

Creation Research Society Quarterly

Haec credimus:

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

VOLUME 14

DECEMBER, 1977

NUMBER 3



CREATION RESEARCH SOCIETY QUARTERLY

Copyright 1977 © by Creation Research Society

VOLUME 14

DECEMBER, 1977

NUMBER 3

EDITORIAL BOARD

Harold L. Armstrong, Editor
4 Couper Street
Kingston, Ontario, Canada

Walter E. Lammerts, Research Editor

- Donald O. Acrey Geophysicist, Amarillo, Texas
Thomas G. Barnes University of Texas at El Paso, Texas
Duane T. Gish Institute for Creation Research,
San Diego, Calif.
George F. Howe Los Angeles Baptist College,
Newhall, Calif.
John W. Klotz Concordia Seminary, St. Louis, MO.
John N. Moore Michigan State University
East Lansing, Michigan
Henry M. Morris Institute for Creation Research,
San Diego, Calif.
William J. Tinkle Anderson College (retired)
North Manchester, Indiana
John C. Whitcomb Grace Theological Seminary,
Winona Lake, Ind.
Emmett Williams Bob Jones University,
Greenville, S. Car.

Notices of change of address, and failure to receive this publication should be sent to Wilbert H. Rusch, Sr. 2717 Cranbrook Road, Ann Arbor, Michigan 48104.

Creation Research Society Quarterly is published by the Creation Research Society, 2717 Cranbrook Road, Ann Arbor, Michigan 48104. © by Creation Research Society.

Creation Research Society Quarterly is indexed in the *Christian Periodical Index*.

COVER ILLUSTRATION

Among the most curious geological formations are the pillars, found in a few places embedded in solid rock. The cover picture shows a striking example of these pillars, one of the group at Hughes' farm, along the Rideau waterway, near Joyceville, a few miles north of Kingston, Ontario. The pillars are found at a cliff, partly embedded and partly exposed, as can be seen. In some cases, even when they are embedded, their tops, with a concentric pattern, can be seen at the top of the cliff.

It seems clear that these pillars are not fossil trees, as some have suggested. Yet they are polystrate; thus they provide as good evidence as do the polystrate fossil trees that the rock around them must have been deposited quickly.

More about these, and other types of pillar, can be found in the article by Cox, elsewhere in this issue of the *Quarterly*. Mr. Cox provided this picture.



TABLE OF CONTENTS

	Page
The Attenuation of Visible Radiation in the Vapor Canopy	139
Jody Dillow	
Im-who?-tep	147
James E. Strickling	
Pillars, Plystrate Formations, and Potholes	149
Douglas E. Cox	
Genetics Favors Creation	155
William J. Tinkle	
A Simple Geometrical Model for Comparing Pre-Flood and Post-Flood Geomorphology	157
James N. Hanson	
A Plea for Caution About Skull 1470	168
Chris C. Hummer	
Skull 1470—a New Look	173
John W. Cuozzo	
Panorama of Science	176
Book Reviews (1)	177
Letters to the Editor (1)	179
Certainties, Less Than Certainties, and Evolution	180
Lewis Neilson	

ANOTHER LOCATION OF THE QUARTERLY

Mr. Stephen P. Brown, Associate Director of Library Services at Cedarville College, Cedarville, Ohio 45314, informs us that the Cedarville College Library, P. O. Box 601, Cedarville, Ohio 45314, has all the volumes of the *Creation Research Society Quarterly*. They are available for use in the library or through normal inter-library loan procedure.

Mr. Brown informs us also that he is indexing the *Quarterly* for the *Christian Periodical Index*. We trust that all these things will help to make the *Quarterly* still more useful to still more people.

PRESIDENT'S NOTE

At the April 1977 Board Meeting of the Creation Research Society, Dr. Wilbert Rusch, Sr. was appointed chairman of a committee to supervise the revision of the textbook "Biology: A Search for Order in Complexity" and its accompanying workbooks and manuals. He was also empowered to appoint other committee members and to initiate discussion with publishers.

Dr. Rusch was requested to begin the revision process necessary for subsequent editions of these books. We are grateful for the accurate recording of minutes at that meeting but want to publish the fact that this one important item was omitted from those minutes.

George F. Howe
President, Creation Research Society

THE ATTENUATION OF VISIBLE RADIATION IN THE VAPOR CANOPY

JODY DILLOW*

Received 27 January 1977

A common objection to the vapor canopy theory has been that an extensive vapor blanket would attenuate all incoming starlight. In the following discussion, a vapor canopy model containing vapor amounting to forty feet of precipitable water is proposed. The physics of the maintenance of this amount of water has been developed and will be the subject of a later publication. The scattering coefficient of the vapor canopy is calculated and some approximations are made on the visibility in the pre-flood heavens. In conclusion, some suggestions are made regarding the effect on ancient mythology of the change in the appearance of the sky after the flood.

A frequent objection raised against the vapor canopy hypothesis is that such a quantity of precipitable water in the atmosphere would result in the total eclipse of all starlight.¹ Indeed, a canopy containing water amounting to thousands of feet of liquid would do so, no matter in what form the water was.² (Actually, a liquid canopy would attenuate less than one containing the same amount of water in the form of vapor.) But a canopy containing a moderate amount of water, in the form of vapor, would not have any drastic optical effect, as will be shown here.

For definiteness, it will be assumed that the canopy contained water vapor equivalent to forty feet of liquid. That rather arbitrary figure is chosen on these grounds: it would provide rain at the rate of one half inch per hour, which is a quite heavy rain, for forty days at the beginning of the flood; and it would still leave many stars visible.

Some Stars Were Visible Before the Flood

Since the Genesis account seems to indicate that men were able to see the stars, it would seem that the thickness of the canopy could not have been such that it would cause the extinction of all star light. (Gen. 1:16). It has been suggested as a way around this objection that the stars did not become visible until after the flood; they were only *created* (but not visible) on the fourth day. However, in view of the fact that men were clearly able to calculate time in years, and months, the sun and the moon must have been visible (Gen. 5). Since Genesis 1:14-17 makes no distinction between the visibility of the various luminaries, and since the sun and the moon are declared or implied to be visible, it seems more natural to assume that Moses intended to teach that the stars also were visible to Adam. It is only the physical problems involved if starlight is to penetrate such a vast vapor blanket as some have imagined that would cause one to entertain this unlikely interpretation. Hence, the question remains: What would be the effect of the proposed forty feet of precipitable water distributed throughout many miles of a thermal vapor blanket on the appearance of the antediluvian heavens?

The Magnitude of Starlight

Astronomers traditionally posit six magnitudes of star on the basis of the visibility of stars to the naked eye. This classification was made on the basis of visual

observations by ancient Greek astronomers. A magnitude of "1" was the magnitude of the *brightest star* visible to ancient stargazers, and a magnitude of "6" is the dimmest. With the advent of modern telescopes, greater precision has been introduced into this scheme. It was found that the ancient classification fell into a nearly perfect geometrical series, the ratio of intensities between magnitudes being about 2.5:1. This ratio between magnitudes has been officially standardized at $(100)^{0.2:1}$, or about 2.512:1.³

A 100-watt bulb held 6.25 miles away has the same visual intensity as a star of the first magnitude.⁴ The sun has a visual magnitude of -26.72^5 (The negative sign is used to extend this system to describe the magnitudes of celestial objects having much brighter intensities than 1.) Thus, the brightest (fixed) star, Sirius, has a magnitude of -1.6 , instead of 1, under this standardized system.⁶ Modern telescopes have now pulled in stars⁷ whose magnitude is $+24$. This system gives the relative intensities of starlight as it appears to the human eye. Thus, a star of the first magnitude is 2.512 times as bright in appearance as a star of the second magnitude, and 100 times, exactly, as bright as a star of the sixth magnitude. A simple equation for the relationships between star magnitudes is as follows:⁸

$$\frac{I_2}{I_1} = 10^{0.4\Delta m} \quad \Delta m = m_1 - m_2 \quad (1)$$

where m_1 and m_2 are the visual magnitude numbers and the I_1 and I_2 refer to the relative intensity of the starlight from stars of those magnitudes, usually expressed in lumens per unit area. Table 1 gives the relative intensities and numbers, of the six magnitudes of visible stars. Thus, a star of magnitude 3 is only 0.16 times as bright in appearance to the human eye as a star of magnitude 1, and so on.

In order to get a kind of practical grasp as to what these numbers mean, consider the following comparisons. The full moon¹⁰ has a magnitude of -12 , and

Table 1. This shows the relative intensities of the light from stars of the various visual magnitudes, and the number of stars of those magnitudes. See also Reference 9.

Visual Magnitude	Relative Intensity	Number of Stars of that Magnitude
1	1.00	20
2	0.40	65
3	0.16	200
4	0.063	500
5	0.025	1400
6	0.010	5000
		Total 7185

*Jody Dillow, B.S., Th.D., lives at 2905 Burning Tree Lane, Garland, Texas 75042.

the sun, having a visual magnitude of -26.72 , is therefore 772,680 times brighter than the moon. A value quoted for the illuminance of a 0 magnitude star is $2.54 \times 10^{-10} \text{ lm/cm}^2$ (incident intensity at the top of the earth's atmosphere).¹¹ This is equivalent to $2.36 \times 10^{-7} \text{ lm/ft}^2$ (i.e., foot candles). The sun, on the other hand, has an incident intensity at the top of the atmosphere of about 12,000 foot candles.¹² Thus, the sun is 5×10^{10} times brighter than a zero magnitude star.¹³ A 100-watt incandescent lamp at a distance of one foot gives about 150 ft-candles.¹⁴ Table 2 gives some comparisons of intensities of various sources. (There may be some discrepancies among the figures given here; for they are from various compilations, in which somewhat different conditions may have been assumed. But the figures will serve to indicate the orders of magnitude involved.)

Table 2. This shows the luminance, i.e. strength of light received, from various sources of light. For comparison, their magnitudes also are calculated, according to the same formula as that used for stars. For the astronomical sources, this refers to light received at the earth; for the other sources, at a typical distance. See also Reference 15.

Source of Light	Visual Magnitude	Approximate Average Luminance (cd/metre ²)
Sun	-26.72	160,000.00
Moon	-12.00	0.25
Flashbulb	-24.01	16,000.00
Candle	-13.50	1.00
Fluorescent Lamp	-13.28	0.82
Sirius (brightest star)	-1.6	9.12×10^{-7}

It may be mentioned that the total light of all the stars in the heavens is equal to that of 1,092 stars of visual magnitude 1.0.¹⁶

A final point needs to be emphasized. The eye has different levels of sensitivity to different wavelengths (i.e., colors) of the visible electromagnetic spectrum. The visible spectrum ranges from about 4000 Angstroms to 7000 Angstroms. (An Angstrom unit, indicated by A, is 10^{-8} cm .) The 7000 A end of the spectrum approaches infrared radiation (heat) and the 4000 A end of the spectrum approaches ultraviolet (the kind of light that produces a suntan). The eye is nearly 100 times as sensitive to yellow-green light (5500 A) as it is to far red or violet.¹⁷

For this reason, one's judgement of brightness depends largely on the yellow-green, even though the stars radiate all wavelengths. Magnitudes measured with the eye are called visual magnitudes; the eye responds most readily to the yellow-green light of the stars.¹⁸ The average wavelength of visual magnitude from the stars is 5280 A,¹⁹ i.e., the visual magnitudes correlate with the intensities of light of that wavelength.

The Attenuation of Starlight

As starlight penetrates the atmosphere, its intensity is reduced (attenuated) by absorption and scattering. The importance of absorption on visible radiation is relatively insignificant and can be neglected.²⁰ Scattering, however, is very important and is of two basic

kinds: Rayleigh and very small particle (aerosols). Both of these scattering phenomena obey Beer's law:²¹

$$I = I_0 e^{-KL(\sec\theta)} \quad (2)$$

(Strictly, this relation is what would apply were the Earth flat. However, it is a sufficiently good approximation to the true situation.) Here I_0 is the "incident" intensity of the starlight at the top of the earth's atmosphere; I is the resultant intensity after going a distance L through the medium (see Figure 1); and θ is the angle from the vertical (zenith) at which the light ray enters the atmosphere. (see Figure 2.) The term, KL , is called the "optical depth" of the medium. The equation for the coefficient of Rayleigh scattering, K , for a gas, is given by²²

$$K = \frac{32\pi^3}{3N\lambda^4}(n-1)^2 \quad (3)$$

where N = the number of molecules/cm³; λ = wavelength in centimeters, and n = the refractive index. Since²³ the term $(n-1)$ is directly proportional to N , so is K . The Rayleigh coefficient is inversely proportional to the fourth power of the wavelength. It is this strong wavelength dependence of K that causes the sky to appear blue and sunsets red. When λ is large, KL is small and there is less scattering.

Thus, at the 7000 A (red) end of the spectrum there is less scattering than there is at the 4000 A (blue) end. Hence, blue light is scattered to a much greater extent by the air molecules, and the sky is blue. As the optical path of the light ray increases, blue light is scattered so much that very little remains in direct sunlight compared with the red wavelengths. This is why the sun appears red close to the horizon. "The ratio for blue light at 4250 A to that for red light at 6500 A under the same conditions would be $(650/425)^4 = 5.48$. Thus, the scattering of blue light is 5.48 times the scattering for red light."²⁴

Sunlight, which is basically white, often reaches the earth with a reddish tinge. This is especially noticeable at sunset when the light passes through its longest path of atmosphere, and is explained by the fact that the blue light has been scattered by the

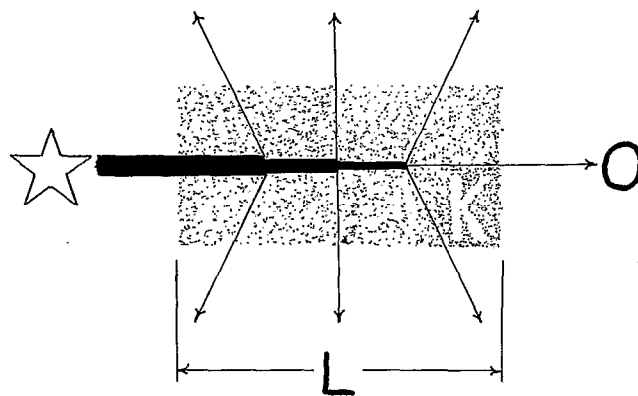


Figure 1. When light from a source, e.g. a star, goes a distance L through a medium characterized by a coefficient K , some of the light is scattered in various directions, as shown, and only a fraction gets through to an observer at O.

atmosphere and only the reddish portions reach us directly On the earth, scattering is the process mainly responsible for reducing the visibility or distance from which objects can barely be seen. Under hazy or dusty conditions the light from a distant object may be completely attenuated by scattering before reaching the eye. Direct absorption by the haze particles is of some importance, but scattering is the main effect.²⁵

When K is directly proportional to the density of the attenuating medium, it follows that the denser the medium, the larger KL will be and hence the greater the scattering. This indeed holds true for gases. However, when water is in the liquid phase, its molecules are more highly ordered and interact less frequently with a penetrating beam of light; thus, it is actually easier for light to penetrate water in the liquid phase. This will be demonstrated later.

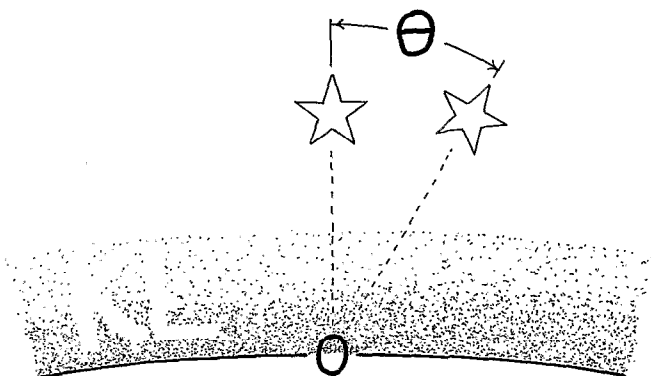


Figure 2. Light from a star at a zenith angle θ goes a greater distance through the air to an observer at O than that from a star directly overhead. An attempt has been made to suggest the curvature of the Earth, but the drawing is not necessarily to scale. Actually, the approximation of a flat Earth would work sufficiently well here.

In order to calculate the optical depth of the pre-flood atmosphere, which is assumed to contain the gases of the present atmosphere plus water vapor amounting to 40 feet of liquid, the optical depth of the water vapor must be added to the optical depth of today's atmosphere. The optical depth for Rayleigh scattering (i.e., the Rayleigh optical depth or optical depth of a Rayleigh atmosphere) has already been worked out for the standard atmosphere at all wavelengths. The KL_p (for $\lambda = 5280\text{\AA}$) of the present atmosphere with aerosols present²⁶ is 0.346. For an approximation for the pre-flood troposphere this value will be used, even though the aerosol levels of the pre-flood atmosphere were probably considerably lower.

Above the pre-flood troposphere was the vapor canopy. It is now necessary to derive an expression for the KL of the vapor canopy. It will be helpful if this can be done as a function of the amount of precipitable water in the canopy and independent of any particular temperature, pressure, or density distribution. John R. Baumgardner suggested the following derivation.²⁷

To find the optical depth KL , the expression for the Rayleigh scattering coefficient (3) is integrated over the optical path through the canopy. Thus,

$$KL = \int_{\text{opt. path}} \frac{32\pi^3(n-1)^2}{3N\lambda^4} dx \quad (4)$$

where n is the local index of refraction of water vapor, λ is the wavelength in cm (5280×10^{-8}), and N is the local number density in particles/cm³. It is desired to derive an expression for KL in terms of ω , the centimeters of precipitable water in the canopy.

Change the variable of integration from distance x through the vapor to distance ω through an equivalent depth of liquid water. The conversion factor would be

$$\frac{dx}{d\omega} = \frac{\text{density of liquid}}{\text{density of vapor}} = \frac{1 \text{ gm/cm}^3}{\left[\frac{(18.0153 \text{ gm/mole})}{(2.24 \times 10^4 \text{ cm}^3/\text{mole})} \right] [N/N_{STP}]} = 1.243 \times 10^3 N_{STP}/N \quad (5)$$

where N_{STP} is the number density of a gas at standard temperature and pressure (STP). Furthermore, the term $(n-1)$ is proportional to the number density N , and at STP for water vapor it has the value 2.54×10^{-4} .²⁸ Therefore, one may write (4) as

$$KL = \frac{32\pi^3}{3\lambda^4} \int_{\text{optical path}} \left[(2.54 \times 10^{-4}) \left(\frac{N}{N_{STP}} \right) \right]^2 \left[(1.243 \times 10^3) \left(\frac{N_{STP}}{N} \right) \right] d\omega \quad (6)$$

and observe that the number density dependence cancels inside the integral. With $N_{STP} = \text{Avogadro's number/molar volume} = 2.69 \times 10^{19} \text{ particles/cm}^3$ (i.e., $6.0238 \times 10^{23}/2.24 \times 10^4$), one obtains $KL = (32\pi^3 - \omega/3\lambda^4)(2.54 \times 10^{-4})^2(1.243 \times 10^3)/(2.69 \times 10^{19}) = 1.269 \times 10^{-4}\omega$. If the canopy contains 40 feet of precipitable water, $\omega = 1219 \text{ cm}$, and the optical depth of the canopy $KL_c = 0.155$.

It seems reasonable to suppose that when God lifted up the water above the firmament it was pure water with no aerosols present. If this is so, the canopy would have been pure water vapor with no particulate matter. However, because of ionization of the water vapor and some meteorite dust, probably some aerosols accumulated in the canopy. True aerosols are particles with a radius of about $3 \times 10^{-4} \text{ cm}$; those larger than that will settle out.²⁹ Meteoritic dust is generally that size or larger. Thus, it would either settle out of the canopy or in most cases burn up as it hit it and never get through.

The only kinds of particles that will produce condensation are called hygroscopic, that is, those substances that have a chemical affinity for water. Condensation will first occur on large hygroscopic particles. Meteoritic dust is non-hygroscopic and hence would not precipitate the canopy. However, meteoritic dust and small ions (i.e., particles with a radius less than $2 \times 10^{-6} \text{ cm}$) would be found in the canopy and would have some effect on Rayleigh scattering.

In the present atmosphere, the KL_p of a pure Rayleigh atmosphere is increased by 0.23 to account for the presence of aerosols. Thus, while the computed value

for a Rayleigh atmosphere is 0.116, a value of 0.346 or 0.35 is used.³⁰ Since there was then no industrial pollution, lower winds, and high humidity, it will be assumed that the aerosol level of the canopy was less than 50% of today's aerosol level. Thus, 50% of 0.23 = 0.115, will be added to the computed canopy KL_c for a generous approximation.

The total optical depth for the canopy including aerosols would then be $0.155 + 0.115 = 0.27$, yielding a KL for the pre-flood atmosphere of: $KL_r = KL_p + KL_c = 0.346 + 0.27 = 0.616$.

A Liquid Canopy Compared

For purposes of comparison, the attenuation that would occur if the canopy had remained in liquid form may now be calculated. The expression for the Rayleigh coefficient for water in its liquid phase is given by,³¹ $K = 24\pi^3 N(n^2 - 1)(n^2 + 1)^{-1} V^{-2} \lambda^{-4}$ where N is the number density of liquid water at STP = Avogadro's number divided by the gram molecular weight of water or $6.0225 \times 10^{23} / 18.0153 = 3.43 \times 10^{22}$ particles/cm³. V the volume of a water molecule is given by $4/3\pi r^3$, where r is the radius of a water vapor molecule or 1.442×10^{-8} cm.³² Solving for V , one gets 1.258×10^{-23} cm³. The term, n , refers to the index of refraction of liquid water at STP = 1.33348.³³ Thus, for a wavelength of 5280×10^{-8} cm, $K = 3.97 \times 10^{-5}$. Since $L = 40$ ft. or 1219 cm, KL_c for a liquid water canopy would be 0.0484. Thus, it is apparent that water in the liquid form will attenuate less radiation of this wavelength (5280 Å) than water in the vapor phase. The KL of a vapor canopy is $0.155/0.0484 = 3.2$ times as great as the KL of a liquid canopy.

Some Stars Would be Seen Through the Proposed Canopy

All starlight (5280 Å) will not be eclipsed by Rayleigh scattering³⁵ until KL approaches 4.605. Thus, before all starlight would be eclipsed by the vapor canopy, vapor amounting to over 1071 feet of liquid would have to be placed above the pre-flood troposphere (for visibility from directly overhead),³⁵ in contrast to the 40 feet assumed here.

Visibility in the Pre-flood Heavens

What did Adam and Noah see when they looked up into the night sky or gazed at the daylight sun under canopy conditions? Some rather interesting phenomena may have marked the antediluvian heavens. From (2) it is clear that the attenuation of the starlight will vary with the zenith angle. For the simple case of light coming in directly from above (zenith angle = 0), $KL = 0.616$, as calculated above. Thus, the pre-flood intensity, I_{pf} , is related to the intensity I_o incident of the top of the canopy by $I_{pf}/I_o = e^{-0.616}$ so $I_{pf} = 0.54I_o$. In other words, the light of wavelength 5280 Å seen by Adam was only 54% as bright as when it entered the top of the pre-flood canopy.

Since the optical depth of today's atmosphere is about 0.35, the present-day intensity I_p is $0.70 I_o$, so $I_{pf} = 0.77I_p$.

Table 3. This shows the relative intensity of stars of various magnitudes, and number of stars of the respective magnitudes visible today. The figures in the third column, being 0.77 times those in the second, show the intensities before the Flood, relative to the situation today.

Magnitude	Relative Intensity	Adjusted Pre-Flood Intensity	Number of Stars Visible Today
1	1.00	0.770	20
2	0.40	0.306	65
3	0.16	0.123	200
4	0.063	0.049	500
5	0.025	0.019	1400
6	0.010	0.008	5000

From this, the following adjustments in star magnitudes relative to today would have existed on the pre-flood earth as shown in Table 3. The dimmest start visible are those of the sixth magnitude where their relative intensity is 0.010. Hence, on the adjusted intensity scale which gives the pre-flood starlight intensity relative to today, any stars which are less than 0.01 will not be visible. This means that only 6th magnitude stars were always obscured on the pre-flood earth. All of the rest of the stars would be visible, at least under some conditions.

On moonlight nights, only stars of magnitudes 1-4 are regularly visible today.³⁶ Hence in Table 1, the 7185 potentially visible stars are actually visible only under the most ideal conditions of no moon backlight. Therefore, stars of relative intensity 0.025 and dimmer are often not visible today. A look at the adjusted intensity scale reveals that 0.025 falls between the 4th and 5th magnitudes on the pre-flood earth also. Hence, the pre-flood sky would have looked approximately like today's at times of full moon. When the moon is dark today, about 2500 stars are visible at one place and time.³⁷ (One can view only half the sky at one time. Also, the optical depth is greater near the horizon, causing dimmer stars not to be visible there.) If the same percentage applied to the antediluvian heavens, 34%, this means that on a clear night with no moon, Adam, potentially, could see any of 34% of all stars of magnitudes 1-5 or $34\% \times 2185 = 743$ stars. At any one time, however, only those of the 743 which were high enough in the sky would be actually visible.

Visibility at Various Zenith Angles

In the above discussion, it was assumed that the zenith angle was zero, i.e., only starlight coming in from directly above was considered. Now the effects of various zenith angles must be considered. See Figure 2.

It is obvious from (2) that as the zenith angle θ increases, the optical depth $KL(\sec \theta)$ will increase. Now since a hundred-fold increase in scattering will reduce a first magnitude star to sixth magnitude, that is, to the limit of visibility, it follows that an increased optical depth which satisfies the relation, $e^{-KL(\sec \theta)} = 0.01$ will yield the value of KL for extinction of all starlight by the earth's atmosphere. This relation is satisfied when $KL(\sec \theta) = 4.605$. Now, at what zenith angle, θ , will this occur? Since the pre-flood KL was calculated to be 0.616 and the present $KL = .35$, an increase in optical depth of $4.605 - 0.266 =$ is needed.³⁸ Thus, $\sec \theta_{ext} =$

Table 4. To reduce a star of magnitude m to invisibility, its effective magnitude would have to be reduced by the amount shown in the second column; this corresponds to reducing its intensity to the fraction shown in the third column. The fourth column shows the increase in optical depth necessary to reduce a star of the magnitude concerned to invisibility. The fifth and sixth columns give θ_{ext} , the greatest zenith angle at which a star of the magnitude concerned would be visible, both under the canopy and today. The angles in the seventh column are the least angles above the horizon at which the stars would be seen. They are ninety degrees minus the angle in the fifth column. All angles are in degrees.

m	$6-m$	$10^{-0.4\Delta m}$	Increase in Optical Depth for Invisibility	θ_{ext} Canopy	θ_{ext} Today	Angle Above Horizon Under Canopy
1	5	0.010	4.339	82	86	8
2	4	0.025	3.422	80	85	10
3	3	0.063	2.499	76	83	14
4	2	0.158	1.579	67	80	23
5	1	0.398	0.655	20	68	70

$4.339/0.616 = 7.043$, and $\theta_{ext} = 82^\circ$, where θ_{ext} = the extinction zenith angle. This means that no stars at a greater distance than 82° from the perpendicular would be visible (i.e., no stars 8° or less above the horizon.) As the zenith angle decreases, more and more stars would come into view as the vertical is approached. Table 4 presents the angles at which stars of various magnitudes will come into view. The starlight of each magnitude will be eclipsed when the optical path is such that it will reduce the starlight of that particular magnitude to the intensity of the sixth magnitude.

As mentioned above, an increase of the optical depth to 4.605 will reduce a first magnitude star to sixth magnitude, that is, to the limit of visibility. What increase in optical depth would be necessary to reduce a second, third, fourth, and fifth magnitude star to a sixth magnitude? This may be simply calculated from (1), and $I_2/I_1 = 10^{-0.4(m_2-m_1)}$. The intensity ratio I_6/I_m between a sixth magnitude star and one of another magnitude, m , is simply given by $10^{-0.4(6-m)}$. Since that ratio represents the increase in optical depth necessary to extinguish the starlight of that magnitude, it follows that the value of $e^{-KL \sec \theta}$ that equals that ratio is the value for extinction.

Thus, by taking the log of I_6/I_m [i.e., the log of $10^{-0.4(6-m)}$] the value of $KL \sec \theta$ for extinction can be determined and from this value of θ . As discussed above, relative to today, 0.266 must be subtracted from the optical depth value to determine the actual optical depth increase over today's values for total eclipse.

The angle $(90^\circ - \theta)$ is the angle above the horizon at which stars of the 1, 2, 3, 4, 5 magnitudes, respectively, will first come into view. The angles above the horizon and the magnitudes of stars that will be visible at those angles are shown in Figure 3.

It is evident that even though each magnitude of star is distributed uniformly throughout the heavens, as for the antediluvian sky, only in a fraction of it would stars of a given magnitude be seen. That fraction depends on the maximum zenith angle for visibility: the angle called $\theta_{ext}/2$. Thus under the canopy, for instance, the fraction of the sky in which third magnitude stars might have been seen was $2\sin^2 (76^\circ/2) = 0.74$ about.

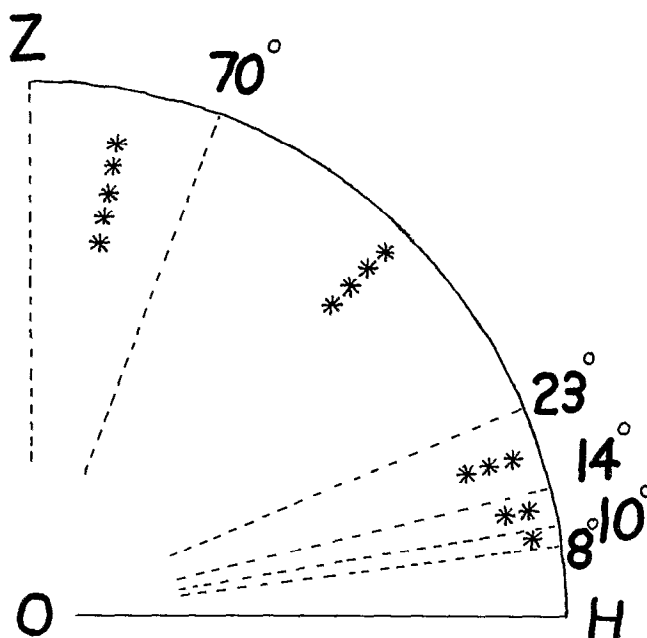


Figure 3. This shows the magnitudes of stars which would have been visible at various angles above the horizon, under the canopy. O is the point of observation, OH the horizontal, Z the zenith. The number of asterisks in an interval shows the number of magnitudes visible in that interval. Between 8 and 10 degrees, for instance, only the first magnitude would have been visible. Between 10 and 14 degrees the first and second would have been visible. Etc.

The ratio of the fraction A_p which applies today is equal to the ratio of $2\sin^2 (\theta_{ext}/2)$ to the same expression as it applies to conditions today. The angles involved are given in Table 4. Thus, for the first magnitude, the ratio is given by $A_d/A_p = [\sin^2 (82^\circ/2)]/[\sin^2 (86^\circ/2)] = 0.91$. I.e., 91% of the antediluvian sky was available for stars of first magnitude. See Figure 3 for an illustration.

