigan Basin, Dott and Batten wrote:

In Michigan, especially, subsidence accelerated in a circular area beneath the state that is simply called the Michigan Basin. Subsidence commenced rather suddenly here in the craton far from any rising arch or mountainous uplift. An increase in density or a decrease in thickness of the crust beneath Michigan must have upset the local isostatic equilibrium.¹¹

Raised shorelines at the coasts of continents, and around inland lakes, also indicate former large-scale tilting and warping of the earth's crust.

Uplift Indicated by Mineralogic Evidence

Evidence for the former deep burial of rocks is also available from mineralogic relationships, that are diagnostic of high pressure conditions. Ernst has discussed the evidence for former deep burial of Franciscan rocks in California.¹² These rocks contained minerals that seemed to require high pressures and low temperatures for their formation. In particular, the presence of glaucophane-crossite, jadeitic pyroxene, lawsonite, pumpellyite, and aragonite were diagnostic of "low temperature production at relatively high pressures resulting from very deep burial."

The conditions required for the formation of these minerals involve pressures of up to 5 to 8 kb, for the

temperature range 150° C to 300° C. Since the rock strengths limited the possible tectonic overpressure to less than 1 kb, Ernst concluded that the former conditions involved burial to depths of 20 to 30 km under water.

Similar indicators of very high pressures at relatively low temperatures have been recognized from other regions. Kennedy wrote:

The most startling thing from the geological point of view is that high-pressure polymorphism of common silicate phases known at the surface of the earth appears to be the rule rather than the exception. In general, however, the depth at which the common polymorphs are formed appears to be greater than current geological thinking would permit. Of particular importance are the considerable depths in the earth's crust needed to form the dense phases grossularite, zoisite, lawsonite, kyanite, and jadeite.¹³

Geophysical Evidence for a Low-Density Layer

The well established increase in the velocity of both primary and secondary seismic waves at the Mohorovicic discontinuity has been interpreted as the lower boundary of the earth's crust. The seismic velocities are related to the density of the medium by the following formulae:

$V_p^2 = (K_s + 4\mu/3)/\rho$; and $V_s^2 = \mu/\rho$. Here ρ = density, V_p = primary wave velocity, V_s = secondary wave velocity, K_s = bulk modulus, μ = shear modulus.¹⁴

Clearly, the increase in the velocity of these seismic waves at the base of the earth's crust could be due to a decrease in density.

If the sub-crustal material were less dense than the crust, the thinnest or lightest parts of the crust would tend to be the most elevated, for isostatic compensation. There would be no need for thick mountain "roots" to compensate for the lower density of sedimentary rocks of mountain areas.

Measurements of the earth's gravity field have shown there are characteristically large negative Bouger anomalies (> 150 mgals) in the earth's mountainous areas.¹⁵ This could be another indication of a low density interior, and thinning of the earth's crust in the elevated regions.

The shape of the earth has been determined to a high degree of accuracy since the advent of artificial satellite geodesy. When compared with the appropriate ellipsoid of revolution, the earth has four "high" points, and four "low" areas. Its radius at the equator is 21 km greater than at the poles.¹⁶

However, according to Stacey, the earth has an ellipticity about 0.5% greater than that which would exist in terms of a hydrostatic theory.¹⁷

This implies the interior is not in a state of hydrostatic equilibrium. Oppenheim pointed out the rigidity of the interior required for the maintenance of the equatorial bulge rules out the possibility of convection currents, as assumed in recent plate tectonics theories.¹⁸ Other considerations by Jeffries support this conclusion.¹⁹

The amount of flattening of the earth, according to hydrostatic theory, is approximated by:²⁰

$$f_H = \frac{5/2 m}{1 + 25/4 [1 - 3/2 (\frac{C}{Ma^2})]^2}$$

In this formula, C is the axial moment of inertia of the earth. The present ideas about density distribution within the earth provide the basis for a calculation of the earth's ellipticity.

It seems possible that with the assumption of a low density layer below the earth's crust, the estimated flattening would be closer to that which is observed. The excess flattening of the earth, then, may provide additional evidence for an interior layer consisting of ice.

These observations have been interpreted as evidence for a greater rate of rotation in the past.²¹ It seems that an increase in the rate of rotation would be likely during the flood, when the continents were submerged, due to the conservation of angular momentum. Subsequent freezing of the interior, uplift of the continents, and readjustment of the earth's speed of rotation could result in the present configuration of the earth.

In this connection, it seems relevant that continental shelves are submerged at increasingly greater depths towards the poles, and are relatively elevated near the equator.²²

An Earth Model for the Creationist

An earth model in which the interior layers below the crust consist of some form of ice can allow vertical movements of the earth's crust. The melting of the ice would absorb heat and would permit the crust to become mobile. The vertical movements of sections of the crust—which may have even been torn apart in places—can occur in a short time in this model, since the viscosity of the liquid water is much less than that of the solid.

The model supplies abundant water to cause the flood, and seems consistent with the present data about the earth's interior, as far as is known with any precision. Of course, it is not consistent with the earth models of the uniformitarians or other opposing models. It should not be tested against these hypothetical models but against experimental data and observations of the available facts.

In the present section, it is demonstrated that this model is consistent with what is known about the earth's mass and average density, and the seismic data available on the properties of the earth's interior. The data are taken from Zharkov *et. al.*²³

The average density of the earth is 5.52 g/cm³ so of course if there is a significant amount of ice of some kind inside there must also be matter of density greater than the average, which is assumed in all earth models.

The earth's crust and oceans represent only 0.8% of the total volume of the earth. The mass in this zone is 2.2×10^{25} g, about 0.42% of the earth's mass.

It is proposed that the layer immediately below the crust consists largely of ice of some kind. This layer extends for some depth, perhaps a few hundred km. It is not suggested that this region is composed of pure water; it could contain sediments, or other solids such as frozen CO₂, or CH₄, or rocks and minerals of various kinds—the composition is completely unknown. If impurities were present the density would be increased.

The high-pressure varieties of ice are all denser than water and will sink in it. We may assume, then, some value for the density of ice for the purpose of investigating the present model. In the extreme case, it could be supposed that the material consisted of pure ice and a density of one of the varieties selected. I will assume a value of 1.2 g/cm^3 for the average density of the hypothetical ice layer.

Next we have to determine the probable depth of this layer. The region below the crust is the mantle, which is sub-divided into several layers. The upper mantle extends from a depth of 19 km to 420 km, and the seismic wave velocities steadily increase with depth in this zone. It is referred to as the low velocity zone since there appears to be a layer at which the speed of sound is less than that of overlying material. Also the rate of increase in the speed of sound is small.

The upper mantle is divided into three layers. The upper part extends from depths of 19 to 80 km; the low velocity zone extends from 80 - 220 km; the lower part is 220 - 420 km. (Incidentally, the stratification of this zone within the earth is a strong argument against the hypothesis of convection currents as a mechanism for sea-floor spreading.)

In all, the upper mantle region comprises 17.6% of the earth's volume. In present models, it is considered to be 10.9% of the earth's mass; i.e., $6.51 \times 10^{24} \text{ g}$. Density in this region is assumed to be about 3.5 g/cm^3 in the present models.

If the upper mantle is assumed to consist of ice with density of 1.2 g/cm^3 , the mass of this region would be 3.7% of the total, and the interior layers would contain a greater proportion of the total. The increase would imply a relatively small increase in the density of one of the lower layers.

Below the low velocity zone, there is a transition zone extending from a depth of 420 km to 670 km. This zone is 9.8% of the earth's volume, with a mass of $4.15 \times 10^{26} \text{ g}$, or 6.9% of the total.

The lower mantle extends from 670 to 2885.3 km. This is 55.3% of the earth's volume. Its mass, in present models, is $2.945 \times 10^{27} \text{ g}$, or 49.2% of the earth's total mass.

Suppose the density of this zone should be slightly higher, to compensate for the low density zone of the upper mantle that was postulated. Then the mass of this layer would be increased to $3.3728 \times 10^{27} \text{ g}$. The layer would now represent 56.45% of the total mass of the earth. (This may alter some of the estimates of the earth's moment of inertia; however, this difference may be small since the increase would be offset by the lower figure for the density of the upper mantle.)

The average density for this zone would increase from 4.918 to 5.63 g/cm^3 , which is reasonable considering the core density is assumed to range from 10 g/cm^3 to 12.5 g/cm^3 in the present models.

This model would comply with the known mass of the earth and the known average density. It provides an abundant supply of waters for the flood, amounting to $2.97 \times 10^{11} \text{ km}^3$.

Earthquake Mechanisms at Island Arcs

With the assumption of a sub-crustal layer composed

of ice of some kind, new explanations may be proposed to account for the long recognized occurrence of deep oceanic trenches adjacent to volcanic island arcs and mountain chains.

These areas are the most seismically active regions of the earth. Isacks and others stated:

Nearly all the world's earthquakes in the deep and intermediate range, most of the world's shallow earthquakes, and the largest departures from isostatic equilibrium are associated with island arcs or arc-like structures.²⁴

The occurrence of earthquakes at depths as great as 700 km in the vicinity of the island arcs and associated deep oceanic trenches is compatible with the concept of an upper mantle consisting of a high pressure variety of ice.

The island arcs are regions of anomalously high heat flow.²⁵ It is suggested that the heat within the rocks of the oceanic crust may cause melting of the underlying ice. The fluids produced by melting may migrate laterally beneath the crust and penetrate adjacent crustal rocks. As the ice melted, subsidence could occur, forming deep oceanic trenches. In harmony with this concept, graben structures, interpreted as evidence for subsidence, occur within oceanic trenches, (for example the Japan trench.)²⁶

The process of melting and subsidence would result in a continual transfer of heat and mass, which could possibly initiate earthquakes at these tectonically active zones. Lateral mass movements could result in differential strains developing in subcrustal ice. Earthquakes could result from shear fractures as stresses were relieved by sudden adjustments to changes in load.

Characteristically, a long, narrow, negative gravity anomaly occurs at the site of an oceanic trench, indicating a deficiency of mass. A positive anomaly occurs in the adjacent volcanic arc.²⁷ These facts tend to support the present interpretation.

The high heat flow at these regions is apparently not in harmony with the proposed mechanism of sea floor spreading and subduction at oceanic trenches.²⁸

An alternative to the above is that the heat source is deep within the mantle. Volatiles ascending the steeply dipping Benioff zones may cause melting, which could result in subsidence at the site of the trench.

Volcanoes and the Earth's Interior

Many people assume that volcanoes are evidence for a very hot interior of the earth. However, most active volcanoes are located in the narrow seismic regions, in particular at island arcs. They may represent local hot spots in the earth's crust rather than a generally hot interior.

There is evidence that volcanoes in close proximity are not connected to a common magma source, since eruptions within adjacent volcanoes are usually not simultaneous.

Various mechanisms for the generation of volcanic magmas may be suggested, in the present model. Sources of heat may exist within the rocks of the earth's crust, rather than the underlying ice layer. The heat may result from seismic movements, which generate heat by friction, or exothermic chemical reactions, or

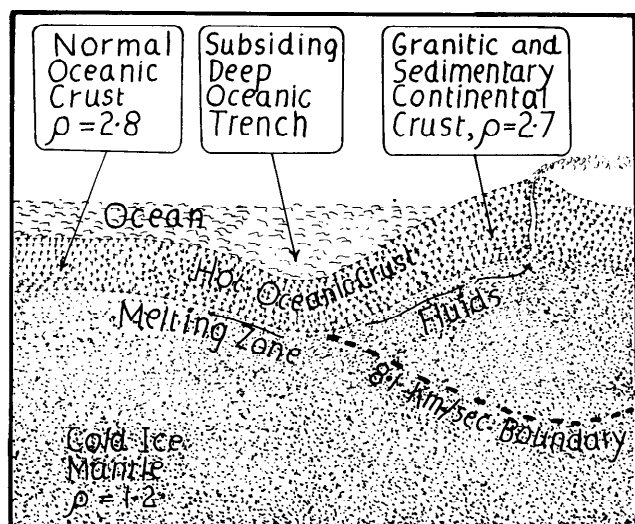


Figure 1. This diagram shows the mechanism which, it is suggested, is involved in subsidence in deep ocean trenches adjacent to volcanic arcs. The sub-crustal material is composed of a dense form of ice.

the rocks may have been heated at the time of the earth's formation.

The ascent of fluids from the subcrustal layer through the hot rocks of the earth's crust could generate volcanic magmas. A mechanism of volcanism in association with subsiding deep oceanic trenches is illustrated in Figure 1.

The Significance of Volcanoes: Additional Thoughts

With the assumption of a sub-crustal layer composed of ice of some kind, a new explanation may be proposed to account for the long recognized occurrence of deep oceanic trenches adjacent to volcanic island arcs and mountain chains.

It is suggested that heat within the basaltic ocean crust may cause melting of the ice upon which the oceanic crust rests. The fluids produced by melting may then migrate laterally underneath the crust, and penetrate adjacent crustal rocks. In this way, heat would be continually transferred from the zone of melting and subsidence. These fluids may also initiate uplift of the crust adjacent to the deep trenches, due to hydrostatic pressure, from time to time. Vertical uplift, for example, seems to be a continuing process along the Pacific coast of South America.

As the fluids from the sub-crustal zone rose through rocks of the crust, heating could occur, resulting in the formation of magmas from the rocks of the deep crust. These would be the source of volcanic magmas. (See Figure 1.)

In this interpretation of volcanic activity, the ejection of water from the subcrustal zone, that was heated during ascent through the crust, is considered the primary cause of volcanic phenomena. The formation of magma is considered to be secondary.

With continued subsidence over a long period, the melting temperature of the sub-crustal ice would rise, due to increased pressure at greater depths.

There would tend to be a decline in the rate of subsidence over a long period, as a result. The cooling of the

rocks of the oceanic crust would also tend to cause a decline in activity.

This hypothesis could account for the association of deep ocean trenches with volcanically active belts. The heating of the sub-crustal material occurs beneath deep-ocean trenches, which are regions of subsidence. Uplift occurs in the adjacent crust.

Such a hypothesis would require that the crustal rocks of the deep ocean trenches would also be areas of high heat flow.

This suggestion also provides an alternative to the supposed "subduction" mechanism that is postulated in current theories of sea-floor spreading.

Conclusion

Wherever evidence exists for vertical movements of the earth's crust, lateral movements of the subcrustal material are also required to fill up the hole that would otherwise be created. This seems to require that this substance was formerly fluid, and has since been frozen into a solid state.

The hypothesis that the subcrustal material is largely H_2O , now frozen into some variety of ice, could allow for the former vertical movements that are implied by geologic evidence. It has been shown that this hypothesis is not inconsistent with certain known properties of the earth's interior, and such a hypothesis seems to be supported by several Biblical statements about the earth's interior.

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(Continued on page 126)

FAITH AND POPULATION IN A DECLINING CIVILIZATION†

COLIN G. CLARK

It is an undoubted fact that civilizations grow and decay, and philosophers of history have attempted, not very successfully, to analyze the circumstances under which this happens. Toynbee has classified 23 civilizations which have risen and fallen, including our own. He made the important point that the whole reason for the existence of a civilization was creativity; but his work has been justly criticized on the grounds that he is almost entirely preoccupied with political and military history, and has little to say about culture, economic life, religion, or other aspects of mankind's existence.

Toynbee's predecessor was the German philosopher Spengler, who wrote his famous book *The Decline of the West* more than 70 years ago. Spengler was guilty of forcing his facts and systems more than other historians, but he did make the interesting point that the life of any civilization corresponded to the seasons of the year. The various civilizations which he studied showed what he called a springtime of great architectural achievements, a summertime of poetry, an autumn of music and mathematics, descending into a winter of sterile philosophy. It is hard to resist the conclusion that our own civilization is now approaching a similar decline.

Most historians, unfortunately, are irreligious. *We* do have a great advantage in understanding the course of human affairs, because we know about the Fall of Man and his complete dependence on God's grace. We can see clearly what many historians fail to see. The life of a civilization is dependent on faith . . .

Civilizations have been built on non-Christian faiths and have not lasted. The vital question now facing us refers to a civilization built on Christian faith: Can it survive as it loses its faith?

Civilization includes political, economic, and cultural elements. But these can be highly unbalanced. If we take the late years of ancient civilization, say the second century A.D., the Greco-Roman world was still politically unified and was making economic progress, but was culturally dead, and was losing faith in its religion.

Now we turn to our own century. Asked what an historian some centuries hence will make of the 20th Century, maybe he will have to report that civilization collapsed through organized crime which we are increasingly unable to control. But supposing that does not happen; then anyone writing about the 20th Century will be bound to say that it was hopelessly unbalanced, that all our greatest talent went into science and technology; followed by business, in which considerable success was achieved; our politics had been pretty deplorable; our cultural life very much worse . . .

One other aspect of the growth and decline of civiliza-

tions, which historians have almost unanimously neglected, is the growth of population. It is with population growth that vigorous civilizations are associated. In the United States you have taken for granted, over a period of three centuries, a background of population growth; and if that had not been the case, the political, cultural, and economic life of the United States would be utterly different from what it is now. This is only the latest and most striking example. We see the development of civilization associated with population growth in ancient Greece, in early medieval Europe, before the great plagues, in 17th Century Netherlands, in 18th Century England, in 19th Century Japan, and in present day India, where, in spite of all the policy mistakes which have been made, population growth is now associated with a much higher rate of economic growth than India had known in earlier times.

There is a widespread obsession that population growth must be checked because the world's resources, so-called, are on the brink of exhaustion. Resources is a very obscure word. In economics, it means that which can be used for production; and labor itself is the principle resource. Are people concerned about agricultural resources? After all, the agricultural resources of the world are renewed every year; and if the land is cultivated properly in the hands of good farmers, it can give increasing yields. I used to be Director of the Agricultural Economics Institute in Oxford University and am familiar with the productive possibilities of the earth's surface. If the potential agricultural land of the world were properly farmed it could provide, not a subsistence, but a rich, American-style diet to more than ten times the world's present population. And if the world in the future, instead of eating as we do, eat as the Japanese do, (and theirs is a very healthy diet) it could support three times as many again.

At this point population "experts" change their ground, and say what they have in mind is the exhaustion of mineral resources. In 1949 the United Nations called a conference on the conservation of resources, at which I was one of the speakers. It occurred to me recently to look up the figures which were then put before us of the world's mineral resources; I subtracted from them what we have mined since 1949 to see how much was left. I got the surprising result that the world's copper, lead and zinc were used up some years ago. People make the most absurd mistakes. The figures published by mining companies represent the mineral reserves which they have actually explored; exploration is costly, and mining companies won't explore more than a few years ahead of their current requirements. But the quantities of minerals known to exist within reach of the earth's surface exceeds by factors of hundreds of thousands, literally, the estimates of current resources explored by the mining companies . . .

There is a good deal of misunderstanding about "zero population growth." People say we have not reached zero population growth because the number of births still exceeds the number of deaths. Those who reason

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†This item is composed of excerpts from an address, having the same title, to the graduating class at Thomas Aquinas College, Santa Paula, California, in June, 1980. It is used, in part, here by permission.

this way are making a mistake which is so obvious that nobody seems to see it. It is this. The number of deaths occurring now represents on the average a much smaller generation, born some sixty or seventy years ago. If current births do no more than replace current deaths it means that they will be quite incapable of replacing the present younger and middle-aged generations, which are far more numerous.

Answering the question whether births are sufficient to replace the parental generation involves a certain amount of mathematics into which I cannot go now. But I will give you the results, which are alarming. In the whole of New Zealand the number of births now falls short of replacement requirements by 10% or more; the worst figure being that of Germany, miserable in the midst of its riches, 30% short of replacement requirements.

Let me add a very significant point. In Soviet Russia the number of births is *above* replacement requirements. It is true that urban European Russia is very similar to Western Europe, with low reproductivity and high divorce rates; but Russia has a large rural population, which is much more than replacing itself, particularly the Moslem populations of the Central Asian Republics.

But we must have the faith and hope to believe that our civilization, unlike the others of Toynbee's 23 civilizations, is capable of recovery, because it is based on true faith, slow and difficult though the recovery may be . . .

The decline of population is a central element in the decline of a civilization. Ours is the only civilization built on Christian faith, and it may yet prove capable of resurrection . . .

HOW THE FLOOD ALTERED THE EARTH

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Based on a new interpretation of the Biblical Fountains of the great Deep, this paper presents a new theory of the construction of the earth's original crust and the changes that have been wrought in it. It is proposed that in the beginning, a layer of water separated two layers of crust. That layer of water was the Deep. The ocean basin floated on that water, supplying the pressure to operate the fountains. To initiate the Flood, God personally produced the deep-sea trenches and the crevice in the crust down the middle of the mid-ocean ridge, in order to force the waters of the Deep to the surface.

Introduction

The Theory of Continental Drift, or Plate Tectonics as it is also called, seems to have won the allegiance of the majority of the scientific community. While lip service is given to its being a theory—

"This theoretical insight, which goes by the term 'plate tectonics,'¹

it is obviously being believed as fact,

"While few earth scientists agree on details, the broad outlines of plate tectonics are established beyond dispute."²

The broad outline of the theory is stated thus:

"Here," (the Mid-Atlantic Ridge) "according to the revolutionary new theory called plate tectonics, huge rafts of crust diverge, carrying the American Continents away from Europe and Africa at about an inch a year. Where plates converge, they form deep ocean trenches as one edge slips beneath the other to be reabsorbed into the earth."³

Although it doesn't shake the faith of the believers that no one can propose a believable mechanism that could produce the stated effects, writers on the subject feel it necessary to point out that lack, as the following quotations indicate.

"This uplifting, from processes unknown, may be the primary agent building the Mid-Atlantic Ridge."⁴

"Driven by implacable and still not-altogether-comprehensible forces, these plates move off around the world . . ."⁵

"The motion of the ocean floor is driven by thermal convection in the mantle. This motion provides the visible half of a convection loop . . . The details of the return flow are poorly understood and are therefore the subject of continuing investigation."⁶

Calder summed up the proponents' views when he wrote,

"Although no one knows exactly how the plates of the earth's shell are driven around, that does not deny their movements."⁷

One wonders, would not the opposite conclusion to Calder's be the more logical one? If none of the brilliant scientific minds that have worked on this problem for years can come to a conclusion as to exactly how the plates of the earth could be driven around, perhaps they never have moved.

The Theory of Plate Tectonics is based on the Uniformitarian principle, i.e., the belief that present processes operating over eons of time, without plan or intervention by a Higher Power, have produced all that we observe today. Heezen emphasized the importance of this doctrine when he wrote,

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"Geologists love this guiding principle of uniformitarianism."⁸

The Biblical Creationist, however, has another guiding principle, which could be called, "The Divine Intervention Principle." God, the Creator according to His own plan, made all things "very good". He established the present processes that maintain His creation. From time to time He directly intervenes to make some change, according to His will and purpose, after which the present processes resume operation.

The new ideas now to be presented are based on a new explanation of the "fountains of the great Deep", and, propose that God brought on the Flood when He personally broke up the fountains of the great Deep, unleashing natural forces, which then resculptured the face of the earth.

These ideas suggest answers to such questions as these: why is the Mid-Atlantic Ridge in the middle of the ocean; why are similar fossils found on opposite sides of the Atlantic; and how were the mountains formed?

Fountains

"For (in) six days Jehovah made the heavens and the earth, the sea, and all which (is) in them" (Exodus 20:11)⁹

"Worship Him having made the heaven and the earth and the sea and the fountains of waters." (Revelation 14:7)

Both the first and the last writers of Scripture tells us that the Creator made the heavens and the earth and the sea. Moses then includes every created thing by adding, "and all which (is) in them". John, however, only adds, "fountains of waters", which is just one of the "all" which is in the earth. What are these "fountains" that are singled out for such special mention?

The Genesis account of creation lists two types of fountains of waters:

"and a river went out of Eden," (2:10) and "a mist went up from the earth." (2:6)

As "Jehovah God had not rained upon the earth" (2:5), Eden's river could not have had its source in rain water. Instead, there had to be a large "pipe" going from the surface down through the earth to a pressurized water reservoir. The other type of fountain sprayed a mist, i.e. liquid water in fine drops,¹⁰ into the air. To accomplish this another "pipe" had to go up through the earth from the pressurized subterranean water supply to the surface where it was capped by a nozzle which produced a mist.

"Subterranean water supply" is one of the definitions of the Hebrew word which is translated "Deep". As the two types of fountains just described had as their source an underground water supply, they then are what Scripture calls, "fountains of the Deep". Solomon mentioned these fountains when he wrote about Jehovah at creation, "making strong the fountains of the Deep". (Proverbs 8:28) The fountains had to be strong. The "pipes" coming up from the Deep had to be waterproof, so that leakage would not cut down on the amount reaching the surface; they had to be wear proof, so that as the years went by the moving water would not wear them thin so they would rupture; and they had to be pressure

proof, so they would not break under the tremendous pressure there had to be on the waters of the Deep.