An analogous calculation gives the fractions applicable to the other magnitudes; some results are shown in Table 5. Thus, while 743 stars were potentially visible to Adam,³⁹ only a fraction of that number were visible at any one time.

When Adam looked up into the antediluvian heavens, if there were 40 feet of precipitable water in the vapor canopy, he saw about 255 stars on a clear night when the moon was dark. If the moon was full, the fifth magnitude stars would have been obscured and he would have seen only about 210 stars.⁴⁰ Thus, when the canopy condensed and Noah left the ark, he would have seen $2500 - 255 = 2245$ new stars (assuming clear night and no moon).⁴¹ (The twenty-seventh of a lunar month would be nearly the dark of the moon. Genesis 8:14.)

Effect of Attenuation on Sunlight

What about the sun? Because of its enormous intensity, and the logarithmic response of the eye, sunlight would not be attenuated enough for one to notice a great difference in intensity. However, the sun would have been somewhat redder in color due to the Rayleigh scattering of the blue light (much more of the red light relative to blue would "get through"). The sight of a suddenly distinct and bright yellow orb for a sun on the post-flood earth could have been quite a striking change

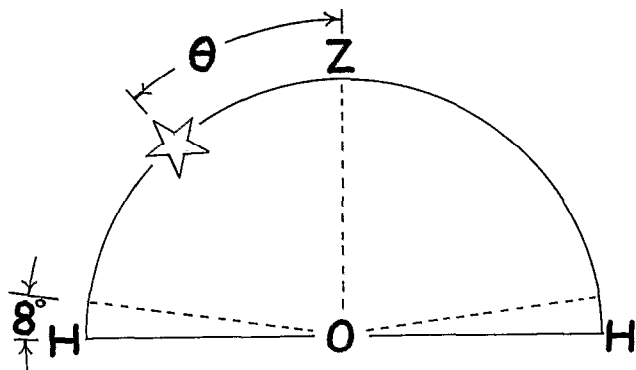


Figure 4. This indicates the part of the sky in which some stars would have been visible under the canopy. Some, as is shown in the text, would be visible at any angle above the horizon greater than 8 degrees. Here O indicates the point of observation, HOH the horizontal, and Z the zenith. The height of a star may be stated in terms of its zenith angle θ , as shown.

Table 5. This shows the number of stars of the first five magnitudes, and the number of them, 34%, which would have been potentially visible to Adam, under the canopy. The fourth column shows the number of those which would be high enough in the sky at a given time to be seen; and the numbers are found by multiplying those in the third by the ratio of $\sin^2(\theta_{\text{can}}/2)$ before the flood to the same expression after the flood. The angles are given in the fifth and sixth columns of Table 4. Thus for the first magnitude the ratio is 0.91, as already calculated. See also Reference 42.

Magnitude	Number of Stars	Number Potentially Visible to Adam	Number Actually Visible Under the Canopy
1	20	7	6
2	65	22	20
3	200	68	59
4	500	170	125
5	1400	476	46
Totals	2185	743	256

for Shem, Ham, and Japheth to relate to their descendants. The pre-flood sun was only 77% as "bright" as today's sun. Even today at sunset, a bright red sun is often observed. This would have been quite pronounced under the canopy.

Astrology, Sun-Worship, and the Collapse of the Canopy

Surely the condensation of the ancient vapor canopy would have left a marked impression on the minds of Noah and his sons and their wives as they described the appearance of the pre-flood heavens in comparison with the heavens after the Deluge. The sigh of an additional 2245 stars, a 23% increase in the intensity of sunlight (noticeable, if not striking, anywhere, and even more marked at the horizon), and of the yellow orb in contrast to the reddish disc of the pre-flood sky could have provided fertile soil for the development of some pagan ideas. In particular, the pagan religions ascribed to the stars and the sun a personal nature and hence could have seen in these accounts passed on down from the sons of Noah, a reference to a battle among the gods.

Sun-Worship in the Ancient Near East

A common thread in most of the myths of the ancient Near East is that of worship of the sun. In many of these myths, the worship of the sun was preceded by the wor-

ship of the sky god, the water heaven or an inferior sun. Often in the myths, the present sun has replaced a former sun.

The entirety of Egypt's religion revolved around the worship of Ammon-Re, the sun god. In Greece, the former sun, Hyperion, is replaced after the banishment of the water heaven by the present sun, Helios. Helios supposedly was drowned in the ocean and then raised as the luminous sun.⁴³

A similar theme is echoed in Iranian religion where the sun who reigned during the rule of the water heaven, was Ahura-Mazda. With the banishment of Varuna (the water heaven), a new sun, Mithras, took over after conquering the darkness.⁴⁴ Again, the theme of a new sun could reflect the physical fact of the change in the appearance and intensity of the old sun, due to the attenuation of sunlight under the canopy.

In Mesopotamia, Marduk, the original sun god, is taken over by Shamash, the new sun god.⁴⁵

It is curious, that in most of the myths, it is the sky god (cf. Ouranos of the Greeks) who is original and the sun god comes along later, as the central deity. As Ferguson has observed, "The sun gives light and life. But it is the sky-god, not the sun-god, who predominates in early religion."⁴⁶ In Egypt, Ammon-Re began to absorb the other gods by the fifth dynasty. In Persia, Ahura-Mazda (the old sun) is viewed as the sky god and is supreme over the sun.⁴⁷

In this connection, Velikovsky has noted a peculiar theme in many ancient myths: the sun ages.⁴⁸ It is quite common to find a reference in the myths to a new sun in the sky at the beginning of every new age. The Mayas, for example, numbered their ages by giving them the names of the consecutive suns. Interestingly enough, the first sun was the "Water Sun." It was followed by several eras, each marked by a new sun (Earthquake Sun, Hurricane Sun, and Fire Sun) to which various catastrophes are attributed.

Ixtlilxochitl (circa 1568-1648), an author who described Indians of Mexico, called the world ages by the names of suns. Again, the "Water Sun" was the first age which was ended by the Deluge.⁵⁰ Successive ages followed.

The idea of a series of sun ages is found in other Mexican writings. Symbols of the successive suns, for instance, are painted on the pre-Columbian literary documents of Mexico.⁵¹

The buddhist sacred book of *Visuddhi-Magga* has a chapter on "World Cycles."⁵² Three destructions of the world are discussed, one by water, fire and wind. Apparently, after the Deluge, a "second sun" appeared. In the future, more suns will appear. The seventh sun's arrival will result in the whole world bursting into flames.⁵³

The Aborigines of British North Borneo, even today, believe that the sky was originally low, and that six suns perished, and at present the world is illuminated by the seventh sun.⁵⁴

Why is it that in so many of the ancient traditions, the word "sun" is substituted for the word "epoch"? Velikovsky asks,

Did the reason for the substitution of the word "sun" for "epoch" by the peoples of both

hemispheres lie in the changed appearance of the luminary . . . ^{p55}

Velikovsky, of course, cites these legends to substantiate a different thesis from that of the collapse of a pre-flood vapor canopy. However, just such a "banishment" of the "water heaven" would precipitate the described visual phenomena. This would explain the sudden burst of sun worship found all over the ancient Near East not long after the time (on Biblical reckoning) that Noah got out of the ark. Within 150 years of that time, the entire human race was immersed in idolatry once again (cf. the Tower of Babel); and thus it is not surprising that the pattern described in Romans 1 would have led to worship of the sun. Given the supposed "personal" nature of the sun, it would have been natural for them to have viewed "him" as a victor in a celestial battle.

The Worship of the Stars

It is of interest that the ancient Near East was involved not only in sun worship, but also star worship, or astrology. This form of idolatry has frequently been associated with the ziggurats, or "temple towers" constructed in and around the ancient city of Babylon. The next historical event mentioned in Genesis after the flood was the incident at Babel (ancient Babylon). While the essence of that rebellion was clearly the pride of man and his desire to be independent of the Creator, its association with the ziggurat (Tower of Babel) suggests that astrology may have been the particular form of idolatry that was judged, at least in part.

There seems to be general agreement that the actual remains of the biblical Tower of Babel have been uncovered. The Tower was located in a temple complex known as E-sag-ila, "The house whose head is raised up," alongside of many shrines of the gods, the ancient Tower of Babel pointed toward the heavens. It was called E-temen-an-ki, or "The house of the foundation of heaven and earth."⁵⁶ This house had seven stories, and the top story was the residence of the god, Marduk. Cassuto says,

There can be no doubt that the Biblical story refers specifically to the city of Babylon and the ziggurat Etemenanki therein . . . ⁵⁷

This ninety-foot tower, the house of Marduk, was a center for astrological worship. The Babylonians conceptualized the gods as stars and constellations.⁵⁸ The erection of the Tower of Babel is specifically referred to in the *Enuma Elish*.

They raised up the head of Esagila on high level with the Apsu.

After they had built the lofty stagetower of the Apsu.

They established an abode for Marduk, Enlil, and Ea.⁵⁹

The above reports the building of the temple tower made in celestial Babylon. Marduk then builds one for himself on earth below that is patterned after the heavenly model.

A likeness of what he made in heaven

Let him make on earth.⁶⁰

The stars had great significance to the astrologically minded Babylonians. Their connection with the Zodiac and with Marduk was well known.

He created stations for the great gods;

The stars their likenesses, the signs of the zodiac he set up.⁶¹

Here's Marduk's creation of the pathways of the gods (the stations or points of the zodiac) is described. It was Marduk who established the Zodiac. The "likenesses" of the gods are the constellations, the signs of the zodiac. From this it may be concluded that in the temple of Marduk, E-temen-an-ki (the Biblical Tower of Babel) the zodiac and star worship had a prominent place.

The primary purpose of the Tower seems to be a house for the god. By using the stairway, the deity could descend to the lower level of men. By housing Marduk there in Babylon, communication between heaven and earth was assured,⁶² i.e., between the gods (stars) and men. In fact, at Larsor, the tower there is even named, "House of the link between heaven and earth."⁶³ While it is debatable that the purpose of the Tower was related to observation of heavenly bodies,⁶⁴ there is some evidence that this may have been a secondary function.⁶⁵

It is clear, then that the Biblical Tower of Babel served as a center for astrology and star worship. It was in that Tower that post-flood man's prideful rejection of the true God was epitomized in his unity around the worship of the stars instead of fear of the Lord.

Why was it that within 150 years of the flood the worship of the stars had already become, virtually, a one-world religion? Saggs suggests,

There is the theoretical consideration that the idea can only have arisen in a milieu where celestial bodies were regarded as divinities affecting the life of mankind . . . ⁶⁶

Much of the religion of the ancient Near East was devoted to getting the stars, the moon, and the sun, on the side of the worshipper by means of magic. They concluded that the stars affect conditions on earth. Why did they draw this conclusion? Could it be that after the greatest flood and cataclysmic destruction that mankind ever knew, over 2000 new stars appeared in the heavens? Like the victorious sun, the stars (i.e., the present gods) were victorious over the forces of chaos and restored order to a shattered planet, so people reasoned. Surely, they must control the destinies of men!

Whether or not this explains the origin of astrology is, of course, debatable. What is clear, however, is that the first recorded general event after the flood in the Bible is the rebellion at the Tower of Babel. There is no mention of astrology or sun worship prior to the flood. Yet suddenly, men are worshiping the stars. Why? The changed appearance of the post-diluvian heavens may suggest the answer.

The Apostle Paul clearly explained how the true story related by the sons of Noah became perverted into the worship of idols, or the stars.

For even though they knew God, they did not honor Him as God, or give thanks; . . . (Romans 1:21)

In other words, mankind after the flood knew all about the true God. From Noah's sons they learned that the Deluge had been an act of judgement.

... but they became futile in their speculations, and their foolish heart was darkened. Professing to be wise, they became fools and exchanged the glory of the incorruptible God for an image in the form of corruptible man, and of birds and four-footed animals and crawling creatures (Rom. 1:21-23).

Instead of seeing the Deluge as an evident warning that God deals with justice in the affairs of men, professing themselves to be wise, they concluded that the post-flood appearance of the stars (which they took to be victorious gods) demonstrated that the stars rule the earth and not Yahweh of the Hebrews. Thus, they worshipped "images", which may originally have been not statues but Orion, the Great Bear, Pegasus, Aquarius, Virgo, Leo, and other constellations which were in the likeness of their gods.

References

- ¹Patten, Donald W., 1970. The pre-flood greenhouse effect, in A Symposium on Creation II, ed. Donald Patten. Baker book House, Grand Rapids, Michigan. P. 24. See also Kofahl, Robert E., 1977. Could the flood water have come from a canopy or extraterrestrial source? *Creation Research Society Quarterly* 13(4):202-206.
- ²Udd, Stanley, 1974. The early atmosphere. Th.M. Thesis, Grace Theological Seminary, Winona Lake, Indiana. p.65.
- ³Kruse, W., and W. Dieckuoss, 1957. The stars, University of Michigan Press, Ann Arbor, Michigan p.61.
- ⁴Valley, Shea L. (ed.) 1965. Handbook of geophysics and space environments. Office of Aerospace Research, Air Force Research Laboratories, Cambridge, Mass. pp. 21-29.
- ⁵Payne-Gaposchkin, Cecilia, 1954. Introduction to astronomy. Prentice-Hall, Englewood Cliffs, New Jersey. p. 268.
- ⁶Kruse and Dieckuoss, *op. cit.*, p. 76.
- ⁷Valley, *op. cit.*, pp. 21-29.
- ⁸*Ibid.*
- ⁹Olcott, William Tyler, and Edmund W. Putnam, 1936. Field book of the skies. Third edition. B.P. Putnam's Sons, New York. P. 498.
- ¹⁰Kruse and Kidckuoss, *op. cit.*, p. 62.
- ¹¹Personal communication from Dale Pleticha, Astrophysics Dept., Cornell University, 23 February 1976. See also the Encyclopaedic Dictionary of Physics, J. Thewlis gen. ed., Pergamon Press, New York, 1962. Vol 2, p. 2. There the figure 2.4×10^{-10} lm/cm for the incident intensity of a 0 magnitude star is given.
- ¹²Shortley, George, and Dudley Williams, 1961. Elements of Physics, third edition. Prentice-Hall, Englewood Cliffs, New Jersey. Vol. 2 p. 505.
- ¹³Computing from (1) gives an exact result of 4.875×10^{10} times brighter.
- ¹⁴Shortley and Williams, *op. cit.*, vol. 2 p. 504.
- ¹⁵See the Handbook of Chemistry and Physics, 56th edition, 1975-1976, p. E-205. Since the figures are approximate, the ratios of luminances will not always agree exactly with the visual magnitudes.
- ¹⁶Olcott and Putnam, *op. cit.* p. 496.
- ¹⁷Shortley and Williams, *op. cit.*, vol. 2 p. 493.
- ¹⁸Payne-Gaposchkin, *op. cit.* p. 262.
- ¹⁹*Ibid.* p. 278.
- ²⁰Valley, *op. cit.* p. 7-6.
- ²¹Byers, Horace Robert, 1974. General meteorology, fourth edition. McGraw-Hill, New York. p. 32.
- ²²*Ibid.* p. 28.
- ²³*Ibid.* p. 29.
- ²⁴*Ibid.* p. 28.
- ²⁵*Ibid.*
- ²⁶Extrapolated from tables in the Handbook of geophysics and space environments, pp. 7-21-27.
- ²⁷Personal communication from Mr. Baumgartner, May 1976.
- ²⁸The Handbook of Chemistry and Physics, 55th edition, 1974-1975, p. E-223, shows n varying from 1.000249 to 1.000259.
- ²⁹Byers, *op. cit.* pp. 342-343.
- ³⁰Reference 26.
- ³¹Byers, *op. cit.* p. 28.
- ³²Leob, Leonard B., 1961. The kinetic theory of gases. Dover, New York. p. 643.
- ³³Handbook of Chemistry and Physics, p. E-222.
- ³⁴See the discussion under "Visibility at Various Zenith Angles".
- ³⁵The optical depth of the canopy for total extinction would be given by the calculated total depth for total extinction minus the optical depth of the present atmosphere with allowance for aerosols. The figures are : $4.605 - (0.346 + 0.115) = 4.144$. From (5), $\omega = KL/1.269 \times 10^{-4} = 4.144/1.269 \times 10^{-4} = 32,656 \text{ cm} = 1.071 \text{ feet}$. This refers to zero zenith angle.
- ³⁶Personal communication from Dr. Frank Clark, Professor of Astronomy, University of Kentucky, February 1976.
- ³⁷Olcott and Putnam, *op. cit.* p. 498.
- ³⁸The 0.266 is the difference between KL_e and KL_p , viz. $0.616 - 0.350 = 0.266$.
- ³⁹See the discussion under "Visibility at Various Zenith Angles".
- ⁴⁰While 255 stars were potentially visible at one time under the canopy, here the 46 fifth magnitude ones are eliminated, leaving 209, or say 210.
- ⁴¹See the discussion under "Visibility in the Pre-Flood Heavens".
- ⁴²Figures for A_e and A_p are calculated from the extinction zenith angles θ_{ext} , in Table 4, as explained.
- ⁴³Guirand, Felix, 1963. Greek mythology. (Translated by Delano Ames) Paul Hamlyn Ltd., London. p. 84.
- ⁴⁴Ferguson, John, 1970. The religions of the Roman Empire. Cornell University Press. p. 47. See also the Brahmanic Charma, India, in the New Larousse Encyclopedia of Mythology, p. 326.
- ⁴⁵Ferguson, *op. cit.*, p. 44.
- ⁴⁶*Ibid.*
- ⁴⁷*Ibid.*
- ⁴⁸Velikovsky, Immanuel, 1967. Worlds in collision. Doubleday and Co. Inc., New York, (Laurel Edition) pp. 50-52.
- ⁴⁹Brasseur, *Sources de l'histoire du Mexique*, p. 25. Cited by Velikovsky, *loc. cit.*
- ⁵⁰Alexander, Latin American mythology, p. 91. Cited by Velikovsky *loc. cit.*
- ⁵¹Humboldt, Researches, II, 16. Cited by Velikovsky, *loc. cit.*
- ⁵²Warren, Buddhism in translations, p. 322. Cited by Velikovsky, *loc. cit.*
- ⁵³Velikovsky, *loc. cit.*
- ⁵⁴Dixon, Ronald B., 1964. Oceanic mythology, in The mythology of all races. Cooper Square Publishers, Inc., New York. Vol. 9 p. 178.
- ⁵⁵Velikovsky, *op. cit.*, p. 52.
- ⁵⁶Cassuto, U., 1961. A commentary on the Book of Genesis. The Magnes Press, The Hebrew University, Jerusalem. Vol. 2 p. 227.
- ⁵⁷*Ibid.* p. 229.
- ⁵⁸Hasel, Gerhard F., 1974. The polemic nature of the Genesis cosmology. *The Evangelical Quarterly* 46(2):100.
- ⁵⁹Heidel, Alexander, 1963, (trans.) *Enuma Elish*, in The Babylonian Genesis. The University of Chicago Press. Tablet VI, line 672. (p. 48).
- ⁶⁰*Ibid.* Tablet VI. line 112, (p. 50).
- ⁶¹*Ibid.* Tablet V, lines 1 and 2. (p. 44).
- ⁶²Parrot, Andre, 1955. The Tower of Babel. S.C.M. Press, London. p. 64.
- ⁶³*Ibid.*
- ⁶⁴*Ibid.* p. 58.
- ⁶⁵Saggs, H.W.F., 1962. The greatness that was Babylon. Mentor Books, New York, The New American Library. p. 338.
- ⁶⁶*Ibid.*, p. 460.

IM-WHO?-TEP

JAMES E. STRICKLING*

Received 31 May 1977

Evidence is presented to show that the sage Imhotep, of Egyptian monuments and literature, may be the same person as Joseph of the Bible.

Aside from familiar Biblical characters, the first figure of nonroyal blood "to stand out from the mists of antiquity" as an individual personality was an Egyptian sage by the name of Imhotep (YMHTP). "The Egyptians ascribed the invention of the art of building with stone to Imhotep, visier and architect of King Zoser, who reigned about fifty years before the building of the Great Pyramid. And in fact there has not been found any important building made only of stone blocks which dates before the reign of Zoser. The Egyptians described Imhotep as a sort of Leonardo da Vinci of Egypt, mathematician, scientist, engineer, and architect."¹

"During Zoser's reign, as recent discoveries have revealed, the stone column seems to have been employed for the first time in the history of architecture."² Imhotep's name signifies 'He who comes in peace'. Imhotep was by far the most celebrated among those ancient sages who were admired by their contemporaries during their lifetime and after their death finally worshipped as equals of the gods.

By the time of the New Kingdom Imhotep was already very famous. he was reputed to have written the 'Book of Temple Foundations', and under the Pharaohs of Sais his popularity increased from year to year. Some time later, during the Persian domination, it was claimed that Imhotep was born not of human parents but of Ptah himself . . . He is represented with shaven head like a priest, without the divine beard, crown or sceptre and dressed simply as a man.

"He was patron of scribes and the protector of all who, like himself, were occupied with the sciences and occult arts. He became the patron of doctors. Then—for ordinary people who celebrated his miraculous cures—he became the god or, more accurately, the demi-god of medicine. He was thus identified by the Greeks with Asclepius. Towards the end of paganism Imhotep seems even to have relegated his father Ptah to second rank, and to have become the most venerated god in Memphis."³

He had many titles. "In the ceremonial court of the Step Pyramid stood the pedestal of a statue with has vanished and which bears, after the name of Imhotep, the citation: 'Chancellor of the King of Lower Egypt, First after the King of Upper Egypt, Administrator of the great Palace, Hereditary Nobleman, High Priest of Heliopolis, Builder, Sculptor and Maker of Vases in Chief'. "⁴

Imhotep Was a Real Person

Up to recently there were Egyptologists who insisted that Imhotep was a legendary figure. One argument was that there is no other instance in Egyptian history

of an ordinary person having been deified. It is only in the last few years that it has been definitely accepted that Imhotep was a real person, since it has been possible to gather some specific details of information even about his physical appearance. King Zoser covered him with all sorts of honors, although he was a man of humble origin.

"But, even though it is now granted that the Egyptians were not living in dreams when they idolized the genius of Imhotep, Egyptologists have failed to investigate what were the scientific achievements of Imhotep other than that he was the first one to have designed a pyramid, the step pyramid of Saqqara. This pyramid is just one element in an enormous group of buildings which is know as Zoser's Complex. This group of buildings is not only so extensive but also so elaborate that nothing of the sort was produced again in the long history of Egypt.

"In spite of this, not one Egyptologist has tried to investigate this monument and other constructions directed by Imhotep in terms of what the Egyptians said were his talents. Scholars are willing to grant that a man with the name of Imhotep walked on the land in Egypt, but they are not yet willing to grant that Egypt could have produced a mind like his."⁵ "Archaeologists have been searching for his tomb for a long time, but so far in vain."⁶

"An inscription on the island of Siheil is of the Ptolemaic period but describes a seven-year famine that occurred during the reign of Djoser (Zoser) . . . The king complains that 'The Nile has not risen for seven years and that there is a scarcity of corn. There are no vegetables and no food of any kind, every man is stealing from his neighbour. Counsellors have no advice to give and when the granaries are opened nothing but air issues from them.' The king in great distress asks the chief lector-priest Imhotep: 'In what place does the Nile rise? What god dwells there, that I may enlist his help?' . . ." Imhotep replies ". . . that the god of the place is Khnum, who allots the land of Egypt to each god and controls the grain, the birds, the fish and everything on which they live."

"Some days later, King Djoser had a dream in which the great god Khnum appears. The king does everything he can to render the god favourable, but Khnum replies: 'I am Khnum your maker; with my arms I protect you and help you. You should be building temples and restoring my statues and those buildings that have fallen into ruin; I am Nun who has existed form earliest times; I am the Nile flood who runs at will; my sanctuary has two gates from which I let out the water for the flood.' Khnum continues that he will make the flood rise for the king, that want will cease and the granaries be filled."⁷

*Mr. James E. Strickling lives at 3309 DeKalb Lane, Norcross, Georgia 30093.

Similarities to Joseph

The Siheil inscription immediately brings to mind the seven-year famine during the time of Joseph (YSF). The associated elements of this account strike an amazing parallel to the Biblical account. The Egyptian inscription was made some 1500 years after the fact, so some garbling of the events and their sequence is to be expected. Nevertheless, in this account the role of Imhotep is clearly seen to be equivalent to that of Joseph—and this one account is not the entire extent of the correlation. For instance:

Imhotep was vizier to Pharaoh—the second over all Egypt, as was Joseph. Gen.41:4.

Imhotep was familiar with the occult. Joseph was an interpreter of dreams. Gen.41:15.

Imhotep and Joseph both witnessed seven-year famines. Gen.41:54.

Both were consulted in this regard. Gen.41:38-39.

Zoser and the Pharaoh over Joseph both had supernatural dreams related to the famine. Gen.41:25 and 29-30.

Imhotep was an administrative genius. Joseph was given complete charge of preparing for the coming famine. Gen.41:48-49.

Imhotep was an architect—he designed the first pyramid. Joseph might also be considered an architect, at least to the extent of preparing granaries. But there may be more. Joseph may have started building projects to keep the people occupied when agriculture was useless or impossible. It is commonly believed that much of the work on the great projects in Egypt was done at the times of the year when it was impossible to work at agriculture. Mendelssohn maintains that the construction of pyramids was a way of maintaining the economy.⁸ If this is so, subsequent administrators may have received the idea from Joseph.

Imhotep commanded the respect and admiration of his contemporaries, as did Joseph. Gen.41:33 and 37.

Imhotep was not a native Egyptian, according to scholarly opinion. Neither was Joseph.

Imhotep's tomb, or his remains, have never been found. "And Moses took the bones of Joseph with him: for he had straitly sworn the children of Israel, saying, God will surely visit you; and ye shall carry up my bones away hence with you." Exodus 13:19.

Supposed Discrepancies in Time May Not be Real

The greatest barrier to a tentative identification of Imhotep as Joseph would seem to be the great time span separating them by the accepted chronology, which dates Imhotep c.2800 B.C. whereas Joseph lived some nine or ten centuries later. Courville⁹ has identified Joseph as one Mentuhotep, vizier to Sesostri I—presently dated some 700 years after Zoser/Imhotep. I.E.S. Ed-

wards¹⁰ calls this vizier by the same name as the vizier to Zoser; i.e., Imhotep.

Courville makes a clear distinction between Imhotep and Mentuhotep by distinguishing between Zoser and Sesostri I. However, with the exception of a reference to the first pyramid, the description accorded to Mentuhotep by Courville is virtually the same as that quoted in this work for Imhotep.

The existence of two such similarly described noteworthy individuals of antiquity in such similar circumstances in the same cultural setting strains the bounds of coincidence. It appears that one man has been erroneously credited with two lifetimes; this resulting, in part, from the insertion of an apparently nonexistent 700 year time span into Egyptian chronology. Velikovsky¹¹ has already shown that an error approaching this magnitude exists in later Egyptian chronology, as it is commonly reckoned. Moreover, just as here, the error arises at least partly from cases in which one person or incident is counted twice.

References

- ¹Tompkins, Peter, 1971. *Secrets of the Great Pyramid*, Harper and Row, New York.
- ²1969. *New Larousse encyclopedia of mythology*. The Hamlyn Publishing Group, London.
- ³*Ibid.*
- ⁴Mendelssohn, Kurt, 1974. *The riddle of the pyramids*. Praeger Publishers, New York.
- ⁵Tompkins, *op. cit.*
- ⁶Mendelssohn, *op. cit.*
- ⁷MacQuitty, William 1976. *Island of Isis*. Charles Scribner's Sons, New York.
- ⁸Mendelssohn, *op. cit.*
- ⁹Courville, D.A., 1971. *The Exodus problem and its ramifications*. Challenge Books, Loma Linda, California. In his revised chronology Courville dates the reign of Sesostri I after c. 1700 B.C. as opposed to the commonly stated dates of 1971-1928 B.C. In his chronology Courville takes the duration of the sojourn of Israel in Egypt as 215 years, not 430.
- ¹⁰Edwards, I.E.S., 1947. *The pyramids of Egypt*. The Viking Press, New York.
- ¹¹Velikovsky, Immanuel, 1952. *Ages in chaos*, Doubleday, Garden City, New York.

QUOTABLE QUOTE

"The same powers, therefore, which at present, govern the material universe, and conduct its various motions, are very different from those, which were necessary, to have produced it from nothing, or to have disposed it in the admirable form, in which it now proceeds."

Maclaurin's *Account of Newton's Philosophy*, eighteenth century, third edition, p. 407. Quoted by Paley, William about 1800, *Natural Theology*, p. 303.

Paley's book has been reprinted by St. Thomas' Press, Houston, Texas.

PILLARS, POLYSTRATE FORMATIONS, AND POTHOLES

DOUGLAS E. COX*

Received 25 August, 1977, revised from June 1975

Three kinds of column-like formation are discussed. There are columns of unconsolidated material, often differing from their surroundings, embedded in sand or drift. There are pillars of consolidated material, often sandstone, embedded in rock. And there are free-standing solid pillars.

It is proposed that all of these kinds of pillars, and also potholes, are to be ascribed to one cause: disintegration following upon the release of pressure as the material was raised out of the water at the end of the Noachian Flood. It is hard to believe that sedimentary processes could have caused these formations; hence the cross stratification, often found with them, can not be an effect of sedimentation.

Some reasons are suggested why the study of these formations may be especially worth while to a Creationist.

Introduction

Strange polystrate pillars occur in sandstone and in drift in many places. The writer has examined many pillars in gravel and sand in the region of Waterloo County and other places in Southern Ontario. Pillars in the Potsdam sandstone, near Kingston, Ontario, were investigated by the writer and H. L. Armstrong.

These pillars, also called "pipes" or "pots", transect the pattern of cross stratification. They are anomalous and difficult to explain in terms of sedimentary deposition.

Polystrate fossils such as trees, vertically embedded in sediments, have been cited as evidence that rock strata accumulated rapidly.¹ This explanation cannot account for unconsolidated pillars; but they, too, may have been formed rapidly.

Causes for vertical pillars in cross stratified sandstone and drift are difficult to find in nature today, but past causes may have been different from those existing now.

One such cause is a possible disintegration process, due to rapid release of former high pressure. Uplift of the continents from the depths of the flood waters would be accompanied by a decrease of pressure on rocks.

In a previous article, it was suggested that the pattern of cross stratification may be an effect of a shattering or disintegration process.² Some features of cross stratified formations support this interpretation.

The presence of polystrate pillars in cross stratified sandstone and drift is evidence that cross stratification is not a sedimentary phenomenon, but may result from a pressure-related disintegration process. Such a process can account for many similarities between the pillars in sandstone and those in the drift. Also, from this point of view, a relationship between pillars and the contents of potholes would be expected.