Purpose of the Fountains

Each type of fountain had its own purpose which is specifically stated in Genesis. Of the fountain supplying the river it is written:

"And a river went out of Eden to water the garden." (2:10) The significance of this statement has escaped notice and it bears repeating. The purpose of the river was, "to water the garden". Every bit of vegetation, from the grasses to the trees, had its total water needs supplied by the river. How was this tremendous task accomplished?

An answer to this question is found in a recent article in the Popular Science Magazine which details a method of raising vegetables indoors. A layer of pea gravel is put in the bottom of a watertight container. On top of that is placed a layer of a growing medium, which in this case is ground pine bark mixed with various nutrients.

"The whole system works by maintaining a constant water table at a point where the gravel and bark meet."

"There is no need to water from above at any time, since water will move up through the pine bark by capillary action."¹¹

From this, a suggestion can be made as to how God structured the original land mass. On top of the bedrock he placed up to several thousand feet (depending on the elevation desired) of all manner of soils and minerals. Most of this material is what formed the sedimentary rock. Then to keep those soils dry he covered them with a layer of watertight material. Next, was a layer of "pea gravel". Covering that was His growing medium. The "pea gravel" layer ran into the river and the elevation of the land mass in relation to the elevation of the river was such as to maintain the proper water table. There was no need to water the garden from above for the water moved up through the growing medium by capillary action.

The Genesis account only speaks of one river which was to water the area of the Garden of Eden. (2:10). As the ban on rain was world-wide (2:5) it is logical to believe that the whole earth was watered by the same system as was Eden. Many, many thousands of fountains, therefore, had to be strategically positioned all over the land area in order to supply rivers, whose purpose was to water the earth.¹²

Genesis also specified the purpose of the second type of fountain.

"And a mist went up from the earth and watered the whole face of the ground." (2:6)

It was previously stated that there was no need to water the garden (or any part of the earth for that matter) from above. What then was the purpose of spraying a mist into the air? The answer to that question is given in the Popular Science Magazine article previously quoted. After telling about the water moving "up through the pine bark by capillary action", it goes on to say,

"The surface of the bark will remain dry, but the

bark immediately below will be moist.”¹¹

The purpose of the mist, then, was to keep the surface of the ground moist so it would not dry out and form a hard crust. This is what Genesis 2:6 tells us when it says that the mist “watered the whole face of the ground”. The face of anything is just the surface and therefore only the surface of the ground was watered by the mist.

The design, operation, and placement of the mist fountains is not revealed to us. The following description, therefore, is just a suggestion of how they might have been.

As the “pipes” for the mist fountains neared the surface, they entered a rock and went through it to the top which was 10-15 feet above the ground. Near the end were shut-off valves. The construction and operation of the valves is a mystery but they probably were operated by heat. At the warmest part of the day, i.e. mid-afternoon, they snapped open due to expansion. As the water flowed through the rock it gradually cooled it down so that when the desired amount of water had been sprayed the valves snapped shut. The ends of the “pipes” were capped by a nozzle or series of nozzles that sprayed a fan shaped pattern which was perpendicular to the direction of the “breeze of the day”. (Genesis 3:8)¹²

This “breeze of the day” occurred at mid-afternoon, at the same time that the valves opened. Thus the spray was spread by the breeze over a wide area.

The number of mist fountains would depend on how far the breeze carried the spray before it fell to the ground and how wide a pattern the fountains sprayed. If, for instance, the area covered was 100 thousand square feet per fountain, it would have taken 2.78×10^{10} number of fountains to water “the whole face of the ground.”

Pressure on the Deep

Tremendous pressure on the Deep was needed to force upward the water that supplied perhaps as many as 200 thousand river fountains plus the almost innumerable mist fountains. What supplied that pressure?

To enable us to answer that question we will first ask a second question, which is, how was the pre-Flood sea level kept constant?

The fountains of the great Deep were “broken up” at the beginning of the Flood. (Genesis 7:11) During the 1656 years from creation until then, however, they had poured out more than 26 million cubic miles of water that was new to the surface, which was enough to cover the land area to a depth of over 1380 feet.¹⁴ All this water, of course, ended up in the ocean which should have raised the sea level and flooded over much of the land area. Such a situation would not have been “very good” (Genesis 1:31) and therefore God had to have provided a way to keep the sea level constant. The following description is a suggestion as to how He accomplished it.

The crust of the earth was made in two sections. The thickest portion, which we will call the lower crust, rested on the mantle. Covering the lower crust was a layer of water. A thinner section of crust which we will call the upper crust, rested on the water. The upper

crust was divided into two sections, the land and the ocean basin. Under the land area spacers went from the lower crust, up through the water to the upper crust, to prevent it from sinking. The ocean basin crust rested freely on the water and thus supplied the pressure that operated the “fountains of the great Deep”. As water was continually being forced to the surface, the ocean basin was continually sinking. Water, however, was continually being added to the ocean and thus sea-level was kept constant.

We have just described a globe-encircling subterranean water supply, i.e., a Deep. Surely it deserves to be called what the Bible called it, a “great” Deep. (Genesis 7:11)

How Much Water in the Deep?

The present amount of surface water has been estimated at 350 million cubic miles. The amount of underground water is, of course, unknown, but is undoubtedly very small in comparison to the surface water. All this water, I believe, is the water that surrounded the earth after God’s first day of creative activity. (Genesis 1:2) Using the 350 million cubic mile figure as a reasonable estimate, the earth was then covered with water to a depth of 1.75 miles or 9240 feet. This amount was divided between three locations; the Canopy, the sea, and the Deep. An amount of 420 feet has been suggested for the canopy.¹⁵ As the sea depth would be deepening constantly, it is likely that the original depth was relatively shallow and I suggest an average depth of 2000 feet. This amount would be enough to cover the entire earth to a depth of 1000 feet.¹⁶ The remaining 7820 feet were put into the Deep.

The Flood

“And behold, I, even I, am bringing a flood of waters on the earth.” (Genesis 6:17)

“And God said to Noah, the end of all flesh has come before me, for the earth is filled with violence through them. And, behold, I will destroy them along with the earth.” (Genesis 6:13)

There would not have been a flood if God had not personally intervened to cause it. The universe had been made “very good”, and surely that meant that the earth’s crust was seamless, solid, and strong. The outward pressure of the earth’s hot interior was counterbalanced by the weight of the crust. The pressure would never crack the crust and the crust would never sag inward and thus be cracked. Only the Creator who had made all things “very good” could change things to “not so good”.

When God did bring on the flood, it not only destroyed man and animal, but as Genesis tells us, the earth. The magnitude of that destruction and the tremendous movements, sinkings, and uplifts of the earth’s crust that took place are almost beyond comprehension.

Estimates of the volume of sedimentary rock, all of which was brought into existence by the flood,¹⁷ are upward from 50 million cubic miles. That much would cover 100 million square miles to a depth of 2640 feet. The original land mass must have had elevations of 5000 feet or more to average 2640 feet, all of which had

to be completely eroded away, mixed, sorted, and deposited to form today's sedimentary rock. Violent upheavals and sinkings of the earth's crust then occurred in order for us to find sedimentary rock on top of the high mountains as well as miles below sea level.

THE OCEAN BASINS

The Pacific

A most unique feature of the Pacific Ocean basin is its deep-sea trenches.

"A nearly continuous garland of long, narrow, deep-sea trenches sharply separates the arcs of active volcanos and the deforming coastal ranges of Asia and America from the stable ocean basin floor which lies beyond. This narrow transition zone, this unstable continental margin, which includes the Indonesian arcs of Southeast Asia, nearly rings the Pacific basin. The greatest depths of the sea are found here in steep-sided narrow gashes which characteristically cut almost precisely ten kilometers into the earth's crust."¹⁸

The Atlantic

The Atlantic Ocean basin's spectacular feature is its 12,000 mile long Mid-Atlantic Ridge or Rise, the planet's largest mountain range.

"It closely duplicates the curves of the coasts far east and west of it."

"Along vast stretches of the rise, the summit is slotted by a great rift valley, gouged out like a groove."

"It is quite as if this rift in the mountain chain were atop a crack in the ocean floor crust, through which heat seeps from the hot mantle substance below."

"Precise soundings by means of waterborne sound waves have shown that the so-called rift valley, where it runs along the summit of the Mid-Atlantic Rise, is about 2 km. deep and up to 50 km. in width."

"On either side of this strange central split lie the peaks of the main range, and farther out along the slopes are the lesser peaks."

"However, the ridges and their central rifts are repeatedly offset by great faults or fracture lines, running very nearly at right angles to the ridge line at that point. Such great ridge fractures may be traced as far as 100 km. or more from the ridge summits."¹⁹

In 1974 the American submarine Alvin made many dives into the Mid-Atlantic Ridge rift valley at a spot near the Azores and observed that,

"The presence of molten lava close beneath the floor of the median valley was indicated by a variety of formations indicating that lava bubbles up, particularly along the valley centerline."

"It was evident . . . that current volcanic eruptions are largely—if not entirely—confined to a zone within some 500 feet to either side of the valley centerline."²⁰

This 1000 foot wide band down the center of the

valley must be the crack in the ocean floor crust mentioned in a previous quotation, through which heat is released upwards.

The Indian—Pacific

The Indian Ocean basin also has its noteworthy features.

"Besides the great Mid-Atlantic Rise, running from Iceland to 40° or more S latitude there are related ridge systems curving eastward around the southern tip of Africa, then running northward all the way through the Indian Ocean into the torrid Gulf of Aden, nearly 15° N of the equator."

"Similar rifted ridges run along the floor of the Indian Ocean and midway between the continents of Australia and Antarctica. Another ridge curves along the floor of the eastern Pacific Ocean in a generally northward direction. Each of these mid-ocean ridges runs very nearly halfway between the limits of the ocean on whose bottom it is found."

"This truly worldwide network of oceanic rises has been said to loop around the earth like the seams on a baseball. Its combined length is about 40,000 km. (25,000 mi.), roughly long enough to encircle the entire earth at the equator."²¹

There are two other features common to all the ocean basins which we will just mention.

"Thousands of bountiful volcanic vents have poured out sufficient lava from the earth's mantle to build the massive underpinnings of oceanic islands, coral atolls, and seamounts. However, millions of abyssal hills, knolls, and peaks have been produced by other less ample vents which failed to produce enough to build to the surface of the sea before their activity was snuffed out."²²

The second feature is the micro-continents.

"There is however, another class of fundamental features which lie slightly submerged beneath the oceans . . . These are the micro-continents. Small in size in comparison with the proverbial seven, and mostly covered by the sea, they constitute an enigmatic phenomenon."²³

The Continents

Several continental features owe their existence to special cracks or vents in the earth's crust. Most of the volcanic activity has occurred in the ocean basins but there are a few volcanic vents scattered around the continents. Then there are the faults such as the famous San Andreas fault in California. Not only are there rift valleys below sea level but also some on land, such as in East Africa. Then there are spots on the continents like the Anadarko Basin in western Oklahoma. Deep wells have been drilled over 36,000 feet down in sedimentary rock, and wells as deep as 50,000 feet are predicted. Bob Hefner, whose company is drilling these deep wells said,

"But this basin has 22,000 cubic miles of sediments below 15,000 feet."²⁴

Imagine the forces that cracked the crust to form a column, maybe 30 km. or more from surface to the

mantle, which then sank into the mantle up to 10 miles, leaving a surface hole just as deep, which then was filled with sediment.

Comments

The authors quoted above were impressed when they contemplated the worldwide systems of trenches and rises, calling certain features "strange", and likening the placement of the trenches to a "garland" and of the rises to the "seams on a baseball": words denoting order. I, too, am impressed as I look at a map²⁵ of these things and contemplate the magnitude of the things it represents. It all looks so orderly, as if designed for some particular purpose.

Creationists have often pointed out that the order comes from intelligence and that a design comes from a designer. I believe that this tremendous system of trenches and rises, as well as the volcanic peaks, and all other crustal deformities, whether in the sea or on land, is the personal work of the Creator when He unleashed the waters of the Deep in order to remake the face of the earth according to His plan.

One Half Land

Every theory has its suppositions and the ideas presented here are no exception. The main supposition of these ideas is that God personally produced the changes in the earth's crust which no natural force was capable of doing. A second supposition is that originally, in addition to the present land mass, the area now occupied by the Atlantic Ocean was also land. God, knowing that some day an ocean would occupy the area, had constructed it to be easily eroded. If the micro-continents had also originally supported land masses, then the amount of land area that had been created would have been approximately fifty per-cent of the earth's surface.

The compelling reason, to me, for having that much land, is the present amount of sedimentary rock, the volume of which, as mentioned earlier, is estimated upwards from 50 million cubic miles. The sediments for that rock had to be eroded from the land. One hundred million square miles (approximately one-half the earth's surface) would have needed an average elevation of 2,640 feet. If the land area had only been today's approximately 60 million square miles, the average elevation of erodable material would have needed to be 4,400 feet. That seems, to me, to be too high.

Broken Fountains

"... in this day all the fountains of the great deep were broken up, and the windows of heaven were opened up." (Genesis 7:11)

The breaking up of the fountains of the Deep, those fountains that had been made strong at creation (Proverbs 8:28), was a tremendous undertaking. It was no haphazard event, but was perfectly planned and designed to accomplish God's purpose. One of the reasons for the flood was to destroy the earth (Genesis 6:10). Out of that destruction, however, had to come another earth, suitable for human habitation. Thus, the destruction

process was also a construction process.

Two main factors determined how the earth was reconstructed. The first was the way God had constructed the first earth; i.e., the location and extent of the various types of vegetation (forest and meadows, etc.) and the location and extent of the soils and minerals that made up the land mass. The second factor was the way in which God broke up the earth's crust; i.e. the location and size of the openings that let out the waters of the Deep. These are the things that determined that America has so much coal and the Middle East has so much oil, and the location and extent of all the earth's natural resources.

The Break-Up

During the Flood, a problem that needed to be solved, was how to keep the sediments over the land area. The eroding waters that fell from the Canopy for 960 consecutive hours, rushed towards the sea, carrying their load of sediments. Those sediments were the building materials needed to rebuild the land mass and therefore counter currents were needed to move the sediments back.

Now let us consider just what God did when He broke up the fountains of the Deep. He crushed a 1,000 foot wide, 25,000 mile long, and a 3 mile thick (the thickness of the upper crust) band in the upper crust down the center of what would be the Mid-Ocean Rise; He made all the faults or fracture lines which are perpendicular to the Mid-Ocean Rise; He crushed the rock which was in what are now called the deep-sea trenches; He poked, as with an oversized ice pick, millions of holes through the 3-mile thick ocean floor which became the vents over which seamounts, etc. were built; He also poked some holes in the continental upper crust; He cracked the upper crust making the fault lines we observe today; He cracked the continental crust in millions of places and ways so that sinkings such as the rift valleys and the Anadarko Basin in Oklahoma would take place, and to allow mountains to be raised; He made vents and trenches in the lower crust to allow lava to rise to the surface; and more.

It took just a moment for God to finish His work and then natural forces took over. The crushed, and maybe pulverized rock,²⁶ started dropping into the Deep and water was forced up through the cracks. It very likely took some days for the 3-mile thickness of crushed rock to fall into the Deep and perhaps towards the end be washed out the top. When the trenches were clear the waters of the Deep were forced to the surface with great power.

The moving wall of water, especially as the flood waters deepened, produced two circulating currents, one on either side, with the water moving towards the middle on the bottom and away from the middle on the surface.

In the Atlantic area these two currents literally melted away the soils, thus producing the ocean basin. The currents extended out equal distances from the middle which explains the central location of the Mid-Atlantic Ridge. The sediments, and vegetable and animal material, were moved out over the continents,

which is the reason similar fossils are found on opposite sides of the ocean.

The currents set up along the rest of the mid-ocean ridge system, swept the ocean bottoms, and moved the sea creatures over the land.

The deep-sea trenches are located next to land so one of the currents set up by them served to help erode the land areas and keep the sediments on the land.

One of the sources of power that produced all these currents was the total weight of the upper crust. The ocean bottom had always rested on the waters of the Deep and the weight of the land areas was added when God faulted and fractured it in innumerable places.

The Lower Crust

The vents and trenches God made in the lower crust allowed lava from the mantle to flow in copious amounts into the Deep, helping to force the water to the surface. It took 150 days (Genesis 7:24) to force out the waters of the Deep and allow the rising lava to meet the sinking crust, at which time the fountains of the Deep were stopped. (Genesis 8:2) That wonderful, fantastic, underground watering system was no more. It had been completely destroyed.

Stopping the fountains did not stop the lava. Pressure from the mantle forced lava up the three mile thick mid-ocean trench. The pressure of the water above counterbalanced it there. In the deep sea trenches, however, lava did not rise very high. The reason for that may be that the openings in the lower crust, through which lava was rising, were some distance away, while the mid-ocean trench was near to the openings in the lower crust.

Lava was forced up the millions of ocean floor vents and built everything from little mounds, to great sea mounts, to islands, and mountain ranges before the flow was shut off. All this sub-marine mountain building took place between days 150 and 223 of the flood year. (Genesis 8:5)

Sinking Oceans, Rising Mountains

Tens of millions of cubic miles of mantle material became part of the crust below the oceans. This caused a slight lessening of mantle pressure, which, coupled with the increased weight of the crust, allowed the ocean bottom to start sinking. Water from the continents immediately started pouring into the oceans, adding more impetus to the sinking. Before mantle pressure built up enough to stop the crust, it had sunk an average of perhaps up to 2 miles or so.

The increased mantle pressure was reflected under the continents by forcing more lava into the old Deep, where, acting like a hydraulic jack, it tilted some land areas, raised up plateaus, and pushed up mountains.

Odds and Ends

1. The lava, which replaced the water in the Deep, trapped large pools of water under pressure up against the bottom of the upper crust. These pools are the source of the water being forced out of vents in the ocean floor.²⁷

2. While forcing the water out of the Deep, the lava incorporated in itself a great quantity of it. This is the source of the water released into the air during a volcanic eruption.

3. "The mid-ocean ridges . . . take up a lot of room under water. If all the present mid-ocean ridges vanished, the sea level would drop by well over 1,000 feet."²⁸

That 1,000 feet represents over 25 million cubic miles of lava that helped push up the rise and now maintains it. The pressure, first of water and then of lava, was able to raise the curved edge of the ridges because of the faults God made in the crust, perpendicular to the ridge. I suggest He needed all those extra millions of cubic miles of lava in the crust to make the crust heavy, so the ocean basins would sink.

4. This paper has proposed that the original crust of the earth was in two sections, upper and lower, which were separated by the Deep, which was a layer of water. During the Flood, this water was replaced by molten lava. The thickness of the Deep became varied during the Flood due to sinkings and uplifts of the upper crust. It is to be expected that most of the lava has cooled and hardened. Some areas, however, would remain fluid due to their being over the larger vents in the lower crust. As the lava is mantle material, which is denser than the crust, there would be a discernable boundary between it and the upper crust, the same as between the mantle and the lower crust.

Is there any evidence for these things?

The literature does not use my terms of upper and lower crust, but it does recognize, due to seismic wave analysis, that the crust is in layers. Under the oceans, we are told, the crust is typically 3 miles thick. This, however, rests on another layer, which Calder calls the "plate", which may be up to 40 miles thick.²⁹ This plate he says rests on a layer of a mixture of solid and molten rock, which rests on the mantle.

Scattered around the globe are about 20 areas, about 400-500 km. in diameter, called "hot spots", because they have a higher than average heat flow at the surface.³⁰ These areas, then, must be over the pools of fluid lava which are over the large vents in the lower crust.

5. On May 25, 1980, a series of earthquakes, registering around 6 on the Richter scale, rocked the Mammoth Lakes area of California, which is located just southeast of Yosemite National Park. The reports stated that the scientists were looking for the fault line that produced them.

If the ideas proposed in this paper are correct, then earthquakes can occur at places other than at fault lines. It was suggested, that when lava rose up through the lower crust into the old Deep, that in some areas it acted as a hydraulic jack and pushed up mountains. If that big pool of molten lava hardened, then the area would be stable. If, however, that lava remained fluid, then, due to shifting forces within the earth, some lava could drain out or new lava could be added. In either case the area could shift, adjusting to the new pressures, which would cause earthquakes. This mechanism could, of course, produce earthquakes along fault lines just as well as elsewhere.

Conclusion

The deep seas give up their secrets reluctantly. The area to be examined is vast, and obtaining first hand information of the depths is difficult. Instruments at, or near sea level tell some things; cameras and dredges lowered in the depths bring back a bit of information; and a few deep sea dives in submersibles have increased our knowledge. Yet, many questions remain unanswered.

It may be, that as more knowledge is obtained, some ideas expressed in this paper will need revision. Nevertheless, the author hopes that what has been said may be a springboard for developing a global model that will conform to Scripture and its time-table, as well as to the facts of God's Creation.

Appendix

Some of the ideas presented in this paper are the outgrowth of the conviction that not only have the crustal plates of the earth not moved, as predicted by the Theory of Plate Tectonics, but that it is impossible for them to do so. In this appendix we will examine some of the evidences that led to that belief.

A powerful argument, to me, against plate movement, has already been mentioned but bears repeating.

"... no one knows exactly how the plates of the earth's shell are driven around ..."

Yet, much is written about convection currents as being the driving force. Diagrams are drawn, as in figure 1a, supposedly showing crustal plates that are just the

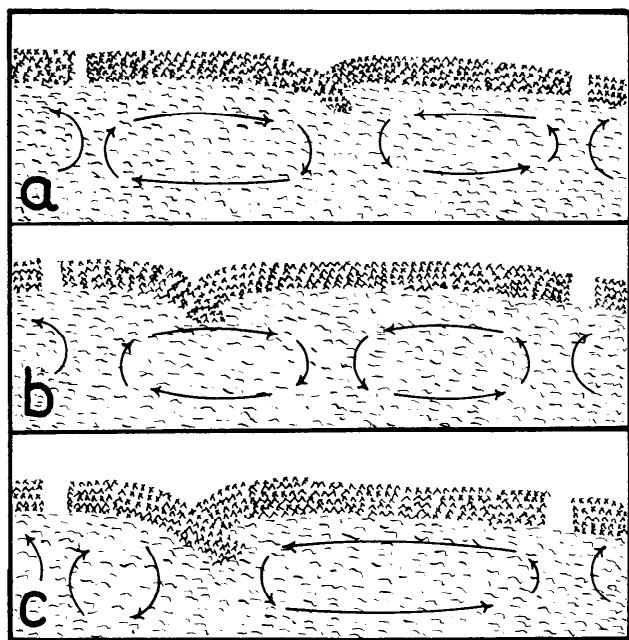


Figure 1. Convection currents, indicated by the arrows, are supposed to move the crustal plates above them, as in part a. However, if the convection currents remained the same, in time the plate would come to a place where adjacent and opposite currents were acting on it, as in part b; and it would remain there. The only way to get the notion to work would seem to be to have the convection currents shift along with the plates, as suggested in part c. But there seems to be no reason why they should do so.

width of the convection currents. The theory calls for one plate to grow in width while its adjacent plate diminishes in width. Under that situation, if the convection currents remained the same width, as in 1b, the movement of the plates would have to slow down and eventually stop, as two opposing currents would be acting on the same plate. Thus, to keep the system working, the width of the convection currents would have to change at the same rate as the plates (1c).

Klein makes an interesting observation.

"newly formed crust moves outward from the mid-ocean rise . . . The process is the result, *not the cause*, of the great convective cycles taking place below in the asthenosphere . . ." ³¹ (emphasis added)

Herein I see an impossibility. The result—moving plates—have to control the cause—convection currents—or the plate movement will stop.

Subduction

The crust of the earth is not divided up in even squares, but in plates of irregular size and shape. The Theory of Plate Tectonics calls for certain edges of certain ocean basin plates to be continually rolled under with the leading edge constantly being melted in the mantle, the supposed process being called subduction. This appears to me to be an impossibility. The plates are not made of rubber, to so be bent, but of solid, rigid rock up to 40 miles thick, that certainly will crack and break off rather than bend. Therein lies another objection. There is no natural force from above which could push on the edge of the plates and bend it. Neither is there a force below that could pull or suck the edge down. Then how could it happen? Menard believes he has a solution and writes authoritatively:

"Trench is created where the leading edge of a plate that emerges from a fast spreading center collides with another plate. Because the combined speed of the two is more than six centimeters per year, neither can absorb the impact by buckling. Instead one crustal plate plunges under the other to be destroyed in the asthenosphere." ³²

The logic of all this escapes me. A speed of six centimeters a year does not seem to be enough to cause any damage in a collision. The opposing plates should just stop, and if the driving force continued, the plates should just be in a shoving match. Also, the words "collision", and "plunge", can hardly be associated with a speed of six centimeters per year.

Another objection is that there never could be a collision. That word implies an original separation of two objects which then come together with force. Two plates of the earth's crust, however, never can have an empty gap between them. Calder explains:

"No gap can exist between the plates—there are no forty-mile deep chasms in the earth's surface. One plate can ease itself away from another but in that case hot rock instantly rises from below to fill the incipient gap." ³³

No gap, no collision; no collision, no plunge; no plunge, no subduction; no subduction, no continental drift. That is the way I see it.