Drift Pillars

Over a period of several years, the writer observed a group of pillars in cross stratified drift gravel exposed in the sides of a gravel pit at Blair, a few miles south of Kitchener, Ontario. See Figure 1. The gravel pit is operated by Forwell Ltd., of Kitchener. In the course of excavations over the past few years, removal of the coarse gravel has revealed many pillars. The way in which this happens is shown in Figure 2.

They were distinguished from the enclosing gravel in various ways. Many were stained dark brown or black, and appeared as finger-like extensions of the soil profile into the gravel below. This can be seen in Figure 3. Some of these contained a light coloured interior, thus exhibiting a concentric structure.

The pillars were cylindrical in shape, with tapering or rounded bottoms. All were in the uppermost part of the drift, beginning within or just below the soil. The pillars extended downwards to varying depths.

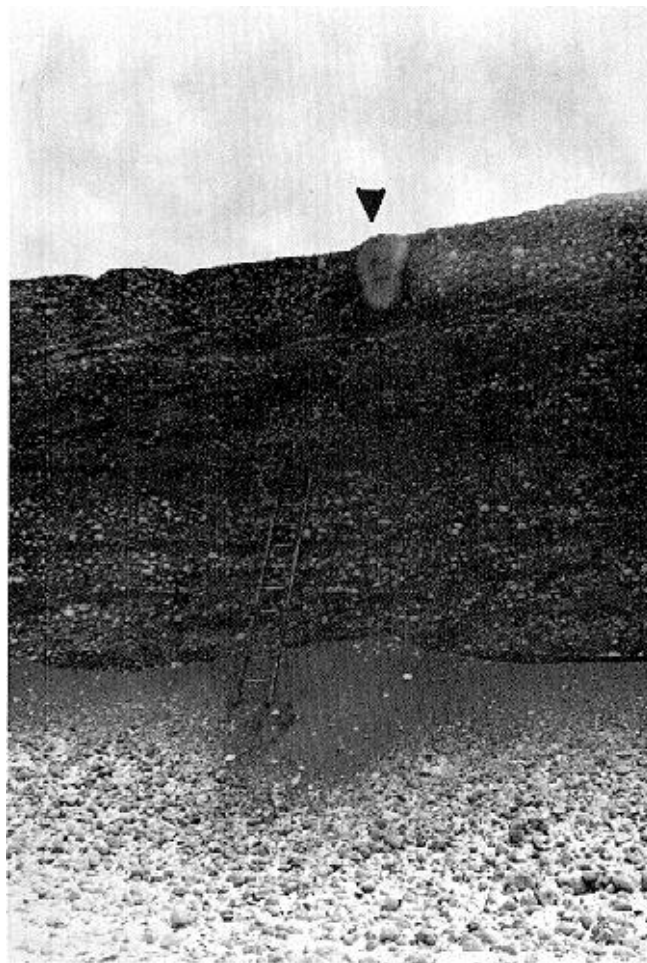


Figure 1. This shows a pillar intact, in the side of a gravel pit, the Blair pit operated by Forwell Ltd. The top of the pillar is indicated by the arrow head. The cylindrical shape of the pillar, and the difference between its composition and that of the surrounding gravel, can readily be seen.

*Mr. Douglas E. Cox's address is P. O. Box 18, Petersburg, Ontario, Canada.



Figure 2 This is a picture of the author excavating a pillar, (indicated by the arrow head) the first one which he investigated, originally about six years ago. Initially the pillar reached to the top of the gravel pit; upon excavation it was found to extend about 10 feet vertically. The dip in the stratification of the gravel around this pillar is marked; this bending downward indicates that the pillar was present before the pattern of cross stratification was formed.

At this site, pillars one to two ft in diameter, and up to 10 ft in vertical extent were common. Don Metzloff, foreman at the site, also observed the pillars in the course of excavations. He reported that the pillars were mostly clustered together in one section of the pit. The largest pillars reached 20 ft vertically and were 3 to 4 ft in diameter. These were described by Metzloff as consisting of "dirty coloured, fine sand, just like ground."

Some of the pillars consisted of sand and clay which transected coarse gravel, and others were composed of gravel, although different in appearance from that of the enclosing drift. More clay was present in some pillars, which made them more compact and resistant to weathering than the enclosing gravel.

Concentric structures were present in many pillars. In one pillar exposed in cross section, there was distinct colour banding, and an outer lining of pebbles formed the perimeter of the pillar. See Figure 4. Another pillar was lined by sand and clay, which formed a smooth cylindrical margin about the pillar.

The pattern of cross stratification in the gravel near some pillars was bent downwards.

Several features of the pillars resemble features of other structures described in the geologic literature. A recent report by Conant et al. describes "pots" in gravels in Maryland and Virginia, which were somewhat different in shape to the pillars in the Blair gravel pit, but otherwise seemed quite similar.³

The pots were more spherical or bulbous in shape than the pillars in the Blair gravel pit. The pots also exhibited concentric structure, and the stratification of the surrounding gravel was bent downwards around some of the pots.

The pots were about 7 ft in depth and about the same width, though some were much larger. All were at the top of the gravel. One pot was wrapped in a layer of white clay 1-2 in. thick. Describing the contents of the pots, the authors say:

The filling of the pots is chiefly a clayey silt containing a few percent to perhaps 40 percent of ad-



Figure 3. This shows a typical pillar found in the Blair gravel pit, indicated by the arrow heads. The pillar is a mass of black gravel; it is not a hollow, as might appear. Only a part of the pillar remains, the top part having been eroded away. The stratification of the gravel bends down ward around the pillar, showing that the pillar was already present when the pattern of cross stratification was formed.

mixed sand and gravel. The silt is generally medium gray and mostly structureless, but in some pots it is faintly or distinctly stratified parallel with the margins. In some pots, flat pebbles also tend to be aligned parallel with the margins. The uppermost 1 ft. of the filling is commonly more gravelly.⁴ "Till clumps" similar in shape to the pots in Maryland and Virginia were reported by Mather et al. from Cape Cod, Massachusetts.⁵

The mechanism favoured by Conant et al. for the formation of the pots involved seasonal frost action during a Glacial Period; but such a mechanism would seem unworkable in the case of the pillars at the Blair gravel pit, which are much narrower and deeper than the Maryland pots. Yet there are similarities which suggest a common origin for all these peculiar structures.

A Pillar with Cross Stratified Contents

Some pillars in the drift seem clearly to indicate that the pattern of cross stratification cannot be of sedimentary origin. The drift in Southern Ontario is explained in terms of the Glacial Theory either as till, thought to



Figure 4. This shows a cross section, looking up, of one of the pillars of which the bottom part has fallen away. The concentric banding can be seen, also the outer margin lined by pebbles, or holes where the pebbles have fallen out. (Indicated by arrow heads.) The section is about 18 inches in diameter.

be a direct deposit of the ice-sheets, or *outwash*, which is considered to be glacial debris which has been transported in streams flowing from the melting ice-sheets, and deposited in rapid currents. Till is unstratified while outwash exhibits the pattern of cross stratification.

A pillar was found in sand near Campbellville, Ontario, with internally cross stratified contents. The pillar was enclosed by fine, cross stratified sand, and consisted of coarse sand and pebbles, with nearly horizontal strata. No pebbles were present in the enclosing sand. Only a part of this pillar was intact, about 5 feet below the original level of the gravel pit. The diameter of the pillar was about 1 ft.

The perimeter of this pillar was well defined, and consisted of a thin film of clay enclosing the structure. It is hard to imagine how such a structure could have formed in an environment of rapidly flowing currents, as assumed in the glacial explanation for cross stratified drift.

In particular, the cross stratification of the contents of the pillar could hardly have been caused by currents within the structure. Since the pillar was unconsolidated, and was enclosed by unconsolidated sand, it would likely have been washed away by currents of outwash streams. Another, non-sedimentary explanation is indeed called for.

Some geologists have proposed rather special circumstances to explain pillars in drift. A pillar of sand, with concentric layers, was found in coarse and medium Quaternary sand at St. Jerome, north of Montreal, Quebec, by Dionne.⁶

Height of the pillar was 152.5 cm, and diameter was 34 cm at the top and 24 cm at the base. The sand comprising the pillar was fine at the center, and the pillar transected cross stratified beds.

It was proposed that a whirlpool eroded a deep cylindrical hole in the unconsolidated sand, and refilled the hole immediately afterwards, forming a pillar.

While some such mechanisms may seem plausible for individual structures, this could hardly apply to a large group of pillars in drift; and as more observations of

these peculiar structures are reported the improbability of isolated polygenetic causes for the pillars is increased.

Can Freezing Explain Pillars?

Explanations for pillars in drift that involve frost effects fail to account for many similarities between the drift pillars and those in sandstone, to be described later.

As previously noted, the deep narrow shape of many pillars does not seem to support a theory of frost action. Further evidence against this theory was found in a very striking example of a pillar, in which many of the boulders seemed to have been subjected to intense heat.

This pillar was located in a gravel pit about 5 miles east of Drayton, Ontario. It was bulbous, about 10 ft in diameter and about the same depth. The pillar was enclosed in beds of fine cross stratified sand.

The perimeter of the pillar was lined with large boulders up to 8 inches in diameter. These were cemented together by white calcite, like a mortar.

The boulders in the outer wall encircling the pillar seemed to have been baked or heated. Many were coated with a thick glaze of glass, and many were cracked.

The peculiar structure was also examined by Dr. Mat Hill of the University of Waterloo anthropology department, since it was thought the pillar may have been man-made.

The sand adjacent to the pillar, and the soil above seemed undisturbed, however; and human manufacture seemed unlikely.

A pillar consisting of boulders could hardly have been derived from the enclosing sand by any Uniformitarian mechanism such as frost action. The presence of such a pillar in sand is also anomalous if the sand is explained in terms of glaciofluvial deposition.

Formation of the Pillars

The idea of a non-Uniformitarian process of rock disintegration, causing the pattern of cross stratification, would lead to a simple explanation for the pillars.

Many Creationists believe the major part of the sedimentary rocks which contain fossils, that occur in the earth's crust, was formed during the Noachian Deluge. Uplift of the continents at the end of the flood would be accompanied by a release of pressure. This would provide the environment for a process of rock disintegration.

Disintegration would likely be limited to consolidated rocks, and it is believed that sediments formed in the Deluge consolidated as they were elevated from the depths. Lithification occurred as diffused cementing agents crystallized at the lower pressures.

As pressure on the topmost rocks decreased, due to lower depths of water and erosion of overlying sediments, water diffused within rocks could not remain diffused at the lower pressure, and tended to be expelled from the rock. Near the surface of the rock, expansion of the occluded water caused shattering of successive thin layers.

Concretions developed in rocks due to changes in the diffusion equilibria, becoming pebbles and boulders as the shattering process changed the rock about them into sand and clay. It is proposed that the pattern of cross stratification was formed by this mechanism of disintegration.⁷

In many places the disintegration began in a small area of the rock surface, and penetrated vertically downwards, resulting in a cavity filled with the disintegration product. In effect, a pothole was formed.

Where the surrounding rock was also subsequently disintegrated, this pothole (with its contents) became a pillar within the cross stratified sand and gravel. This mechanism for the formation of the pillars in the drift implies a relationship exists between the pillars and the contents of potholes, before excavation.

Concentric structure in many pillars may be explained by lateral enlargement of the pillars during the pothole stage. Disintegration of the rock walls would account for linings of pebbles, orientation of the pebbles parallel to the margins, and lining of the margins by clay which has been reported in some pillars.

Discolouration of the contents of the pillars, which also produces a concentric effect, probably occurred during the pothole stage. Diffusion of volatiles, calcite, iron oxide, and other minerals from the rock enclosing the pillar towards the low-pressure surface would cause concentric banding. Precipitation of these minerals at the margin of the pillars occurred due to changes in diffusion equilibria during the lowering of pressure.

Down warping or bending of the pattern of cross stratification of the gravel around some pillars indicates the pillars were present when the pattern of cross stratification was formed. This bending may indicate more rapid disintegration of the rock near some pillars.

Pillars Compared with Potholes

Potholes are believed, in the Uniformitarian view, to have been formed by erosion such as the action of streams; but it is difficult to explain all the features of potholes in this way. Several problems with the Uniformitarian explanations for potholes were outlined in another article.⁸

Potholes which are exposed by streams, or other agents such as wave action along the shores of lakes or coasts, may have been present in rocks prior to the initiation of present conditions.

Before exposure, potholes are usually filled with drift, consisting of sand, clay, and gravel. In some rocks potholes may contain sandstone.

The mechanism outlined for the formation of drift pillars also explains potholes, and a resemblance between the pillars and the contents of potholes would support the proposed theory.

The pillars in drift resemble potholes in shape, many are bulbous like potholes, and the range of sizes is similar. Like potholes, the pillars are rounded at the base, and penetrate to varying depths.

In distribution patterns the pillars resemble potholes, which may occur individually or in clusters. Observations by the writer on a remarkable cluster of pillars illustrates the similarity of the pillars to groups or clusters of potholes.

A group of pillars was exposed in a field adjacent to Pinebush and Balmoral Roads, Cambridge, Ontario, in the summer of 1976. The topsoil had been removed from the field prior to a construction project. Wind erosion of the sand revealed the tops of a large cluster of pillars, numbering about 100.

The pillars were reddish brown, and were enclosed by yellow-gray sand. The largest pillar was about 3 ft in diameter, and excavation of one of the pillars showed a vertical dimension of 4 ft. Some of the pillars in the cluster were connected, which is also a common feature of potholes. The pillars resembled "hoodoos", which are sometimes eroded from soft sandstone.

Dikes of white clay connected some pillars, possibly formed by deposition of calcite in cracks in the original rock before disintegration. The sand in some pillars was speckled, possibly due to disintegration of concretions.

The characteristics of the contents of potholes are rarely given much attention in the geologic literature. Some large potholes in Norway were excavated in 1874, and described by Brögger and Reusch.⁹

The largest kettle excavated was near Bäckhelagel, and the work occupied 3 men for 50 days. Careful records were kept of the position of the boulders found in the kettle. The depth was found to be 33½ ft, or 44 ft if measured from the highest side.

The larger rocks in the kettle formed layers at various levels, and the authors wrote, "The contents of this kettle, therefore, plainly showed a sort of stratification."¹⁰

Deep within the pothole two large boulders were found, which appeared to have a smaller hole begun in them. The small hole was at the centre of the kettle.

In the theory of disintegration causing potholes, the smaller hole may represent part of an initial pothole, which widened and deepened by further disintegration of the enclosing rock.

Indications of a concentric structure in the contents of a pothole were found by the writer in a large filled pothole at Rockwood, Ontario. Here the larger rocks seemed to be concentrated around the walls. This may also indicate widening of the pothole by disintegration.

Further studies of pothole contents are needed to confirm the presence of a concentric arrangement of the contents, and other points of resemblance between the pillars in drift and the contents of potholes.

The Park of Pillars

From the point of view of Uniformitarianism, a relationship is not readily perceived between the drift and cross stratified sandstone. But the theory of disintegration would require such a relationship.

Pillars or pipes are present in many sandstones, which show similarities to pillars in the drift. A well known example of pillars occurs in an outcrop of Potsdam sandstone on the property of Bill Hughes, R.R. 6 Kingston, Ontario. See Figure 5, and the front cover of this *Quarterly*.

Several vertical pillars are visible, the largest measuring 14 ft in diameter. Some exposed in the sides of a cliff, evidently the site of an old quarry, extend 20 ft vertically. This is shown in Figure 6.

Concentric bands occur within many of the pillars, and also in the rock enclosing them. This feature led

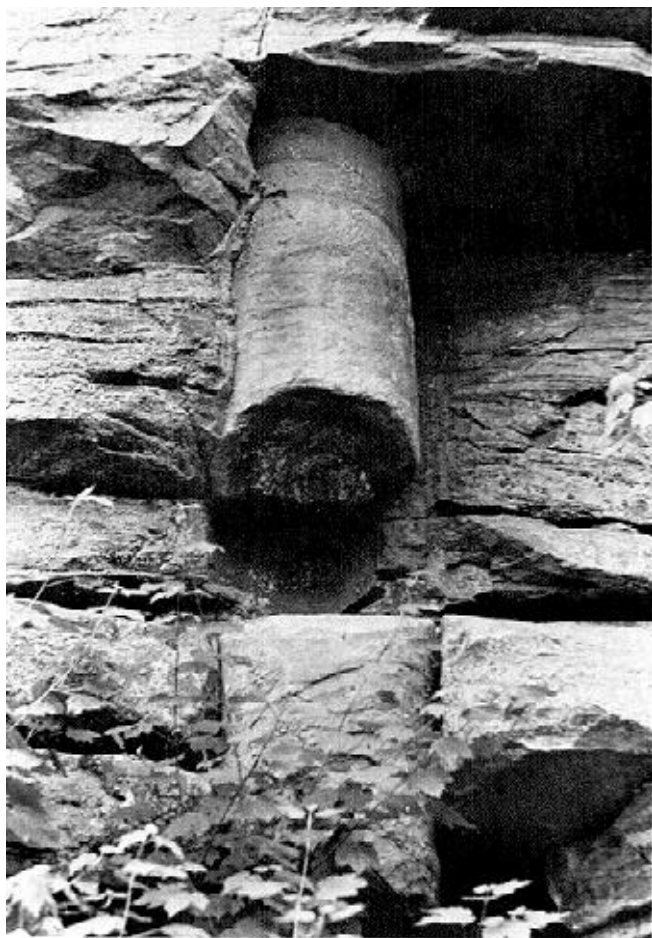


Figure 5. This shows one of the pillars at Hughes' farm. A section has broken out. Marks adjacent to the pillar wall, in the rock adjacent to the pillar, can be seen at the left.

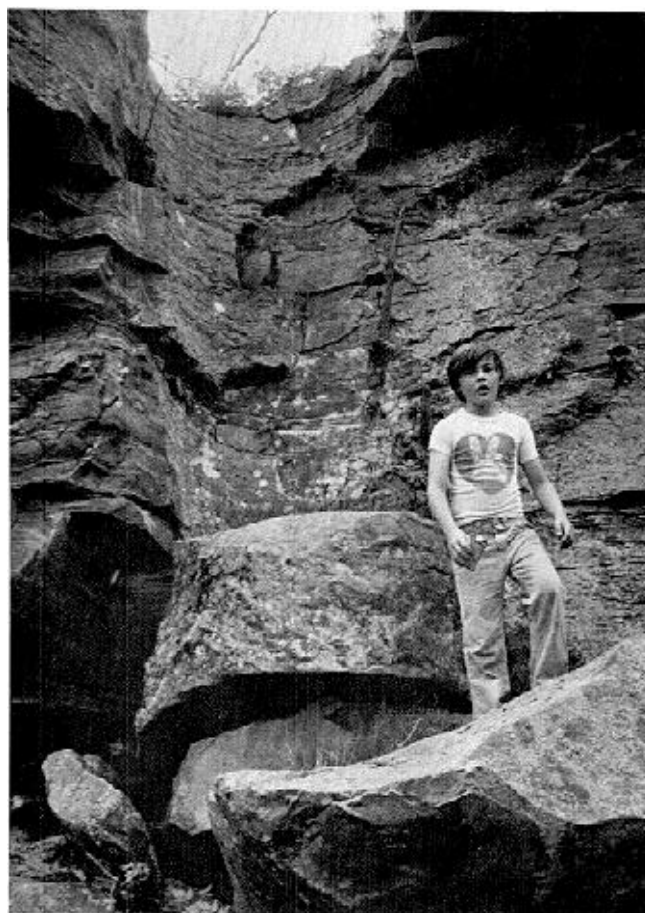


Figure 6. This is another pillar at Hughes' farm, a large one, much of which has fallen down. Gary Hughes is standing on broken pieces of the pillar. As can be seen, the place where the pillar once stood now resembles a partial pothole.

some to conclude the pillars were "fossil trees," and sections of the pillars were exhibited as such in shop windows in Kingston in 1888.¹¹ This feature can be seen in Figure 7.

Hughes now operates a quarry near the site of the pillars, and he told me a pothole was recently found during the excavations. It was filled with sand and small pebbles.

One of the explanations which has been offered for the pillars is that they are potholes filled with alluvial sediments.¹² It seems clear that they are not fossil trees, but, being polystrate, they may show as well as polystrate trees that the rock around them was formed quickly.

The pillars are described in an article by Hawley and Hart,¹³ and a thorough description is not attempted here. These authors proposed that the pillars were formed by springs rising through the strata while it was still unconsolidated, and referred to the pillars as "quicksands enclosed by concretions."

Similar pillars have been reported from other exposures of the Potsdam formation. Some occur across the Rideau Canal opposite the Hughes farm, others are present at Morton, Ontario, and at Redwood, New York.

The rock in which the pillars occur is a reddish sandstone with cross stratification. The rock may have been formed by alteration of the granite bedrock, in a process similar to disintegration. One indication of this is a gradual transition of the rock from granite to sandstone, within a few hundred yards from the site of the pillars.

The formation of the sandstone may have occurred in either of two ways. Disintegration of the granite may have formed cross stratified sand, which was cemented by silica and iron oxide, or the alteration may not have been a complete disintegration but more a recrystallization of granite, resulting in a pattern of cross stratification.

The pillars may have been formed in a manner similar to that described for the formation of pillars in drift. Vertical pillars were formed by disintegration in localized areas, and subsequently the surrounding rock was also altered. Concentric structures were formed in the pillars due to decreased pressure upon disintegration, and deposition of hematite at successive surfaces of the rock during disintegration.

Structures similar to those in the Potsdam sandstone near Kingston have been reported from cross bedded



Figure 7. This shows the bottom of one of the parts of pillars at Hughes' farm, the parts below that have broken away. Parts farther up have broken away also, so that the pillar is in a detached block of sandstone, and can be seen from beneath. The pillar is about 4 feet in diameter.

siltstone and conglomerate in the Bush Creek region of Eagle County, Colorado.¹⁴

These were up to 4 ft in length and 8 inches across. Some of the pillars interlocked, and some completely enclosed smaller ones. Concentric bands surrounded the pillars.

Another report described pillar-like structures up to 200 feet in height.¹⁵ These occur in the Laguna area, New Mexico, and are referred to by Schlee as "sandstone pipes." The pipes range from a few inches up to 150 feet in diameter. The pipes are grouped in clusters, and many have a concentric internal structure. Cross bedding was present within the pipes and in the enclosing sandstone.

Other similar structures have been reported in the St. Peter Sandstone of Arkansas, and in northern Arizona and Colorado.¹⁶

Dietrich described cylindrical pillars in the Potsdam sandstone at Redwood, New York, and noted that similar structures also occur at East Anglesey, England; near Brussels, Illinois; along the coast of Syria and Palestine; at Barnstaple Bay, Devonshire, England; and at Cañadón Hondo, Chubut, Argentina.¹⁷

In some regions the disintegration of the rock enclosing pillars may have been more complete than the disintegration which formed the pillar itself. In such cases a free-standing pillar may be formed by erosion of the loose sand.

Free-Standing Pillars

Free-standing pillars of sandstone were described by Simpson at Cañadón Hondo, Central Patagonia, and associated with the Potsdam pillars near Kingston.¹⁸ These pillars were exposed by erosion of the soft sandstone beds in which they were embedded. Most of the pillars were from 1 to 2 ft in diameter, and from 3 to 10 feet in height.

Many of the features of the pillars mentioned by Simpson have their counterpart in typical potholes. Some twin pillars were observed, some contained horizontal flutings on the sides, some tended to bulge in the

middle. The bases of some weathered pillars were undercut.

The pillars seem to be the antithesis of potholes, which may be explained in terms of the disintegration theory of cross stratification. The pillars originally formed by rock disintegration in small areas, and subsequently the enclosing rock also disintegrated more completely. The material in the pillars was indistinguishable from the matrix except for a slightly coarser sand and firmer cementation.

The pillars described by Simpson seem to be sandstone counterparts of pillars in drift observed by the writer.

Islands, composed of sandstone, such as those in the Wisconsin River at Wisconsin Dells, may really be large pillars. One of these island pillars is known as the "Inkstand." Many potholes occur in crevices along the Wisconsin River.

The pillars are cross stratified, and these may have been formed by more complete disintegration of the rock enclosing pillars. Sand enclosing the pillars would have been washed away by the Wisconsin River, leaving the pillars as islands.

Predictions Based on the New Theory

Four kinds of phenomena can be related by the theory of rock disintegration forming the pattern of cross stratification. These are potholes, pillars in drift, sandstone pipes, and free-standing pillars. All of these show similarities, which suggest a similar cause.

One of the ways in which theories can be tested is by means of predictions. The following two predictions can be made on the basis of the theory outlined in this article:

1. The contents of potholes should reveal concentric features, or internal cross stratification, or other features similar to those of pillars in sandstone and in drift.
2. Pillars similar to those which occur in drift may also be expected in cave fill. Potholes are common in caves, and the fill has been explained in terms of the disintegration similar to that proposed for the drift.¹⁹

Both these predictions can be easily tested, and future observations may either support or refute the present theory. Another prediction, based on the Uniformitarian premise, is possible, to test its validity: potholes ought to occur in rock strata at all levels, as fossils of bygone times. Are there any such examples of fossil potholes?

Why Pillars Are of Interest to a Creationist

There are at least two reasons why these pillars, or related formations, are of interest to a Creationist. First of all, while many of them are clearly not fossils, in the sense of having once been living, yet, being polystrate, they provide as good evidence as that from the polystrate fossils for rapid formation of the strata.

The other point is this. Uniformitarian methods have not been very successful in explaining these structures. Even those who suggest explanations do not seem to be very well convinced. The explanation proposed in this article may be verified on the basis of its predictions.

Thus the superiority of the Creationist approach could be demonstrated.

References

- ¹Rupke, N.A. 1970. Prolegomena to a study of cataclysmal sedimentation. in W.E. Lammerts, ed. *Why Not Creation?* Presbyterian and Reformed Publishing Co., Nutley, N.J., pp. 141-147.
- ²Cox, D.E. 1975. The formation of cross stratification: a new explanation. *Creation Research Society Quarterly*, 12(3):166-173.
- ³Conant, L.C., R.F. Black, and J. W. Hosterman, 1976. Sediment-filled pots in upland gravels of Maryland and Virginia, *Journal of Research U.S. Geological Survey* 4(3):353-358.
- ⁴*Ibid.*, p. 354.
- ⁵Mather, K.F., R.P. Goldthwait, and L.R. Thiesmeyer, 1942. Pleistocene geology of western Cape Cod, Massachusetts: *Bulletin of the Geological Society of America*. 53(8):1127-1174.
- ⁶Dionne, J.-C., and C. Laverdière, 1972. Structure cylindrique verticale dans un dépôt meuble Quaternaire, au nord de Montreal, Quebec. *Canadian Journal of Earth Sciences*, 9(5):528-543.
- ⁷Cox, D.E., 1975. *Op. Cit.*
- ⁸Cox, D.E., 1975. On the interpretation of potholes, *Creation Research Society Quarterly*, 12(1):25-31.
- ⁹Brögger, W.C. and Reusch, H.H. 1874. Giant's kettles at Christiania. *Quarterly Journal of the Geological Society*, 30, 750-771.
- ¹⁰*Ibid.*, p. 760.
- ¹¹Weston, T.C., 1899. Reminiscences among the Rocks, Warwick Bros and Rutter, Toronto. p. 278.
- ¹²Baker, M.B., 1916. The geology of Kingston and vicinity, *Ontario Bureau of Mines Annual Report*, vol 25, pt. 3. pp. 19-20.
- ¹³Hawley, J.E. and Hart, R.C., 1934. Cylindrical structures in sandstone. *Bulletin of the Geological Society of America* 45(6):1017-1034.
- ¹⁴Gabelman, J.W. 1955. Cylindrical structures in Permian (?) siltstone, Eagle County, Colorado. *Journal of Geology*, 63(3):214-227.
- ¹⁵Schlee, J.S., 1963. Sandstone pipes of the Laguna area, New Mexico. *Journal of Sedimentary Petrology*, 33(1):112-123.
- ¹⁶*Ibid.*, p. 115.
- ¹⁷Dietrich, R.V., 1953. Conical and Cylindrical structures in the Potsdam sandstone, Redwood, New York. *New York State Museum Circular* 34, pp. 8-9.
- ¹⁸Simpson, G.G., 1935. Cylindrical structures in sandstone, (discussion). *Bulletin of the Geological Society of America*, vol 46, pp. 2011-2014.
- ¹⁹Cox, D.E. 1976. Cave formation by rock disintegration. *Creation Research Society Quarterly* 13(3):155-161.

GENETICS FAVORS CREATION

WILLIAM J. TINKLE*

Received 5 July 1977

While Charles Darwin and the naturalists were speculating about vague tendencies in heredity, Gregor Mendel was learning from his own research the scientific laws which govern the passing of genes from parent to offspring. This paper points out how these laws do not agree with the speculations of the evolutionists.

In the last few years much has been written against evolution, as there should be; but relatively little from the standpoint of genetics. There is a definiteness, an objectivity about this science which stands out clearly against the cloudiness and suppositions of paleontology and anthropology. Scientists say they accept the findings of genetics, giving lip service to that science, then go on accepting an armchair speculation which they want to believe about the nature and formation of living things. It was the facts of genetics that made necessary a reconciliation about fifty years ago in order to bring peace in the family of science; but this "peace" is only a patch-work affair.

The Beginning of Genetics

Genetics describes the changes which actually have occurred in living things and shows that they are small, or recurrent and not increasing, or of a disadvantage to the plant or animal. They do not tend toward greater size or better organization as the generations succeed one other.

The father of genetics, it is agreed, was Gregor Mendel, who lived at the same time as Charles Darwin. However people for a long time listened to the latter instead of to Mendel, who was primarily a teacher and later administrator. After seven year's work on the genetics of peas, he read his report to the Natural History Society of Brunn, his home town, in 1865.

Modern scientists agree that his report gave definite results in an orderly manner, but the minutes of the meeting report that there were no comments.¹ The minutes also report that a member of the Society mentioned a book written by a certain Englishman named Darwin six years before, and that is what they talked about. And that is what all Europe talked about for 35 years while Mendel's paper lay on a shelf. Now that paper has become the foundation of genetics.

Different Kinds of Change Distinguished

Charles Darwin lumped all changes together, whereas we now recognize four definite kinds: acquired characters, latent genes, groups of diverse genes, and mutations. Acquired characters arise from the environment, from use or disuse, and are not inherited by the next generation if the causative environment has ceased; evolutionists and creationists agree on this point. J. B. Lamarck was the great protagonist of acquired characters; but Darwin also believed they were inherited.

Mendel pointed out that a gene may be recessive and, in the presence of a dominant gene, it becomes latent, not causing the formation of its trait. In a later generation it may occur, not accompanied by its dominant partner, and so produce its characteristic trait. It is clear that such genetics works toward recurrence rather than evolution.

In some plants and animals genes occur in groups rather than pairs and are accountable for different sizes and shapes. The same is true of some animals.

*William J. Tinkle, PhD., lives at Timbercrest Home, North Manchester, Indiana 46060.

animals, different production of eggs or milk, etcetera. Experiment and experience have established limits in such changes by selection.