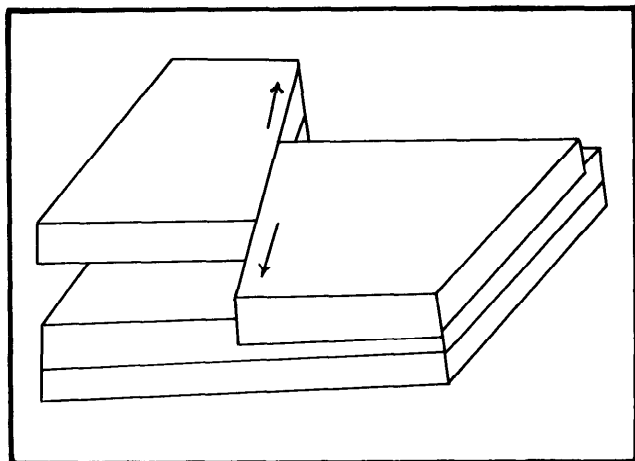


Figure 2. This shows how transverse faults are commonly envisaged in connection with the plates. This view is criticized in the text, as overly simplified.

Transverse Faults

Figure 2 is similar to the book illustration³³ of the operation of transverse faults. I have two objections to this model.

First, actual faults in the earth's crust are not straight lines. Figure 3 shows the line of the San Andreas Fault³⁴, which, as it goes through California, is a transverse fault.

For the two plates to move as indicated, they will have to cam themselves apart leaving a gap between them, which would then fill up with lava. In the supposed millions of years of movement, similar situations must have arisen many times. The fault line, therefore, should be a wide band of hardened lava—but it is not.

The second objection to figure 2 is that the topography of actual fault lines is not flat. The fault runs up and over hills and down through valleys. If the supposed movement had occurred, there should be no conformity of elevation of the two sides of the fault line, except where one side going up met the other side coming down. Also, sheer high cliffs on one side of the fault line should be next to low valleys on the other side of the fault line. These conditions do not exist. My conclusion is that the plates have not been moving for millions of years as is claimed.

Comments

The two theories of Evolution and Plate Tectonics have two big points in common. They both need millions and billions of years to accomplish their objectives, and neither one can find a satisfactory mechanism to make their systems work. Calder laments:

"The plates and their interactions constitute a fine piece of machinery that explains the outward appearance of the planet. It is exasperating not to be sure how the machinery works."³⁵

Allow me to make a few personal observations. The above quotation brings to mind Paul's comment about some in the last days who are "always learning and

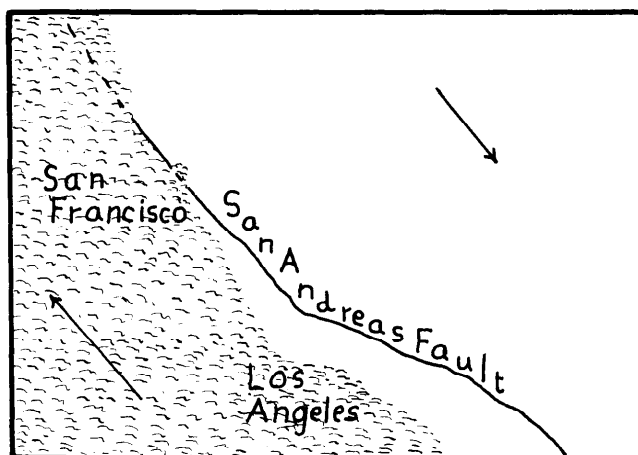


Figure 3. This shows how the two sides of the San Andreas fault are moving. The sliding is not along one straight line; so complications, as discussed in the text, would arise if the crust moved any great distance in that way.

never being able to come to a full knowledge of truth." (II Timothy 3:7)

How can they find mechanisms for supposed processes that take supposed millions of years when the universe is only a few thousands of years old? How much more profitable their research would be if they could at least consider the possibility of a Creator, Who not only created the universe, but, when He considers it necessary to fulfill His purpose, makes an adjustment to His creation. The biggest adjustment He made was when He initiated the Flood.

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- ⁴*Ibid.*, p. 603.
- ⁵Alexander, Tom, 1975. Plate tectonics has a lot to tell us about the present and future Earth. *Smithsonian Magazine*, 5(11): 38-47. See especially p. 39.
- ⁶Sclater, John G., and Christopher Tapscott, 1979. The history of the Atlantic. *Scientific American*, 240(6): 156-174. See especially pp. 159 & 160.
- ⁷Calder, Nigel, 1972. *The restless earth*, The Viking Press, New York, p. 108.
- ⁸Heezen, Bruce C. and Charles D. Hollister, 1971. *The face of the deep*, Oxford University Press, New York, London, & Toronto, p. 591.
- ⁹Green, Jay, 1976. *The Interlinear Hebrew/Greek English Bible*, Associated Publishers and Authors, Lafayette, Indiana. All Biblical quotations are from this version.
- ¹⁰Either the mist that went up from the earth was liquid water or it was evaporated water. If evaporated water, then it had to condense back to liquid in order to water the ground. (Genesis 2:6) That would be rain which was ruled out. (Genesis 2:5) The mist, therefore, had to be liquid water.
- ¹¹Jones, J. Benton Jr., March 1980. Construct your own automatic growing machine, *Popular Science Magazine*, p. 87.
- ¹²If the original land area was one-half the earth's surface, i.e. 10⁸ square miles, and the vegetation used 8 inches of water a year; if the river fountain's pipes were 20 feet in diameter and the water flowed out at a rate of 1 (one) mile per hour, it would take the total output of

125,000 plus fountains just to water the earth. But there must have been more than that to allow the rivers to carry water all the way to the sea.

¹³Peterson, Everett H., 1980. The necessity of the canopies. *Creation Research Society Quarterly*. 17(4): 201-204, and 213.

¹⁴If the vegetation used 8 inches of water a year and the mist fountains sprayed 2 inches a year for a total of 10 inches a year, in 1656 years, that would amount to 26 million cubic miles of water, enough to cover 10⁸ square miles to a depth of 1380 feet. The amount of water the rivers carried to the sea would add to that amount.

¹⁵Reference 13, p. 202.

¹⁶This paper assumes that the original areas of land and sea were equal.

¹⁷Reference 13, pp. 202 & 203.

¹⁸Reference 8, pp. 445 and 448.

¹⁹Klein, H. Arthur, 1972. Oceans and Continents in Motion. J.B. Lipincott Company, Philadelphia and New York, pp. 121, 123, 124.

²⁰*San Jose News*, August 16, 1974, from *New York Times Service*, p. 25.

²¹Reference 19, pp. 121, 123, & 124.

²²Reference 8, p. 493.

²³*Ibid.*, pp. 521, 522

²⁴Hodgson, Bryan, 1978. Natural gas: the search goes on. *National*

Geographic, 154(5): 632-651. See especially p. 641.

²⁵Reference 8, pp. 550-551 & 596-597.

²⁶*Ibid.*, p. 452. "Masses of rubble, talus slopes, fractured, fragmented, pitted and corroded outcrops, all have been photographed on the inner walls" of the trenches. This is what would be expected if the origin of the trenches had been the suggested crushed rock.

²⁷1979. Strange world without sun. *National Geographic* 156(5): 680-683 shows a picture of a plume of water spewing a black cloud of minerals from an ocean floor vent. Rate of water flow unknown. To flow for the approx. 4400 years since the flood at 1 cu. ft./min. an original cube of trapped water only 1322 ft./side was needed. If 10 cu. ft./min., a cube 2849 ft./side was needed.

²⁸Reference 7, p. 121.

²⁹*Ibid.*, p. 100.

³⁰Reference 19, p. 165.

³¹*Ibid.*, p. 125.

³²Menard, H.W., September 1969. The deep-ocean floor. Reprinted in *Oceanography—Readings from Scientific American*, W.H. Freeman and Company, San Francisco, p. 163.

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³⁴*Ibid.*, p. 58.

³⁵Reference 7, p. 106.

PANORAMA OF SCIENCE

Roman Numerals

It is commonly supposed that Roman numerals are a clumsy method of arithmetic. Two authors, however, have pointed out that that is not so; both authors, I believe, working independently.^{1,2} For instance, it is relatively easy to do long multiplication with the Roman numerals. Indeed, they have certain advantages; for instance, there is no need to memorize multiplication tables.

It is not clear whether such results were used anciently: whether these recent discoveries are really re-discoveries. There was undoubtedly a tendency, in ancient times, to work with counting-boards, or abaci. It may be that only since paper and pencils have been so readily available has our way of working with pencil and paper been advantageous.

It is worth while to notice such things to dispel any notion that the ancients were ignorant, or stupid. They were nothing of the sort. Thus ancient literature, when it concerns origins in particular, deserves at least our respectful attention.³

Maybe, incidentally, some ingenious reader can devise an easy method of long division with Roman numerals.

Onychophora

The onychophora are small, soft-bodied, creeping animals, looking slightly like caterpillars. They are found in various warm places, and are sometimes called

Peripatus—at least, some of them are.

Onychophora has been viewed as an intermediate between typical annelid worms and the arthropods. Also, fossils found in the middle Cambrian, which are said to look remarkably like the modern onychophora, were said by many evolutionists to be related to the modern animals, and were sometimes proposed as the connecting links.

However, all of this has changed. The onychophora has lost its place as a link. Neither are the fossils now considered to be any particular relation to it. The total structure, and mode of development right from the egg to the adult, are those of an arthropod. The same is true of the leg movements. The placing of them as an intermediate is now seen to have been a mistake.

How many other plants and animals are there which have been placed with great confidence in certain groups and later found not to belong there? And how many more are there whose misplacing is still to be discovered?

Contributed by Mr. Colin Brown

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³Watson, David C.C., 1981. Time and ancient records. *Creation Research Society Quarterly* 18(1): 30-39.

Vertical Movements of the Earth's Crust (Continued from page 116)

²⁰Reference 17.

²¹Munk, W., and G.J.F. MacDonald, 1960. Continuity and the gravitational field of the earth. *Journal of Geophysical Research* 65(7): 2169-2172.

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²⁴Isacks, B., J. Oliver, and L.R. Sykes, 1968. Seismology and the new global tectonics. *Journal of Geophysical Research* 73(18): 5855-5899. (See especially p. 5866.)

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²⁶Reference 24, p. 5870.

²⁷Reference 15, p. 189.

²⁸*Ibid.*, p. 374.

BOOK REVIEWS

Tuning in to Nature, by Philip S. Callahan, 1977. Routledge and Kegan Paul, London. 240 pages. \$20.25.

Reviewed by Stephen M. Butt*

This book is not a creationist work; but it contains much information which could be useful to creationists. The author in a very engaging and witty style presents his thesis that insects are able to communicate by using infrared radiation. He discusses the structure of insect antennae and sensory hairs to demonstrate that they are superbly designed tools for reception of infrared rays at specific frequencies. He states that this design is one of the marvels of God's creation.

In chapter one, the author speaks of the origin of the solar system. He assumes a four to six billion year age for the universe, but states that only God knows the answer to the riddle of life. He then proceeds to explain the electromagnetic spectrum, pointing out that it stretches 180 octaves, from wavelengths of several miles long for broadcast radio to the .2 micrometer wavelength of ultraviolet. Infrared consists of wavelengths of one millimeter down to .7 micrometers. This largely unexplored type of radiation occupies 17 octaves of the electromagnetic spectrum.

Chapter two consists of a discussion of the forgotten genius of Nikola Tesla from Yugoslavia, who lived in the U.S. for many years, and was responsible for inventing such things as fluorescent lighting, the A.C. generator, black light, and, most important to this discourse, the tuned resonant circuit. The author then recalls his experience during World War Two at a military radar station. He remembers how large sphinx moths were attracted to the gaseous tubes in his transmitter set. The author later decided that the moths were so attracted because the tubes were surrounded by an aura of invisible infrared emissions. He decided that the moth antenna was actually a receiver tuned to these waves.

In chapter three the author explains the function and purpose of a tuned circuit. It causes electromagnetic waves to resonate together. This principle is used in radio transmission, and is also used in radio reception to insure frequency discrimination, and is of fundamental importance.

In chapter four, the author discusses the fact that flies come to sun-heated rocks in Dartmoor, in England. He points out that the heat from the rocks may have caused the many scents from the surrounding moorland flowers to radiate infrared at specific frequencies. These frequencies are actually infrared "colors" one of "God's great secrets" that we are not able to tune in yet.