Evidence for Limitations on Variability

Results of selection were tested by Charles Zeleny working with a compound eye in *Drosophila*. The normal eye is made up of 850 facets, while the mutant type may have as few as 65. In a white bar race, Zeleny selected a line having the highest number of facets and also a line having the least number. Selection caused a rapid increase in mean facet number during the first five generations, but after the fifth generation the effectiveness of selection ceased, although flies with the most facets were selected for 25 more generations.² Similar limits of effective selection have been found in sugar beets and corn, showing that while there may be selection in the types of gene the gene itself rarely changes.

In any case the change brought about by selection tends to reach a limit, as was shown by sugar beets in France. These have been developed from ordinary table beets starting with roots having 6 percent of sugar. By planting seed from the best i.e. richest in sugar, each year, after about 100 years, 17 percent of sugar was attained. This, of course, was a good result; but the same process of selection, continued for 40 years more, gave no higher percentage of sugar.³ This is the situation found time and again in nature with genes, which do not increase in effectiveness. If they change, it is because they become abnormal, i.e. a mutation takes place. Genetics gives no ground for believing in the bit changes in the direction of improvement demanded by evolution.

Charles Darwin, with no observation of such behavior but his neighbors' rule of thumb selection, guessed wrongly that genes change slightly in each reproduction, in every possible direction, and without limit.

Mutations Rarely, if Ever, Cause Improvement

The last type of change in living things, mutation, seldom occurs, but is hereditary. It involves a change in a gene or a chromosome and is hereditary like other genes. Some may cause changes which make plants or animals more useful to man, but very few if any bring a real improvement; an advanced plant or animal. People write glibly about harmful and beneficial mutants, but do not mention the beneficial ones. When a new mutation is discovered, a few tests are made to see if it is recessive or dominant and so on, but not to see if it has greater vigor than the parent type.

The present author raised several generations of tomatoes which came up with three cotyledons instead of two. Weighing all the fruits produced by the two types, I found that an average normal plant produced 119.3 ounces of fruit, while an average mutant plant produced 92.0 ounces. The normal plants also did better in lack of light, in cool temperature and in light frost. Mutants, even plants that appear improved at first sight, seem to lack vigor.⁴

Belief in Evolution Comes from Predilection, not Evidence

Scientists have looked in vain for changed plants or animals which can live better in natural surroundings because of the change; many live worse, if at all. Evolution is what some men wish to happen, not what happens.

Evolution I say, is not science, it is an arbitrary world-view which some scientists a hundred years ago wanted to believe, but which some discriminating scientists of the present reject. The conclusion of this paper is that genetics does not give evidence for the improvements which the theory of evolution needs. As Professor Caullery of the Chair of Evolution, University of Paris, said at Harvard University already in 1916, "It comes to pass that some biologists of the highest authority in the study of Mendelian principles of heredity are led to the expression of ideas which would almost take us back to creationism."⁵

Time and again scholars have pointed out that Darwin's ideas of fundamental principles were influenced more by what he wanted to believe than by what he observed.⁶ Such criticisms have commonly been rejected by the majority, who seem to be influenced more by their preferences, even as Darwin was. In truth, however, genetics accounts well for all the changes which are actually observed; and it permits, nay encourages, a belief that the world of life was planned and created by a Higher Power.

References

- ¹Iltis, Hugo, 1932. *Life of Mendel*. Allen, London. p. 178. (Reproduced by Hafner in 1966.)
- ²Zeleny, C., 1922. The effect of selection on eye facet number. *Genetics* 7(January):1-115.
- ³Jones, D.F., 1924. *Genetics in plant and animal improvement*. Wiley. p. 414.
- ⁴Tinkle, William J., 1975. Further research on reduced viability of mutant plants. *Creation Research Society Quarterly* 12(1):52.
- ⁵*Smithsonian Institution Report*, 1916.
- ⁶Siegler, Hilbert R., 1976. Fleeming Jenkin's critique of Darwin's Origin of Species. *Creation Research Society Quarterly* 13(2):111-114.

A SIMPLE GEOMETRICAL MODEL FOR COMPARING PRE-FLOOD AND POST-FLOOD GEOMORPHOLOGY

JAMES N. HANSON*

Received 11 March 1977

A simple model, based on Gen 1:9, Ps 104:6-8, Gen 7:11 et al., for comparing the geometric disposition of land and sea of the pre-Flood, Flood time and post-Flood worlds, is developed and evaluated. Numerical evaluation of this model provides estimates of: the energies associated with the Flood and "the fountains of the great deep," the change in the earth's radius, and the changes of the depth of the ocean and heights of the continents. A discussion follows, on the application to: global ice formation, continent building, the frozen mammoths, the rotation of the earth on its axis and the accuracy of the King James Version translation of Ps 104:8.

Introduction

Scriptures contain many references to the physical characteristics of the Flood, as well as to its spiritual import. (Gen 6:1-7, 1 Pet 3:19-20, Mt 24:37.) This paper will only attempt, on the basis of selected verses, to study the geometry of this global catastrophe. This study should provide, then, a basis for further work on the subject, and may throw light onto several diverse problems which, in recent years, have been associated with or explained in terms of the Flood.¹

The Biblical Evidence

Before the Flood, it will be supposed here, the world had one ocean and one continent; and, of course, it was spherical then as now. The first point seems to follow from Genesis 1:9:

Gen 1:9. And God said, Let the waters under the heaven be gathered together unto one place, and let the dry land appear: and it was so.

That the "waters . . . be . . . unto one place" bespeaks of a single ocean; and if so, there must have been just one continent. Hence Gen 1:9, theoremtically states that at Creation there was an island continent on a spherical earth. The fact of a spherical earth is not only common knowledge but follows from Biblical revelation (e.g. Isa 40:22, Prov 8:27, Job 38:14, Job 22:14, Eccl 1:5, 6). For purposes of simplicity the demarcation between land and sea shall be assumed to be circular; this does not affect the argument much. Several other verses relate to Gen 1:9, for example, Ps 95:5 and Prov 8:29. All Bible citations will be from the King James Version.

The water of the Flood, in my opinion, was supplied by a great upwelling of deep ocean water and of subterranean water beneath the pre-Flood ocean floor. This follows from Gen 7:11,

Gen 7:11. . . ., the same day were all the fountains of the great deep broken up, and the windows of heaven were opened.

and several related verses, for example Job 38:8, Ps 33:7 and 2 Pet 3:5, to list but a few. The magnitude of this catastrophe cannot be overstated, for "all" sources of oceanic water commenced to give forth water from the "same day." "Fountains of the great deep" and "broken up" mean that God brought forth the water of Gen 1:2 which was stored at Gen 1:9 (Ps 33:7), once again to immerse and cleanse the world. This might be

pictured as many local heapings-up throughout the ocean contributing to a global rise of the water level. The heapings occurred above the places where the ocean floor was rent (i.e. "broken up") and which gave rise to great elevations ("fountains") of masses of water tens or hundreds of miles in radius. For example, consider Psalm 33:7,

Ps 33:7. He gatherth the waters of the sea together as an heap: he layeth up the depth in store-houses.

It is interesting to note that the KJV translators have used "waters" as opposed to "water" in Genesis 7 (:6, 7, 17, 18, 19, 20, 24) to indicate the plurality of water sources, i.e. from the "deep" ocean and subterranean ocean "fountains" as well as from "the windows of heaven" of the atmosphere. In fact, in Genesis 1 and in the Flood chapters Genesis 6 through 9, they used 'water' only in the plural where as elsewhere in Genesis it occurs exclusively in the singular.

Flood Geometry

From the description developed, a geometrical model for comparing the pre-Flood with the post-Flood world will be mathematically defined. The total volume of the earth will be conserved from which changes in the earth radius, ocean depth, and land elevation can be derived in terms of the pre-Flood conditions and change in water budget. A change in water budget corresponds a releasing of encapsulated subterranean water during the Flood. The potential energy change of the water mass due to the Flood, as defined by a pre-Flood and post-Flood geometry, will be derived along with other kinematical and dynamical quantities.

These results, equally, apply to "heap"-ing up (Ps 33:7) of the water "above" (Ps 104:6) their usual level and provide some appreciation of the violence ensuing from the formation of such enormous water columns. More generally, these results apply to local phenomena and to the comparison and change of any set of earth geometries and not just to the comparison of pre-Flood and post-Flood geomorphologies.

In Figure 1, h_3 is the height of the land above (below if $h_3 < 0$), h_2 is the depth of the ocean and the radius of the dry earth is $R = h_1 + h_2 + h_3$. The ocean is assumed to be bound by spheres of radii h_1 and $h_1 + h_2$ and by the cone with apex angle 2ψ . Further let the total volume of the earth (solid matter plus water) be a constant given by $V = (4/3)\pi R_0^3$ where, for simplicity $R_0 \equiv 1$, i.e. use the earth's radius as a unit. Also define $f_v = V_w/V$ as the fraction of the total volume that is in the

*James N. Hanson, Ph.D., is Professor of Computing and Information Science, Cleveland State University, Cleveland, Ohio 44115.

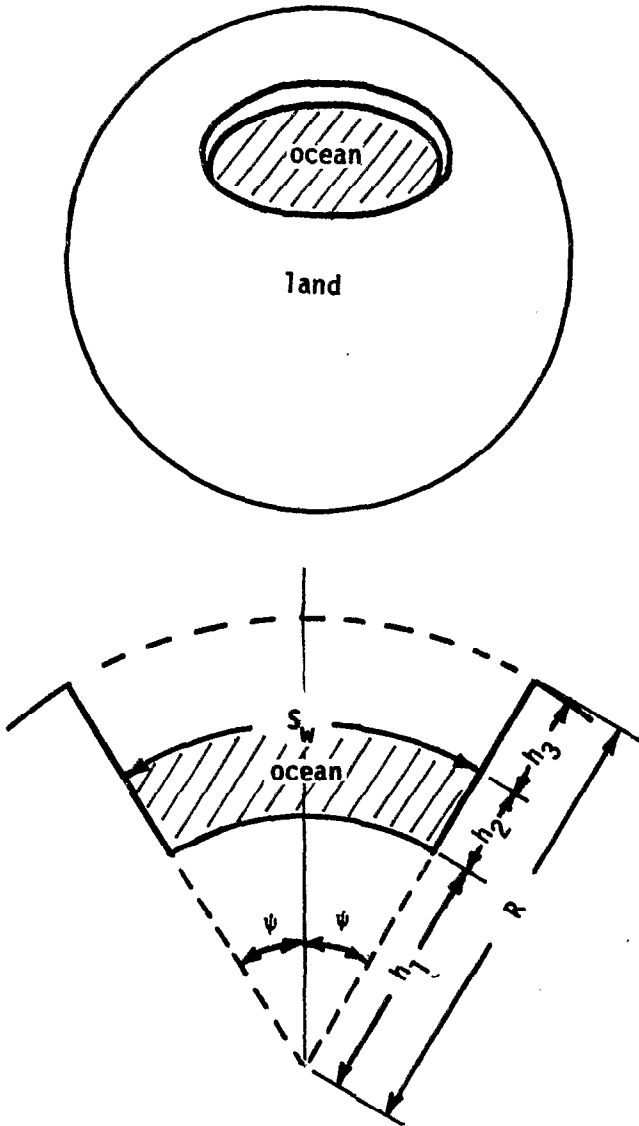


Figure 1. This shows the geometry assumed for the world before the Flood. Above is a general view; below, a cross-section through the earth. The proportion of land to water in this drawing is arbitrary; it is not assumed that it necessarily represents what actually existed.

ocean, where $V = V_w + V_e$ and V_w , V_e are the components of the total volume in water and in solid earth.

From the geometry of the sphere it follows that the area subtended on the surface of a sphere of arbitrary radius ρ by an arbitrary central one cone of apex angle 2ϕ is

$$A_\phi = 2\pi\rho^2(1 - \cos\phi) \quad (1)$$

and the corresponding volume is

$$V_\phi = 2\pi\rho^3(1 - \cos\phi) \quad (2)$$

Choosing h_2 , h_3 and f_v as independent variables, and now using ψ as the angle, gives

$$V_w = \frac{2}{3}\pi(1 - \cos\psi)[(R - h_3)^3 - (R - h_2 - h_3)^3] \quad (3)$$

$$V_e = \frac{4}{3}\pi R^3 - \frac{2}{3}\pi(1 - \cos\psi)[R^3 - (R - h_2 - h_3)^3]$$

from which result two equations in R and ψ ,

$$V = V_w + V_e = \frac{4}{3}\pi R^3 + \frac{2}{3}\pi(1 - \cos\psi)[(R - h_3)^3 - R^3]$$

$$f_v V = V_w = \frac{2}{3}\pi(1 - \cos\psi)[(R - h_3)^3 - (R - h_2 - h_3)^3] \quad (4)$$

eliminating ψ gives a fifth order polynomial in R

$$\begin{aligned} 0 = & (V - \frac{4}{3}\pi R^3)[(R - h_3)^3 - (R - h_2 - h_3)^3] \\ & - f_v V[(R - h_3)^3 - R^3] = -4\pi h_2 R^5 + 4\pi h_2(2h_3 + h_2)R^4 \\ & - 4\pi h_2(h_2 h_3 + h_3^2 + \frac{h_2^2}{3})R^3 + 4\pi(h_3 f_v + h_2)R^2 \\ & - 4\pi(h_3^2 f_v + 2h_2 h_3 + h_2^2)R + (\frac{4}{3}\pi)(h_3^2 f_v + 3h_2^2 h_3 \\ & + 3h_2 h_3^2 + h_2^3) \end{aligned} \quad (5)$$

R obtained ψ may be computed from,

$$\cos\psi = 1 - \frac{3}{2\pi} f_v V[(R - h_3)^3 - (R - h_2 - h_3)^3]^{-1} \quad (6)$$

$$\psi = \begin{cases} \tan^{-1} \left| \frac{(1 - \cos^2\psi)^{1/2}}{\cos\psi} \right|, & \cos\psi \geq 0 \\ \pi - \tan^{-1} \left| \frac{(1 - \cos^2\psi)^{1/2}}{\cos\psi} \right|, & \cos\psi < 0 \end{cases}$$

This permits computation of the areas of land, water, total area, and ocean diameter,

$$A_e = 2\pi R^2[1 - \cos(\pi - \psi)] = 2\pi R^2(1 + \cos\psi) \quad (7)$$

$$A_w = 2\pi(R - h_3)^2(1 - \cos\psi)$$

$$A_T = A_e + A_w$$

$$S_w = 2\psi(h_1 + h_2)$$

Define f_A as the fractional area of water and δR as the change in radius

$$f_A = A_w/A_T, \delta R = R - R_0 \quad (8)$$

These equations apply for $\cos\psi \geq -1$ (i.e. $\psi \leq \pi$). Hence the expression for $\cos\psi$ yields permissible values only for $f_v < f'_v$, where

$$\begin{aligned} f'_v & \equiv (R - h_2)^3 - (R - h_2 - h_3)^3 \\ & \approx 3h_2(1 - h_2 - 2h_3), R \approx 1, |h_3 + h_2| \ll 1 \\ & \approx 3h_2 \end{aligned} \quad (9)$$

is the limiting value of f_v obtained by assigning $\psi = \pi$ in the expression for $\cos\psi$. Notice that $\psi = \pi$ corresponds to the entire earth being covered by the water.

Kinematical Relationships

If h_3 is permitted to become negative then the standing or heaping of the water may be included in the model. Figure 2 illustrates this. Figure 2(a) shows the stable configuration corresponding to $h_3 \geq 0$ while figures 2(b, c) show the two unstable cases corresponding to $h_3 < 0$. In figure 2(b) $h_3 < 0$ and $h_3 > h_2$ which puts the ocean floor as well as the ocean above dry land. In figures 2(b, c) the shaded area above radius R represent

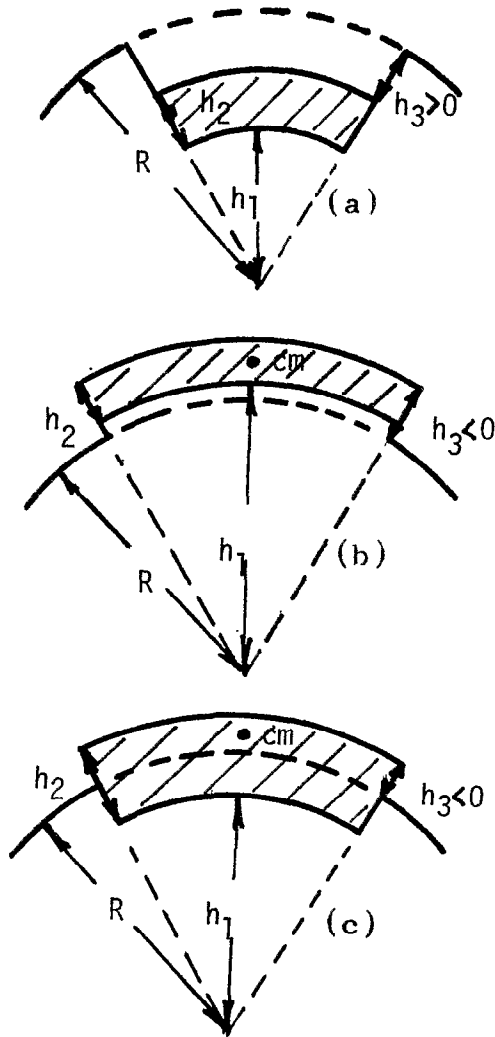


Figure 2. This shows the comparative geometries at various possible stages of the Flood, it being assumed that the water could rise above the land. (a), equilibrium, $h_3 \geq 0$; the ocean is below the land. (b), $h_3 < 0$, $|h_3| > h_2$; the ocean is completely above the land. (c), $h_3 < 0$, $|h_3| < h_2$; the ocean is partly above the land.

waters that were quickly welled up by the "fountains" and which will immediately fall to their level with devastating force and violence.

In reference to Figures 3(b, c) define; X_1 to be the depth of the global ocean after the suspended water falls, X_2 as the height of the land above the land in case (b), X_3 to be the height through which the water falls in order to establish equilibrium, and P_e as the potential energy in ergs corresponding to the fall of water through height X_3 . Uniform gravity will be assumed and X_3 is defined as the difference between the radii of the center of mass of the suspended water and that of the resultant equivalent mass spread out over the globe. The height of the water (surface) above the land is $-h_3$.

In the derivation of the X_i and P_e it will be convenient to define the logical function,

$$(P) = \begin{cases} 1, & P \text{ is true} \\ 0, & P \text{ is false} \end{cases} \quad (10)$$

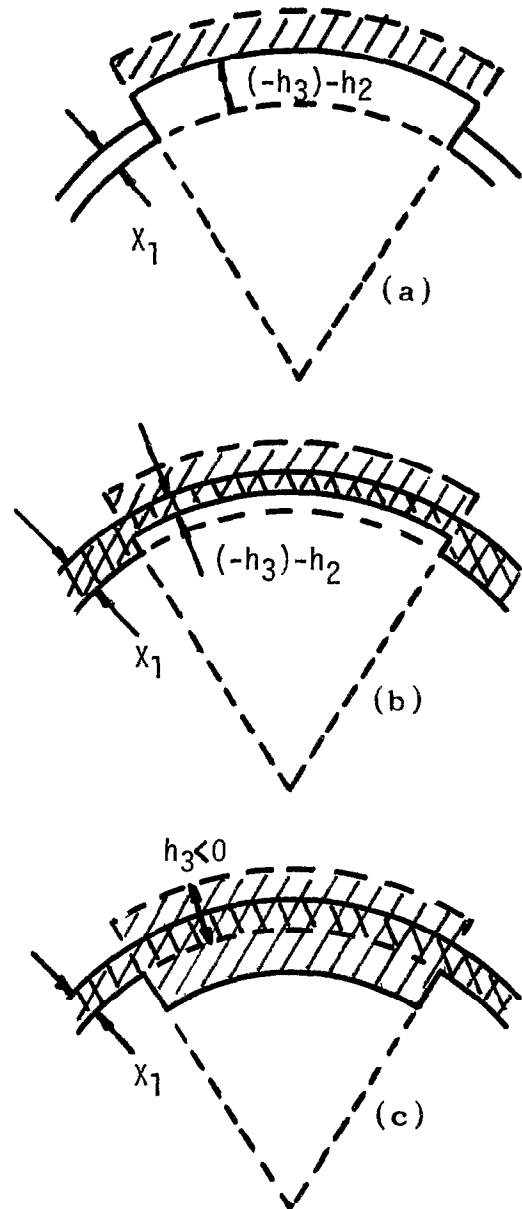


Figure 3. This shows how X_1 is defined. The shaded areas indicate suspended water, the doubly shaded its fallen configuration. (a), $h_3 < 0$, $|h_3| > h_2$, $-h_3 - h_2 \geq V_w/A_e$. The ocean floor is above the fallen water level. (b), $h_3 < 0$, $|h_3| > h_2$, $-h_3 - h_2 < V_w/A_e$. The ocean floor is within the fallen water limits. (c), $h_3 < 0$, $|h_3| < h_2$. The fallen water limits lie within the previous water limits.

e.g. $(\sin x / \cos x = \tan x) (x + y) + (2 > 3)(y) = 1(x + y) + 0y = x + y$.

Figure 3 defines the three distinct cases for defining x_1 . In case (a) it follows that, since x_1 is small, $V_w \approx A_e X_1$ and therefore

$$X_1 \approx V_w/A_e, \quad (a) \quad (11)$$

Similarly for case (b) it follows that $V_w \approx A X_1 + A_w[X_1 - (-h_3 - h_2)]$ from which

$$X_1 \approx [V_w - A_w(h_2 + h_3)]/(A_e + A_w), \quad (b) \quad (12)$$

For case (c), $(-h_3)S_w \approx 4\pi R^2 X_1$ and hence

$$X_1 = -S_w h_3 / (4\pi R^3), \quad (c) \quad (13)$$

These approximations can be further simplified by noting that $R \approx 1$ and $A_e + A_w \approx 4\pi$. Combining these three cases into one expression gives

$$X_1 \approx (h_3 < 0)(|h_3| \geq h_2)[(-h_3 - h_2 \geq f_v V/A_e)f_v V/A_e + (-h_3 - h_2 < f_v V/A_e)[f_v V - A_w(h_2 + h_3)]/(A_e + A_w) + (|h_3| < h_2)(-S_w h_3/4\pi R^3) \quad (14)$$

The exact formulae for X_1 are easily derived and are

$$X_1 = \begin{cases} \left(\frac{3}{2\pi} V_w [(1 + \cos\psi)^{-1} + R^3]^{1/3} - R, (a) \right. \\ \left. \left(\frac{3}{4\pi} V_w (1 + \cos\psi)^{-1} + R^3 + [R - h_2 - h_3]^{1/3} - R, (b) \right. \right. \\ \left. \left. \frac{1}{6} [(R - h_3)^3 - R^3(1 - \cos\psi) + R^2]^{1/2} - R, (c) \right) \end{cases} \quad (15)$$

Only for very large f_v would the above approximations depart sensible from the exact formulae.

Again, in reference to Figures 2(b,c) and by virtue of having determined X_1 ,

$$\begin{aligned} X_2 &= (h_3 < 0)(-h_3 - h_2) \\ X_3 &= (h_3 < 0)[(|h_3| \geq h_2)(-h_3 - h_2 \geq V_w/A_e) \\ &\quad (-h_3 - h_2/2 - X_1/2) + (-h_3 - h_2 < V_w/A_e)] \end{aligned} \quad (16)$$

$$\begin{aligned} &(-h_3 - h_2/2 - X_1/2) + (|h_3| < h_2)(-h_3/2 - X_1/2) \\ &= (h_3 < 0)[(|h_3| \geq h_2)(-h_3 - h_2/2 - X_1/2) \\ &\quad + (|h_3| < h_2)(-h_3/2 - X_1/2)] \end{aligned}$$

where X_3 has been approximated in reference to Figure 3. Figure 3 shows the water before and after it is spread out into an equilibrium configuration, whereby X_3 is taken as the radial difference between the center of mass of the two shaded areas in the three cases shown. An estimate of the potential energy of the water stored and then released is given by

$$P_e \approx [h_2(|h_3| \geq h_2) + (-h_3)(|h_3| < h_2)]A_w P_w g X_3 \quad (17)$$

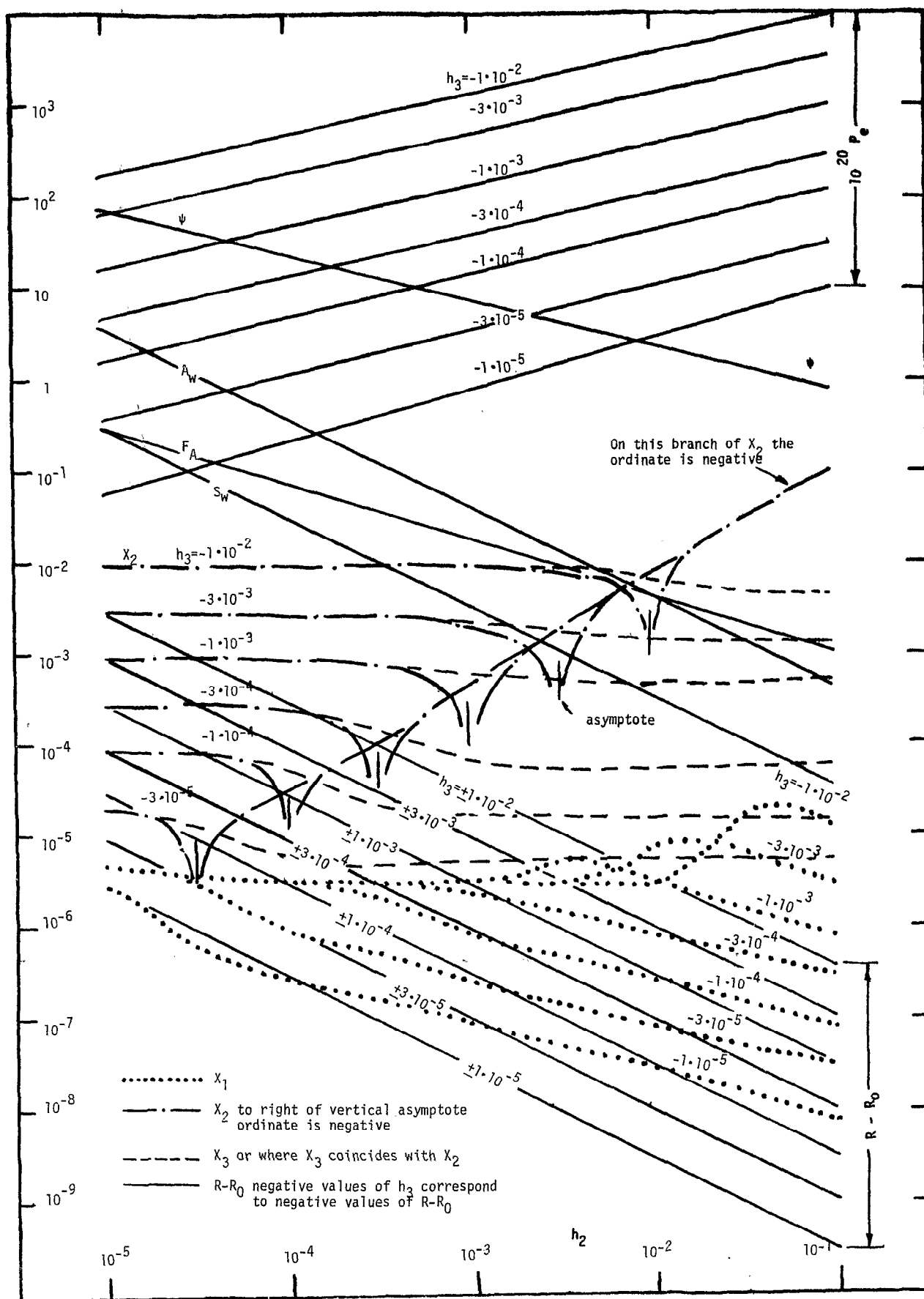
$$\sim 8 \cdot 5 \cdot 10^{28} h_2 P_w X_3 \text{ ergs, } -h_3 \sim h_2$$

where a value of the acceleration due to gravity of $g \approx 980$ cgs is sufficiently representative for these purposes and where p_w is the total mass of the earth if it were totally water, i.e. had a specific density of 1 cgs. An earth radius of $6.4 = 10^8$ cm gives $p_w g \pi^{1/2} = (6.4 = 10^8)^3 = 980 \approx 8.5 = 10^{28}$. This estimate follows from Figure 3(a, b) in which the volume of water for which every particle falls is $V_w \approx A_w h_2$ and from 3(c) in which

Figure 4. (On the facing page.) This chart gives $R - R_0$, A_w , F_A , ψ , S_w , X_1 , X_2 , X_3 , P_e vs. h_2 for $f_v = 1.10^{-5}$ parametric in h_3 .

	f_v	h_2	h_3	$R - R_0$	A_w	A_e	F_A	ψ	S_w	X_1	X_2	X_3	P_e
1	1.0E-05	1.0E-05	1.0E-01	-3.1E-02	4.19	8.35	0.33	65	1.2	5.0E-06	1.0E-01	1.0E-01	3.6E+23
2	1.0E-05	1.0E-05	1.0E-03	-3.3E-04	4.19	8.38	0.33	70	1.2	5.0E-06	9.9E-04	9.9E-04	3.5E+21
3	1.0E-05	1.0E-05	1.0E-05	-3.3E-06	4.19	8.38	0.33	71	1.2	3.3E-06	0.0E+00	3.3E-06	1.2E+19
4	1.0E-05	1.0E-05	1.0E-05	3.3E-06	4.19	8.38	0.33	71	1.2	0.0E+00	0.0E+00	0.0E+00	0.0E+00
5	1.0E-05	1.0E-05	1.0E-03	3.3E-04	4.19	8.38	0.33	71	1.2	0.0E+00	0.0E+00	0.0E+00	0.0E+00
6	1.0E-05	1.0E-05	1.0E-01	3.6E-02	4.19	8.35	0.33	76	1.2	0.0E+00	0.0E+00	0.0E+00	0.0E+00
7	1.0E-05	1.0E-03	1.0E-01	-3.0E-04	0.04	12.52	0.00	6	0.1	3.3E-06	9.9E-02	9.9E-02	3.5E+23
8	1.0E-05	1.0E-03	1.0E-03	-3.3E-06	0.04	12.52	0.00	7	0.1	3.3E-06	0.0E+00	5.0E-04	1.8E+21
9	1.0E-05	1.0E-03	1.0E-05	-3.3E-08	0.04	12.52	0.00	7	0.1	9.2E-08	9.9E-04	5.0E-06	1.8E+19
10	1.0E-05	1.0E-03	1.0E-05	3.3E-08	0.04	12.52	0.00	7	0.1	0.0E+00	0.0E+00	0.0E+00	0.0E+00
11	1.0E-05	1.0E-03	1.0E-03	3.3E-06	0.04	12.52	0.00	7	0.1	0.0E+00	0.0E+00	0.0E+00	0.0E+00
12	1.0E-05	1.0E-03	1.0E-01	3.7E-04	0.04	12.52	0.00	7	0.1	0.0E+00	0.0E+00	0.0E+00	0.0E+00
13	1.0E-05	1.0E-01	1.0E-01	-3.3E-06	0.00	12.57	0.00	1	0.0	3.3E-06	0.0E+00	5.0E-02	2.0E+23
14	1.0E-05	1.0E-01	1.0E-03	-3.7E-08	0.00	12.57	0.00	1	0.0	9.7E-07	9.9E-02	5.0E-04	2.0E+21
15	1.0E-05	1.0E-01	1.0E-05	-3.7E-00	0.00	12.57	0.00	1	0.0	9.7E-09	1.0E-01	5.0E-06	2.0E+19
16	1.0E-05	1.0E-01	1.0E-05	3.7E-00	0.00	12.57	0.00	1	0.0	0.0E+00	0.0E+00	0.0E+00	0.0E+00
17	1.0E-05	1.0E-01	1.0E-03	3.7E-08	0.00	12.57	0.00	1	0.0	0.0E+00	0.0E+00	0.0E+00	0.0E+00
18	1.0E-05	1.0E-01	1.0E-01	4.2E-06	0.00	12.57	0.00	1	0.0	0.0E+00	0.0E+00	0.0E+00	0.0E+00
19	1.0E-03	1.0E-03	1.0E-01	-3.1E-02	4.19	8.35	0.33	65	1.2	5.0E-04	9.9E-02	9.9E-02	3.5E+25
20	1.0E-03	1.0E-03	1.0E-03	-3.3E-04	4.19	8.37	0.33	71	1.2	3.3E-04	0.0E+00	3.3E-04	1.2E+23
21	1.0E-03	1.0E-03	1.0E-05	-3.3E-06	4.19	8.37	0.33	71	1.2	9.8E-07	9.9E-04	4.5E-06	1.6E+21
22	1.0E-03	1.0E-03	1.0E-05	3.3E-06	4.19	8.37	0.33	71	1.2	0.0E+00	0.0E+00	0.0E+00	0.0E+00
23	1.0E-03	1.0E-03	1.0E-03	3.3E-04	4.19	8.37	0.33	71	1.2	0.0E+00	0.0E+00	0.0E+00	0.0E+00
24	1.0E-03	1.0E-03	1.0E-01	3.6E-02	4.19	8.34	0.33	76	1.2	0.0E+00	0.0E+00	0.0E+00	0.0E+00
25	1.0E-03	1.0E-01	1.0E-01	-3.3E-04	0.05	12.52	0.00	6	0.1	3.3E-04	0.0E+00	5.0E-02	1.2E+25
26	1.0E-03	1.0E-01	1.0E-03	-3.7E-06	0.05	12.52	0.00	7	0.1	9.7E-06	9.9E-02	5.0E-04	2.0E+23
27	1.0E-03	1.0E-01	1.0E-05	-3.7E-08	0.05	12.52	0.00	7	0.1	9.7E-08	1.0E-01	5.0E-06	2.0E+21
28	1.0E-03	1.0E-01	1.0E-05	3.7E-08	0.05	12.52	0.00	7	0.1	0.0E+00	0.0E+00	0.0E+00	0.0E+00
29	1.0E-03	1.0E-01	1.0E-03	3.7E-06	0.05	12.52	0.00	7	0.1	0.0E+00	0.0E+00	0.0E+00	0.0E+00
30	1.0E-03	1.0E-01	1.0E-01	4.2E-04	0.05	12.52	0.00	8	0.1	0.0E+00	0.0E+00	0.0E+00	0.0E+00
31	1.0E-01	1.0E-01	1.0E-01	-3.5E-02	4.61	7.93	0.37	69	1.3	3.3E-02	0.0E+00	3.3E-02	1.3E+27
32	1.0E-01	1.0E-01	1.0E-03	-3.7E-04	4.64	7.93	0.37	75	1.3	1.0E-04	9.9E-02	4.5E-04	1.8E+25
33	1.0E-01	1.0E-01	1.0E-05	-3.7E-06	4.64	7.93	0.37	75	1.3	1.0E-06	1.0E-01	4.5E-06	1.8E+23
34	1.0E-01	1.0E-01	1.0E-05	3.7E-06	4.64	7.93	0.37	75	1.3	1.0E+00	0.0E+00	0.0E+00	0.0E+00
35	1.0E-01	1.0E-01	1.0E-03	3.7E-04	4.64	7.93	0.37	75	1.3	0.0E+00	0.0E+00	0.0E+00	0.0E+00
36	1.0E-01	1.0E-01	1.0E-01	4.0E-02	4.67	7.87	0.37	81	1.3	0.0E+00	0.0E+00	0.0E+00	0.0E+00

Table 1. This gives the Flood parameters as a function of f_v , h_2 and h_3 .



this volume is $A_w(-h_3)$. Since $R \cong R_o \cong 1$ then the mass of the volume is the product of its volume by p_w , i.e. this volume is the fraction of the total.

Numerical Evaluation

Table 1 contains a brief list of the values of the formulae derived. Note that, because of the use of the logical function, a value of zero for the X_i and P_e may indicate that these quantities are not defined for the choice of dependent values. f_v , h_2 and h_3 have been chosen as the independent variables in constructing this table and in subsequent figures. A PL/I Formac listing of a program to produce a more comprehensive table with higher precision is available from the author. Figure 4 gives a detailed graphical representation for $f_v = 10^{-5}$. Figure 5 displays variations with respect to f_v . The solution of the quintic for R has been obtained by Newton's method.

For example if $f_v = 10^{-3}$, $h_2 = 10^{-3}$ and $h_3 = 10^{-3}$ (i.e. 1/10000 of the earth is ocean whose depth is .001 and whose surface is .001 below land) then, from line 23 of Table 1, the ocean will have an area of $A_w = 4.19$, a diameter of $S_w = 1.2$, and will subtend an angle of $2\psi = 142$ degrees as measured from the center of the earth. The area of dry land is $A_e = 8.37$ which comprises $100(1 - f_A) = 67\%$ of the total earth's surface. The radius of the dry earth is $R = R_o + (R - R_o) = 1 + 3.3 \cdot 10^{-4} = 1.0033$, i.e. the radius is $3.3 = 10^{-4}$ larger than that of a reference sphere having the same volume.

The quantities X_1 , X_2 , X_3 , and P_e do not apply in this case for the ocean is below the level of land. Next, let the pre-Flood world be defined by $f_v = 10^{-3}$, $h_2 = 10^{-3}$ and $h_3 = 10^{-5}$ and the post-Flood world by $f_v = 10^{-3}$, $h_2 = 10^{-3}$ and $h_3 = 10^{-5}$ then by comparing lines 10 and 22 of Table 1 it is found that the radius of land has increased from $1 + 3.3 \cdot 10^{-8}$ to $1 + 3.3 \cdot 10^{-6}$, the area of water from .04 to 4.19 corresponding to diameters of 0.1 and 1.2 and central angles of 14° and 142° . In this example the water of the Flood would have been increased an hundredfold.

Now consider the following values which might pertain to the circumstances before and after an upwelling during the Flood year, $f_v = 10^{-5}$, $h_2 = 10^{-5}$, $h_3 = 10^{-5}$ and $f_v = 10^{-5}$, $h_2 = 10^{-5}$, $h_3 = -10^{-3}$. Comparing lines 4 and 2 of Table 1 shows that the radius of land decreases from $1 + 3.3 \cdot 10^{-6}$ to $1 - 3.3 \cdot 10^{-4}$ with no appreciable change in the oceanic geometry but in this case the negative value of h_3 gives $X_1 = 5.0 \cdot 10^{-6}$, $X_2 = 9.9 \cdot 10^{-4}$, $X_3 = 9.9 \cdot 10^{-4}$ and $P_e = 3.5 \cdot 10^{21}$.

A more extensive table could have been used to trace the change in parameters for a given program for the continuous variations of h_2 and h_3 . This is an example where the ocean floor would become dry land and dry land would become the ocean floor after the water column (as pictured in Figure 3) were to fall.

The concatenation of such events, as in these examples, could be used to profile an hypothetical succession of upheavals during the Flood year. For example after the water fall of the previous example h_2 becomes $h_2 = X_1 = 5.0 \cdot 10^{-6}$ and h_3 becomes $h_3 = X_2 - X_1 \cong 0$. In this manner an ordered record of f_v , h_2 and h_3 can be assembled from assumed f_v , h_2 and h_3 .

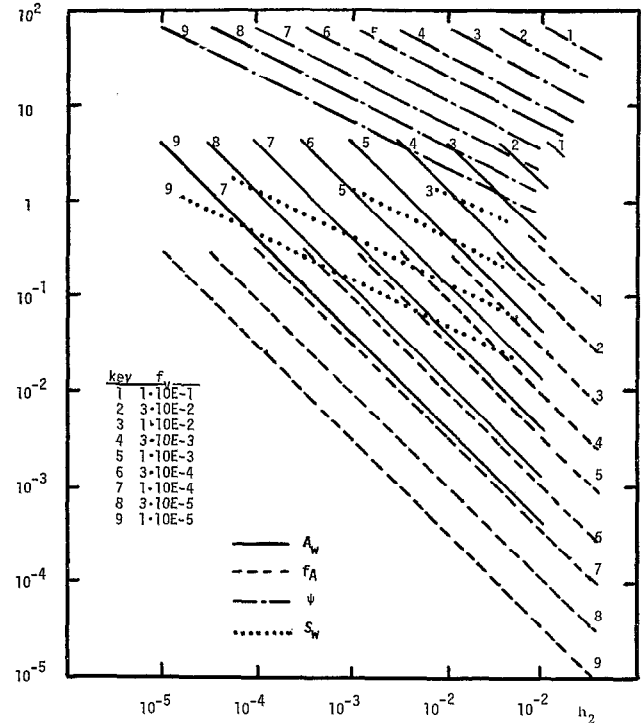


Figure 5. This chart shows A_w , F_A , ψ , S_w , vs. h_2 with parameter f_v . These curves are very nearly straight and independent of h_3 .

Before proceeding to specific applications, it is important to realize the generic nature of the assumptions made. Obviously h_2 and h_3 represent average dimensions. A circular ocean is representative of an ocean of arbitrary shape, not necessarily contiguous, and subtending the same solid angle as viewed from the earth's center, i.e. equal to A_w steradians.

The volume fraction, f_v , has thus far been used to represent the fraction of water, however, mathematically it may represent any material, e.g. a continental uplift with dimensions h_2 and h_3 .

Approximations

The logarithmic-linear approximations evident in Figure 4 are shown in Figures 5 and may be represented by,

$$A_w \approx 4 \cdot 3f_v h_2^{-1} \quad (18)$$

$$F_A \approx \cdot 35f_v h_2^{-1}$$

$$\psi \approx 73f_v^{1/2} h_2^{1/2}$$

$$\delta_w \approx 1 \cdot 25f_v^{1/2} h_2^{1/2}$$

$$R - R_o \approx \cdot 335f_v h_2^{-1} h_3$$

These approximations are within about 10% of the correct answer for $0 \leq f_v, h_2, h_3 \leq 10^{-1}$, the accuracy increasing as f_v and h_3 approach zero; however the accuracy of the expression for $R - R_o$ is accurate to within 0.5%. Note that these approximations permit the easy rescaling of Figure 5 so that a similar figure for any f_v results. This rescaling is valid only for relations and parameter ranges where logarithmic-linearity occurs. No such approximations for X_1 , X_2 , X_3 and P_e are apparent.

Possible Changes in the Earth's Angular Velocity

It frequently has been conjectured that the upheavals during the Flood year altered the earth's rotational velocity. In order to test this conjecture assume that as in ordinary mechanics, angular momentum is conserved during the Flood year, i.e. if subscripts 1 and 2 represent the time before and after an event then

$$I_1 \omega_1 = I_2 \omega_2 \quad (19)$$

where the earth's moment of inertia will be approximated by $I = (\frac{2}{5})MR^2$ (the formula for an homogeneous sphere of mass M) and ω is the angular velocity. Then if δR is the departure of R from 1, $\Delta R = \delta R_1 - \delta R_2$ and $\Delta \omega$ the change in ω then,

$$\begin{aligned} \omega_2 &= (R_1/R_2)^2 \omega_1 \\ &= [(1 + \delta R_1)/(1 + \delta R_2)]^2 \omega_1 \\ &\approx [(1 + \delta R_1)(1 - \delta R_2)]^2 \omega_1 \\ &\approx (1 + \delta R_1 - \delta R_2)^2 \omega_1 = (1 + 2\Delta R) \omega_1 \end{aligned} \quad (20)$$

hence

$$\Delta \omega = \omega_2 - \omega_1 \approx 2\Delta R \omega_1 \approx 2\Delta R \quad (21)$$

where ω remains very nearly 1 rev/day. For example, once again comparing lines 4 and 2 of Table 1 gives $\Delta R = 1 + 3.3 \cdot 10^{-6} - (1 - 3.3 \cdot 10^{-4}) = 3.3 \cdot 10^{-4}$ which corresponds to an increase of ω , at the column's highest, of $6.6 \cdot 10^{-4}$ rev/day. This, of course, may immediately be followed by an almost equal decrease in angular velocity as the water column falls. In this case ($f_v = 10^{-5}$, $h_2 = 5.0 \cdot 10^{-6}$ and $h_3 = 0$) $\Delta R_3 = 0$ and hence $\Delta \omega_{2,3} = 2[(1 - 3.3 \cdot 10^{-4}) - (1 - 0)] = -6.6 \cdot 10^{-4}$ (22) Therefore it seems that ω would fluctuate up and down throughout the Flood year but the net change, if any, would depend only on the pre-Flood and post-Flood values of f_v , h_2 and h_3 . If in the pre-Flood world much of the Flood waters were yet subterranean and the land low and mountainless,¹ then $f_v = 10^{-5}$ and $h_2 = h_3 = 10^{-5}$ might apply.

If the circumstances after the Flood are essentially as now, then an average ocean depth of 2 miles covering 80% of the earth and an average land height of 1 mile gives, $f_v = (.8)(2/4000)(4\pi \cdot 1^2)/[(4\pi/3)1^3] = 1 \cdot 2 \cdot 10^{-3}$, $h_2 = 2/4000 = 5.0 \cdot 10^{-4}$ and $h_3 = 1/4000 = 2.5 \cdot 10^{-4}$ where the radius of the earth is taken as 4000 miles. Putting these values in the approximation gives $\delta R_1 = +3.35 \cdot 10^{-6}$ and $\delta R_2 = +2.01 \cdot 10^{-4}$ from which $\Delta \omega \approx -1.98 \cdot 10^{-4}$. In this case the available water was increased by a factor of 120. Other plausible values for the pre-Flood world might yield $\Delta \omega$ of about -10^{-3} to $+10^{-3}$.

Possibly the "covenant of night and day" (Jer 31:36, 33:20) may mean that God has preserved the value of ω from the beginning. A much larger change than $-.001$ would be needed in order to substantiate the claim that the pre-Flood year was appreciably shorter than at present. Further, the change would need to be positive, not negative. In conclusion it would seem that the Flood did not appreciably alter the earth's rotational speed.

If, in fact, the net $\Delta \omega$ throughout the Flood is precisely zero, and given that the present values are the post-Flood values then all permissible pre-Flood values for

f_v , h_2 and h_3 can be computed i.e. those for which $\Delta R_1 = \Delta R_2$. Figure 6 shows some of these permissible values within the range where near logarithmic-linearity is displayed. The great amounts of thermal energy dissipated by Flood events will reduce the value of $\Delta \psi^2$.

Also note, in this analysis the earth is not spherical, unless $h_3 = 0$, and hence a more accurate and complicated formula for the moment of inertia should be used which would depend on R , h_2 and h_3 as well as orientation with respect to the axis of rotation. This more detailed analysis will be performed in the next section and will essentially agree with the results just obtained.

The Earth's Moment of Inertia

In this section a rather precise model for the earth's moment of inertia will be derived and, in the next section, applied to a Flood model. It will first be necessary to obtain the moment of inertia of an arbitrary spherical cone of apex angle ψ and with orientation angle ϕ_0 (note the different meaning from that of the ϕ in Equations 1 and 2) as shown in Figure 7. The moment of inertia of the spherical cone OBC is

$$I(\psi, \phi_0, R) = \int \int \int r^2 dI(\theta, \phi, R) \quad (23)$$

where $\sigma(\theta, \phi, R)$ is the density and

$$dI(\theta, \phi, R) = r^2 \cdot \sigma \rho^2 \sin \phi d\theta d\phi d\rho = \sigma \rho^4 \sin^3 \phi d\theta d\phi d\rho \quad (24)$$

Hence define

$$I(\theta, \phi, R) = R^5 \sigma H(\psi, \phi_0) \quad (25)$$

where

$$H(\psi, \phi_0) = \frac{1}{5} \int_0^\psi \int_0^{2\pi} \sin^3 \phi d\theta d\phi \quad (26)$$

For Figure 7(a)

$$\begin{aligned} H(\psi, \phi_0) &= \frac{1}{5} \int_0^\psi \int_0^{2\pi} \sin^3 \phi d\theta d\phi \\ &= \frac{2}{5} \pi \left(\frac{2}{3} - \cos \psi + \cos^3 \psi / 3 \right) \end{aligned} \quad (27)$$

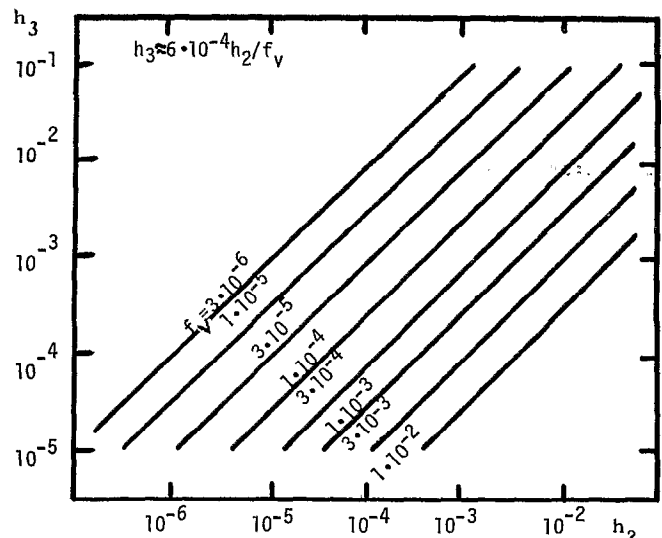


Figure 6. This chart gives the permissible values of the pre-Flood f_v , h_2 , and h_3 , assuming that present conditions are those after the Flood, i.e. $\Delta R_1 = 2.10^{-4}$ and that the net throughout the Flood was precisely zero.

In cases (b), (c) and (d) the law of cosines for the spherical triangle ABC will be solved for the limit on the first integration. For Figure 7(b)

$$H(\psi, \phi_0) = \left(\frac{1}{5}\right) \cdot 2 \int_{\phi=0}^{\pi/2+\psi} \int_{\theta=0}^{\cos^{-1}(\cos\psi/\sin\phi)} \sin^3\phi d\theta d\phi \quad (28)$$

$$= \frac{4}{5} \int_{\phi=0}^{\pi/2+\psi} \sin^3\phi \cos^{-1}(\cos\psi/\sin\phi) d\phi$$

For Figure 7(c)

$$H(\psi, \phi_0) = \frac{1}{5} \int_{\phi=\phi_0-\psi}^{\phi_0+\psi} \int_{\theta=0}^{\theta(\phi)} \sin^3\phi d\theta d\phi \quad (29)$$

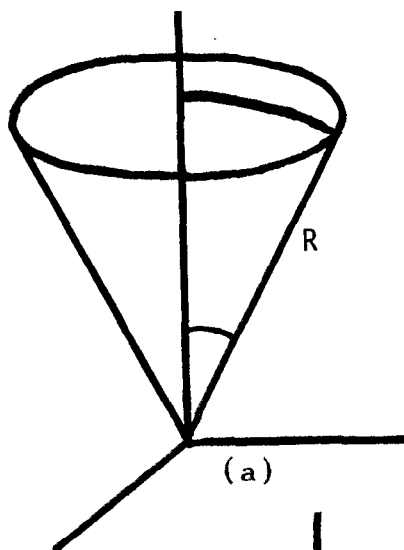
$$= \frac{2}{5} \int_{\phi=\phi_0-\psi}^{\phi_0+\psi} \sin^3\phi \cdot \beta(\phi) d\phi$$

$$\beta(\phi) = \cos^{-1}[(\cos\psi - \cos\phi\cos\phi_0)/(\sin\phi\sin\phi_0)]$$

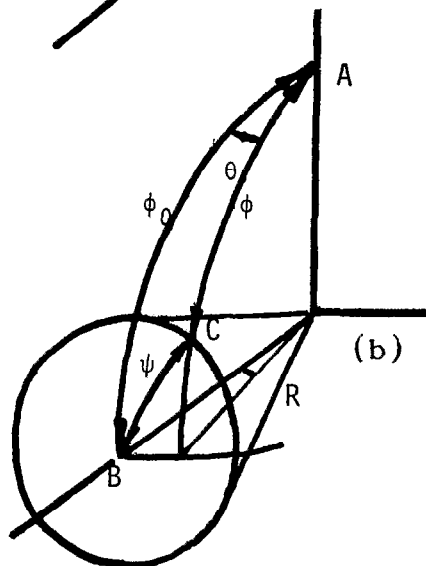
For Figure 7(d)

$$H(\psi, \phi_0) = \frac{1}{5} \int_{\phi=\psi-\phi_0}^{\psi+\phi_0} \int_{\theta=0}^{\theta(\phi)} \sin^3\phi d\theta d\phi + H(\psi - \phi_0, 0) \quad (30)$$

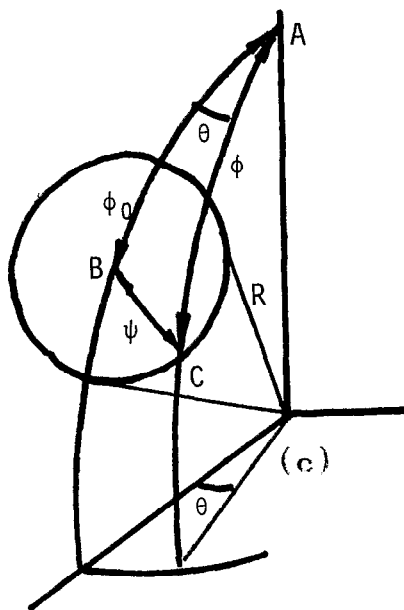
$$= \frac{2}{5} \int_{\phi=\psi-\phi_0}^{\psi+\phi_0} \sin^3\phi \cdot \beta(\phi) d\phi + H(\psi - \phi_0, 0)$$



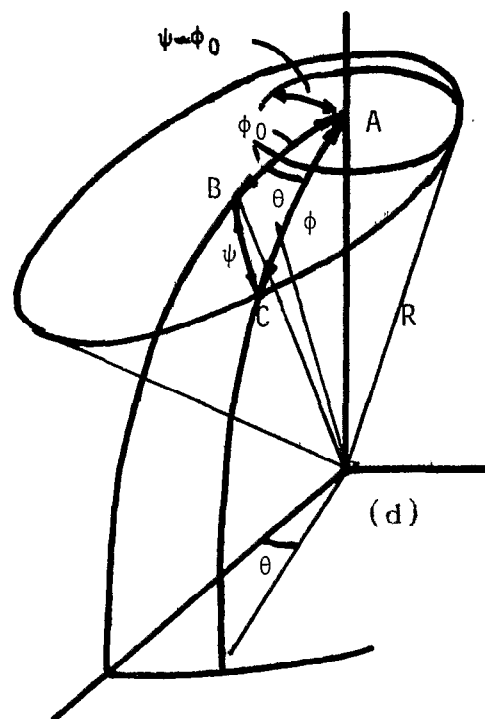
(a)



(b)



(c)



(d)

Figure 7 (in four parts). This shows the coordinates and geometry for determining the moment of inertia of a spherical cone about the vertical axis for arbitrary cone angle ψ , radius R , and cone axial angle ϕ_0 . (a), $\phi_0 = 0$, $0 \leq \psi \leq \pi$. (b), $\phi_0 = \pi/2$, $0 \leq \psi \leq \pi$. [c], $\psi \leq \phi_0$. (d), $\psi > \phi_0$.

Table 2 contains values for $H(\psi, \phi_0)$ obtained by numerical integration. The moment of inertia of a sphere is $I(0, \pi, R) = (8/15)\pi R^5$ for unit density.

The value of $H(\psi, \phi_0)$ permits the computation of the moment of inertia for any Flood geometry by volumetric decomposition into spherical shells and spherical cones. A table in terms of R as well as ψ and ϕ_0 could be constructed for an assumed variation of σ with R .

A Flood Model

In this section a possible Flood model will be suggested predicated on present observations. Figure 8 shows this model. Figure 8(a) represents the pre-Flood geometry with the ocean subtending a central angle of 2ψ displaced by the angle ϕ_0 from the earth's axis of rotation and possessing a water volume of f_v .

Figure 8(b) occurs at the outset of the Flood at which time the pre-Flood ocean is pushed up above the land accompanied a fall of the land. Flood waters have been increased from f_v to f'_v while the ocean still subtends central angle 2ψ . Figure 8(c) shows the earth overspread by the fallen water of 8(b) to depth X_1 as it might had been throughout much of the Flood year. Figure 8(d) shows the present configuration where the volume of free water is now f''_v .

The moment of inertia of the earth about its axis of rotation can be computed in reference to Figure 8(a),

$$I_a = \frac{8}{15} \pi \sigma_e R^5 - \sigma_e [R^5 - (R - h_2 - h_3)^5] H(\psi, \phi_0) \\ + \sigma_w [(R - h_3)^5 - (R - h_2 - h_3)^5] H(\psi, \phi_0) \quad (31)$$

where σ_e and σ_w are the densities of the dry earth and water. Similarly

$$I_b = \frac{8}{15} \pi \sigma_e R'^5 - \sigma_e [R'^5 - (R - h'_2 - h_3)^5] H(\psi, \phi_0) \\ + \sigma_w [(R' - h_3)^5 - (R' - h'_2 - h_3)^5] H(\psi, \phi_0) \\ I_c = \frac{8}{15} \pi \sigma_e R'^5 + \sigma_e [R'^5 - (R' - h'_2 - h_3)^5] H(\psi, \phi_0) \\ + \frac{8}{15} \pi \sigma_w [(R' + X_1)^5 - R'^5] \\ + \sigma_w (R'^5 - (R' - h'_2 - h_3)^5) H(\psi, \phi_0) \\ I_d = \frac{8}{15} \pi \sigma_e (R'' - h''_2 - h_3)^5 + \sigma_e [R''^5 - (R'' - h''_2 - h_3)^5] \\ H(\psi, \phi_0) + \frac{8}{15} \pi \sigma_w [(R'' - h_3)^5 - (R'' - h''_2 - h_3)^5] \\ - \sigma_w [(R'' - h_3)^5 - (R'' - h''_2 - h_3)^5] H(\psi, \phi_0) \quad (32)$$

These expressions can be simplified by expanding the fifth powers and retaining only the first order term,

$$I_a \approx \frac{8}{15} \pi \sigma_e R^5 + 5R^4 H(\psi, \phi_0) [\sigma_w h_2 - \sigma_e (h_2 + h_3)] \\ \approx \frac{8}{15} \pi \sigma_e (1 + 5\delta R) + 5(1 + 4\delta R) H(\psi, \phi_0) \\ [\sigma_w h_3 - \sigma_e (h_2 + h_3)] \quad (33) \\ \approx \frac{8}{15} \pi \sigma_e + \delta R \left[\frac{8}{3} \pi \sigma_e + 5H(\psi, \phi_0) [\sigma_w h_2 - \sigma_e (h_2 + h_3)] \right]$$

Define $I_a \approx I_o + \Delta I_a$, with the interpretation

$$I_o = \frac{8}{15} \pi \sigma_e \quad (34)$$

$$\Delta I_a \approx \delta R \left[\frac{8}{15} \pi \sigma_e + 5H(\psi, \phi_0) [\sigma_w h_2 - \sigma_e (h_2 + h_3)] \right]$$

Similarly

$$\Delta I_b \approx \delta R' \left[\frac{8}{3} \pi \sigma_e + 5H(\psi, \phi_0) [\sigma_w h'_2 - \sigma_e (h'_2 + h_3)] \right] \quad (35)$$

$$\Delta I_c \approx \delta R' \left[\frac{8}{3} \pi \sigma_e + 5H(\psi, \phi_0) (\sigma_w - \sigma_e) (h'_2 + h_3) \right] + 3\pi \sigma_w X_1$$

$$\Delta I_d \approx \delta R'' \left[\frac{8}{3} \pi - 5H(\psi, \phi_0) [\sigma_w h''_2 - \sigma_e (h''_2 + h_3)] \right]$$

Assuming angular momentum conserved as would be expected, and the axis of rotation unchanged, $I_a \omega_a = I_i \omega_i$, ($i = a, b, c$). (Strictly speaking the Euler equations of motion should be solved from which $h = I\omega$ is conserved where now ω is the angular velocity vector and I the inertia tensor and where the energies associated with the forces of the upheaval are considered). Define $\omega_a = 1$ then

$$\omega_i = I_a/I_i \approx (I_o + \Delta I_a)/(I_o + \Delta I_i) \quad (36)$$

$$= (1 + \Delta I_a/I_o)/(1 + \Delta I_i/I_o)$$

$$\approx (1 + \Delta I_a/I_o)(1 - \Delta I_i/I_o)$$

$$\approx 1 + (\Delta I_a - \Delta I_i)/I_o$$

Hence define $\omega_i = 1 + \Delta\omega_i$ and $\Delta\omega_i = (\Delta I_a - \Delta I_i)/I_o$.