Chapter five deals with an explanation of blackbody infrared radiation. The peak frequency at which an object radiates infrared is dependent on its temperature. All objects on the earth radiate infrared, because they all contain some degree of heat. In order for an object to radiate infrared that will be detectable by a receiver, it must be warmer than ambient temperature, so that its blackbody infrared will undergo a corresponding shift

to a shorter wavelength. The corn earworm moth warms its body by vibrating its wings before it takes off at night. Its body will thus radiate detectable blackbody infrared. This infrared is modulated into peaks by the flapping of the wings. This signal is strongest from the sides of the moth, and weakest from the head and tail because of the wing placement, and that most of the heat is generated by the thoracic muscles. The signal is thus directional, containing the elements of a good navigational device. The signal can be picked up directionally by other moths because they possess antenna pits which consist of vectored elements arranged in a 360° circle around a main detector.

Chapter six is devoted to an explanation of how the form of an antenna is related to the frequency that it receives. The antenna can be structurally designed in such a way that it "grabs hold" more firmly to wavelengths specific to its own dimensions. At high frequencies in the centimeter region, dielectric substances can make better antennas than metal. The insect exoskeleton is an excellent dielectric because it bears a thin layer of wax. Log-periodic, helical, horn cavity and slot, and loop antennae all have their counterparts in the sensory receptors found on the antennae of various insects.

Thermoelectrets are explained in chapter seven. Dr. Callahan details his experiments which demonstrated that insect antenna are thermoelectrets. They thus have the ability electrostatically to attract scent molecules from the air.

Chapter eight explains the phenomenon of fluorescence. Moths are attracted to a candle flame because the heated wax fluoresces at infrared frequencies which correspond to the frequencies used in the moth's communication with members of its own kind.

Dr. Callahan details in chapter nine his experiments which demonstrated that ultraviolet radiation and scent are both important as oviposition attractants for certain insects. These insects were not attracted to an ultraviolet bulb by itself, nor to auto exhaust by itself. They were, however, greatly attracted to auto exhaust irradiated by the ultraviolet bulb. The irradiation of the auto exhaust resulted in the photochemical formation of aldehydes, which are emitted by piles of rotting organic matter where the insects lay their eggs. These aldehydes then fluoresced at infrared frequencies which attracted the insects.

Chapter ten tells how the author's experiments explained why many insects vibrate their antenna. He rubbed an insect pheromone on a dielectric of beeswax and modulated it with a mirror vibrating at 50 to 55 cps. He obtained a ten-to-twenty-fold increase in the normal infrared fluorescence of the pheromone, with log periodic emissions at 17 to 18 and 26 to 27 micrometer wavelengths. These matched the wavelength design structure of the 30 to 55 micrometer sensilla that are found on the antenna of the cabbage hopper moth which vibrates its antenna at this rate!

Chapter eleven covers a blueprint for insect control in which tiny infrared-emitting antennae could be

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manufactured by miniaturization techniques. These could be used to radiate infrared at the same frequencies encountered in the pheromones of pest insects. The infrared would jam the insects' pheromone system so mating would be impossible, or attract the insect away from the plants they infest.

Chapter twelve explores the possibility that the spines on plants such as nettles are used to sense the electromagnetic component of the sun's radiation. They are thus able to gain information about the environment which helps them to regulate processes such as photoperiodism.

Dr. Callahan explores in chapter thirteen the possibility of using the principles he discovered with the insect and infrared light to develop an energy source. Electromagnetic wave energy converters could be developed which would convert electromagnetic energy from the sun into electricity. These devices resemble greatly in design the dielectric sensilla of the insect antenna.

This book cannot, as was said earlier, be considered a creationist work. On page 94 the author admits to being a creative evolutionist. The book is, however, imbued with his sense of wonder at the marvels of God's creation. The splendidly designed natural systems that the author explains in this book are excellent testimonies in themselves to the glories of the Godhead, and the wisdom of His design in creation.

The Seed of the Woman, by Arthur C. Custance. Box 291, Brockville, Ont., Canada. Doorway Publications. 1980. \$16.00. Hardback.

Reviewed by John W. Klotz*

As usual Dr. Custance has provided us with a well-researched volume, challenging a great many generally accepted views, providing unusual insights, and suggesting new approaches and understandings. The book deals with the nature of our Lord's suffering, death and resurrection, with His work as our great High Priest and with the significance of the virgin birth so far as the work of redemption is concerned.

Dr. Custance believes that there is no such thing as a natural death. He points out that Augustine had said of Adam that it was not impossible for him to die but it was possible for him not to die. He believes that death is both an event and a process. The departure of the spirit back to the God who gave it is an event which presumably would be followed at once by complete electrocerebral silence. Death, however, also involves a process, the progressive breakdown of all functions of the body unless artificial means are used to prevent it. Man dies as a person when his spirit departs. He dies as an organism when body functions break down. Custance believes that this process is referred to in Genesis 2:7 where Adam is told that "in the day thou eatest thereof thou shalt surely die." The original Hebrew, Dr. Custance says, literally reads, "dying thou shalt die." Adam did not die on the day on which he ate the forbid-

den fruit, but on that day he became a dying creature, a mortal man. Today it appears that the process of dying begins early in life; indeed in one sense at the very moment of conception.

Dr. Custance devotes several chapters to the question of the longevity of the patriarchs in Genesis. His conclusion is that there is every reason to have far more confidence in the Hebrew version of their ages than in the records of other Semitic peoples and in the Septuagint, the Samaritan Pentateuch and Josephus. Since the others do not really help to solve any chronological problems there are really no good reasons for preferring them. He believes that we have no evidence whatever from Scripture that there are really any missing names in the genealogies. For some reason or other he does not deal with the question of Cainan mentioned in Luke which to this reviewer suggests the possibility of gaps in the genealogical records.

Dr. Custance suggests that something quite specific reduced man's life expectancy from nearly 1000 years to 120 within a period of 17 generation after the Flood. He suggests that this reduction was due to the close inbreeding that was forced by there being only eight survivors of the Flood.

Dr. Custance seeks to explain the cause of Adam's death and loss of immortality. He suggests that there was a slow acting poison in the fruit, since he believes that physical death is a process rather than an event. He believes that only man was immortal, that from the beginning God intended the death of animals. Thus it was only human death that entered through the sin of Adam. It is his position that this poison was somewhat akin to alcohol and that death came as a result of the introduction of this poison into the human germ plasm.

Dr. Custance has a very strange idea as to the nature of Adam. He believes that Adam had both principles, maleness and femaleness in a sort of androgynous form. It is by taking the female characteristics out of Adam that Eve was created. Dr. Custance believes that this is the reason why original sin is passed down only through the male and not through the female; in this way Christ, born only of a woman, did not inherit original sin.

Dr. Custance believes that it was not Eve's failure but Adam's that resulted in the introduction of physical death into the human experience. As a result of eating the forbidden fruit Eve had unknowingly introduced a fatal poison. When she went back to Adam to invite him to share her experience, she had no real comprehension of what had happened to herself. Adam at this time was still immortal but for Eve a subtle change had taken place and she had begun to die. Adam now had a choice and he chose to follow his wife and eat the fatal fruit; thus Adam introduced death into the human experience. He deliberately poisoned himself, since Paul wrote to Timothy that Adam was not deceived, 1 Tim. 2:14.

Thus Custance believes that God first created Adam who was potentially immortal and who encompassed within himself both seeds, male and female, containing a single organism the mechanism for the production of both sperm and eggs. He then separated Eve out of Adam and entrusted to her one of the two seeds and the related reproductive mechanism, fashioning her body in a special way to preserve that seed uncorrupted even

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if she should poison herself with the forbidden fruit. Her body was poisoned like Adam's, but unlike Adam's seed, her seed remained untouched. Thus Eve was not responsible for introducing death into the human race; Adam was, for it was by his seed that death came. Contrary wise, by the seed of the woman life came.

To this reviewer, this is an interesting speculation but has no Scriptural support. Custance believes this explains how Christ could become incarnate without assuring the taint of original sin. Scripture does not answer that question directly, and this reviewer would prefer to leave the exact answer a mystery.

Dr. Custance believes that the forbidden fruit was the grape and presents a great deal of support for his rather unusual position, since most exegetes believe that the fruit grew on a tree not on a vine. This lays the basis for his conclusion that alcohol is a paradigm of the poison which struck down Adam.

Dr. Custance says that it is not natural for man to die. We die because we are killed. Death is a penalty imposed on us. It is passive, something that is done to us. Strictly speaking, we are executed. We do not die actively in the sense that our wills decide we shall terminate our lives. Jesus, however, did die actively. We are subject to death; He became subject to death. He was uniquely in a position to choose not simply the time in which He would permit Himself to be crucified but He would actually choose whether to die or not to die. On the cross He died two deaths, the first a spiritual one and then a physical one. For us, he says, spiritual death is active and physical death, passive; spiritual death for Him was passive whereas His physical death was active.

In a second section in his book, Custance deals with the seed of the woman. He believes that God set the stage for man's redemption first by creating Adam who was potentially immortal encompassing within himself both male and female seeds and then by separating Eve out of him and entrusting to her one of the two seeds, fashioning for her a body specifically designed to preserve that seed uncorrupted through each successive generation because it is untouched by the fatal poison. He makes much of the fact that in early development both sexes develop side by side in each individual, and he believes this is a reflection of the fact that the sexes at one time were not differentiated at all. Adam and Eve, he believes, were endowed with immortality. Mortality, he believes, is an acquired characteristic which is passed on to all men. However, he believes that it is transmitted to the male seed only. Although the woman was the first to introduce the fatal poison into her body cells she did not by that act poison her own seed. But the poison of death enters through the male seed into the seed of the woman by the fusion of the two. He believes this is an example of an inheritance of acquired characteristics which is inherited not by the genes but by something analogous to them in the surrounding cytoplasm, the plasmagenes.

Custance believes that the uniqueness of man does not lie merely in the uniqueness of his spirit; it includes also a uniqueness in his body. Man is not just an animal even from a physical standpoint. In addition to these physical differences, there is the fact that he has a non-material side. Custance discusses the difference between

a dichotomous and a trichotomous view of the nature of man. He points out that the Latin church opted for a dichotomous view in spite of the fact that a great many theologians and exegetes have suggested a trichotomous: body, soul and spirit. He believes that it is difficult to separate the three and uses the analogy of an overlay of the blue, which represents the spirit, and of the yellow, which represents the body, results in the appearance of green which represents the soul, a fusion of spirit and body. Thus the soul has no independent existence but results from an overlap of the spirit and the body. It is the spirit that is created and given to man. Man became a living soul when God added an appropriate spirit to a prepared body. Adam did not acquire a soul; he became one.

In our Lord's case, Custance believes that His birth was not so much a miracle as His conception. He believes that because He was conceived by the Holy Spirit He did not inherit original sin, since he believes that sin is not passed down through the mother but only through the father. Thus he believes that the Roman Catholic doctrine of the immaculate conception of Mary to insure that our Lord's body would be free from the effects of original sin is unnecessary. Custance states that Jesus Christ is both God and man. He had two titles: Son of God, and Son of Man which represent in one person two sonships, one by reason of his deity and the other by reason of his humanity. The first was the result of an eternal generation and always existed, the latter was acquired by incarnation and was properly referred to in the future until the incarnation became a reality. Custance, however, believes that the Son of God became man not at the time of conception nor sometime during fetal development but only when Mary's first born had achieved independent existence. He says, "The Nativity, not the conception was the day of angelic exaltation, for it was then that God became man." To this reviewer this seems a strange approach. It would seem far more in keeping with what we know about developmental processes to place the incarnation at the time of conception.

Custance distinguishes between sin and sins. Sins, he says, are to be distinguished from sin as the fruit of an evil and must be distinguished from their root. Sin is the defect which we inherit from Adam by natural generation: it is this that is often referred as original sin; sins are those transgressions which we are morally accountable, frequently referred to as actual sins. Sins are the cause of our spiritual death, Custance holds; sin is the cause of our physical death. To this review this is a weakening of what Scripture says of original sin, Custance's "sin". It is this and not our actual sins that is responsible for our alienation from God.

Custance speaks of the day of atonement in which two goats were sacrificed. The one was sent away into the wilderness to perish in isolation, the sins of God's people having been laid on his head. He was the sacrifice for "sins." The second was killed and his blood sprinkled on the altar in the Holy of Holies; this was the "sin" offering. Christ fulfilled both roles.