Table 3 contains a summary of a set of assumed values for this model and the resulting computed values. The beforementioned approximations $\psi = 73F_v^{1/2}h_2^{-1/2}$, and $\delta R \approx 0.335 f_v h_2^{-1} h_3$ will be used. Let $\phi_0 = 20$ in all four epochs. As before, the present values $f_v = 1.2 \cdot 10^{-3}$, $h_2 = 5 \cdot 10^{-4}$, $h_3 = 2.5 \cdot 10^{-4}$ will be adopted from which $\psi = 107$ and $\delta R = +7.37 \cdot 10^{-4}$. This establishes $\psi = 180 - 107 = 73$ for epochs (a), (b) and (c). At epoch (b) the assumed values of ψ and h_2 give

	$\phi = 0$	10	20	30	40	50	60	70	80	90
$\psi = 5$	0.00002	0.00016	0.00057	0.00121	0.00198	0.00281	0.00358	0.00422	0.00463	0.00477
10	0.00029	0.00085	0.00247	0.00495	0.00800	0.01124	0.01428	0.01677	0.01839	0.01895
15	0.00144	0.00267	0.00620	0.01161	0.01824	0.02530	0.03194	0.03734	0.04087	0.04210
20	0.00448	0.00656	0.01256	0.02175	0.03302	0.04501	0.05628	0.06547	0.07147	0.07355
25	0.01069	0.01375	0.02259	0.03612	0.05271	0.07037	0.08697	0.10050	0.10933	0.11240
30	0.02155	0.02565	0.03746	0.05556	0.07776	0.10138	0.12358	0.14168	0.15349	0.15759
35	0.03862	0.04373	0.05843	0.08096	0.10859	0.13800	0.16563	0.18815	0.20285	0.20795
40	0.06342	0.06942	0.08668	0.11314	0.14560	0.18013	0.21258	0.23903	0.25630	0.26229
45	0.09728	0.10398	0.12327	0.15282	0.18907	0.22765	0.26390	0.29345	0.31273	0.31942
50	0.14125	0.14840	0.16898	0.20051	0.23919	0.28035	0.31902	0.35055	0.37112	0.37826
55	0.19602	0.20332	0.22432	0.25649	0.29595	0.33795	0.37741	0.40957	0.43056	0.43785
60	0.26180	0.26891	0.28937	0.32071	0.35916	0.40008	0.43853	0.46987	0.49032	0.49742
65	0.33830	0.34488	0.36382	0.39283	0.42843	0.46630	0.50189	0.53091	0.54984	0.55641
70	0.42472	0.43044	0.44692	0.47217	0.50314	0.53609	0.56705	0.59229	0.60876	0.61448
75	0.51978	0.52435	0.53753	0.55772	0.58248	0.60883	0.63358	0.65376	0.66693	0.67151
80	0.62174	0.62493	0.63412	0.64820	0.66547	0.68384	0.70111	0.71518	0.72437	0.72756
85	0.72851	0.73015	0.73487	0.74210	0.75097	0.76041	0.76928	0.77650	0.78122	0.78286
90	0.83776	0.83776	0.83776	0.83776	0.83776	0.83776	0.83776	0.83776	0.83776	0.83776

Table 2. This gives values of $H(\psi, \phi_0)$. A computer program for computing H is available from the author.

$f_v = 10^{-4}$. The resulting value of $X_1 = 3.3 \cdot 10^{-5}$ for epoch (c) corresponds to an average global ocean depth throughout the Flood year of $3.3 \cdot 10^{-5} \cdot 4000 = .33\text{mi}$. An increase of f_v by a factor of 120 from epoch (a) to (d) has again been used. The specific densities $\sigma_w = 1$ and $\sigma_s = 5 \cdot 5$ have been used.

This more detailed analysis of the earth's angular velocity agrees with the sense of the previous cruder analysis, i.e. the angular velocity, again, has increased, by $4 \cdot 34 \cdot 10^{-4}$, as compared with $1 \cdot 98 \cdot 10^{-4}$. The computed angular velocity changes would surely be smaller if total momentum was not conserved. I am of the opinion that to pursue this matter too deeply would be to inquire of secret things of the Lord (Deut 29:29); for He is not constrained by the conservation of energy or any other of man's perceptions of nature.

Possible Changes in the Earth's Axis of Rotation

Since the three principle moments of inertia of the earth are very nearly equal, then the raising and falling of both land and water during the Flood year will leave the spatial direction of the earth rotation axis essentially invariant but may very substantially alter the geographic location of the point on the earth's surface where the axis pierces it, i.e. great wandering of the pole could take place.^{3,4}

The effect of Flood events would be to alter the principle moments of inertia and thus cause a displacement of the poles. In this way, through a succession of such events, a point near the pre-Flood equator might come to rest in a polar region after the Flood. This analysis is quite lengthy and will be presented in a later paper in which the Euler equations for a body-fixed set of axes are solved and the resulting angular velocity components transformed to an inertial reference.

A Possible Mechanism for the Formation of Ice

One of the motivations for this paper was to investigate conditions for the formation of global ice. One obvious means by which large areas of ice could have been formed would be the repeated evaporative cooling of the waters on the earth during the after Flood. When sufficient heat had been removed freezing would occur. Such freezing should not have occurred before the Flood, if the canopy model is correct.¹

This process, though it started during the Flood year, did not form ice immediately after the Flood for Noah set foot on high and dry land (Gen 8:4, 13) when embarking from the Ark. Hence great build-ups of ice, by refrigeration, occurred during the years after the Flood and were followed quickly by melting; for by the time of Job, already, great melting⁵ and formation of brackish ice water were common (Job 6:16, 24:19, 37:6, 7, 10, 36:28-30).

A second means by which ice could have been formed is by great pressure. This would form ice almost instant-

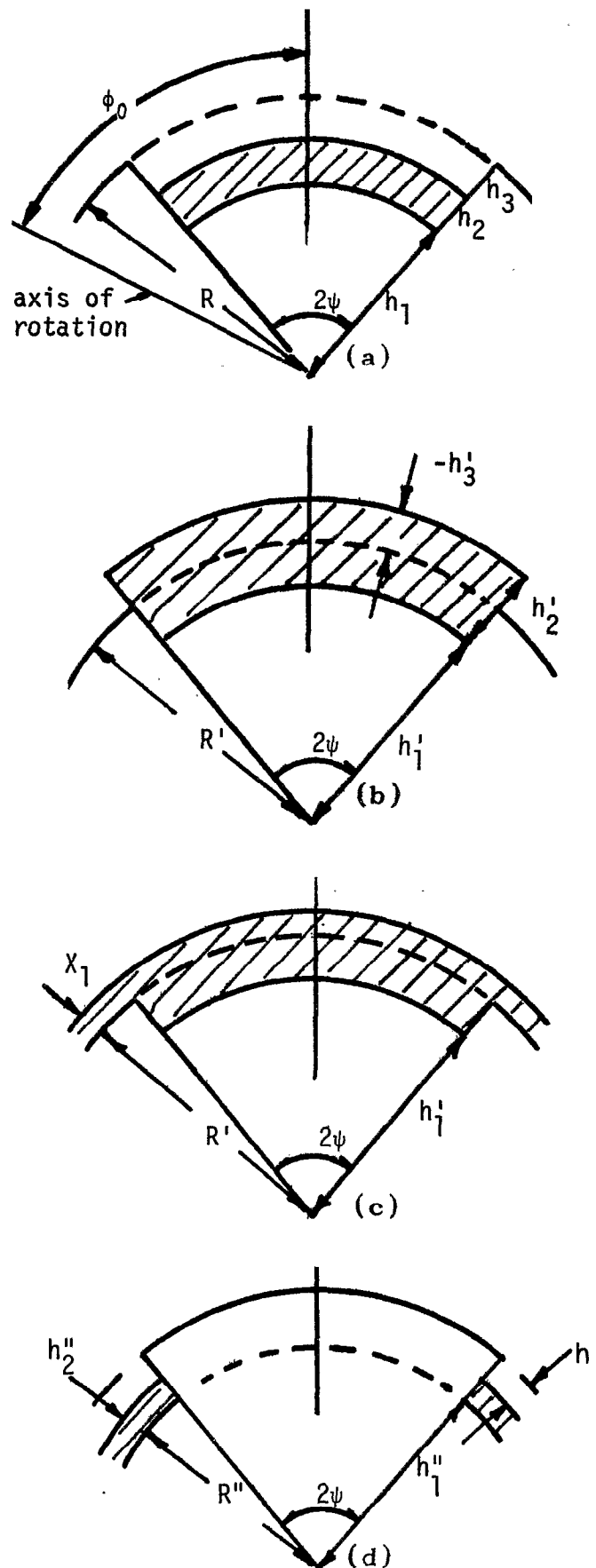


Figure 8. This shows the geometry of a Flood model in which the pre-Flood ocean bottom becomes the post-Flood dry land. Epochs (a)-(d) show, respectively, the pre-Flood geometry, the upwelling of Gen 7:11 and Ps 33:7, the Flood year during which the earth was covered, and the post-Flood conditions. (a), pre-Flood, $t = 0$, f_v . (b), upwelling, $t = t'$, f_v , $h'_2 > -h'_3$. (c) Flood year, $t = t'_2$, f_v . (d), post-Flood, $t = t''$, f_v .

Epoch	f_v	h_2	h_3	ϕ_0	ψ	$10^6 \delta R$	x_1	x_2	x_3	P_e	$10^4 \Delta I$	$10^4 \Delta \omega$
(a) Pre-Flood	$1.0 \cdot 10^{-5}$	$1.0 \cdot 10^{-5}$	$1.0 \cdot 10^{-5}$	20	73	3.35	-	-	-	-	-2.74	-2.17
(b) Upwelling	$1.0 \cdot 10^{-4}$	$1.0 \cdot 10^{-4}$	$-1.0 \cdot 10^{-4}$	20	73	-3.35	-	-	$3.3 \cdot 10^{-5}$	$1.2 \cdot 10^{21}$	+2.74	-2.50
(c) Flood year	$1.0 \cdot 10^{-4}$	-	-	20	73	-3.35	$3.3 \cdot 10^{-5}$	-	-	0	+2.45	-2.50
(d) Post-Flood	$1.2 \cdot 10^{-3}$	$5.0 \cdot 10^{-4}$	$2.5 \cdot 10^{-4}$	20	107	737.	-	-	-	-	-43.	0

Table 3. This gives a summary of the Flood model as pictured in Figure 8. The numbers enclosed in boxes are the assumed values from which all others on the same line were computed. The conditions in the post-Flood epoch have been assumed to be the same as at present.

ly and might provide a mechanism by which the mammoths of Siberia were so quickly frozen. In the case where h_3 is negative a great upswelling of water takes place followed by the release of potential energy P_e . The potential energy would give rise to the enormous kinetic energy of the waters rushing away radially from the location of the event. The antipodal point to the event would be the site of a heaping-up.

An enormous gradually decreasing wave, or waves, would travel back and forth until sufficient kinetic energy was dissipated through friction. At the first convergence of water at the antipodal point great pressures would result where a heightening circular wall of water converges to a point. It is suggested that potential energy of about 10^{20} ergs released by the Flood event would yield pressures on the order of 10^4 atmospheres near the antipodal point which would be sufficient to quick-freeze the water even if its temperature were $200^\circ\text{F}.$ ⁶

Subsequent removal of heat from the ice through the geographical cooling mentioned above coupled with the great pressure of the just-formed ice and water above could possibly maintain the ice, i.e. keep it from all melting. As many such events must have occurred throughout the globe during the Flood it would seem reasonable to assume that sizeable amounts of ice were formed at antipodal points and at the interface of the colliding waves emanating from Flood events.

At impact points large amounts of debris accumulated by the moving waters were deposited. The resonance of such impact points and lines could account for continent-size land and ocean bottom formations. Similarly this action might account for the hollowing out of ocean basins whereby material was eroded and carried from one place to be dumped another when at impact the water was momentarily at rest. This picture might be suggested for understanding the lines of tectonic activity and rift lines throughout the earth, the rift lines being the locations of upwelling events and the tectonic mountain lines being the locations of the corresponding impacts.⁷

A Possible Explanation of the Frozen Mammoths

A mechanism for instantly freezing large warm masses might explain the freezing of the Siberian mammoths so quickly and thoroughly that some have been perfectly preserved through several thousand years. To appreciate the enigma of the mammoths and the many dilemmas that they present to evolutionary theory one need only read Hapgood's thorough treatise.⁸ The pre-

sent writer holds that ordinary convective or conductive cooling could not account for the mammoths' state of preservation, for too much decay would occur before freezing was completed and thereafter. Such freezing would not be thorough enough to provide such preservation for even a decade.^{8,9}

This conjecture will be dealt with elsewhere in a detailed mathematical analysis of the thermodynamics and hydrodynamics associated with the ice formation by pressure and the possibility of the need to quick-freeze the mammoths.

Mammoth remains are found all over the world; however, they are only preserved in the flesh in arctic-like regions such as Siberia.^{8,9} The mammoth was *not* a cold weather animal.^{8,9} Since, amongst animals, the mammoth was comparatively highly mobile, he would have resisted the Flood longer by attaining high ground. To do this mammoths may have covered vast distances in order to congregate on remaining islands. Thus having congregated, they would be assembled for their mass burial. If great walls of water were to collide at their place of assembly then the mammoths would be as so much debris frozen into the water by the great pressure of impact.

The Meaning of Psalm 104:8

The King James Version translation of Ps 104:6-8 reads;

:6 Thou coveredst it with the deep as with a garment: the waters stood above the mountains.

:7 At thy rebuke they fled; at the voice of thy tunder they hastened away.

:8 They go up by the mountains; they go down by the valleys unto the place which thou hast founded for them.

Verse 6, I suggest, describes the Flood which covered the earth. Verses 7 and 8 describe the releasing of water (i.e. an increase of f_v) for the Flood followed by the raising of water (i.e. negative h_3) and subsequent spreading forth of the heaped up waters, then eventually followed by some of the excess water once again being encapsulated (i.e. a decrease of f_v) as subterranean water.

It is suggested that the arguments of this paper provide a mathematical representation of Ps 104:6-8 which is compatible with Gen 7:11, 8:1-5, and other references such as Ps 33:7, Job 38:8, etc. Modern translations, e.g. the ASV, RSV and NASV, translate verse 8 with, "The mountains rose, the valleys sank," This translation and the King James Version marginal note ("The mountains ascend, the valley descend") are

seen as corollary to the King James Version text; in that the primal act of God in bringing forth the Flood was the breaking of fountains of the deep giving rise to heaping up of water which, in order to conserve total volume, would be followed by an overall land subsidence that would unleash associated up and down land motions. Furthermore, as already discussed, the spreading forth would carve out valleys and deposit mountains elsewhere at water impact regions. The rendering given by the modern translations seems to be favored by many creation scientists; for example see Whitcomb's discussion.¹⁰

References

¹Whitcomb, J. C., Jr., and H. M. Morris, 1961. The Genesis flood. Presbyterian and Reformed Publishing Co., Nutley, New Jersey.

²Kuiper, G. P. (ed.) 1954. The Earth as a planet. University of Chicago Press.

³Jeffreys, H., 1953. The Earth, third edition. Cambridge University Press.

⁴Maxwell, J. C., 1857. On the dynamical top. *Transactions of the Royal Society of Edinburgh* 21, 559-570.

⁵Northrup, B., 1976. Light on the ice age. *Bible-Science Newsletter* 14(6)(June):1-4.

⁶Finday, A., A. N. Campbell, and N. O. Smith, 1951. The phase rule. Dover Publishing Co., New York. Chapter 4.

⁷Wilson, J. T. (ed.) 1973. Continents adrift. W. H. Freeman Co., San Francisco.

⁸Hapgood, C. H., 1970. The path of the pole. Chilton Book Co., Philadelphia.

⁹Dillow, Jody, 1977. The catastrophic deep freeze of the Beresovka mammoth. *Creation Research Society Quarterly* 14(1):5-13.

¹⁰Whitcomb, J. C., Jr., 1973. The world that perished. Presbyterian and Reformed Publishing Co., Nutley, New Jersey.

A PLEA FOR CAUTION ABOUT SKULL 1470

CHRIS C. HUMMER*

Received 27 May 1977

The well known skull 1470, found by Richard Leakey, has been cited by many Creationists as evidence that man appears in the fossil record as early as other hominids, and that when he does appear he is fully a man. However, the skull has ape-like, as well as man-like, features. The author urges that Creationists be very cautious in using this skull as evidence, for if it should be decided later that it is not a human skull after all, they would have been leaning on a broken reed. It is suggested also that there is other evidence which Creationists should consider, and which they might find to be more conclusive and more helpful.

In 1973 Richard E. F. Leakey cautiously announced the astounding find of a human-like fossil skull that possessed features too advanced for its tremendous antiquity of 2.8 million years. KNM-ER 1470, better known simply as "Skull 1470", immediately became controversial. Most evolutionary anthropologists were at first unwilling to accept its antiquity. Gradually acceptance was gained as several prominent scientists attested to its genuineness. The find of the decade shocked the world of anthropology. The neat textbook scenario of human evolution that pictured primitive forms progressing to modern man was suddenly all wrong. Of the skull Leakey said, "it simply fits no previous models of human beginnings . . . leaves in ruins the notion that all early fossils can be arranged in an orderly sequence of evolutionary change."¹

Skull 1470 is now regarded, tentatively at least, by some as genus *Homo*, species indeterminate. Marvin Harris assigns the skull to an advanced hominid series called "habilines" which includes the controversial Lothagam mandible fragment and the dubious *Homo habilis*.² According to Leakey and others favoring *Homo* status, the creature lived contemporaneously with the australopithecines, considered by most scientists through the decade of the 1960's to be the "missing link" between man (*Homo erectus*) and his earlier ape-like ancestor, *Ramapithecus*.

But 1470 is more advanced than *Australopithecus*. *Australopithecus* cannot, therefore, be a human ancestor. But where did 1470 come from? No one knows. The fossil record, at this point, is not known to contain any ancestral forms for 1470. Even Harvard geologist Stephen Jay Gould is willing to admit that the form "appears suddenly" in the fossil record.³

Creationist Comment on Skull 1470

Creationists welcomed the find joyously, especially when evolutionists emphasized its "human" features and began to call it genus *Homo*. Jon Buell in an article for *Moody Monthly* commented: "(the) find of Skull 1470 is not at all disquieting to the creationist, but it is to the evolutionist".⁴ Duane T. Gish in his little book *Evolution: The Fossils Say No!* wrote: "The latest reports of Richard Leakey are startling, and, if verified, will reduce to a shambles the presently held schemes of evolutionists concerning man's origins".⁵ And even more recently Marvin Lubenow, in his essay on evolutionary reversals, asserted that fossil skull 1470 "is more 'modern' than either *Homo erectus* or the Neanderthals, both of which, in evolutionary concepts, are supposed to have arisen much later".⁶

Features of the Skull

Before proceeding further with an interpretation of this "startling" fossil, it is well to pause for a moment to catalogue its "remarkable mixture of both primitive and advanced features".⁷

*Chris C. Hummer, B.D., M.A., teaches Anthropology and Prehistoric Archaeology at Plymouth-Whitemarsh Senior High School, Plymouth Meeting, Pennsylvania. His address is 1121 Rose Lane, Berwyn, Pennsylvania 19312.

(1) The skull lacks the prominent eyebrow ridges common on *Homo erectus* (eg., Java Man), many Neanderthals, and its own contemporary, *Australopithecus*. (2) The brain case is 775 cc. (cubic centimeters) in capacity, which is as large as some rather small human brains. (3) The leg bones (found several weeks after the skull, but from the same 12 square mile area), assuming they belong to 1470, are "almost indistinguishable from those of *Homo sapiens*", and indicate an upright mode of locomotion. (4) The jaw and the molars (these from perhaps a child of the same species) are somewhat larger than the average modern human's. (5) The lack of bony support beneath the nostrils might indicate a rather gorilla-like nose. (6) The individual is thought to have been a mature female who weighed over 100 pound.^{8,9} (7) Anatomist Alan Walker from the University of Nairobi, Kenya believes he may have found a Broca's area impression on the underside of the skull.¹⁰ In man Broca's area is that part of the brain which controls articulate speech.

Skull 1470 has been with us for nearly five years. Indeed, there is even another newer find on the record. In August 1975 near Lake Turkana (formerly Rudolf), Kenya, Richard Leakey's team found a man-like creature that Leakey describes as "a dead ringer" for 1470.¹¹ It seems confirmed, then, that the species did exist.

The Need of Caution by Creationists

It is at this point that I want to urge caution. I would caution creationists to not be overconfident in assigning Skull 1470 to our genus. I have serious doubts about such an assignment, especially with the announcement of the second find. The reasons for my doubt will be listed below. In doubting that 1470 was a human I am not thereby arguing for evolution. I am a convinced creationist. But creationists should not appear credulous, nor go out too far on a limb. We should have sound scholarly reasons for our position on this or any other skull find. And we should remember that the evolutionists may change their minds. They did about *Australopithecus*.

My point is this. The evolutionary mind thinks in terms of a general trend in time in which it is supposed man has rid himself of primitive or ape-like characteristics. "Advanced", as used of 1470, is therefore a relative term. 1470 is advanced from an evolutionist's point of view when compared with previously known australopithecines: its brain is larger, it lacks prominent orbital ridges, it possibly had better bipedal locomotion. And it had all these things at a time far earlier than the evolutionary mind was ready to accept. There was, in consequence, a great deal of discussion about the advanced features.

Therein, however, lies the very danger for creationists. We must not take the relative term "advanced" used by the evolutionists and make it our absolute. The evolutionary definition of man to such an extent as it is definite at all, falls rather short of a Biblical definition. "Man" is not simply an erect, bipedal, large brained (relatively), tool-making/using creature. Speech, for example, is one item many evolutionists leave out of their definition. Speech was one of the characteristics of the

first created humans according to the Biblical record (Genesis 2:23). 1470 may or may not (the evidence on the fragmentary skull is extremely tenuous) have had the facility for speech. Leakey was apparently assigning 1470 to genus *Homo* before Alan Walker's report that he may have found a Broca's area on the inside of the skull.¹² Indeed, the things which make a being human in the Biblical sense are precisely those which would hardly be preserved in a fossil.

On the basis then of the morphology (shape, form) of the Skull 1470 I want to argue that it is doubtful whether its so-called advanced features are so advanced as to warrant calling it a human skull. We will examine and comment on its features in some detail.

A Closer Look at Some Features

Browridges and forehead. Heavy prominent browridges and sloping forehead are considered primitive features. They are common on monkeys and apes; and humans who possess them may be said to have simian features. Modern man almost always is relatively free of such pronounced ape-like characteristics. Some forms of early man (*Homo erectus*, Neanderthal, others) were characterized by both. If evolution were true one should find them rather prominently displayed on early forms of man, since he would be closer in time and evolution to his ape-like ancestors than is modern man.

The fossil record is rather inconsistent on this matter. Some fossil apes have prominent browridges, some do not. One that does not is *Proconsul*, the reputed ancestor of *Ramapithecus* (the so-called "first hominid"), who lived more than 10 million years ago (ages cited are those used by evolutionists). There are some early men that lack prominent browridges: A Fontéchevade female skull associated with pre-Neanderthal tools; and fossils from Kanjera, East Africa, of about the same antiquity.¹³ And there are some very recent men who had them: mineralized bones of some 40 humans who reportedly lived only 10,000 years ago were recently discovered at Kow Swamp, north of Melbourne, Australia. The excavators tell of "massive and prominent" browridges on the skulls.¹⁴

The browridges on 1470 are not prominent. The forehead does slope backward rather abruptly in simian fashion, but it is more rounded (as is the occipital area of the skull) than that of either ape or robust varieties of australopithecines (Fig. 1). In light of the inconsistent fossil record and normal modern men who have simian features this evidence seems inconclusive by itself as to what genus 1470 belongs.

Brain. The absolute and relative sizes of the brain of 1470 seem to me the most damaging features of the skull's claim to *Homo* status. The listed cranial capacity for 1470 is 775 cc.¹⁵ Compared to the gorilla (average, 500 cc.) or to *Australopithecus* (422 cc. to 530 cc.), that is rather large. The average brain size for modern man is about 1,450 cc. The small brain of Anatole France measured 1,000 cc., but very few humans with brains as small as 1470's have been recorded. By modern standards a human with a brain as small as 775 cc. is classified as microcephalic. "Humans with microcephaly are quite subnormal in intelligence, but they still show specifically human behavioral patterns . . ."¹⁶

As important as absolute brain size are studies of brain size and body weight ratios (or relative brain size), and the neurological organization of the brain. With regard to the first of these two items I quote from McHenry's report of his rather elaborate study of early hominids:¹⁷

None of these early hominids had brains approaching the size of modern human ones. The indices of encephalization show that australopithecines were only slightly above the great apes in relative brain size and even the largest cranium (KNM-ER 1470) is about as close to apes as it is to humans.

The neurological organization of a fossil brain is more difficult to assess. Casts made of fossil hominid brains can reveal at least the general brain morphology, but precise impressions of the convolutions of the

cerebral cortex and the furrows marking the boundaries between the various lobes are not found on the skull interior. Having made an endocast of 1470, Holloway wrote: "... this very ancient and relatively large brain was essentially human in neurological organization".¹⁸ For those who want 1470 listed as genus *Homo* however, that statement may not be as supportive as it sounds: Holloway, in the preceding paragraph, says that *Australopithecus* also had "an essentially human brain." *Australopithecus* is today considered a primitive evolutionary dead end, an experiment that went nowhere.

For several years the possibility existed that 1470 was a single human fossil that just happened to be a microcephalic. Cranial fragments of possibly a child of the same species found near the original 1470 are inconclusive. But there are now other 1470-type fossils on

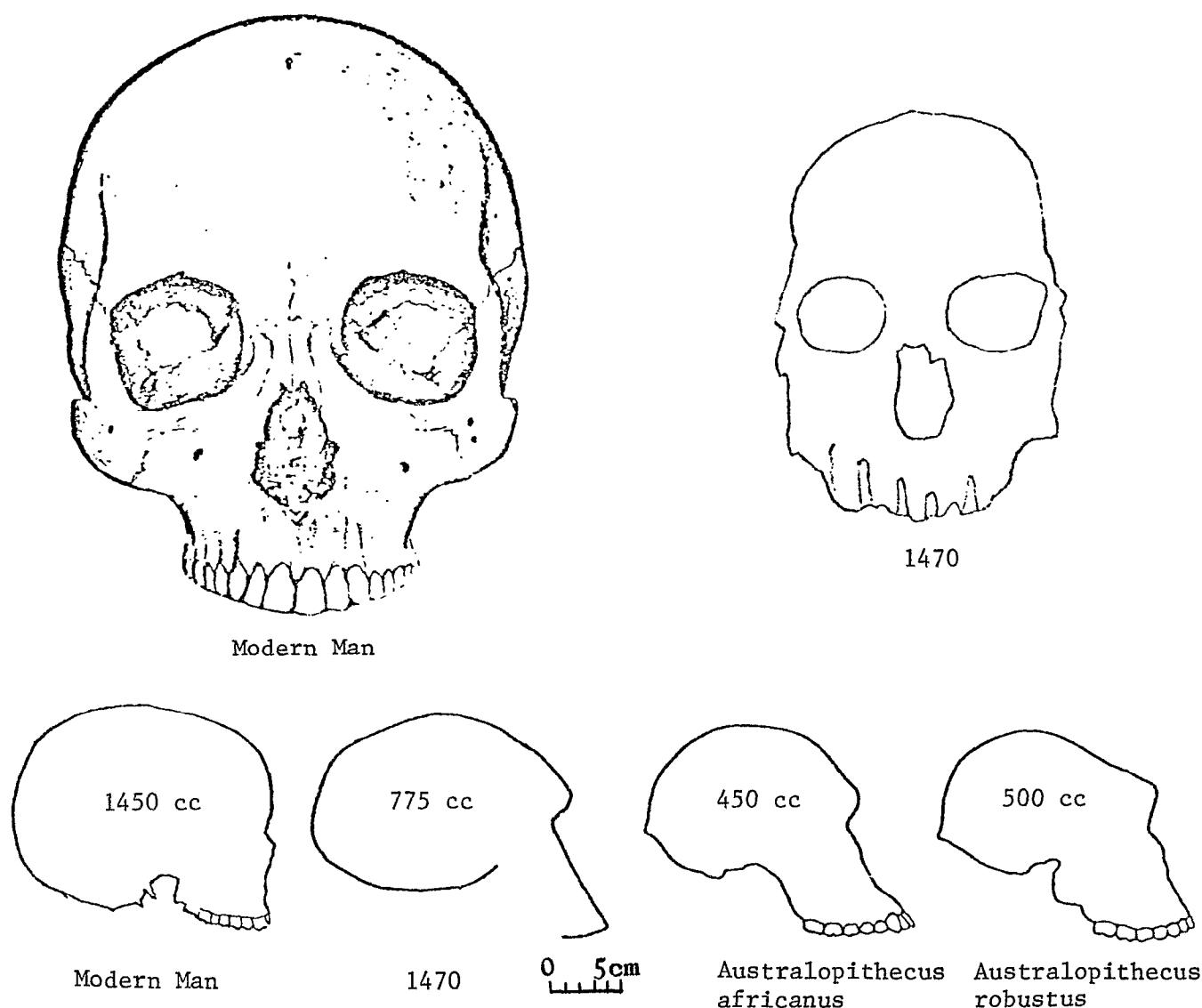


Figure 1. Skull 1470 seems to have more in common with *Australopithecus* than with *Homo*. It may represent an australopithecine variant. The sample is still too impoverished for us to make definitive statements about the relationship of Skull 1470 to the australopithecines and other hominids.

The following may be noted in the line drawings: (i) The prognathous facial profile of 1470 is similar to the australopithecines. (ii) The forehead of 1470 recedes at a rather low angle. (iii) The brain capacity is small compared to the average for modern man and even earlier sapient (for example, the Steinheim skull at 1150 cc.). (iv) The upper lip of Skull 1470 is nearly twice as long as the lip of genus *Homo*. A long upper lip is characteristic of apes.

the record, one of which Leakey describes as the "dead ringer." Not only do the additional finds establish the species, they also confirm that the species was small-brained both in an absolute sense and a relative sense when compared to modern man. This fact is a serious hindrance to placing 1470-types in genus *Homo*.

Face. The lower jaw of Skull 1470 was not recovered. In the reconstruction done for *National Geographic* by Jay H. Matternes the lower jaw is pictured as being chinless as is the case with monkeys, apes, australopithecines and some forms of early man. The reconstruction of the mandible was suggested by teeth and fragments of the possible 1470-type child found in the same area. Those teeth and jaw are reported as somewhat larger than ours, and imply, according to Leakey, a mixed diet of raw foods, including meat.¹⁹ No teeth were present in the upper jaw of 1470 but enough of the palate survives to suggest a horseshoe shape (a shape that occurs with small canine teeth and which characterizes australopithecines and man—hominid dentition). The assumed lower jaw and teeth are inconclusive evidence for assigning the skull to a particular genus.

The face below the eyes of 1470, including the upper jaw, is rather prognathous (protrudes forward). Facial prognathism (as opposed to alveolar prognathism when only the tooth-bearing parts project) is the rule among all apes and is true of the australopithecines. Facial skeletons in *Australopithecus* are larger relative to the size of the neurocranium (brain case) than they are in man. A numerical index to express the relationship of the two parts of the skull shows 51.0 to 64.5 to be the range for *Australopithecus*. The range in *Homo* is from 30.0 to 45.0. The face/cranium index for Skull 1470 is 59.0, or about in the middle of the australopithecine range.²⁰

Matternes felt justified in portraying a fleshed-out face of 1470 with a gorilla-like nose. The narrow nasal opening and the lack of bony support beneath the nostrils are indicative.

I might also point out that the quite long upper lip is very ape-like in contrast to the relatively short lip of humans.²¹

Some Attempts at Interpretation

Leakey feels that the gorilla-like nose "is perhaps the most strikingly unhuman feature . . .".²² My own feeling is that that nose, and that long upper lip on that prognathous face, are too primitive to be found on a member of genus *Homo*. It is true, and Matternes admits it, that soft features such as the nose of the reconstructed visage are conjectural. But, I believe that Gish over-simplified the matter in saying that it is merely necessary to replace the simian-like nose with a modern one in order to produce a human face "indistinguishable from types of individuals we have all seen many times".²³ A very small brained, long lipped, facially prognathous individual, regardless of the appearance of the nose, would not be a familiar looking human.

If not a member of genus *Homo*, what is 1470? Though many evolutionists are willing to assign 1470 to *Homo*, there are a significant number who are more

cautious. Alan Walker, who suggested the Broca's area in the skull, is one of those who urge caution in assigning such a taxonomic designation: "... several features that seem to be constantly found in *Australopithecus* are found in this cranium . . .".²⁴ (Fig. 2).

Marvin Harris' assignment of the skull to the habilines indicates his decision against *Homo* status for 1470. The best known representative of the habilines is *Homo habilis*. Elwyn L. Simons of Yale University maintains that holding *Homo habilis* as a valid species belonging in genus *Homo* is "defending a very weak case".²⁵ As Marvin Harris points out, "some experts continue to present persuasive arguments in favor of the theory that habilines, robusts, and graciles (the latter are both australopithecines) all belonged to one species".²⁶

If Skull 1470 is not that of a human, what does one conclude? The evolutionist still has his continuing puzzle as to just which hominid(s) represents the ancestral line(s) leading to man. The fossil record at three or four million years ago inconsistently presents the evolutionist with advanced and primitive hominids living side by side with no indication as to where they came from or

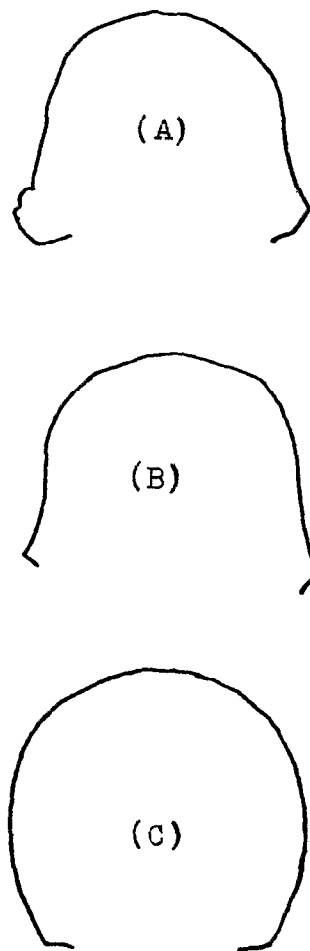


Figure 2. Comparison of *Australopithecus africanus* (A), Skull 1470 (B), and *Homo* (true man) (C). View is from the rear of the cranium. Note that the characteristic skirt-like profile of *Australopithecus* is true also of 1470. The widest part of the cranium is low as in *Australopithecus*.

where they went. No fossils connect either 1470 or *Australopithecus* back over five or more million years to *Ramapithecus*. No fossils connect 1470 forward in time to *Homo erectus*.²⁷

If, of course, Skull 1470 is a member of genus *Homo* creationists will welcome it; for it represents the sudden appearance of man in the fossil record without ancestral forms. Its find would be, on that basis, disquieting to the evolutionist.

Other Evidence Which Needs to be Considered

There are for the creationist some other interesting fossils to study from the supposed ancient time period of 1470 and the australopithecines. There are the femurs that "are unlike those of *Australopithecus*, and astonishingly similar to those of modern man".²⁸ There are the human-appearing fossil jaws of 11 distinct individuals recovered by Mary Leakey near Laetolil, Tanzania, in December 1974.²⁹ There is Donald C. Johanson's find of the left hand of an individual from the Afar Valley of Ethiopia that is "surprisingly modern in appearance".³⁰ What, though, does "astonishingly similar to modern man" mean? Were they or were they not humans whose remains Mary Leakey found? One wishes for clarification.

These new finds, as well as the claims of their finders, must also be treated with caution. Though I, personally, am sceptical of 1470, it should be considered that a scientific creation model would predict the presence of human bones together stratigraphically with other hominid remains in the fossil record. Much study remains to be done in order to clarify the hominid problem. So far there is little more than fragmentary skeletal remains to analyze. In spite of numerous and far ranging occurrences of stone tools (choppers, hammers, hand axes, etc.) and a provocative arrangement of stones suggesting a shelter in Bed I (the bottom!) of Olduvai Gorge, no cultural material has been found in unequivocal, direct and meaningful association with the fossil bones of Skull 1470 and related types. Creationists should be actively involved in hominid excavation, study and interpretation. They are the only ones who will bring to the study a proper definition of man. It may be said that for the evolutionist the definition of "man" is the problem.

References

- ¹Leakey, Richard E., 1973. Skull 1470. *National Geographic Magazine* 143(6):819-829.
- ²Harris, Marvin, 1975. Culture, people, nature. Thomas Y. Crowell Co., Inc. New York. pp. 50-52.
- ³Gould, Stephen Jay, 1976. Ladders, bushes, and human evolution. *Natural History* LXXXV(4):31.
- ⁴Buell, Jon, 1976. Creationist, evolutionist: who's more credible. *Moody Monthly*, January. p. 50.
- ⁵Gish, Duane T., 1973. Evolution: the fossils say no. Creation-Life Publishers, San Diego. p. 105.
- ⁶Lubenow, Marvin, 1976. Evolutionary reversals: the latest problem facing stratigraphy and evolutionary phylogeny. *Bible-Science Newsletter* 14(11):1-4.
- ⁷Leakey, *op. cit.*, p. 820.
- ⁸*Ibid.*, p. 829.
- ⁹McHenry, Henry M., 1975. Fossils and the mosaic nature of human evolution. *Science* 190(4213):425-431. See especially p. 430.
- ¹⁰1974. The Leakeys' telltale skulls. *Newsweek*. 15 July. p. 77.
- ¹¹1976. The oldest man. *Newsweek*. 22 March. p. 59.
- ¹²Leakey, *op. cit.*, pp. 820 & 821.
- ¹³Hulse, Fredrick S., 1973. The human species. Random House, New York. pp. 213-215.
- ¹⁴Katz, Solomon H., (ed.) 1975. Biological anthropology. W. H. Freeman and Co., San Francisco. p. 14.
- ¹⁵McHenry, *op. cit.*, p. 190.
- ¹⁶Holloway, Ralph L., (in) Katz, *op. cit.*, p. 73.
- ¹⁷McHenry, *op. cit.*
- ¹⁸Holloway, *loc. cit.*, p. 72.
- ¹⁹Leakey, *op. cit.*, p. 823.
- ²⁰Walker, Alan, (in) Coppens, Yves, F. Clark Howell, Glynn Ll. Isaacs, and Richard E. F. Leakey (eds.) 1976. Earliest man and environments in the Lake Rudolph basin. University of Chicago Press. pp. 487 & 488.
- ²¹Beals, Ralph L., and Harry Hoijer, 1965. An introduction to anthropology. The Macmillan Co., New York. p. 51.
- ²²Leakey, *op. cit.*
- ²³Gish, *op. cit.*, p. 106.
- ²⁴Coppens *et al.*, *loc. cit.*, p. 489.
- ²⁵Simons, Elwyn, 1968. Assessment of a fossil hominid (book review). *Science* 160(3828):672-675.
- ²⁶Harris, *op. cit.*, p. 54.
- ²⁷Leakey, Richard E., 1976. Hominids in Africa. *American Scientist* 64(2):174-178. See especially p. 177.
- ²⁸Leakey, *op. cit.*, p. 828.
- ²⁹1975. Hominid bones: old and firm at 3.75 million. *Science News* 108(8 November):292.
- ³⁰1976. *Newsweek*, 22 March. *Op. cit.*

Editor's note. In connection with Reference 6, it should be said that, in a subsequent publication, Lubenow, having seen that the very evolutionists were questioning the status of skull 1470, did not depend on it in his argument. See Lubenow, Marvin L., 1977, Reversals in the fossil record: the latest problem in stratigraphy and evolutionary phylogeny. *Creation Research Society Quarterly* 13(4):185-190 and 230.

I understand also that Creationists are often at a disadvantage in discussing such fossils, having to depend on second-hand evidence. For it is likely difficult for them to be able to examine the fossil at first hand.

SKULL 1470 — A NEW LOOK

JOHN W. Cuozzo*

Received 30 July 1977

The skull 1470, which Leakey found a few years ago in Kenya, has puzzled both evolutionists and Creationists. For it is much more human in many ways than anything which evolutionists had expected to find from as long ago as they believed it to be. On the other hand, there were some ape-like features. Reasons are presented here for believing that the ape-like features may be due to environmental happenings to the skull after its owner's death. Thus the owner may well have looked very much like a present-day man.

After his discovery of skull 1470 near Kenya's Lake Rudolf, Richard Leakey¹ asserted in 1973, "Either we toss out this skull or we toss out our theories of early man." Speaking of the 2.8 million-year-old fossil which has been tentatively identified with the genus *homo*, he said that this "leaves in ruins the notion that all early fossils can be arranged in an orderly sequence of evolutionary change."

From the cranial capacity of 800 cc. and the three hundred implements that were also found near the site, it has been concluded that someone of a high order of intelligence and dexterity inhabited this area approximately 2.6-2.8 million years ago.

From the reconstructed skull (Fig. 1) it is obvious that the conspicuous absence of the beetle brow was unlike the contemporary *australopithecus* or later *homo erectus* crania.

Holloway in 1976^{2,3} studied an endocast of the 1470 skull and found a well defined Broca's area which may indicate a capacity for speech. He thus added a significant new dimension to this discovery.

I would like to submit more evidence that would place this skull still closer to the line of human ancestry.

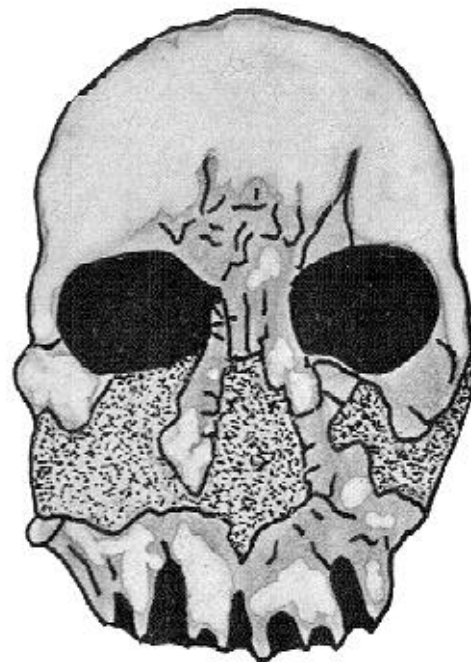
Features of the Skull

In his National Geographic article of 1973, Leakey states,¹ "Adding ears, more cartilage, eyebrows, and lips, plus salivary glands, superficial muscles, and fatty tissue, the artist approaches the finished portrait (Fig. 2)." He continues, "narrow nasal aperture of the original skull and a lack of bony support beneath the nostrils might indicate a rather gorilla-like nose. This characteristic is perhaps the most strikingly unhuman feature in a physiognomy that displays an intriguing mix of the primitive and the advanced."

The important point to notice here is that the narrow nasal aperture and lack of bony support for the nasal septum and cartilage provide the only criteria (Fig. 3) for the reconstruction of an ape-like nose in the fleshy likeness of "1470 man".

The nasal aperture of the gorilla (Fig. 4) is commonly a wide one while the narrow and more piriform shape is found in *homo sapiens* (Fig. 5). This fact doesn't seem to support the reasoning behind the ape-like nasal reconstruction.

In *homo sapiens* the anterior nasal spine (*ans*) is an anteriorly pointed projection of bone at the base and center of the nasal aperture. The malar surface of the maxilla extends medially to the edge of the border of the



SKULL 1470

Figure 1. A drawing of Skull 1470. Other pictures may be found in References 1 and 6.

piriform aperture; in the midline the bone projects forward and with the corresponding projection of the contralateral half forms this spine (Fig. 6). With this spine and the support it would provide for the nasal cartilage, septum and columella, a nose that would be very much within the human range of normal could be reconstructed for "1470 man".

The maxillary and mandibular procumbencies are unremarkable and likenesses can be found in orthodontists' offices around the world (Fig. 7, 8).

In his description of skull 1470 in *Nature*, 1973,⁷ Richard Leakey notes that "the glenoid fossa and external auditory meati are positioned well forward by comparison with *australopithecus*". In the occipital area, thought it be incomplete, there is no indication of a nuchal crest or other powerful muscle attachments.

The palate is shallow and broad and very wide. The labial border is described to be nearly straight like the large *australopithecus*.

A short broad palate is not outside the range of normal in the human as seen in Fig. 9. The palate in Fig. 9 is cleft and the skull belongs to Hrdlika's collection in

*John W. Cuozzo, D.D.S., M.S., receives mail at 200 Highland Avenue, Glen Ridge, New Jersey 07028.

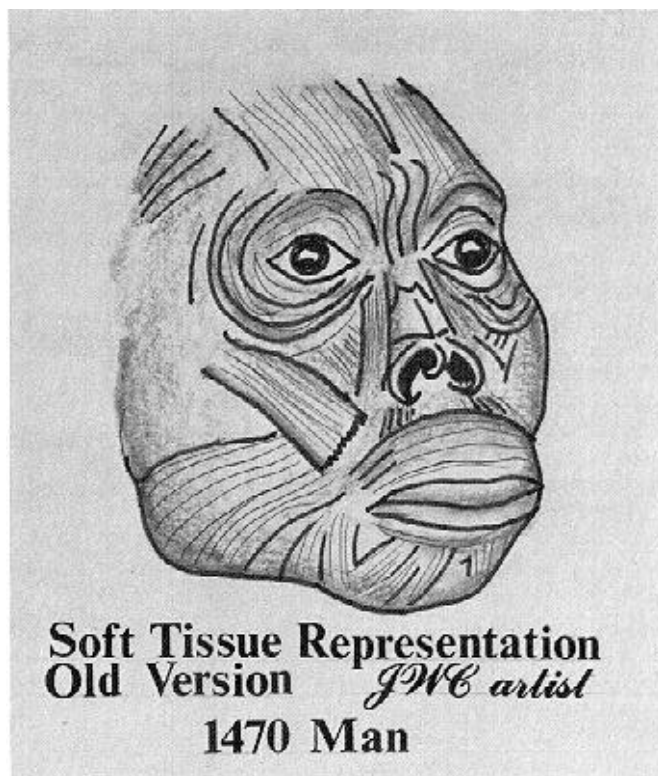


Figure 2.

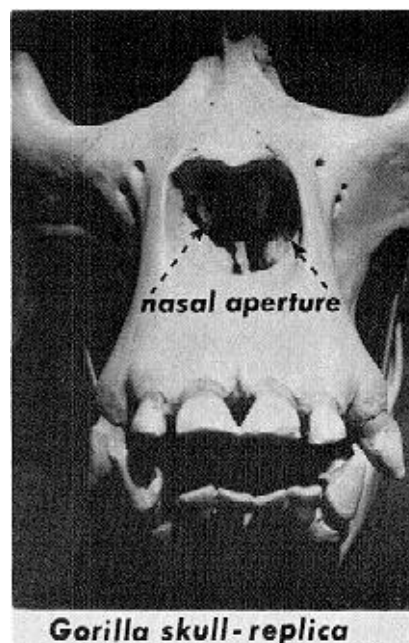


Figure 4.

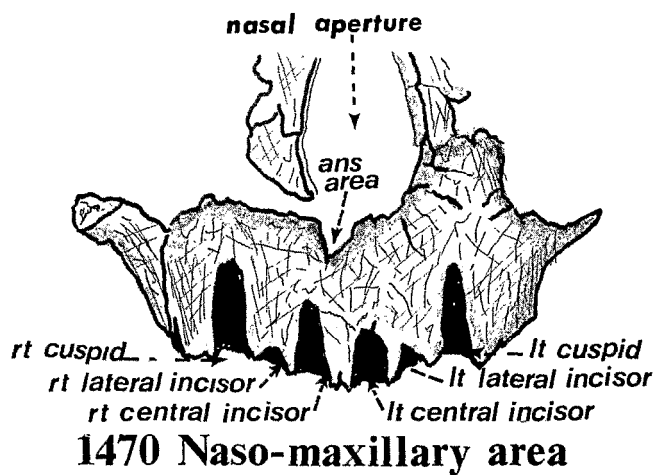


Figure 3.

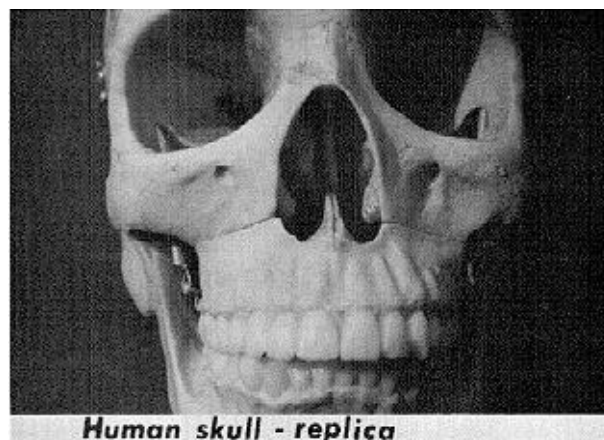


Figure 5.

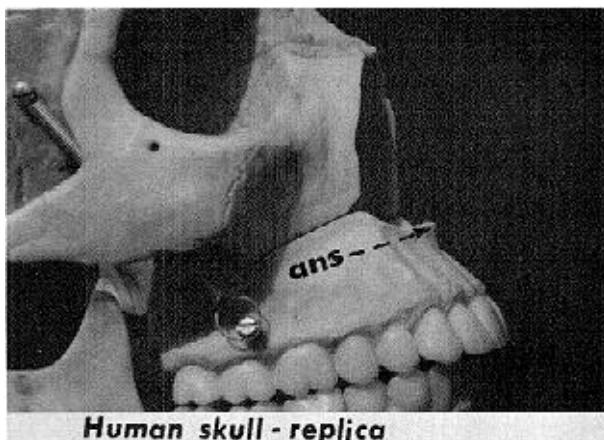


Figure 6.

the Smithsonian museum, Washington, D.C. It is approximately one-thousand to one-thousand five-hundred years old. It clearly belongs in the *homo sapiens* category, and was found in 1910 in Peru.

In the 1470 specimen Leaky further states in Nature that "the molar and premolar crowns are not preserved but the remaining roots and alveoli suggest some mesiodistal compression." He also mentions that the large alveoli (sockets) of the anterior teeth suggest the presence of large canines and incisors.

Fig 10 shows a modern day Caucasian boy of eleven years with very large teeth and in need of orthodontic

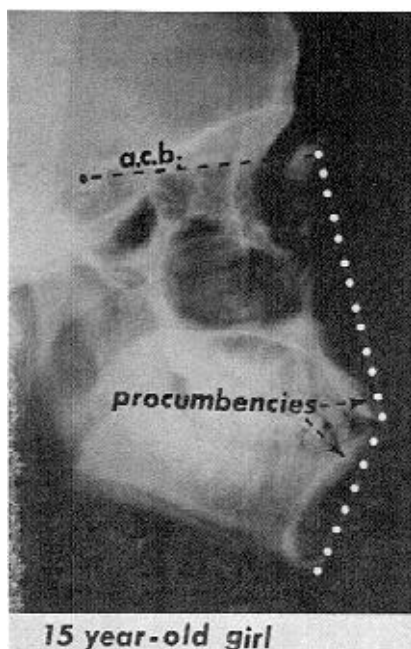


Figure 7.

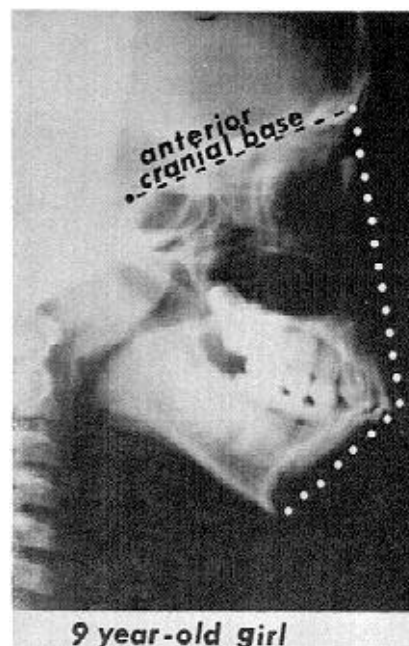


Figure 8.

care. Certainly large anterior teeth are not outside modern man's range of normal.

Therefore it must be concluded that if it can be shown that the ape-like nasal reconstruction was unjustified, it can then be inferred that 1470 man or "woman" was well within the range of human facial variations commonly seen today.

Evidence of Post-Mortem Damage

A closer external examination of the maxillary frontal view (Fig. 3) discloses six empty tooth sockets. Proceeding from left to right they are: the maxillary right cuspid or canine socket immediately inferior to the canine eminence. The maxillary cuspid when present forms the cornerstone of the arch and gives form to the face in that area. The next very small socket (it may be larger inside the alveolar process) belongs to the right lateral incisor. The next two sockets on either side of the midline are for the central incisors, left and right respectively. Another small socket for the lateral incisor on the left side is followed by the longer maxillary left cuspid or canine socket. Here the canine buttress that Sicher⁴ first described is very evident.

The interesting fact about these tooth sockets is that they still remain open and have not filled in with bone as would result from the normal healing process. In a study of the time sequence of tissue regeneration in human extraction wounds Amler⁵ establishes that alveolar socket healing in humans is two-thirds complete after forty days. Shortly thereafter the entire socket fills in with bone and the socket disappears.

Based upon this study and the common knowledge among those in the dental profession that in approximately 6-8 weeks the average socket will fill in with bone, we must conclude that "1470 man" either lost these teeth less than six weeks before his death or that they were lost in the post-mortem period.

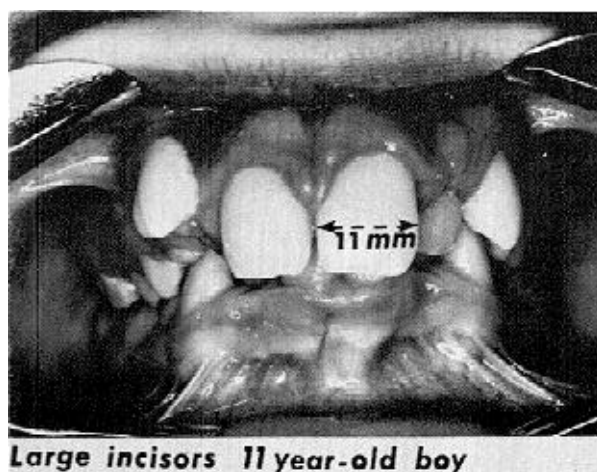
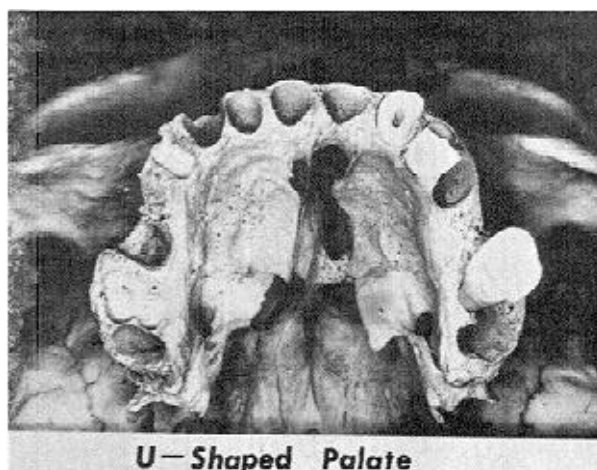


Figure 10.

Amler⁵ states that in the osteogenic sequence even at twenty-five days some calcification of osteoid can be seen.

The restrictions that these facts place upon the chances of the teeth being lost in vivo are very severe. The probability that they were lost in the years of the post mortem period when the skull was subjected to numerous environmental influences is very high.

Can one then not reasonably assume that if the teeth were lost in this period due to traumatic conditions, the anterior nasal spine might have been subjected to the same fate? Does the presence of the V-shaped notch in that area (Fig. 3) testify to the absence of some structure that was once a part of the bone?

Utilizing the evidence which has just been presented, a normal human nose can be reconstructed with confidence.

This, of course, produces an entire face within the normal range of human variation.

With this new look for "1470 man" (Fig. 11) and the three million year old fossils found by Johanson⁶ in Ethiopia, we are suddenly left with our oldest ancestors looking very much like us.

Acknowledgement: Figure 9 is used here by permission of the division of Physical Anthropology of the Smithsonian Institute.

References

- ¹Leakey, Richard E., 1973. Skull 1470—a new clue to earliest man? *National Geographic Magazine* 143(6):819-829.
- ²Holloway, Ralph, 1976. New study: brain casts in old skull. *New York Times* 39, 74. (21 April).
- ³Holloway, Ralph, Paleoneurological evidence for language origin. *Annals of the New York Academy of Science* 280.

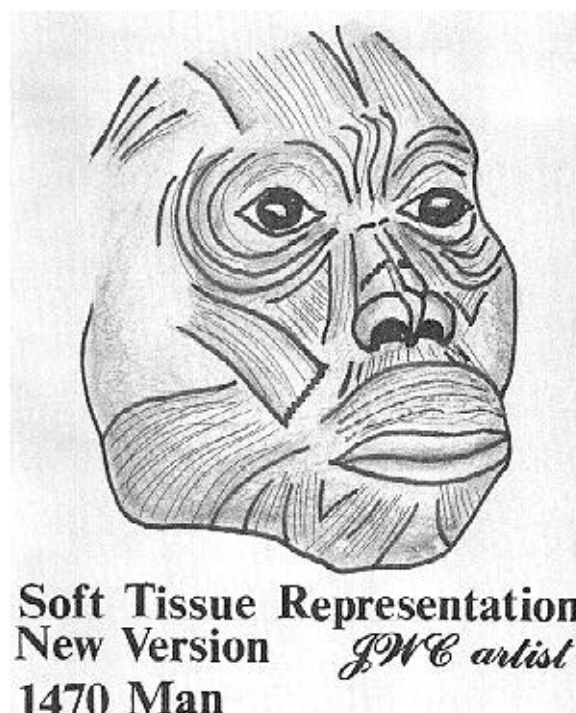


Figure 11.

⁴Sicher, Harry, 1960. Oral anatomy, C.V. Mosby Co., St. Louis, Missouri. p. 87.

⁵Amler, Melvin H., 1969. The time sequence of tissue regeneration in human extraction wounds. *O. Med., O. Surg., O. Path.*, 27, 309-318.

⁶Johanson, Donald C., 1975. Ethiopia yields "first family" of early man. *National Geographic Magazine* 150(6):791-811.

⁷Leakey, Richard E. 1973. Evidence for an advanced Plio-Pleistocene hominid from East Rudolph, Kenya. *Nature* 242(5398):447-450.

PANORAMA OF SCIENCE

The Atmosphere Has Always Contained Oxygen

Evolutionists, who want to ascribe the origin of life to random chemical processes long ago, commonly suppose that, at the time about which they are imagining, the atmosphere contained no oxygen, but rather was reducing. For the presence of oxygen would spoil their alleged processes.

But there is a growing body of evidence to show that the atmosphere has always contained oxygen, evidently being about the same as it is now.

One study, for instance, has dealt with the presence of various elements in sedimentary rocks, considered very old by the uniformitarian view.¹ The conclusion was that: "The sedimentary distribution of carbon, sulfur, uranium, and ferric and ferrous iron depend greatly upon ambient pressure and should reflect any major change in the proportion of oxygen in the atmosphere or hydrosphere. The similar distributions of these elements in sedimentary rocks of all ages are here interpreted to indicate the existence of a Precambrian atmosphere containing much oxygen . . . we find no evidence . . . that an oxygen-free atmosphere has existed at any

time during the span of geological history recorded in well preserved sedimentary rocks."

Another study has considered not only evidence of the kind just mentioned, but also the fact that, even if the Earth had begun without oxygen in the atmosphere, processes such as the decomposition of water vapour in the atmosphere by ultraviolet light, and of oxides which presumably have always existed would have provided oxygen in the atmosphere in a time short by uniformitarian standards.² Thus: "... no other conclusion than that oxygen has always been an important constituent of the atmosphere seems possible."

Dr. R.H. Brown, of the Geoscience Research Institute, Berrien Springs, Michigan, called these items to my attention.

May I add a philosophical point? The problem which the evolutionists set themselves was to find the cause of life, i.e. of living things, in non-living. But it has been pointed out that the only cause which means anything is that which sees the origin of something in a living, sentient, being.³ Thus the evolutionists, in their approach, have the cart about as squarely before the horse as it has

ever been. To them may be put the question put long ago: "Why seek ye the living among the dead?"⁴

Life on Other Planets—Other Solar Systems?

Is there life on planets in other solar systems throughout space? This pointed question has been widely debated by scientists and Bible students alike and as yet no final set of answers has emerged. Yet certain creation scientists like Professor Harold Armstrong have been openly critical of the belief that life exists elsewhere in the universe and now a NASA scientist likewise has expressed deep pessimism.⁵

Michael H. Hart, an expert in planetary atmospheres at the Goddard Space Flight Center, Greenbelt, Maryland, has turned his attention to studying the earth's atmosphere over a period of 4.5 billion years by means of a specially designed computer program.

While CRSQ readers will doubtless question the 4.5 billion year expanse of this analysis, they will be interested to learn of Hart's conclusion that if the earth had been only 1% farther from the sun than we are now, the ocean would have frozen two billion years ago! A news editor, Terence Dickinson, reporting on Hart's research wrote, "Allowing for a margin of error, it still seems clear from this study that the development of life on earth only occurred because the planet was limited to a fairly critical zone from the sun the permitted the appropriate conditions."⁶

Such statements are reminiscent of Henderson in his monumental book, "The Fitness of The Environment" where he concluded that the physical features on earth were "just right" for life. Similar ideas were also expressed by A. Cressy Morrison of the New York

Academy of Sciences in his stimulating book, "Man Does Not Stand Alone."

Regarding Hart's computer studies, Dickinson concluded that "The shrinking of that zone means that we must assume that the life zone around other stars is small and hence life on planets of other stars may be rarer than previously believed."⁶ Accumulating research results point unerringly to Design in every aspect of the universe. The odds against life arising by chance are so great that every scientist should give thought to the Special Creation view, in which Design has a natural and logical position.

Of course, Creationists need not believe that the atmosphere developed in the way assumed, any more than they believe in the billions of years. But the study does show that even on uniformitarian principles, it is most unlikely that something as well designed could come about by chance, either here or elsewhere in the universe.