Custance has a lengthy and valuable section on the passion describing it in detail through insights he has gained from a study of Jewish practices. He believes

that crucifixion was the ultimate disgrace. It was not practiced among the Jews. The Jewish leaders wanted to put Christ to death not only because they hated Him but also to demolish His Messianic claims. Crucifixion alone, Custance believes, served God's purpose. Another form of execution such as those practised by the Jews—strangling, stoning, burning and beheading—would have required a miracle to keep Christ alive long enough to make this a voluntary sacrifice; on the cross it was only a miracle that He died when He did. He shows from historical records those crucified lingered for a long time—as much as a week or even nine days. Custance stresses that while He died on the cross He did not die because of it; He voluntarily gave up His life. Since our Lord had to die both for sin and for sins He had to suffer two deaths, the one spiritual and the other

physical. Physical death is the result of sin; spiritual death is the result of sins. The spiritual death that our Lord experienced was that of being cut off from the source of spiritual life which is God. Just as on the great day of atonement, atonement had to be made both for sins and for sin, that is, for spiritual as well as for physical death, so that on the cross Christ had to atone and died both spiritually and physically. It is for that reason that the day of atonement provided for two goats, the scapegoat and the goat who was to be slain as the sin offering; these were a shadow of things to come.

The book is well researched and provides new and valuable insights. While this reviewer does not agree with a number of the author's conclusions he believes it is a valuable and significant contribution from the combined fields of science and theology.

LETTERS TO THE EDITOR

The Triplets and the Addition of Velocities

I have read with interest Lee's triplets' paradox,¹ and the subsequent discussion.² In my opinion, Lee is right in saying that there is a fault in the usual relativity theory. But the fault lies, not in simultaneity where most have looked, but rather in the relativistic formula for the addition of velocities.

I have discussed elsewhere the Dual Velocity Theorem of Relativity.^{3,4} When it is applied, instead of the usual one, in Lee's equation on page 48, it gives, for the velocity with which Alvin observes Bill approaching him:

$$c \left[\frac{(v_A + v_B)^2}{c^2(1 - v_A^2/c^2)} \right]^{1/2} = c \left[\frac{(0.6 + 0.6)^2}{1 - 0.36} \right]^{1/2} = 0.83205c$$

So Bill, to meet up with Alvin, has to go, with respect to him, a distance of 360,000 $(1 - 0.83205^2)^{1/2}$ kilometers, at the relative speed found above. (The square root term is just the usual Lorentz transformation.) So it will take $360,000 \times .55470 / (0.83205 \times 3 \times 10^5) = 0.8$ second.

On the other hand, Ernie has to go 180,000 $(1 - 0.6^2)^{1/2}$ kilometers with respect to Alvin (the transformation again having been applied) and the relative speed is $0.6c$. So the time would be $(180,000 \times 0.8) / (0.6 \times 3 \times 10^5) = 0.8$ second.

The two times found are the same. Hence Bill and Ernie would indeed meet up with Alvin simultaneously, from the latter's viewpoint. Clearly, by symmetry, the same calculation would be made from Bill's viewpoint; and from Ernie's viewpoint the matter is obvious. So there need be no paradox, provided the correct addition formula be used.

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Settling Sedimentation

Morton's idea of the expansion of the earth¹ is a novel one to me. I would not shrug it off as impossible, and it does seem to resolve the dilemma of the sediment distribution. Short of direct Divine intervention, however, I can't understand the mechanism that would cause such an increase in the size of the earth.

I do wonder if perhaps he was not too quick in rejecting the idea that the ocean basins were not once higher than the present continents. True, the problem of "pushing down" the continents is a difficult one. But is it really necessary to postulate that?

Let us suppose that the continents had less relief before the flood than is now the case. Further, visualize the present basins as being low domes supported by hydraulic pressure by vast amounts of water beneath a relatively thin crust. These underground aquifers and the vapor canopy would have the bulk of the earth's water. Most available water would be in lowland seas covering the present continents. It would not be necessary to suppose that this situation was in perfect balance, it could have been in a state of tension, seeking a new equilibrium.

The flood would then have commenced with a dissolution of the vapor canopy. Heavy rains would have sluiced down, moving sediments from the domes

toward the continents. As the fountains of the deep began to release water the domes would have begun to collapse, forcing out still more water. As the event progressed, the continents would become higher relatively (and perhaps a bit absolutely) and the oceans would begin to move to the present-day basins, carrying sediments to their present locations.

To me, this seems to be a plausible model, in conformity with the Genesis record. I am not positive that it would explain completely the presently-observed relationship of sediments. Perhaps he could enlighten me on that score? It does seem to eliminate your problem of "pushing down" the continents, since the absolute altitude of the continents would not change. (Perhaps only rising slightly to account for a release of the water formerly lying on top of them)

I could go on with this model, postulating extensive mountain-building episodes on the continents during or soon after the flood year, or possible lateral movement of continents for centuries after the flood, but am not sure what effect these ideas would have on the pattern of sediments that would result as a consequence of these postulations. I would appreciate any comments on the general model that I've sketched. One thing seems sure; the pre-flood earth was quite a different place than the one we now observe.

Reference

¹Morton, Robert, 1980. Prolegomena to the study of the sediments. *Creation Research Society Quarterly* 17(3); 162-167.

²Harry James Fox, 1216 E. Robinson, Carson City, Nevada 89701.

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Reply to Fox

I do not believe that Fox's solution to the flood would explain the sediment distribution for several reasons. First the ocean basins are not shaped such that dome-shaped coverings could cover the basins. Secondly, that configuration would not explain the fit of the continents on an earth with a smaller radius as was demonstrated by Creer.¹ Third, the structure of a dome is such that the height at the top of the dome would be far higher than any feature so far observed on any planet of the solar system. It is also doubtful that the strength of the rock material would be able to support such a structure. Fifth, if these domes collapsed into the present ocean basins there should be some seismic evidence of the remnants, but there isn't any.

As to the reference to the vapor canopy, I suggest reading my article in the Quarterly on the earth's surface temperature under the canopy.² Life would have been impossible.

I am proposing a model of the flood in which God miraculously changed the electric force. It would cause an expansion of the earth's radius, change the rates of radioactive decay and explain many other features of the earth's geology. There are still many biological questions left to be answered; but so far this proposal has explained the geology quite nicely.

References

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*Glenn Robert Morton, 3313 Claymore, Plano, Texas 75075

Received 23 March, 1981.

Comments on Statistics

With regard to Mr. J.M. Andresen's article "Notes on the Use of Statistics in the Debate of Creation versus Evolution",¹ I feel that several comments are necessary. I agree that in systems theory, there are "many paths that a system . . . may take to reach a particular outcome".

However, in known cases with nontrivial similarities to molecular biology, closer examination shows that multiplicity of paths will not prevent an exponential decrease of probability as a function of string length. Biologists generally admit that computer programs as well as sentences of natural language do share relevant features with DNA-coded genes. (I have personally presented creationist lectures exploiting these parallels to university audiences in Germany and Switzerland.)

Let us take an example from natural language. Suppose a sentence reads "I want to go to Hamburg". Now assume there are external factors requiring the sequence "I am hungry" or an equivalent. If the latter sequence is to be a mutational product of the former text, it is clear that the probability of that particular sequence is somewhat like 26^{-23} in a space of strings of equiprobable letters. In other words: ridiculously small, virtually zero. Evolutionists may reply that lots of other sentences will produce the same result on the environment. Take "I need something to eat", "my stomach is empty", "provide me with something edible", etc., possibly even "me no eat". There is a certain amount of freedom in the choice of words. The important thing at this point is that the probability of getting the 'hungry'-message across by changing letters at random, is still somewhere around 26^{-22} in the space of equally long sequences of letters. Still virtually zero! The argument could of course be refined on a more sophisticated level.

Prof. Marcel Schutzenberger, the pioneer of computer science in France, pointed out that similar estimates apply in the case of computer programs², taking bit inversion or some other random change as a mutational primitive. Furthermore, the excellent paper by H.P. Yockey³, considering cytochromes, demonstrates that molecular biology is indeed subject to the same kind of argument. Another useful reference is 4.

Please note that all of these articles grant a hypothetical duration of 10^9 years to trial-and-error. (Readers of this journal know this to be fairly optimistic.) As a general comment on defensive strategies of Darwinists, I get the impression that much energy is expended in trying to find insignificant flaws in creationist reasoning. To use a somewhat drastic comparison, arguments against the evolutionary, self-organized construction of

the dome of Cologne might be answered by emphasizing the centrifugal forces caused by the earth's rotation.

In my opinion, Mr. Andresen has done a valuable job in pointing out some areas where further research will prove to be helpful. I agree with him even to the extent that further qualitative criteria should be formulated along with quantitative ones. After all, Psalm 8 gives God the glory without statistics. On the other hand, I am convinced that multiplicative calculation of probabilities is an appropriate tool in the debate of origins.

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*Eberhard Bertsch, Professor of Computer Science, Fernuniversitat Hagen, D-5800, Hagen 1, W. Germany.

Received 26 March, 1981.

How Punctuated was our Equilibrium!

Chicago's Field Museum of Natural History recently hosted a conference on "macroevolution". Those who attended, including geologists, paleontologists, and geneticists, discussed mainly punctuated equilibrium.¹ This notion, which tries to explain major variation in terms of short periods of rapid evolution, has been viewed as a resurrection of Richard Goldschmidt's "hopeful monster" mechanism, which he expounded in the 1930's.

It is interesting to note the existence of a somewhat similar idea, having, though, significant differences, prior to the advent of Darwinism.

Patrick Matthew (1790-1864) published his book *On Naval Timber and Arboriculture* in 1831. In an appendix he contended that each geological epoch has been concluded by a catastrophe which destroyed most of the living world.² Only the more primitive, less specialized forms of life survived through each catastrophe to evolve and re-populate the earth for the next epoch. Thus each period featured a different array of living things.

As Loren Eiseley pointed out:

What Matthew upholds, therefore, is the comparative stability of life in the calm intervals when the world is filled up and, on the other hand, he appears to visualize marked rapidity of evolution by selective principles when the amount of life on the globe is greatly reduced by catastrophic events³ . . . The continuity in Matthew's system is reduced, in other words, to a bare minimum of primitive organisms. His system, therefore, demands great and rapid malleability on the part of the organism⁴ . . .

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- ⁴*Ibid.*, p. 131.

*Jay Hall, Box 19434, Oklahoma City, Oklahoma 73144

Received 7 April, 1981.

Gleanings from the Telegraph

Just reading the daily newspaper can throw illuminating information before a creationist. May I share some examples from the "Daily Telegraph"?

1) Doctors at Hammersmith Hospital are planning to give sauna-type baths to cancer patients a few hours after their radio-therapy as there is evidence that heat causes regression of tumors.

It would therefore appear that the warm, humid conditions that many creationists believe to have prevailed under the ante-diluvian vapour canopy would have been inimical to cancers and thus been a contributing factor to the very long lifespans before the Flood.

2) Coal miners in Inner Mongolia unearthed China's largest mammoth skeleton fossil; a specimen 16 ft. high with 10 ft. tusks. Nearby were another mammoth skeleton and two woolly rhinoceros.

If they were found by coal miners, were the fossils found in the coal seams or adjacent rocks; how would an evolutionist explain mammalian remains from the carboniferous? Oh for more details about this discovery!

3) Scientists in Argentina have discovered "5 to 8 million year old" fossils of a bird measuring 11 ft. from beak to tail, with a 25 ft. wingspan and weighing more than 12 stone (168 pounds) "This makes it the world's largest known flying bird," said Dr. Kenneth Campbell, curator of Vertebrate Paleontology at Los Angeles Museum of Natural History.

The heaviest flying birds today (e.g., albatross, condor, eagles, swans) all weigh about 40 pounds; zoologists generally accept that above this size the power:weight ratio forbids flight-with structures made of flesh and bone at any rate! If this really weighed more than four times that limit, and really flew, then there are four possible conclusions:—

- a) the zoologists are wrong by a factor of four;
- b) the fossilised bird's muscles were much more efficient than those of modern birds;
- c) the force of gravity was less.
- d) the air was denser.

Option d, perhaps in combination with a small factor from a, would seem to me the most probable. Such a dense atmosphere is strong evidence in support of an antediluvian vapour canopy, and a consideration of the flight dynamics of the fossilised bird may allow someone cleverer than I to deduce a likely thickness for it.