—Item above contributed by George F. Howe

References

- ¹Dimroth, Erich, and Michael M. Kimberly, 1976. Precambrian atmospheric oxygen: evidence in the sedimentary distribution of carbon, sulfur, uranium, and iron. *Canadian Journal of Earth Sciences* 13(9):1161-1185.
- ²Walton, John C., 1976. The chemical composition of the Earth's original atmosphere. *Origins* 3(2):66-84.
- ³Lande, Alfred, 1960. From dualism to unity in quantum physics. The University Press, Cambridge. p. 2.
- ⁴St. Luke 24:5.
- ⁵Dickinson, Terence, 1977. Earth was born under critical conditions; just missed a lethal sheet of ice cover. *Astronomy News-Edmund Scientific Co.* 15(7):2. (July).
- ⁶Dickinson, *loc. cit.*, p. 4.

BOOK REVIEWS

Editor's note. The following book is not, perhaps, of the sort which would ordinarily be reviewed in the Quarterly. However, Creationists certainly have an interest in the controversies with which it is concerned. Also, there seem to be some erroneous statements which should be corrected.

Reviewed by John N. Moore*

Science Textbook Controversies and the Politics of Equal Time by Dorothy Nelkin. 1977. The MIT Press, Cambridge, Mass. 92142, 174 pp., \$12.50.

Author Nelkin, Associate Professor in the Cornell University Program of Science, Technology, and Society and the Department of City and Regional Planning, explains in the Preface that she began her study basic to this book because she was curious about creationists who challenged "norms of the scientific establishment". Her interest in the subject broadened into a study of "more abstract and vague concerns about science and technology"—particularly she examines the bearing of growing criticisms of science on public policy.

After a brief Introduction, Professor Nelkin provides a two-chapter discussion of the context of textbook criticisms from early antievolutionists in the 1920's to critics of recent science curriculum reform in high school biology and social studies for upper elementary pupils.

Before getting to specific textbook disputes (Chapter 6, "Creation vs. Evolution: The California Controversy" and Chapter 7, "The Proper Study of Mankind . . . : The MACOS Dispute") she takes two full chapters to identify the real focal point of her attention throughout the book: The Science Textbook Watchers.

Thus in Chapter 4 ("Textbook Watchers and Space Age Fundamentalism") the reader is introduced to "textbook watchers"—a term she employs to refer primarily to fundamental, conservative church members who have expressed their concern about the way public schools in the United States are used to convey perceptions of values to their children (future citizens). She admitted on page 33 that the social studies curriculum reform (code word MACOS) contained denial of the existence of absolute values, "thus explicitly teaching just those controversial ideas that fun-

*John N. Moore, M.S., Ed.D., is Professor of Natural Science, Michigan State University, East Lansing, Michigan 48824.

damentalists have long suspected were implicit in the teaching of evolution".

In her somewhat strained effort to be fair and candid Author Nelkin does not seem to appreciate that in this country parental and general citizen attention to the public schools is quite proper and normal. And she fails to realize that the interests of more than a few fundamental sects are involved as far as expression of concerns for seeming demise of traditional values in the public schools. She does not seem to comprehend that the broad range of human beings who value creation beliefs about ultimate origins also includes hundreds of thousands of orthodox Jews and adherents of the Islamic faith. However she candidly admits to three "difficult questions" near the close of her book (page 138):

"How can one determine if textbook material is antireligious or in some way biased?"

"What kind of constraints or standards can be imposed to balance academic judgements with local and individual religious or personal concerns?"

"How, in fact, do the personal beliefs and political values of free choice and fairness affect the communication and evaluation of science?"

Since this book will be used very likely by evolutionists (and others interested in the sociology of science) concerned about the evolution/creation dispute, I regret that a total of 30 *factual errors* appear on 18 different pages from page ix to page 172. There are five errors on page 67 alone and three errors each on pages 66 and 69, which are in the very middle chapter of this book, Chapter 5, "The Scientific Creationists."

Space is not available for the 23 corrections required in Chapter 5 especially, which include that the American Scientific Affiliation was not formed mostly by Lutherans; the Creation Research Society was formed in Michigan, not California; no split in that organization has occurred; and corrections of date, page references of publications, quotation of Henry M. Morris out of context, and spelling of names. Dr. Morris tried to correct an identical error in Nelkin's *Scientific American* article of April 1976 but his letter of correction was not published. Some of these points are mentioned in the list which follows this review.

I regret her further carelessness as she uses the terms "theory" and "hypothesis" interchangeably—in spite of the tabular citation on page 63 that creationist scientists have properly itemized points of the *Creation Model* and the *Evolution Model*. If students and their parents "fail to understand the complex and subtle relationship between fact and theory" (page 147), is this condition the consequence of inadequate comprehension of scientific methodology by evolutionists, who dominate science instruction?

In light of these previous points I might be excused for adding a personal point of clarification. Nelkin refers (page 85) to the "dismay" of John A. Moore (professor of biology at the University of California, Riverside) because of similarity of his name to my name. Possibly the following will help: John A. is "affirmative" toward evolution, whereas John N. is "negative" toward evolution. What further dismay John A. Moore must have felt

when he was cited as co-editor of the Creation Research Society sponsored high school textbook (*BIOLOGY: A Search for Order in Complexity*, which I co-edited with Dr. Harold S. Slusher) in footnote 8 (page 188) of his own article, "Creationism in California", *Daedalus* (Summer 1974):173-190.

Again, in the sense of clarification, Nelkin makes reference to an article by John A. Moore as containing "a masterful exercise in Biblical exegesis" (page 86), which she references as "On Giving Equal Time to the Teaching of Evolution and Creation", *Perspectives in Biology and Medicine* 18 (Spring 1975):405-417. On page 414 of that article Professor Moore wrote: "Thus, all life subsequent to the flood was descended from the animals and plants that Noah had taken into the ark." (Emphasis added) A question about "masterful exegesis" could be raised about which plants Noah took on the ark, beyond possible plant food.

The author waits until the last section of "resistance ideology" to express fully (page 128ff) the following three themes she maintains pervade these disputes about science, and gives very little attention to the "equal time" concept (which is not even included in the Index): (a) disillusionment with science, (b) resentment of authority, and (c) defense of pluralist and egalitarian values.

Evidently she has not studied the careful critique of behavioral psychology in *On Being Human* by M. Kinget which is apropos to why parents are disillusioned with MACOS; does not know that Christianity was the wellspring of modern science as many, many parents do know; and does not realize that Transcendental Meditation (TM, a medium for Hindu values) is already in a favored position in public school curricula across the nation. Also readers should be warned of propaganda-style words, including "aggressive", "activists", "obscure", "antiliberal", and "anti-intellectual", which are encountered in this book.

CORRECTIONS for *Science Textbook Controversies and the Politics of Equal Time*

- p. ix Omission of abbreviation "ISIS" for "Individualized Science Instruction Systems."
- p. 4 "Biblical theories" (sic) is a misleading term and could not be scientifically validated anyway.
- p. 61 Author is incorrect to write that "creationists try to present . . ." as she properly identified they do present their case (per page 93 re NABT panel in 1972 annual convention in San Francisco).
- p. 62 Creationists do not necessarily believe any fixity of species which is implicit in her misleading statement at top of page. She is most incorrect to make possible the implication that creationists hold that "evolution" is a directed and purposeful process as far as CRS, ICR, and other strongly Biblical creationist groups.
- p. 63 Table 5 actually contains the author's wording in significant places, and she incorrectly attributes the adaptation from Henry Morris when specifically she has drawn upon a portion (page 135) of the article by Duane T. Gish, "Creation, Evolution, and the Historical Evidence", ABT, March 1972—though she shows what that journal editor used as a subhead ("Creation vs. Evolution") as the title.
- p. 65 Creationists do not impose their beliefs through any political efforts as far as the *organizations* are concerned which she mentions in close association in following pages.
Also the American Scientific Affiliation was not formed mostly by Lutherans, but rather was started by men of the Moody Bible Institute and other denominational affiliations.
- p. 66 The Creation Research Society was formed in Michigan and not in California. The quotation with footnote 17 citation is not

- from a CRS brochure (but very likely from a statement relevant to work of the Creation-Science Research Center per consultation with probable author. Further CRS did not move to Lansing where a branch had been formed. Also Nelkin might have shown that John Grebe was, at the time of formulation of CRS, Director of Research at Dow Chemical in Midland, Michigan, and in whose home final organizational steps for CRS were taken rather than "a retired chemist".
- p. 67 CRS leader at Michigan State University is Professor of Natural Science and not "professor of science education". CRS does not publish "various fundamentalist tracts". CRS does not "support a stable of speakers". CRS does not receive any funds from sale of magazines. CRS is not a sect and NO split over "a struggle over leadership" has ever occurred in that organization with excellent record of continuity of officer leadership and editorial direction of *CRS Quarterly*.
- p. 68 The president of Christian Heritage College and pastor of Scott Memorial Baptist Church has a first identification of "Tim" and not "Tom".
- p. 69 It is debatable whether it is proper to refer to Tim LaHaye as a "radio minister". His wife's sister and the wife of Henry Morris are not properly identified. And John Morris was never "full-time public relations director" of the Institute for Creation Research.
- p. 70 Bob Jones University is located in South Carolina and not Arkansas. (Note the shift under the heading: "Other Organizations", to *individuals* in the next to last paragraph on this page. Odd composition of discourse.) (Also Table 6, pp. 74, 75) does not contain *identity* of ICR Staff)
- p. 76 Certainly in a 1977 book it is an error to fail informing the reader of the Revised 1974 Edition of the Moore and Slusher BIOLOGY textbook. In footnote 9 reference instead of the

- pages for the Gish article as cited (same as for Moore article in next reference) the author should have shown "132-141".
- p. 77 Footnote 17 is incorrect as the source shown is incorrect and probably quotation given on page 66 comes from a Creation-Science Research Center "release".
- p. 81 Walter Lammerts does not spell his name with a final "z".
- p. 131 The author is fully incorrect to assert: "Modern science developed as a revolt against the authority of 'sacred tradition'". Many excellent scholarly works could be cited here that Christianity was the wellspring of modern science as evidenced by written materials from Kepler, Newton, Clerk-Maxwell, Linnaeus, Pasteur, and on and on. (See at least, *Science and Creation* by Stanley L. Jaki. 1974. Science History Publications, 156 Fifth Avenue, N.Y., N.Y. 10010. 360 pages. \$15.00)
- p. 139 For Table 11 the author shows general sources at the bottom of the page. However what kind of scholarship is involved when a check is made of the quotations given? Under "Science Textbook Critics" she correctly repeats a statement by Klotz cited earlier in the chapter (page 128). Yet in the next two categories she gives the reader a "composite" quotation enclosed with marks that give the impression to the reader of unified source: a. Under "Critiques of Expertise" she should have shown the first sentence in closed quote marks as it comes from Duane T. Gish (page 135) and the second sentence in closed quotes as it comes from Congressman Conlan (page 131). b. Further under "Demands for Increased Participation" she should have shown the first sentence in closed quotes as it comes from Henry M. Morris (page 34) and the second sentence in closed quotes as it comes from the Congressional Record (page 132).
- p. 142 The correct spelling of the last name for the author of the statement cited in footnote 35 is "Howe".
- p. 172 Walter Lammerts does not spell his name with a final "z".

NOTICE OF BOOKS

A Challenge to Biology, published by the Bible-Science Association, Box 1016, Caldwell, Idaho 83605, 1977. 96 pages. Price \$3.00.

This work, which is the Proceedings of the Fifth Annual Creation Convention, at the Philadelphia College of Bible, August 1977, is one of which Creationists should certainly be aware. It does not however, seem to need any very extensive review here. For lists of topics, and some of the papers, have already been published in

the *Bible-Science Newsletter*. Besides, the Conference was quite well attended; so many Creationists have heard these items directly.

However, it may be remarked that since the Conference was concerned especially with Biology, most of the items have to do with that study, and some with Medicine. Matters of Christian belief and practice have not been neglected.

In short, almost every reader should find in this collection something both interesting and helpful.

LETTERS TO THE EDITOR

Carbon 14 and Possible Remains of the Ark

It has been reported, e.g. in the well known book "In Search of Noah's Ark",¹ that lumber was found on Mount Ararat, which some thought might have come from the Ark. However, it appears that the age of that lumber, as estimated from carbon 14, was only 1,300 to 1,700 years. Other methods, on the other hand, gave ages from 4,000 to 6,000 years.

Some have suggested, in light of the results from the carbon 14, that the lumber must have been taken up the mountain about 1,300 to 1,700 years ago. From reports of those who have climbed Ararat, however, it is difficult enough to get oneself up the mountain;² it is hard to believe that anyone would have hauled timber up for no very apparent purpose.

I should suggest that the timber might appear younger, according to carbon 14, because of the effects of the water with which it has no doubt been soaked. It is well known that the presence of carbonates in hard water can cause great errors in the results from carbon 14. Often, these errors are in the direction of too great indicated ages.³ However, it is also known that, under certain circumstances, ground-water can contain much dissolved carbon dioxide.⁴ That carbon dioxide might contain a proportion of carbon 14; and the net result might be to make the amount of carbon 14 in the wood too great, thus making it seem too young. More experimenting would be desirable.

Of course, Creationists have for years argued that the use of carbon 14 can be subject to many errors; and

now that fact is generally conceded. It is true that often the result is to make things appear older, not younger.

Variation of the Earth's magnetic field may be very important here. Barnes, especially, has shown that the field is decreasing.⁵ It is known also that the field partly at least shields the Earth from cosmic rays, and that the cosmic rays cause the formation of carbon 14. So formerly, when the field was considerably stronger, there was less carbon 14. Organic remains from those times, then, contain little carbon 14; and that, in uniformitarian terms, in interpreted as a very great age of the samples.

The conclusion, then, seems to be that Creationists need to look at the results of tests with Carbon 14 very carefully; and that errors are not necessarily always in the direction of too great ages.

References

- ¹Balsiger, Dave, and Charles Sellier, In search of Noah's Ark. Available from the Bible-Science Association, Caldwell, Idaho.
- ²Morris, John D., 1973. Adventure on Ararat. Institute for Creation Research, San Diego, California.
- ³Shotton, F.W., 1972. An example of hard-water error in radiocarbon dating of vegetable matter. *Nature* 240(5382):460-461.
- ⁴Williams, Emmett L., and Richard J. Herdtklotz, 1977. Solution and deposition of calcium carbonate in a laboratory situation II. *Creation Research Society Quarterly* 13(4):192-199.
- ⁵Barnes, Thomas G., 1971. Decay of the Earth's magnetic moment and geochronological implications. *Creation Research Society Quarterly* 8(1):24-29.

Yours very truly,
Donald Slattery

4602 Bancroft
Lincoln, Nebraska 68506
Received 18 August, 1977,
revised from 13 June 1977.

CERTAINTIES, LESS THAN CERTAINTIES, AND EVOLUTION

LEWIS NEILSON*

Received 2 September 1977, revised from 11 July 1977

It is suggested that Creationists may work most efficiently by noting that there are some doctrines about which they are certain, others which admit some uncertainty. Those which are firmly based on Scripture, and are matters of faith, are certain; there is no need of research to establish them, although corroboration may be satisfying.

About other points, which may for instance be mentioned only incidentally in Scripture, one feels less than certain. About these, sincere believers can and do reach different conclusions. Experimental research may throw light onto these matters; and, of course, so may further Bible study.

At the opposite pole from certainly—or, rather, it is certainly false—is the dogma of evolution.

As God's creatures we can derive knowledge of the world from Scripture revelation, from our own or other's experience, from specially contrived experience which we call research, and in some measure from logical reasoning.

All Scripture is given by inspiration of God and what it reveals are certainties. Much of what is revealed is of sufficient definitiveness that the Christian with study and often with help from others can arrive at a correct certainty, even on various matters relating to the world and origins. We do not need research to tell us about these matters, although research may corroborate.

Regarding other portions of Scripture, due to their brevity, for instance, or often the imperceptiveness of the reader, a person may arrive at less than certainty as to their meaning and scope. In considering the world and origins, we must identify our certainties and less than certainties, so as to rest in the former and try to resolve the latter.

Areas of Certainty

Most Creationists, I suggest, would hold the following to be Scriptural certainties:

1. The only eternal and unchangeable God in His wisdom and almightiness and by His will and act

created all things, and continues to uphold and govern all things. In all areas and consistent with His nature God has been and is absolute sovereign and nothing is impossible with Him. God reveals to man only what He chooses to reveal. No man can expostulate with God and nothing can say Him nay.

2. The Genesis account of origins is to be taken as literal history. Adam (Eve formed from his rib and given to him) was appointed federal head of the human race and the race morally stood or fell in him. He descended from no creature and there were no men before him and there are no men but that are descended from him.

3. Adam transgressed and the human race fell into sin as literally described. The curse of vanity, misery, decay and death fell on Adam and on all men. Had Adam not sinned there would have been no death for the human race. Adam's transgression brought a curse upon the earth.

4. The total creation was not instant. There was an instantaneous beginning of creation and sequential creation and steps. There was growth and development and structuring from existing created material. For instance, matter created at the beginning was used on the sixth day in the making of the animals, and of man. There were created distinct *kinds* of flora and fauna, with no indication of branching among the kinds. Vegetation and fruit were given as food. Heavenly bodies

*Mr. Lewis Neilson is an attorney and business man. He lives at 111 Kuhn Drive, RD2, Boiling Springs, Pennsylvania 17007.

were appointed for lights, signs, seasons, days and years. God created during six sequential days (meaning considered later) and rested on and blessed the seventh day. God pronounced His works good.

5. The earth is by God subject to vanity, corruption, decay and groaning. The earth will perish, wear out like a garment, be rolled up and be changed. The change will occur at the return of Christ.¹

6. God judged and destroyed mankind with a massive global flood, all as revealed in Genesis. The flood was a unique catastrophe, the worst yet upon the earth, and is a type of the climactic universal judgment at Christ's return.

Less Than Certainties

On these points everyone must speak for himself. For my part, I am not able from Scripture to arrive at the certainty embodied in the previous propositions. On some matters I have strong or lesser conviction; on some I am unsure or questioning.

1. My strong conviction—almost certainty—is that creation occurred in six literal days. A natural reading of the Bible and concentrated application of best principles of interpretation lead to that conviction. The gap theory is an aberration. Davis A. Young argues that the seventh day extends until Christ returns and therefore the six days also can be indeterminate spans of time.² I consider this argument and resort to Hebrews 4 as not sufficiently convincing, and his conclusion to lack the broad foundation that undergirds the literal-day interpretation.

2. It is, as already mentioned, certain that the earth will perish, wear out like a garment, be rolled up and changed. The same is asserted of the heavens. To me the heavy presumption is that the whole universe will wear out and perish—in order then to be changed. I am not sure that in these declarations we have an intimation of the laws of thermodynamics. The emphasis is that the first creation was always appointed to give way to the new creation in Christ, and the words "wear out" refer to time passage, not decay.

3. Scripture does not seem to forbid a surmise that God originally at creation may have appointed death to life forms less than man. However, I feel that vanity, predation, ravages of nature and most aspects of decay on earth resulted from Adam's sin. It appears that eating of flesh came after the fall. If animal life was originally subject to death even apart from man's sin, the death may have been sudden without preceding vexation and decay. One can argue whether the vanity discussed in Romans 8 encompassed the whole universe. Possibly in discussions of vanity and decay we have some connection with thermodynamics.

4. I have a strong conviction from Scripture that, even if there are gaps in genealogies, man has not been on earth for more than six to ten thousand years. I do not believe that in the creation period or since there has been any branching or descent of one kind to another.

5. What degree of the supernatural is associated with the various post-creation unusual occurrences revealed in Scripture? The end of the sixth day is not necessarily to be construed as meaning the cessation of *all* creative acts; incidental creative acts in God's ongoing govern-

ment are conceivable. Must we always opt for that degree of the supernatural least required to produce the phenomena? When the sun stood still for Joshua, instead of arranging an atmospheric condition or bending light, God may have stopped earth rotation. Thorns and thistles and pest forms of life may have been created after the fall and special creations may have attended the plagues on Egypt. Study of the Bible with close attention to detail, remembering that God is the God of wonders with nothing too hard for him, and consideration of reported natural phenomena and archaeological discoveries along with difficulties of more natural models, may lead us to at least presumptions concerning the extent of the supernatural.

6. In the light of the Scripture account and foregoing discussion, I can conceive of a high degree of the supernatural in connection with the flood, possibly even a special creation of some of the water, and alteration of rates of process during the flood and in the aftermath. The flood, considering the impact it had according to Scripture, must have left traces in the earth. Because there are present evidences of other judgments (e.g., Babylon, Egypt, Sodom and Gomorrah, the land of Canaan), one would expect to find evidence of the Flood. And so one does, Creationists believe; but, of course, it has to be interpreted properly.

7. I have the impression of both instantaneousness and sequential developing process during the six creation days. Reference to God's forming the earth with His hands could imply a molding and forming by God which occupied some time. God's stretching out the heavens could imply an expansion process. Does Ezekiel's vision of the bones assuming life reflect man's original creation? I can conceive of development, even radioactive decay, fossilization of small life forms, volcanic action or meteoric impact on the moon or planets involved in the act of creation—but all or part at rates beyond our experience. From our time reference much perhaps would have appeared as a blur of extensive activity. The creation of trees, for instance, might have appeared, had anyone been there to see, like a motion picture speeded up, or like time-lapse photography.

Confrontation with Evolution

How stands it between Scripture, as I consider the areas of certainty and less than certainty advanced in this article, and the pervasive evolutionistic pronouncements? The answer is: antithesis.

In this confrontation we remind ourselves that we may never adequately discern the past from present or future observations of earth or the universe. Without Scripture, and beyond the bounds where it speaks with sufficient definitiveness, we may be left only or in major part to mercurial speculations. As creationists we know there are weaknesses in the evolutionists' evidences, that scientists share the common problem of bias or baser traits, and that man has an antipathy in mind and will against the sovereign Creator. We are thankful for evidences tending toward creationism and are interested to hear of observed processes that extrapolated backwards seem to indicate young age.

From the standpoint of debate, a crucial issue is time. Six billion years versus six days: that can shake a man

and assail the Bible. I do not believe in evolution and I hold to what I consider to be the more sure Scripture account of the creation period; but I must admit that in connection with the problem of time questions arise to which I do not know the answer.

The Time Problem

The scientist and historian must always have his Bible at hand. What God says about origins and earth and universe history is true. The general Scriptural impression is one of rapid creation not too long ago.

But scientists bring forth an array of processes, methods, observations and reasonings which they assert preponderantly evidence past vast ages. Some therefore sneer that the Bible was wrong all along; others claim that it was not wrong, but we had misinterpreted and thus days become ages or other than actual periods of history. And some further invoke God to buttress their claim. God would be guilty of deception in creation if our conclusions of vast age were not substantially correct, they say.

God would not be a deceiver unless His purpose were to deceive (which it is not); and He has no obligation so to order all in creation that scientists can proclaim age from what they consider their favorite "clocks." Adam and the earth on the sixth day would have had an appearance of some age beyond his or its actual age. It would be absurd to call God a deceiver in this; and this would especially be so seeing that He by special revelation has disclosed the rapidity of creation.

Now it might be another matter if God buried bones in the ground to look as if an animal that actually never existed had died and decayed. There is a difference between evidencing something that never existed or occurred and not accommodating every scientist who wants a particular time signature.

But the scientist responds: It is not just a matter of one or two "clocks" but a whole convergence and correlation of different "clocks", age estimates of strata, thermoluminescent indications of actual decay, astronomical observations, and logical conclusions. When there are such an abundance of confirmations, God, if he is true, must have credited them.

This response is not frivolous, but we point out that there are processes seemingly indicating youth that scientists apparently desire to ignore, that there are some untidinesses in the scientists' assumptions, that much remains to be discovered and considered—and again finally that we have a Bible revelation in which God certainly does not deceive.

One argument of the evolutionistic cosmologist which I personally have some difficulty is the simple one: Because we can see stellar objects that are, at the known speed of light, millions or billions of light years distant, the universe must therefore be very old. Of course if the astronomer is wrong on constancy of light speed or distance, then the argument is rent.

Some creationists have answered by asserting that on the fourth day God not only created the distant stellar objects but also created a continuous span of light to earth so that they then became visible.³

But there is some problem with this. We again face the argument about deceit. I personally can accept that God is not misleading just because with our present knowledge the universe may appear older than it is. The difficulty, however, is that the light span suggestion might mean we observe events that never occurred. Would God do *this*?

Astronomers observe events on what they believe to be very distant stellar objects. Light travelling at its known speed since the fourth day, would not yet have reached us. So the light which we see did not leave the star after its creation. Thus we may observe something which never occurred. Of course we could hypothesize that the light span might have contained the subsequent history of the object before it occurred. Would God do *this*? Possibly this is not misleading. But it certainly is contrary to current theories about light.

I have no solution and I leave this for others to think about. Christian astronomers and physicists may be able to help here. Meanwhile I continue to adhere to Scripture.

Conclusion

We waver not from Scripture regardless of prevailing winds. We must be cautious to identify our certainties and less than certainties, and guard against being too dogmatic about conclusions which we impute to Scripture but which lack sufficient Scripture revelation. As to origins, it is likely that the just will always, as in the past have to live by faith, at least in this present world.

References

- ¹Neilson, Lewis, 1975. *Waiting for His coming*. Mack Publishing, Cherry Hill, N.J.
- ²Young, Davis A., 1977. *Creation and the Flood*. Baker Book House, Grand Rapids, MI, p. 84.
- ³Whitcomb, John C. and Morris, Henry M., 1961. *The Genesis Flood*. Presbyterian & Reformed Publishing Co., Philadelphia, PA, p. 369.

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 about 500 voting members (with graduate degrees in science) and over 1600 non-voting members. The *Creation Research Society Quarterly* has been gradually enlarged and improved and is now 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 \$10.00 (Foreign, \$11.00 U. S.) 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 \$10.00 (Foreign, 11.00 U. S.) per year and includes subscription to the Annual Issue and Quarterlies. All others interested in receiving copies of these publications may do so at the rate of the subscription price for all issues for one year: \$13.00 (Foreign, \$14.00 U. S.).

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; Lane P. Lester, Ph.D., 110 Wisteria, Orlando, FL 32806; John R. Meyer, Ph.D., University of Louisville, KY 40208; Wilbert H. Rusch, Sr., M.S., LL.D., Membership Secretary, Academic Dean, Concordia College, Ann Arbor, MI 48105. *Genetics*: John W. Klotz, Ph.D., Academic Dean, Concordia Seminary, St. Louis, MO 63105; Walter E. Lammerts, Ph.D., Freedom, CA 95019; William J. Tinkle, Ph.D., Timbercrest Home, North Manchester, IN 46962. *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 and Consultant to Globe Universal Sciences, Inc., El Paso, TX 79902; Richard G. Korthals, M.S., Treasurer, Dean, Concordia Teachers College, River Forest, IL 60305; Henry M. Morris, Ph.D., Institute for Creation Research, 2716 Madison Avenue, San Diego, CA 92116; George Mulfinger, M.S., Bob Jones University, Greenville, SC 29614; Emmett L. Williams, Jr., Ph.D., Vice-President, Bob Jones University, Greenville, SC 29614. *Science Education*: John N. Moore, M.S., Ed.D., 136 Brody Hall, Michigan State University, East Lansing, MI 48824.

ANNOUNCING SPECIAL REPRINT

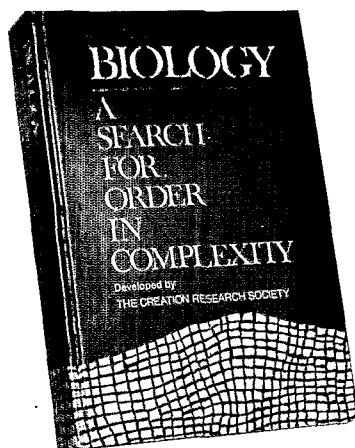
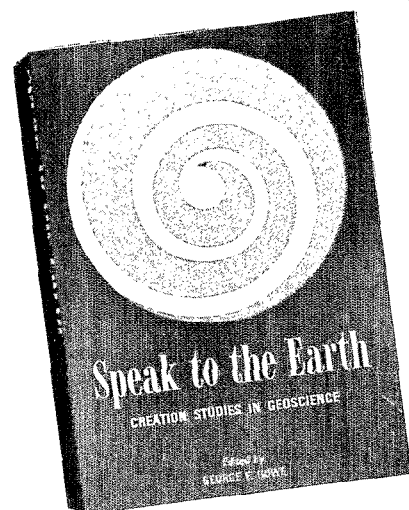
Some Christians believe that Charles Darwin, toward the close of his life, repudiated evolution and became enthusiastic for Christianity. That this did not occur has been reported by Dr. Wilbert H. Rusch, Sr., in a 1975 investigative paper on what Darwin wrote, and presumably believed, in the last two years of his life.

Now a special reprint of that paper "Darwin's Last Hours" is available for twenty-five cents (\$0.25)/postpaid per copy from the College Bookstore of Concordia College, 4090 Geddes Road, Ann Arbor, Michigan 48105. This will be a fine publication to give to those people who inquire about a possible Christian conversion of Darwin.

SPEAK TO THE EARTH (*Creation Studies in Geoscience*)

A classified anthology of articles from *Creation Research Society Quarterly* for second five-year period, 1969-1974.

Presbyterian and Reformed Publishing Company, Nutley, New Jersey. \$12.50.



BIOLOGY: A SEARCH FOR ORDER IN COMPLEXITY (Revised Edition, 1974)

A textbook for high school presenting creation AND evolution.

595 pp., 436 illustrations, \$9.95.

TEACHER'S GUIDE TO ACCOMPANY BIOLOGY: A SEARCH FOR ORDER IN COMPLEXITY

Paperback, \$1.95.

INVESTIGATIONS INTO BIOLOGY: STUDENT'S LABORATORY MANUAL

Paperback, \$1.95.

INVESTIGATIONS INTO BIOLOGY: TEACHER'S LABORATORY MANUAL

Paperback, \$1.95.

WHY NOT CREATION?

A classified anthology of articles from *Creation Research Society Quarterly* for the first five-year period, 1964-1969.

Baker Book House, Grand Rapids, Michigan and Presbyterian and Reformed Publishing Company, Nutley, New Jersey. \$7.50.

SCIENTIFIC STUDIES IN SPECIAL CREATION

Additional articles from *Creation Research Society Quarterly*, 1964-1969.

Baker Book House, Grand Rapids, Michigan and Presbyterian and Reformed Publishing Company, Nutley, New Jersey. \$6.95.

SPECIAL REPRINT AVAILABLE

The primary purpose of the Creation Research Society is to carry out, or to encourage, Creationist research in the natural sciences, and to publish the results of such research. In an article in the June, 1975 issue of the *Creation Research Society Quarterly*, Dr. Duane T. Gish published a summary report of Creationist research in the last decade.

His report was organized under these headings: Geology, General Geological Reports, Genetics, Natural Selection, General Biology, Taxonomy, Thermodynamics, and A Research Challenge.

So that members of the Creation Research Society and other interested persons might distribute this summary of a decade of Creationist research a special reprint of the Gish article has been made available. The 16-page reprint is priced at 75 cents per copy, with price reduced to 50 cents each for orders of 100 copies. Orders for the reprint may be placed through the College Bookstore of Concordia College, 4090 Geddes Road, Ann Arbor, MI 48105. Postage will be paid by the bookstore.