*Alan Donnelly, 13, Byron Walk, Thetford, Norfolk, England

Advance Notice of an Important Research Result

I wish to inform creationists in general of the publication, in the Australian Journal of Creation Science "Ex Nihilo", of part 1 of a series of articles of potentially enormous impact. (March 1981 issue) In brief, 40 observations of the speed of light (c) over 300 years show a non-random variation. A computer analysis demonstrates that c is decaying according to a log-sine curve with a statistical accuracy of r squared being 1 (to 9 significant figures.) Experimental error has been mathematically eliminated as an explanation for the variation. This means that light at about 2 days after creation was travelling 5×10^{11} faster than today. The problem of the time taken for light to reach us in a few thousand years from distant stars is at last resolved, and

furthermore the date of origin of the curve is 4040 B.C., plus or minus 20 years. There are some fascinating "spinoffs" from this, as well as a number of areas of confirmation of the curve's implications. Eg., since radioactive half-lives are mathematically related to c , uranium isotopes have their half-lives reduced from billions of years to a few days in the early period of earth history. The address for the magazine (which is not exclusively a technical journal) is P.O. Box 302 Sunnysbank, Queensland, Australia 4109."

*Dr. Carl Wieland, 37 Anzac Ridge, Bridgewater, South Australia

Received 14 April, 1981.

REPORT OF 1980 BOARD OF DIRECTORS MEETING

The annual meeting of the Board of Directors of the Creation Research Society was held 10 and 11 April at Concordia College, Ann Arbor, Michigan. The first meeting was called to order on Friday, 10 April, at 15:30 hours by President Howe who read from Matthew 19:4 and announced a period of silent prayer. Present: H. Armstrong, D. Boylan, C. Burdick, W. Frair, D. Gish, G. Howe, J. Klotz, J. Meyer, J. Moore, G. Mulfing, W. Rusch, N. Smith, E. Williams. Excused absences: T. Barnes, R. Korthals, H. Morris, H. Slusher, P. Zimmerman. Visitors: W. Lammerts (and about 40 others on Friday).

Ted Aufdemberge of the Concordia faculty welcomed the C.R.S.; and David Golisch, president of the Creation Society Association of the Greater Detroit Area, spoke on behalf of its members, many of whom supplied and served mid-evening refreshments. The members of the Board thank those concerned for this kindness.

The secretary's report of the 1980 board meeting was read and approved. The secretary reported that 206 votes had been cast in electing the following for three-year terms on the C.R.S. board: C. Burdick, W. Frair, G. Howe, J. Meyer, J. Moore, G. Mulfing, Jr.

The treasurer's report for 1980-1981 showed total expenditures of \$38,992.64 and total income of \$48,843.94. Total cash assets were \$59,944.64.

The membership report indicated the following: 693 voting members, 1172 sustaining members, 378 student members, 158 subscriptions, 224 library subscriptions, 25 school and 11 church subscriptions, giving a total of 2,661. There were 359 foreign subscribers, mostly in England. Foreign members are reminded to remit by a check drawn on a U.S. bank, or international money order; otherwise the Society incurs needless expense.

Rusch reported that the textbook manuscript is proceeding well and should go to the publisher within several months.

Armstrong reported that there were 240 pages in Volume 17 of the *Quarterly* and that considerable material had been coming in since the fall of 1980,

these papers usually being printed in the order received. The editor welcomes good scientific papers and is anxious to obtain notes which can be included in the Panorama of Science.

Mulfing indicated that only a few weeks remained before the expected completion of the thermodynamics monograph which hopefully would be the prototype of many others. An astronomy manuscript is in process. Also the committee is hopeful of obtaining people who will take leadership in producing other monographs on various subjects including genetics, anthropology, dating methods, paleontology, and biochemistry.

Williams reported that last year 268 books were sold through Creation Research Society Books.

Announcement was made regarding a new creation magazine which will be published for a broad readership in the near future. Advisors and contributing editors are being sought. (This is not a project of the C.R.S.; the matter is reported here just for information.)

Klotz reported that the clearing house for employment had been informed of one high school and four college vacancies. Seventeen inquiries had come from individuals looking for positions. He appealed to members of the C.R.S. to give him information regarding known openings. The address is 5 Seminary Terrace North, St. Louis, Missouri 63105.

In one Friday evening half-hour report Howe presented answers to some anticreationist arguments raised in letters from noted evolutionists. The matter discussed at greatest length was the excellent design of the human pharynx as a common passageway for air, food and fluids.

In a second report he discussed the 2-6 March 1981 case in Sacramento Superior Court. He attended the trial and felt that the creationists as plaintiffs won the decision that in California school the subject of origins should be presented in a nondogmatic manner.

Russell Arndts presented a paper on the linear representations of radioisotope abundances indicating that radioisotope mixing may be more important than many

evolutionists have recognized.

Russell Akridge presented evidence that solar luminosity may be caused by contraction rather than thermonuclear fusion. If so, the sun could be only thousands rather than billions of years old.

Business on Saturday included the following:

There was discussion of what is happening on the current scene and Gish pointed out that data are accumulating to support creation rather than evolution as the explanation of the origin of the entire universe as well as life on earth. It is important to pray for C.R.S. members.

The following were accepted by vote or consensus:

1. that there be a drive to raise funds for establishing a research station;
2. that necessary expenditures be authorized for the Research Committee to investigate property for a research station;
3. that the C.R.S. purchase for resale *Variation and Fixity in Nature*, by Frank L. Marsh, the C.R.S. to become the exclusive distributor;
4. that the *Creation Reflections and Selections* publication be terminated, since only about 200 people bothered to send in a dollar for it;
5. that money be made available to print 1000 copies of the monograph, *The Universe as a Whole*;
6. that Armstrong be asked to plan to continue as editor of the *Quarterly* until 1985;
7. that the theme of the 1982 *Annual* be "Creation vs. Saltation";
8. that the persons listed elsewhere in this issue be nominated to the Board of Directors to serve for a three-year term, beginning in 1982;
9. that the present officers be reelected;
10. that the C.R.S. establish a senior citizen membership category (65 years and above), the cost to be at the student rate;
11. that the overseas subscription rate be \$2.00 more than the cost in the United States and Canada. The difference is necessary because of the extra cost of postage;
12. that the 1982 Board of Directors' meeting be held 23 and 24 April at Concordia College, Ann Arbor, Michigan.

The meeting was adjourned at 15:35 hours.

—Wayne Frair, Secretary

CALL FOR ARTICLES

The theme of the Annual Issue of the *Quarterly*, June, 1982, is to be "Creation vs. Saltation". There has been a tendency, on the part of some evolutionists, to abandon Darwinian gradualism, and to substitute saltation, i.e., sudden changes, or some form of the "hopeful monster". It behooves Creationists to consider what effect such developments may have on the debate of Creationism vs. evolution, and what they may say to those who uphold some kind of saltation theory, and articles along such lines are solicited.

Items for the Annual Issue of 1982 should reach the editor no later than 1 February, 1982.

SPECIAL NOTICE

The following candidates have been nominated to the Board of Directors to serve for a three-year term beginning in 1982.

John W. Klotz	Wilbert H. Rusch
Richard G. Korthals	Harold S. Slusher
Henry M. Morris	E. Norbert Smith

Six members are to be elected to the Board. It should be remembered that the elections are staggered, one third of the members of the Board being elected annually. Thus, if a certain member of the Board is not listed here, that does not necessarily mean that he is leaving the Board.

The date of the Annual election is 1 March, 1982. Biographical information on each Nominee will be distributed with the ballots.

Creationist and Neo-Darwinian Views

(Continued from page 110)

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CREATION RESEARCH SOCIETY

History The Creation Research Society was first organized in 1963, with Dr. Walter E. Lammerts as first president and editor of a quarterly publication. Initially started as an informal committee of 10 scientists, it has grown rapidly, evidently filling a real need for an association devoted to research and publication in the field of scientific creationism, with a current membership of over 600 voting members (with graduate degrees in science) and over 1800 non-voting members. The *Creation Research Society Quarterly* has been gradually enlarged and improved and now is recognized as probably 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.

Membership Voting membership is limited to scientists having at least an earned graduate degree in a natural or applied science. Dues are \$12.00 (\$14.00 U.S. for overseas) per year and may be sent to Wilbert H. Rusch, Sr., Membership Secretary, 2717 Cranbrook Road, Ann Arbor, Michigan 48104. 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 \$12.00 (\$14.00 U.S. for overseas) per year and includes subscription to the Annual Issue and 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: \$15.00 (\$17.00 U.S. for overseas.)

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. Subsequently a Revised Edition (1974), a Teachers' Guide and both Teachers' and Students' Laboratory Manuals have been published by Zondervan Publishing House. 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 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.

Board of Directors *Biochemistry*: Duane T. Gish, Ph.D., Institute for Creation Research, 2716 Madison Avenue, San Diego, CA 92116. *Biological Sciences*: Wayne Frair, Ph.D., **Secretary**, The King's College, Briarcliff Manor, NY 10510; George F. Howe, Ph.D., **President**, Los Angeles Baptist College, Newhall, CA 91321; John R. Meyer, Ph.D., Los Angeles Baptist College, Newhall, CA 91321; Wilbert H. Rusch, Sr., M.S., LL.D., **Membership Secretary**, Professor of Science, Concordia College, Ann Arbor, MI 48105; E. Norbert Smith, Ph.D., Northeastern Oklahoma State University, Tahlequah, OK 74464; Paul A. Zimmerman, Ph.D. Concordia Junior College, River Forest, IL; *Engineering*: D. R. Bøylan, Ph.D., Professor of Engineering, Iowa State University, Ames, Iowa 50011; *Genetics*: John W. Klotz, Ph.D., Director of Graduate Studies, Concordia Seminary, St. Louis, MO 63105; *Geology*: Clifford L. Burdick, M.S., D.Sc., 924 N. 6th Avenue, Tucson, AZ 85705. *Geophysics*: Harold Slusher, M.S., D.Sc., University of Texas at El Paso, TX 79902. *Physical Sciences*: Harold Armstrong, M.S., **Publications Editor**, Queens University, Kingston, Ontario, Canada; Thomas G. Barnes, D.Sc., University of Texas at El Paso, TX 79902; Richard G. Korthals, M.S., **Treasurer**, P. O. Box 135, Arcadia, MI 49613; Henry M. Morris, Ph.D., Institute for Creation Research, 2716 Madison Avenue, San Diego, CA 92116, and President of Christian Heritage College, San Diego; George Mulfinger, M.S., Bob Jones University, Greenville, SC 29614; Emmett L. Williams, Jr., Ph.D., **Vice-President**, Continental Telephone Laboratories, Norcross, GA. *Science Education*: John N. Moore, M.S., Ed.D., 136 Brody Hall, Michigan State University, East Lansing, MI 48824.

EXCERPTS FROM THE BYLAWS

Article III—Election of Directors

Section 1. The date for the annual election of directors shall be set by the secretary, but in no case shall it be later than March 1.

Section 2. The Board of Directors shall annually nominate at least one candidate for each vacancy on the Board of Directors, said candidate to have agreed to serve on the Board of Directors. The secretary shall report the names of those nominated by the Board of Directors together with the date of the election to all voting members not less than 120 days prior to the election.

Section 3. Any voting member may nominate one candidate for election to the Board of Directors by

presenting a petition signed by not less than 25 voting members of the Society, said petition to list the name and address of the candidate, indicate the qualifications of the candidate in not more than 50 words, list the name of the individual nominating him, bear the certification of the nominator as to the authenticity of the signatures on the petition, and contain a statement by the nominator that the individual nominated is willing to serve on the Board of Directors. This petition must be mailed to the secretary and must be postmarked not less than 60 days prior to the election. On receipt of the petition, the secretary shall ascertain that at least 25 of the signers of the petition are voting members in good standing.

\$4⁹⁵

Why Not Creation?

Selected articles from the
Creation Research Society Quarterly
(Volumes I-V, 1964-1968)

Edited by

WALTER E. LAMMERTS

CREATION RESEARCH SOCIETY BOOKS
5093 WILLIAMSPORT DRIVE, NORCROSS, GA. 30071

FORTHCOMING BOOK

The third edition of *Biology: a Search for Order in Complexity*, should be available in the fall of 1981. Watch for further information.

ALSO AVAILABLE FROM CREATION RESEARCH SOCIETY BOOKS

Variation and Fixity in Nature, by Frank L. Marsh,
\$3.95.

Heredity, by William J. Tinkle, \$3.25

Forthcoming

Thermodynamics and the Development of Order.

PLACEMENT SERVICE

Do you know of academic vacancies to which Creationists might be directed? The Creation Research Society would like to be in a position to be able to inform Creationist scientists of such vacancies. If you know of such positions, will you please inform Dr. John W. Klotz, 5 Seminary Terrace North, St. Louis, Missouri 63105, describing the position, and the academic requirements and training required, and giving any other information which might be available? You will be helping students whose views you share.

Graduate students who are interested in placement may write to Dr. Klotz for information about any available positions which are known to the C.R.S.